February 24, 2012

Ohio Environmental Protection Agency
Division of Surface Water

Biological and Habitat Studies: 17 River and Stream Projects in Ohio

Year 2011 Section 319(h) Clean Water Act Grants
Year 2010 GLRI/SWIF Grants

State of Ohio

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

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February 24, 2012
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prepared for
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INTRODUCTION

In 1987 the federal Clean Water Act amendments created a national program to control nonpoint source pollution (NPS), established under Section 319 of the Clean Water Act. Ohio EPA is the designated water quality agency responsible for administering the Ohio 319 program. Since 1990, Ohio EPA has annually applied for, received, and distributed Section 319 grant funds to correct NPS caused water quality impairment to Ohio's surface water resources. Section 319(h) implementation grant funding is targeted to Ohio waters where NPS pollution is a significant cause of aquatic life use impairments. The cornerstone of Ohio's 319 program is working with watershed groups and others who are implementing locally developed watershed management plans and restoring surface waters impaired by NPS pollution.

The Surface Water Improvement Fund (SWIF) was created in 2008 with the passage of Ohio House Bill 119 and authorizes the Ohio EPA to provide grant funding to applicants such as local governments, park districts, conservation organizations and others. During 2010, there was $1.5 million available that was required to be awarded for projects in Cuyahoga County only. Ohio EPA elected to use the state SWIF funding as local match for a Great Lakes Restoration Initiative (GLRI) grant from US EPA in which an additional $1 million may be available for total SWIF awards for Cuyahoga County of $2.5 million. Eligible projects include stream restoration and/or renaturalization, riparian restoration and protection, wetland restoration and protection, innovative storm water management demonstration projects, inland lakes restoration and management, and replacement and/or repair of on-site home sewage treatment systems.

A requirement of each project is a baseline and post-project water quality monitoring study, used to gauge the effectiveness of the NPS project improvement. For projects approved prior to FFY2008, the baseline and post-project monitoring was conducted by the subgrantees. Starting with FFY2008 approved Section 319 projects, all baseline and post-project environmental monitoring for projects involving stream, lake, or wetland channel or riparian restoration, renaturalization, or protection is being completed by the Ohio EPA, Ecological Assessment Section (EAS). Monitoring includes evaluating biological and physical habitat conditions. The following summaries in this report include baseline monitoring conducted at each FFY2011 project area during the summer and fall of 2011. Several projects were monitored during 2011, but are listed under FFY2009 and FFY2010 funding years. Five projects evaluated post-restoration water quality conditions. Three projects monitored included streams within the Cuyahoga County GRLI/SWIF program.

Detailed descriptions of each FFY2011 Section 319 project area are located on the Ohio EPA website http://www.epa.ohio.gov/portals/35/nps/319DOCS/FFY2010%20Project%20Summaries.pdf. SWIF project descriptions are located at:
http://www.epa.ohio.gov/portals/35/nps/swif_docs/2010_GLRI_SWIF_Project_Summaries_Compiled.pdf.
Biological monitoring results are included on the Ohio EPA, Division of Surface Water website at:
http://wwwapp.epa.ohio.gov/dsw/gis/bio/index.php.

Ohio Environmental Protection Agency
FFY2009 - 2011 Section 319(h) Subgrant Projects
Project Baseline Monitoring Areas

Project #	County	Project Title	Project Sponsor	Grant Amount
09(h)EPA-20	Lucas	Ottawa River Multifaceted Urban Stream Restoration	University of Toledo	$240,724
10(h)EPA-18	Cuyahoga	West Creek Confluence Restoration	West Creek Preservation Comm.	$394,000
11(h)EPA-31	Medina	Chippewa Creek - Chippewa Lake Upper Watershed Restoration Phase 2	Medina County Park District	$169,000
11(h)EPA-09	Hamilton	Beaver Creek Riparian Restoration Phase 2	City of Springdale	$362,920
11(h)EPA-21	Lucas	Hill Ditch Stream Restoration and Dam Removal	Toledo Botanical Garden	$500,000
11(h)EPA-18	Franklin	Lower Olentangy River 5th Ave. Dam Removal And Stream Restoration	Columbus Public Utilities Department	$500,000
11(h)EPA-14	Portage	Harmon Homestead Tributaries Restoration	City of Aurora	$478,075
11(h)EPA-11	Brown	Solomon Run Dam Removal and Stream Restoration	Ursulines of Brown County	$367,805

Ohio Environmental Protection Agency
FFY2010 SWIF Subgrant Projects
Project Baseline Monitoring Areas

Project #	County	Project Title	Project Sponsor	Grant Amount
10SWIF-CUY-047	Cuyahoga	Doan Brook – Restoring a Wetland With Native Species	Nature Center at Shaker Lakes	$78,664
10SWIF-GLRI-CUY-068	Cuyahoga	Green Stabilization of Riparian Area Along the Chagrin River in Hunting Valley	Village of Hunting Valley	$137,500
10SWIF-GLRI-CUY-123	Cuyahoga	Baldwin Creek Dam Removal and Habitat Enhancement	Cuyahoga County SWCD	$147,270
10SWIF-145	Delaware	Wild Cat Run Stream Restoration and Storm Water Management Demonstration, Phase 1	Liberty Township	$108,991

Ohio Environmental Protection Agency
Completed 319 Subgrant Projects
Project Post Restoration Monitoring Areas

Project #	County	Project Title	Project Sponsor
06(h)EPA-10	Lucas	Ottawa River Secor Dam Removal and Stream Restoration	TMACOG
06(h)EPA-28	Geauga	Shadybrook Run Stream Restoration	Holden Arboretum
08(h)EPA-11	Cuyahoga	East Branch Euclid Creek Dam Removal and Stream Restoration	Cuyahoga County SWCD
08(h)EPA-18 07(h)EPA-15	Franklin	Clover Groff Run Stream Restoration	Columbus Recreation and Parks Dept. The River Institute
Not Applicable	Lucas	Ottawa River Miakonda Dam Removal	National Fish and Wildlife Foundation – non 319 funding

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319 PROJECTS

PROJECT BASELINE MONITORING

OTTAWA RIVER

MULTIFACETED URBAN STREAM RESTORATION

Project Baseline Stream Monitoring

PROJECT NAME: OTTAWA RIVER MULTIFACETED URBAN STREAM RESTORATION

Project Baseline Stream Monitoring

PROJECT NUMBER: 09(h)EPA-20
STREAM SAMPLED: Ottawa River

SUMMARY

Funding for this project will be used to restore 900 linear feet of impaired waters of the Ottawa River and address habitat and hydromodification impacts on the main campus of the University of Toledo. Stream restoration will incorporate natural channel design including grade work in areas adjacent to stream structures to restore a more natural stream channel and functional floodplain. The project will also install habitat and flow control features such as riffles, bend-way weirs, low flow concentrators and hydrologic cover stones. Bank shape and stability will be addressed using bioengineering techniques at this highly visible site. Streambank restoration and stabilization work will include planting native grasses, shrubs and trees and will include live stacking, establishing vegetated terraces, and protecting and enhancing storm water discharge points and placement of vegetated filter strips.

Poor quality biological communities were documented in the Ottawa River at RM 11.6, upstream from the proposed stream restoration area, resulting in non-attainment of the Warmwater Habitat (WWH) biocriteria. This location was almost exclusively pool habitat (90%) with soft sand dominating the river bottom. The occurrence of a small riffle area, along with some run habitat contributed to the good habitat score at RM 11.6. Significantly reduced habitat diversity was documented at RMs 11.1 and 10.9, where river habitat was characterized by the dominance of soft sand substrates, the lack of high quality riffles, sparse instream cover, channel modification, and extensive substrate embeddedness. Biological community performance at the proposed restoration site (RM 11.1) and further downstream (RM 10.9) was in the fair range, and in partial attainment of the WWH use.

AQUATIC LIFE USE ATTAINMENT – OTTAWA RIVER 2011.

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. Stream sites are located in the Huron Erie Lake Plain (HELP) ecoregion. In the Ohio Water Quality Standards, the Ottawa River is designated Warmwater Habitat (WWH) within the study area. Poor and very poor results are underlined.

Sample Site River Mile	Attainment Status	IBI	MIwb	ICI	QHEI	Biological Assessment
RM 11.6	**NON**	27*	4.3*	22*	63.0 (good)	Very poor/Fair
RM 11.1	**PARTIAL**	33	7.1^{ns}	28*	48.5 (fair)	Fair
RM 10.9	**PARTIAL**	30^{ns}	6.2*	16*	43.0 (poor)	Fair

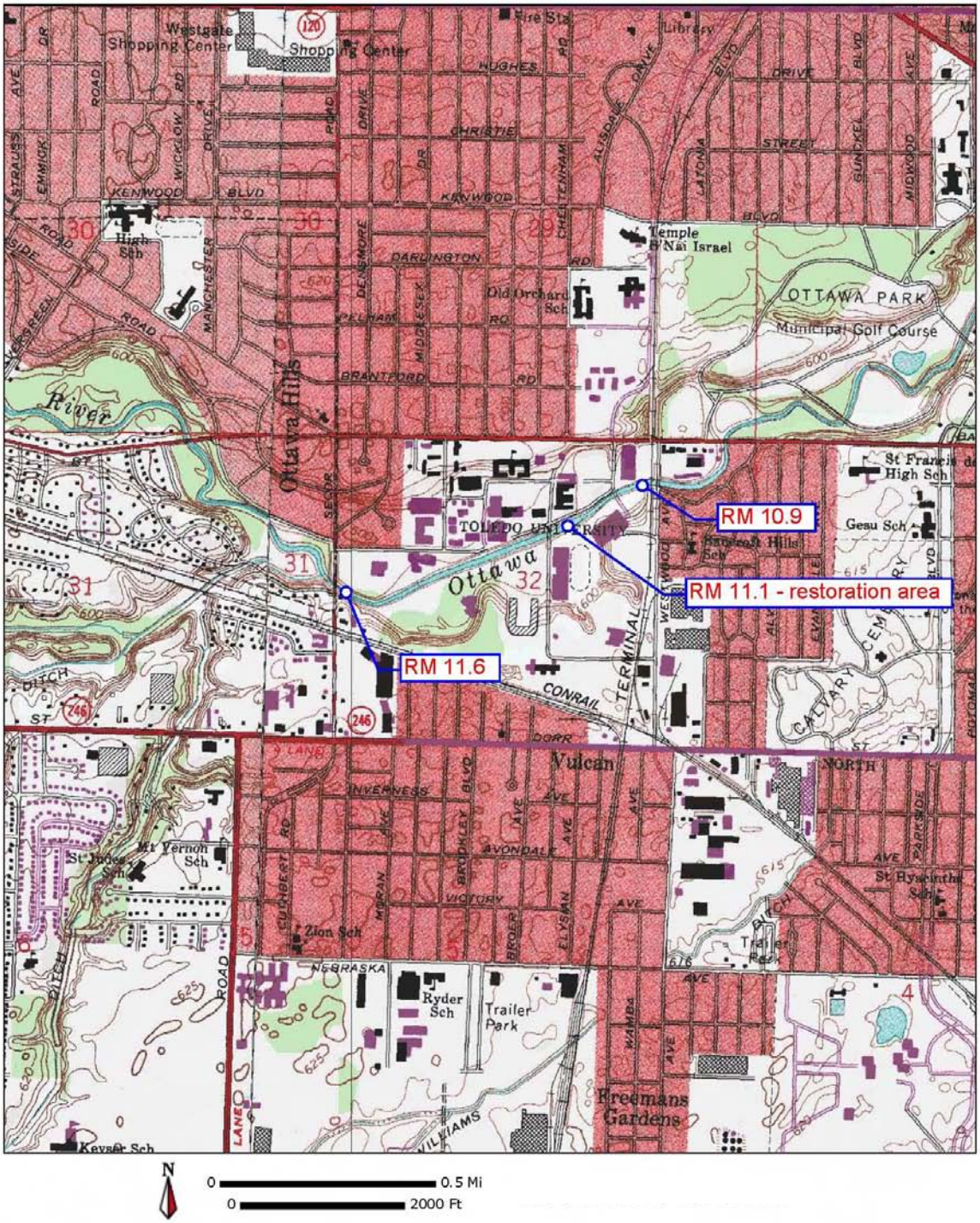
Ecoregion Biocriteria: Huron Erie Lake Plain (HELP)	
INDEX – SITE TYPE	WWH
IBI: Wading	32
MIwb: Wading	7.3
ICI	34

^{ns} Nonsignificant departure from biocriterion (≤4 IBI or ICI units, ≤0.5 MIwb units).
* Significant departure from biocriterion (>4 IBI or ICI units, >0.5 MIwb units).

Sampling locations in the Ottawa River, 2011.

River Mile	Latitude	Longitude	Landmark
11.6	41.65765	-83.62119	Secor Road
11.1	41.65970	-83.61250	Stadium Drive
10.9	41.66169	-83.60845	Douglass Avenue

Ottawa River (University of Toledo area) Sampling Locations, 2011



APPENDICES – OTTAWA RIVER (UNIVERSITY OF TOLEDO) PROJECT

Appendix Table 1. Qualitative Habitat Evaluation Index (QHEI) scores for the Ottawa River.

Appendix Table 2. Index of Biotic Integrity (IBI) scores and metrics for the Ottawa River.

Appendix Table 3. Ohio EPA fish results for the Ottawa River.

Appendix Table 4. Invertebrate Community Index (ICI) scores and metrics for the Ottawa River.

Appendix Table 5. Ohio EPA macroinvertebrate results for the Ottawa River.

Appendix Table 1. Qualitative Habitat Evaluation Index (QHEI) scores and physical attributes for fish sampling sites in the Ottawa River, University of Toledo project, 2011.

Key QHEI Components

			WWH Attributes											MWH Attributes: High Influence						MWH Attributes: Moderate Influence												
River Mile	**QHEI**	**Habitat Rating**	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**
Ottawa River Year: 2011																																
11.6	**63.0**	Good	■			■			■		■		4				◆		1		●			●	●				●	●		5
11.1	**48.5**	Fair				■					■		2	◆			◆		2		●			●	●			●	●	●		6
10.9	**43.0**	Poor									■		1	◆			◆		2		●			●	●			●	●		●	6

Appendix Table 2. Index of Biotic Integrity (IBI) scores and metrics for the Ottawa River - Univ. of Toledo area, 2011.

				Number of					Percent of Individuals									
River Mile	Type	Date	Drainage area (sq mi)	Total species	Sunfish species	Sucker species	Intolerant species	Darter species	Simple Lithophils	Tolerant fishes	Omni-vores	Top carnivores	Insect-ivores	DELT anomalies	Rel.No. minus tolerants /(0.3km)		IBI	Modified Iwb
Ottawa River - (04300)																		
Year: 2011																		
11.60	D	07/06/2011	154	13(3)	3(3)	0(1)	0(1)	2(1)	8(1)	28(3)	18(5)	0.8(1)	29(3)	1.0(5)	141(1)	*	28	3.8
11.60	D	08/16/2011	154	18(3)	3(3)	0(1)	0(1)	3(3)	1(1)	38(1)	28(3)	0.5(1)	20(1)	0.2(5)	372(3)		26	4.8
11.10	D	07/07/2011	154	18(3)	3(3)	3(3)	0(1)	2(1)	5(1)	23(3)	10(5)	0.3(1)	27(3)	0.0(5)	402(3)		32	6.8
11.10	D	08/16/2011	154	20(3)	3(3)	3(3)	0(1)	3(3)	8(1)	19(5)	12(5)	0.8(1)	24(1)	0.3(5)	461(3)		34	7.5
10.90	D	07/07/2011	155	14(3)	3(3)	3(3)	0(1)	3(3)	3(1)	18(5)	13(5)	0.4(1)	18(1)	1.1(3)	342(3)		32	5.7
10.90	D	08/16/2011	155	21(3)	4(5)	2(1)	0(1)	3(3)	4(1)	44(1)	39(1)	2.2(3)	25(1)	0.0(5)	302(3)		28	6.7

na - Qualitative data, Modified Iwb not applicable.

♦ - IBI is low end adjusted.

* - < 200 Total individuals in sample

** - < 50 Total individuals in sample

● - One or more species excluded from IBI calculation.

River Code: **04-300**	Stream: **Ottawa River**	Sample Date: **2011**
River Mile: **11.60**	Location: Secor Rd.	Date Range: 07/06/2011
Time Fished: 4543 sec	Drainage: 154.0 sq mi	Thru: 08/16/2011
Dist Fished: 0.40 km	Basin: Ottawa River No of Passes: 2	Sampler Type: D

Species Name / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Redfin Pickerel		P	M	P	1	0.75	0.19	0.03	0.10	40.00
Northern Pike	F	P	M		1	0.75	0.19	0.24	0.78	325.00
Common Carp	G	O	M	T	18	13.50	3.38	28.98	93.10	2,146.34
Golden Shiner	N	I	M	T	1	0.75	0.19	0.00	0.00	2.00
Creek Chub	N	G	N	T	3	2.25	0.56	0.02	0.05	6.67
Emerald Shiner	N	I	M		15	11.25	2.81	0.06	0.18	5.07
Spotfin Shiner	N	I	M		9	6.75	1.69	0.05	0.16	7.22
Fathead Minnow	N	O	C	T	5	3.75	0.94	0.01	0.02	1.60
Bluntnose Minnow	N	O	C	T	115	86.25	21.58	0.15	0.49	1.76
Central Stoneroller	N	H	N		21	15.75	3.94	0.05	0.15	3.03
Yellow Bullhead		I	C	T	2	1.50	0.38	0.05	0.17	35.50
Tadpole Madtom		I	C		1	0.75	0.19	0.02	0.07	30.00
Western Mosquitofish	E	I	N		2	1.50	0.38	0.00	0.01	1.50
Largemouth Bass	F	C	C		1	0.75	0.19	0.01	0.03	12.00
Green Sunfish	S	I	C	T	47	35.25	8.82	0.48	1.55	13.70
Bluegill Sunfish	S	I	C	P	16	12.00	3.00	0.10	0.31	7.94
Pumpkinseed Sunfish	S	I	C	P	3	2.25	0.56	0.06	0.21	28.33
Green Sf X Bluegill Sf					1	0.75	0.19	0.02	0.08	32.00
Yellow Perch			M		2	1.50	0.38	0.23	0.75	155.50
Logperch	D	I	S	M	13	9.75	2.44	0.08	0.25	7.85
Johnny Darter	D	I	C		5	3.75	0.94	0.01	0.03	2.20
Least Darter [S]	D	I	N		5	3.75	0.94	0.00	0.01	1.00
Round Goby	E				246	184.50	46.15	0.47	1.52	2.56
	Mile Total				533	399.75		31.12		
	Number of Species				22					
	Number of Hybrids				1					

River Code: **04-300**	Stream: **Ottawa River**	Sample Date: **2011**
River Mile: **11.10**	Location: Stadium Drive	Date Range: 07/07/2011
Time Fished: 3741 sec	Drainage: 154.0 sq mi	Thru: 08/16/2011
Dist Fished: 0.40 km	Basin: Ottawa River No of Passes: 2	Sampler Type: D

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		3	2.25	0.41	0.34	3.98	150.00
Northern Pike	F	P	M		2	1.50	0.28	0.09	1.06	60.00
Golden Redhorse	R	I	S	M	8	6.00	1.10	0.36	4.26	60.25
White Sucker	W	O	S	T	13	9.75	1.79	0.44	5.14	44.69
Spotted Sucker	R	I	S		8	6.00	1.10	1.22	14.38	203.38
Common Carp	G	O	M	T	2	1.50	0.28	1.90	22.36	1,265.00
Goldfish	G	O	M	T	1	0.75	0.14	0.32	3.80	430.00
Creek Chub	N	G	N	T	5	3.75	0.69	0.04	0.51	11.60
Emerald Shiner	N	I	M		11	8.25	1.51	0.03	0.39	4.00
Spotfin Shiner	N	I	M		7	5.25	0.96	0.02	0.28	4.57
Fathead Minnow	N	O	C	T	1	0.75	0.14	0.00	0.02	2.00
Bluntnose Minnow	N	O	C	T	63	47.25	8.67	0.13	1.50	2.70
Central Stoneroller	N	H	N		31	23.25	4.26	0.14	1.61	5.90
Yellow Bullhead		I	C	T	9	6.75	1.24	0.38	4.49	56.44
Brown Bullhead		I	C	T	15	11.25	2.06	0.52	6.07	45.80
Black Bullhead		I	C	P	2	1.50	0.28	0.19	2.21	125.00
Western Mosquitofish	E	I	N		1	0.75	0.14	0.00	0.02	2.00
Largemouth Bass	F	C	C		2	1.50	0.28	0.22	2.60	147.00
Green Sunfish	S	I	C	T	43	32.25	5.91	0.47	5.48	14.42
Bluegill Sunfish	S	I	C	P	44	33.00	6.05	0.26	3.03	7.80
Pumpkinseed Sunfish	S	I	C	P	16	12.00	2.20	0.15	1.77	12.50
Yellow Perch			M		1	0.75	0.14	0.07	0.86	97.00
Blackside Darter	D	I	S		2	1.50	0.28	0.01	0.06	3.50
Logperch	D	I	S	M	18	13.50	2.48	0.11	1.27	8.00
Johnny Darter	D	I	C		3	2.25	0.41	0.00	0.04	1.33
Round Goby	E				416	312.00	57.22	1.09	12.83	3.49
	Mile Total				727	545.25		8.49		
	Number of Species				26					
	Number of Hybrids				0					

River Code: **04-300**	Stream: **Ottawa River**	Sample Date: **2011**
River Mile: **10.90**	Location: Douglas Ave.	Date Range: 07/07/2011
Time Fished: 3599 sec	Drainage: 155.0 sq mi	Thru: 08/16/2011
Dist Fished: 0.40 km	Basin: Ottawa River No of Passes: 2	Sampler Type: D

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		2	1.50	0.32	0.12	0.37	79.50
Central Mudminnow		I	C	T	2	1.50	0.32	0.01	0.04	8.00
Northern Pike	F	P	M		4	3.00	0.63	1.29	4.01	431.25
Golden Redhorse	R	I	S	M	4	3.00	0.63	0.14	0.44	47.50
White Sucker	W	O	S	T	7	5.25	1.10	0.82	2.55	157.00
Spotted Sucker	R	I	S		1	0.75	0.16	0.34	1.04	448.00
Common Carp	G	O	M	T	16	12.00	2.52	26.37	81.68	2,197.22
Creek Chub	N	G	N	T	4	3.00	0.63	0.01	0.04	3.75
Emerald Shiner	N	I	M		38	28.50	5.99	0.10	0.31	3.53
Striped Shiner	N	I	S		1	0.75	0.16	0.01	0.03	12.00
Fathead Minnow	N	O	C	T	1	0.75	0.16	0.00	0.01	4.00
Bluntnose Minnow	N	O	C	T	149	111.75	23.50	0.28	0.87	2.51
Central Stoneroller	N	H	N		2	1.50	0.32	0.01	0.03	6.00
Brown Bullhead		I	C	T	13	9.75	2.05	0.59	1.84	60.77
Largemouth Bass	F	C	C		5	3.75	0.79	0.35	1.10	94.40
Green Sunfish	S	I	C	T	13	9.75	2.05	0.20	0.60	20.00
Bluegill Sunfish	S	I	C	P	44	33.00	6.94	0.25	0.78	7.61
Orangespotted Sunfish	S	I	C		1	0.75	0.16	0.01	0.04	16.00
Pumpkinseed Sunfish	S	I	C	P	9	6.75	1.42	0.13	0.41	19.44
Green Sf X Bluegill Sf					1	0.75	0.16	0.05	0.14	62.00
Yellow Perch			M		4	3.00	0.63	0.33	1.02	109.50
Blackside Darter	D	I	S		7	5.25	1.10	0.02	0.08	4.57
Logperch	D	I	S	M	4	3.00	0.63	0.03	0.08	8.50
Johnny Darter	D	I	C		2	1.50	0.32	0.00	0.01	1.50
Round Goby	E				300	225.00	47.32	0.81	2.50	3.59
	Mile Total				634	475.50		32.28		
	Number of Species				24					
	Number of Hybrids				1					

Appendix Table 4. Invertebrate Community Index (ICI) scores and metrics for the Ottawa River - Univ. of Toledo area, 2011. page 9

River Mile	Drainage Area (sq mi)	Number of Total Taxa	Number of Mayfly Taxa	Number of Caddisfly Taxa	Number of Dipteran Taxa	Percent: Mayflies	Percent: Caddis-flies	Percent: Tany-tarsini	Percent: Other Dipt/NI	Percent: Tolerant Organisms	Qual. EPT	Eco-region	ICI
Ottawa River (04-300)													
Year: 2011													
11.60	154.0	36(4)	2(0)	1(2)	22(6)	0.7(2)	14.9(4)	21.2(4)	61.3(0)	14.7(0)	4(0)	1	22
11.10	154.0	36(4)	3(2)	3(4)	22(6)	6.6(2)	28.3(6)	12.8(2)	51.7(2)	14.7(0)	4(0)	1	28
10.90	155.0	33(4)	1(0)	0(0)	22(6)	0.2(2)	0.0(0)	18.0(4)	79.4(0)	26.6(0)	0(0)	1	16

Appendix Table 5. Ohio EPA/DSW Ecological Assessment Section Macroinvertebrate Collection

Site: Ottawa River
Secor Rd.

Collection Date: 08/16/2011 River Code: 04-300 RM: 11.60

Taxa Code	Taxa	Quant/Qual	
01801	*Turbellaria*	2	
03360	*Plumatella sp*	1	
03451	*Urnatella gracilis*	4	
03600	*Oligochaeta*	122	+
04664	*Helobdella stagnalis*	7	+
04964	*Mooreobdella microstoma*	3	
05800	*Caecidotea sp*	15	+
08250	*Orconectes (Procericambarus) rusticus*		+
11130	*Baetis intercalaris*	8	+
13400	*Stenacron sp*	1	+
21200	*Calopteryx sp*		+
22300	*Argia sp*	14	+
43300	*Ranatra sp*		+
52200	*Cheumatopsyche sp*	182	+
52530	*Hydropsyche depravata group*		+
68901	*Macronychus glabratus*	5	
69400	*Stenelmis sp*	4	+
77120	*Ablabesmyia mallochi*	36	
77130	*Ablabesmyia rhamphe group*		+
77500	*Conchapelopia sp*	7	
77750	*Hayesomyia senata or Thienemannimyia norena*	36	+
78140	*Labrundinia pilosella*	7	
78450	*Nilotanypus fimbriatus*	36	
80370	*Corynoneura lobata*	52	+
81231	*Nanocladius (N.) crassicornus or N. (N.) "rectinervis"*	36	
82820	*Cryptochironomus sp*	7	+
83040	*Dicrotendipes neomodestus*	22	+
83050	*Dicrotendipes lucifer*	7	
83300	*Glyptotendipes (G.) sp*	14	+
83840	*Microtendipes pedellus group*	7	
84210	*Paratendipes albimanus or P. duplicatus*		+
84450	*Polypedilum (Uresipedilum) flavum*	108	+
84460	*Polypedilum (P.) fallax group*	51	
84470	*Polypedilum (P.) illinoense*	7	
84540	*Polypedilum (Tripodura) scalaenum group*	115	+
84700	*Stenochironomus sp*	14	+
85500	*Paratanytarsus sp*	7	+
85625	*Rheotanytarsus sp*	29	
85800	*Tanytarsus sp*	29	
85821	*Tanytarsus glabrescens group sp 7*	195	
87540	*Hemerodromia sp*	32	
93900	*Elimia sp*	3	+

Taxa Code	Taxa	Quant/Qual

No. Quantitative Taxa: 36 Total Taxa: 42
No. Qualitative Taxa: 24 ICI: **22**
Number of Organisms: 1225 Qual EPT: 4

Appendix Table 5. Ohio EPA/DSW Ecological Assessment Section Macroinvertebrate Collection

Site: Ottawa River
Stadium Drive

Collection Date: 08/16/2011 River Code: 04-300 RM: 11.10

Taxa Code	Taxa	Quant/Qual
01801	*Turbellaria*	+
03360	*Plumatella sp*	3
03600	*Oligochaeta*	433 +
04664	*Helobdella stagnalis*	1
05800	*Caecidotea sp*	+
06700	*Crangonyx sp*	+
08200	*Orconectes sp*	+
08601	*Hydrachnidia*	+
11120	*Baetis flavistriga*	80 +
11130	*Baetis intercalaris*	185 +
13400	*Stenacron sp*	5 +
22300	*Argia sp*	1
44501	*Corixidae*	+
52200	*Cheumatopsyche sp*	1067 +
52530	*Hydropsyche depravata group*	48
53800	*Hydroptila sp*	39
60800	*Haliplus sp*	+
64050	*Liodessus sp*	+
65501	*Hydrophilidae*	+
68901	*Macronychus glabratus*	20
69400	*Stenelmis sp*	2
77120	*Ablabesmyia mallochi*	25
77500	*Conchapelopia sp*	50
77750	*Hayesomyia senata or Thienemannimyia norena*	25
77800	*Helopelopia sp*	25
78450	*Nilotanypus fimbriatus*	25
78655	*Procladius (Holotanypus) sp*	+
80370	*Corynoneura lobata*	24
80430	*Cricotopus (C.) tremulus group*	75
81231	*Nanocladius (N.) crassicornus or N. (N.) "rectinervis"*	25
81825	*Rheocricotopus (Psilocricotopus) robacki*	75
82141	*Thienemanniella xena*	8
82730	*Chironomus (C.) decorus group*	+
82820	*Cryptochironomus sp*	+
82885	*Cryptotendipes pseudotener*	+
83040	*Dicrotendipes neomodestus*	199
83050	*Dicrotendipes lucifer*	25 +
83300	*Glyptotendipes (G.) sp*	25
84450	*Polypedilum (Uresipedilum) flavum*	673 +
84460	*Polypedilum (P.) fallax group*	50
84470	*Polypedilum (P.) illinoense*	100 +
84520	*Polypedilum (Tripodura) halterale group*	+
84540	*Polypedilum (Tripodura) scalaenum group*	224 +
85230	*Cladotanytarsus mancus group*	25
85500	*Paratanytarsus sp*	125
85625	*Rheotanytarsus sp*	100
85821	*Tanytarsus glabrescens group sp 7*	274 +
87540	*Hemerodromia sp*	1
89700	*Limnophora sp*	+
93900	*Elimia sp*	1
96900	*Ferrissia sp*	19

No. Quantitative Taxa: 36 Total Taxa: 51
No. Qualitative Taxa: 25 ICI: **28**
Number of Organisms: 4082 Qual EPT: 4

Appendix Table 5. Ohio EPA/DSW Ecological Assessment Section Macroinvertebrate Collection

Site: Ottawa River
Douglas Ave.

Collection Date: 08/16/2011 River Code: 04-300 RM: 10.90

Taxa Code	Taxa	Quant/Qual	
01320	*Hydra sp*	19	
01801	*Turbellaria*	5	
03360	*Plumatella sp*	2	+
03451	*Urnatella gracilis*	4	
03600	*Oligochaeta*	173	+
05800	*Caecidotea sp*		+
08250	*Orconectes (Procericambarus) rusticus*		+
08601	*Hydrachnidia*		+
13400	*Stenacron sp*	2	
22001	*Coenagrionidae*		+
22300	*Argia sp*	17	+
23909	*Boyeria vinosa*		+
68601	*Ancyronyx variegata*	4	
68901	*Macronychus glabratus*	4	+
74501	*Ceratopogonidae*	3	
77120	*Ablabesmyia mallochi*	18	
77800	*Helopelopia sp*	6	
78655	*Procladius (Holotanypus) sp*	24	+
80370	*Corynoneura lobata*	24	
81200	*Nanocladius sp*	6	
81231	*Nanocladius (N.) crassicornus or N. (N.) "rectinervis"*	6	
82730	*Chironomus (C.) decorus group*	12	+
82820	*Cryptochironomus sp*	6	+
83002	*Dicrotendipes modestus*	24	
83040	*Dicrotendipes neomodestus*	174	
83050	*Dicrotendipes lucifer*	30	
83051	*Dicrotendipes simpsoni*	36	
83300	*Glyptotendipes (G.) sp*	144	+
84100	*Paracladopelma sp*		+
84450	*Polypedilum (Uresipedilum) flavum*	6	
84460	*Polypedilum (P.) fallax group*	24	
84470	*Polypedilum (P.) illinoense*	18	+
84540	*Polypedilum (Tripodura) scalaenum group*	30	+
84800	*Tribelos jucundum*	12	
85500	*Paratanytarsus sp*	144	
85800	*Tanytarsus sp*	12	
85821	*Tanytarsus glabrescens group sp 7*	30	
96120	*Menetus (Micromenetus) dilatatus*	2	
96900	*Ferrissia sp*	11	

Taxa Code	Taxa	Quant/Qual

No. Quantitative Taxa: 33 Total Taxa: 39
No. Qualitative Taxa: 16 ICI: **16**
Number of Organisms: 1032 Qual EPT: 0

WEST CREEK
CONFLUENCE RESTORATION

Project Baseline Stream Monitoring – 2011 Update

PROJECT NAME: WEST CREEK CONFLUENCE RESTORATION
Project Baseline Stream Monitoring – 2011 Update

PROJECT NUMBER: 10(h) EPA-18
STREAM SAMPLED: West Creek

SUMMARY

This project involves the restoration of the 10-acre confluence area of West Creek with the Cuyahoga River. Restoration activities to be completed under this project will result in the restoration of 8 acres of riparian wetlands, 1,100 linear feet of West Creek, two acres of vernal pools as well as the establishment of a functional floodplain and sustainable riparian habitat. Stream restoration work will be completed using natural channel design methods including log cribs, live branch layering, log weirs, live staking etc. Riparian restoration will be completed by planting 7,000-10,000 native hardwood trees and shrubs.

During 2010 and 2011, biological sampling occurred in West Creek within the proposed project area (RM 0.1 – downstream State Route 7) and at an upstream background location (RM 1.8 – Lancaster Road). Both sampling sites tested in 2010 and 2011 in West Creek were in non-attainment of the Warmwater Habitat (WWH) biological criteria listed in the Ohio Water Quality Standards. The upstream sampling site was located within a recently restored section of West Creek, which incorporated natural channel design features and had a QHEI score of 65.5 – representing good quality habitat. A significant flood event during February 2011 in West Creek caused major changes in the restoration work (several rock cross vanes moved and severe bank erosion around cross vanes) at Lancaster Road. The sampling site within the proposed restoration area (RM 0.1) has been modified in the past, with the floodplain filled in and the stream banks and bottom largely comprised of broken concrete slabs. The biological impairment in the upper sampling site was caused by organic enrichment conditions from combined sewer overflows and potentially on-site treatment systems. The highly urbanized quality of the watershed contributed to flashy flow conditions which can impair biological communities. West Creek at the proposed project area was impaired by reduced habitat quality (concrete substrates, entrenched floodplain) and organic enrichment.

AQUATIC LIFE USE ATTAINMENT – WEST CREEK 2010 AND 2011.

The Index of Biotic Integrity (IBI) and Invertebrate Community Index (ICI) scores are based on the performance of the biological community. Narrative ranges are used with macroinvertebrate results when quantitative data are not available. The Qualitative Habitat Evaluation Index (QHEI) is a measure of the ability of the physical habitat to support a biological community. Stream sites are located in the Erie-Ontario Lake Plain (EOLP) ecoregion. In the Ohio Water Quality Standards, West Creek is designated Warmwater Habitat (WWH). Poor or very poor results are underlined.

Sample Site River Mile	Attainment Status	IBI	ICI	QHEI	Biological Assessment
1.8 - 2010	**NON**	32*	Fair*	65.5 (good)	Fair
1.8 - 2011	**NON**	26*	Fair*	65.0 (good)	Poor/Fair
0.1 - 2010	**NON**	34*	Fair*	56.8 (good)	Fair
0.1 – 2011	**NON**	32*	Fair*	59.5 (good)	Fair

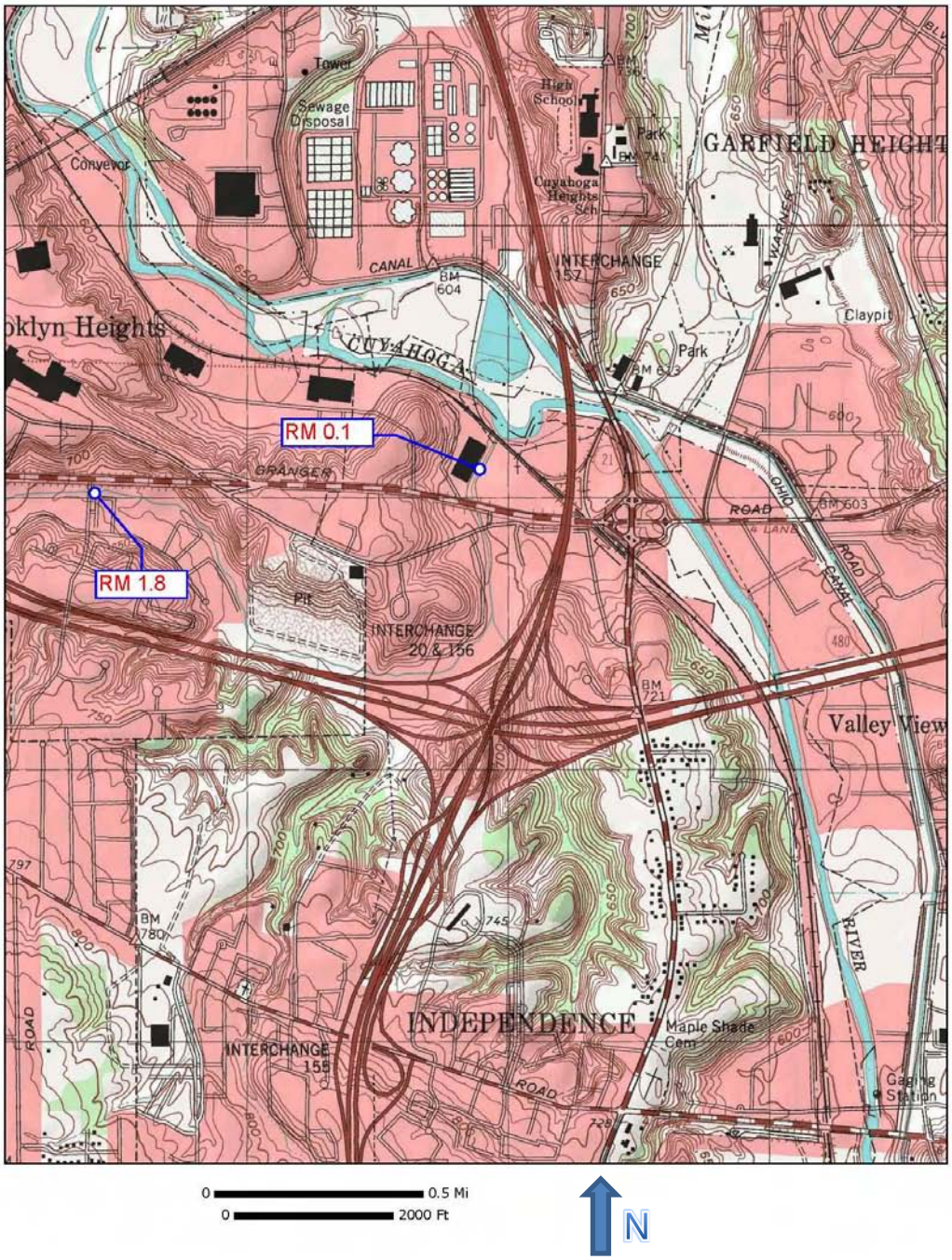
Ecoregion Biocriteria: Erie-Ontario Lake Plain (EOLP)	
INDEX – SITE TYPE	WWH
IBI: Headwater	40
ICI	34

* Significant departure from biocriterion (>4 IBI or ICI units, >0.5 MIwb units).

Sampling locations in the West Creek, 2010 and 2011.

River Mile	Latitude	Longitude	Landmark
1.8	41.41480	-81.66520	Lancaster Road
0.1	41.41580	-81.64750	State Route 7 (Granger Road)

West Creek Sampling Locations, 2010 and 2011



APPENDICES – WEST CREEK PROJECT, 2010 AND 2011

Appendix Table 1. Qualitative Habitat Evaluation Index (QHEI) scores for West Creek.

Appendix Table 2. Index of Biotic Integrity (IBI) scores and metrics for West Creek.

Appendix Table 3. Ohio EPA fish results for West Creek.

Appendix Table 4. Ohio EPA macroinvertebrate results for West Creek.

Appendix Table 1. Qualitative Habitat Evaluation Index (QHEI) scores and physical attributes for fish sampling sites in West Creek, 2010 and 2011.

			WWH Attributes											MWH Attributes																		
														High Influence						*Moderate Influence*												
River Mile	**QHEI**	**Habitat Rating**	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**
West Creek Year: 2010 and 2011																																
1.8 ('10)	**65.5**	Good	■	■		■	■	■	■	■	■	■	9			◆			1													0
1.8 ('11)	**65.0**	Good	■	■		■	■	■	■	■	■	■	9			◆			1													0
0.1 ('10)	**56.8**	Good	■	■		■	■	■	■	■	■	■	9				◆		1										●	●		2

Appendix Table 2. Index of Biotic Integrity (IBI) scores and metrics for West Creek, 2010 and 2011.

				Number of						Percent of Individuals						
River Mile	Type	Date	Drainage area (sq mi)	Total species	Minnow species	Headwater species	Sensitive species	Darter & Sculpin species	Simple Lithophils	Tolerant fishes	Omni-vores	Pioneering fishes	Insect-ivores	DELT anomalies	Rel.No. minus tolerants /(0.3km)	IBI
West Creek - (19-066)																
Year: 2011																
1.80	E	09/01/2011	9.2	4(1)	3(1)	1(1)	1(1)	0(1)	2(1)	72(1)	0(5)	16(5)	0(1)	0.0(5)	462(3)	26
0.10	E	09/01/2011	13.2	10(3)	4(3)	1(1)	3(3)	0(1)	3(1)	49(3)	1(5)	33(3)	5(1)	0.3(5)	400(3)	32
Year: 2010																
1.80	E	07/28/2010	9.2	5(1)	4(3)	1(1)	0(1)	0(1)	2(1)	37(3)	2(5)	8(5)	0(1)	0.0(5)	820(5)	32
0.10	E	07/28/2010	13.8	8(3)	5(3)	1(1)	2(1)	0(1)	2(1)	43(3)	0(5)	1(5)	25(3)	0.5(5)	218(3)	34

♦ - IBI is low end adjusted.

* - < 200 Total individuals in sample

** - < 50 Total individuals in sample

● - One or more species excluded from IBI calculation.

River Code: **19-066**	Stream: **West Creek**	Sample Date: **2010**
River Mile: **1.80**	Location: Lancaster Rd.	Date Range: 07/28/2010
Time Fished: 1740 sec	Drainage: 9.2 sq mi	
Dist Fished: 0.15 km	Basin: Cuyahoga River No of Passes: 1	Sampler Type: E

Species Name / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
White Sucker	W	O	S	T	14	28.00	2.15			
Western Blacknose Dace	N	G	S	T	176	352.00	27.04			
Creek Chub	N	G	N	T	50	100.00	7.68			
Fathead Minnow	N	O	C	T	1	2.00	0.15			
Central Stoneroller	N	H	N		410	820.00	62.98			
	Mile Total				651	1,302.00				
	Number of Species				5					
	Number of Hybrids				0					

River Code: **19-066**	Stream: **West Creek**	Sample Date: **2011**
River Mile: **1.80**	Location: Lancaster Rd.	Date Range: 09/01/2011
Time Fished: 1719 sec	Drainage: 9.2 sq mi	
Dist Fished: 0.15 km	Basin: Cuyahoga River No of Passes: 1	Sampler Type: E

Species Name / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Northern Hog Sucker	R	I	S	M	1	2.00	0.12			
Western Blacknose Dace	N	G	S	T	452	904.00	55.32			
Creek Chub	N	G	N	T	134	268.00	16.40			
Central Stoneroller	N	H	N		230	460.00	28.15			
	Mile Total				817	1,634.00				
	Number of Species				4					
	Number of Hybrids				0					

River Code: **19-066**	Stream: **West Creek**	Sample Date: **2010**
River Mile: **0.10**	Location: at mouth	Date Range: 07/28/2010
Time Fished: 1409 sec	Drainage: 13.2 sq mi	
Dist Fished: 0.15 km	Basin: Cuyahoga River No of Passes: 1	Sampler Type: E

Species Name / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Northern Hog Sucker	R	I	S	M	3	6.00	1.58			
Western Blacknose Dace	N	G	S	T	75	150.00	39.47			
Creek Chub	N	G	N	T	2	4.00	1.05			
Spotfin Shiner	N	I	M		1	2.00	0.53			
Sand Shiner	N	I	M	M	40	80.00	21.05			
Central Stoneroller	N	H	N		62	124.00	32.63			
Yellow Bullhead		I	C	T	1	2.00	0.53			
Brown Bullhead		I	C	T	3	6.00	1.58			
Round Goby	E				3	6.00	1.58			
	Mile Total				190	380.00				
	Number of Species				9					
	Number of Hybrids				0					

River Code: **19-066**	Stream: **West Creek**	Sample Date: **2011**
River Mile: **0.10**	Location: at mouth	Date Range: 09/01/2011
Time Fished: 1501 sec	Drainage: 13.2 sq mi	
Dist Fished: 0.15 km	Basin: Cuyahoga River No of Passes: 1	Sampler Type: E

Species Name / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Northern Hog Sucker	R	I	S	M	5	10.00	1.29			
White Sucker	W	O	S	T	4	8.00	1.03			
Goldfish	G	O	M	T	1	2.00	0.26			
Western Blacknose Dace	N	G	S	T	53	106.00	13.62			
Creek Chub	N	G	N	T	126	252.00	32.39			
Sand Shiner	N	I	M	M	5	10.00	1.29			
Central Stoneroller	N	H	N		184	368.00	47.30			
Yellow Bullhead		I	C	T	4	8.00	1.03			
Smallmouth Bass	F	C	C	M	1	2.00	0.26			
Green Sunfish	S	I	C	T	1	2.00	0.26			
Bluegill Sunfish	S	I	C	P	4	8.00	1.03			
Round Goby	E				1	2.00	0.26			
	Mile Total				389	778.00				
	Number of Species				12					
	Number of Hybrids				0					

Appendix Table 4. Ohio EPA/DSW Ecological Assessment Section
Macroinvertebrate Collection

Site: West Creek
Lancaster Rd.

Collection Date: 09/01/2011 River Code: 19-066 RM: 1.80

Taxa Code	Taxa	Quant/Qual
01801	*Turbellaria*	+
03360	*Plumatella sp*	+
03600	*Oligochaeta*	+
05800	*Caecidotea sp*	+
11120	*Baetis flavistriga*	+
11130	*Baetis intercalaris*	+
51600	*Polycentropus sp*	+
52200	*Cheumatopsyche sp*	+
52430	*Ceratopsyche morosa group*	+
52450	*Ceratopsyche sparna*	+
52530	*Hydropsyche depravata group*	+
74100	*Simulium sp*	+
77120	*Ablabesmyia mallochi*	+
77500	*Conchapelopia sp*	+
80310	*Cardiocladius obscurus*	+
80410	*Cricotopus (C.) sp*	+
80430	*Cricotopus (C.) tremulus group*	+
80440	*Cricotopus (C.) trifascia*	+
82820	*Cryptochironomus sp*	+
84450	*Polypedilum (Uresipedilum) flavum*	+
84470	*Polypedilum (P.) illinoense*	+
85625	*Rheotanytarsus sp*	+

Taxa Code	Taxa	Quant/Qual

No. Quantitative Taxa: 0 Total Taxa: 22
No. Qualitative Taxa: 22 ICI:
Number of Organisms: 0 Qual EPT: 7

Appendix Table 4. Ohio EPA/DSW Ecological Assessment Section Macroinvertebrate Collection

Site: West Creek at mouth

Collection Date: 09/01/2011 River Code: 19-066 RM: 0.10

Taxa Code	Taxa	Quant/Qual	Taxa Code	Taxa	Quant/Qual
01801	*Turbellaria*	+			
01900	*Nemertea*	+			
03600	*Oligochaeta*	+			
05800	*Caecidotea sp*	+			
11120	*Baetis flavistriga*	+			
11130	*Baetis intercalaris*	+			
21200	*Calopteryx sp*	+			
21300	*Hetaerina sp*	+			
52200	*Cheumatopsyche sp*	+			
52430	*Ceratopsyche morosa group*	+			
52450	*Ceratopsyche sparna*	+			
52530	*Hydropsyche depravata group*	+			
71900	*Tipula sp*	+			
74100	*Simulium sp*	+			
77120	*Ablabesmyia mallochi*	+			
77500	*Conchapelopia sp*	+			
78350	*Meropelopia sp*	+			
80410	*Cricotopus (C.) sp*	+			
80430	*Cricotopus (C.) tremulus group*	+			
83040	*Dicrotendipes neomodestus*	+			
84300	*Phaenopsectra obediens group*	+			
84450	*Polypedilum (Uresipedilum) flavum*	+			
84470	*Polypedilum (P.) illinoense*	+			
85800	*Tanytarsus sp*	+			
89700	*Limnophora sp*	+			

No. Quantitative Taxa: 0 Total Taxa: 25

No. Qualitative Taxa: 25 ICI:

Number of Organisms: 0 Qual EPT: 6

Appendix Table 4. Ohio EPA/DSW Ecological Assessment Section Macroinvertebrate Collection

Site: West Creek
Lancaster Rd.

Collection Date: 07/28/2010 River Code: 19-066 RM: 1.80

Taxa Code	Taxa	Quant/Qual	Taxa Code	Taxa	Quant/Qual
01801	*Turbellaria*	+			
03600	*Oligochaeta*	+			
04960	*Mooreobdella sp*	+			
05800	*Caecidotea sp*	+			
06700	*Crangonyx sp*	+			
11120	*Baetis flavistriga*	+			
11130	*Baetis intercalaris*	+			
21200	*Calopteryx sp*	+			
22300	*Argia sp*	+			
52200	*Cheumatopsyche sp*	+			
52530	*Hydropsyche depravata group*	+			
53501	*Hydroptilidae*	+			
68708	*Dubiraphia vittata group*	+			
69400	*Stenelmis sp*	+			
77120	*Ablabesmyia mallochi*	+			
77500	*Conchapelopia sp*	+			
78655	*Procladius (Holotanypus) sp*	+			
83003	*Dicrotendipes fumidus*	+			
84300	*Phaenopsectra obediens group*	+			
84470	*Polypedilum (P.) illinoense*	+			
95100	*Physella sp*	+			

No. Quantitative Taxa: 0 Total Taxa: 21
No. Qualitative Taxa: 21 ICI:
Number of Organisms: 0 Qual EPT: 5

Appendix Table 4. Ohio EPA/DSW Ecological Assessment Section Macroinvertebrate Collection

Collection Date: 07/28/2010 River Code: 19-066 RM: 0.10 Site: West Creek at mouth

Taxa Code	Taxa	Quant/Qual	Taxa Code	Taxa	Quant/Qual
01801	*Turbellaria*	+			
06700	*Crangonyx sp*	+			
11120	*Baetis flavistriga*	+			
11130	*Baetis intercalaris*	+			
21300	*Hetaerina sp*	+			
22001	*Coenagrionidae*	+			
23909	*Boyeria vinosa*	+			
51600	*Polycentropus sp*	+			
52200	*Cheumatopsyche sp*	+			
52430	*Ceratopsyche morosa group*	+			
52530	*Hydropsyche depravata group*	+			
69400	*Stenelmis sp*	+			
71900	*Tipula sp*	+			
77800	*Helopelopia sp*	+			
78401	*Natarsia species A (sensu Roback, 1978)*	+			
84450	*Polypedilum (Uresipedilum) flavum*	+			

No. Quantitative Taxa: 0 Total Taxa: 16

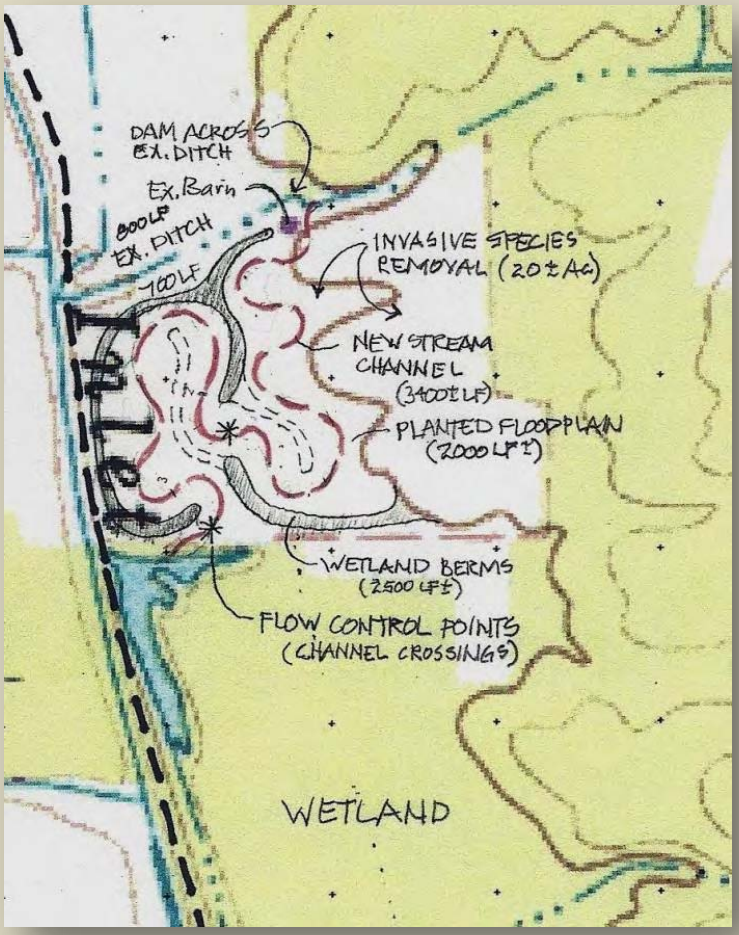
No. Qualitative Taxa: 16 ICI:

Number of Organisms: 0 Qual EPT: 6

CHIPPEWA CREEK

CHIPPEWA LAKE UPPER WATERSHED RESTORATION PHASE 2

Project Baseline Stream Monitoring



PROJECT NAME: CHIPPEWA CREEK – CHIPPEWA LAKE UPPER WATERSHED RESTORATION PHASE 2

Project Baseline Stream Monitoring

PROJECT NUMBER: 11(h)EPA-31
STREAM SAMPLED: Chippewa Creek

SUMMARY

Funding for this project will be used to eliminate 800 feet of channelized farm ditch and restore it with 3,400 lineal feet of 2-stage channel and functional floodplain. The restored tributary will be directed into existing riparian wetlands adjacent to Chippewa Creek. Additionally, wetlands restoration will be completed on 20 acres, involving removal of invasive species and replanting with native species of trees, shrubs, and grasses.

Biological sampling sites in Chippewa Creek were located upstream (RM 22.5) and downstream (RM 21.8) from the agricultural ditch and wetland restoration area. Both sampling locations were in non-attainment of the WWH biological criteria listed in the Ohio Water Quality Standards. Fish results reflected marginally good biological integrity, and macroinvertebrate results from both locations reflected poor water quality. The macroinvertebrate community was typical of a wetland type stream environment (low gradient and soft bottom substrates). Causes of biological impairment in Chippewa Creek included habitat alterations and sedimentation/siltation due to channelization in a low gradient wetland area.

AQUATIC LIFE USE ATTAINMENT – CHIPPEWA CREEK 2011.

The Index of Biotic Integrity (IBI) and Invertebrate Community Index (ICI) scores are based on the performance of the biological community. Narrative ranges are used with macroinvertebrate results when quantitative data are not available. The Qualitative Habitat Evaluation Index (QHEI) is a measure of the ability of the physical habitat to support a biological community. Stream sites are located in the Erie Ontario Lake Plain (EOLP) ecoregion. In the Ohio Water Quality Standards, Chippewa Creek upstream from Chippewa Lake is designated Warmwater Habitat (WWH). Underlined results reflect poor or very poor conditions.

Sample Site River Mile	Attainment Status	IBI	ICI	QHEI	Biological Assessment
RM 22.5	**NON**	36^{ns}	Poor*	44.0 (fair)	Marginally Good/ Poor
RM 21.8	**NON**	36^{ns}	Poor*	46.0 (fair)	Marginally Good/ Poor

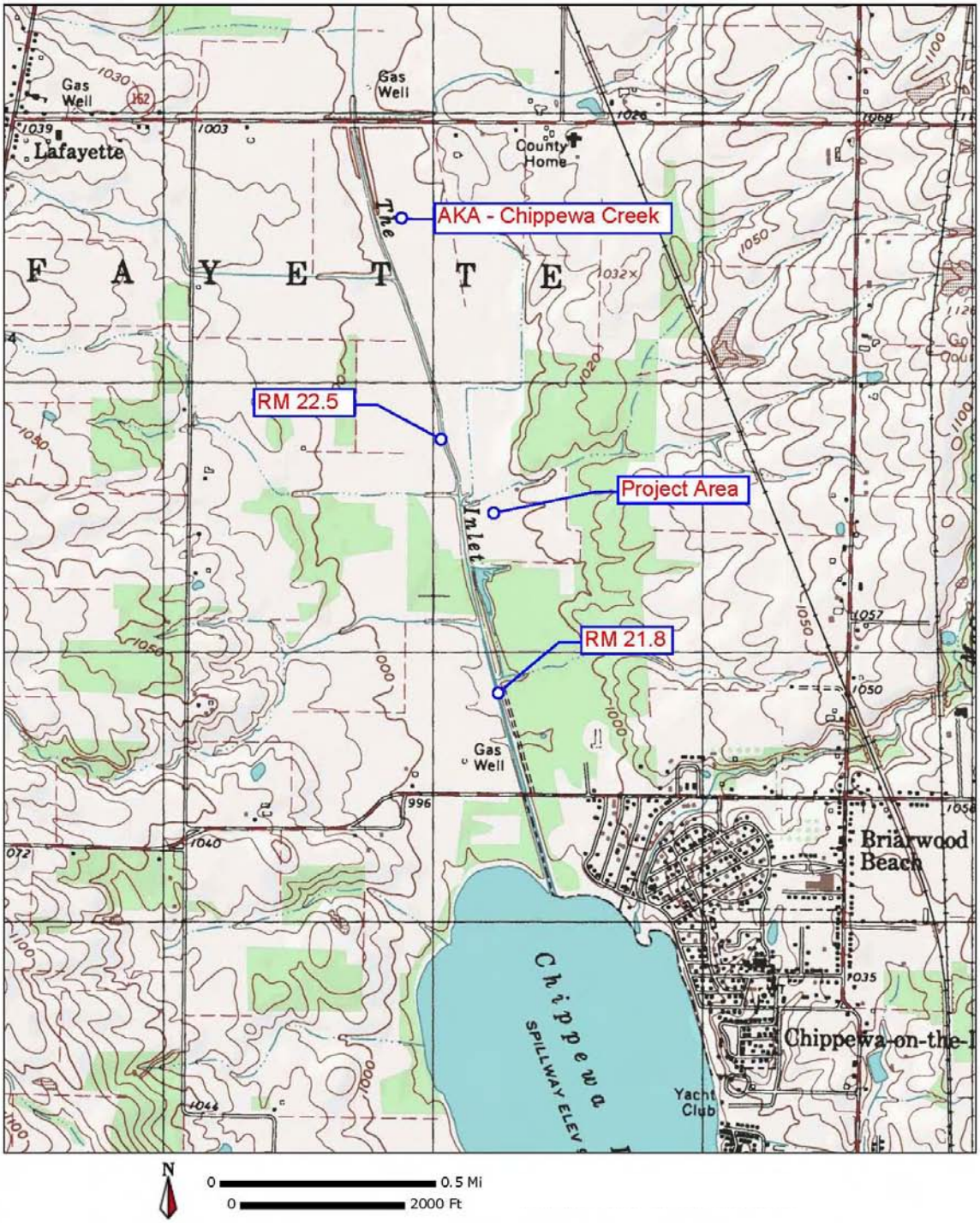
Ecoregion Biocriteria: Erie Ontario Lake Plain (EOLP)	
INDEX – SITE TYPE	WWH
IBI: Headwater	40
ICI	34

* Significant departure from biocriterion (>4 IBI or ICI units).
^{ns} Nonsignificant departure from biocriterion (≤4 IBI or ICI units).

Sampling locations in Chippewa Creek, 2011.

River Mile	Latitude	Longitude	Landmark
22.5	41.08725	-81.91555	Upstream agricultural ditch; downstream State Route 162
21.8	41.07877	-81.91315	Just upstream Chippewa Lake @ Chippewa Road

Chippewa Creek Sampling Locations, 2011



APPENDICES – CHIPPEWA CREEK PROJECT

Appendix Table 1. Qualitative Habitat Evaluation Index (QHEI) scores for Chippewa Creek.

Appendix Table 2. Index of Biotic Integrity (IBI) scores and metrics for Chippewa Creek.

Appendix Table 3. Ohio EPA fish results for Chippewa Creek.

Appendix Table 4. Ohio EPA macroinvertebrate results for Chippewa Creek.

Appendix Table 1. Qualitative Habitat Evaluation Index (QHEI) scores and physical attributes for fish sampling sites in Chippewa Creek, 2011.

			WWH Attributes											MWH 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**																														
Chippewa Creek Year: 2011																																
22.5	**44.0**	Fair						■			■		2	◆	◆	◆	◆		4		●			●				●	●		●	5
21.8	**46.0**	Fair						■			■		2	◆	◆	◆	◆		4		●			●				●	●		●	5

Appendix Table 2. Index of Biotic Integrity (IBI) scores and metrics for Chippewa Creek, 2011.

				Number of						Percent of Individuals						
River Mile	Type	Date	Drainage area (sq mi)	Total species	Minnow species	Headwater species	Sensitive species	Darter & Sculpin species	Simple Lithophils	Tolerant fishes	Omni-vores	Pioneering fishes	Insect-ivores	DELT anomalies	Rel.No. minus tolerants /(0.3km)	IBI
Chippewa Creek - (17-550)																
Year: 2011																
22.50	E	07/19/2011	11.4	13(3)	2(1)	0(1)	1(1)	0(1)	1(1)	11(5)	6(5)	0(5)	78(5)	0.5(5)	348(3)	36
21.80	E	07/19/2011	14.6	10(3)	1(1)	0(1)	0(1)	0(1)	0(1)	12(5)	2(5)	1(5)	83(5)	0.0(5)	338(3)	36

♦ - IBI is low end adjusted.

* - < 200 Total individuals in sample

** - < 50 Total individuals in sample

● - One or more species excluded from IBI calculation.

River Code: **17-550**	Stream: **Chippewa Creek**	Sample Date: **2011**
River Mile: **22.50**	Location: upst. restoration area	Date Range: 07/19/2011
Time Fished: 1898 sec	Drainage: 11.4 sq mi	
Dist Fished: 0.15 km	Basin: Muskingum River No of Passes: 1	Sampler Type: E

Species Name / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Bowfin		P	C		2	4.00	1.02			
Gizzard Shad		O	M		1	2.00	0.51			
White Sucker	W	O	S	T	10	20.00	5.10			
Common Carp	G	O	M	T	1	2.00	0.51			
Golden Shiner	N	I	M	T	11	22.00	5.61			
Spotfin Shiner	N	I	M		1	2.00	0.51			
Brook Silverside		I	M	M	1	2.00	0.51			
White Bass	F	P	M		1	2.00	0.51			
White Crappie	S	I	C		4	8.00	2.04			
Largemouth Bass	F	C	C		21	42.00	10.71			
Warmouth Sunfish	S	C	C		1	2.00	0.51			
Bluegill Sunfish	S	I	C	P	131	262.00	66.84			
Pumpkinseed Sunfish	S	I	C	P	5	10.00	2.55			
Bluegill X Pumpkinseed					1	2.00	0.51			
Yellow Perch			M		5	10.00	2.55			
	Mile Total				196	392.00				
	Number of Species				14					
	Number of Hybrids				1					

River Code: **17-550**	Stream: **Chippewa Creek**	Sample Date: **2011**
River Mile: **21.80**	Location: upst. Chippewa Rd.	Date Range: 07/19/2011
Time Fished: 1970 sec	Drainage: 14.6 sq mi	
Dist Fished: 0.15 km	Basin: Muskingum River No of Passes: 1	Sampler Type: E

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		4	8.00	2.08			
Central Mudminnow		I	C	T	7	14.00	3.65			
Golden Shiner	N	I	M	T	15	30.00	7.81			
White Crappie	S	I	C		4	8.00	2.08			
Largemouth Bass	F	C	C		27	54.00	14.06			
Warmouth Sunfish	S	C	C		1	2.00	0.52			
Green Sunfish	S	I	C	T	1	2.00	0.52			
Bluegill Sunfish	S	I	C	P	117	234.00	60.94			
Pumpkinseed Sunfish	S	I	C	P	15	30.00	7.81			
Yellow Perch			M		1	2.00	0.52			
	Mile Total				192	384.00				
	Number of Species				10					
	Number of Hybrids				0					

Appendix Table 4. Ohio EPA/DSW Ecological Assessment Section Macroinvertebrate Collection

Site: Chippewa Creek
upst. restoration area

Collection Date: 07/19/2011 River Code: 17-550 RM: 22.50

Taxa Code	Taxa	Quant/Qual	Taxa Code	Taxa	Quant/Qual
03600	*Oligochaeta*	+			
04664	*Helobdella stagnalis*	+			
06201	*Hyalella azteca*	+			
06700	*Crangonyx sp*	+			
17200	*Caenis sp*	+			
22001	*Coenagrionidae*	+			
45100	*Palmacorixa sp*	+			
64050	*Liodessus sp*	+			
65800	*Berosus sp*	+			
72700	*Anopheles sp*	+			
74501	*Ceratopogonidae*	+			
77120	*Ablabesmyia mallochi*	+			
77355	*Clinotanypus pinguis*	+			
82730	*Chironomus (C.) decorus group*	+			
82800	*Cladopelma sp*	+			
82820	*Cryptochironomus sp*	+			
83051	*Dicrotendipes simpsoni*	+			
83158	*Endochironomus nigricans*	+			
83300	*Glyptotendipes (G.) sp*	+			
95100	*Physella sp*	+			

No. Quantitative Taxa: 0 Total Taxa: 20
No. Qualitative Taxa: 20 ICI:
Number of Organisms: 0 Qual EPT: 1

Appendix Table 4. Ohio EPA/DSW Ecological Assessment Section Macroinvertebrate Collection

Site: Chippewa Creek upst. Chippewa Rd.

Collection Date: 07/19/2011 River Code: 17-550 RM: 21.80

Taxa Code	Taxa	Quant/Qual	Taxa Code	Taxa	Quant/Qual
01801	*Turbellaria*	+			
03600	*Oligochaeta*	+			
06201	*Hyalella azteca*	+			
11200	*Callibaetis sp*	+			
17200	*Caenis sp*	+			
22001	*Coenagrionidae*	+			
42700	*Belostoma sp*	+			
45100	*Palmacorixa sp*	+			
45400	*Trichocorixa sp*	+			
60900	*Peltodytes sp*	+			
74501	*Ceratopogonidae*	+			
82730	*Chironomus (C.) decorus group*	+			
87250	*Odontomyia (Odontomyiina) sp*	+			
95501	*Planorbidae*	+			

No. Quantitative Taxa: 0 Total Taxa: 14

No. Qualitative Taxa: 14 ICI:

Number of Organisms: 0 Qual EPT: 2

BEAVER CREEK
RIPARIAN RESTORATION PHASE 2

Project Baseline Stream Monitoring

PROJECT NAME: BEAVER CREEK RIPARIAN RESTORATION PHASE 2

Project Baseline Stream Monitoring

PROJECT NUMBER: 11(h)EPA-09
STREAM SAMPLED: Beaver Creek

SUMMARY

Funding for this project will be used to stabilize the streambank of Beaver Creek adjacent to Chamberlain Park within the city of Springdale. Streambank stabilization will include installation of 230 linear feet of terrace wall and geo-cell lifts of bioengineered bank armor, along with re-vegetating the streambank with native grass, shrub and tree species. Multiple instream structures will be installed to manage scour and flow.

Of the three sites sampled in Beaver Creek during 2011, only one location (RM 1.1 – proposed restoration area) was partially attaining the Warmwater Habitat (WWH) biological criteria. The most upstream background location (RM 1.2) and the most downstream location (RM 0.9) were in non-attainment of the WWH biocriteria, with both fish and macroinvertebrate communities reflective of fair water quality. At the upstream station, extensive sand deposits caused severe embeddedness of the stream bottom substrates. Bank restoration/stabilization activities occurred at this site (and upstream) in 2003. The improved fish communities noted in the proposed restoration section was associated with greater pool depths and a predominance of large, coarse substrate types (cobbles and boulders) compared with the upstream and downstream stations. Beaver Creek is a high energy urban stream which contributes to high flashy flows during rainfall events and low summer flows during drier periods.

AQUATIC LIFE USE ATTAINMENT – BEAVER CREEK 2011.

The Index of Biotic Integrity (IBI) and Invertebrate Community Index (ICI) scores are based on the performance of the biological community. Narrative ranges are used with macroinvertebrate results when quantitative data are not available. The Qualitative Habitat Evaluation Index (QHEI) is a measure of the ability of the physical habitat to support a biological community. Stream sites are located in the Interior Plateau (IP) ecoregion. In the Ohio Water Quality Standards, Beaver Creek is designated Warmwater Habitat (WWH).

Sample Site River Mile	Attainment Status	IBI	ICI	QHEI	Biological Assessment
RM 1.2	**NON**	32*	Low Fair*	60.3 (good)	Fair/ Low Fair
RM 1.1	**PARTIAL**	44	Low Fair*	73.5 (excellent)	Good/ Low Fair
RM 0.9	**NON**	32*	Fair*	65.0 (good)	Fair

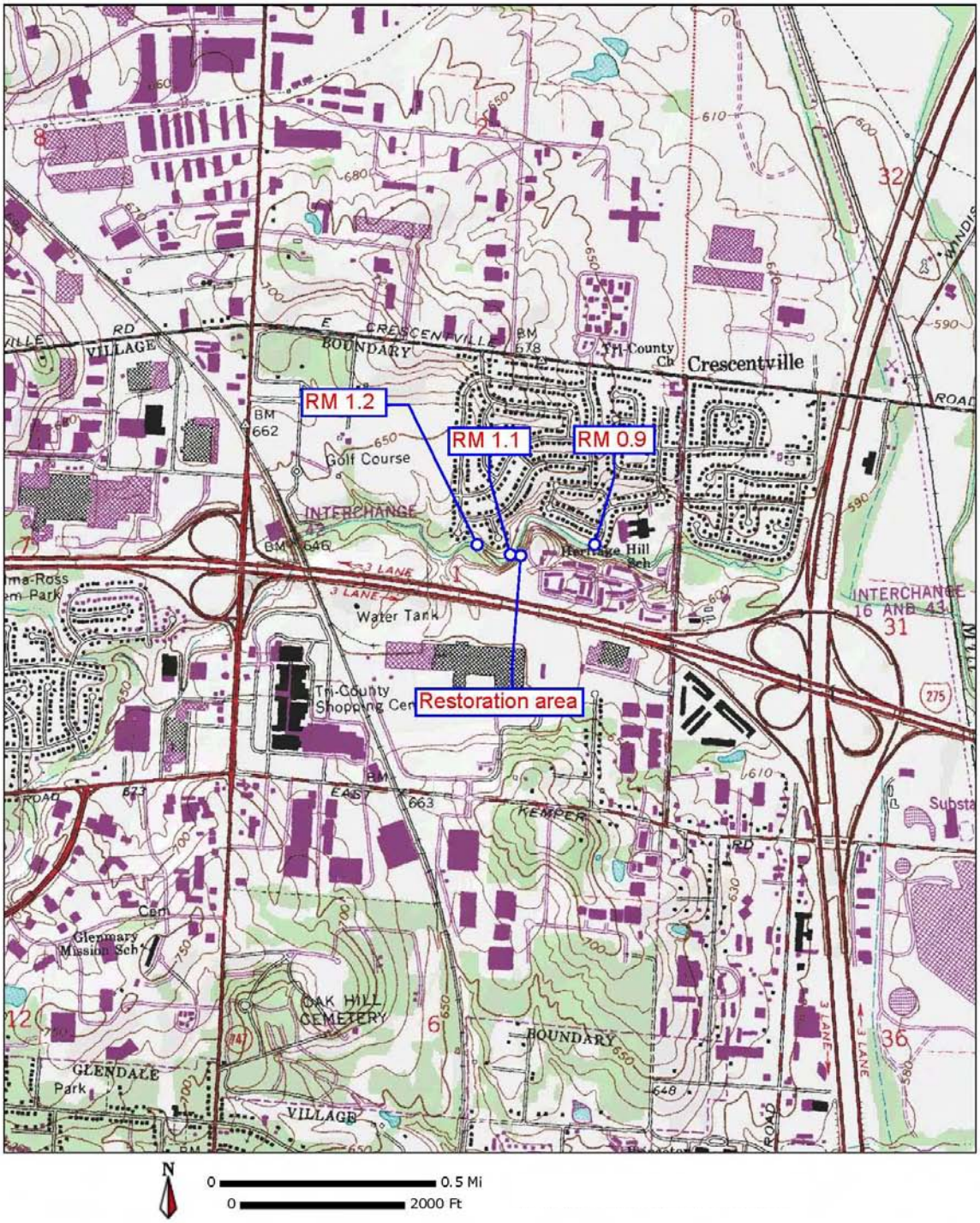
Ecoregion Biocriteria: Interior Plateau (IP)		
INDEX – SITE TYPE	WWH	EWH
IBI: Headwater	40	50
ICI	30	46

* Significant departure from biocriterion (>4 IBI or ICI units).

Sampling locations in Beaver Creek, 2011.

River Mile	Latitude	Longitude	Landmark
1.2	39.29498	-84.45455	At Cresentville, upstream Phase 2 restoration (within Phase 1)
1.1	39.29523	-84.45580	At Cresentville, within proposed Phase 2 restoration area
0.9	39.29500	-84.45140	At Cresentville, upstream Heritage School

Beaver Creek Sampling Locations, 2011



APPENDICES – BEAVER CREEK PROJECT

Appendix Table 1. Qualitative Habitat Evaluation Index (QHEI) scores for Beaver Creek.

Appendix Table 2. Index of Biotic Integrity (IBI) scores and metrics for Beaver Creek.

Appendix Table 3. Ohio EPA fish results for Beaver Creek.

Appendix Table 4. Ohio EPA macroinvertebrate results for Beaver Creek.

Appendix Table 1. Qualitative Habitat Evaluation Index (QHEI) scores and physical attributes for fish sampling sites in Beaver Creek, 2011.

			WWH Attributes																													
Key QHEI Components																																
River Mile	**QHEI**	**Habitat Rating**	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**
														High Influence						*Moderate Influence*												
Beaver Creek Year: 2011																																
1.2	**60.3**	Good	■	■	■		■	■			■		6				◆		1					●				●	●	●		4
1.1	**73.5**	Excellent	■	■	■	■	■	■		■	■	■	9			◆			1									●				1
0.9	**65.0**	Good	■	■	■		■	■			■	■	7			◆	◆		2					●				●	●			3

Appendix Table 2. Index of Biotic Integrity (IBI) scores and metrics for Beaver Creek, 2011.

				Number of						Percent of Individuals						
River Mile	Type	Date	Drainage area (sq mi)	Total species	Minnow species	Headwater species	Sensitive species	Darter & Sculpin species	Simple Lithophils	Tolerant fishes	Omni-vores	Pioneering fishes	Insect-ivores	DELT anomalies	Rel.No. minus tolerants /(0.3km)	IBI
Beaver Creek - (23-023)																
Year: 2011																
1.20	E	10/04/2011	4.4	5(1)	2(1)	0(1)	0(1)	0(1)	1(1)	8(5)	0(5)	8(5)	1(1)	0.0(5)	1026(5)	32
1.10	E	10/04/2011	4.4	13(5)	5(3)	2(3)	0(1)	3(5)	3(3)	35(3)	5(5)	30(5)	16(1)	0.0(5)	444(5)	44
0.90	E	10/04/2011	4.5	9(3)	3(3)	2(3)	0(1)	2(3)	2(1)	58(1)	1(5)	57(1)	2(1)	0.0(5)	519(5)	32

♦ - IBI is low end adjusted.

* - < 200 Total individuals in sample

** - < 50 Total individuals in sample

● - One or more species excluded from IBI calculation.

River Code: **23-023**	Stream: **Beaver Creek**	Sample Date: **2011**
River Mile: **1.20**	Location:	Date Range: 10/04/2011
Time Fished: 1012 sec	Drainage: 4.4 sq mi	
Dist Fished: 0.10 km	Basin: Mill Creek No of Passes: 1	Sampler Type: E

Species Name / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
White Sucker	W	O	S	T	1	3.00	0.27			
Creek Chub	N	G	N	T	26	78.00	6.99			
Central Stoneroller	N	H	N		342	1,026.00	91.94			
Yellow Bullhead		I	C	T	1	3.00	0.27			
Green Sunfish	S	I	C	T	2	6.00	0.54			
	Mile Total				372	1,116.00				
	Number of Species				5					
	Number of Hybrids				0					

River Code: **23-023**	Stream: **Beaver Creek**	Sample Date: **2011**
River Mile: **1.10**	Location:	Date Range: 10/04/2011
Time Fished: 1474 sec	Drainage: 4.4 sq mi	
Dist Fished: 0.10 km	Basin: Mill Creek No of Passes: 1	Sampler Type: E

Species Name / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
White Sucker	W	O	S	T	5	15.00	2.21			
Common Carp	G	O	M	T	4	12.00	1.77			
Goldfish	G	O	M	T	1	3.00	0.44			
Western Blacknose Dace	N	G	S	T	4	12.00	1.77			
Creek Chub	N	G	N	T	40	120.00	17.70			
Spotfin Shiner	N	I	M		1	3.00	0.44			
Bluntnose Minnow	N	O	C	T	1	3.00	0.44			
Central Stoneroller	N	H	N		132	396.00	58.41			
Yellow Bullhead		I	C	T	2	6.00	0.88			
Largemouth Bass	F	C	C		4	12.00	1.77			
Green Sunfish	S	I	C	T	21	63.00	9.29			
Bluegill Sunfish	S	I	C	P	5	15.00	2.21			
Johnny Darter	D	I	C		2	6.00	0.88			
Orangethroat Darter	D	I	S		3	9.00	1.33			
Fantail Darter	D	I	C		1	3.00	0.44			
	Mile Total				226	678.00				
	Number of Species				15					
	Number of Hybrids				0					

River Code: **23-023**	Stream: **Beaver Creek**	Sample Date: **2011**
River Mile: **0.90**	Location: upst. Heritage School	Date Range: 10/04/2011
Time Fished: 1168 sec	Drainage: 4.5 sq mi	
Dist Fished: 0.10 km	Basin: Mill Creek No of Passes: 1	Sampler Type: E

Species Name / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
White Sucker	W	O	S	T	2	6.00	0.49			
Western Blacknose Dace	N	G	S	T	5	15.00	1.22			
Creek Chub	N	G	N	T	228	684.00	55.75			
Central Stoneroller	N	H	N		164	492.00	40.10			
Largemouth Bass	F	C	C		1	3.00	0.24			
Green Sunfish	S	I	C	T	1	3.00	0.24			
Bluegill Sunfish	S	I	C	P	3	9.00	0.73			
Johnny Darter	D	I	C		4	12.00	0.98			
Fantail Darter	D	I	C		1	3.00	0.24			
	Mile Total				409	1,227.00				
	Number of Species				9					
	Number of Hybrids				0					

Appendix Table 4. Ohio EPA/DSW Ecological Assessment Section Macroinvertebrate Collection

Site: Beaver Creek

Collection Date: 10/04/2011 River Code: 23-023 RM: 1.20

Taxa Code	Taxa	Quant/Qual	Taxa Code	Taxa	Quant/Qual
01801	*Turbellaria*	+			
03360	*Plumatella sp*	+			
03600	*Oligochaeta*	+			
11120	*Baetis flavistriga*	+			
11130	*Baetis intercalaris*	+			
21200	*Calopteryx sp*	+			
22001	*Coenagrionidae*	+			
22300	*Argia sp*	+			
52200	*Cheumatopsyche sp*	+			
52530	*Hydropsyche depravata group*	+			
74100	*Simulium sp*	+			
84470	*Polypedilum (P.) illinoense*	+			

No. Quantitative Taxa: 0 Total Taxa: 12

No. Qualitative Taxa: 12 ICI:

Number of Organisms: 0 Qual EPT: 4

Appendix Table 4. Ohio EPA/DSW Ecological Assessment Section Macroinvertebrate Collection

Site: Beaver Creek

Collection Date: 10/04/2011 River Code: 23-023 RM: 1.10

Taxa Code	Taxa	Quant/Qual	Taxa Code	Taxa	Quant/Qual
01801	*Turbellaria*	+			
03600	*Oligochaeta*	+			
11001	*Baetidae*	+			
11120	*Baetis flavistriga*	+			
11130	*Baetis intercalaris*	+			
21200	*Calopteryx sp*	+			
22001	*Coenagrionidae*	+			
22300	*Argia sp*	+			
50315	*Chimarra obscura*	+			
52200	*Cheumatopsyche sp*	+			
52530	*Hydropsyche depravata group*	+			
82501	*Chironomini*	+			

No. Quantitative Taxa: 0 Total Taxa: 12

No. Qualitative Taxa: 12 ICI:

Number of Organisms: 0 Qual EPT: 6

Appendix Table 4. Ohio EPA/DSW Ecological Assessment Section
Macroinvertebrate Collection

Site: Beaver Creek
upst. Heritage School

Collection Date: 10/04/2011 River Code: 23-023 RM: 0.90

Taxa Code	Taxa	Quant/Qual	Taxa Code	Taxa	Quant/Qual
01801	*Turbellaria*	+			
05900	*Lirceus sp*	+			
06700	*Crangonyx sp*	+			
11120	*Baetis flavistriga*	+			
11130	*Baetis intercalaris*	+			
17200	*Caenis sp*	+			
22001	*Coenagrionidae*	+			
22300	*Argia sp*	+			
50315	*Chimarra obscura*	+			
52200	*Cheumatopsyche sp*	+			
52430	*Ceratopsyche morosa group*	+			
52530	*Hydropsyche depravata group*	+			
78140	*Labrundinia pilosella*	+			
84790	*Tribelos fuscicorne*	+			

No. Quantitative Taxa: 0 Total Taxa: 14
No. Qualitative Taxa: 14 ICI:
Number of Organisms: 0 Qual EPT: 7

HILL DITCH

STREAM RESTORATION AND DAM REMOVAL

Project Baseline Stream Monitoring

PROJECT NAME: HILL DITCH STREAM RESTORATION AND DAM REMOVAL

Project Baseline Stream Monitoring

PROJECT NUMBER: 11(h)EPA-21
STREAM SAMPLED: Hill Ditch

SUMMARY

Hill Ditch restoration project details at the Toledo Botanical Garden include the removal of two lowhead dam structures and restoration of a 1,050 foot segment of Hill Ditch that flows through their facilities. The two low-head dams currently impound the east and west Crosby Lake ponds at Toledo Botanical Gardens and will be removed during this project. Removal will restore natural flow conditions to Hill Ditch and stream channel restoration activities will follow using natural channel design and include the installation of five in-stream grade control structures and replanting of 0.32 acres of riparian areas as well as 1.7 acres of previously impounded deep water areas.

Hill Ditch biological communities were assessed immediately upstream (RM 2.6) and downstream (RM 2.2) from the proposed restoration work. Hill Ditch currently has an aquatic life use designation of Limited Resource Water (LRW), with “small drainageway maintenance" as the causative factor. Based on sampling conducted during 2011, the recommended aquatic life use designation for Hill Ditch is Modified Warmwater Habitat (MWH). This recommendation is based on improved habitat conditions and fish communities performing to the MWH level. Evaluation of the biological communities revealed partial attainment of the MWH biocriteria at both the upstream site (RM 2.6) and at RM 2.2, located downstream from the Toledo Botanical Gardens ponds.

AQUATIC LIFE USE ATTAINMENT – HILL DITCH 2011.

The Index of Biotic Integrity (IBI) and Invertebrate Community Index (ICI) scores are based on the performance of the biological community. Narrative ranges are used with macroinvertebrate results when quantitative data are not available. The Qualitative Habitat Evaluation Index (QHEI) is a measure of the ability of the physical habitat to support a biological community. Stream sites are located in the Huron Erie Lake Plain (HELP) ecoregion. In the Ohio Water Quality Standards, Hill Ditch is currently designated Limited Resource Water (LRW); Modified Warmwater Habitat is recommended based on the 2011 sampling. Attainment status is based on a comparison to the MWH biocriteria.

Sample Site River Mile	Attainment Status	IBI	ICI	QHEI	Biological Assessment
RM 2.6	**PARTIAL**	22	Poor*	64.5 (good)	Poor
RM 2.2	**PARTIAL**	22	Low Fair*	55.0 (good)	Poor/ Low Fair

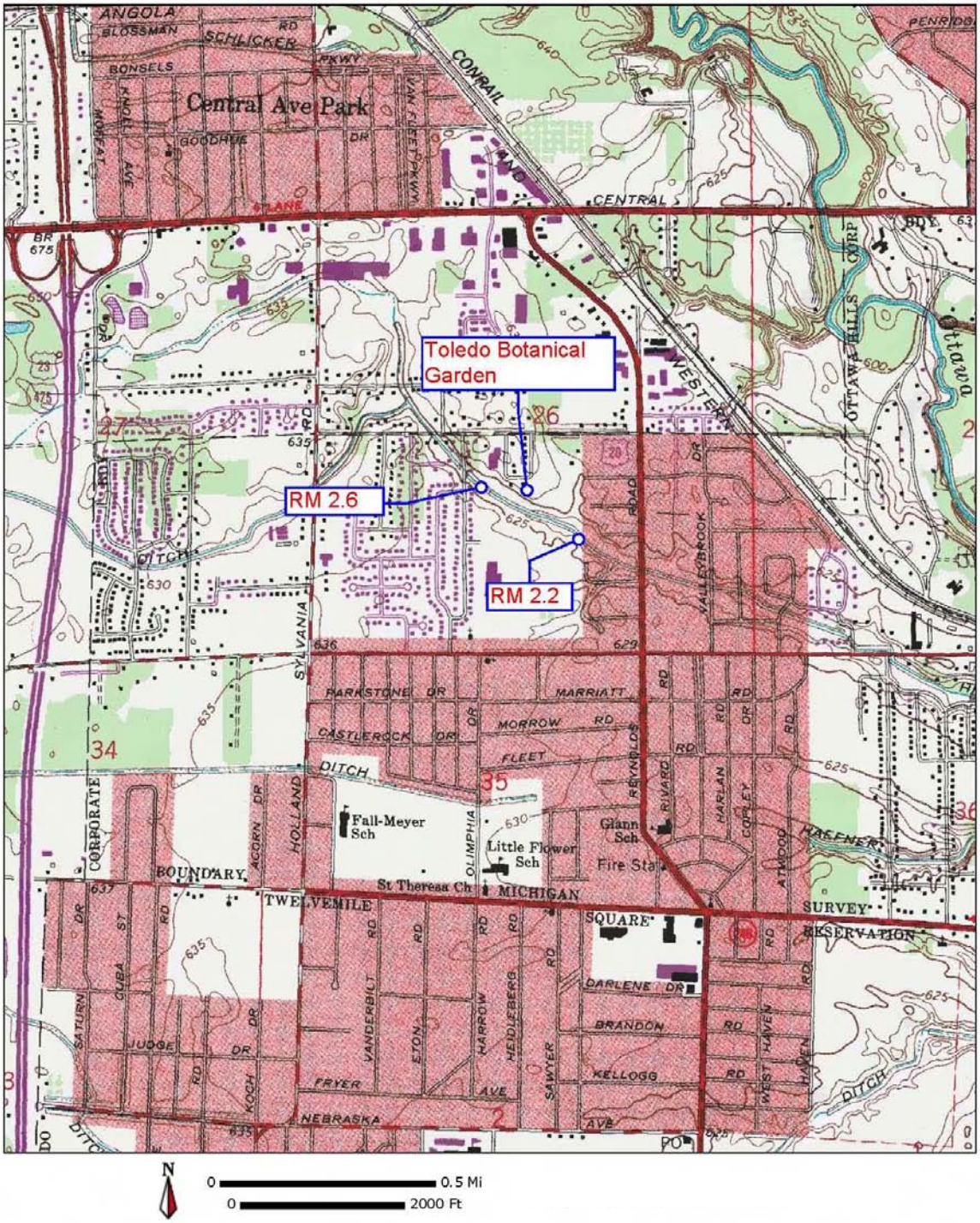
Ecoregion Biocriteria: Huron Erie Lake Plain (HELP)		
INDEX – SITE TYPE	LRW	MWH
IBI: Headwater	18	20
ICI	8	22

* Significant departure from biocriterion (>4 IBI or ICI units).

Sampling locations in Hill Ditch, 2011.

River Mile	Latitude	Longitude	Landmark
2.6	41.66722	-83.67535	Dst. Carriage Drive, upstream Toledo Botanical Gardens ponds
2.2	41.66541	-83.67003	Upst. Reynolds Rd, downstream Toledo Botanical Gardens ponds

Hill Ditch Sampling Locations, 2011



APPENDICES – HILL DITCH PROJECT

Appendix Table 1. Qualitative Habitat Evaluation Index (QHEI) scores for Hill Ditch.

Appendix Table 2. Index of Biotic Integrity (IBI) scores and metrics for Hill Ditch.

Appendix Table 3. Ohio EPA fish results for Hill Ditch.

Appendix Table 4. Ohio EPA macroinvertebrate results for Hill Ditch.

Appendix Table 1. Qualitative Habitat Evaluation Index (QHEI) scores and physical attributes for fish sampling sites in Hill Ditch, 2011.

			WWH Attributes																													
Key QHEI Components																																
River Mile	**QHEI**	**Habitat Rating**	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**
														High Influence						*Moderate Influence*												
Hill Ditch Year: 2011																																
2.6	**64.5**	Good	■	■		■		■			■		5			◆	◆		2	●								●	●	●		4
2.2	**55.0**	Good		■							■		2			◆	◆		2	●	●			●				●	●	●		6

Appendix Table 2. Index of Biotic Integrity (IBI) scores and metrics for Hill Ditch, 2011.

				Number of						Percent of Individuals						
River Mile	Type	Date	Drainage area (sq mi)	Total species	Minnow species	Headwater species	Sensitive species	Darter & Sculpin species	Simple Lithophils	Tolerant fishes	Omni-vores	Pioneering fishes	Insect-ivores	DELT anomalies	Rel.No. minus tolerants /(0.3km)	IBI
Hill Ditch - (04-303)																
Year: 2011																
2.60	E	07/08/2011	3.5	7(3)	4(3)	0(1)	0(1)	0(1)	1(1)	88(1)	78(1)	85(1)	2(1)	0.4(5)	120(3)	22
2.20	E	07/08/2011	6.3	11(3)	5(3)	0(1)	0(1)	0(1)	1(1)	80(1)	54(1)	76(1)	24(3)	0.5(3)	450(3)	22

♦ - IBI is low end adjusted.

* - < 200 Total individuals in sample

** - < 50 Total individuals in sample

● - One or more species excluded from IBI calculation.

River Code: **04-303**	Stream: **Hill Ditch**	Sample Date: **2011**
River Mile: **2.60**	Location: Carriage Drive	Date Range: 07/08/2011
Time Fished: 945 sec	Drainage: 3.5 sq mi	
Dist Fished: 0.08 km	Basin: Ottawa River No of Passes: 1	Sampler Type: E

Species Name / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Central Mudminnow		I	C	T	1	3.75	0.38			
White Sucker	W	O	S	T	5	18.75	1.92			
Common Carp	G	O	M	T	1	3.75	0.38			
Creek Chub	N	G	N	T	21	78.75	8.08			
Fathead Minnow	N	O	C	T	69	258.75	26.54			
Bluntnose Minnow	N	O	C	T	127	476.25	48.85			
Central Stoneroller	N	H	N		32	120.00	12.31			
Green Sunfish	S	I	C	T	4	15.00	1.54			
	Mile Total				260	975.00				
	Number of Species				8					
	Number of Hybrids				0					

River Code: **04-303**	Stream: **Hill Ditch**	Sample Date: **2011**
River Mile: **2.20**	Location: Reynolds Rd.	Date Range: 07/08/2011
Time Fished: 1307 sec	Drainage: 6.3 sq mi	
Dist Fished: 0.08 km	Basin: Ottawa River No of Passes: 1	Sampler Type: E

Species Name / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
White Sucker	W	O	S	T	3	11.25	0.49			
Golden Shiner	N	I	M	T	12	45.00	1.98			
Creek Chub	N	G	N	T	54	202.50	8.90			
Fathead Minnow	N	O	C	T	19	71.25	3.13			
Bluntnose Minnow	N	O	C	T	308	1,155.00	50.74			
Central Stoneroller	N	H	N		16	60.00	2.64			
Yellow Bullhead		I	C	T	12	45.00	1.98			
Largemouth Bass	F	C	C		1	3.75	0.16			
Green Sunfish	S	I	C	T	79	296.25	13.01			
Bluegill Sunfish	S	I	C	P	7	26.25	1.15			
Pumpkinseed Sunfish	S	I	C	P	33	123.75	5.44			
Green Sf X Pumpkinseed					63	236.25	10.38			
	Mile Total				607	2,276.25				
	Number of Species				11					
	Number of Hybrids				1					

Appendix Table 4. Ohio EPA/DSW Ecological Assessment Section Macroinvertebrate Collection

Site: Hill Ditch
Carriage Drive

Collection Date: 07/08/2011 River Code: 04-303 RM: 2.60

Taxa Code	Taxa	Quant/Qual
01801	*Turbellaria*	+
03600	*Oligochaeta*	+
08250	*Orconectes (Procericambarus) rusticus*	+
52200	*Cheumatopsyche sp*	+
52530	*Hydropsyche depravata group*	+
74100	*Simulium sp*	+
77800	*Helopelopia sp*	+
81231	*Nanocladius (N.) crassicornus or N. (N.) "rectinervis"*	+
82730	*Chironomus (C.) decorus group*	+
82820	*Cryptochironomus sp*	+
84060	*Parachironomus pectinatellae*	+
84450	*Polypedilum (Uresipedilum) flavum*	+
84470	*Polypedilum (P.) illinoense*	+
84540	*Polypedilum (Tripodura) scalaenum group*	+
85500	*Paratanytarsus sp*	+
85800	*Tanytarsus sp*	+
85814	*Tanytarsus glabrescens group*	+
87540	*Hemerodromia sp*	+
96900	*Ferrissia sp*	+

Taxa Code	Taxa	Quant/Qual

No. Quantitative Taxa: 0 Total Taxa: 19
No. Qualitative Taxa: 19 ICI:
Number of Organisms: 0 Qual EPT: 2

Appendix Table 4. Ohio EPA/DSW Ecological Assessment Section
Macroinvertebrate Collection

Site: Hill Ditch
Reynolds Rd.

Collection Date: 07/08/2011 River Code: 04-303 RM: 2.20

Taxa Code	Taxa	Quant/Qual	Taxa Code	Taxa	Quant/Qual
01320	*Hydra sp*	+			
01801	*Turbellaria*	+			
03360	*Plumatella sp*	+			
04664	*Helobdella stagnalis*	+			
06700	*Crangonyx sp*	+			
11130	*Baetis intercalaris*	+			
17200	*Caenis sp*	+			
52200	*Cheumatopsyche sp*	+			
52530	*Hydropsyche depravata group*	+			
74100	*Simulium sp*	+			
77120	*Ablabesmyia mallochi*	+			
77130	*Ablabesmyia rhamphe group*	+			
77500	*Conchapelopia sp*	+			
82730	*Chironomus (C.) decorus group*	+			
82820	*Cryptochironomus sp*	+			
83002	*Dicrotendipes modestus*	+			
83040	*Dicrotendipes neomodestus*	+			
83051	*Dicrotendipes simpsoni*	+			
83300	*Glyptotendipes (G.) sp*	+			
84040	*Parachironomus frequens*	+			
84450	*Polypedilum (Uresipedilum) flavum*	+			
84470	*Polypedilum (P.) illinoense*	+			
84800	*Tribelos jucundum*	+			
98600	*Sphaerium sp*	+			

No. Quantitative Taxa: 0 Total Taxa: 24
No. Qualitative Taxa: 24 ICI:
Number of Organisms: 0 Qual EPT: 4

LOWER OLENTANGY RIVER
5TH AVENUE DAM REMOVAL AND STREAM RESTORATION

Project Baseline Stream Monitoring

PROJECT NAME: LOWER OLENTANGY RIVER ECOSYSTEM RESTORATION – 5TH AVE. DAM REMOVAL

Project Baseline Stream Monitoring

PROJECT NUMBER: 11(h)EPA-18
STREAM SAMPLED: Olentangy River

SUMMARY

Funding for this project will be used to assist the city of Columbus with removing the 5th Ave. dam. The project will also involve in-stream channel and riparian restoration of 10,650 linear feet of river. In-stream restoration will include the installation of grade structures and habitat features and riparian area restoration will include plantings and grading as needed. This project will include disposal of 6,350 cubic yards of dam debris.

At the two free-flowing stations sampled in the Olentangy River, excellent physical habitat conditions were present and exceptional biological communities were documented. These two sites (RMs 3.9 and 0.7) fully attained the Warmwater Habitat (WWH) and Exceptional Warmwater Habitat (EWH) biological criteria listed in the Ohio Water Quality Standards. The site located in the project area (RM 2.2 - impounded section of the Olentangy River) had fair instream habitat conditions due to the lack of riffle areas, sparse instream cover, and predominantly sand and gravel substrates extensively embedded with silts and muck. Biological results from RM 2.2 did not attain the WWH biocriteria and macroinvertebrate results were reflective of poor water quality. Completion of this project will restore approximately two miles of the lower Olentangy River to an unimpeded natural condition with the potential to support exceptional biological communities.

AQUATIC LIFE USE ATTAINMENT – OLENTANGY RIVER 2011.

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. Stream sites are located in Eastern Corn Belt Plains (ECBP) ecoregion. In the Ohio Water Quality Standards, the Olentangy River is designated Warmwater Habitat (WWH) within the study area. An ICI of E= exceptional. ICI macroinvertebrate results at RM 3.9 were not used in the assessment due to low flow conditions over the HD – the qualitative evaluation was used to assess macroinvertebrate quality.

Sample Site River Mile	Attainment Status	IBI	MIwb	ICI	QHEI	Biological Assessment
RM 3.9	**FULL**	54	9.7	E	77.0 (excellent)	Exceptional
RM 2.2 Impounded	**NON**	42	7.7*	10*	47.0 (fair)	Fair/ Poor
RM 0.7	**FULL**	50	10.1	48	82.5 (excellent)	Exceptional

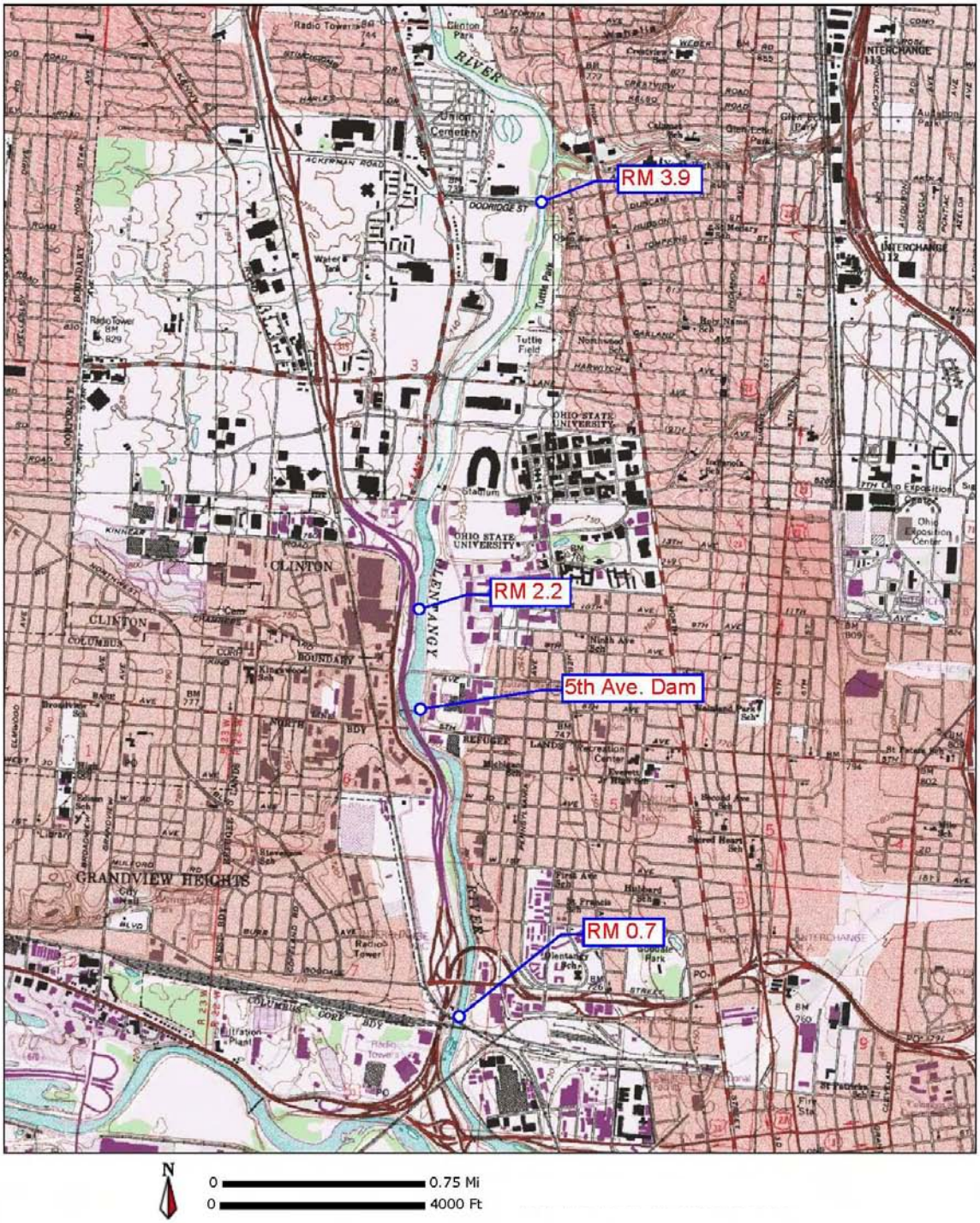
Ecoregion Biocriteria: Eastern Corn Belt Plains (ECBP)		
INDEX – SITE TYPE	WWH	EWH
IBI: Boat	42	48
MIwb: Boat	8.5	9.6
ICI	36	46

* Significant departure from biocriterion (>4 IBI or ICI units, >0.5 MIwb units).
Underlined values are poor or very poor.

Sampling locations in the Olentangy River, 2011.

River Mile	Latitude	Longitude	Landmark
3.9	40.01582	-83.01618	Dodridge Street
2.2	39.99146	-83.02461	King Ave. - impounded
0.7	39.97291	-83.02042	At RR bridge downstream Goodale Blvd.

Olentangy River Sampling Locations, 2011



APPENDICES – OLENTANGY RIVER PROJECT

Appendix Table 1. Qualitative Habitat Evaluation Index (QHEI) scores for the Olentangy River.

Appendix Table 2. Index of Biotic Integrity (IBI) scores and metrics for the Olentangy River.

Appendix Table 3. Ohio EPA fish results for the Olentangy River.

Appendix Table 4. Invertebrate Community Index (ICI) scores and metrics for the Olentangy River.

Appendix Table 5. Ohio EPA macroinvertebrate results for the Olentangy River.

Appendix Table 1. Qualitative Habitat Evaluation Index (QHEI) scores and physical attributes for fish sampling sites in the Olentangy River, 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**																													
Olentangy River Year: 2011																															
3.9	**77.0**	Excellent	■	■		■		■	■	■	■	■	8				◆		1						●				●			2
2.2	**47.0**	Fair	■	■							■		3			◆	◆		2		●			●				●	●		●	5
0.7	**82.5**	Excellent	■	■		■		■	■		■	■	7						0						●				●			2

Appendix Table 2. Index of Biotic Integrity (IBI) scores and metrics for the Olentangy River, 2011.

				Number of				Percent of Individuals										
River Mile	Type	Date	Drainage area (sq mi)	Total species	Sunfish species	Sucker species	Intolerant species	Rnd-bodied suckers	Simple Lithophils	Tolerant fishes	Omni-vores	Top carnivores	Insect-ivores	DELT anomalies	Rel.No. minus tolerants /(1.0 km)		IBI	Modified Iwb
Olentangy River - (02-400)																		
Year: 2011																		
3.90	A	07/13/2011	535	22(5)	5(5)	6(5)	5(5)	27(3)	36(3)	2(5)	3(5)	8(3)	80(5)	0.0(5)	562(5)		54	9.7
2.20	A	07/13/2011	540	11(3)	4(5)	4(3)	1(1)	30(3)	30(3)	13(5)	13(5)	7(3)	65(5)	1.0(5)	172(1)	*	42	7.8
2.20	A	08/29/2011	540	14(3)	7(5)	3(3)	1(1)	9(1)	9(1)	12(5)	9(5)	7(3)	57(5)	0.0(5)	476(5)		42	7.6
0.70	A	07/13/2011	543	24(5)	5(5)	5(3)	4(5)	29(3)	39(3)	10(5)	10(5)	8(3)	74(5)	0.0(5)	544(5)		52	10.0
0.70	A	08/29/2011	543	25(5)	5(5)	4(3)	6(5)	21(3)	29(3)	12(5)	17(3)	21(5)	51(3)	0.8(3)	720(5)		48	10.2

♦ - IBI is low end adjusted.

* - < 200 Total individuals in sample

** - < 50 Total individuals in sample

River Code: **02-400**	Stream: **Olentangy River**	Sample Date: **2011**
River Mile: **3.90**	Location: Dodrodge St.	Date Range: 07/13/2011
Time Fished: 1914 sec	Drainage: 535.0 sq mi	
Dist Fished: 0.50 km	Basin: Scioto 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		1	2.00	0.35	2.45	2.36	1,225.00
Silver Redhorse	R	I	S	M	4	8.00	1.39	9.55	9.21	1,193.75
Black Redhorse	R	I	S	I	36	72.00	12.50	28.64	27.62	397.83
Golden Redhorse	R	I	S	M	13	26.00	4.51	10.95	10.56	421.15
River Redhorse [S]	R	I	S	I	3	6.00	1.04	1.48	1.42	246.00
Northern Hog Sucker	R	I	S	M	22	44.00	7.64	6.46	6.23	146.91
Common Carp	G	O	M	T	5	10.00	1.74	26.10	25.17	2,610.00
Silver Shiner	N	I	S	I	16	32.00	5.56	0.55	0.53	17.07
Spotfin Shiner	N	I	M		76	152.00	26.39	1.04	1.01	6.87
Bluntnose Minnow	N	O	C	T	2	4.00	0.69	0.02	0.02	4.00
Central Stoneroller	N	H	N		5	10.00	1.74	0.15	0.15	15.40
Channel Catfish	F		C		5	10.00	1.74	2.33	2.25	232.80
White Crappie	S	I	C		3	6.00	1.04	0.51	0.49	84.67
Rock Bass	S	C	C		6	12.00	2.08	1.17	1.13	97.33
Smallmouth Bass	F	C	C	M	13	26.00	4.51	7.79	7.52	299.77
Largemouth Bass	F	C	C		5	10.00	1.74	0.76	0.73	76.00
Bluegill Sunfish	S	I	C	P	33	66.00	11.46	1.42	1.37	21.48
Orangespotted Sunfish	S	I	C		2	4.00	0.69	0.11	0.11	28.50
Longear Sunfish	S	I	C	M	14	28.00	4.86	0.67	0.64	23.86
Green Sf X Bluegill Sf					15	30.00	5.21	1.29	1.25	43.13
Logperch	D	I	S	M	6	12.00	2.08	0.22	0.21	18.33
Greenside Darter	D	I	S	M	1	2.00	0.35	0.02	0.02	10.00
Banded Darter	D	I	S	I	1	2.00	0.35	0.00	0.00	2.00
Bluebreast Darter [T]	D	I	S	R	1	2.00	0.35	0.00	0.00	2.00
	Mile Total				288	576.00		103.69		
	Number of Species				23					
	Number of Hybrids				1					

River Code: **02-400**	Stream: **Olentangy River**	Sample Date: **2011**
River Mile: **2.20**	Location: upst. King Ave.	Date Range: 07/13/2011
Time Fished: 4212 sec	Drainage: 540.0 sq mi	Thru: 08/29/2011
Dist Fished: 1.00 km	Basin: Scioto 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		3	3.00	0.81	0.55	0.50	182.67
Quillback	C	O	M		3	3.00	0.81	3.55	3.25	1,183.33
Silver Redhorse	R	I	S	M	2	2.00	0.54	2.45	2.24	1,225.00
Black Redhorse	R	I	S	I	34	34.00	9.21	15.16	13.89	445.78
Golden Redhorse	R	I	S	M	18	18.00	4.88	11.23	10.29	623.89
Common Carp	G	O	M	T	30	30.00	8.13	62.19	56.98	2,073.00
Spotfin Shiner	N	I	M		1	1.00	0.27	0.02	0.01	15.00
Channel Catfish	F		C		1	1.00	0.27	2.20	2.02	2,200.00
Yellow Bullhead		I	C	T	2	2.00	0.54	0.27	0.25	135.00
Brook Silverside		I	M	M	2	2.00	0.54	0.00	0.00	2.00
White Crappie	S	I	C		5	5.00	1.36	0.22	0.20	43.00
Rock Bass	S	C	C		3	3.00	0.81	0.25	0.23	82.00
Largemouth Bass	F	C	C		22	22.00	5.96	4.74	4.34	215.42
Green Sunfish	S	I	C	T	13	13.00	3.52	0.21	0.19	15.85
Bluegill Sunfish	S	I	C	P	74	74.00	20.05	1.41	1.30	19.11
Orangespotted Sunfish	S	I	C		12	12.00	3.25	0.11	0.10	8.90
Longear Sunfish	S	I	C	M	43	43.00	11.65	0.69	0.63	16.05
Redear Sunfish	E	I	C		2	2.00	0.54	0.08	0.07	39.00
Pumpkinseed Sunfish	S	I	C	P	10	10.00	2.71	0.40	0.37	40.40
Green Sf X Bluegill Sf					15	15.00	4.07	1.31	1.20	87.33
Hybrid X Sunfish					74	74.00	20.05	2.13	1.95	28.79
	Mile Total				369	369.00		109.15		
	Number of Species				19					
	Number of Hybrids				2					

River Code: **02-400**	Stream: **Olentangy River**	Sample Date: **2011**
River Mile: **0.70**	Location: railroad bridge near mouth	Date Range: 07/13/2011
Time Fished: 4413 sec	Drainage: 543.0 sq mi	Thru: 08/29/2011
Dist Fished: 1.00 km	Basin: Scioto 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		27	27.00	3.80	0.18	0.12	6.67
Silver Redhorse	R	I	S	M	3	3.00	0.42	3.50	2.26	1,166.67
Black Redhorse	R	I	S	I	54	54.00	7.61	21.74	14.05	402.68
Golden Redhorse	R	I	S	M	29	29.00	4.08	16.11	10.41	555.46
River Redhorse [S]	R	I	S	I	42	42.00	5.92	38.92	25.15	926.61
Northern Hog Sucker	R	I	S	M	45	45.00	6.34	14.93	9.65	331.88
Common Carp	G	O	M	T	11	11.00	1.55	29.56	19.10	2,687.50
River Chub	N	I	N	I	16	16.00	2.25	0.50	0.32	31.13
Silver Shiner	N	I	S	I	1	1.00	0.14	0.03	0.02	25.00
Rosyface Shiner	N	I	S	I	19	19.00	2.68	0.08	0.05	4.00
Striped Shiner	N	I	S		14	14.00	1.97	0.38	0.25	27.45
Spotfin Shiner	N	I	M		67	67.00	9.44	0.35	0.22	5.19
Sand Shiner	N	I	M	M	34	34.00	4.79	0.09	0.06	2.56
Bluntnose Minnow	N	O	C	T	63	63.00	8.87	0.19	0.12	3.06
Central Stoneroller	N	H	N		6	6.00	0.85	0.06	0.04	9.33
Channel Catfish	F		C		8	8.00	1.13	11.73	7.58	1,465.63
Brook Silverside		I	M	M	8	8.00	1.13	0.02	0.01	2.50
Rock Bass	S	C	C		19	19.00	2.68	1.41	0.91	74.21
Smallmouth Bass	F	C	C	M	84	84.00	11.83	9.86	6.37	117.34
Largemouth Bass	F	C	C		8	8.00	1.13	0.10	0.06	12.25
Green Sunfish	S	I	C	T	4	4.00	0.56	0.19	0.12	47.50
Bluegill Sunfish	S	I	C	P	44	44.00	6.20	1.25	0.81	28.35
Orangespotted Sunfish	S	I	C		2	2.00	0.28	0.02	0.01	9.00
Longear Sunfish	S	I	C	M	20	20.00	2.82	0.25	0.16	12.73
Green Sf X Bluegill Sf					18	18.00	2.54	1.30	0.84	71.94
Hybrid X Sunfish					36	36.00	5.07	1.65	1.06	45.71
Logperch	D	I	S	M	19	19.00	2.68	0.29	0.19	15.21
Greenside Darter	D	I	S	M	5	5.00	0.70	0.07	0.05	14.60
Banded Darter	D	I	S	I	1	1.00	0.14	0.01	0.00	5.00
Rainbow Darter	D	I	S	M	2	2.00	0.28	0.01	0.01	4.00
Fantail Darter	D	I	C		1	1.00	0.14	0.00	0.00	3.00
	Mile Total				710	710.00		154.75		
	Number of Species				29					
	Number of Hybrids				2					

River Mile	Drainage Area (sq mi)	Number of Total Taxa	Number of Mayfly Taxa	Number of Caddisfly Taxa	Number of Dipteran Taxa	Percent: Mayflies	Percent: Caddis-flies	Percent: Tany-tarsini	Percent: Other Dipt/NI	Percent: Tolerant Organisms	Qual. EPT	Eco-region	ICI
Olentangy River (02-400)													
Year: 2011													
3.90	535.0	44(6)	7(4)	4(4)	20(6)	4.3(2)	1.1(2)	0.0(0)	92.7(0)	7.2(0)	17(6)	5	30
2.20	540.0	19(2)	1(0)	2(2)	6(2)	0.2(2)	0.1(2)	0.0(0)	99.6(0)	39.6(0)	1(0)	5	10
0.70	543.0	36(6)	9(6)	8(6)	12(4)	15.8(4)	47.2(6)	5.3(2)	31.2(4)	3.4(4)	17(6)	5	48

Appendix Table 5. Ohio EPA/DSW Ecological Assessment Section Macroinvertebrate Collection

Site: Olentangy River
Dodrodge St.

Collection Date: 08/29/2011 River Code: 02-400 RM: 3.90

Taxa Code	Taxa	Quant/Qual	
01320	*Hydra sp*	8	
01801	*Turbellaria*	133	+
03360	*Plumatella sp*	18	
03451	*Urnatella gracilis*	12	
03600	*Oligochaeta*	312	+
08250	*Orconectes (Procericambarus) rusticus*		+
11123	*Labiobaetis dardanus*		+
11130	*Baetis intercalaris*		+
11650	*Procloeon sp (w/ hindwing pads)*		+
12200	*Isonychia sp*		+
13000	*Leucrocuta sp*	4	+
13100	*Nixe sp*		+
13400	*Stenacron sp*	50	+
13521	*Stenonema femoratum*		+
13550	*Maccaffertium mexicanum integrum*	1	
13561	*Maccaffertium pulchellum*	34	+
13570	*Maccaffertium terminatum*	22	+
16700	*Tricorythodes sp*	118	+
17200	*Caenis sp*	2	+
21300	*Hetaerina sp*		+
22001	*Coenagrionidae*		+
22300	*Argia sp*	54	+
34700	*Agnetina capitata complex*		+
50315	*Chimarra obscura*		+
51206	*Cyrnellus fraternus*	20	
51300	*Neureclipsis sp*	1	
52200	*Cheumatopsyche sp*	37	+
52430	*Ceratopsyche morosa group*		+
52580	*Hydropsyche valanis*		+
59500	*Oecetis sp*	3	
59970	*Petrophila sp*	16	+
67800	*Tropisternus sp*		+
68075	*Psephenus herricki*		+
68601	*Ancyronyx variegata*	16	
68901	*Macronychus glabratus*	10	
69400	*Stenelmis sp*	1	+
71900	*Tipula sp*		+
74100	*Simulium sp*		+
77120	*Ablabesmyia mallochi*	69	
77130	*Ablabesmyia rhamphe group*	35	
77500	*Conchapelopia sp*	35	
77750	*Hayesomyia senata or Thienemannimyia norena*		+
77800	*Helopelopia sp*	35	+
78140	*Labrundinia pilosella*	35	+
80370	*Corynoneura lobata*	8	
80410	*Cricotopus (C.) sp*	69	
81231	*Nanocladius (N.) crassicornus or N. (N.) "rectinervis"*	35	+
81240	*Nanocladius (N.) distinctus*	69	
82100	*Thienemanniella sp*		+
82820	*Cryptochironomus sp*	35	
83040	*Dicrotendipes neomodestus*	1662	
83050	*Dicrotendipes lucifer*	69	
83300	*Glyptotendipes (G.) sp*	762	
83310	*Glyptotendipes (Heynotendipes) amplus*	69	
84000	*Parachironomus sp*	104	
84300	*Phaenopsectra obediens group*	104	
84450	*Polypedilum (Uresipedilum) flavum*	1108	+
84470	*Polypedilum (P.) illinoense*		+
84540	*Polypedilum (Tripodura) scalaenum group*	104	+
84700	*Stenochironomus sp*	35	
85800	*Tanytarsus sp*		+
87250	*Odontomyia (Odontomyiina) sp*		+
87540	*Hemerodromia sp*	1	
93200	*Hydrobiidae*		+
93900	*Elimia sp*	1	+
95100	*Physella sp*	5	
96120	*Menetus (Micromenetus) dilatatus*	10	
98600	*Sphaerium sp*		+

No. Quantitative Taxa: 44 Total Taxa: 68
No. Qualitative Taxa: 42 ICI: **30**
Number of Organisms: 5331 Qual EPT: 17

Appendix Table 5. Ohio EPA/DSW Ecological Assessment Section
Macroinvertebrate Collection

Site: Olentangy River
upst. King Ave.

Collection Date: 08/29/2011 River Code: 02-400 RM: 2.20

Taxa Code	Taxa	Quant/Qual	
01320	*Hydra sp*	159	
01801	*Turbellaria*	52	+
03600	*Oligochaeta*	1124	
04664	*Helobdella stagnalis*	21	
04666	*Helobdella triserialis*	1	
05800	*Caecidotea sp*	43	+
06201	*Hyalella azteca*		+
11200	*Callibaetis sp*		+
12501	*Heptageniidae*	8	
22001	*Coenagrionidae*		+
22300	*Argia sp*		+
28955	*Plathemis lydia*		+
51206	*Cyrnellus fraternus*	4	
54200	*Orthotrichia sp*	1	
67800	*Tropisternus sp*		+
69400	*Stenelmis sp*		+
77100	*Ablabesmyia sp*	24	
78655	*Procladius (Holotanypus) sp*		+
82730	*Chironomus (C.) decorus group*	24	
83040	*Dicrotendipes neomodestus*	24	+
83051	*Dicrotendipes simpsoni*	239	+
83158	*Endochironomus nigricans*		+
83300	*Glyptotendipes (G.) sp*	1745	+
84470	*Polypedilum (P.) illinoense*		+
84520	*Polypedilum (Tripodura) halterale group*		+
84790	*Tribelos fuscicorne*	24	
85821	*Tanytarsus glabrescens group sp 7*		+
92613	*Cipangopaludina chinensis malleata*	2	+
94800	*Stagnicola sp*	1	+
95100	*Physella sp*		+
96120	*Menetus (Micromenetus) dilatatus*	18	
96900	*Ferrissia sp*	5	

Taxa Code	Taxa	Quant/Qual

No. Quantitative Taxa: 19 Total Taxa: 32
No. Qualitative Taxa: 20 ICI: **10**
Number of Organisms: 3519 Qual EPT: 1

Appendix Table 5. Ohio EPA/DSW Ecological Assessment Section Macroinvertebrate Collection

Site: Olentangy River
railroad bridge near mouth

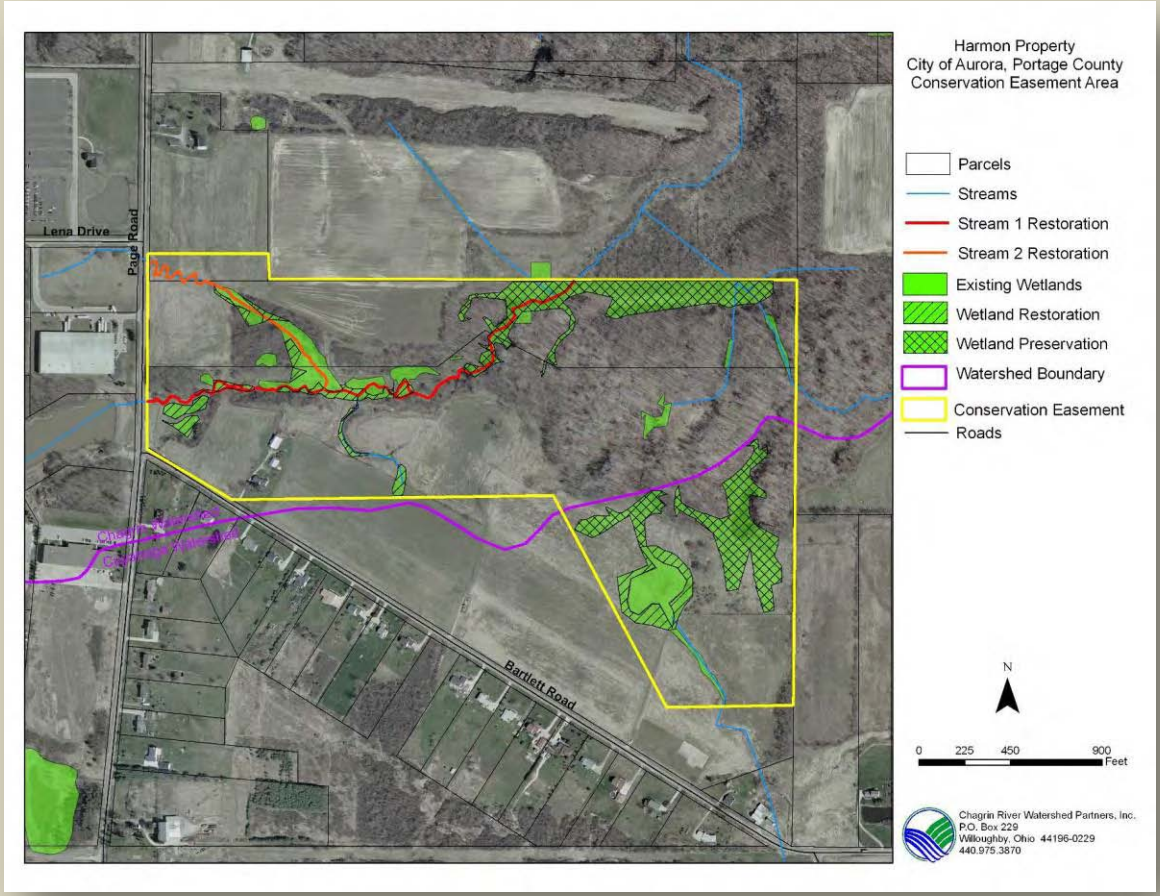
Collection Date: 08/29/2011 River Code: 02-400 RM: 0.70

Taxa Code	Taxa	Quant/Qual	
01801	*Turbellaria*	293	+
03360	*Plumatella sp*	5	
03600	*Oligochaeta*	32	+
05800	*Caecidotea sp*		+
05900	*Lirceus sp*		+
06201	*Hyalella azteca*		+
08250	*Orconectes (Procericambarus) rusticus*		+
11130	*Baetis intercalaris*	803	+
12200	*Isonychia sp*	4	
13000	*Leucrocuta sp*	89	+
13400	*Stenacron sp*	51	+
13510	*Maccaffertium exiguum*	25	+
13521	*Stenonema femoratum*		+
13561	*Maccaffertium pulchellum*	179	+
13570	*Maccaffertium terminatum*	89	+
16700	*Tricorythodes sp*	50	+
17200	*Caenis sp*	1	+
18600	*Ephemera sp*		+
21300	*Hetaerina sp*	1	+
22001	*Coenagrionidae*		+
22300	*Argia sp*		+
27307	*Epitheca (Epicordulia) princeps*		+
50315	*Chimarra obscura*	2	+
51300	*Neureclipsis sp*		+
52200	*Cheumatopsyche sp*	3610	+
52430	*Ceratopsyche morosa group*	201	+
52560	*Hydropsyche orris*	27	+
52570	*Hydropsyche simulans*	4	+
52580	*Hydropsyche valanis*	13	+
52801	*Potamyia flava*	1	
59100	*Ceraclea sp*	1	
59970	*Petrophila sp*		+
68901	*Macronychus glabratus*	4	
69400	*Stenelmis sp*	27	+
74100	*Simulium sp*		+
77120	*Ablabesmyia mallochi*		+
77500	*Conchapelopia sp*	31	+
77750	*Hayesomyia senata or Thienemannimyia norena*	125	
78350	*Meropelopia sp*	31	+
78450	*Nilotanypus fimbriatus*	31	
78750	*Rheopelopia paramaculipennis*	31	
80310	*Cardiocladius obscurus*		+
80410	*Cricotopus (C.) sp*		+
81231	*Nanocladius (N.) crassicornus or N. (N.) "rectinervis"*	8	
81240	*Nanocladius (N.) distinctus*	249	
82820	*Cryptochironomus sp*		+
83300	*Glyptotendipes (G.) sp*	31	+
83310	*Glyptotendipes (Heynotendipes) amplus*		+
84300	*Phaenopsectra obediens group*	31	+
84450	*Polypedilum (Uresipedilum) flavum*	1620	+
84470	*Polypedilum (P.) illinoense*		+
84490	*Polypedilum (Cerobregma) ontario*	31	+
84540	*Polypedilum (Tripodura) scalaenum group*		+
85265	*Cladotanytarsus vanderwulpi group sp 5*		+
85625	*Rheotanytarsus sp*	436	+
93900	*Elimia sp*		+
96900	*Ferrissia sp*		+
97601	*Corbicula fluminea*	2	
98600	*Sphaerium sp*		+

No. Quantitative Taxa: 36 Total Taxa: 59
No. Qualitative Taxa: 48 ICI: **48**
Number of Organisms: 8169 Qual EPT: 17

HARMON HOMESTEAD TRIBUTARIES RESTORATION

Project Baseline Stream Monitoring



PROJECT NAME: HARMON HOMESTEAD TRIBUTARIES RESTORATION PROJECT

Project Baseline Stream Monitoring

PROJECT NUMBER: 11(h)EPA-14
STREAM SAMPLED: Harmon Run and Unnamed Tributary to Harmon Run

SUMMARY

Funding of this project will restore 550 linear feet of two streams using natural channel design and installing six grade control structures to eliminate down-cutting and erosion within the project area. The project will also restore 11 acres of previously occurring wetlands and 17.5 acres of riparian corridor. The project site and surrounding acreage will be permanently protected by conservation easements placed on more than 100 acres.

Two stream sites were assessed on October 5, 2011 using the Primary Headwater Habitat (PHWH) evaluation techniques. One site was located on Harmon Run just downstream from Page Road, and one site was located in an unnamed tributary to Harmon Run also just downstream from Page Road. Both assessment reaches were 61 meters in length. Data collected during the assessments is summarized in the table below. The unnamed tributary has an extremely small drainage area of 0.05 square miles. This site lacks a wooded riparian corridor, the channel has been modified in the past, and the predominant substrates were silt and muck. Based on the Headwater Habitat Evaluation Index (HHEI) habitat score and conditions, along with the macroinvertebrate quality, the unnamed tributary should be classified as a modified Class II PHWH stream. Harmon Run was assessed at RM 2.1, which is located approximately one mile upstream from Sunny Lake. Identifying characteristics of this site included a natural stream channel, a small drainage area (0.7 square mile), a predominance of gravel and cobble substrates, and a maximum pool depth of 50 centimeters. Although the drainage area of this site was less than one square mile (and would suggest a PHWH stream), the maximum pool depth of 50 cm exceeds the general recommendation for qualifying as a PHWH. Evaluating the HHEI score, QHEI score, and biological results, Harmon Run upstream from the unnamed tributary confluence is a Class II PHWH stream.

	Harmon Run (RM 2.1)	Unnamed Trib. (RM 0.1)
Watershed Area	0.7 sq. mi.	0.05 sq. mi.
Dominant Substrates	Gravel and Cobble	Silt and Muck
HHEI Score	68	52
QHEI Score	76.5	NA
HMFEI Score	11	21
Class III PHWH Vertebrates?	No	No
PHWH Classification	Class II	Modified Class II
IBI Score	30	NA
Macroinvertebrate EPT/Sensitive Taxa	1/0	4/0

Sampling locations in Harmon Run and Unnamed Trib. To Harmon Run, 2011.

River Mile	Latitude	Longitude	Stream/ Landmark
2.1	41.28175	-81.32484	Harmon Run/ downstream Page Road
2.0, 0.1	41.28328	-81.32461	Unnamed Tributary to Harmon Run/ near the mouth

Harmon Homestead Sampling Locations, 2011

APPENDICES – HARMON HOMESTEAD PROJECT

Appendix Table 1. Qualitative Habitat Evaluation Index (QHEI) score for Harmon Run.

Appendix Table 2. Index of Biotic Integrity (IBI) scores and metrics for Harmon Run.

Appendix Table 3. Ohio EPA fish results for Harmon Run.

Appendix Table 4. Ohio EPA macroinvertebrate results for Harmon Run and UT to Harmon Run.

HHEI AND PHWH scoring sheets

Appendix Table 1. Qualitative Habitat Evaluation Index (QHEI) scores and physical attributes for fish sampling sites in Harmon Run, 2011.

			WWH Attributes											MWH Attributes																		
														High Influence						*Moderate Influence*												
Key QHEI Components																																
River Mile	**QHEI**	**Habitat Rating**	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**
Harmon Run Year: 2011																																
2.1	**76.5**	Excellent	■	■		■	■	■		■	■	■	8						0									●				1

Appendix Table 2. Index of Biotic Integrity (IBI) scores and metrics for Harmon Run, 2011.

				Number of						Percent of Individuals						
River Mile	Type	Date	Drainage area (sq mi)	Total species	Minnow species	Headwater species	Sensitive species	Darter & Sculpin species	Simple Lithophils	Tolerant fishes	Omni-vores	Pioneering fishes	Insect-ivores	DELT anomalies	Rel.No. minus tolerants /(0.3km)	IBI
Harmon Run - (15-055)																
Year: 2011																
2.10	E	10/05/2011	0.6	6(3)	3(3)	0(1)	0(1)	0(1)	1(3)	71(1)	26(1)	58(1)	27(5)	0.0(5)	295(5)	30

♦ - IBI is low end adjusted.

* - < 200 Total individuals in sample

** - < 50 Total individuals in sample

● - One or more species excluded from IBI calculation.

Species List

River Code: **15-055**	Stream: **Harmon Run**	Sample Date: **2011**
River Mile: **2.10**	Location: Page Rd.	Date Range: 10/05/2011
Time Fished: 1158 sec	Drainage: 0.6 sq mi	
Dist Fished: 0.06 km	Basin: Chagrin River No of Passes: 1	Sampler Type: E

Species Name / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
White Sucker	W	O	S	T	23	115.00	11.27			
Creek Chub	N	G	N	T	90	450.00	44.12			
Bluntnose Minnow	N	O	C	T	29	145.00	14.22			
Central Stoneroller	N	H	N		8	40.00	3.92			
Yellow Bullhead		I	C	T	3	15.00	1.47			
Pumpkinseed Sunfish	S	I	C	P	51	255.00	25.00			
Mile Total					204	1,020.00				
Number of Species					6					
Number of Hybrids					0					

Appendix Table 4. Ohio EPA/DSW Ecological Assessment Section Macroinvertebrate Collection

Site: Harmon Run Page Rd.

Collection Date: 10/05/2011 River Code: 15-055 RM: 2.10

Taxa Code	Taxa	Quant/Qual	Taxa Code	Taxa	Quant/Qual
01320	*Hydra sp*	+			
01801	*Turbellaria*	+			
03600	*Oligochaeta*	+			
22001	*Coenagrionidae*	+			
23600	*Aeshna sp*	+			
23700	*Anax sp*	+			
28500	*Libellula sp*	+			
28955	*Plathemis lydia*	+			
45300	*Sigara sp*	+			
55300	*Ptilostomis sp*	+			
60800	*Haliplus sp*	+			
60900	*Peltodytes sp*	+			
61400	*Agabus sp*	+			
63900	*Laccophilus sp*	+			
64050	*Liodessus sp*	+			
67700	*Paracymus sp*	+			
67800	*Tropisternus sp*	+			
95100	*Physella sp*	+			
98200	*Pisidium sp*	+			
98600	*Sphaerium sp*	+			

No. Quantitative Taxa: 0 Total Taxa: 20

No. Qualitative Taxa: 20 ICI:

Number of Organisms: 0 Qual EPT: 1

Appendix Table 4. Ohio EPA/DSW Ecological Assessment Section Macroinvertebrate Collection

Site: Trib. to Harmon Run

Collection Date: 10/05/2011 River Code: 15-056 RM: 0.10

Taxa Code	Taxa	Quant/Qual	Taxa Code	Taxa	Quant/Qual
01320	*Hydra sp*	+			
01801	*Turbellaria*	+			
01900	*Nemertea*	+			
03360	*Plumatella sp*	+			
03600	*Oligochaeta*	+			
11130	*Baetis intercalaris*	+			
13521	*Stenonema femoratum*	+			
17200	*Caenis sp*	+			
22001	*Coenagrionidae*	+			
22300	*Argia sp*	+			
52200	*Cheumatopsyche sp*	+			
69400	*Stenelmis sp*	+			
74100	*Simulium sp*	+			
77100	*Ablabesmyia sp*	+			
80420	*Cricotopus (C.) bicinctus*	+			
83158	*Endochironomus nigricans*	+			
95100	*Physella sp*	+			
96264	*Planorbella (Pierosoma) pilsbryi*	+			
98200	*Pisidium sp*	+			

No. Quantitative Taxa: 0 Total Taxa: 19

No. Qualitative Taxa: 19 ICI:

Number of Organisms: 0 Qual EPT: 4

Primary Headwater Habitat Evaluation Form

HHEI Score (sum of metrics 1, 2, 3) : 68

SITE NAME/LOCATION: Harmon Run @ Page Road - tributary to Sunny Lake; Portage County

SITE NUMBER: 2 RIVER BASIN: 15 - Chagrin DRAINAGE AREA (mi²): 0.70

LENGTH OF STREAM REACH (ft): 200 LAT.: 41.28175 LONG.: -81.32484 RIVER CODE: 15-005-00 RIVER MILE: 2.1

DATE: 10/05/11 SCORER: D. Altfater COMMENTS: Ohio EPA

NOTE: Complete All Items On This Form - Refer to "Field Evaluation Manual for Ohio's PHWH Streams" for Instructions

STREAM CHANNEL MODIFICATIONS: ☑ NONE / NATURAL CHANNEL ☐ RECOVERED ☐ RECOVERING ☐ RECENT OR NO RECOVERY

1. SUBSTRATE (Estimate percent of every type of substrate present. Check *ONLY* two predominant substrate *TYPE* boxes (Max of 32). Add total number of significant substrate types found (Max of 8). Final metric score is sum of boxes A & B.

TYPE		PERCENT	TYPE		PERCENT
☐	BLDR SLABS [16 pts]	0%	☐	SILT [3 pt]	10%
☐	BOULDER (>256 mm) [16 pts]	3%	☐	LEAF PACK/WOODY DEBRIS [3 pts]	5%
☐	BEDROCK [16 pt]	0%	☐	FINE DETRITUS [3 pts]	0%
☑	COBBLE (65-256 mm) [12 pts]	25%	☐	CLAY or HARDPAN [0 pt]	0%
☑	GRAVEL (2-64 mm) [9 pts]	35%	☐	MUCK [0 pts]	5%
☐	SAND (<2 mm) [6 pts]	17%	☐	ARTIFICIAL [3 pts]	0%

Total of Percentages of Bldr Slabs, Boulder, Cobble, Bedrock: 28.00% (A)

Substrate Percentage Check: 100% (B)

SCORE OF TWO MOST PREDOMINATE SUBSTRATE TYPES: 21

TOTAL NUMBER OF SUBSTRATE TYPES: 7

HHEI Metric Points

Substrate Max = 40: 28

A + B

2. Maximum Pool Depth ***(Measure the maximum pool depth within the 61 meter (200 ft)*** evaluation reach at the time of evaluation. Avoid plunge pools from road culverts or storm water pipes) (Check *ONLY* one box):

- ☑ > 30 centimeters [20 pts]
- ☐ > 22.5 - 30 cm [30 pts]
- ☐ > 10 - 22.5 cm [25 pts]
- ☐ > 5 cm - 10 cm [15 pts]
- ☐ < 5 cm [5 pts]
- ☐ NO WATER OR MOIST CHANNEL [0 pts]

COMMENTS: Deepest pool was a beaver impoundment

MAXIMUM POOL DEPTH (centimeters): 50

Pool Depth Max = 30: 20

3. BANK FULL WIDTH (Measured as the average of 3-4 measurements) (Check *ONLY* one box):

- ☐ > 4.0 meters (> 13') [30 pts]
- ☐ > 3.0 m - 4.0 m (> 9' 7" - 13') [25 pts]
- ☑ > 1.5 m - 3.0 m (> 9' 7" - 4' 8") [20 pts]
- ☐ > 1.0 m - 1.5 m (> 3' 3" - 4' 8") [15 pts]
- ☐ ≤ 1.0 m (<=3' 3") [5 pts]

COMMENTS:

AVERAGE BANKFULL WIDTH (meters): 2.90

Bankfull Width Max=30: 20

This information must also be completed

RIPARIAN ZONE AND FLOODPLAIN QUALITY ☆NOTE: River Left (L) and Right (R) as looking downstream☆

RIPARIAN WIDTH (Per Bank) L	R		FLOODPLAIN QUALITY (Most Predominant per Bank) L	R		L	R	
☑	☐	Wide >10m	☐	☐	Mature Forest, Wetland	☐	☐	Conservation Tillage
☐	☐	Moderate 5-10m	☑	☐	Immature Forest, Shrub or Old Field	☐	☐	Urban or Industrial
☐	☑	Narrow <5m	☐	☑	Residential, Park, New Field	☐	☐	Open Pasture, Row Crop
☐	☐	None	☐	☐	Fenced Pasture	☐	☐	Mining or Construction

COMMENTS:

FLOW REGIME *(At Time of Evaluation)* (Check *ONLY* one box):

- ☑ Stream Flowing
- ☐ Subsurface flow with isolated pools (Interstitial)
- ☐ Moist Channel, isolated pools, no flow (Intermittent)
- ☐ Dry channel, no water (Ephemeral)

COMMENTS:

SINUOSITY (Number of bends per 61 m (200 ft) of channel) (Check *ONLY* one box):

- ☐ None
- ☐ 0.5
- ☐ 1.0
- ☐ 1.5
- ☐ 2.0
- ☐ 2.5
- ☐ 3.0
- ☑ >3

STREAM GRADIENT ESTIMATE

☐ Flat (0.5 ft/100 ft) ☐ Flat to Moderate ☐ Moderate (2 ft/100 ft) ☑ Moderate to Severe ☐ Severe (10 ft/100 ft)

ADDITIONAL STREAM INFORMATION (This Information Must Also be Completed):

QHEI PERFORMED? - ☑ Yes ☐ No QHEI Score _____ (If Yes, Attach Completed QHEI Form)

DOWNSTREAM DESIGNATED USE(S)

☑ WWH Name: **Aurora Branch** Distance from Evaluated Stream **2.10**

☐ CWH Name: _____ Distance from Evaluated Stream _____

☐ EWH Name: _____ Distance from Evaluated Stream _____

MAPPING: ATTACH COPIES OF MAPS, INCLUDING THE ENTIRE WATERSHED AREA. CLEARLY MARK THE SITE LOCATION

USGS Quadrangle Name: _____ NRCS Soil Map Page: _____ NRCS Soil Map Stream Order _____

County: **Portage** Township / City: **Aurora**

MISCELLANEOUS

Base Flow Conditions? (Y/N): **Y** Date of last precipitation: **10/03/11** Quantity: **1.00**

Photograph Information: _____

Elevated Turbidity? (Y/N): **N** Canopy (% open): **40%**

Were samples collected for water chemistry? (Y/N): **N** (Note lab sample no. or id. and attach results) Lab Number: _____

Field Measures: Temp (°C) **15.00** Dissolved Oxygen (mg/l) _____ pH (S.U.) _____ Conductivity (µmhos/cm) _____

Is the sampling reach representative of the stream (Y/N) **Y** If not, please explain: **Small beaver dam at the downstream end of sampling zone**

Additional comments/description of pollution impacts: **Stream flow likely elevated - lots of rain over the prior week and a wet summer and fall**

BIOTIC EVALUATION

Performed? (Y/N): **Y** (If Yes, Record all observations. Voucher collections optional. NOTE: all voucher samples must be labeled with the site ID number. Include appropriate field data sheets from the Primary Headwater Habitat Assessment Manual)

Fish Observed? (Y/N) **Y** Voucher? (Y/N) **N** Salamanders Observed? (Y/N) **N** Voucher? (Y/N) **N**

Frogs or Tadpoles Observed? (Y/N) **Y** Voucher? (Y/N) **N** Aquatic Macroinvertebrates Observed? (Y/N) **Y** Voucher? (Y/N) **Y**

Comments Regarding Biology: _____

DRAWING AND NARRATIVE DESCRIPTION OF STREAM REACH (This must be completed):

Include important landmarks and other features of interest for site evaluation and a narrative description of the stream's location

FLOW ➔

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Primary Headwater Habitat Evaluation Form

HHEI Score (sum of metrics 1, 2, 3) : 52

SITE NAME/LOCATION: Unnamed Tributary to Harmon Run (flows into Sunny Lake) @ Harmon Homestead Farm

SITE NUMBER: 1 RIVER BASIN: 15 - Chagrin River DRAINAGE AREA (mi²): 0.05

LENGTH OF STREAM REACH (ft): 200 LAT.: 41.28328 LONG.: -81.32461 RIVER CODE: RIVER MILE: 0.1

DATE: 10/05/11 SCORER: D. Altfater COMMENTS: Ohio EPA

NOTE: Complete All Items On This Form - Refer to "Field Evaluation Manual for Ohio's PHWH Streams" for Instructions

STREAM CHANNEL MODIFICATIONS: ☐ NONE / NATURAL CHANNEL ☐ RECOVERED ☑ RECOVERING ☐ RECENT OR NO RECOVERY

1. SUBSTRATE (Estimate percent of every type of substrate present. Check *ONLY* two predominant substrate *TYPE* boxes (Max of 32). Add total number of significant substrate types found (Max of 8). Final metric score is sum of boxes A & B.

TYPE		PERCENT	TYPE		PERCENT
☐	BLDR SLABS [16 pts]	0%	☑	SILT [3 pt]	38%
☐	BOULDER (>256 mm) [16 pts]	0%	☐	LEAF PACK/WOODY DEBRIS [3 pts]	0%
☐	BEDROCK [16 pt]	0%	☐	FINE DETRITUS [3 pts]	20%
☐	COBBLE (65-256 mm) [12 pts]	0%	☐	CLAY or HARDPAN [0 pt]	0%
☐	GRAVEL (2-64 mm) [9 pts]	0%	☑	MUCK [0 pts]	40%
☐	SAND (<2 mm) [6 pts]	2%	☐	ARTIFICIAL [3 pts]	0%

Total of Percentages of Bldr Slabs, Boulder, Cobble, Bedrock: 0.00% (A)

Substrate Percentage Check: 100% (B)

SCORE OF TWO MOST PREDOMINATE SUBSTRATE TYPES: 3 **TOTAL NUMBER OF SUBSTRATE TYPES:** 4

HHEI Metric Points

Substrate Max = 40: 7

A + B

2. Maximum Pool Depth ***(Measure the maximum pool depth within the 61 meter (200 ft)*** evaluation reach at the time of evaluation. Avoid plunge pools from road culverts or storm water pipes) (Check *ONLY* one box):

- ☐ > 30 centimeters [20 pts]
- ☐ > 22.5 - 30 cm [30 pts]
- ☑ > 10 - 22.5 cm [25 pts]
- ☐ > 5 cm - 10 cm [15 pts]
- ☐ < 5 cm [5 pts]
- ☐ NO WATER OR MOIST CHANNEL [0 pts]

COMMENTS: Flow may be elevated from wet fall **MAXIMUM POOL DEPTH (centimeters):** 17

Pool Depth Max = 30: 25

3. BANK FULL WIDTH (Measured as the average of 3-4 measurements) (Check *ONLY* one box):

- ☐ > 4.0 meters (> 13') [30 pts]
- ☐ > 3.0 m - 4.0 m (> 9' 7" - 13') [25 pts]
- ☑ > 1.5 m - 3.0 m (> 9' 7" - 4' 8") [20 pts]
- ☐ > 1.0 m - 1.5 m (> 3' 3" - 4' 8") [15 pts]
- ☐ ≤ 1.0 m (<=3' 3") [5 pts]

COMMENTS: **AVERAGE BANKFULL WIDTH (meters):** 1.80

Bankfull Width Max=30: 20

This information must also be completed

RIPARIAN ZONE AND FLOODPLAIN QUALITY ☆NOTE: River Left (L) and Right (R) as looking downstream☆

RIPARIAN WIDTH (Per Bank) L	R		FLOODPLAIN QUALITY (Most Predominant per Bank) L	R		L	R	
☐	☐	Wide >10m	☐	☐	Mature Forest, Wetland	☐	☐	Conservation Tillage
☐	☐	Moderate 5-10m	☐	☐	Immature Forest, Shrub or Old Field	☐	☐	Urban or Industrial
☐	☐	Narrow <5m	☑	☑	Residential, Park, New Field	☐	☐	Open Pasture, Row Crop
☑	☑	None	☐	☐	Fenced Pasture	☐	☐	Mining or Construction

COMMENTS:

FLOW REGIME *(At Time of Evaluation)* (Check *ONLY* one box):

- ☑ Stream Flowing
- ☐ Subsurface flow with isolated pools (Interstitial)
- ☐ Moist Channel, isolated pools, no flow (Intermittent)
- ☐ Dry channel, no water (Ephemeral)

COMMENTS:

SINUOSITY (Number of bends per 61 m (200 ft) of channel) (Check *ONLY* one box):

- ☑ None
- ☐ 0.5
- ☐ 1.0
- ☐ 1.5
- ☐ 2.0
- ☐ 2.5
- ☐ 3.0
- ☐ >3

STREAM GRADIENT ESTIMATE

☐ Flat (0.5 ft/100 ft) ☐ Flat to Moderate ☐ Moderate (2 ft/100 ft) ☑ Moderate to Severe ☐ Severe (10 ft/100 ft)

ADDITIONAL STREAM INFORMATION (This Information Must Also be Completed):

QHEI PERFORMED? - ☐ Yes ☑ No QHEI Score _____ (If Yes, Attach Completed QHEI Form)

DOWNSTREAM DESIGNATED USE(S)

☑ WWH Name: **Harmon Run (UT to Aurora Branch at RM 14.61) - Sunny Lake** Distance from Evaluated Stream **0.10**

☐ CWH Name: _____ Distance from Evaluated Stream _____

☐ EWH Name: _____ Distance from Evaluated Stream _____

MAPPING: ATTACH COPIES OF MAPS, INCLUDING THE ENTIRE WATERSHED AREA. CLEARLY MARK THE SITE LOCATION

USGS Quadrangle Name: _____ NRCS Soil Map Page: _____ NRCS Soil Map Stream Order _____

County: **Portage** Township / City: **Aurora**

MISCELLANEOUS

Base Flow Conditions? (Y/N): **N** Date of last precipitation: **10/03/11** Quantity: **1.00**

Photograph Information: **none**

Elevated Turbidity? (Y/N): **N** Canopy (% open): **90%**

Were samples collected for water chemistry? (Y/N): **N** (Note lab sample no. or id. and attach results) Lab Number: _____

Field Measures: Temp (°C) **14.00** Dissolved Oxygen (mg/l) _____ pH (S.U.) _____ Conductivity (µmhos/cm) _____

Is the sampling reach representative of the stream (Y/N) **Y** If not, please explain: _____

Additional comments/description of pollution impacts:

Stream flow is probably up from base flow - rained several days in prior week, plus above average rainfall for summer and fall

BIOTIC EVALUATION

Performed? (Y/N): **Y** (If Yes, Record all observations. Voucher collections optional. NOTE: all voucher samples must be labeled with the site ID number. Include appropriate field data sheets from the Primary Headwater Habitat Assessment Manual)

Fish Observed? (Y/N) **N** Voucher? (Y/N) **N** Salamanders Observed? (Y/N) **N** Voucher? (Y/N) **N**

Frogs or Tadpoles Observed? (Y/N) **Y** Voucher? (Y/N) **N** Aquatic Macroinvertebrates Observed? (Y/N) **Y** Voucher? (Y/N) **Y**

Comments Regarding Biology:

Water depth too shallow to support fish

DRAWING AND NARRATIVE DESCRIPTION OF STREAM REACH (This must be completed):

Include important landmarks and other features of interest for site evaluation and a narrative description of the stream's location

FLOW ➔

Save as pdf Reset Form

Enter Site Name or ID Harmon Run @ RM 2.1 (UT to Aurora Br. @ RM 14.61); Page Rd. Date: 10/05/11

PHWH STREAM BIOLOGICAL CHARATERISTICS FIELD SHEET:

1. Fish:

Voucher Specimens Retained? (select) N Time Spent (minutes): 19

Sample Method Electrofishing Stream Length Assessed (meters) 61

Species	Number Caught	Notes
Creek Chub	90	
Central Stoneroller	8	
White Sucker	23	
Blank	0	
Pumpinseed	51	
Bluntnose minnow	24	
Yellow bullhead	3	
	0	

2. Salamanders:

Voucher Specimens Retained? (circle) N Time Spent (minutes): 19

Sample Method Electrofishing Stream Length Assessed (meters) 61.0

Species *(Genus)*	# Larvae	# Juveniles/Adults	Total Number
Mountain Dusky (*Desmognathus ochrophaeus*)	0	0	0
Northern Dusky (*Desmognathus fuscus*)	0	0	0
Two-lined (*Eurycea bislineata*)	0	0	0
Long-tailed (*Eurycea longicauda*)	0	0	0
Cave (*Eurycea lucifuga*)	0	0	0
Red (*Pseudotriton ruber*)	0	0	0
Mud (*Pseudotriton montanus*)	0	0	0
Spring (*Gyrinophilus porphyriticus*)	0	0	0
Mole spp. (*Ambystoma spp.*)	0	0	0
Four-toed (*Hemidactylium scutatum*)	0	0	0
Other (name) green frogs	0	6	6
Total	0	6	6

Notes on Vertebrates:

3. Macroinvertebrate Scoring Sheet:

THE HEADWATER MACROINVERTEBRATE FIELD EVALUATION INDEX (HMFEI) SCORING SHEET

Indicate Abundance of Each Taxa Above each White Box.

Record HMFEI Scoring Value Points Within each Box.

For EPT taxa, also indicate the different taxa present.

Key: V = Very Abundant (> 50); **A** = Abundant (10 -50); **C** = Common (3 -9); **R** = Rare (< 3)

Sessile Animals (**Porifera, Cnidaria, Bryozoa**) (HMFEI pts = 1)	R	1	Crayfish (**Decapoda**) (HMFEI pts = 2)	NA	0	Fishfly Larvae (**Corydalidae**) (HMFEI pts = 3)	NA	0
Aquatic Worms (**Turbellaria, Hirudinea, Oligochaeta**) (HMFEI pts = 1)	R	1	Dragonfly Nymphs (**Anisoptera**) (HMFEI pts = 2)	C	2	Water Penny Beetles (**Psephenidae**) (HMFEI pts = 3)	NA	0
Sow Bugs (**Isopoda**) (HMFEI pts = 1)	NA	0	Riffle Beetles (**Dryopidae, Elmidae, Ptilodactylidae**) (HMFEI pts = 2)	NA	0	Cranefly Larvae (**Tipulidae**) (HMFEI pts = 3)	NA	0
Scuds (**Amphipoda**) (HMFEI pts = 1)	NA	0	Larvae of other Flies (enter name in comments) (**Diptera**): (HMFEI pts = 1)	NA	0	**EPT TAXA*** Total No. EPT Taxa = 1		
Water Mites (**Hydracarina**) (HMFEI pts = 1)	NA	0	Midges (**Chironomidae**) (HMFEI pts = 1)	NA	0	Mayfly Nymphs (**Ephemeroptera**) Taxa Present: 0 [HMFEI pts = No. Taxa (x) 3]	NA	0
Damselfly Nymphs (**Zygoptera**) (HMFEI pts = 1)	C	1	Snails (**Gastropoda**) (HMFEI pts = 1)	C	1			
Alderfly Larvae (**Sialidae**) (HMFEI pts = 1)	NA	0	Clams (**Bivalvia**) (HMFEI pts = 1)	C	1	Stonefly Nymphs (**Plecoptera**) Taxa Present: 0 [HMFEI pts = No. Taxa (x) 3]	NA	0
Other Beetles (**Coleoptera**) (HMFEI pts = 1)	C	1	Other Taxa : Sigora					
Other Taxa:			Other Taxa:			Caddisfly Larvae (**Trichoptera**) Taxa Present: 1 [HMFEI pts = No. Taxa (x) 3]	C	3
Other Taxa:			Other Taxa					

*Note: EPT identification based upon Family or Genus level of taxonomy

Voucher Sample ID_____ Time Spent (minutes):_____

Notes on Macroinvertebrates: (Predominant Organisms; Other Common Organisms; Diversity Estimate)

~~Beetles common and diverse. Damselfies common and diverse~~

Final HMFEI Calculated Score (Sum of All White Box Scores) = **11**

IF Final HMFEI Score is > 19, Then CLASS III PHWH STREAM
IF Final HMFEI Score is 7 to 19, Then CLASS II PHWH STREAM
IF Final HMFEI Score is < 7, Then CLASS I PHWH STREAM

Save as pdf

Reset Form

Enter Site Name or ID Unnamed Tributary to Harmon Run @ RM 2.0 Date: 10/05/11

PHWH STREAM BIOLOGICAL CHARATERISTICS FIELD SHEET:

1. Fish:

Voucher Specimens Retained? (select) N Time Spent (minutes):_____

Sample Method No Evaluation Stream Length Assessed (meters) _____

Species	Number Caught	Notes
Blank	0	
Blank	0	
Blank	0	
Blank	0	
	0	
	0	
	0	
	0	

2. Salamanders:

Voucher Specimens Retained? (circle) N Time Spent (minutes): 20

Sample Method Dip Net + Hand Sorting Stream Length Assessed (meters) 61.0

Species *(Genus)*	# Larvae	# Juveniles/Adults	Total Number
Mountain Dusky (*Desmognathus ochrophaeus*)	0	0	0
Northern Dusky (*Desmognathus fuscus*)	0	0	0
Two-lined (*Eurycea bislineata*)	0	0	0
Long-tailed (*Eurycea longicauda*)	0	0	0
Cave (*Eurycea lucifuga*)	0	0	0
Red (*Pseudotriton ruber*)	0	0	0
Mud (*Pseudotriton montanus*)	0	0	0
Spring (*Gyrinophilus porphyriticus*)	0	0	0
Mole spp. (*Ambystoma spp.*)	0	0	0
Four-toed (*Hemidactylium scutatum*)	0	0	0
Other (name)	0	0	0
Total	0	0	0

Notes on Vertebrates: _____

3. Macroinvertebrate Scoring Sheet:

THE HEADWATER MACROINVERTEBRATE FIELD EVALUATION INDEX (HMFEI) SCORING SHEET

Indicate Abundance of Each Taxa Above each White Box.

Record HMFEI Scoring Value Points Within each Box.

For EPT taxa, also indicate the different taxa present.

Key: V = Very Abundant (> 50); **A** = Abundant (10 -50); **C** = Common (3 -9); **R** = Rare (< 3)

Sessile Animals (**Porifera, Cnidaria, Bryozoa**) (HMFEI pts = 1)	C	1	Crayfish (**Decapoda**) (HMFEI pts = 2)	NA	0	Fishfly Larvae (**Corydalidae**) (HMFEI pts = 3)	NA	0
Aquatic Worms (**Turbellaria, Hirudinea, Oligochaeta**) (HMFEI pts = 1)	A	1	Dragonfly Nymphs (**Anisoptera**) (HMFEI pts = 2)	NA	0	Water Penny Beetles (**Psephenidae**) (HMFEI pts = 3)	NA	0
Sow Bugs (**Isopoda**) (HMFEI pts = 1)	NA	0	Riffle Beetles (**Dryopidae, Elmidae, Ptilodactylidae**) (HMFEI pts = 2)	R	2	Cranefly Larvae (**Tipulidae**) (HMFEI pts = 3)	NA	0
Scuds (**Amphipoda**) (HMFEI pts = 1)	NA	0	Larvae of other Flies (enter name in comments) (**Diptera**): (HMFEI pts = 1)	C	1	**EPT TAXA*** Total No. EPT Taxa = 4		
Water Mites (**Hydracarina**) (HMFEI pts = 1)	NA	0	Midges (**Chironomidae**) (HMFEI pts = 1)	R	1	Mayfly Nymphs (**Ephemeroptera**) Taxa Present: 3 [HMFEI pts = No. Taxa (x) 3]	C	9
Damselfly Nymphs (**Zygoptera**) (HMFEI pts = 1)	A	1	Snails (**Gastropoda**) (HMFEI pts = 1)	R	1			
Alderfly Larvae (**Sialidae**) (HMFEI pts = 1)	NA	0	Clams (**Bivalvia**) (HMFEI pts = 1)	R	1	Stonefly Nymphs (**Plecoptera**) Taxa Present: 0 [HMFEI pts = No. Taxa (x) 3]	NA	0
Other Beetles (**Coleoptera**) (HMFEI pts = 1)	NA	0	Other Taxa : nemertes					
Other Taxa:			Other Taxa:			Caddisfly Larvae (**Trichoptera**) Taxa Present: 1 [HMFEI pts = No. Taxa (x) 3]	C	3
Other Taxa:			Other Taxa					

*Note: EPT identification based upon Family or Genus level of taxonomy

Voucher Sample ID_____ Time Spent (minutes):_____

Notes on Macroinvertebrates: (Predominant Organisms; Other Common Organisms; Diversity Estimate)

Blackflies predominant; Baetids Heptagenids common

Final HMFEI Calculated Score (Sum of All White Box Scores) = **21**

IF Final HMFEI Score is > 19, Then CLASS III PHWH STREAM
IF Final HMFEI Score is 7 to 19, Then CLASS II PHWH STREAM
IF Final HMFEI Score is < 7, Then CLASS I PHWH STREAM

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SOLOMON RUN

DAM REMOVAL AND STREAM RESTORATION

Project Baseline Stream Monitoring

PROJECT NAME: SOLOMON RUN DAM REMOVAL AND STREAM RESTORATION

Project Baseline Stream Monitoring

PROJECT NUMBER: 11(h)EPA-11
STREAM SAMPLED: Solomon Run

SUMMARY

This nonpoint source funded project involves the removal of a low-head dam and restoring approximately 2,400 linear feet of Solomon Run. Restoration activities include removal and beneficial use of sediments from the former dam pool, natural channel design, bio-engineering methods, planting native grasses, shrubs, and trees, and installation of two instream habitat structures.

Of the three sites sampled in Solomon Run during 2011, only one location (RM 2.9 – downstream station) was partially attaining the Warmwater Habitat (WWH) biological criteria. The most upstream background location (RM 4.1) and the impounded site (RM 3.3) were in non-attainment of the WWH biocriteria, with both fish and macroinvertebrate communities reflective of poor to fair water quality. At the upstream station, natural low flow conditions along with excessive nutrients contributed to the impaired quality of the biological communities. The reduced habitat diversity at the proposed restoration area/impounded section included a bottom dominated by soft muck material, stagnant flow conditions due to lack of riffles and runs, and a sparse level of instream cover beneficial to aquatic organisms. Poor habitat conditions in the impoundment contributed to the non-attainment of the biocriteria. The interstitial flow conditions observed at RM 2.9 impaired the quality of the macroinvertebrate community.

AQUATIC LIFE USE ATTAINMENT – SOLOMON RUN 2011.

The Index of Biotic Integrity (IBI) and Invertebrate Community Index (ICI) scores are based on the performance of the biological community. Narrative ranges are used with macroinvertebrate results when quantitative data are not available. The Qualitative Habitat Evaluation Index (QHEI) is a measure of the ability of the physical habitat to support a biological community. Stream sites are located in the Interior Plateau (IP) ecoregion. In the Ohio Water Quality Standards, Solomon Run is designated Warmwater Habitat (WWH). Underlined results represent poor or very poor conditions.

Sample Site River Mile	Attainment Status	IBI	ICI	QHEI	Biological Assessment
RM 4.1	**NON**	26*	Low Fair*	46.8 (fair)	Poor/ Low Fair
RM 3.3	**NON**	34*	Low Fair*	32.3 (poor)	Fair/ Low Fair
RM 2.9	**PARTIAL**	36[ns]	Low Fair*	65.0 (good)	Marginally Good/ Low Fair

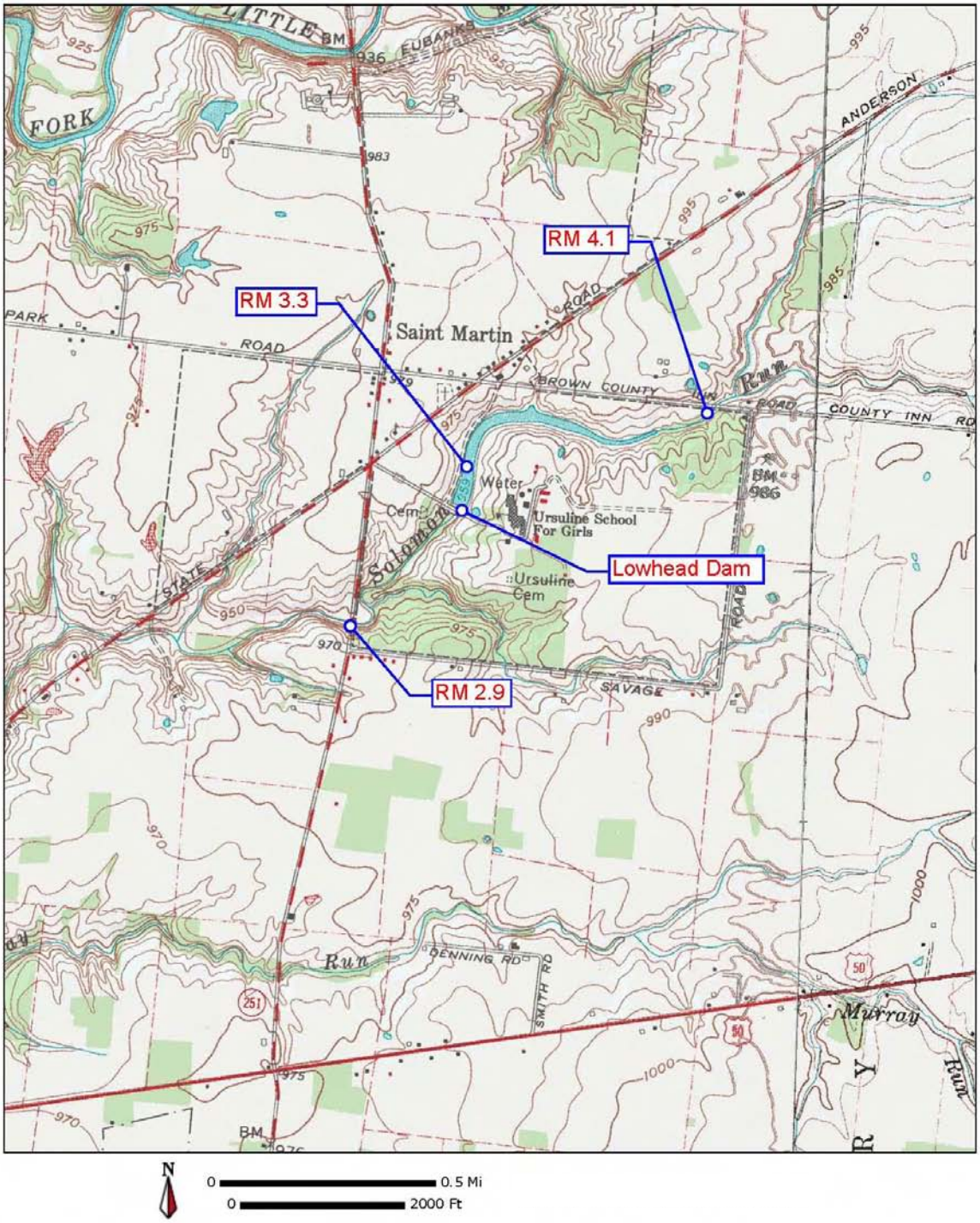
Ecoregion Biocriteria: Interior Plateau (IP)	
INDEX – SITE TYPE	WWH
IBI: Headwater	40
ICI	30

* Significant departure from biocriterion (>4 IBI or ICI units).
[ns] Nonsignificant departure from biocriterion (≤4 IBI or ICI units).

Sampling locations in Solomon Run, 2011.

River Mile	Latitude	Longitude	Landmark
4.1	39.21377	-83.87933	Upstream St. Martin @ Brown County Inn Road
3.3	39.21000	-83.89000	Impoundment at Ursulines of Brown County
2.9	39.20610	-83.89440	South of St. Martin @ SR 251

Solomon Run Sampling Locations, 2011



APPENDICES – SOLOMON RUN PROJECT

Appendix Table 1. Qualitative Habitat Evaluation Index (QHEI) scores for Solomon Run.

Appendix Table 2. Index of Biotic Integrity (IBI) scores and metrics for Solomon Run.

Appendix Table 3. Ohio EPA fish results for Solomon Run.

Appendix Table 4. Ohio EPA macroinvertebrate results for Solomon Run.

Appendix Table 1. Qualitative Habitat Evaluation Index (QHEI) scores and physical attributes for fish sampling sites in Solomon Creek, 2011.

			WWH Attributes											MWH 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**																														
Solomon Creek Year: 2011																																
4.1	**46.8**	Fair	■	■									2			◆	◆	◆	3		●			●		●	●	●	●		●	7
3.3	**32.3**	Poor	■								■		2		◆	◆	◆		3		●			●				●	●		●	5
2.9	**65.0**	Good	■	■		■		■		■	■	■	7			◆			1					●				●				2

Appendix Table 2. Index of Biotic Integrity (IBI) scores and metrics for Solomon Run, 2011.

				Number of						Percent of Individuals						
River Mile	Type	Date	Drainage area (sq mi)	Total species	Minnow species	Headwater species	Sensitive species	Darter & Sculpin species	Simple Lithophils	Tolerant fishes	Omni-vores	Pioneering fishes	Insect-ivores	DELT anomalies	Rel.No. minus tolerants /(0.3km)	IBI
Solomon Run - (11-147)																
Year: 2011																
4.10	E	08/24/2011	3.7	6(3)	1(1)	0(1)	0(1)	0(1)	0(1)	67(1)	21(3)	30(3)	70(5)	0.0(5)	33(1) *	26
3.30	E	08/24/2011	4.1	3(1)	0(1)	0(1)	0(1)	0(1)	0(1)	1(5)	1(5)	0(5)	97(5)	0.0(5)	349(3)	34
2.90	E	08/24/2011	5.0	16(5)	7(5)	1(1)	3(3)	3(3)	4(3)	70(1)	21(3)	72(1)	29(3)	0.0(5)	262(3)	36

♦ - IBI is low end adjusted.

* - < 200 Total individuals in sample

** - < 50 Total individuals in sample

● - One or more species excluded from IBI calculation.

River Code: **11-147**	Stream: **Solomon Run**	Sample Date: **2011**
River Mile: **4.10**	Location: Brown County Inn Rd.	Date Range: 08/24/2011
Time Fished: 660 sec	Drainage: 3.7 sq mi	
Dist Fished: 0.10 km	Basin: Little Miami River No of Passes: 1	Sampler Type: E

Species Name / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Goldfish	G	O	M	T	5	15.00	15.15			
Bluntnose Minnow	N	O	C	T	2	6.00	6.06			
Yellow Bullhead		I	C	T	7	21.00	21.21			
Black Bullhead		I	C	P	3	9.00	9.09			
Largemouth Bass	F	C	C		2	6.00	6.06			
Green Sunfish	S	I	C	T	8	24.00	24.24			
Bluegill Sunfish	S	I	C	P	5	15.00	15.15			
Green Sf X Bluegill Sf					1	3.00	3.03			
	Mile Total				33	99.00				
	Number of Species				7					
	Number of Hybrids				1					

River Code: **11-147**	Stream: **Solomon Run**	Sample Date: **2011**
River Mile: **3.30**	Location: Ursulines dam impoundment	Date Range: 08/24/2011
Time Fished: 1196 sec	Drainage: 4.1 sq mi	
Dist Fished: 0.23 km	Basin: Little Miami River No of Passes: 1	Sampler Type: E

Species Name / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Common Carp	G	O	M	T	3	3.91	1.11			
White Crappie	S	I	C		24	31.30	8.86			
Largemouth Bass	F	C	C		6	7.83	2.21			
Bluegill Sunfish	S	I	C	P	238	310.44	87.82			
Mile Total					271	353.48				
Number of Species					4					
Number of Hybrids					0					

River Code: **11-147**	Stream: **Solomon Run**	Sample Date: **2011**
River Mile: **2.90**	Location: St. Rt. 251	Date Range: 08/24/2011
Time Fished: 1740 sec	Drainage: 5.0 sq mi	
Dist Fished: 0.15 km	Basin: Little Miami River No of Passes: 1	Sampler Type: E

Species Name / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
White Sucker	W	O	S	T	4	8.00	0.90			
Creek Chub	N	G	N	T	178	356.00	40.27			
Scarlet Shiner	N	I	S	M	11	22.00	2.49			
Striped Shiner	N	I	S		23	46.00	5.20			
Spotfin Shiner	N	I	M		3	6.00	0.68			
Silverjaw Minnow	N	I	M		4	8.00	0.90			
Bluntnose Minnow	N	O	C	T	87	174.00	19.68			
Central Stoneroller	N	H	N		37	74.00	8.37			
Yellow Bullhead		I	C	T	2	4.00	0.45			
Largemouth Bass	F	C	C		5	10.00	1.13			
Green Sunfish	S	I	C	T	40	80.00	9.05			
Bluegill Sunfish	S	I	C	P	14	28.00	3.17			
Longear Sunfish	S	I	C	M	5	10.00	1.13			
Green Sf X Bluegill Sf					1	2.00	0.23			
Johnny Darter	D	I	C		9	18.00	2.04			
Rainbow Darter	D	I	S	M	11	22.00	2.49			
Fantail Darter	D	I	C		8	16.00	1.81			
	Mile Total				442	884.00				
	Number of Species				16					
	Number of Hybrids				1					

Appendix Table 4. Ohio EPA/DSW Ecological Assessment Section
Macroinvertebrate Collection

Site: Solomon Run
Brown County Inn Rd.

Collection Date: 08/24/2011 River Code: 11-147 RM: 4.10

Taxa Code	Taxa	Quant/Qual
04664	*Helobdella stagnalis*	+
04935	*Erpobdella punctata punctata*	+
04960	*Mooreobdella sp*	+
05900	*Lirceus sp*	+
13521	*Stenonema femoratum*	+
17200	*Caenis sp*	+
22001	*Coenagrionidae*	+
23501	*Aeshnidae*	+
28001	*Libellulidae*	+
43570	*Neoplea sp*	+
44501	*Corixidae*	+
60900	*Peltodytes sp*	+
68201	*Scirtidae*	+
69400	*Stenelmis sp*	+
72900	*Culex sp*	+
78655	*Procladius (Holotanypus) sp*	+
83000	*Dicrotendipes sp*	+
84210	*Paratendipes albimanus or P. duplicatus*	+
84540	*Polypedilum (Tripodura) scalaenum group*	+
84800	*Tribelos jucundum*	+
85800	*Tanytarsus sp*	+
94400	*Fossaria sp*	+
95100	*Physella sp*	+
95900	*Gyraulus sp*	+
96002	*Helisoma anceps anceps*	+
96264	*Planorbella (Pierosoma) pilsbryi*	+
96900	*Ferrissia sp*	+

Taxa Code	Taxa	Quant/Qual

No. Quantitative Taxa: 0 Total Taxa: 27
No. Qualitative Taxa: 27 ICI:
Number of Organisms: 0 Qual EPT: 2

Appendix Table 4. Ohio EPA/DSW Ecological Assessment Section Macroinvertebrate Collection

Site: Solomon Run
Ursulines dam impoundment

Collection Date: 08/24/2011 River Code: 11-147 RM: 3.30

Taxa Code	Taxa	Quant/Qual
01801	*Turbellaria*	+
03600	*Oligochaeta*	+
04666	*Helobdella triserialis*	+
04960	*Mooreobdella sp*	+
08601	*Hydrachnidia*	+
11200	*Callibaetis sp*	+
17200	*Caenis sp*	+
22001	*Coenagrionidae*	+
27610	*Epitheca (Tetragoneuria) cynosura*	+
28001	*Libellulidae*	+
28208	*Erythemis simplicicollis*	+
42700	*Belostoma sp*	+
43570	*Neoplea sp*	+
44501	*Corixidae*	+
54200	*Orthotrichia sp*	+
60900	*Peltodytes sp*	+
67800	*Tropisternus sp*	+
72900	*Culex sp*	+
74501	*Ceratopogonidae*	+
77355	*Clinotanypus pinguis*	+
78200	*Larsia sp*	+
78655	*Procladius (Holotanypus) sp*	+
82820	*Cryptochironomus sp*	+
83002	*Dicrotendipes modestus*	+
83158	*Endochironomus nigricans*	+
84155	*Paralauterborniella nigrohalteralis*	+
84520	*Polypedilum (Tripodura) halterale group*	+
84540	*Polypedilum (Tripodura) scalaenum group*	+
95100	*Physella sp*	+
96264	*Planorbella (Pierosoma) pilsbryi*	+

Taxa Code	Taxa	Quant/Qual

No. Quantitative Taxa: 0 Total Taxa: 30
No. Qualitative Taxa: 30 ICI:
Number of Organisms: 0 Qual EPT: 3

Appendix Table 4. Ohio EPA/DSW Ecological Assessment Section
Macroinvertebrate Collection

Site: Solomon Run
St. Rt. 251

Collection Date: 08/24/2011 River Code: 11-147 RM: 2.90

Taxa Code	Taxa	Quant/Qual	Taxa Code	Taxa	Quant/Qual
01801	*Turbellaria*	+			
03600	*Oligochaeta*	+			
04666	*Helobdella triserialis*	+			
04935	*Erpobdella punctata punctata*	+			
04960	*Mooreobdella sp*	+			
05900	*Lirceus sp*	+			
08250	*Orconectes (Procericambarus) rusticus*	+			
08601	*Hydrachnidia*	+			
13400	*Stenacron sp*	+			
13521	*Stenonema femoratum*	+			
17200	*Caenis sp*	+			
22001	*Coenagrionidae*	+			
27307	*Epitheca (Epicordulia) princeps*	+			
28208	*Erythemis simplicicollis*	+			
64050	*Liodessus sp*	+			
69400	*Stenelmis sp*	+			
77355	*Clinotanypus pinguis*	+			
78655	*Procladius (Holotanypus) sp*	+			
83040	*Dicrotendipes neomodestus*	+			
84210	*Paratendipes albimanus or P. duplicatus*	+			
93200	*Hydrobiidae*	+			
93900	*Elimia sp*	+			
95100	*Physella sp*	+			
96002	*Helisoma anceps anceps*	+			
96264	*Planorbella (Pierosoma) pilsbryi*	+			

No. Quantitative Taxa: 0 Total Taxa: 25
No. Qualitative Taxa: 25 ICI:
Number of Organisms: 0 Qual EPT: 3

SWIF PROJECTS

PROJECT BASELINE MONITORING

DOAN BROOK

RESTORING A WETLAND WITH NATIVE SPECIES

Project Baseline Stream Monitoring

PROJECT NAME: DOAN BROOK – RESTORING A WETLAND WITH NATIVE SPECIES

Project Baseline Stream Monitoring

PROJECT NUMBER: 10SWIF-CUY-047
STREAM SAMPLED: Doan Brook

SUMMARY

Funding for this project will be used to restore the 5 acre wetland area located at the Nature Center at Shaker Lakes. Doan Brook flows into and exits this wetland at the nature center. Restoration activities include removal of non-native invasive species, which prior to restoration, comprised 99 percent of the wetland area. It is anticipated that restoring this wetland will have a significant impact on Doan Brook by improving flood control and water quality of this Lake Erie tributary.

Biological sampling sites in Doan Brook were located upstream (RM 6.1) and downstream (RM 5.5) from the Shaker Lakes wetland. Both sampling locations were in non-attainment of the WWH biological criteria listed in the Ohio Water Quality Standards. Biological results were largely reflective of poor water quality. Although physical habitat quality was considered good at both Doan Brook sampling locations, moderate to extensively embedded bottom substrates were noted. Sources of biological impairment in Doan Brook included embedded substrates and organic enrichment caused by the highly urbanized watershed and combined sewer overflows.

AQUATIC LIFE USE ATTAINMENT – DOAN BROOK 2011.

The Index of Biotic Integrity (IBI) and Invertebrate Community Index (ICI) scores are based on the performance of the biological community. Narrative ranges are used with macroinvertebrate results when quantitative data are not available. The Qualitative Habitat Evaluation Index (QHEI) is a measure of the ability of the physical habitat to support a biological community. Stream sites are located in the Erie Ontario Lake Plain (EOLP) ecoregion. In the Ohio Water Quality Standards, Doan Brook is designated Warmwater Habitat (WWH). Underlined results reflect poor or very poor conditions.

Sample Site River Mile	Attainment Status	IBI	ICI	QHEI	Biological Assessment
RM 6.1	**NON**	24*	Low Fair*	63.0 (good)	Poor/Low Fair
RM 5.5	**NON**	18*	Poor*	64.0 (good)	Poor

Ecoregion Biocriteria: Erie Ontario Lake Plain (EOLP)	
INDEX – SITE TYPE	WWH
IBI: Headwater	40
ICI	34

* Significant departure from biocriterion (>4 IBI or ICI units).

Sampling locations in Doan Brook, 2011.

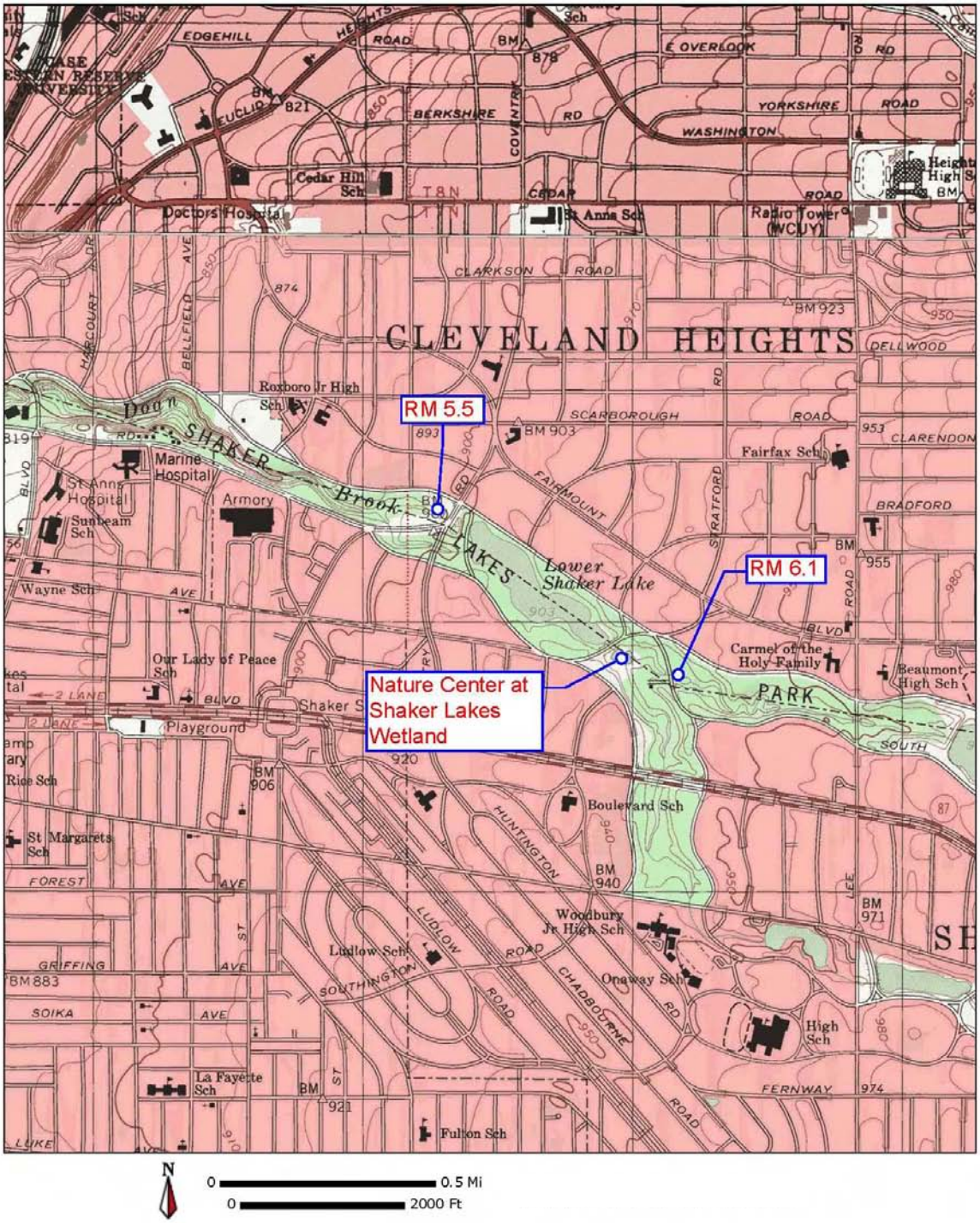
River Mile	Latitude	Longitude	Landmark
6.1	41.48518	-81.57276	South Park Blvd., upstream Shaker Lakes wetland
5.5	41.49096	-81.58421	Coventry Road, downstream Shaker Lakes wetland

NATURE CENTER AT SHAKER LAKES – WETLAND ASSESSMENT

The Shaker Lakes wetland was monitored for ecological condition using the Vegetation Index of Biotic Integrity (VIBI). VIBI scores range from 0 to 100, with a higher score indicating higher ecological quality. A VIBI calculation based on pre-restoration plant collections conducted by the Nature Center at Shaker Lakes was performed by Ohio EPA. In addition, Ohio EPA conducted a plant assessment in June 2011 to assess the ecological quality of the wetland after cattails and other invasive species from the main area of the wetland were physically removed and chemically treated during 2010. The Ohio EPA 2011 plant collections and VIBI metric calculations are attached. The 2011 VIBI-emergent score calculated was 47, and the score calculated using the pre-restoration data (2010) was 0. A substantial improvement in ecological condition occurred in the wetland over a one year time period. The VIBI score and ecological quality of the wetland should continue to rise as the species diversity improves over the years.

A	CG	CH
monitoring event	NWCA	NWCA
date	8-Jun-11	8-Jun-11
site	SHAKHTS	SHAKHTS
	value	VIBI-E
Carex	2	3
Cyperaceae	9	n/a
dicot	21	7
shade	6	n/a
shrub	2	3
hydrophyte	33	10
SVP	0	n/a
A/P ratio	0.6667	0
FQAI	15.4	7
%bryophyte	0.0000	n/a
%hydrophyte	0.0091	n/a
%sensitive	0.0334	3
%tolerant	0.8429	0
%invasive graminoids	0.0486	7
small tree	0.0000	n/a
subcanopy IV	0.0000	n/a
canopy IV	0.0000	n/a
biomass	268	7
stems/ha wetland trees	0	n/a
stems/ha wetland shrubs	40	n/a
%unvegetated	0.3020	n/a
%buttonbush	0.0008	n/a
%perennial native hydrophytes	0.5129	n/a
%adventives	0.1995	n/a
%open water	0.000	n/a
%unvegetated open water	0.000	n/a
%bare ground	0.000	n/a
	SCORE	47

Doan Brook Sampling Locations, 2011



APPENDICES – DOAN BROOK/ WETLAND PROJECT

Appendix Table 1. Qualitative Habitat Evaluation Index (QHEI) scores for Doan Brook.

Appendix Table 2. Index of Biotic Integrity (IBI) scores and metrics for Doan Brook.

Appendix Table 3. Ohio EPA fish results for Doan Brook.

Appendix Table 4. Ohio EPA macroinvertebrate results for Doan Brook.

Appendix Table 5. Wetland plant community species with sensitivity, native status, and wetland indicator status for the Nature Center at Shaker Lakes wetland, June 2011.

Appendix Table 6. Raw VIBI cover data for the Nature Center at Shaker Lakes wetland, June 2011.

Appendix Table 1. Qualitative Habitat Evaluation Index (QHEI) scores and physical attributes for fish sampling sites in Doan Brook, 2011.

			WWH Attributes																												
Key QHEI Components																															
River Mile	**QHEI**	**Habitat Rating**	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**
														High Influence						*Moderate Influence*											
Doan Brook Year: 2011																															
6.1	**63.0**	Good	■	■			■	■			■		5				◆		1					●				●	●	●		4
5.5	**64.0**	Good	■			■	■	■			■		5			◆	◆		2		●			●				●	●	●		5

Appendix Table 2. Index of Biotic Integrity (IBI) scores and metrics for Doan Brook, 2011.

				Number of						Percent of Individuals						
River Mile	Type	Date	Drainage area (sq mi)	Total species	Minnow species	Headwater species	Sensitive species	Darter & Sculpin species	Simple Lithophils	Tolerant fishes	Omni-vores	Pioneering fishes	Insect-ivores	DELT anomalies	Rel.No. minus tolerants /(0.3km)	IBI
Doan Brook - (19-039)																
Year: 2011																
6.10	E	09/01/2011	1.4	4(3)	3(3)	1(1)	0(1)	0(1)	1(1)	99(1)	0(5)	67(1)	2(1)	0.0(5)	11(1)	24
5.50	E	09/01/2011	4.4	4(1)	3(3)	1(1)	0(1)	0(1)	1(1)	100(1)	2(5)	97(1)	5(1)	5.1(1)	5(1)	18

♦ - IBI is low end adjusted.

* - < 200 Total individuals in sample

** - < 50 Total individuals in sample

● - One or more species excluded from IBI calculation.

River Code: **19-039**	Stream: **Doan Brook**	Sample Date: **2011**
River Mile: **6.10**	Location: South Park Rd.	Date Range: 09/01/2011
Time Fished: 1714 sec	Drainage: 1.4 sq mi	
Dist Fished: 0.11 km	Basin: Cuyahoga River No of Passes: 1	Sampler Type: E

Species Name / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Western Blacknose Dace	N	G	S	T	253	690.00	32.73			
Creek Chub	N	G	N	T	504	1,374.55	65.20			
Central Stoneroller	N	H	N		4	10.91	0.52			
Green Sunfish	S	I	C	T	12	32.73	1.55			
	Mile Total				773	2,108.18				
	Number of Species				4					
	Number of Hybrids				0					

River Code: **19-039**	Stream: **Doan Brook**	Sample Date: **2011**
River Mile: **5.50**	Location: Coventry Rd.	Date Range: 09/01/2011
Time Fished: 1422 sec	Drainage: 4.4 sq mi	
Dist Fished: 0.11 km	Basin: Cuyahoga River No of Passes: 1	Sampler Type: E

Species Name / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Goldfish	G	O	M	T	9	24.55	1.45			
Western Blacknose Dace	N	G	S	T	9	24.55	1.45			
Creek Chub	N	G	N	T	569	1,551.82	91.48			
Central Stoneroller	N	H	N		2	5.46	0.32			
Green Sunfish	S	I	C	T	33	90.00	5.31			
	Mile Total				622	1,696.36				
	Number of Species				5					
	Number of Hybrids				0					

Appendix Table 4. Ohio EPA/DSW Ecological Assessment Section
Macroinvertebrate Collection

Site: Doan Brook
South Park Rd.

Collection Date: 09/01/2011 River Code: 19-039 RM: 6.10

Taxa Code	Taxa	Quant/Qual
01801	*Turbellaria*	+
03360	*Plumatella sp*	+
03600	*Oligochaeta*	+
04901	*Erpobdellidae*	+
06700	*Crangonyx sp*	+
11120	*Baetis flavistriga*	+
21200	*Calopteryx sp*	+
22001	*Coenagrionidae*	+
52200	*Cheumatopsyche sp*	+
52530	*Hydropsyche depravata group*	+
78350	*Meropelopia sp*	+
78655	*Procladius (Holotanypus) sp*	+
82820	*Cryptochironomus sp*	+
84210	*Paratendipes albimanus or P. duplicatus*	+
95100	*Physella sp*	+
98200	*Pisidium sp*	+
98600	*Sphaerium sp*	+

Taxa Code	Taxa	Quant/Qual

No. Quantitative Taxa: 0 Total Taxa: 17
No. Qualitative Taxa: 17 ICI:
Number of Organisms: 0 Qual EPT: 3

Appendix Table 4. Ohio EPA/DSW Ecological Assessment Section Macroinvertebrate Collection

Site: Doan Brook
Coventry Rd.

Collection Date: 09/01/2011 River Code: 19-039 RM: 5.50

Taxa Code	Taxa	Quant/Qual
00556	*Ephydatia fluviatilis*	+
01801	*Turbellaria*	+
03121	*Paludicella articulata*	+
03360	*Plumatella sp*	+
03600	*Oligochaeta*	+
04666	*Helobdella triserialis*	+
04935	*Erpobdella punctata punctata*	+
04960	*Mooreobdella sp*	+
05800	*Caecidotea sp*	+
06700	*Crangonyx sp*	+
11130	*Baetis intercalaris*	+
22300	*Argia sp*	+
52530	*Hydropsyche depravata group*	+
83300	*Glyptotendipes (G.) sp*	+
84450	*Polypedilum (Uresipedilum) flavum*	+
92615	*Cipangopaludina japonica*	+
93200	*Hydrobiidae*	+
95100	*Physella sp*	+
98600	*Sphaerium sp*	+
99001	*Unionidae*	+

Taxa Code	Taxa	Quant/Qual

No. Quantitative Taxa: 0 Total Taxa: 20
No. Qualitative Taxa: 20 ICI:
Number of Organisms: 0 Qual EPT: 2

Appendix Table 5. Wetland plant community species with sensitivity, native status, and wetland indicator status for the Nature Center at Shaker Lakes wetland, June 2011.

Site	date	species	C of C	nativity	common	indicator	totcov	sitecov	relcov
Shaker Heights Nature Center	23-Aug-11	Carex scoparia	3	native	POINTED BROOM SEDGE	FACW	0.01	6.5903	0.00152
Shaker Heights Nature Center	23-Aug-11	Lysimachia nummularia	0	adventive	MONEYWORT	OBL	0.005	6.5903	0.00076
Shaker Heights Nature Center	23-Aug-11	Myosotis scorpioides	0	adventive	TRUE FORGET-ME-NOT	OBL	0.01	6.5903	0.00152
Shaker Heights Nature Center	23-Aug-11	Polygonum lapathifolium	1	native	DOCK-LEAVED SMARTWEED	FACW+	0.005	6.5903	0.00076
Shaker Heights Nature Center	23-Aug-11	Cephalanthus occidentalis	6	native	BUTTONBUSH	OBL	0.005	6.5903	0.00076
Shaker Heights Nature Center	23-Aug-11	Schoenoplectus tabernaemontani	2	native	SOFT-STEMMED BULRUSH	OBL	0.0301	6.5903	0.00457
Shaker Heights Nature Center	23-Aug-11	Echinochloa muricata	3	native	ROUGH BARNYARD GRASS	FACW+	0.015	6.5903	0.00228
Shaker Heights Nature Center	23-Aug-11	Asclepias incarnata	4	native	SWAMP MILKWEED	OBL	0.01	6.5903	0.00152
Shaker Heights Nature Center	23-Aug-11	Epilobium hirsutum	0	adventive	HAIRY WILOW-HERB	FACW	0.125	6.5903	0.01897
Shaker Heights Nature Center	23-Aug-11	Pilea pumila	2	native	CLEARWEED	FACW	0.005	6.5903	0.00076
Shaker Heights Nature Center	23-Aug-11	Lobelia cardinalis	5	native	CARDINAL-FLOWER	FACW+	0.02	6.5903	0.00303
Shaker Heights Nature Center	23-Aug-11	Cyperus esculentus	0	native	YELLOW NUT-SEDGE	FACW	0.01	6.5903	0.00152
Shaker Heights Nature Center	23-Aug-11	Eleocharis obtusa	1	native	BLUNT SPIKE-RUSH	OBL	0.005	6.5903	0.00076
Shaker Heights Nature Center	23-Aug-11	Juncus effusus	1	native	SOFT RUSH	FACW+	0.005	6.5903	0.00076
Shaker Heights Nature Center	23-Aug-11	Rorippa palustris	2	native	YELLOW CRESS	OBL	0.015	6.5903	0.00228
Shaker Heights Nature Center	23-Aug-11	Panicum virgatum	4	native	SWITCH GRASS	FAC	0.01	6.5903	0.00152
Shaker Heights Nature Center	23-Aug-11	Amaranthus sp.	*	ND	ND	ND	0.01	6.5903	0.00152
Shaker Heights Nature Center	23-Aug-11	Carex comosa	2	native	BEARDED SEDGE	OBL	0.05	6.5903	0.00759
Shaker Heights Nature Center	23-Aug-11	Bidens frondosa	2	native	DEVIL'S BEGGAR'S-TICK	FACW	0.005	6.5903	0.00076
Shaker Heights Nature Center	23-Aug-11	Cyperus bipartitus	3	native	UMBRELLA-SEDGE	FACW+	0.005	6.5903	0.00076
Shaker Heights Nature Center	23-Aug-11	Daucus carota	0	adventive	QUEEN-ANNE'S-LACE	UPL	0.005	6.5903	0.00076
Shaker Heights Nature Center	23-Aug-11	Impatiens capensis	2	native	SPOTTED TOUCH-ME-NOT	FACW	0.005	6.5903	0.00076
Shaker Heights Nature Center	23-Aug-11	Sagittaria latifolia	1	native	COMMON ARROWHEAD	OBL	0.6	6.5903	0.09104
Shaker Heights Nature Center	23-Aug-11	Typha angustifolia	0	adventive	NARROW-LEAVED CAT-TAIL	OBL	0.32	6.5903	0.04856
Shaker Heights Nature Center	23-Aug-11	Pontederia cordata	6	native	PICKEREL-WEED	OBL	0.18	6.5903	0.02731
Shaker Heights Nature Center	23-Aug-11	Cyperus erythrorhizos	4	native	RED-ROOTED UMBRELLA-SEDGE	FACW+	0.32	6.5903	0.04856
Shaker Heights Nature Center	23-Aug-11	Cyperus odoratus	4	native	RUSTY UMBRELLA-SEDGE	FACW	0.22	6.5903	0.03338
Shaker Heights Nature Center	23-Aug-11	Polygonum hydropiper	1	native	WATER-PEPPER	OBL	1.1	6.5903	0.16691
Shaker Heights Nature Center	23-Aug-11	Echinochloa crusgalli	0	adventive	BARNYARD GRASS	FACU	0.11	6.5903	0.01669
Shaker Heights Nature Center	23-Aug-11	Lythrum salicaria	0	adventive	PURPLE LOOSESTRIFE	FACW+	0.62	6.5903	0.09408
Shaker Heights Nature Center	23-Aug-11	Polygonum persicaria	0	adventive	LADY'S THUMB	FACW	0.08	6.5903	0.01214
Shaker Heights Nature Center	23-Aug-11	Alisma subcordatum	2	native	SOUTHERN WATER-PLANTAIN	OBL	0.02	6.5903	0.00303
Shaker Heights Nature Center	23-Aug-11	Bidens cernua	3	native	NODDING BEGGAR'S-TICK	OBL	0.03	6.5903	0.00455
Shaker Heights Nature Center	23-Aug-11	Leersia oryzoides	1	native	RICE CUT GRASS	OBL	2.225	6.5903	0.33762
Shaker Heights Nature Center	23-Aug-11	Iris virginica	6	native	SOUTHERN BLUE FLAG	OBL	0.025	6.5903	0.00379
Shaker Heights Nature Center	23-Aug-11	Calystegia Sepium	1	native	HEDGE BINDWEED	FAC-	0.1	6.5903	0.01517
Shaker Heights Nature Center	23-Aug-11	Acalypha rhomboidea	0	native	RHOMBIC THREE-S. MERCURY	FACU-	0.0001	6.5903	0.00002
Shaker Heights Nature Center	23-Aug-11	Sparganium eurycarpum	4	native	GIANT BUR-REED	OBL	0.075	6.5903	0.01138
Shaker Heights Nature Center	23-Aug-11	Verbena hastata	4	native	BLUE VERVAIN	FACW+	0.015	6.5903	0.00228
Shaker Heights Nature Center	23-Aug-11	Polygonum cespitosum	0	adventive	LONG-BRISTLED SMARTWEED	FACU-	0.01	6.5903	0.00152
Shaker Heights Nature Center	23-Aug-11	Verbena urticifolia	3	native	WHITE VERVAIN	FACU	0.0001	6.5903	0.00002
Shaker Heights Nature Center	23-Aug-11	Eclipta prostrata	3	native	YERBA-DE-TAJO	FAC	0.015	6.5903	0.00228
Shaker Heights Nature Center	23-Aug-11	Polygonum sagittatum	2	native	ARROW-LEAVED TEARTHUMB	OBL	0.03	6.5903	0.00455
Shaker Heights Nature Center	23-Aug-11	Populus deltoides	3	native	EASTERN COTTONWOOD	FAC	0.05	6.5903	0.00759
Shaker Heights Nature Center	23-Aug-11	Rumex crispus	0	adventive	CURLY DOCK	FACU	0.005	6.5903	0.00076
Shaker Heights Nature Center	23-Aug-11	Juncus torreyi	3	native	TORREY'S RUSH	FACW	0.005	6.5903	0.00076
Shaker Heights Nature Center	23-Aug-11	Cornus amomum	2	native	SILKY DOGWOOD	FACW	0.015	6.5903	0.00228
Shaker Heights Nature Center	23-Aug-11	Salix fragilis	0	adventive	CRACK WILLOW	FAC+	0.005	6.5903	0.00076
Shaker Heights Nature Center	23-Aug-11	Boehmeria cylindrica	4	native	FALSE NETTLE	FACW+	0.005	6.5903	0.00076
Shaker Heights Nature Center	23-Aug-11	Setaria faberi	0	adventive	GIANT FOXTAIL GRASS	UPL	0.005	6.5903	0.00076
Shaker Heights Nature Center	23-Aug-11	decodon verticillatus	6	native	SWAMP LOOSESTRIFE	OBL	0.005	6.5903	0.00076
Shaker Heights Nature Center	23-Aug-11	Solanum dulcamara	0	adventive	BITTERSWEET NIGHTSHADE	FAC-	0.005	6.5903	0.00076
Shaker Heights Nature Center	23-Aug-11	Fragaria sp.	*	ND	ND	ND	0.005	6.5903	0.00076
Shaker Heights Nature Center	23-Aug-11	Arctium minus	0	adventive	COMMON BURDOCK	FACU-	0.005	6.5903	0.00076
Shaker Heights Nature Center	23-Aug-11	Nyssa sylvatica	7	native	BLACK-GUM	FAC	0.005	6.5903	0.00076
Shaker Heights Nature Center	23-Aug-11	Rumex obtusifolius	0	adventive	BITTER DOCK	FACU-	0.005	6.5903	0.00076
Shaker Heights Nature Center	23-Aug-11	Cyperus strigosus	1	native	STRAW-COLORED UMBRELLA-S.	FACW	0.005	6.5903	0.00076

Appendix Table 6. Raw VIBI cover data for the Nature Center at Shaker Lakes wetland, June 2011.

			mod #	corner #	mod #	corner #	mod #	corner #	mod #	corner #	mod #	corner #	mod #	corner #	mod #	corner #	mod #	corner #	mod #	corner #
			2	2	2	4	3	2	3	4	8	2	8	4	9	2	9	4	R	R
Site			depth	covcode	depth	covcode	depth	covcode	depth	covcode	depth	covcode	depth	covcode	depth	covcode	depth	covcode	depth	covcode
Shaker Heights Nature Center	23-Aug-11	species	1				1				1				1					
		Carex scoparia		2	1							2	1						R	
		Lysimachia nummularia		2	1														R	
		Myosotis scorpioides		2	1		2	2											R	
		Unknown dicot 2		2	1														R	
		Polygonum lapathifolium		2	1														R	
		Cephalanthus occidentalis		2	1														R	
		Schoenoplectus tabernaemontani		3	1		2	1								3	1		R	
		Echinochloa muricata		2	1		3	2	3							2	1		R	
		Asclepias incarnata		2	1											2	1		R	
		Epilobium hirsutum		4	2		2	5	2		2	3							R	
		Pilea pumila					3					2	2						R	
		Lobelia cardinalis					2	3				2	1						R	
		Cyperus esculentus					2	2				2	1						R	
		Eleocharis obtusa						2	2										R	
		Juncus effusus						2	1										R	
		Rorippa palustris						2	1			2	1			2	2		R	
		Panicum virgatum										2	2			2	1		R	
		Amaranthus sp.		2	1							2	2						R	
		Carex comosa										3	1			4	1		R	
		Bidens frondosa										2	1						R	
		Cyperus bipartitus														2	1		R	
		Daucus carota																	R	2
		Impatiens capensis																	R	2
		Sagittaria latifolia	4	5			4	6	2		4	6				6	2		R	
		Typha angustifolia	4	4			3	6	4		4	5			4	4			R	
		Pontederia cordata	4	5	2			4	4			4	1			4	2		R	
		Cyperus erythrorhizos	2	6	4		3	4	3		2	4	3		2	5	2		R	
		Cyperus odoratus	2	4	2			5	2		2	4	3		2	5	2		R	
		Polygonum hydropiper	2	7	4		4	6	3		2	7	4		3	6			R	
		Echinochloa crusgalli	2	3			2	3	3			2	1		3	5			R	
		Lythrum salicaria	2	4			4	7	2		2	6	2			4	2		R	
		Polygonum persicaria	2	2	4		3	2			2	4	2			4	2		R	
		Alisma subcordatum	2	2	2			2	2			2	1		3	2			R	
		Bidens cernua	2	3	3		2	2	4		2	2	2			2	1		R	
		Leersia oryzoides	2	7	4		3	8	4		3	9	4		4	7			R	
		Iris sp.		3	4							2	1			2	2		R	
		Calystegia Sepium		4	4		3	3			2	4	4		2	3	2		R	
		Acalypha rhomboidea		1	4														R	
		Sparganium eurycarpum		5	3														R	
		Verbena hastata		2	2			2	1			2	1						R	
		Polygonum cespitosum		2	2							2	4						R	
		Verbena urticifolia		1	2														R	
		Eclipta prostrata		2	1			2	1							2	2		R	
		Polygonum sagittatum		2	1		3	3			2	2	4			2	2		R	
		Populus deltoides		4	1			2	2			2	1		3	2	2		R	
		Rumex crispus		2	1														R	
		Juncus torreyi																	R	2
		Cornus amomum																	R	3
		Salix fragilis																	R	2
		Boehmeria cylindrica																	R	2
		Setaria faberi																	R	2
		decodon verticillatus																	R	2
		Solanum dulcamara																	R	2
		Fragaria sp.																	R	2
		Arctium minus																	R	2
		Nyssa sylvatica																	R	2
		Rumex obtusifolius																	R	2
		Cyperus strigosus																	R	2

GREEN STABILIZATION OF RIPARIAN AREA ALONG THE CHAGRIN RIVER IN HUNTING VALLEY

Project Baseline Stream Monitoring

PROJECT NAME: GREEN STABILIZATION OF RIPARIAN AREA, CHAGRIN RIVER IN HUNTING VALLEY

Project Baseline Stream Monitoring

PROJECT NUMBER: 10SWIF-GLRI-CUY-068
STREAM SAMPLED: Chagrin River

SUMMARY

Funding for this project will be used to install vegetative rip-rap to restore vegetation and to stabilize 400 linear feet of severely eroding streambank on the Chagrin River along Chagrin River Road in Hunting Valley, Ohio. The project will use a green practice, vegetative rip-rap (bioengineering) in an area that has been a perennial erosion problem.

At all three stations sampled in the Chagrin River, good to excellent physical habitat conditions were present and good to exceptional biological communities were documented in 2010 and 2011. These three sites (RMs 20.1, 19.9, and 19.7) fully attained the Warmwater Habitat (WWH) biological criteria listed in the Ohio Water Quality Standards. River habitat at the proposed restoration site was reduced in quality compared to the upstream site. This reduced habitat quality was most noted in two characteristics - heavy/severe erosion on the left bank (proposed work area) and moderate substrate embeddedness. Completion of this project will help to maintain the good to exceptional biological integrity of the lower Chagrin River.

AQUATIC LIFE USE ATTAINMENT – CHAGRIN RIVER 2010 AND 2011.

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. Stream sites are located in Erie Ontario Lake Plain (EOLP) ecoregion. In the Ohio Water Quality Standards, the Chagrin River is designated Warmwater Habitat (WWH) within the study area. VG=very good.

Sample Site River Mile	Attainment Status	IBI	MIwb	ICI	QHEI	Biological Assessment
RM 20.1 - 2010	**FULL**	46	8.7	48	86.3 (excellent)	Good/Exceptional
RM 20.1 - 2011	**FULL**	46	8.7	VG	86.8 (excellent)	Good/Very Good
RM 19.9 - 2010	**FULL**	46	8.2	50	72.0 (good)	Good/Exceptional
RM 19.9 - 2011	**FULL**	45	8.0	42	72.5 (good)	Good/ Very Good
RM 19.7 - 2010	**FULL**	50	9.0	50	81.3 (excellent)	Very Good/Exceptional
RM 19.7 - 2011	**FULL**	50	9.2	34	82.8 (excellent)	Very Good/Good

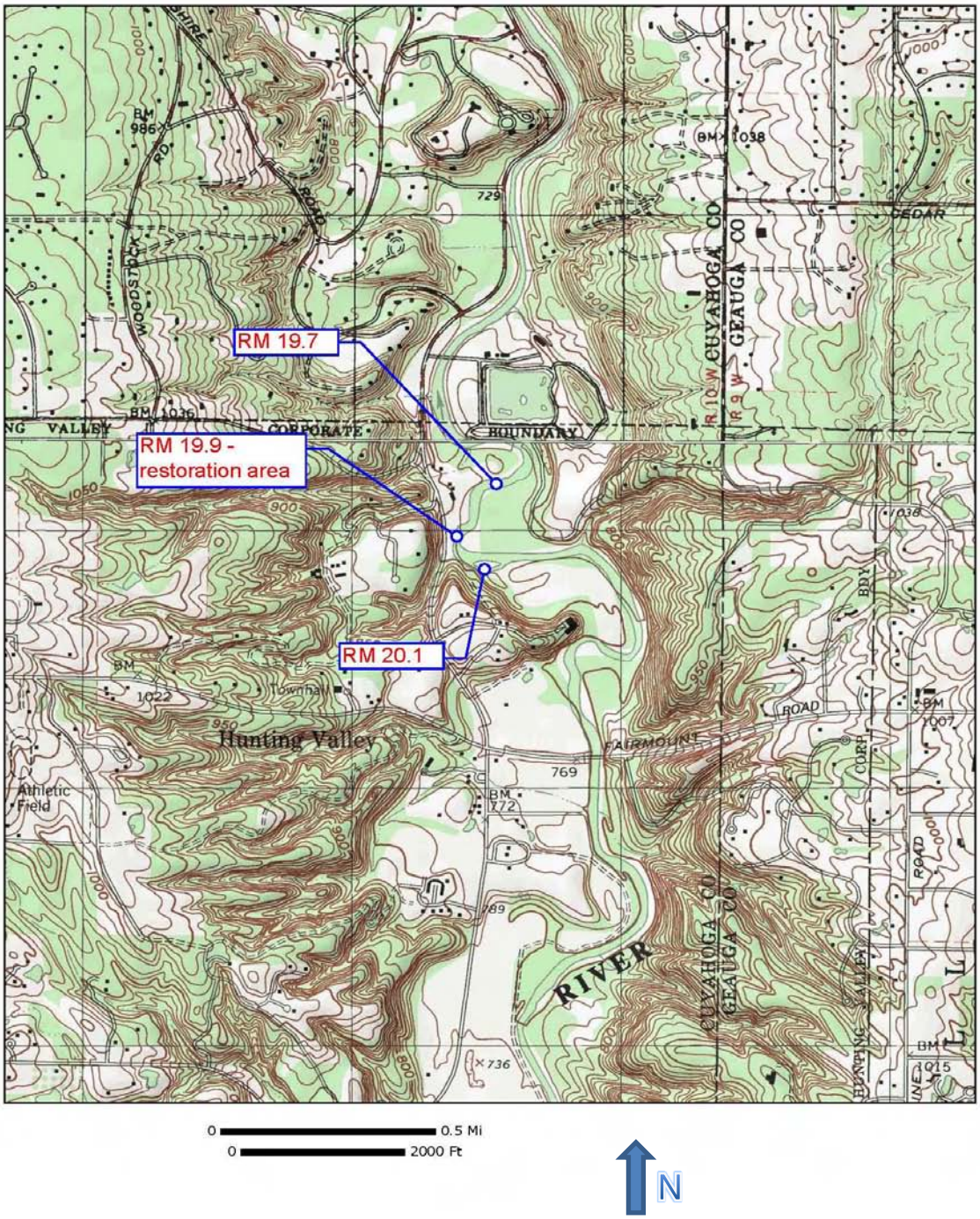
Ecoregion Biocriteria: Erie Ontario Lake Plain (EOLP)		
INDEX – SITE TYPE	WWH	EWH
IBI: Wading	38	50
MIwb: Wading	7.9	9.4
ICI	34	46

[ns] Nonsignificant departure from biocriterion (≤4 IBI or ICI units, ≤0.5 MIwb units).
* Significant departure from biocriterion (>4 IBI or ICI units, >0.5 MIwb units).

Sampling locations in the Chagrin River, 2010/2011.

River Mile	Latitude	Longitude	Landmark
20.1	41.49550	-81.40150	Immediately upstream Hunting Valley riparian restoration area
19.9	41.49700	-81.40260	Hunting Valley riparian restoration area
19.7	41.49880	-81.40070	Immediately downstream Hunting Valley riparian restoration area

Chagrin River Sampling Locations, 2010/2011



APPENDICES – CHAGRIN RIVER PROJECT

Appendix Table 1. Qualitative Habitat Evaluation Index (QHEI) scores for the Chagrin River.

Appendix Table 2. Index of Biotic Integrity (IBI) scores and metrics for the Chagrin River.

Appendix Table 3. Ohio EPA fish results for the Chagrin River.

Appendix Table 4. Invertebrate Community Index (ICI) scores and metrics for the Chagrin River.

Appendix Table 5. Ohio EPA macroinvertebrate results for the Chagrin River.

Appendix Table 1. Qualitative Habitat Evaluation Index (QHEI) scores and physical attributes for fish sampling sites in the Chagrin River, 2010 and 2011.

			WWH Attributes																												
Key QHEI Components																															
River Mile	**QHEI**	**Habitat Rating**	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**
														MWH Attributes																	
														High Influence						*Moderate Influence*											
Chagrin River Year: 2010 and 2011																															
20.1 ('10)	**86.3**	Excellent	■	■		■	■	■	■	■	■	■	9						0												0
20.1 ('11)	**86.8**	Excellent	■	■		■	■	■	■	■	■	■	9						0												0
19.9 ('10)	**72.0**	Good	■	■		■		■			■		5						0		●		●		●			●	●	●		6
19.9 ('11)	**72.5**	Good	■	■		■		■			■		5						0		●		●		●			●	●	●		6
19.7 ('10)	**81.3**	Excellent	■	■		■	■	■	■	■	■	■	9						0		●				●				●			3
19.7 ('11)	**82.8**	Excellent	■	■		■	■	■	■	■	■	■	9						0		●				●				●			3

Appendix Table 2. Index of Biotic Integrity (IBI) scores and metrics for the Chagrin River, 2010 and 2011.

				Number of					Percent of Individuals								
River Mile	Type	Date	Drainage area (sq mi)	Total species	Sunfish species	Sucker species	Intolerant species	Darter species	Simple Lithophils	Tolerant fishes	Omni-vores	Top carnivores	Insect-ivores	DELT anomalies	Rel.No. minus tolerants /(0.3km)	IBI	Modified Iwb
Chagrin River - (15001)																	
Year: 2011																	
20.10	D	07/18/2011	156	21(3)	3(3)	3(3)	4(3)	3(3)	68(5)	17(5)	16(5)	4.0(3)	74(5)	0.0(5)	530(3)	46	8.7
20.10	D	08/31/2011	156	21(3)	4(5)	4(3)	4(3)	2(1)	60(5)	5(5)	4(5)	6.3(5)	80(5)	0.2(5)	698(3)	48	8.7
19.90	D	08/31/2011	156	20(3)	4(5)	2(1)	4(3)	2(1)	49(5)	11(5)	11(5)	2.2(3)	85(5)	0.0(5)	660(3)	44	8.2
19.90	D	07/18/2011	156	20(3)	2(3)	3(3)	4(3)	3(3)	59(5)	3(5)	3(5)	1.9(3)	90(5)	0.0(5)	311(3)	46	7.8
19.70	D	08/31/2011	157	22(3)	4(5)	3(3)	4(3)	2(1)	54(5)	11(5)	12(5)	6.2(5)	66(5)	0.0(5)	708(3)	48	9.0
19.70	D	07/18/2011	157	25(5)	5(5)	3(3)	5(3)	3(3)	56(5)	7(5)	6(5)	1.8(3)	77(5)	0.0(5)	1112(5)	52	9.4
Year: 2010																	
20.10	D	08/26/2010	156	15(3)	2(3)	2(1)	3(3)	2(1)	69(5)	4(5)	4(5)	5.4(5)	82(5)	0.0(5)	1094(5)	46	8.7
19.90	D	08/26/2010	156	20(3)	4(5)	2(1)	3(3)	2(1)	50(5)	8(5)	7(5)	8.4(5)	82(5)	0.3(5)	539(3)	46	8.2
19.70	D	08/26/2010	157	20(3)	4(5)	2(1)	4(3)	3(3)	73(5)	9(5)	9(5)	7.2(5)	79(5)	0.0(5)	1218(5)	50	9.0

na - Qualitative data, Modified Iwb not applicable.

♦ - IBI is low end adjusted.

* - < 200 Total individuals in sample

** - < 50 Total individuals in sample

● - One or more species excluded from IBI calculation.

River Code: **15-001**	Stream: **Chagrin River**	Sample Date: **2010**
River Mile: **20.10**	Location: upst. Hunting Valley project site	Date Range: 08/26/2010
Time Fished: 2312 sec	Drainage: 156.0 sq mi	
Dist Fished: 0.20 km	Basin: Chagrin River No of Passes: 1	Sampler Type: D

Species Name / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Northern Hog Sucker	R	I	S	M	290	435.00	38.21	32.44	64.05	74.58
White Sucker	W	O	S	T	9	13.50	1.19	3.00	5.93	222.38
River Chub	N	I	N	I	66	99.00	8.70	1.19	2.34	11.97
Rosyface Shiner	N	I	S	I	59	88.50	7.77	0.17	0.33	1.88
Common Shiner	N	I	S		129	193.50	17.00	1.70	3.36	8.81
Spotfin Shiner	N	I	M		20	30.00	2.64	0.10	0.19	3.25
Sand Shiner	N	I	M	M	14	21.00	1.84	0.07	0.14	3.29
Bluntnose Minnow	N	O	C	T	21	31.50	2.77	0.09	0.17	2.76
Central Stoneroller	N	H	N		69	103.50	9.09	0.70	1.39	6.79
Stonecat Madtom		I	C	I	5	7.50	0.66	0.10	0.20	13.40
Rock Bass	S	C	C		9	13.50	1.19	1.82	3.60	134.89
Smallmouth Bass	F	C	C	M	32	48.00	4.22	9.14	18.05	190.50
Bluegill Sunfish	S	I	C	P	2	3.00	0.26	0.02	0.05	8.00
Greenside Darter	D	I	S	M	3	4.50	0.40	0.03	0.06	6.67
Rainbow Darter	D	I	S	M	31	46.50	4.08	0.08	0.15	1.61
	Mile Total				759	1,138.50		50.65		
	Number of Species				15					
	Number of Hybrids				0					

River Code: **15-001**	Stream: **Chagrin River**	Sample Date: **2011**
River Mile: **20.10**	Location: upst. Hunting Valley project site	Date Range: 07/18/2011
Time Fished: 4461 sec	Drainage: 156.0 sq mi	Thru: 08/31/2011
Dist Fished: 0.40 km	Basin: Chagrin River No of Passes: 2	Sampler Type: D

Species Name / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Black Redhorse	R	I	S	I	4	3.00	0.44	1.03	3.27	343.75
Golden Redhorse	R	I	S	M	2	1.50	0.22	0.54	1.71	360.00
Northern Hog Sucker	R	I	S	M	279	209.25	30.43	15.54	49.31	74.26
White Sucker	W	O	S	T	69	51.75	7.52	4.30	13.65	83.14
River Chub	N	I	N	I	79	59.25	8.62	1.18	3.73	19.82
Western Blacknose Dace	N	G	S	T	1	0.75	0.11	0.00	0.01	3.00
Rosyface Shiner	N	I	S	I	34	25.50	3.71	0.10	0.31	3.85
Striped Shiner	N	I	S		3	2.25	0.33	0.04	0.11	15.67
Common Shiner	N	I	S		171	128.25	18.65	1.26	4.00	9.83
Spotfin Shiner	N	I	M		58	43.50	6.32	0.21	0.66	4.78
Sand Shiner	N	I	M	M	19	14.25	2.07	0.04	0.13	2.95
Silverjaw Minnow	N	I	M		12	9.00	1.31	0.05	0.15	5.17
Bluntnose Minnow	N	O	C	T	21	15.75	2.29	0.09	0.27	5.43
Central Stoneroller	N	H	N		70	52.50	7.63	0.34	1.07	6.44
Yellow Bullhead		I	C	T	6	4.50	0.65	0.33	1.06	74.33
Stonecat Madtom		I	C	I	3	2.25	0.33	0.06	0.18	25.33
Rock Bass	S	C	C		9	6.75	0.98	0.81	2.56	119.44
Smallmouth Bass	F	C	C	M	39	29.25	4.25	5.40	17.14	184.62
Green Sunfish	S	I	C	T	2	1.50	0.22	0.02	0.05	10.50
Bluegill Sunfish	S	I	C	P	11	8.25	1.20	0.08	0.27	10.18
Pumpkinseed Sunfish	S	I	C	P	1	0.75	0.11	0.03	0.08	34.00
Greenside Darter	D	I	S	M	6	4.50	0.65	0.04	0.13	9.00
Rainbow Darter	D	I	S	M	17	12.75	1.85	0.04	0.14	3.45
Fantail Darter	D	I	C		1	0.75	0.11	0.00	0.00	2.00
	Mile Total				917	687.75		31.51		
	Number of Species				24					
	Number of Hybrids				0					

River Code: **15-001**	Stream: **Chagrin River**	Sample Date: **2010**
River Mile: **19.90**	Location: adj. Hunting Valley project site	Date Range: 08/26/2010
Time Fished: 1999 sec	Drainage: 156.0 sq mi	
Dist Fished: 0.20 km	Basin: Chagrin River No of Passes: 1	Sampler Type: D

Species Name / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Northern Hog Sucker	R	I	S	M	129	193.50	32.99	8.24	52.37	42.58
White Sucker	W	O	S	T	3	4.50	0.77	0.15	0.95	33.33
River Chub	N	I	N	I	9	13.50	2.30	0.59	3.74	43.63
Bigeye Chub	N	I	S	I	26	39.00	6.65	0.15	0.95	3.81
Rosyface Shiner	N	I	S	I	4	6.00	1.02	0.02	0.10	2.50
Common Shiner	N	I	S		29	43.50	7.42	0.45	2.84	10.28
Spotfin Shiner	N	I	M		4	6.00	1.02	0.02	0.11	3.00
Sand Shiner	N	I	M	M	41	61.50	10.49	0.17	1.05	2.68
Silverjaw Minnow	N	I	M		61	91.50	15.60	0.20	1.25	2.15
Bluntnose Minnow	N	O	C	T	25	37.50	6.39	0.12	0.78	3.24
Central Stoneroller	N	H	N		8	12.00	2.05	0.15	0.97	12.75
Yellow Bullhead		I	C	T	1	1.50	0.26	0.01	0.05	5.00
Rock Bass	S	C	C		5	7.50	1.28	0.55	3.51	73.60
Smallmouth Bass	F	C	C	M	28	42.00	7.16	4.59	29.16	109.22
Green Sunfish	S	I	C	T	3	4.50	0.77	0.10	0.60	21.00
Bluegill Sunfish	S	I	C	P	6	9.00	1.53	0.14	0.91	15.83
Pumpkinseed Sunfish	S	I	C	P	2	3.00	0.51	0.07	0.41	21.50
Yellow Perch			M		1	1.50	0.26	0.01	0.07	7.00
Greenside Darter	D	I	S	M	2	3.00	0.51	0.02	0.10	5.00
Rainbow Darter	D	I	S	M	4	6.00	1.02	0.02	0.10	2.50
	Mile Total				391	586.50		15.73		
	Number of Species				20					
	Number of Hybrids				0					

River Code: **15-001**	Stream: **Chagrin River**	Sample Date: **2011**
River Mile: **19.90**	Location: adj. Hunting Valley project site	Date Range: 07/18/2011
Time Fished: 4170 sec	Drainage: 156.0 sq mi	Thru: 08/31/2011
Dist Fished: 0.40 km	Basin: Chagrin River No of Passes: 2	Sampler Type: D

Species Name / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Golden Redhorse	R	I	S	M	1	0.75	0.14	0.32	3.09	425.00
Northern Hog Sucker	R	I	S	M	216	162.00	30.42	5.64	54.54	34.79
White Sucker	W	O	S	T	13	9.75	1.83	1.61	15.60	165.38
River Chub	N	I	N	I	20	15.00	2.82	0.27	2.61	17.95
Bigeye Chub	N	I	S	I	64	48.00	9.01	0.19	1.84	3.97
Creek Chub	N	G	N	T	1	0.75	0.14	0.00	0.01	1.00
Rosyface Shiner	N	I	S	I	6	4.50	0.85	0.02	0.16	3.67
Common Shiner	N	I	S		42	31.50	5.92	0.37	3.58	11.74
Spotfin Shiner	N	I	M		3	2.25	0.42	0.01	0.07	3.00
Sand Shiner	N	I	M	M	141	105.75	19.86	0.20	1.96	1.91
Silverjaw Minnow	N	I	M		47	35.25	6.62	0.09	0.89	2.61
Bluntnose Minnow	N	O	C	T	47	35.25	6.62	0.13	1.23	3.61
Central Stoneroller	N	H	N		20	15.00	2.82	0.06	0.59	4.05
Stonecat Madtom		I	C	I	8	6.00	1.13	0.23	2.23	38.38
White Crappie	S	I	C		7	5.25	0.99	0.36	3.46	68.00
Smallmouth Bass	F	C	C	M	12	9.00	1.69	0.44	4.27	49.02
Largemouth Bass	F	C	C		3	2.25	0.42	0.03	0.28	12.67
Green Sunfish	S	I	C	T	2	1.50	0.28	0.01	0.09	6.00
Bluegill Sunfish	S	I	C	P	24	18.00	3.38	0.19	1.82	10.46
Pumpkinseed Sunfish	S	I	C	P	5	3.75	0.70	0.04	0.41	11.20
Green Sf X Bluegill Sf					2	1.50	0.28	0.08	0.73	50.00
Johnny Darter	D	I	C		1	0.75	0.14	0.00	0.01	1.00
Greenside Darter	D	I	S	M	8	6.00	1.13	0.03	0.31	5.38
Rainbow Darter	D	I	S	M	17	12.75	2.39	0.03	0.26	2.12
	Mile Total				710	532.50		10.33		
	Number of Species				23					
	Number of Hybrids				1					

River Code: **15-001**	Stream: **Chagrin River**	Sample Date: **2010**
River Mile: **19.70**	Location: dst. Hunting Valley project site	Date Range: 08/26/2010
Time Fished: 2476 sec	Drainage: 157.0 sq mi	
Dist Fished: 0.20 km	Basin: Chagrin River No of Passes: 1	Sampler Type: D

Species Name / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Northern Hog Sucker	R	I	S	M	315	472.50	35.43	25.17	56.47	53.26
White Sucker	W	O	S	T	28	42.00	3.15	2.91	6.53	69.25
River Chub	N	I	N	I	49	73.50	5.51	1.37	3.07	18.65
Bigeye Chub	N	I	S	I	4	6.00	0.45	0.02	0.05	3.75
Rosyface Shiner	N	I	S	I	43	64.50	4.84	0.16	0.36	2.50
Common Shiner	N	I	S		167	250.50	18.79	1.81	4.05	7.21
Spotfin Shiner	N	I	M		11	16.50	1.24	0.06	0.14	3.82
Sand Shiner	N	I	M	M	4	6.00	0.45	0.02	0.05	4.00
Bluntnose Minnow	N	O	C	T	48	72.00	5.40	0.33	0.74	4.56
Central Stoneroller	N	H	N		50	75.00	5.62	0.96	2.15	12.80
Stonecat Madtom		I	C	I	7	10.50	0.79	0.14	0.31	13.29
Rock Bass	S	C	C		14	21.00	1.57	1.15	2.58	54.64
Smallmouth Bass	F	C	C	M	48	72.00	5.40	9.69	21.75	134.62
Largemouth Bass	F	C	C		2	3.00	0.22	0.05	0.11	16.50
Green Sunfish	S	I	C	T	1	1.50	0.11	0.02	0.05	15.00
Bluegill Sunfish	S	I	C	P	7	10.50	0.79	0.12	0.27	11.43
Pumpkinseed Sunfish	S	I	C	P	1	1.50	0.11	0.02	0.04	12.00
Johnny Darter	D	I	C		2	3.00	0.22	0.01	0.02	3.00
Greenside Darter	D	I	S	M	27	40.50	3.04	0.29	0.66	7.26
Rainbow Darter	D	I	S	M	61	91.50	6.86	0.27	0.60	2.90
	Mile Total				889	1,333.50		44.57		
	Number of Species				20					
	Number of Hybrids				0					

River Code: **15-001**	Stream: **Chagrin River**	Sample Date: **2011**
River Mile: **19.70**	Location: dst. Hunting Valley project site	Date Range: 07/18/2011
Time Fished: 5890 sec	Drainage: 157.0 sq mi	Thru: 08/31/2011
Dist Fished: 0.40 km	Basin: Chagrin River No of Passes: 2	Sampler Type: D

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	3.75	0.38	0.27	0.93	71.20
Quillback	C	O	M		3	2.25	0.23	0.04	0.14	18.33
Black Redhorse	R	I	S	I	1	0.75	0.08	0.17	0.59	225.00
Northern Hog Sucker	R	I	S	M	321	240.75	24.23	12.48	43.47	51.85
White Sucker	W	O	S	T	17	12.75	1.28	2.06	7.18	161.76
Common Carp	G	O	M	T	4	3.00	0.30	4.22	14.69	1,406.25
River Chub	N	I	N	I	82	61.50	6.19	0.66	2.31	10.78
Bigeye Chub	N	I	S	I	8	6.00	0.60	0.03	0.11	5.13
Western Blacknose Dace	N	G	S	T	4	3.00	0.30	0.01	0.03	2.50
Creek Chub	N	G	N	T	1	0.75	0.08	0.00	0.01	2.00
Rosyface Shiner	N	I	S	I	51	38.25	3.85	0.13	0.44	3.29
Common Shiner	N	I	S		169	126.75	12.75	1.69	5.89	13.35
Spotfin Shiner	N	I	M		21	15.75	1.58	0.09	0.33	5.95
Sand Shiner	N	I	M	M	99	74.25	7.47	0.18	0.62	2.38
Silverjaw Minnow	N	I	M		3	2.25	0.23	0.01	0.03	3.33
Bluntnose Minnow	N	O	C	T	83	62.25	6.26	0.29	1.00	4.60
Central Stoneroller	N	H	N		200	150.00	15.09	2.28	7.95	15.22
Stonecat Madtom		I	C	I	17	12.75	1.28	0.25	0.88	19.72
White Crappie	S	I	C		1	0.75	0.08	0.09	0.31	118.00
Rock Bass	S	C	C		8	6.00	0.60	0.56	1.93	92.50
Smallmouth Bass	F	C	C	M	37	27.75	2.79	2.40	8.36	86.49
Largemouth Bass	F	C	C		2	1.50	0.15	0.06	0.19	36.50
Green Sunfish	S	I	C	T	3	2.25	0.23	0.08	0.27	34.33
Bluegill Sunfish	S	I	C	P	22	16.50	1.66	0.14	0.47	8.18
Pumpkinseed Sunfish	S	I	C	P	4	3.00	0.30	0.05	0.18	17.25
Green Sf X Bluegill Sf					1	0.75	0.08	0.03	0.10	38.00
Greenside Darter	D	I	S	M	57	42.75	4.30	0.27	0.94	6.28
Rainbow Darter	D	I	S	M	100	75.00	7.55	0.19	0.68	2.59
Fantail Darter	D	I	C		1	0.75	0.08	0.00	0.00	1.00
	Mile Total				1,325	993.75		28.72		
	Number of Species				28					
	Number of Hybrids				1					

Appendix Table 4. Invertebrate Community Index (ICI) scores and metrics for the Chagrin River, 2010 and 2011.

River Mile	Drainage Area (sq mi)	Number of: Total Taxa	Mayfly Taxa	Caddisfly Taxa	Dipteran Taxa	Percent: Mayflies	Caddis-flies	Tany-tarsini	Other Dipt/NI	Tolerant Organisms	Qual. EPT	Eco-region	ICI
Chagrin River (15-001)													
Year: 2011													
19.90	156.0	39(6)	10(6)	7(6)	12(2)	9.4(2)	41.0(6)	13.9(2)	34.9(4)	0.4(6)	10(2)	3	42
19.70	157.0	43(6)	6(4)	5(6)	24(6)	4.7(2)	10.6(4)	7.3(2)	75.8(0)	11.6(2)	9(2)	3	34
Year: 2010													
20.10	156.0	29(4)	6(4)	5(6)	10(2)	33.9(6)	29.2(6)	19.8(4)	16.5(6)	0.0(6)	11(4)	3	48
19.90	156.0	36(4)	8(4)	5(6)	15(4)	41.4(6)	25.9(6)	18.7(4)	12.8(6)	0.7(6)	14(4)	3	50
19.70	157.0	40(6)	6(4)	5(6)	20(6)	30.3(4)	34.4(6)	14.5(2)	20.0(6)	1.7(6)	12(4)	3	50

Ohio EPA/DSW Ecological Assessment Section
Macroinvertebrate Collection

Site: Chagrin River
upst. Hunting Valley project site

Collection Date: 08/31/2011 River Code: 15-001 RM: 20.10

Taxa Code	Taxa	Quant/Qual
01801	*Turbellaria*	+
04960	*Mooreobdella sp*	+
05800	*Caecidotea sp*	+
06700	*Crangonyx sp*	+
08250	*Orconectes (Procericambarus) rusticus*	+
11014	*Acentrella turbida*	+
11120	*Baetis flavistriga*	+
11130	*Baetis intercalaris*	+
12200	*Isonychia sp*	+
13100	*Nixe sp*	+
13400	*Stenacron sp*	+
13561	*Maccaffertium pulchellum*	+
21200	*Calopteryx sp*	+
22300	*Argia sp*	+
52200	*Cheumatopsyche sp*	+
52430	*Ceratopsyche morosa group*	+
52450	*Ceratopsyche sparna*	+
59410	*Nectopsyche diarina*	+
68075	*Psephenus herricki*	+
68708	*Dubiraphia vittata group*	+
68901	*Macronychus glabratus*	+
69400	*Stenelmis sp*	+
74100	*Simulium sp*	+
77800	*Helopelopia sp*	+
80360	*Corynoneura "celeripes" (sensu Simpson & Bode, 1980)*	+
80440	*Cricotopus (C.) trifascia*	+
84210	*Paratendipes albimanus or P. duplicatus*	+
84450	*Polypedilum (Uresipedilum) flavum*	+
84540	*Polypedilum (Tripodura) scalaenum group*	+

Taxa Code	Taxa	Quant/Qual

No. Quantitative Taxa: 0 Total Taxa: 29
No. Qualitative Taxa: 29 ICI:
Number of Organisms: 0 Qual EPT: 11

Ohio EPA/DSW Ecological Assessment Section
Macroinvertebrate Collection

Site: Chagrin River
adj. Hunting Valley project site

Collection Date: 08/31/2011 River Code: 15-001 RM: 19.90

Taxa Code	Taxa	Quant/Qual	
01801	*Turbellaria*	18	
03360	*Plumatella sp*	2	
03600	*Oligochaeta*	16	
04960	*Mooreobdella sp*		+
08250	*Orconectes (Procericambarus) rusticus*		+
08601	*Hydrachnidia*	8	
11014	*Acentrella turbida*	7	+
11120	*Baetis flavistriga*	87	+
11130	*Baetis intercalaris*	225	+
12200	*Isonychia sp*	12	+
13100	*Nixe sp*	2	+
13400	*Stenacron sp*	4	+
13561	*Maccaffertium pulchellum*	101	+
13590	*Maccaffertium vicarium*	28	+
16700	*Tricorythodes sp*	1	
17200	*Caenis sp*	16	
21200	*Calopteryx sp*		+
22001	*Coenagrionidae*		+
22300	*Argia sp*	3	+
23905	*Boyeria grafiana*		+
23909	*Boyeria vinosa*		+
51206	*Cyrnellus fraternus*	1	
52200	*Cheumatopsyche sp*	1203	+
52430	*Ceratopsyche morosa group*	844	+
52450	*Ceratopsyche sparna*	11	
52530	*Hydropsyche depravata group*	1	
52540	*Hydropsyche dicantha*	23	
53501	*Hydroptilidae*	16	
68075	*Psephenus herricki*	1	+
68601	*Ancyronyx variegata*	15	+
68901	*Macronychus glabratus*	7	
69400	*Stenelmis sp*	8	+
70600	*Antocha sp*	2	
77500	*Conchapelopia sp*	55	
77750	*Hayesomyia senata or Thienemannimyia norena*	27	
78450	*Nilotanypus fimbriatus*	165	
80370	*Corynoneura lobata*	8	
80410	*Cricotopus (C.) sp*		+
81200	*Nanocladius sp*		+
82141	*Thienemanniella xena*	24	
82220	*Tvetenia discoloripes group*	55	
84155	*Paralauterborniella nigrohalteralis*		+
84450	*Polypedilum (Uresipedilum) flavum*	1318	+
84460	*Polypedilum (P.) fallax group*		+
84470	*Polypedilum (P.) illinoense*		+
84540	*Polypedilum (Tripodura) scalaenum group*	82	
85625	*Rheotanytarsus sp*	686	
85821	*Tanytarsus glabrescens group sp 7*	27	
86401	*Atherix lantha*	1	+
96900	*Ferrissia sp*	5	

No. Quantitative Taxa: 39 Total Taxa: 50
No. Qualitative Taxa: 27 ICI: **42**
Number of Organisms: 5115 Qual EPT: 10

Ohio EPA/DSW Ecological Assessment Section
Macroinvertebrate Collection

Site: Chagrin River
dst. Hunting Valley project site

Collection Date: 08/31/2011 River Code: 15-001 RM: 19.70

Taxa Code	Taxa	Quant/Qual	
00401	*Spongillidae*		+
01801	*Turbellaria*	1	
03600	*Oligochaeta*	234	+
05800	*Caecidotea sp*		+
06201	*Hyalella azteca*		+
06700	*Crangonyx sp*		+
08250	*Orconectes (Procericambarus) rusticus*		+
11120	*Baetis flavistriga*	40	+
11130	*Baetis intercalaris*	49	+
12200	*Isonychia sp*	1	
13000	*Leucrocuta sp*	1	
13100	*Nixe sp*		+
13400	*Stenacron sp*	4	+
13521	*Stenonema femoratum*		+
13561	*Maccaffertium pulchellum*	3	+
13590	*Maccaffertium vicarium*		+
21200	*Calopteryx sp*		+
22001	*Coenagrionidae*		+
22300	*Argia sp*	1	+
43300	*Ranatra sp*		+
43570	*Neoplea sp*		+
48220	*Chauliodes rastricornis*		+
52200	*Cheumatopsyche sp*	139	+
52430	*Ceratopsyche morosa group*	76	+
52450	*Ceratopsyche sparna*	1	
52530	*Hydropsyche depravata group*	1	
52540	*Hydropsyche dicantha*	2	
59970	*Petrophila sp*	2	
60900	*Peltodytes sp*		+
68075	*Psephenus herricki*		+
68601	*Ancyronyx variegata*	8	+
68708	*Dubiraphia vittata group*		+
68901	*Macronychus glabratus*	5	+
69400	*Stenelmis sp*	17	+
70600	*Antocha sp*	4	+
72700	*Anopheles sp*		+
74501	*Ceratopogonidae*	8	
77120	*Ablabesmyia mallochi*	15	
77500	*Conchapelopia sp*	46	+
77800	*Helopelopia sp*		+
78450	*Nilotanypus fimbriatus*	76	
80350	*Corynoneura sp*	16	
80360	*Corynoneura "celeripes" (sensu Simpson & Bode, 1980)*	8	
80420	*Cricotopus (C.) bicinctus*		+
80430	*Cricotopus (C.) tremulus group*	61	
81231	*Nanocladius (N.) crassicornus or N. (N.) "rectinervis"*	15	
81650	*Parametriocnemus sp*	15	
81690	*Paratrichocladius sp*	15	
82220	*Tvetenia discoloripes group*	15	
82730	*Chironomus (C.) decorus group*		+
83040	*Dicrotendipes neomodestus*	76	+
83300	*Glyptotendipes (G.) sp*		+
83820	*Microtendipes "caelum" (sensu Simpson & Bode, 1980)*	15	
83840	*Microtendipes pedellus group*	15	
84210	*Paratendipes albimanus or P. duplicatus*	76	+
84300	*Phaenopsectra obediens group*	15	
84450	*Polypedilum (Uresipedilum) flavum*	732	+
84460	*Polypedilum (P.) fallax group*		+
84470	*Polypedilum (P.) illinoense*		+
84520	*Polypedilum (Tripodura) halterale group*		+
84540	*Polypedilum (Tripodura) scalaenum group*	107	
85230	*Cladotanytarsus mancus group*	15	
85261	*Cladotanytarsus vanderwulpi group sp 1*	15	
85625	*Rheotanytarsus sp*	46	+
85800	*Tanytarsus sp*	15	+
85821	*Tanytarsus glabrescens group sp 7*	61	
86401	*Atherix lantha*		+
96900	*Ferrissia sp*	6	

No. Quantitative Taxa: 43 Total Taxa: 68
No. Qualitative Taxa: 43 ICI: **34**
Number of Organisms: 2073 Qual EPT: 9

Ohio EPA/DSW Ecological Assessment Section
Macroinvertebrate Collection

Site: Chagrin River
upst. Hunting Valley project site

Collection Date: 08/25/2010 River Code: 15-001 RM: 20.10

Taxa Code	Taxa	Quant/Qual	
01801	*Turbellaria*	20	+
03360	*Plumatella sp*	1	
03600	*Oligochaeta*		+
04960	*Mooreobdella sp*		+
05800	*Caecidotea sp*		+
06700	*Crangonyx sp*		+
08250	*Orconectes (Procericambarus) rusticus*		+
08601	*Hydrachnidia*	8	
11120	*Baetis flavistriga*	4	+
11130	*Baetis intercalaris*	1723	+
11650	*Procloeon sp (w/ hindwing pads)*		+
12200	*Isonychia sp*	11	+
13100	*Nixe sp*	2	+
13400	*Stenacron sp*	24	+
13561	*Maccaffertium pulchellum*	303	+
21200	*Calopteryx sp*		+
21300	*Hetaerina sp*	1	
22001	*Coenagrionidae*		+
22300	*Argia sp*	5	+
23909	*Boyeria vinosa*		+
50315	*Chimarra obscura*	106	+
50906	*Psychomyia flavida*	1	
52200	*Cheumatopsyche sp*	1140	+
52430	*Ceratopsyche morosa group*	509	+
52450	*Ceratopsyche sparna*	25	+
68075	*Psephenus herricki*		+
68601	*Ancyronyx variegata*	1	+
68708	*Dubiraphia vittata group*		+
68901	*Macronychus glabratus*	22	+
69400	*Stenelmis sp*		+
70600	*Antocha sp*		+
74100	*Simulium sp*		+
74501	*Ceratopogonidae*	8	
77500	*Conchapelopia sp*		+
78450	*Nilotanypus fimbriatus*	23	
80351	*Corynoneura n.sp 1*	8	
80370	*Corynoneura lobata*	8	
80410	*Cricotopus (C.) sp*		+
82141	*Thienemanniella xena*	24	
82220	*Tvetenia discoloripes group*	23	
82820	*Cryptochironomus sp*		+
83040	*Dicrotendipes neomodestus*	46	+
83300	*Glyptotendipes (G.) sp*		+
83820	*Microtendipes "caelum" (sensu Simpson & Bode, 1980)*		+
84210	*Paratendipes albimanus or P. duplicatus*		+
84450	*Polypedilum (Uresipedilum) flavum*	836	+
84470	*Polypedilum (P.) illinoense*		+
84480	*Polypedilum (P.) laetum group*		+
84540	*Polypedilum (Tripodura) scalaenum group*		+
84700	*Stenochironomus sp*		+
85230	*Cladotanytarsus mancus group*		+
85625	*Rheotanytarsus sp*	1184	+
85800	*Tanytarsus sp*		+
85821	*Tanytarsus glabrescens group sp 7*	23	+
86401	*Atherix lantha*		+
95100	*Physella sp*		+
96900	*Ferrissia sp*	2	+

No. Quantitative Taxa: 29 Total Taxa: 57
No. Qualitative Taxa: 47 ICI: **48**
Number of Organisms: 6091 Qual EPT: 11

Ohio EPA/DSW Ecological Assessment Section
Macroinvertebrate Collection

Site: Chagrin River
adj. Hunting Valley project site

Collection Date: 08/26/2010 River Code: 15-001 RM: 19.90

Taxa Code	Taxa	Quant/Qual	
01320	*Hydra sp*		+
03121	*Paludicella articulata*		+
03600	*Oligochaeta*		+
04960	*Mooreobdella sp*		+
05800	*Caecidotea sp*		+
08250	*Orconectes (Procericambarus) rusticus*		+
08601	*Hydrachnidia*		+
11014	*Acentrella turbida*	1	
11120	*Baetis flavistriga*	195	+
11130	*Baetis intercalaris*	2343	+
11670	*Procloeon viridoculare*		+
12200	*Isonychia sp*	13	
13000	*Leucrocuta sp*	1	
13100	*Nixe sp*		+
13400	*Stenacron sp*	138	+
13561	*Maccaffertium pulchellum*	171	+
13590	*Maccaffertium vicarium*	3	+
21200	*Calopteryx sp*	2	+
22001	*Coenagrionidae*		+
22300	*Argia sp*	21	+
23909	*Boyeria vinosa*		+
44501	*Corixidae*		+
50315	*Chimarra obscura*	129	+
51600	*Polycentropus sp*		+
52200	*Cheumatopsyche sp*	997	+
52430	*Ceratopsyche morosa group*	623	+
52450	*Ceratopsyche sparna*	35	+
59410	*Nectopsyche diarina*		+
59500	*Oecetis sp*	8	+
59970	*Petrophila sp*	5	+
68075	*Psephenus herricki*	1	+
68601	*Ancyronyx variegata*	3	+
68708	*Dubiraphia vittata group*		+
68901	*Macronychus glabratus*	31	+
69400	*Stenelmis sp*	21	+
70600	*Antocha sp*	53	+
72700	*Anopheles sp*		+
74100	*Simulium sp*	16	
77500	*Conchapelopia sp*	45	+
78450	*Nilotanypus fimbriatus*	45	
78655	*Procladius (Holotanypus) sp*		+
78750	*Rheopelopia paramaculipennis*		+
80370	*Corynoneura lobata*	40	
80410	*Cricotopus (C.) sp*	22	
81250	*Nanocladius (N.) minimus*	22	
82130	*Thienemanniella similis*	8	
82141	*Thienemanniella xena*	8	+
82220	*Tvetenia discoloripes group*	22	
82730	*Chironomus (C.) decorus group*		+
83040	*Dicrotendipes neomodestus*		+
83300	*Glyptotendipes (G.) sp*		+
83820	*Microtendipes "caelum" (sensu Simpson & Bode, 1980)*		+
84210	*Paratendipes albimanus or P. duplicatus*	67	+
84450	*Polypedilum (Uresipedilum) flavum*	491	+
84470	*Polypedilum (P.) illinoense*		+
84480	*Polypedilum (P.) laetum group*		+
84540	*Polypedilum (Tripodura) scalaenum group*		+
84750	*Stictochironomus sp*		+
85625	*Rheotanytarsus sp*	1182	+
85800	*Tanytarsus sp*	22	
85821	*Tanytarsus glabrescens group sp 7*	89	
86401	*Atherix lantha*		+
94400	*Fossaria sp*		+
95100	*Physella sp*		+
96900	*Ferrissia sp*	50	+

No. Quantitative Taxa:	36	Total Taxa:	65
No. Qualitative Taxa:	53	ICI:	**50**
Number of Organisms:	6923	Qual EPT:	14

Ohio EPA/DSW Ecological Assessment Section
Macroinvertebrate Collection

Site: Chagrin River
dst. Hunting Valley project site

Collection Date: 08/26/2010 River Code: 15-001 RM: 19.70

Taxa Code	Taxa	Quant/Qual	
01900	*Nemertea*		+
03360	*Plumatella sp*	1	
03600	*Oligochaeta*	25	+
06700	*Crangonyx sp*		+
08250	*Orconectes (Procericambarus) rusticus*		+
08601	*Hydrachnidia*	8	
11014	*Acentrella turbida*		+
11120	*Baetis flavistriga*	121	+
11130	*Baetis intercalaris*	1756	+
11650	*Procloeon sp (w/ hindwing pads)*		+
12200	*Isonychia sp*	16	
13100	*Nixe sp*	1	+
13400	*Stenacron sp*	231	+
13561	*Maccaffertium pulchellum*	186	+
17200	*Caenis sp*		+
21200	*Calopteryx sp*		+
21300	*Hetaerina sp*	1	
22001	*Coenagrionidae*		+
22300	*Argia sp*	6	+
23909	*Boyeria vinosa*		+
28955	*Plathemis lydia*		+
45100	*Palmacorixa sp*		+
45400	*Trichocorixa sp*		+
50315	*Chimarra obscura*	125	+
52200	*Cheumatopsyche sp*	1921	+
52430	*Ceratopsyche morosa group*	539	+
52450	*Ceratopsyche sparna*	23	+
53800	*Hydroptila sp*	17	
59970	*Petrophila sp*	19	
60900	*Peltodytes sp*		+
63900	*Laccophilus sp*		+
65800	*Berosus sp*		+
68075	*Psephenus herricki*		+
68130	*Helichus sp*		+
68601	*Ancyronyx variegata*		+
68708	*Dubiraphia vittata group*		+
68901	*Macronychus glabratus*	7	+
69400	*Stenelmis sp*	36	+
70600	*Antocha sp*	33	+
71900	*Tipula sp*		+
74100	*Simulium sp*	1	
74501	*Ceratopogonidae*		+
74650	*Atrichopogon sp*		+
77355	*Clinotanypus pinguis*		+
77500	*Conchapelopia sp*	48	
78450	*Nilotanypus fimbriatus*	24	
78655	*Procladius (Holotanypus) sp*		+
80310	*Cardiocladius obscurus*		+
80370	*Corynoneura lobata*	32	
80410	*Cricotopus (C.) sp*	24	
80430	*Cricotopus (C.) tremulus group*	48	
82101	*Thienemanniella taurocapita*	88	
82141	*Thienemanniella xena*	8	
82220	*Tvetenia discoloripes group*	72	
82730	*Chironomus (C.) decorus group*		+
82820	*Cryptochironomus sp*		+
83040	*Dicrotendipes neomodestus*	144	
83820	*Microtendipes "caelum" (sensu Simpson & Bode, 1980)*		+
84155	*Paralauterborniella nigrohalteralis*		+
84210	*Paratendipes albimanus or P. duplicatus*	48	
84450	*Polypedilum (Uresipedilum) flavum*	718	+
84460	*Polypedilum (P.) fallax group*	48	
84470	*Polypedilum (P.) illinoense*		+
84520	*Polypedilum (Tripodura) halterale group*		+
84540	*Polypedilum (Tripodura) scalaenum group*	96	+
84750	*Stictochironomus sp*		+
85261	*Cladotanytarsus vanderwulpi group sp 1*	24	
85625	*Rheotanytarsus sp*	792	+
85720	*Stempellinella fimbriata*	24	
85752	*Sublettea coffmani*	24	
85800	*Tanytarsus sp*		+
85821	*Tanytarsus glabrescens group sp 7*	240	
86401	*Atherix lantha*		+
93200	*Hydrobiidae*		+
95100	*Physella sp*		+
96900	*Ferrissia sp*	59	
97601	*Corbicula fluminea*		+
98600	*Sphaerium sp*		+

No. Quantitative Taxa: 40 Total Taxa: 78
No. Qualitative Taxa: 55 ICI: **50**
Number of Organisms: 7634 Qual EPT: 12

BALDWIN CREEK DAM REMOVAL AND HABITAT ENHANCEMENT

Project Baseline Stream Monitoring

PROJECT NAME: BALDWIN CREEK DAM REMOVAL AND HABITAT ENHANCEMENT

Project Baseline Stream Monitoring

PROJECT NUMBER: 10SWIF-GLRI-CUY-123
STREAM SAMPLED: Baldwin Creek

SUMMARY

Funding for this project will be used to remove three small lowhead dams on Baldwin Creek within the city of Berea. Activities associated with this project are designed to restore habitat and natural flows conditions in this segment of Baldwin Creek to its designated Warmwater Habitat (WWH) aquatic life use. Natural flow qualities will be restored for 4,750 linear feet of Baldwin Creek.

Two of the three proposed restoration sites were biologically assessed in 2010 and 2011 (the third site was not readily accessible for sampling). The background sampling location (RM 2.6) and downstream partially impounded site at RM 0.1 were in non-attainment of the WWH biological criteria listed in the Ohio Water Quality Standards. Partial attainment of the WWH biological criteria was recorded at RM 0.2, a site largely free-flowing with shallow pools and riffles. River habitat at the proposed restoration sites (RMs 0.2 and 0.1) were reduced in quality compared to the upstream site, although these two sites were represented by good quality habitat. Sewage odors were prevalent in Baldwin Creek while conducting sampling at RM 2.6. This site is located 0.3 miles downstream from the Strongsville C wastewater treatment plant which likely contributed to the impaired biological communities. Over the last two years, the Strongsville C effluent has been in non-compliance of permit conditions on several occasions for BOD and ammonia.

AQUATIC LIFE USE ATTAINMENT – BALDWIN CREEK 2010 AND 2011.

The Index of Biotic Integrity (IBI) and Invertebrate Community Index (ICI) scores are based on the performance of the biological community. Narrative ranges are used with macroinvertebrate results when quantitative data are not available. The Qualitative Habitat Evaluation Index (QHEI) is a measure of the ability of the physical habitat to support a biological community. Stream sites are located in the Erie Ontario Lake Plain (EOLP) ecoregion. In the Ohio Water Quality Standards, Baldwin Creek is designated Warmwater Habitat (WWH) within the study area. Underlined results = poor or very poor.

Sample Site River Mile	Attainment Status	IBI	ICI	QHEI	Biological Assessment
RM 2.6 - 2010	**NON**	22*	Low Fair*	75.5 (excellent)	Poor/Low Fair
RM 2.6 - 2011	**NON**	30*	Fair*	75.5 (excellent)	Fair
RM 0.2 - 2010	**PARTIAL**	40	Fair*	58.8 (good)	Good/Fair
RM 0.2 - 2011	**PARTIAL**	40	Low Fair*	61.8 (good)	Good/Low Fair
RM 0.1 - 2010	**NON**	34*	Low Fair*	68.3 (good)	Fair/Low Fair
RM 0.1 - 2011	**NON**	30*	Low Fair*	68.0 (good)	Fair/Low Fair

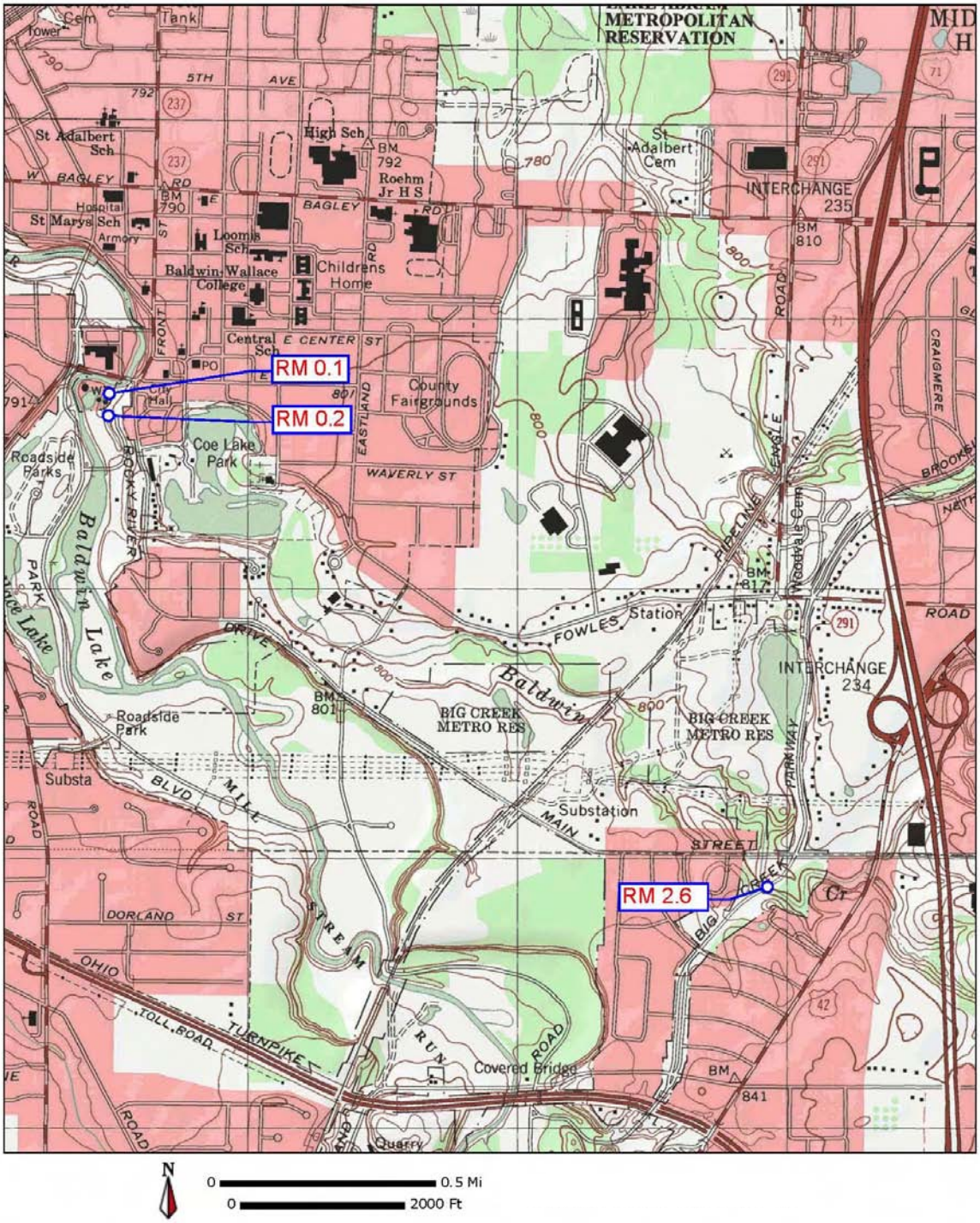
Ecoregion Biocriteria: Erie Ontario Lake Plain (EOLP)	
INDEX – SITE TYPE	WWH
IBI: Headwater	40
ICI	34

* Significant departure from biocriterion (>4 IBI or ICI units).

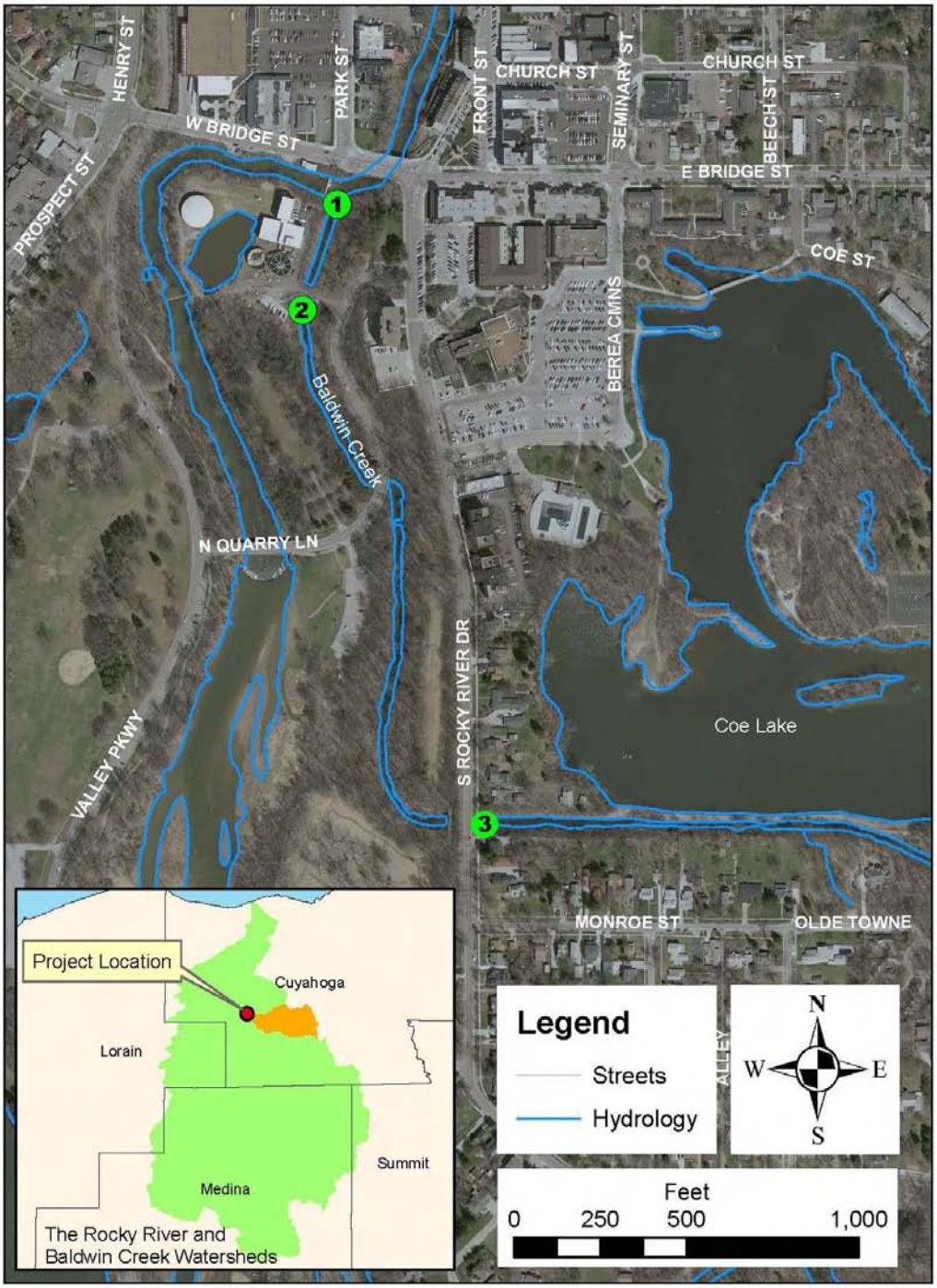
Sampling locations in Baldwin Creek, 2010/2011.

River Mile	Latitude	Longitude	Landmark
2.6	41.34940	-81.82580	Big Creek Parkway – upstream restoration sites
0.2	41.36280	-81.85420	Upstream Berea water treatment plant entrance drive
0.1	41.36575	-81.85481	At mouth, partially impounded

Baldwin Creek Sampling Locations, 2010/2011



Baldwin Creek Dam Removal Project Locations



APPENDICES – BALDWIN CREEK PROJECT

Appendix Table 1. Qualitative Habitat Evaluation Index (QHEI) scores for Baldwin Creek.

Appendix Table 2. Index of Biotic Integrity (IBI) scores and metrics for Baldwin Creek.

Appendix Table 3. Ohio EPA fish results for the Baldwin Creek.

Appendix Table 4. Ohio EPA macroinvertebrate results for Baldwin Creek.

Appendix Table 1. Qualitative Habitat Evaluation Index (QHEI) scores and physical attributes for fish sampling sites in Baldwin Creek, 2010 and 2011.

Key QHEI Components																																
River Mile	**QHEI**	**Habitat Rating**	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**
			WWH Attributes											**MWH Attributes**																		
														High Influence						*Moderate Influence*												
Baldwin Creek Year: 2010 and 2011																																
2.6 ('10)	**75.5**	Excellent	■	■		■	■	■		■	■	■	8						0									●	●			2
2.6 ('11)	**75.5**	Excellent	■	■		■	■	■		■	■	■	8						0									●	●			2
0.2 ('10)	**58.8**	Good	■	■			■	■	■		■	■	7			◆	◆		2					●		●			●	●		4
0.2 ('11)	**61.8**	Good	■	■			■		■		■	■	6			◆	◆		2					●		●			●	●		4
0.1 ('10)	**68.3**	Good	■	■				■	■		■	■	6			◆	◆		2					●					●	●		3
0.1 ('11)	**68.0**	Excellent	■	■				■	■		■	■	6			◆	◆		2					●					●	●		3

Appendix Table 2. Index of Biotic Integrity (IBI) scores and metrics for Baldwin Creek, 2010 and 2011.

				Number of						Percent of Individuals						
River Mile	Type	Date	Drainage area (sq mi)	Total species	Minnow species	Headwater species	Sensitive species	Darter & Sculpin species	Simple Lithophils	Tolerant fishes	Omni-vores	Pioneering fishes	Insect-ivores	DELT anomalies	Rel.No. minus tolerants /(0.3km)	IBI
Baldwin Creek - (13-101)																
Year: 2011																
2.60	E	08/30/2011	8.3	10(3)	5(3)	0(1)	0(1)	0(1)	2(1)	55(3)	18(3)	48(3)	25(3)	0.0(5)	476(3)	30
0.20	E	09/01/2011	10.0	9(3)	4(3)	1(1)	3(3)	2(3)	5(3)	28(5)	2(5)	17(5)	13(1)	0.0(5)	407(3)	40
0.10	E	09/01/2011	10.0	9(3)	3(1)	0(1)	3(3)	2(3)	4(3)	66(1)	13(5)	56(1)	24(3)	0.0(5)	86(1)	30
Year: 2010																
2.60	E	07/29/2010	8.3	12(3)	6(3)	0(1)	1(1)	0(1)	1(1)	81(1)	28(3)	56(1)	16(1)	0.4(3)	210(3)	22
0.20	E	07/14/2010	10.0	10(3)	4(3)	1(1)	3(3)	2(3)	5(3)	39(3)	6(5)	24(5)	39(3)	0.0(5)	297(3)	40
0.10	E	07/14/2010	10.0	13(3)	5(3)	0(1)	4(3)	2(3)	5(3)	55(3)	24(3)	33(3)	35(3)	0.0(5)	168(1)	34

♦ - IBI is low end adjusted.

* - < 200 Total individuals in sample

** - < 50 Total individuals in sample

● - One or more species excluded from IBI calculation.

River Code: **13-101**	Stream: **Baldwin Creek**	Sample Date: **2010**
River Mile: **2.60**	Location: Big Creek Parkway	Date Range: 07/29/2010
Time Fished: 2143 sec	Drainage: 8.3 sq mi	
Dist Fished: 0.15 km	Basin: Rocky River No of Passes: 1	Sampler Type: E

Species Name / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
White Sucker	W	O	S	T	142	284.00	25.49			
Creek Chub	N	G	N	T	243	486.00	43.63			
Bigmouth Shiner [T]	N	I	M		27	54.00	4.85			
Sand Shiner	N	I	M	M	9	18.00	1.62			
Fathead Minnow	N	O	C	T	6	12.00	1.08			
Bluntnose Minnow	N	O	C	T	10	20.00	1.80			
Central Stoneroller	N	H	N		65	130.00	11.67			
Yellow Bullhead		I	C	T	1	2.00	0.18			
Largemouth Bass	F	C	C		2	4.00	0.36			
Green Sunfish	S	I	C	T	50	100.00	8.98			
Bluegill Sunfish	S	I	C	P	1	2.00	0.18			
Pumpkinseed Sunfish	S	I	C	P	1	2.00	0.18			
	Mile Total				557	1,114.00				
	Number of Species				12					
	Number of Hybrids				0					

River Code: **13-101**	Stream: **Baldwin Creek**	Sample Date: **2011**
River Mile: **2.60**	Location: Big Creek Parkway	Date Range: 08/30/2011
Time Fished: 1672 sec	Drainage: 8.3 sq mi	
Dist Fished: 0.15 km	Basin: Rocky River No of Passes: 1	Sampler Type: E

Species Name / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
White Sucker	W	O	S	T	33	66.00	6.24			
Creek Chub	N	G	N	T	157	314.00	29.68			
Common Shiner	N	I	S		1	2.00	0.19			
Bigmouth Shiner [T]	N	I	M		81	162.00	15.31			
Bluntnose Minnow	N	O	C	T	63	126.00	11.91			
Central Stoneroller	N	H	N		142	284.00	26.84			
Yellow Bullhead		I	C	T	4	8.00	0.76			
Largemouth Bass	F	C	C		1	2.00	0.19			
Green Sunfish	S	I	C	T	34	68.00	6.43			
Bluegill Sunfish	S	I	C	P	10	20.00	1.89			
Green Sf X Bluegill Sf					3	6.00	0.57			
	Mile Total				529	1,058.00				
	Number of Species				10					
	Number of Hybrids				1					

River Code: **13-101**	Stream: **Baldwin Creek**	Sample Date: **2010**
River Mile: **0.20**	Location: Berea WTP drive	Date Range: 07/14/2010
Time Fished: 957 sec	Drainage: 10.0 sq mi	
Dist Fished: 0.10 km	Basin: Rocky River No of Passes: 1	Sampler Type: E

Species Name / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Northern Hog Sucker	R	I	S	M	13	39.00	8.07			
White Sucker	W	O	S	T	2	6.00	1.24			
Common Carp	G	O	M	T	5	15.00	3.11			
Western Blacknose Dace	N	G	S	T	17	51.00	10.56			
Creek Chub	N	G	N	T	32	96.00	19.88			
Bluntnose Minnow	N	O	C	T	2	6.00	1.24			
Central Stoneroller	N	H	N		40	120.00	24.84			
Largemouth Bass	F	C	C		1	3.00	0.62			
Green Sunfish	S	I	C	T	4	12.00	2.48			
Greenside Darter	D	I	S	M	43	129.00	26.71			
Rainbow Darter	D	I	S	M	2	6.00	1.24			
	Mile Total				161	483.00				
	Number of Species				11					
	Number of Hybrids				0					

River Code: **13-101**	Stream: **Baldwin Creek**	Sample Date: **2011**
River Mile: **0.20**	Location: Berea WTP drive	Date Range: 09/01/2011
Time Fished: 823 sec	Drainage: 10.0 sq mi	
Dist Fished: 0.09 km	Basin: Rocky River No of Passes: 1	Sampler Type: E

Species Name / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Northern Hog Sucker	R	I	S	M	1	3.33	0.59			
White Sucker	W	O	S	T	1	3.33	0.59			
Western Blacknose Dace	N	G	S	T	12	40.00	7.10			
Creek Chub	N	G	N	T	27	90.00	15.98			
Bluntnose Minnow	N	O	C	T	2	6.67	1.18			
Central Stoneroller	N	H	N		105	350.00	62.13			
Yellow Bullhead		I	C	T	5	16.67	2.96			
Greenside Darter	D	I	S	M	14	46.67	8.28			
Rainbow Darter	D	I	S	M	2	6.67	1.18			
	Mile Total				169	563.33				
	Number of Species				9					
	Number of Hybrids				0					

River Code: **13-101**	Stream: **Baldwin Creek**	Sample Date: **2010**
River Mile: **0.10**	Location: at mouth	Date Range: 07/14/2010
Time Fished: 1306 sec	Drainage: 10.0 sq mi	
Dist Fished: 0.10 km	Basin: Rocky River No of Passes: 1	Sampler Type: E

Species Name / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Northern Hog Sucker	R	I	S	M	6	18.00	4.80			
White Sucker	W	O	S	T	25	75.00	20.00			
Creek Chub	N	G	N	T	34	102.00	27.20			
Common Shiner	N	I	S		6	18.00	4.80			
Sand Shiner	N	I	M	M	1	3.00	0.80			
Bluntnose Minnow	N	O	C	T	5	15.00	4.00			
Central Stoneroller	N	H	N		16	48.00	12.80			
Yellow Bullhead		I	C	T	3	9.00	2.40			
Largemouth Bass	F	C	C		1	3.00	0.80			
Green Sunfish	S	I	C	T	2	6.00	1.60			
Bluegill Sunfish	S	I	C	P	2	6.00	1.60			
Greenside Darter	D	I	S	M	23	69.00	18.40			
Rainbow Darter	D	I	S	M	1	3.00	0.80			
	Mile Total				125	375.00				
	Number of Species				13					
	Number of Hybrids				0					

River Code: **13-101**	Stream: **Baldwin Creek**	Sample Date: **2011**
River Mile: **0.10**	Location: at mouth	Date Range: 09/01/2011
Time Fished: 713 sec	Drainage: 10.0 sq mi	
Dist Fished: 0.08 km	Basin: Rocky River No of Passes: 1	Sampler Type: E

Species Name / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Northern Hog Sucker	R	I	S	M	7	26.25	10.29			
White Sucker	W	O	S	T	7	26.25	10.29			
Creek Chub	N	G	N	T	34	127.50	50.00			
Bluntnose Minnow	N	O	C	T	2	7.50	2.94			
Central Stoneroller	N	H	N		9	33.75	13.24			
Green Sunfish	S	I	C	T	2	7.50	2.94			
Bluegill Sunfish	S	I	C	P	2	7.50	2.94			
Greenside Darter	D	I	S	M	3	11.25	4.41			
Rainbow Darter	D	I	S	M	2	7.50	2.94			
	Mile Total				68	255.00				
	Number of Species				9					
	Number of Hybrids				0					

Appendix Table 4. Ohio EPA/DSW Ecological Assessment Section Macroinvertebrate Collection

Site: Baldwin Creek
Big Creek Parkway

Collection Date: 08/30/2011 River Code: 13-101 RM: 2.60

Taxa Code	Taxa	Quant/Qual
01801	*Turbellaria*	+
01900	*Nemertea*	+
03360	*Plumatella sp*	+
03600	*Oligochaeta*	+
04664	*Helobdella stagnalis*	+
04960	*Mooreobdella sp*	+
05800	*Caecidotea sp*	+
06700	*Crangonyx sp*	+
08250	*Orconectes (Procericambarus) rusticus*	+
11120	*Baetis flavistriga*	+
11130	*Baetis intercalaris*	+
21200	*Calopteryx sp*	+
22001	*Coenagrionidae*	+
22300	*Argia sp*	+
23600	*Aeshna sp*	+
52200	*Cheumatopsyche sp*	+
52430	*Ceratopsyche morosa group*	+
52530	*Hydropsyche depravata group*	+
68130	*Helichus sp*	+
68601	*Ancyronyx variegata*	+
69400	*Stenelmis sp*	+
72700	*Anopheles sp*	+
74100	*Simulium sp*	+
77500	*Conchapelopia sp*	+
78350	*Meropelopia sp*	+
81231	*Nanocladius (N.) crassicornus or N. (N.) "rectinervis"*	+
82141	*Thienemanniella xena*	+
82700	*Chironomus sp*	+
82820	*Cryptochironomus sp*	+
83002	*Dicrotendipes modestus*	+
84450	*Polypedilum (Uresipedilum) flavum*	+
84470	*Polypedilum (P.) illinoense*	+
84540	*Polypedilum (Tripodura) scalaenum group*	+
84700	*Stenochironomus sp*	+
85500	*Paratanytarsus sp*	+

Taxa Code	Taxa	Quant/Qual

No. Quantitative Taxa: 0 Total Taxa: 35
No. Qualitative Taxa: 35 ICI:
Number of Organisms: 0 Qual EPT: 5

Appendix Table 4. Ohio EPA/DSW Ecological Assessment Section Macroinvertebrate Collection

Site: Baldwin Creek
Berea WTP drive

Collection Date: 08/30/2011 River Code: 13-101 RM: 0.20

Taxa Code	Taxa	Quant/Qual
05800	*Caecidotea sp*	+
11120	*Baetis flavistriga*	+
11130	*Baetis intercalaris*	+
21200	*Calopteryx sp*	+
52200	*Cheumatopsyche sp*	+
52430	*Ceratopsyche morosa group*	+
52530	*Hydropsyche depravata group*	+
77500	*Conchapelopia sp*	+
77800	*Helopelopia sp*	+
78350	*Meropelopia sp*	+
84450	*Polypedilum (Uresipedilum) flavum*	+
84470	*Polypedilum (P.) illinoense*	+
97710	*Dreissena polymorpha*	+
98600	*Sphaerium sp*	+

Taxa Code	Taxa	Quant/Qual

No. Quantitative Taxa: 0 Total Taxa: 14
No. Qualitative Taxa: 14 ICI:
Number of Organisms: 0 Qual EPT: 5

Appendix Table 4. Ohio EPA/DSW Ecological Assessment Section Macroinvertebrate Collection

Site: Baldwin Creek at mouth

Collection Date: 08/30/2011 River Code: 13-101 RM: 0.10

Taxa Code	Taxa	Quant/Qual	Taxa Code	Taxa	Quant/Qual
01801	*Turbellaria*	+			
03600	*Oligochaeta*	+			
05800	*Caecidotea sp*	+			
06700	*Crangonyx sp*	+			
11120	*Baetis flavistriga*	+			
11130	*Baetis intercalaris*	+			
13521	*Stenonema femoratum*	+			
52200	*Cheumatopsyche sp*	+			
68601	*Ancyronyx variegata*	+			
69400	*Stenelmis sp*	+			
77120	*Ablabesmyia mallochi*	+			
77500	*Conchapelopia sp*	+			
84450	*Polypedilum (Uresipedilum) flavum*	+			
84540	*Polypedilum (Tripodura) scalaenum group*	+			
85800	*Tanytarsus sp*	+			
97710	*Dreissena polymorpha*	+			

No. Quantitative Taxa: 0 Total Taxa: 16

No. Qualitative Taxa: 16 ICI:

Number of Organisms: 0 Qual EPT: 4

Appendix Table 4. Ohio EPA/DSW Ecological Assessment Section
Macroinvertebrate Collection

Site: Baldwin Creek
Big Creek Parkway

Collection Date: 07/19/2010 River Code: 13-101 RM: 2.60

Taxa Code	Taxa	Quant/Qual
01801	*Turbellaria*	+
03600	*Oligochaeta*	+
04901	*Erpobdellidae*	+
05800	*Caecidotea sp*	+
11120	*Baetis flavistriga*	+
22001	*Coenagrionidae*	+
52200	*Cheumatopsyche sp*	+
52530	*Hydropsyche depravata group*	+
69400	*Stenelmis sp*	+
74100	*Simulium sp*	+
77500	*Conchapelopia sp*	+
82820	*Cryptochironomus sp*	+
84210	*Paratendipes albimanus or P. duplicatus*	+
84300	*Phaenopsectra obediens group*	+
84450	*Polypedilum (Uresipedilum) flavum*	+
84470	*Polypedilum (P.) illinoense*	+
84540	*Polypedilum (Tripodura) scalaenum group*	+
98600	*Sphaerium sp*	+

Taxa Code	Taxa	Quant/Qual

No. Quantitative Taxa: 0 Total Taxa: 18
No. Qualitative Taxa: 18 ICI:
Number of Organisms: 0 Qual EPT: 3

Appendix Table 4. Ohio EPA/DSW Ecological Assessment Section Macroinvertebrate Collection

Site: Baldwin Creek
Berea WTP drive

Collection Date: 07/14/2010 River Code: 13-101 RM: 0.20

Taxa Code	Taxa	Quant/Qual	Taxa Code	Taxa	Quant/Qual
01801	*Turbellaria*	+			
03360	*Plumatella sp*	+			
04901	*Erpobdellidae*	+			
05800	*Caecidotea sp*	+			
08200	*Orconectes sp*	+			
11120	*Baetis flavistriga*	+			
11130	*Baetis intercalaris*	+			
52200	*Cheumatopsyche sp*	+			
52430	*Ceratopsyche morosa group*	+			
52530	*Hydropsyche depravata group*	+			
53501	*Hydroptilidae*	+			
68601	*Ancyronyx variegata*	+			
69400	*Stenelmis sp*	+			
71900	*Tipula sp*	+			
77500	*Conchapelopia sp*	+			
82820	*Cryptochironomus sp*	+			
84210	*Paratendipes albimanus or P. duplicatus*	+			
84470	*Polypedilum (P.) illinoense*	+			
85625	*Rheotanytarsus sp*	+			

No. Quantitative Taxa: 0 Total Taxa: 19
No. Qualitative Taxa: 19 ICI:
Number of Organisms: 0 Qual EPT: 6

Appendix Table 4. Ohio EPA/DSW Ecological Assessment Section Macroinvertebrate Collection

Site: Baldwin Creek at mouth

Collection Date: 07/14/2010 River Code: 13-101 RM: 0.10

Taxa Code	Taxa	Quant/Qual	Taxa Code	Taxa	Quant/Qual
00401	*Spongillidae*	+			
01801	*Turbellaria*	+			
03600	*Oligochaeta*	+			
04901	*Erpobdellidae*	+			
05800	*Caecidotea sp*	+			
06700	*Crangonyx sp*	+			
08250	*Orconectes (Procericambarus) rusticus*	+			
21200	*Calopteryx sp*	+			
22001	*Coenagrionidae*	+			
23501	*Aeshnidae*	+			
52200	*Cheumatopsyche sp*	+			
52430	*Ceratopsyche morosa group*	+			
52530	*Hydropsyche depravata group*	+			
68601	*Ancyronyx variegata*	+			
69400	*Stenelmis sp*	+			
71900	*Tipula sp*	+			
77500	*Conchapelopia sp*	+			
82820	*Cryptochironomus sp*	+			
84450	*Polypedilum (Uresipedilum) flavum*	+			
97710	*Dreissena polymorpha*	+			
98600	*Sphaerium sp*	+			

No. Quantitative Taxa: 0 Total Taxa: 21

No. Qualitative Taxa: 21 ICI:

Number of Organisms: 0 Qual EPT: 3

WILDCAT RUN

STREAM RESTORATION AND STORM WATER MANAGEMENT DEMONSTRATION PHASE 1

Project Baseline Stream Monitoring

PROJECT NAME: WILDCAT RUN STREAM RESTORATION AND STORM WATER MANAGEMENT DEMONSTRATION, PHASE 1
Project Baseline Stream Monitoring

PROJECT NUMBER: 10SWIF-145
STREAM SAMPLED: Wildcat Run

SUMMARY

Surface Water Improvement Fund (SWIF) grant funding of $108,991 was awarded to restore 500 linear feet of perennial stream with natural channel design using stone riffles and eddy rock groupings. This project will utilize storm water management practices by constructing a self-forming channel on a previously channelized feeder stream and constructing a vegetated swale with rock check dams within the swale. This project is part of a larger initiative to establish a storm water management demonstration site for innovative storm water practices that will serve as a model for other townships and developers. With a conservation covenant, the Liberty Township Park will secure 30 acres of wooded stream corridor to be protected in perpetuity.

Both the upstream (RM 1.7) and project area (RM 1.4) biological monitoring sites were in non-attainment of the Warmwater Habitat (WWH) biocriteria listed in the Ohio Water Quality Standards. Extensive embeddedness of the stream bottom occurred at both sites, and along with nutrient enrichment, contributed to the fair quality biological communities. Overall physical habitat conditions at each monitoring site were marginally good. Macroinvertebrates at both locations were predominated by flatworms, reflecting nutrient enriched conditions.

AQUATIC LIFE USE ATTAINMENT – WILDCAT RUN 2010.

The Index of Biotic Integrity (IBI) and Invertebrate Community Index (ICI) scores are based on the performance of the biological community. Narrative ranges are used with macroinvertebrate results when quantitative data are not available. The Qualitative Habitat Evaluation Index (QHEI) is a measure of the ability of the physical habitat to support a biological community. Stream sites are located in the Eastern Corn Belt Plains (ECBP) ecoregion. Wildcat Run is not listed in the Ohio Water Quality Standards - this study documented that the WWH use designation is appropriate. Poor or very poor results are underlined.

Sample Site River Mile	Attainment Status	IBI	ICI	QHEI	Biological Assessment
1.7	**NON**	38[ns]	Poor*	55.0 (good)	Marginally Good/ Poor
1.4	**NON**	32*	Low Fair*	56.0 (good)	Fair/ Low Fair

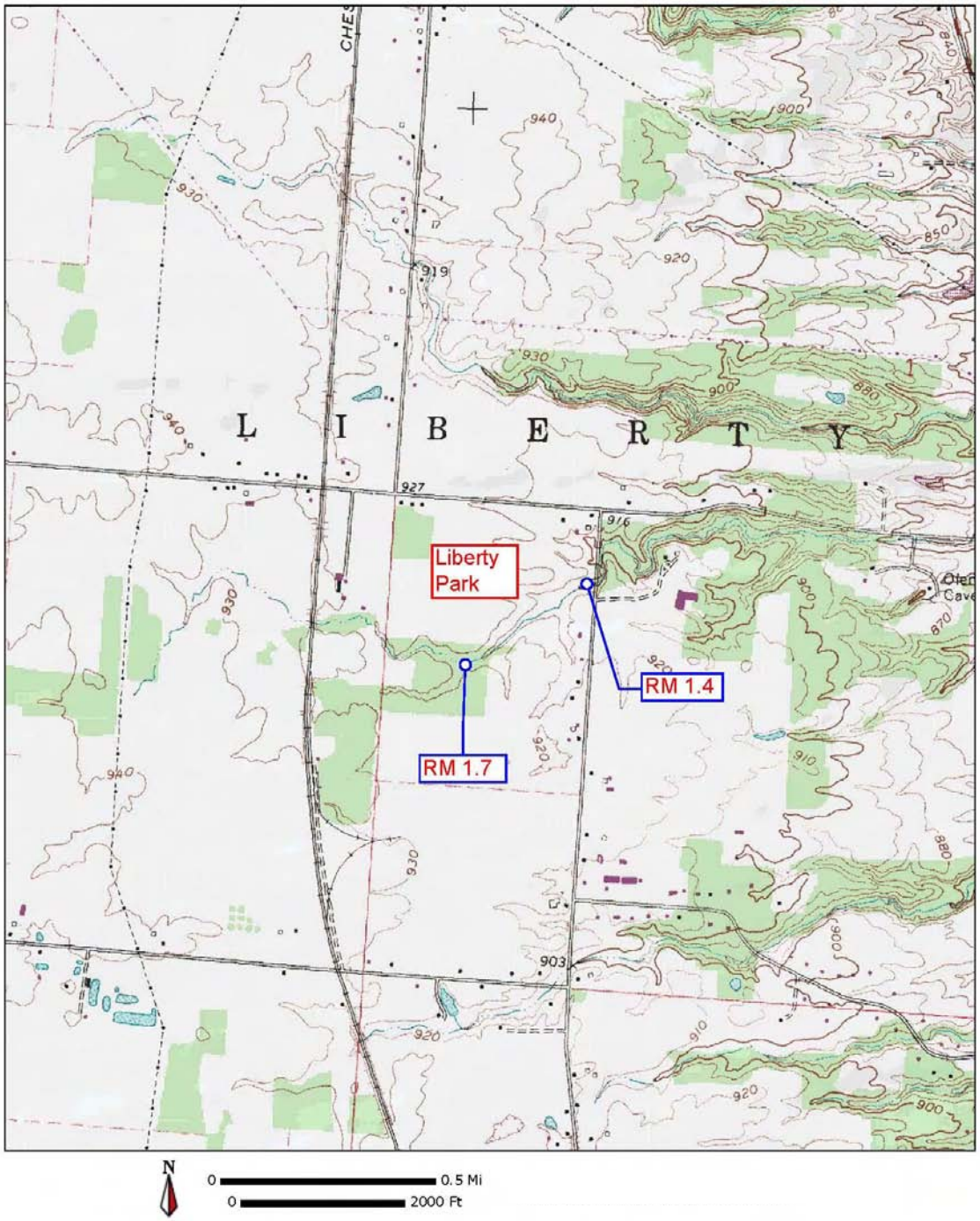
Ecoregion Biocriteria: Eastern Corn Belt Plains (ECBP)	
INDEX – SITE TYPE	WWH
IBI: Headwater	40
ICI	36

[ns] Nonsignificant departure from biocriterion (≤4 IBI or ICI units, ≤0.5 MIwb units).
* Significant departure from biocriterion (>4 IBI or ICI units, >0.5 MIwb units).

Sampling locations in the Wildcat Run, 2010.

River Mile	Latitude	Longitude	Landmark
1.7	40.19013	-83.08217	Liberty Twp. Park
1.4	40.192517	-83.077611	Upstream Powell Road

Wildcat Run Sampling Locations, 2010



APPENDICES – WILDCAT RUN PROJECT

Appendix Table 1. Qualitative Habitat Evaluation Index (QHEI) scores for Wildcat Run.

Appendix Table 2. Index of Biotic Integrity (IBI) scores and metrics for Wildcat Run.

Appendix Table 3. Ohio EPA fish results for Wildcat Run.

Appendix Table 4. Ohio EPA macroinvertebrate results for Wildcat Run.

Appendix Table 1. Qualitative Habitat Evaluation Index (QHEI) scores and physical attributes for fish sampling sites in Wildcat Run, 2011.

			WWH Attributes											**MWH 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**																													
Wildcat Run Year: 2010																															
1.7	**55.0**	Good	■				■				■		3				◆		1		●		●	●				●	●	●		6
1.4	**56.0**	Good	■	■			■	■			■		5						0		●		●	●				●	●	●		6

Appendix Table 2. Index of Biotic Integrity (IBI) scores and metrics for Wildcat Run, 2010.

				Number of						Percent of Individuals						
River Mile	Type	Date	Drainage area (sq mi)	Total species	Minnow species	Headwater species	Sensitive species	Darter & Sculpin species	Simple Lithophils	Tolerant fishes	Omni-vores	Pioneering fishes	Insect-ivores	DELT anomalies	Rel.No. minus tolerants /(0.3km)	IBI
Wildcat Run - (02-486)																
Year: 2010																
1.70	E	10/06/2010	1.1	4(3)	2(3)	0(1)	0(1)	0(1)	0(1)	22(5)	12(3)	21(5)	82(5)	0.0(5)	173(5)	38
1.40	E	10/06/2010	1.3	5(3)	2(3)	0(1)	0(1)	0(1)	0(1)	39(3)	10(3)	39(3)	73(5)	0.0(5)	78(3) *	32

♦ - IBI is low end adjusted.

* - < 200 Total individuals in sample

** - < 50 Total individuals in sample

● - One or more species excluded from IBI calculation.

River Code: **02-486**	Stream: **Wildcat Run**	Sample Date: **2010**
River Mile: **1.70**	Location: at Liberty Park	Date Range: 10/06/2010
Time Fished: 662 sec	Drainage: 1.1 sq mi	
Dist Fished: 0.12 km	Basin: Scioto River No of Passes: 1	Sampler Type: E

Species Name / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Goldfish	G	O	M	T	1	2.50	1.12			
Creek Chub	N	G	N	T	5	12.50	5.62			
Fathead Minnow	N	O	C	T	10	25.00	11.24			
Green Sunfish	S	I	C	T	4	10.00	4.49			
Bluegill Sunfish	S	I	C	P	69	172.50	77.53			
	Mile Total				89	222.50				
	Number of Species				5					
	Number of Hybrids				0					

River Code: **02-486**	Stream: **Wildcat Run**	Sample Date: **2010**
River Mile: **1.40**	Location: Liberty Rd.	Date Range: 10/06/2010
Time Fished: 1050 sec	Drainage: 1.3 sq mi	
Dist Fished: 0.12 km	Basin: Scioto River No of Passes: 1	Sampler Type: E

Species Name / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Creek Chub	N	G	N	T	7	17.50	13.73			
Fathead Minnow	N	O	C	T	5	12.50	9.80			
Largemouth Bass	F	C	C		2	5.00	3.92			
Green Sunfish	S	I	C	T	8	20.00	15.69			
Bluegill Sunfish	S	I	C	P	29	72.50	56.86			
	Mile Total				51	127.50				
	Number of Species				5					
	Number of Hybrids				0					

Appendix Table 4. Ohio EPA/DSW Ecological Assessment Section Macroinvertebrate Collection

Site: Wildcat Run at Liberty Park

Collection Date: 09/24/2010 River Code: 02-486 RM: 1.70

Taxa Code	Taxa	Quant/Qual	Taxa Code	Taxa	Quant/Qual
01801	*Turbellaria*	+			
03360	*Plumatella sp*	+			
03600	*Oligochaeta*	+			
08601	*Hydrachnidia*	+			
21200	*Calopteryx sp*	+			
22001	*Coenagrionidae*	+			
28001	*Libellulidae*	+			
68707	*Dubiraphia quadrinotata*	+			
68708	*Dubiraphia vittata group*	+			
74100	*Simulium sp*	+			
78655	*Procladius (Holotanypus) sp*	+			
80420	*Cricotopus (C.) bicinctus*	+			
84800	*Tribelos jucundum*	+			
85625	*Rheotanytarsus sp*	+			
95100	*Physella sp*	+			
96264	*Planorbella (Pierosoma) pilsbryi*	+			
98200	*Pisidium sp*	+			
98600	*Sphaerium sp*	+			

No. Quantitative Taxa: 0 Total Taxa: 18

No. Qualitative Taxa: 18 ICI:

Number of Organisms: 0 Qual EPT: 0

Appendix Table 4. Ohio EPA/DSW Ecological Assessment Section Macroinvertebrate Collection

Site: Wildcat Run
Liberty Rd.

Collection Date: 09/24/2010 River Code: 02-486 RM: 1.40

Taxa Code	Taxa	Quant/Qual
01801	*Turbellaria*	+
03360	*Plumatella sp*	+
03600	*Oligochaeta*	+
04666	*Helobdella triserialis*	+
04686	*Placobdella papillifera*	+
05900	*Lirceus sp*	+
08601	*Hydrachnidia*	+
11200	*Callibaetis sp*	+
21200	*Calopteryx sp*	+
22001	*Coenagrionidae*	+
22300	*Argia sp*	+
23704	*Anax junius*	+
23909	*Boyeria vinosa*	+
42700	*Belostoma sp*	+
44501	*Corixidae*	+
52200	*Cheumatopsyche sp*	+
52530	*Hydropsyche depravata group*	+
53800	*Hydroptila sp*	+
60900	*Peltodytes sp*	+
64050	*Liodessus sp*	+
67700	*Paracymus sp*	+
67800	*Tropisternus sp*	+
68707	*Dubiraphia quadrinotata*	+
68708	*Dubiraphia vittata group*	+
69400	*Stenelmis sp*	+
71900	*Tipula sp*	+
72700	*Anopheles sp*	+
74100	*Simulium sp*	+
77120	*Ablabesmyia mallochi*	+
78655	*Procladius (Holotanypus) sp*	+
80420	*Cricotopus (C.) bicinctus*	+
83000	*Dicrotendipes sp*	+
83040	*Dicrotendipes neomodestus*	+
83158	*Endochironomus nigricans*	+
83300	*Glyptotendipes (G.) sp*	+
84450	*Polypedilum (Uresipedilum) flavum*	+
85500	*Paratanytarsus sp*	+
85800	*Tanytarsus sp*	+
85821	*Tanytarsus glabrescens group sp 7*	+
92613	*Cipangopaludina chinensis malleata*	+
95900	*Gyraulus sp*	+
96120	*Menetus (Micromenetus) dilatatus*	+
96264	*Planorbella (Pierosoma) pilsbryi*	+
98200	*Pisidium sp*	+

Taxa Code	Taxa	Quant/Qual

No. Quantitative Taxa: 0
No. Qualitative Taxa: 44
Number of Organisms: 0

Total Taxa: 44
ICI:
Qual EPT: 4

319 PROJECTS

PROJECT POST RESTORATION MONITORING

OTTAWA RIVER

SECOR DAM REMOVAL AND STREAM RESTORATION

Project Post Restoration Stream Monitoring

PROJECT NAME: OTTAWA RIVER SECOR DAM REMOVAL AND STREAM RESTORATION

Project Post Restoration Stream Monitoring

PROJECT NUMBER: 06(h)EPA-10
STREAM SAMPLED: Ottawa River

SUMMARY

Funds awarded under provisions of project 06(h)EPA-10 were used to complete stream channel and streambank restoration in and near the former Secor dam pool. Removal of this dam restored fish migration patterns and natural flow conditions to more than 1,000 linear feet of the Ottawa River. The completed project resulted in the removal of the Secor Road lowhead dam, stabilization of 1,000 linear feet of stream banks, restoration of the natural floodplain contour as well as installing in-stream riffles and pools, and enhancing the riparian corridor with plantings of 500 native hardwoods and grasses.

Within the section of the Ottawa River previously impounded by the Secor low head dam (RM 11.8), biological communities in 2011 were in full attainment of the Warmwater Habitat (WWH) biological criteria listed in the Ohio Water Quality Standards. Although the physical habitat score within the old impoundment area is only of fair quality (QHEI = 59.3), scores should continue to improve to a good rating as the free-flowing habitat conditions evolve and stabilize within the prior impounded reach. Full attainment of WWH biocriteria was recorded at the station located upstream from the previously impounded area. Poor quality biological communities were documented in the Ottawa River at RM 11.6, downstream from the old Secor dam site and Heldman Ditch, resulting in non-attainment of the WWH biocriteria. Sampling was conducted in the Ottawa River behind the Secor dam in 2000. Flow regulation valves at the base of the dam were opened in April 2000, resulting in free-flowing conditions behind the dam when biological sampling occurred in July and October of 2000. Biological communities were of very poor to fair quality in the Ottawa River behind the dam during 2000, reflecting influences from the previously impounded condition. Substantial improvement in biological quality occurred at RM 11.8 in the Ottawa River after the Secor dam was removed. With removal of the Secor low head dam, full WWH aquatic life use attainment has been realized and the impairment of 0.2 miles within the former impoundment has been eliminated.

AQUATIC LIFE USE ATTAINMENT – OTTAWA RIVER (OLD SECOR DAM AREA) 2011 AND 2000.

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. Stream sites are located in the Huron Erie Lake Plain (HELP) ecoregion. In the Ohio Water Quality Standards, the Ottawa River is designated Warmwater Habitat (WWH) within the study area. Poor or very poor results are underlined.

Sample Site River Mile - Year	Attainment Status	IBI	MIwb	ICI	QHEI	Biological Assessment
RM 12.2 - 2011	**FULL**	30^{ns}	8.2	30^{ns}	67.0 (good)	Fair/ Marginally Good
RM 11.8 - 2011	**FULL**	29^{ns}	6.8^{ns}	36	59.3 (fair)	Fair/ Good
RM 11.8 - 2000	**NON**	17*	5.4*	24*	53.0 (fair)	Very poor/ Fair
RM 11.6 - 2011	**NON**	27*	4.3*	22*	63.0 (good)	Very poor/ Fair

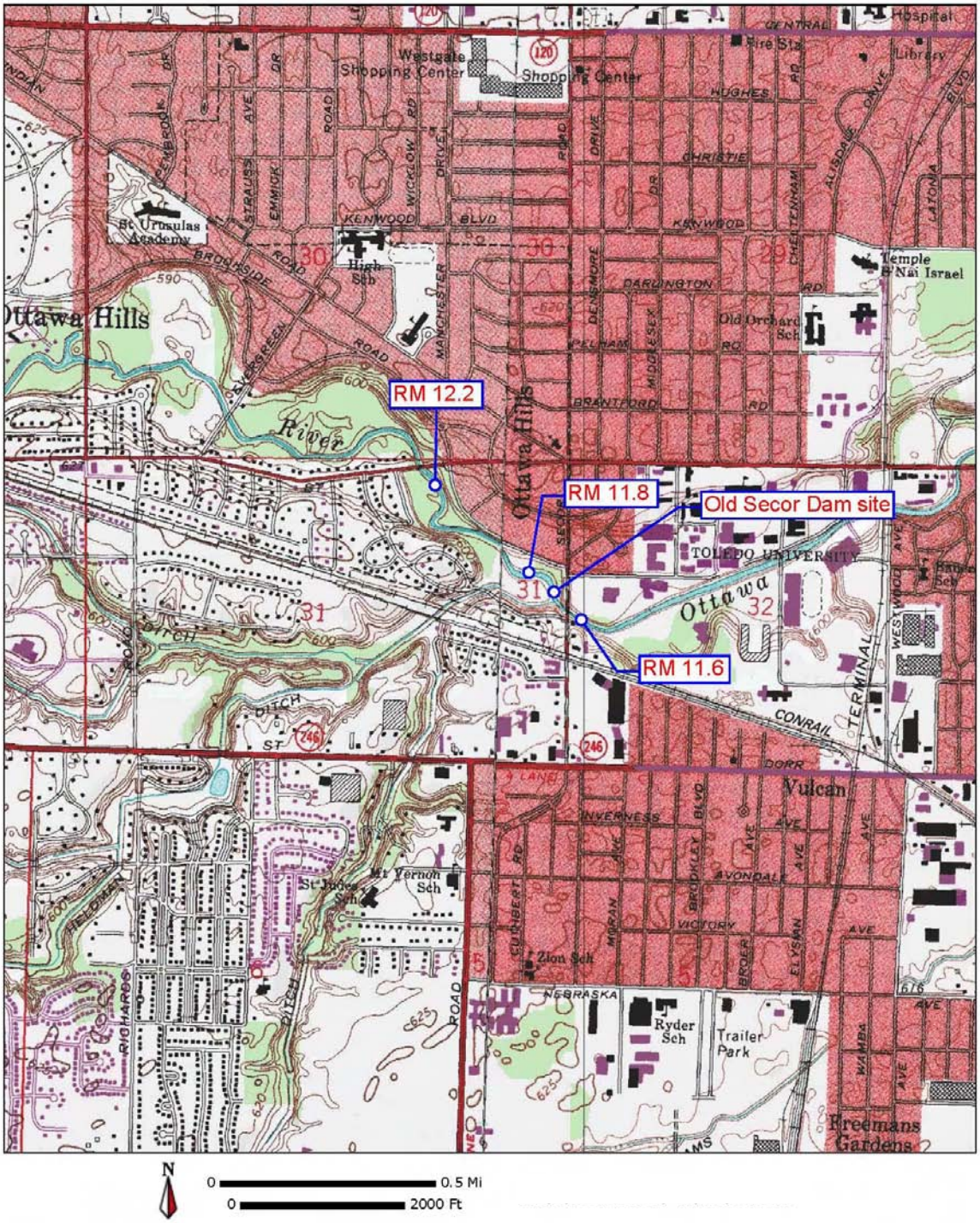
Ecoregion Biocriteria: Huron Erie Lake Plain (HELP)	
INDEX – SITE TYPE	WWH
IBI: Wading	32
MIwb: Wading	7.3
ICI	34

^{ns} Nonsignificant departure from biocriterion (≤4 IBI or ICI units, ≤0.5 MIwb units).
* Significant departure from biocriterion (>4 IBI or ICI units, >0.5 MIwb units).

Sampling locations in the Ottawa River – old Secor dam area, 2011 and 2000.

River Mile	Latitude	Longitude	Landmark
12.2	41.66195	-83.62780	Downstream Bancroft Street
11.8	41.65890	-83.62290	Old Secor dam impounded area – now a free-flowing river area
11.6	41.65765	-83.62119	Secor Road

Ottawa River (old Secor dam area) Sampling Locations, 2011 and 2000



APPENDICES – OTTAWA RIVER (OLD SECOR DAM AREA) PROJECT

Appendix Table 1. Qualitative Habitat Evaluation Index (QHEI) scores for the Ottawa River.

Appendix Table 2. Index of Biotic Integrity (IBI) scores and metrics for the Ottawa River.

Appendix Table 3. Ohio EPA fish results for the Ottawa River.

Appendix Table 4. Invertebrate Community Index (ICI) scores and metrics for the Ottawa River.

Appendix Table 5. Ohio EPA macroinvertebrate results for the Ottawa River.

Appendix Table 1. Qualitative Habitat Evaluation Index (QHEI) scores and physical attributes for fish sampling sites in the Ottawa River, Secor dam project, 2011 and 2000.

			WWH Attributes																												
Key QHEI Components																															
River Mile	**QHEI**	**Habitat Rating**	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**
														MWH Attributes																	
														High Influence							*Moderate Influence*										
Ottawa River Year: 2011																															
12.2	**67.0**	Good	■	■		■		■	■		■		6				◆		1		●		●		●				●	●		5
11.8	**59.3**	Fair	■			■			■		■		4				◆		1		●		●	●	●				●	●		6
11.6	**63.0**	Good	■			■			■		■		4				◆		1		●			●	●				●	●		5
Ottawa River Year: 2000																															
11.8	**53.0**	Fair	■				■				■		3				◆		1		●			●	●			●	●	●		6

Appendix Table 2. Index of Biotic Integrity (IBI) scores and metrics for the Ottawa River, 2011 2000.

				Number of					Percent of Individuals									
River Mile	Type	Date	Drainage area (sq mi)	Total species	Sunfish species	Sucker species	Intolerant species	Darter species	Simple Lithophils	Tolerant fishes	Omni-vores	Top carnivores	Insect-ivores	DELT anomalies	Rel.No. minus tolerants /(0.3km)		IBI	Modified Iwb
Ottawa River - (04300)																		
Year: 2011																		
12.20	D	07/07/2011	133	16(3)	3(3)	1(1)	0(1)	4(3)	11(1)	27(3)	22(3)	0.8(1)	25(1)	0.2(3)	671(3)		28	8.1
12.20	D	08/17/2011	133	17(3)	3(3)	2(1)	0(1)	3(3)	12(1)	27(3)	18(5)	0.8(1)	27(3)	0.0(5)	732(3)		32	8.3
11.80	D	07/06/2011	133	12(3)	3(3)	0(1)	0(1)	3(3)	11(1)	12(5)	3(5)	0.8(1)	25(1)	0.0(5)	173(1)	*	30	5.9
11.80	D	08/16/2011	133	16(3)	3(3)	1(1)	0(1)	4(3)	5(1)	26(3)	24(3)	0.9(1)	21(1)	0.0(5)	488(3)		28	7.8
11.60	D	07/06/2011	154	13(3)	3(3)	0(1)	0(1)	2(1)	8(1)	28(3)	18(5)	0.8(1)	29(3)	1.0(5)	141(1)	*	28	3.8
11.60	D	08/16/2011	154	18(3)	3(3)	0(1)	0(1)	3(3)	1(1)	38(1)	28(3)	0.5(1)	20(1)	0.2(5)	372(3)		26	4.8
Year: 2000																		
11.80	D	07/20/2000	147	10(1)	1(1)	1(1)	0(1)	2(1)	1(1)	84(1)	81(1)	0.0(1)	17(1)	0.2(3)	190(1)		14	4.9
11.80	E	10/03/2000	147	13(3)	2(3)	1(1)	0(1)	2(1)	3(1)	75(1)	74(1)	0.2(1)	16(1)	0.0(5)	186(1)		20	5.9

na - Qualitative data, Modified Iwb not applicable.

♦ - IBI is low end adjusted.

* - < 200 Total individuals in sample

** - < 50 Total individuals in sample

● - One or more species excluded from IBI calculation.

River Code: **04-300**	Stream: **Ottawa River**	Sample Date: **2011**
River Mile: **12.20**	Location:	Date Range: 07/07/2011
Time Fished: 5197 sec	Drainage: 133.0 sq mi	Thru: 08/17/2011
Dist Fished: 0.40 km	Basin: Ottawa River No of Passes: 2	Sampler Type: D

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	0.75	0.08	0.01	0.17	12.00
Redfin Pickerel		P	M	P	1	0.75	0.08	0.01	0.14	10.00
Northern Pike	F	P	M		2	1.50	0.16	0.12	2.19	77.50
Golden Redhorse	R	I	S	M	3	2.25	0.23	0.13	2.44	57.67
White Sucker	W	O	S	T	46	34.50	3.60	0.66	12.43	19.20
Creek Chub	N	G	N	T	65	48.75	5.09	0.81	15.27	16.70
Emerald Shiner	N	I	M		47	35.25	3.68	0.13	2.38	3.61
Striped Shiner	N	I	S		3	2.25	0.23	0.02	0.34	8.00
Spotfin Shiner	N	I	M		13	9.75	1.02	0.04	0.75	4.08
Bluntnose Minnow	N	O	C	T	205	153.75	16.04	0.28	5.18	1.80
Central Stoneroller	N	H	N		437	327.75	34.19	0.76	14.28	2.32
Brown Bullhead		I	C	T	4	3.00	0.31	0.08	1.48	26.25
Largemouth Bass	F	C	C		7	5.25	0.55	0.29	5.37	54.43
Green Sunfish	S	I	C	T	23	17.25	1.80	0.31	5.72	17.65
Bluegill Sunfish	S	I	C	P	86	64.50	6.73	0.53	9.90	8.17
Pumpkinseed Sunfish	S	I	C	P	20	15.00	1.56	0.24	4.44	15.75
Green Sf X Bluegill Sf					4	3.00	0.31	0.09	1.76	31.25
Blackside Darter	D	I	S		45	33.75	3.52	0.11	1.99	3.13
Logperch	D	I	S	M	45	33.75	3.52	0.22	4.09	6.45
Johnny Darter	D	I	C		35	26.25	2.74	0.06	1.19	2.42
Orangethroat Darter	D	I	S		4	3.00	0.31	0.01	0.17	3.00
Round Goby	E				182	136.50	14.24	0.45	8.40	3.28
	Mile Total				1,278	958.50		5.33		
	Number of Species				21					
	Number of Hybrids				1					

River Code: **04-300**	Stream: **Ottawa River**	Sample Date: **2011**
River Mile: **11.80**	Location: upst. old University of Toledo dam	Date Range: 07/06/2011
Time Fished: 3551 sec	Drainage: 133.0 sq mi	Thru: 08/16/2011
Dist Fished: 0.40 km	Basin: Ottawa River No of Passes: 2	Sampler Type: D

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		46	34.50	8.10	0.43	12.62	12.39
Central Mudminnow		I	C	T	1	0.75	0.18	0.00	0.03	1.00
White Sucker	W	O	S	T	3	2.25	0.53	0.04	1.24	18.67
Creek Chub	N	G	N	T	31	23.25	5.46	0.05	1.55	2.26
Emerald Shiner	N	I	M		3	2.25	0.53	0.01	0.35	5.33
Spotfin Shiner	N	I	M		1	0.75	0.18	0.00	0.09	4.00
Bluntnose Minnow	N	O	C	T	61	45.75	10.74	0.12	3.54	2.63
Central Stoneroller	N	H	N		129	96.75	22.71	0.61	17.87	6.26
Yellow Bullhead		I	C	T	3	2.25	0.53	0.12	3.50	52.67
Largemouth Bass	F	C	C		5	3.75	0.88	0.58	17.03	153.80
Green Sunfish	S	I	C	T	29	21.75	5.11	0.34	10.08	15.69
Bluegill Sunfish	S	I	C	P	40	30.00	7.04	0.28	8.23	9.30
Pumpkinseed Sunfish	S	I	C	P	7	5.25	1.23	0.10	3.00	19.29
Green Sf X Pumpkinseed					1	0.75	0.18	0.06	1.73	78.00
Blackside Darter	D	I	S		11	8.25	1.94	0.03	0.97	4.00
Logperch	D	I	S	M	23	17.25	4.05	0.17	5.00	9.83
Johnny Darter	D	I	C		4	3.00	0.70	0.01	0.16	1.75
Least Darter [S]	D	I	N		1	0.75	0.18	0.00	0.03	1.00
Round Goby	E				169	126.75	29.75	0.44	13.01	3.48
	Mile Total				568	426.00		3.39		
	Number of Species				18					
	Number of Hybrids				1					

River Code: **04-300**	Stream: **Ottawa River**	Sample Date: **2000**
River Mile: **11.80**	Location: upst. old University of Toledo dam	Date Range: 07/20/2000
Time Fished: 3776 sec	Drainage: 133.0 sq mi	Thru: 10/03/2000
Dist Fished: 0.41 km	Basin: Ottawa River No of Passes: 2	Sampler Type: D E

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	4.50	0.46	0.36	6.48	79.33
White Sucker	W	O	S	T	12	8.93	0.92	0.26	4.70	28.83
Common Carp	G	O	M	T	6	4.43	0.45	1.91	34.66	437.17
Goldfish	G	O	M	T	1	0.71	0.07	0.04	0.64	50.00
Creek Chub	N	G	N	T	20	14.46	1.49	0.54	9.80	37.15
Redfin Shiner	N	I	N		8	5.79	0.59	0.01	0.25	2.38
Striped Shiner	N	I	S		2	1.50	0.15	0.04	0.75	27.50
Fathead Minnow	N	O	C	T	2	1.46	0.15	0.00	0.06	2.50
Bluntnose Minnow	N	O	C	T	1,018	739.68	75.97	1.30	23.53	1.75
Central Stoneroller	N	H	N		50	37.25	3.83	0.20	3.54	5.21
Yellow Bullhead		I	C	T	1	0.71	0.07	0.02	0.31	24.00
Largemouth Bass	F	C	C		1	0.75	0.08	0.01	0.19	14.00
Green Sunfish	S	I	C	T	21	15.25	1.57	0.57	10.27	36.95
Bluegill Sunfish	S	I	C	P	1	0.75	0.08	0.00	0.05	3.00
Green Sf X Bluegill Sf					1	0.71	0.07	0.01	0.26	20.00
Green Sf X Hybrid					1	0.75	0.08	0.03	0.54	40.00
Blackside Darter	D	I	S		6	4.39	0.45	0.01	0.25	3.17
Johnny Darter	D	I	C		181	131.61	13.52	0.20	3.71	1.56
	Mile Total				1,338	973.64		5.51		
	Number of Species				16					
	Number of Hybrids				2					

River Code: **04-300**	Stream: **Ottawa River**	Sample Date: **2011**
River Mile: **11.60**	Location: Secor Rd.	Date Range: 07/06/2011
Time Fished: 4543 sec	Drainage: 154.0 sq mi	Thru: 08/16/2011
Dist Fished: 0.40 km	Basin: Ottawa River No of Passes: 2	Sampler Type: D

Species Name / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Redfin Pickerel		P	M	P	1	0.75	0.19	0.03	0.10	40.00
Northern Pike	F	P	M		1	0.75	0.19	0.24	0.78	325.00
Common Carp	G	O	M	T	18	13.50	3.38	28.98	93.10	2,146.34
Golden Shiner	N	I	M	T	1	0.75	0.19	0.00	0.00	2.00
Creek Chub	N	G	N	T	3	2.25	0.56	0.02	0.05	6.67
Emerald Shiner	N	I	M		15	11.25	2.81	0.06	0.18	5.07
Spotfin Shiner	N	I	M		9	6.75	1.69	0.05	0.16	7.22
Fathead Minnow	N	O	C	T	5	3.75	0.94	0.01	0.02	1.60
Bluntnose Minnow	N	O	C	T	115	86.25	21.58	0.15	0.49	1.76
Central Stoneroller	N	H	N		21	15.75	3.94	0.05	0.15	3.03
Yellow Bullhead		I	C	T	2	1.50	0.38	0.05	0.17	35.50
Tadpole Madtom		I	C		1	0.75	0.19	0.02	0.07	30.00
Western Mosquitofish	E	I	N		2	1.50	0.38	0.00	0.01	1.50
Largemouth Bass	F	C	C		1	0.75	0.19	0.01	0.03	12.00
Green Sunfish	S	I	C	T	47	35.25	8.82	0.48	1.55	13.70
Bluegill Sunfish	S	I	C	P	16	12.00	3.00	0.10	0.31	7.94
Pumpkinseed Sunfish	S	I	C	P	3	2.25	0.56	0.06	0.21	28.33
Green Sf X Bluegill Sf					1	0.75	0.19	0.02	0.08	32.00
Yellow Perch			M		2	1.50	0.38	0.23	0.75	155.50
Logperch	D	I	S	M	13	9.75	2.44	0.08	0.25	7.85
Johnny Darter	D	I	C		5	3.75	0.94	0.01	0.03	2.20
Least Darter [S]	D	I	N		5	3.75	0.94	0.00	0.01	1.00
Round Goby	E				246	184.50	46.15	0.47	1.52	2.56
	Mile Total				533	399.75		31.12		
	Number of Species				22					
	Number of Hybrids				1					

River Mile	Drainage Area (sq mi)	Number of Total Taxa	Number of Mayfly Taxa	Number of Caddisfly Taxa	Number of Dipteran Taxa	Percent: Mayflies	Percent: Caddis-flies	Percent: Tany-tarsini	Percent: Other Dipt/NI	Percent: Tolerant Organisms	Qual. EPT	Eco-region	ICI
Ottawa River (04-300)													
Year: 2011													
12.21	133.0	33(4)	3(2)	2(2)	19(6)	1.6(2)	4.1(2)	24.5(4)	68.7(0)	4.5(6)	5(2)	1	30
11.80	133.0	32(4)	4(2)	3(4)	17(4)	6.7(2)	23.0(6)	20.7(4)	49.2(2)	2.0(6)	5(2)	1	36
11.60	154.0	36(4)	2(0)	1(2)	22(6)	0.7(2)	14.9(4)	21.2(4)	61.3(0)	14.7(0)	4(0)	1	22
Year: 2000													
11.80	147.0	30(4)	4(2)	1(2)	19(6)	8.5(2)	8.4(2)	18.2(4)	64.6(0)	27.6(0)	6(2)	1	24

Appendix Table 5. Ohio EPA/DSW Ecological Assessment Section Macroinvertebrate Collection

Site: Ottawa River
Bancroft St.

Collection Date: 08/17/2011 River Code: 04-300 RM: 12.21

Taxa Code	Taxa	Quant/Qual	
01801	*Turbellaria*	60	+
03360	*Plumatella sp*	4	+
03600	*Oligochaeta*	32	+
04960	*Mooreobdella sp*	8	+
08250	*Orconectes (Procericambarus) rusticus*		+
08601	*Hydrachnidia*		+
11120	*Baetis flavistriga*		+
11130	*Baetis intercalaris*	34	+
13400	*Stenacron sp*	17	+
13521	*Stenonema femoratum*	1	
22300	*Argia sp*	34	+
42700	*Belostoma sp*		+
43300	*Ranatra sp*		+
52200	*Cheumatopsyche sp*	125	+
52530	*Hydropsyche depravata group*		+
53800	*Hydroptila sp*	9	
68201	*Scirtidae*		+
68901	*Macronychus glabratus*	4	
69400	*Stenelmis sp*		+
77120	*Ablabesmyia mallochi*	27	
77500	*Conchapelopia sp*	82	+
77750	*Hayesomyia senata or Thienemannimyia norena*	55	
78140	*Labrundinia pilosella*	27	
78450	*Nilotanypus fimbriatus*	27	+
80370	*Corynoneura lobata*	208	
80430	*Cricotopus (C.) tremulus group*	55	
81231	*Nanocladius (N.) crassicornus or N. (N.) "rectinervis"*	27	
82141	*Thienemanniella xena*		+
82820	*Cryptochironomus sp*		+
83040	*Dicrotendipes neomodestus*	1042	+
83300	*Glyptotendipes (G.) sp*	110	
84450	*Polypedilum (Uresipedilum) flavum*	247	+
84460	*Polypedilum (P.) fallax group*	82	
84470	*Polypedilum (P.) illinoense*	27	+
84540	*Polypedilum (Tripodura) scalaenum group*	82	+
85500	*Paratanytarsus sp*	219	
85625	*Rheotanytarsus sp*	27	
85800	*Tanytarsus sp*	55	
85821	*Tanytarsus glabrescens group sp 7*	494	+
87540	*Hemerodromia sp*	16	+
93900	*Elimia sp*	10	+
95100	*Physella sp*	2	
96900	*Ferrissia sp*	2	

Taxa Code	Taxa	Quant/Qual

No. Quantitative Taxa: 33 Total Taxa: 43
No. Qualitative Taxa: 27 ICI: **30**
Number of Organisms: 3251 Qual EPT: 5

Appendix Table 5. Ohio EPA/DSW Ecological Assessment Section Macroinvertebrate Collection

Site: Ottawa River

Collection Date: 08/16/2011 River Code: 04-300 RM: 11.80 upst. old University of Toledo dam

Taxa Code	Taxa	Quant/Qual	
00401	*Spongillidae*		+
01320	*Hydra sp*	72	
01801	*Turbellaria*	146	+
03360	*Plumatella sp*	2	+
03600	*Oligochaeta*	96	+
08250	*Orconectes (Procericambarus) rusticus*		+
11020	*Acerpenna pygmaea*	1	
11120	*Baetis flavistriga*	11	+
11130	*Baetis intercalaris*	300	+
13400	*Stenacron sp*	10	+
21200	*Calopteryx sp*		+
22001	*Coenagrionidae*		+
22300	*Argia sp*	2	
52200	*Cheumatopsyche sp*	958	+
52530	*Hydropsyche depravata group*	73	+
53800	*Hydroptila sp*	70	
68901	*Macronychus glabratus*	2	
69400	*Stenelmis sp*	16	+
77750	*Hayesomyia senata or Thienemannimyia norena*	28	+
77800	*Helopelopia sp*		+
78450	*Nilotanypus fimbriatus*	110	
78655	*Procladius (Holotanypus) sp*		+
80370	*Corynoneura lobata*	96	
80410	*Cricotopus (C.) sp*	83	
80420	*Cricotopus (C.) bicinctus*		+
80430	*Cricotopus (C.) tremulus group*	276	
81825	*Rheocricotopus (Psilocricotopus) robacki*	55	+
82141	*Thienemanniella xena*	32	
82730	*Chironomus (C.) decorus group*		+
82885	*Cryptotendipes pseudotener*		+
83040	*Dicrotendipes neomodestus*	414	+
83300	*Glyptotendipes (G.) sp*		+
83820	*Microtendipes "caelum" (sensu Simpson & Bode, 1980)*	55	
84040	*Parachironomus frequens*	28	
84210	*Paratendipes albimanus or P. duplicatus*		+
84450	*Polypedilum (Uresipedilum) flavum*	634	+
84470	*Polypedilum (P.) illinoense*		+
84520	*Polypedilum (Tripodura) halterale group*		+
84540	*Polypedilum (Tripodura) scalaenum group*	165	
85500	*Paratanytarsus sp*	27	
85625	*Rheotanytarsus sp*	165	
85800	*Tanytarsus sp*	28	+
85821	*Tanytarsus glabrescens group sp 7*	772	+
87540	*Hemerodromia sp*	64	
93900	*Elimia sp*	3	+

No. Quantitative Taxa: 32 Total Taxa: 45

No. Qualitative Taxa: 29 ICI: **36**

Number of Organisms: 4794 Qual EPT: 5

Appendix Table 5. Ohio EPA/DSW Ecological Assessment Section Macroinvertebrate Collection

Site: Ottawa River
Secor Rd.

Collection Date: 07/06/2000 River Code: 04-300 RM: 11.80

Taxa Code	Taxa	Quant/Qual	
01801	*Turbellaria*	8	+
03600	*Oligochaeta*	96	+
08250	*Orconectes (Procericambarus) rusticus*		+
11120	*Baetis flavistriga*	52	
11130	*Baetis intercalaris*	115	+
13400	*Stenacron sp*	102	+
13521	*Stenonema femoratum*	4	+
17200	*Caenis sp*		+
21200	*Calopteryx sp*		+
22001	*Coenagrionidae*		+
22300	*Argia sp*	2	+
44501	*Corixidae*		+
47600	*Sialis sp*	1	+
52200	*Cheumatopsyche sp*	270	+
53800	*Hydroptila sp*		+
68601	*Ancyronyx variegata*		+
68708	*Dubiraphia vittata group*		+
68901	*Macronychus glabratus*		+
69400	*Stenelmis sp*	8	+
74100	*Simulium sp*	17	+
77120	*Ablabesmyia mallochi*	80	+
77500	*Conchapelopia sp*	80	+
78655	*Procladius (Holotanypus) sp*	27	+
80204	*Brillia flavifrons group*		+
80370	*Corynoneura lobata*	64	
80410	*Cricotopus (C.) sp*	133	
80420	*Cricotopus (C.) bicinctus*	425	+
80430	*Cricotopus (C.) tremulus group*	80	
81825	*Rheocricotopus (Psilocricotopus) robacki*	106	+
82141	*Thienemanniella xena*	117	
82730	*Chironomus (C.) decorus group*		+
82820	*Cryptochironomus sp*		+
83040	*Dicrotendipes neomodestus*	53	+
83300	*Glyptotendipes (G.) sp*		+
84450	*Polypedilum (Uresipedilum) flavum*	398	+
84460	*Polypedilum (P.) fallax group*	239	+
84470	*Polypedilum (P.) illinoense*	53	+
84540	*Polypedilum (Tripodura) scalaenum group*	27	+
85500	*Paratanytarsus sp*	53	+
85625	*Rheotanytarsus sp*	212	+
85800	*Tanytarsus sp*	186	
85821	*Tanytarsus glabrescens group sp 7*	133	
95100	*Physella sp*		+
96900	*Ferrissia sp*	74	+
98600	*Sphaerium sp*		+
99180	*Strophitus undulatus undulatus*		+
99240	*Lasmigona complanata*		+
99260	*Lasmigona compressa*		+
99440	*Fusconaia flava*		+

No. Quantitative Taxa: 30 Total Taxa: 49
No. Qualitative Taxa: 42 ICI: **24**
Number of Organisms: 3215 Qual EPT: 6

Appendix Table 5. Ohio EPA/DSW Ecological Assessment Section Macroinvertebrate Collection

Site: Ottawa River
Secor Rd.

Collection Date: 08/16/2011 River Code: 04-300 RM: 11.60

Taxa Code	Taxa	Quant/Qual	
01801	*Turbellaria*	2	
03360	*Plumatella sp*	1	
03451	*Urnatella gracilis*	4	
03600	*Oligochaeta*	122	+
04664	*Helobdella stagnalis*	7	+
04964	*Mooreobdella microstoma*	3	
05800	*Caecidotea sp*	15	+
08250	*Orconectes (Procericambarus) rusticus*		+
11130	*Baetis intercalaris*	8	+
13400	*Stenacron sp*	1	+
21200	*Calopteryx sp*		+
22300	*Argia sp*	14	+
43300	*Ranatra sp*		+
52200	*Cheumatopsyche sp*	182	+
52530	*Hydropsyche depravata group*		+
68901	*Macronychus glabratus*	5	
69400	*Stenelmis sp*	4	+
77120	*Ablabesmyia mallochi*	36	
77130	*Ablabesmyia rhamphe group*		+
77500	*Conchapelopia sp*	7	
77750	*Hayesomyia senata or Thienemannimyia norena*	36	+
78140	*Labrundinia pilosella*	7	
78450	*Nilotanypus fimbriatus*	36	
80370	*Corynoneura lobata*	52	+
81231	*Nanocladius (N.) crassicornus or N. (N.) "rectinervis"*	36	
82820	*Cryptochironomus sp*	7	+
83040	*Dicrotendipes neomodestus*	22	+
83050	*Dicrotendipes lucifer*	7	
83300	*Glyptotendipes (G.) sp*	14	+
83840	*Microtendipes pedellus group*	7	
84210	*Paratendipes albimanus or P. duplicatus*		+
84450	*Polypedilum (Uresipedilum) flavum*	108	+
84460	*Polypedilum (P.) fallax group*	51	
84470	*Polypedilum (P.) illinoense*	7	
84540	*Polypedilum (Tripodura) scalaenum group*	115	+
84700	*Stenochironomus sp*	14	+
85500	*Paratanytarsus sp*	7	+
85625	*Rheotanytarsus sp*	29	
85800	*Tanytarsus sp*	29	
85821	*Tanytarsus glabrescens group sp 7*	195	
87540	*Hemerodromia sp*	32	
93900	*Elimia sp*	3	+

Taxa Code	Taxa	Quant/Qual

No. Quantitative Taxa: 36 Total Taxa: 42
No. Qualitative Taxa: 24 ICI: **22**
Number of Organisms: 1225 Qual EPT: 4

SHADYBROOK RUN
STREAM RESTORATION

Project Post Restoration Stream Monitoring

PROJECT NAME: SHADYBROOK RUN STREAM RESTORATION

Project Post Restoration Stream Monitoring

PROJECT NUMBER: 06(h) EPA-28
STREAM SAMPLED: Shadybrook Run

SUMMARY

Funding was awarded to the Holden Arboretum to remove a failing lowhead dam and restore the associated stream channel to a natural and free-flowing condition. However, following further analysis it was determined that removing the dam would cause excessive damage to surrounding riparian areas. Not only would the mature trees that had become established adjacent to the dam be destroyed, but the expense to remove, transport and dispose of the excess sediment was cost-prohibitive. The project was revised to reroute Shadybrook Run around the dam. As a result, 740 linear feet of riparian area was restored with plantings of native vegetation. Several natural channel design features were incorporated as appropriate for stream gradient.

Biological sampling occurred in Shadybrook Run at two locations, one within the restored channel and one upstream from the restoration area. Both locations had comparable fish and macroinvertebrate communities, with results in full attainment of the Coldwater Habitat (CWH) aquatic life use. Coldwater Habitat stream sites with a drainage area around one square mile are characterized by having at least four coldwater macroinvertebrate taxa and may have one or more coldwater fish species. One coldwater fish species (rainbow trout) and ten coldwater macroinvertebrate taxa were recorded from Shadybrook Run within the study area. This sampling confirmed that the CWH use designation currently assigned to Shadybrook Run is appropriate, and the stream section restored in 2009 is meeting the CWH use.

AQUATIC LIFE USE ATTAINMENT – SHADYBROOK RUN 2011.

The Index of Biotic Integrity (IBI) and Invertebrate Community Index (ICI) scores are based on the performance of the biological community. Narrative ranges are used with macroinvertebrate results when quantitative data are not available. The Qualitative Habitat Evaluation Index (QHEI) is a measure of the ability of the physical habitat to support a biological community. Stream sites are located in the Erie Ontario Lake Plain (EOLP) ecoregion. In the Ohio Water Quality Standards, Shadybrook Run is designated Coldwater Habitat (CWH).

Sample Site River Mile	Attainment Status	IBI	ICI	QHEI	Biological Assessment
RM 0.6	**FULL**	24 - Good	Good	77.5 (excellent)	Good
RM 0.5	**FULL**	24 - Good	Good	69.5 (very good)	Good

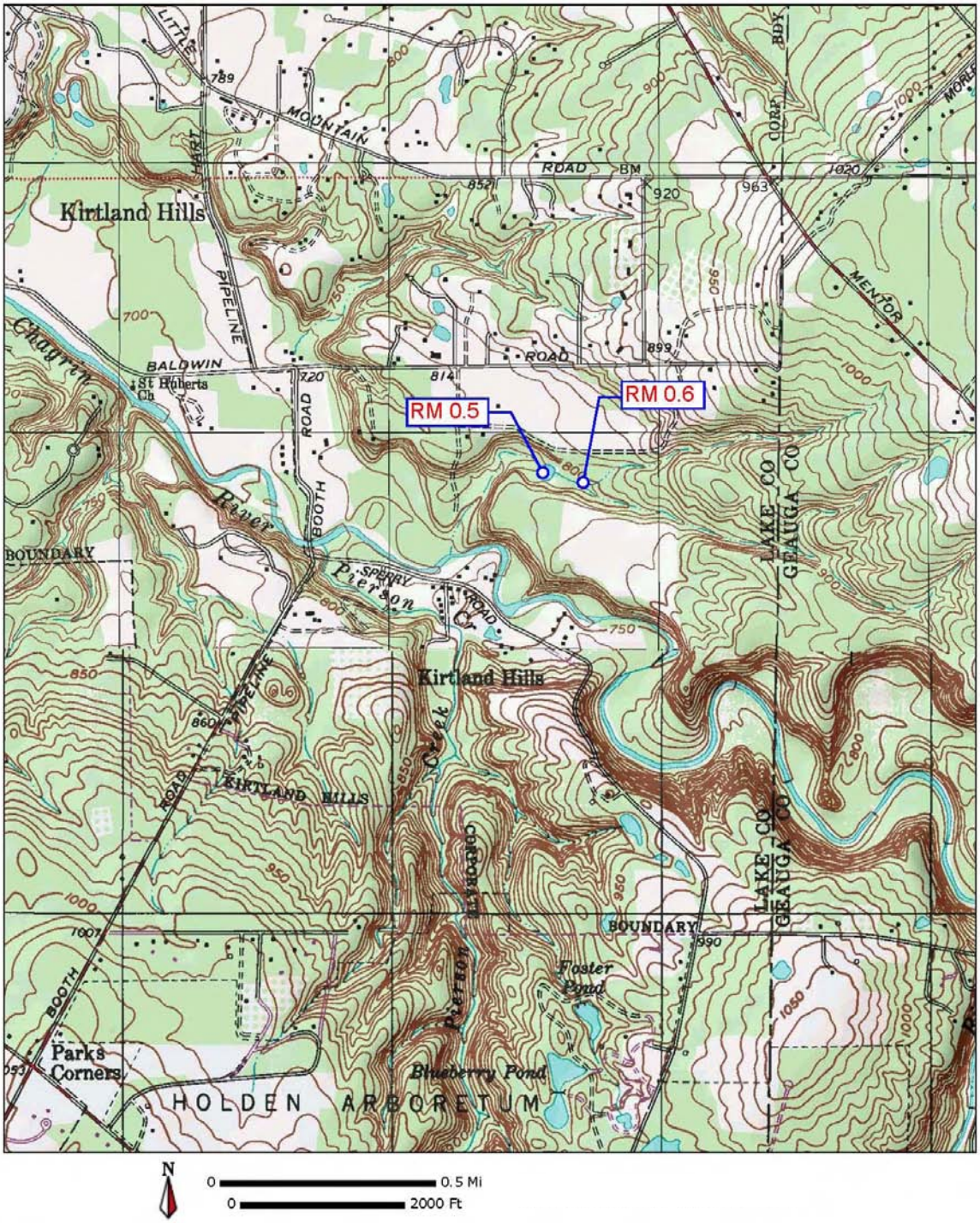
Ecoregion Biocriteria: Erie Ontario Lake Plain (EOLP)	
INDEX – SITE TYPE	CWH
IBI: Headwater	Narrative
ICI	Narrative

* Significant departure from biocriterion (>4 IBI or ICI units).

Sampling locations in Shadybrook Run, 2011.

River Mile	Latitude	Longitude	Landmark
0.6	41.63046	-81.30277	Holden Arboretum property; upstream restoration area
0.5	41.63096	-81.30517	Holden Arboretum property; within stream restoration site

Shadybrook Run Sampling Locations, 2011



APPENDICES – SHADYBROOK RUN PROJECT

Appendix Table 1. Qualitative Habitat Evaluation Index (QHEI) scores for Shadybrook Run.

Appendix Table 2. Index of Biotic Integrity (IBI) scores and metrics for Shadybrook Run.

Appendix Table 3. Ohio EPA fish results for Shadybrook Run.

Appendix Table 4. Ohio EPA macroinvertebrate results for Shadybrook Run.

Appendix Table 1. Qualitative Habitat Evaluation Index (QHEI) scores and physical attributes for fish sampling sites in Shadybrook Run, 2011.

			WWH Attributes											MWH 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**																														
Shadybrook Run Year: 2011																																
0.6	**77.5**	Excellent	■	■	■	■	■	■	■	■	■	■	10						0													0
0.5	**69.5**	Very Good	■	■		■	■	■	■		■	■	8						0					●					●			2

Appendix Table 2. Index of Biotic Integrity (IBI) scores and metrics for Shadybrook Run, 2011.

				Number of						Percent of Individuals						
River Mile	Type	Date	Drainage area (sq mi)	Total species	Minnow species	Headwater species	Sensitive species	Darter & Sculpin species	Simple Lithophils	Tolerant fishes	Omni-vores	Pioneering fishes	Insect-ivores	DELT anomalies	Rel.No. minus tolerants /(0.3km)	IBI
Shadybrook Run - (15-048)																
Year: 2011																
0.60	E	10/05/2011	0.8	2(1)	2(3)	1(1)	0(1)	0(1)	1(3)	97(1)	0(5)	60(1)	0(1)	0.0(5)	12(1)	24
0.50	E	10/05/2011	0.8	2(1)	2(3)	1(1)	0(1)	0(1)	1(3)	98(1)	0(5)	60(1)	0(1)	0.0(5)	9(1)	24

♦ - IBI is low end adjusted.

* - < 200 Total individuals in sample

** - < 50 Total individuals in sample

● - One or more species excluded from IBI calculation.

River Code: **15-048**	Stream: **Shadybrook Run**	Sample Date: **2011**
River Mile: **0.60**	Location: upst. from restoration area	Date Range: 10/05/2011
Time Fished: 1182 sec	Drainage: 0.8 sq mi	
Dist Fished: 0.10 km	Basin: Chagrin River No of Passes: 1	Sampler Type: E

Species Name / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Rainbow Trout	E		N		4	12.00	3.15			
Western Blacknose Dace	N	G	S	T	47	141.00	37.01			
Creek Chub	N	G	N	T	76	228.00	59.84			
Mile Total					127	381.00				
Number of Species					3					
Number of Hybrids					0					

River Code: **15-048**	Stream: **Shadybrook Run**	Sample Date: **2011**
River Mile: **0.50**	Location: in restoration area	Date Range: 10/05/2011
Time Fished: 1587 sec	Drainage: 0.8 sq mi	
Dist Fished: 0.10 km	Basin: Chagrin River No of Passes: 1	Sampler Type: E

Species Name / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Rainbow Trout	E		N		3	9.00	2.29			
Western Blacknose Dace	N	G	S	T	49	147.00	37.40			
Creek Chub	N	G	N	T	79	237.00	60.31			
Mile Total					131	393.00				
Number of Species					3					
Number of Hybrids					0					

Appendix Table 4. Ohio EPA/DSW Ecological Assessment Section Macroinvertebrate Collection

Site: Shadybrook Run
upst. from restoration area

Collection Date: 10/05/2011 River Code: 15-048 RM: 0.60

Taxa Code	Taxa	Quant/Qual
03600	*Oligochaeta*	+
07860	*Cambarus (Puncticambarus) robustus*	+
11014	*Acentrella turbida*	+
11115	*Baetis tricaudatus*	+
11120	*Baetis flavistriga*	+
14950	*Leptophlebia sp or Paraleptophlebia sp*	+
16200	*Eurylophella sp*	+
21200	*Calopteryx sp*	+
32001	*Nemouridae*	+
32200	*Amphinemura sp*	+
33100	*Leuctra sp*	+
36500	*Sweltsa sp*	+
50410	*Dolophilodes distinctus*	+
52200	*Cheumatopsyche sp*	+
52315	*Diplectrona modesta*	+
52460	*Ceratopsyche ventura*	+
53300	*Glossosoma sp*	+
67100	*Hydrobius sp*	+
69400	*Stenelmis sp*	+
70900	*Gonomyia sp*	+
71100	*Hexatoma sp*	+
79085	*Telopelopia okoboji*	+
82141	*Thienemanniella xena*	+
84440	*Polypedilum (Uresipedilum) aviceps*	+

Taxa Code	Taxa	Quant/Qual

No. Quantitative Taxa: 0 Total Taxa: 24
No. Qualitative Taxa: 24 ICI:
Number of Organisms: 0 Qual EPT: 14

Appendix Table 4. Ohio EPA/DSW Ecological Assessment Section Macroinvertebrate Collection

Site: Shadybrook Run
in restoration area

Collection Date: 10/05/2011 River Code: 15-048 RM: 0.50

Taxa Code	Taxa	Quant/Qual	Taxa Code	Taxa	Quant/Qual
07860	*Cambarus (Puncticambarus) robustus*	+			
11115	*Baetis tricaudatus*	+			
11120	*Baetis flavistriga*	+			
12501	*Heptageniidae*	+			
14950	*Leptophlebia sp or Paraleptophlebia sp*	+			
16200	*Eurylophella sp*	+			
32001	*Nemouridae*	+			
42700	*Belostoma sp*	+			
52315	*Diplectrona modesta*	+			
52440	*Ceratopsyche slossonae*	+			
52460	*Ceratopsyche ventura*	+			
53300	*Glossosoma sp*	+			
63300	*Hydroporini*	+			
63900	*Laccophilus sp*	+			
71700	*Pilaria sp*	+			

No. Quantitative Taxa: 0 Total Taxa: 15

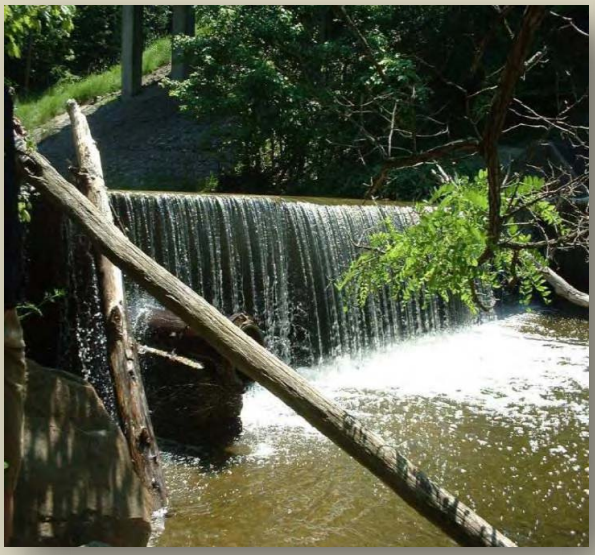
No. Qualitative Taxa: 15 ICI:

Number of Organisms: 0 Qual EPT: 10

EAST BRANCH EUCLID CREEK

DAM REMOVAL AND STREAM RESTORATION PROJECT

Project Post Restoration Stream Monitoring



PROJECT NAME: EAST BRANCH EUCLID CREEK DAM REMOVAL AND STREAM RESTORATION

Project Post Restoration Stream Monitoring

PROJECT NUMBER: 08(h) EPA-11
STREAM SAMPLED: East Branch Euclid Creek

SUMMARY

The East Branch Euclid Creek low head dam located near the mouth (RM 0.15) was removed in December 2010. The East Branch Dam was constructed in 1933 to impound water for swimming at a YMCA camp. The dam was roughly 6 feet high by 40 feet wide and made of concrete. Over the years, the area behind the dam filled with sediment. This 319 funded project eliminated the current impoundment and initiated restoration of natural stream habitat conditions as well as eliminating a barrier to fish. Following successful completion of the project, the area will be protected with a permanent conservation easement. During February, 2011, a significant flood event washed out several of the rock cross vanes established during restoration.

Biological sampling occurred in the East Branch Euclid Creek before (2008 – Ohio EPA, 2009 – Northeast Ohio Regional Sewer District) and after (2011 – Ohio EPA) removal of the dam. The site sampled prior to the dam removal and located downstream from the dam (RM 0.1), was partially attaining the Warmwater Habitat (WWH) biological criteria. Sampling results within the impoundment were in non-attainment of the WWH biocriteria. The low biological scores within the impoundment were associated with reduced habitat diversity (no riffles and extensive sediment deposits) and stormwater influences from a largely urbanized watershed. Sampling in 2011, within the previously impounded section of stream and further downstream (RMs 0.2 and 0.1) revealed fair quality biological communities and non-attainment of the WWH biocriteria. The 2011 results indicated continued negative influences from the largely urbanized watershed of the East Branch Euclid Creek.

AQUATIC LIFE USE ATTAINMENT – EAST BRANCH EUCLID CREEK 2008, 2009 and 2011.

The Index of Biotic Integrity (IBI) and Invertebrate Community Index (ICI) scores are based on the performance of the biological community. Narrative ranges are used with macroinvertebrate results when quantitative data are not available. The Qualitative Habitat Evaluation Index (QHEI) is a measure of the ability of the physical habitat to support a biological community. Stream sites are located in the Erie Ontario Lake Plain (EOLP) ecoregion. In the Ohio Water Quality Standards, East Branch Euclid Creek is designated Warmwater Habitat (WWH).

Sample Site River Mile	Attainment Status	IBI	ICI	QHEI	Biological Assessment
RM 0.3 - 2009	**PARTIAL**	28*	34	62.3 (good)	Fair/Good
RM 0.2 - 2008	**NON**	28*	24*	30.0 (poor)	Fair
RM 0.2- 2011	**NON**	34*	Fair*	63.8 (good)	Fair
RM 0.1- 2008	**PARTIAL**	32*	38	60.0 (good)	Fair/Good
RM 0.1- 2009	**PARTIAL**	32*	42	74.0 (excellent)	Fair/Very Good
RM 0.1- 2011	**NON**	30*	Fair*	65.8 (good)	Fair

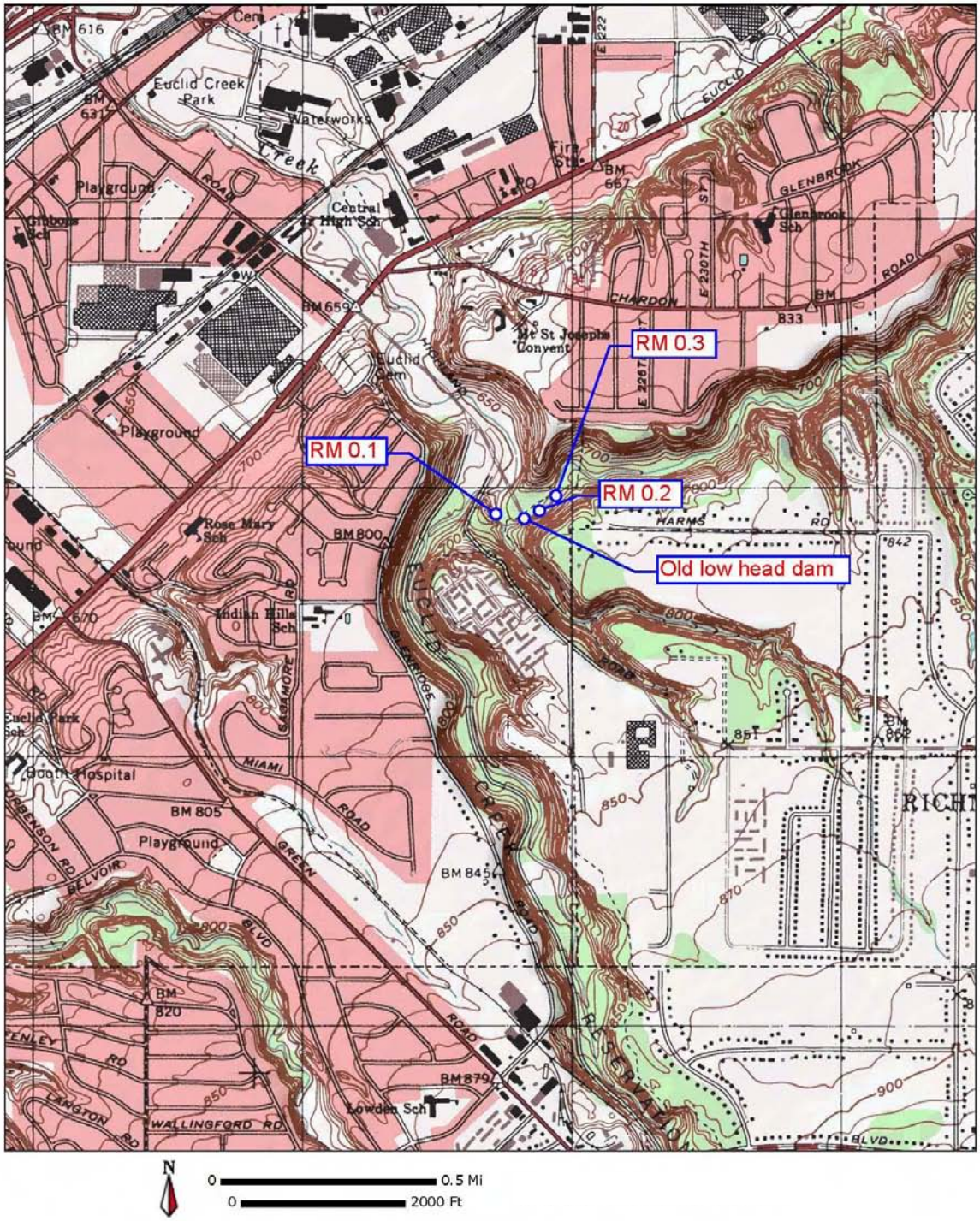
Ecoregion Biocriteria: Erie Ontario Lake Plain(EOLP)	
INDEX – SITE TYPE	WWH
IBI: Headwater	40
ICI	34

* Significant departure from biocriterion (>4 IBI or ICI units).

Sampling locations in the East Branch Euclid Creek, 2008 - 2011.

River Mile	Latitude	Longitude	Landmark
0.3	41.56180	-81.52767	Upstream impounded section of stream
0.2	41.56040	-81.52985	Upstream Highland Rd., old dam pool and restoration area
0.1	41.56100	-81.53080	Downstream Highland Rd., near mouth (downstream old dam)

East Branch Euclid Creek Sampling Locations, 2008, 2009, 2011



APPENDICES – EAST BRANCH EUCLID CREEK PROJECT

Appendix Table 1. Qualitative Habitat Evaluation Index (QHEI) scores for East Branch Euclid Creek.

Appendix Table 2. Index of Biotic Integrity (IBI) scores and metrics for East Branch Euclid Creek.

Appendix Table 3. Ohio EPA fish results for East Branch Euclid Creek.

Appendix Table 4. Invertebrate Community Index (ICI) scores and metrics for East Branch Euclid Creek.

Appendix Table 5. Ohio EPA macroinvertebrate results for East Branch Euclid Creek.

Appendix Table 1. Qualitative Habitat Evaluation Index (QHEI) scores and physical attributes for fish sampling sites in the East Branch Euclid Creek, 2008 - 2011.

			WWH Attributes																													
Key QHEI Components																																
River Mile	**QHEI**	**Habitat Rating**	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**
														High Influence						*Moderate Influence*												
East Branch Euclid Creek Year: 2011																																
0.2	**63.8**	Good	■	■		■			■	■	■	■	7			◆	◆		2					●								1
0.1	**65.8**	Good	■	■		■	■		■	■	■	■	8				◆		1					●								1
East Branch Euclid Creek Year: 2009																																
0.2	**62.3**	Good	■	■			■	■	■		■		6			◆			1		●			●					●	●		4
0.1	**74.0**	Excellent	■	■		■		■	■	■	■	■	8			◆	◆		2		●								●	●		3
East Branch Euclid Creek Year: 2008																																
0.2	**30.0**	Poor											0	◆		◆	◆	◆	4		●			●		●		●	●		●	6
0.1	**60.0**	Good	■	■					■	■	■	■	6			◆	◆		2					●								1

Appendix Table 2. Index of Biotic Integrity (IBI) scores and metrics for the East Branch Euclid Creek, 2008 and 2011.

				Number of						Percent of Individuals						
River Mile	Type	Date	Drainage area (sq mi)	Total species	Minnow species	Headwater species	Sensitive species	Darter & Sculpin species	Simple Lithophils	Tolerant fishes	Omni-vores	Pioneering fishes	Insect-ivores	DELT anomalies	Rel.No. minus tolerants /(0.3km)	IBI
E. Br. Euclid Creek - (19-056)																
Year: 2011																
0.20	E	09/02/2011	12.5	8(3)	4(3)	1(1)	0(1)	0(1)	2(1)	35(3)	10(5)	15(5)	7(1)	0.0(5)	909(5)	34
0.10	E	09/02/2011	12.5	7(1)	4(3)	1(1)	0(1)	0(1)	2(1)	46(3)	10(5)	18(5)	1(1)	0.0(5)	716(3)	30
Year: 2009																
0.3	E	09/21/2009	12.5	7(1	4(3)	1(1)	0(1)	0(1)	2(1)	66(1)	17(5)	32(3)	0(1)	0.0(5	802(5)	28
0.01	E	09/21/2009	12.5	8(3)	5(3)	1(1)	0(1)	0(1)	2(1)	61(1)	13(5)	29(5)	1(1)	0.0(5)	900(5)	32
Year: 2008																
0.20	D	08/12/2008	12.5	7(1)	4(3)	1(1)	0(1)	0(1)	2(1)	64(1)	29(3)	30(5)	1(1)	0.0(5)	1283(5)	28
0.10	D	08/12/2008	12.5	11(3)	5(3)	1(1)	1(1)	1(1)	3(1)	43(3)	8(5)	31(3)	3(1)	0.0(5)	2412(5)	32

♦ - IBI is low end adjusted.

* - < 200 Total individuals in sample

** - < 50 Total individuals in sample

● - One or more species excluded from IBI calculation.

River Code: **19-056**	Stream: **East Branch Euclid Creek**	Sample Date: **2009**
River Mile: **0.3**	Location: near mouth, upst. dam	Date Range: 09/21/2009
Time Fished: 1800 sec	Drainage: 12.5 sq mi	
Dist Fished: 0.15 km	Basin: Cuyahoga River No of Passes: 1	Sampler Type: E

Species Name / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
White Sucker	W	O	S	T	176	352.00	14.88			
Western Blacknose Dace	N	G	S	T	225	450.00	19.02			
Creek Chub	N	G	N	T	360	720.00	30.43			
Bluntnose Minnow	N	O	C	T	19	38.00	1.61			
Central Stoneroller	N	H	N		401	802.00	33.90			
Yellow Bullhead		I	C	T	1	2.00	0.08			
Green Sunfish	S	I	C	T	1	2.00	0.08			
	Mile Total				1,183	2,366.00				
	Number of Species				7					
	Number of Hybrids				0					

River Code: **19-056**	Stream: **East Branch Euclid Creek**	Sample Date: **2008**
River Mile: **0.20**	Location: dam pool	Date Range: 08/12/2008
Time Fished: 783 sec	Drainage: 12.5 sq mi	
Dist Fished: 0.08 km	Basin: Cuyahoga River No of Passes: 1	Sampler Type: D

Species Name / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
White Sucker	W	O	S	T	200	750.00	21.34	17.15	61.63	22.86
Western Blacknose Dace	N	G	S	T	111	416.25	11.85	1.38	4.95	3.31
Creek Chub	N	G	N	T	201	753.75	21.45	3.73	13.41	4.95
Bluntnose Minnow	N	O	C	T	74	277.50	7.90	1.43	5.12	5.14
Central Stoneroller	N	H	N		341	1,278.75	36.39	3.31	11.88	2.58
Yellow Bullhead		I	C	T	3	11.25	0.32	0.41	1.48	36.67
Green Sunfish	S	I	C	T	6	22.50	0.64	0.35	1.24	15.33
Hybrid X Sunfish					1	3.75	0.11	0.08	0.28	21.00
	Mile Total				937	3,513.75		27.82		
	Number of Species				7					
	Number of Hybrids				1					

River Code: **19-056**	Stream: **East Branch Euclid Creek**	Sample Date: **2011**
River Mile: **0.20**	Location: dam pool	Date Range: 09/02/2011
Time Fished: 1495 sec	Drainage: 12.5 sq mi	
Dist Fished: 0.13 km	Basin: Cuyahoga River No of Passes: 1	Sampler Type: E

Species Name / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
White Sucker	W	O	S	T	11	25.39	1.82			
Western Blacknose Dace	N	G	S	T	105	242.31	17.41			
Creek Chub	N	G	N	T	44	101.54	7.30			
Bluntnose Minnow	N	O	C	T	49	113.08	8.13			
Central Stoneroller	N	H	N		353	814.62	58.54			
Largemouth Bass	F	C	C		2	4.62	0.33			
Bluegill Sunfish	S	I	C	P	29	66.92	4.81			
Pumpkinseed Sunfish	S	I	C	P	10	23.08	1.66			
	Mile Total				603	1,391.54				
	Number of Species				8					
	Number of Hybrids				0					

River Code: **19-056**	Stream: **East Branch Euclid Creek**	Sample Date: **2008**
River Mile: **0.10**	Location: dst. dam pool	Date Range: 08/12/2008
Time Fished: 2453 sec	Drainage: 12.5 sq mi	
Dist Fished: 0.15 km	Basin: Cuyahoga River No of Passes: 1	Sampler Type: D

Species Name / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
White Sucker	W	O	S	T	54	108.00	2.57	2.10	14.16	19.44
Western Blacknose Dace	N	G	S	T	198	396.00	9.41	1.32	8.92	3.34
Creek Chub	N	G	N	T	536	1,072.00	25.48	3.37	22.71	3.14
Fathead Minnow	N	O	C	T	80	160.00	3.80	0.30	2.04	1.89
Bluntnose Minnow	N	O	C	T	28	56.00	1.33	0.63	4.23	11.21
Central Stoneroller	N	H	N		1,145	2,290.00	54.42	4.80	32.37	2.10
Yellow Bullhead		I	C	T	2	4.00	0.10	0.42	2.83	105.00
Black Bullhead		I	C	P	1	2.00	0.05	0.48	3.24	240.00
Largemouth Bass	F	C	C		1	2.00	0.05	0.02	0.11	8.00
Bluegill Sunfish	S	I	C	P	29	58.00	1.38	0.55	3.72	9.52
Redear Sunfish	E	I	C		23	46.00	1.09	0.45	3.01	9.73
Hybrid X Sunfish					6	12.00	0.29	0.36	2.40	29.67
Logperch	D	I	S	M	1	2.00	0.05	0.04	0.26	19.00
	Mile Total				2,104	4,208.00		14.83		
	Number of Species				12					
	Number of Hybrids				1					

River Code: **19-056**	Stream: **East Branch Euclid Creek**	Sample Date: **2011**
River Mile: **0.10**	Location: dst. dam pool	Date Range: 09/02/2011
Time Fished: 1831 sec	Drainage: 12.5 sq mi	
Dist Fished: 0.15 km	Basin: Cuyahoga River No of Passes: 1	Sampler Type: E

Species Name / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
White Sucker	W	O	S	T	7	14.00	1.06			
Goldfish	G	O	M	T	1	2.00	0.15			
Western Blacknose Dace	N	G	S	T	173	346.00	26.25			
Creek Chub	N	G	N	T	65	130.00	9.86			
Bluntnose Minnow	N	O	C	T	55	110.00	8.35			
Central Stoneroller	N	H	N		354	708.00	53.72			
Bluegill Sunfish	S	I	C	P	1	2.00	0.15			
Pumpkinseed Sunfish	S	I	C	P	3	6.00	0.46			
	Mile Total				659	1,318.00				
	Number of Species				8					
	Number of Hybrids				0					

River Code: **19-056**	Stream: **East Branch Euclid Creek**	Sample Date: **2009**
River Mile: **0.01**	Location: at mouth	Date Range: 09/21/2009
Time Fished: 1800 sec	Drainage: 12.5 sq mi	
Dist Fished: 0.15 km	Basin: Cuyahoga River No of Passes: 1	Sampler Type: E

Species Name / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
White Sucker	W	O	S	T	121	242.00	10.53			
Western Blacknose Dace	N	G	S	T	242	484.00	21.06			
Creek Chub	N	G	N	T	304	608.00	26.46			
Fathead Minnow	N	O	C	T	17	34.00	1.48			
Bluntnose Minnow	N	O	C	T	13	26.00	1.13			
Central Stoneroller	N	H	N		439	878.00	38.21			
Green Sunfish	S	I	C	T	2	4.00	0.17			
Pumpkinseed Sunfish	S	I	C	P	11	22.00	0.96			
Mile Total					1,149	2,298.00				
Number of Species					8					
Number of Hybrids					0					

Appendix Table 4. Invertebrate Community Index (ICI) scores and metrics for the East Branch Euclid Creek, 2008 and 2009.

River Mile	Drainage Area (sq mi)	Number of: Total Taxa	Mayfly Taxa	Caddisfly Taxa	Dipteran Taxa	Percent: Mayflies	Caddis-flies	Tany-tarsini	Other Dipt/NI	Tolerant Organisms	Qual. EPT	Eco-region	ICI
East Branch Euclid Creek (19-056)													
Year: 2009													
0.3	12.5	23(2)	2(0)	2(4)	14(4)	7.9(2)	3.1(6)	29.9(6)	58.7(2)	2.5(6)	4(2)	3	34
0.01	12.5	24(2)	3(2)	3(6)	15(4)	31.3(6)	9.3(6)	16.2(4)	43.2(4)	3.3(6)	4(2)	3	42
Year: 2008													
0.20	12.5	30(4)	2(0)	1(2)	18(4)	2.2(2)	0.1(2)	28.6(6)	68.6(0)	22.2(2)	4(2)	3	24
0.10	12.5	26(4)	2(0)	5(6)	12(2)	7.9(2)	16.8(6)	30.2(6)	44.9(4)	9.2(4)	8(4)	3	38

Appendix Table 5. Ohio EPA/DSW Ecological Assessment Section Macroinvertebrate Collection

Site: East Branch Euclid Creek
dam pool

Collection Date: 09/02/2011 River Code: 19-056 RM: 0.20

Taxa Code	Taxa	Quant/Qual
01801	*Turbellaria*	+
03360	*Plumatella sp*	+
03600	*Oligochaeta*	+
05800	*Caecidotea sp*	+
06700	*Crangonyx sp*	+
11120	*Baetis flavistriga*	+
50301	*Chimarra aterrima*	+
52200	*Cheumatopsyche sp*	+
52430	*Ceratopsyche morosa group*	+
52450	*Ceratopsyche sparna*	+
52530	*Hydropsyche depravata group*	+
69400	*Stenelmis sp*	+
74100	*Simulium sp*	+
80430	*Cricotopus (C.) tremulus group*	+
83040	*Dicrotendipes neomodestus*	+
84315	*Phaenopsectra flavipes*	+
84450	*Polypedilum (Uresipedilum) flavum*	+
96900	*Ferrissia sp*	+

Taxa Code	Taxa	Quant/Qual

No. Quantitative Taxa: 0 Total Taxa: 18
No. Qualitative Taxa: 18 ICI:
Number of Organisms: 0 Qual EPT: 6

Appendix Table 5. Ohio EPA/DSW Ecological Assessment Section Macroinvertebrate Collection

Site: East Branch Euclid Creek
dst. dam pool

Collection Date: 09/02/2011 River Code: 19-056 RM: 0.10

Taxa Code	Taxa	Quant/Qual
01801	*Turbellaria*	+
03600	*Oligochaeta*	+
05800	*Caecidotea sp*	+
06700	*Crangonyx sp*	+
08250	*Orconectes (Procericambarus) rusticus*	+
11120	*Baetis flavistriga*	+
22001	*Coenagrionidae*	+
23600	*Aeshna sp*	+
50301	*Chimarra aterrima*	+
52200	*Cheumatopsyche sp*	+
52450	*Ceratopsyche sparna*	+
52530	*Hydropsyche depravata group*	+
69400	*Stenelmis sp*	+
74100	*Simulium sp*	+
80410	*Cricotopus (C.) sp*	+
80420	*Cricotopus (C.) bicinctus*	+
80430	*Cricotopus (C.) tremulus group*	+
81690	*Paratrichocladius sp*	+
83040	*Dicrotendipes neomodestus*	+
84315	*Phaenopsectra flavipes*	+
84450	*Polypedilum (Uresipedilum) flavum*	+
84470	*Polypedilum (P.) illinoense*	+
85821	*Tanytarsus glabrescens group sp 7*	+

Taxa Code	Taxa	Quant/Qual

No. Quantitative Taxa: 0 Total Taxa: 23
No. Qualitative Taxa: 23 ICI:
Number of Organisms: 0 Qual EPT: 5

Appendix Table 5. Ohio EPA/DSW Ecological Assessment Section Macroinvertebrate Collection

Site: East Branch Euclid Creek
near mouth, upst. dam

Collection Date: 08/25/2009 River Code: 19-056 RM: 0.25

Taxa Code	Taxa	Quant/Qual	
01801	*Turbellaria*	52	+
03600	*Oligochaeta*	1	+
04935	*Erpobdella punctata punctata*		+
05800	*Caecidotea sp*	158	+
06700	*Crangonyx sp*		+
11120	*Baetis flavistriga*	105	+
13521	*Stenonema femoratum*	1	
21200	*Calopteryx sp*		+
22300	*Argia sp*		+
22600	*Enallagma sp*		+
23909	*Boyeria vinosa*	1	
52200	*Cheumatopsyche sp*	37	+
52430	*Ceratopsyche morosa group*	5	
52450	*Ceratopsyche sparna*		+
52530	*Hydropsyche depravata group*		+
60900	*Peltodytes sp*		+
69400	*Stenelmis sp*	4	+
72700	*Anopheles sp*		+
74100	*Simulium sp*		+
77120	*Ablabesmyia mallochi*	8	
78450	*Nilotanypus fimbriatus*	40	
79100	*Thienemannimyia group*	64	+
80350	*Corynoneura sp*	328	
81240	*Nanocladius (N.) distinctus*	32	
81650	*Parametriocnemus sp*	16	
82141	*Thienemanniella xena*	8	
82220	*Tvetenia discoloripes group*		+
83003	*Dicrotendipes fumidus*	8	+
83040	*Dicrotendipes neomodestus*	64	+
84200	*Paratendipes sp*		+
84300	*Phaenopsectra obediens group*		+
84450	*Polypedilum (Uresipedilum) flavum*	8	+
84470	*Polypedilum (P.) illinoense*		+
84540	*Polypedilum (Tripodura) scalaenum group*		+
85500	*Paratanytarsus sp*	8	
85625	*Rheotanytarsus sp*	8	
85814	*Tanytarsus glabrescens group*	368	
85840	*Tanytarsus sepp*	16	

Taxa Code	Taxa	Quant/Qual

No. Quantitative Taxa: 23 Total Taxa: 38
No. Qualitative Taxa: 25 ICI: **34**
Number of Organisms: 1340 Qual EPT: 4

Appendix Table 5. Ohio EPA/DSW Ecological Assessment Section Macroinvertebrate Collection

Site: East Branch Euclid Creek at mouth

Collection Date: 08/25/2009 River Code: 19-056 RM: 0.01

Taxa Code	Taxa	Quant/Qual	
01801	*Turbellaria*	17	+
03600	*Oligochaeta*	2	+
05800	*Caecidotea sp*	1	+
06700	*Crangonyx sp*		+
11120	*Baetis flavistriga*	1048	+
11130	*Baetis intercalaris*	16	
16700	*Tricorythodes sp*	16	
52200	*Cheumatopsyche sp*	193	+
52450	*Ceratopsyche sparna*		+
52530	*Hydropsyche depravata group*	98	+
53800	*Hydroptila sp*	32	
69400	*Stenelmis sp*		+
70600	*Antocha sp*	1	+
71900	*Tipula sp*		+
74100	*Simulium sp*		+
78450	*Nilotanypus fimbriatus*	80	
79100	*Thienemannimyia group*	96	+
79720	*Diamesa sp*		+
80310	*Cardiocladius obscurus*	16	
80350	*Corynoneura sp*	816	
80420	*Cricotopus (C.) bicinctus*	48	
81650	*Parametriocnemus sp*	80	
82141	*Thienemanniella xena*	144	
82220	*Tvetenia discoloripes group*	16	
82820	*Cryptochironomus sp*	16	
84450	*Polypedilum (Uresipedilum) flavum*	96	+
84470	*Polypedilum (P.) illinoense*	64	
85500	*Paratanytarsus sp*	16	
85625	*Rheotanytarsus sp*	160	
85814	*Tanytarsus glabrescens group*	384	
85840	*Tanytarsus sepp*		+
87540	*Hemerodromia sp*		+

Taxa Code	Taxa	Quant/Qual

No. Quantitative Taxa: 24 Total Taxa: 32

No. Qualitative Taxa: 17 ICI: **42**

Number of Organisms: 3456 Qual EPT: 4

Appendix Table 5. Ohio EPA/DSW Ecological Assessment Section Macroinvertebrate Collection

Site: East Branch Euclid Creek
dam pool

Collection Date: 09/23/2008 River Code: 19-056 RM: 0.20

Taxa Code	Taxa	Quant/Qual	
01801	*Turbellaria*	15	+
01900	*Nemertea*	8	
03600	*Oligochaeta*	158	+
04935	*Erpobdella punctata punctata*		+
04960	*Mooreobdella sp*		+
05800	*Caecidotea sp*	26	+
06700	*Crangonyx sp*	4	+
08250	*Orconectes (Procericambarus) rusticus*		+
13521	*Stenonema femoratum*	24	+
17200	*Caenis sp*	1	+
21200	*Calopteryx sp*	4	+
22001	*Coenagrionidae*		+
22300	*Argia sp*	1	
51600	*Polycentropus sp*		+
52200	*Cheumatopsyche sp*	1	+
60900	*Peltodytes sp*		+
68601	*Ancyronyx variegata*		+
69400	*Stenelmis sp*		+
72700	*Anopheles sp*		+
74501	*Ceratopogonidae*	1	
77120	*Ablabesmyia mallochi*	24	+
77500	*Conchapelopia sp*	16	
78130	*Labrundinia neopilosella*		+
78655	*Procladius (Holotanypus) sp*		+
80370	*Corynoneura lobata*	44	
80410	*Cricotopus (C.) sp*	16	
80420	*Cricotopus (C.) bicinctus*		+
80430	*Cricotopus (C.) tremulus group*	55	
80510	*Cricotopus (Isocladius) sylvestris group*		+
81231	*Nanocladius (N.) crassicornus or N. (N.) "rectinervis"*	8	
82730	*Chironomus (C.) decorus group*	8	+
83003	*Dicrotendipes fumidus*	31	+
83040	*Dicrotendipes neomodestus*	228	+
83700	*Microchironomus sp*	8	
84210	*Paratendipes albimanus or P. duplicatus*		+
84300	*Phaenopsectra obediens group*	16	
84315	*Phaenopsectra flavipes*	16	
84540	*Polypedilum (Tripodura) scalaenum group*		+
85500	*Paratanytarsus sp*	189	
85625	*Rheotanytarsus sp*	16	
85800	*Tanytarsus sp*	8	
85821	*Tanytarsus glabrescens group sp 7*	110	
87540	*Hemerodromia sp*	8	
95100	*Physella sp*	4	+
96900	*Ferrissia sp*	80	+

No. Quantitative Taxa: 30 Total Taxa: 45
No. Qualitative Taxa: 29 ICI: **24**
Number of Organisms: 1128 Qual EPT: 4

Appendix Table 5. Ohio EPA/DSW Ecological Assessment Section Macroinvertebrate Collection

Site: East Branch Euclid Creek
dst. dam pool

Collection Date: 09/23/2008 River Code: 19-056 RM: 0.10

Taxa Code	Taxa	Quant/Qual		Taxa Code	Taxa	Quant/Qual
00650	*Eunapius sp*		+			
01320	*Hydra sp*	20				
01801	*Turbellaria*	308	+			
03360	*Plumatella sp*		+			
03600	*Oligochaeta*	158	+			
05800	*Caecidotea sp*	7	+			
06700	*Crangonyx sp*	18	+			
11120	*Baetis flavistriga*	171	+			
13521	*Stenonema femoratum*	11	+			
21200	*Calopteryx sp*	4				
22300	*Argia sp*	1				
51600	*Polycentropus sp*		+			
52200	*Cheumatopsyche sp*	325	+			
52430	*Ceratopsyche morosa group*	22	+			
52450	*Ceratopsyche sparna*	12	+			
52530	*Hydropsyche depravata group*	30	+			
53800	*Hydroptila sp*	1	+			
69400	*Stenelmis sp*		+			
70600	*Antocha sp*	18				
71900	*Tipula sp*		+			
74100	*Simulium sp*		+			
77120	*Ablabesmyia mallochi*	14	+			
78350	*Meropelopia sp*		+			
80310	*Cardiocladius obscurus*		+			
80330	*Chaetocladius piger*		+			
80351	*Corynoneura n.sp 1*	12				
80370	*Corynoneura lobata*	64				
80410	*Cricotopus (C.) sp*		+			
80420	*Cricotopus (C.) bicinctus*	56	+			
80430	*Cricotopus (C.) tremulus group*	196	+			
82730	*Chironomus (C.) decorus group*		+			
82820	*Cryptochironomus sp*		+			
83003	*Dicrotendipes fumidus*	28	+			
83040	*Dicrotendipes neomodestus*	126	+			
84040	*Parachironomus frequens*		+			
84540	*Polypedilum (Tripodura) scalaenum group*	14				
85500	*Paratanytarsus sp*	140	+			
85625	*Rheotanytarsus sp*	56				
85821	*Tanytarsus glabrescens group sp 7*	503				

No. Quantitative Taxa: 26 Total Taxa: 39
No. Qualitative Taxa: 30 ICI: **38**
Number of Organisms: 2315 Qual EPT: 8

CLOVER GROFF RUN STREAM RESTORATION

Project Post Construction Stream Monitoring

Construction of meandering stream channel with riffle/pool/run character.

Completed stream channel and floodplain with emergent native wildflowers.

PROJECT NAME: CLOVER GROFF RUN STREAM RESTORATION

Project Baseline and Post-Restoration Stream Monitoring

PROJECT NUMBER: 07(h)EPA-15 and 08(h)EPA-18
STREAM SAMPLED: Clover Groff Run

SUMMARY

Two stream restoration projects awarded through a 319 nonpoint grant have been completed (Latham Park section and Franks Park section) in Clover Groff Run. Restoration activities were based on natural channel design principles. This included creating a sinuous natural stream channel where previously the stream was a straight channelized ditch. The goal of both project areas was to create a functional stream with an accessible floodplain and to meet minimum physical stream attributes for achieving the Warmwater Habitat (WWH) aquatic life use designation. To meet these goals, keystone attributes, such as pools and riffles, were created where the primary habitat was silt embedded shallow glides. The Latham Park project was completed in 2010 and the Franks Park project was completed in 2011. Restoration activities combined included nearly 13,000 linear feet. Restoration work has occurred in Clover Groff Run at several additional locations, including an over-wide channel project upstream from Latham Park, Heritage Lakes golf course, and current stream restoration between RMs 4.5 and 3.6.

Four sites in Clover Groff Run were measured for biological condition and physical habitat quality. The most upstream site (RM 7.8) was located in an over-wide channel restoration project area, just upstream from the Latham Park natural channel restoration project. Sampling at RM 6.5 occurred in an unrestored section of channelized ditch, located downstream from Latham Park. The natural channel restoration project at Franks Park was directly assessed at RM 5.5. The most downstream sampling site (RM 3.6) was located downstream from all current and completed restoration projects. All four sampling sites had poor or very poor quality physical habitat conditions, represented by a predominance of soft substrate types (sand, silt, and detritus), heavy silt cover and extensive embeddedness of the bottom, sparse to nearly absent instream cover, recent or recovering channelization, and either poor performing riffles or no riffles present. The recently completed restoration work at RM 5.5 appeared to still be going through channel stabilization processes. This was evident by the highly embedded bottom of very fine grained material. Coarse substrates at this site – gravel, cobble, and boulder material – were largely non-functioning biologically because of the extensive silt load.

Biological results to some degree were a reflection of the poor quality habitat. Although fish sampling results at all four stations were fully achieving the current Modified Warmwater Habitat (MWH) aquatic life use designation, poor macroinvertebrate results were noted at each location. The influence of poor quality habitat was observed in the types and abundance of pollution tolerant taxa collected in Clover Groff Run. Overall, all four sampling locations were in non-attainment of the MWH aquatic life use, and this was associated with the poor quality of the macroinvertebrate communities.

Previous biological collections (2008 and 2009) in Clover Groff Run have documented similar fish results with collections made in 2011, particularly when comparing within sampling sites. Fair to good fish communities were observed at all four sampling locations from samples collected in 2008 and 2009. For the one site sampled within a 319 funded restoration area (RM 5.5), some improvement in fish biotic integrity was recorded after restoration occurred. This was reflected in the IBI score (34 in 2008 and 30 in 2009 versus 40 in 2011). Macroinvertebrate sampling results from 2008 and 2009 were slightly better than results from 2011. During 2008 and 2009, macroinvertebrate community quality ranged from poor to fair compared with overall poor quality during 2011. The determining factor in MWH full attainment or non-attainment at sites sampled in 2008 and 2009 (and from 2011) was the condition of the macroinvertebrate community. Poor quality resulted in non-attainment while fair findings resulted in full attainment.

AQUATIC LIFE USE ATTAINMENT – CLOVER GROFF RUN 2011.

The Index of Biotic Integrity (IBI) and Invertebrate Community Index (ICI) scores are based on the performance of the biological community. Narrative ranges are used with macroinvertebrate results when quantitative data are not available. The Qualitative Habitat Evaluation Index (QHEI) is a measure of the ability of the physical habitat to support a biological community. Stream sites are located in the Eastern Corn Belt Plains (ECBP) ecoregion. In the Ohio Water Quality Standards, Clover Groff Run is designated Modified Warmwater Habitat (MWH) within the study reach (RM 2.5 to the headwaters). Underlined results represent poor or very poor conditions.

Sample Site River Mile	Attainment Status	IBI	ICI	QHEI	Biological Assessment
RM 7.8	**NON**	38	Poor*	31.0 (poor)	Marginally Good/ Poor
RM 6.5	**NON**	38	Poor*	32.5 (poor)	Marginally Good/ Poor
RM 5.5	**NON**	40	Poor*	42.0 (poor)	Good/ Poor
RM 3.6	**NON**	32	Poor*	27.0 (very poor)	Fair/ Poor

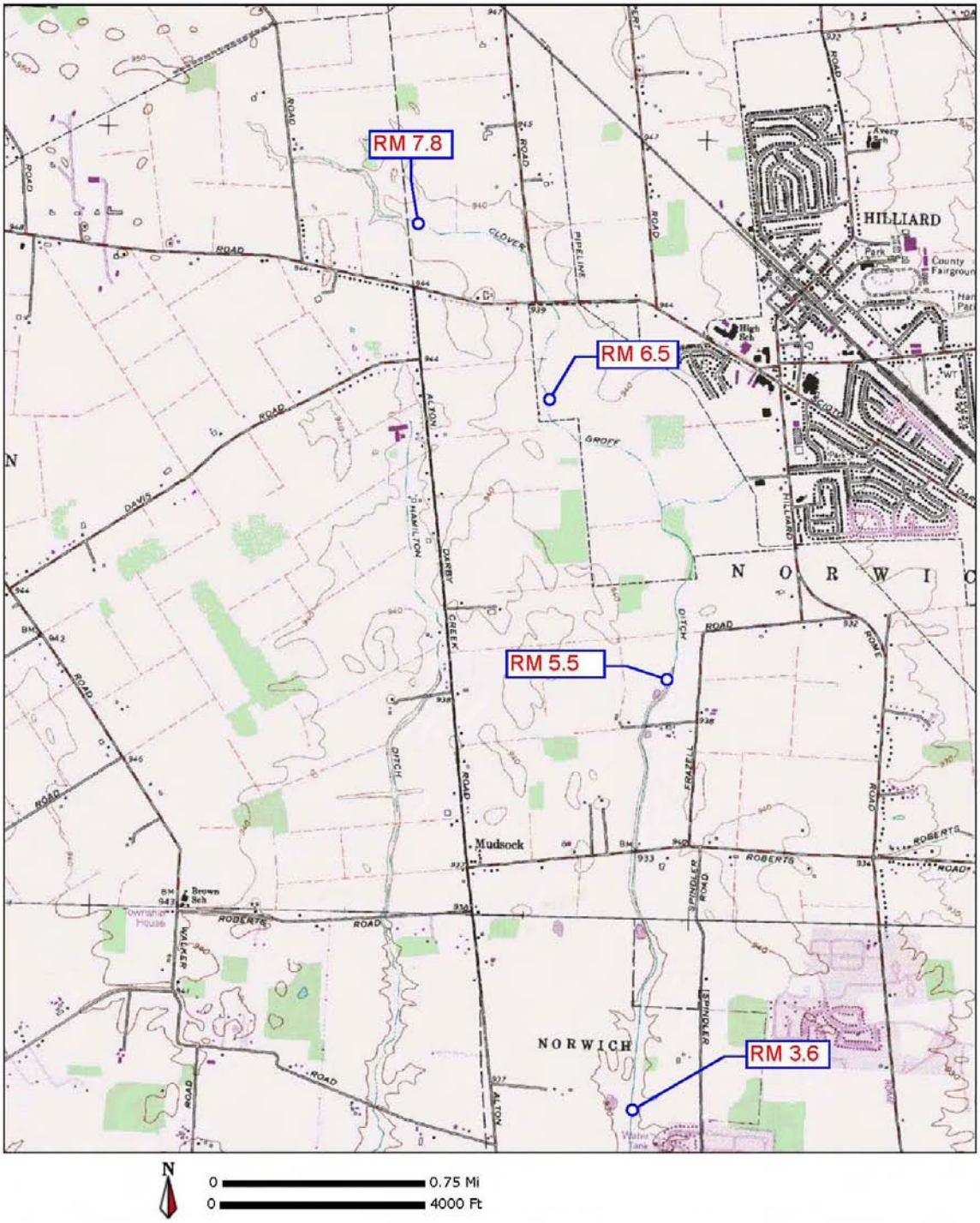
Ecoregion Biocriteria: Eastern Corn Belt Plains (ECBP)		
INDEX – SITE TYPE	MWH	WWH
IBI: Headwater	24	40
ICI	22	36

* Significant departure from biocriterion (>4 IBI or ICI units).

Sampling locations in Clover Groff Run, 2011.

River Mile	Latitude	Longitude	Landmark
7.8	40.03690	-83.18610	Adjacent Park Meadow Lane, upstream Latham Park restoration
6.5	40.02625	-83.17607	Upstream Heritage Lakes golf course, downstream Latham Park
5.5	40.01417	-83.16775	At Franks Park – restoration area
3.6	39.98727	-83.17028	Near Timberbrook water treatment plant & Hickory Hill Drive

Clover Groff Run Sampling Locations, 2011



APPENDICES – CLOVER GROFF RUN PROJECT

Appendix Table 1. Qualitative Habitat Evaluation Index (QHEI) scores for Clover Groff Run.

Appendix Table 2. Index of Biotic Integrity (IBI) scores and metrics for Clover Groff Run.

Appendix Table 3. Ohio EPA fish results for Clover Groff Run.

Appendix Table 4. Ohio EPA macroinvertebrate results for Clover Groff Run.

Appendix Table 1. Qualitative Habitat Evaluation Index (QHEI) scores and physical attributes for fish sampling sites in Clover Groff Run, 2011.

			WWH Attributes											MWH 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**																														
Clover Groff Run Year: 2011																																
7.8	**31.0**	Poor									■		1	◆		◆	◆		3		●			●				●	●		●	5
6.5	**32.5**	Poor									■		1	◆		◆	◆		3		●			●				●	●	●	●	6
5.5	**42.0**	Poor		■							■		2		◆	◆	◆		3	●	●			●				●	●	●		6
3.6	**27.0**	Very Poor									■		1	◆	◆	◆	◆		4		●			●		●		●	●	●	●	7

Appendix Table 2. Index of Biotic Integrity (IBI) scores and metrics for Clover Groff Run, 2011.

				Number of						Percent of Individuals						
River Mile	Type	Date	Drainage area (sq mi)	Total species	Minnow species	Headwater species	Sensitive species	Darter & Sculpin species	Simple Lithophils	Tolerant fishes	Omni-vores	Pioneering fishes	Insect-ivores	DELT anomalies	Rel.No. minus tolerants /(0.3km)	IBI
Clover Groff Run - (02-245)																
Year: 2011																
7.80	E	07/21/2011	2.0	6(3)	0(1)	0(1)	1(1)	0(1)	0(1)	9(5)	0(5)	3(5)	97(5)	0.0(5)	660(5)	38
6.50	E	07/21/2011	2.9	6(3)	1(1)	0(1)	0(1)	0(1)	0(1)	15(5)	2(5)	12(5)	75(5)	0.0(5)	295(5)	38
5.50	E	07/19/2011	3.8	10(3)	3(3)	0(1)	0(1)	0(1)	2(1)	4(5)	0(5)	2(5)	58(5)	0.0(5)	584(5)	40
3.60	E	07/19/2011	5.7	6(1)	0(1)	0(1)	0(1)	0(1)	1(1)	32(5)	3(5)	3(5)	40(5)	0.0(5)	52(1) *	32

♦ - IBI is low end adjusted.

* - < 200 Total individuals in sample

** - < 50 Total individuals in sample

● - One or more species excluded from IBI calculation.

River Code: **02-245**	Stream: **Clover Groff Run**	Sample Date: **2011**
River Mile: **7.80**	Location: new channel, upst. from old channel	Date Range: 07/21/2011
Time Fished: 876 sec	Drainage: 2.0 sq mi	
Dist Fished: 0.08 km	Basin: Scioto River No of Passes: 1	Sampler Type: E

Species Name / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Yellow Bullhead		I	C	T	12	45.00	6.19			
Black Bullhead		I	C	P	153	573.75	78.87			
Brook Silverside		I	M	M	8	30.00	4.12			
Largemouth Bass	F	C	C		5	18.75	2.58			
Green Sunfish	S	I	C	T	6	22.50	3.09			
Bluegill Sunfish	S	I	C	P	10	37.50	5.15			
Mile Total					194	727.50				
Number of Species					6					
Number of Hybrids					0					

River Code: **02-245**	Stream: **Clover Groff Run**	Sample Date: **2011**
River Mile: **6.50**	Location: upst. Heritage Lakes	Date Range: 07/21/2011
Time Fished: 1276 sec	Drainage: 2.9 sq mi	
Dist Fished: 0.12 km	Basin: Scioto River No of Passes: 1	Sampler Type: E

Species Name / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Bluntnose Minnow	N	O	C	T	3	7.50	2.16			
Yellow Bullhead		I	C	T	4	10.00	2.88			
Black Bullhead		I	C	P	29	72.50	20.86			
Largemouth Bass	F	C	C		28	70.00	20.14			
Green Sunfish	S	I	C	T	14	35.00	10.07			
Bluegill Sunfish	S	I	C	P	57	142.50	41.01			
Green Sf X Bluegill Sf					4	10.00	2.88			
	Mile Total				139	347.50				
	Number of Species				6					
	Number of Hybrids				1					

River Code: **02-245**	Stream: **Clover Groff Run**	Sample Date: **2011**
River Mile: **5.50**	Location: Franks Park	Date Range: 07/19/2011
Time Fished: 1870 sec	Drainage: 3.8 sq mi	
Dist Fished: 0.15 km	Basin: Scioto River No of Passes: 1	Sampler Type: E

Species Name / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Redfin Pickerel		P	M	P	1	2.00	0.33			
Spotted Sucker	R	I	S		1	2.00	0.33			
Creek Chub	N	G	N	T	2	4.00	0.66			
Striped Shiner	N	I	S		2	4.00	0.66			
Central Stoneroller	N	H	N		40	80.00	13.16			
Yellow Bullhead		I	C	T	5	10.00	1.64			
Black Bullhead		I	C	P	20	40.00	6.58			
Largemouth Bass	F	C	C		80	160.00	26.32			
Green Sunfish	S	I	C	T	5	10.00	1.64			
Bluegill Sunfish	S	I	C	P	142	284.00	46.71			
Green Sf X Bluegill Sf					6	12.00	1.97			
	Mile Total				304	608.00				
	Number of Species				10					
	Number of Hybrids				1					

River Code: **02-245**	Stream: **Clover Groff Run**	Sample Date: **2011**
River Mile: **3.60**	Location: Timberbrook WTP	Date Range: 07/19/2011
Time Fished: 1270 sec	Drainage: 5.7 sq mi	
Dist Fished: 0.15 km	Basin: Scioto River No of Passes: 1	Sampler Type: E

Species Name / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Redfin Pickerel		P	M	P	1	2.00	2.63			
White Sucker	W	O	S	T	1	2.00	2.63			
Yellow Bullhead		I	C	T	10	20.00	26.32			
Largemouth Bass	F	C	C		21	42.00	55.26			
Green Sunfish	S	I	C	T	1	2.00	2.63			
Bluegill Sunfish	S	I	C	P	4	8.00	10.53			
Mile Total					38	76.00				
Number of Species					6					
Number of Hybrids					0					

Appendix 4. Ohio EPA/DSW Ecological Assessment Section
Macroinvertebrate Collection

Site: Clover Groff Run
new channel, upst. from old channel

Collection Date: 07/21/2011 River Code: 02-245 RM: 7.80

Taxa Code	Taxa	Quant/Qual
01801	*Turbellaria*	+
03600	*Oligochaeta*	+
04664	*Helobdella stagnalis*	+
04666	*Helobdella triserialis*	+
04935	*Erpobdella punctata punctata*	+
17200	*Caenis sp*	+
22001	*Coenagrionidae*	+
60900	*Peltodytes sp*	+
77355	*Clinotanypus pinguis*	+
78655	*Procladius (Holotanypus) sp*	+
83040	*Dicrotendipes neomodestus*	+
83051	*Dicrotendipes simpsoni*	+
83158	*Endochironomus nigricans*	+
83300	*Glyptotendipes (G.) sp*	+
84520	*Polypedilum (Tripodura) halterale group*	+
87200	*Odontomyia (O.) sp or Hedriodiscus sp*	+
95100	*Physella sp*	+
96264	*Planorbella (Pierosoma) pilsbryi*	+
98600	*Sphaerium sp*	+

Taxa Code	Taxa	Quant/Qual

No. Quantitative Taxa: 0 Total Taxa: 19
No. Qualitative Taxa: 19 ICI:
Number of Organisms: 0 Qual EPT: 1

Appendix 4. Ohio EPA/DSW Ecological Assessment Section
Macroinvertebrate Collection

Site: Clover Groff Run
upst. Heritage Lakes

Collection Date: 07/21/2011 River Code: 02-245 RM: 6.50

Taxa Code	Taxa	Quant/Qual
01801	*Turbellaria*	+
03600	*Oligochaeta*	+
04601	*Glossiphoniidae*	+
04664	*Helobdella stagnalis*	+
04901	*Erpobdellidae*	+
08250	*Orconectes (Procericambarus) rusticus*	+
08601	*Hydrachnidia*	+
17200	*Caenis sp*	+
22300	*Argia sp*	+
52200	*Cheumatopsyche sp*	+
65800	*Berosus sp*	+
68201	*Scirtidae*	+
77120	*Ablabesmyia mallochi*	+
77500	*Conchapelopia sp*	+
78655	*Procladius (Holotanypus) sp*	+
82141	*Thienemanniella xena*	+
82820	*Cryptochironomus sp*	+
83300	*Glyptotendipes (G.) sp*	+
84155	*Paralauterborniella nigrohalteralis*	+
84315	*Phaenopsectra flavipes*	+
84450	*Polypedilum (Uresipedilum) flavum*	+
84470	*Polypedilum (P.) illinoense*	+
84700	*Stenochironomus sp*	+
84790	*Tribelos fuscicorne*	+
85800	*Tanytarsus sp*	+
98600	*Sphaerium sp*	+

Taxa Code	Taxa	Quant/Qual

No. Quantitative Taxa: 0 Total Taxa: 26
No. Qualitative Taxa: 26 ICI:
Number of Organisms: 0 Qual EPT: 2

Appendix 4. Ohio EPA/DSW Ecological Assessment Section
Macroinvertebrate Collection

Site: Clover Groff Run
Franks Park

Collection Date: 07/19/2011 River Code: 02-245 RM: 5.50

Taxa Code	Taxa	Quant/Qual
01801	*Turbellaria*	+
03600	*Oligochaeta*	+
04664	*Helobdella stagnalis*	+
04666	*Helobdella triserialis*	+
04960	*Mooreobdella sp*	+
08250	*Orconectes (Procericambarus) rusticus*	+
08320	*Procambarus (Scapulicambarus) clarkii*	+
08601	*Hydrachnidia*	+
17200	*Caenis sp*	+
22001	*Coenagrionidae*	+
42700	*Belostoma sp*	+
53800	*Hydroptila sp*	+
60900	*Peltodytes sp*	+
64800	*Uvarus sp*	+
65800	*Berosus sp*	+
67800	*Tropisternus sp*	+
68201	*Scirtidae*	+
68702	*Dubiraphia bivittata*	+
68708	*Dubiraphia vittata group*	+
74501	*Ceratopogonidae*	+
78655	*Procladius (Holotanypus) sp*	+
82882	*Cryptotendipes sp 2*	+
82885	*Cryptotendipes pseudotener*	+
83040	*Dicrotendipes neomodestus*	+
84155	*Paralauterborniella nigrohalteralis*	+
84470	*Polypedilum (P.) illinoense*	+
84520	*Polypedilum (Tripodura) halterale group*	+
84960	*Pseudochironomus sp*	+
85230	*Cladotanytarsus mancus group*	+
85800	*Tanytarsus sp*	+
92613	*Cipangopaludina chinensis malleata*	+
94400	*Fossaria sp*	+
95100	*Physella sp*	+
96264	*Planorbella (Pierosoma) pilsbryi*	+
98600	*Sphaerium sp*	+

Taxa Code	Taxa	Quant/Qual

No. Quantitative Taxa: 0 Total Taxa: 35
No. Qualitative Taxa: 35 ICI:
Number of Organisms: 0 Qual EPT: 2

Appendix 4. Ohio EPA/DSW Ecological Assessment Section
Macroinvertebrate Collection

Site: Clover Groff Run
Timberbrook WTP

Collection Date: 07/19/2011 River Code: 02-245 RM: 3.60

Taxa Code	Taxa	Quant/Qual
01801	*Turbellaria*	+
03600	*Oligochaeta*	+
04664	*Helobdella stagnalis*	+
04935	*Erpobdella punctata punctata*	+
04960	*Mooreobdella sp*	+
06700	*Crangonyx sp*	+
08250	*Orconectes (Procericambarus) rusticus*	+
17200	*Caenis sp*	+
22001	*Coenagrionidae*	+
60900	*Peltodytes sp*	+
65800	*Berosus sp*	+
68702	*Dubiraphia bivittata*	+
77355	*Clinotanypus pinguis*	+
78655	*Procladius (Holotanypus) sp*	+
82820	*Cryptochironomus sp*	+
82885	*Cryptotendipes pseudotener*	+
84155	*Paralauterborniella nigrohalteralis*	+
84210	*Paratendipes albimanus or P. duplicatus*	+
84520	*Polypedilum (Tripodura) halterale group*	+
85800	*Tanytarsus sp*	+
98600	*Sphaerium sp*	+

Taxa Code	Taxa	Quant/Qual

No. Quantitative Taxa: 0 Total Taxa: 21
No. Qualitative Taxa: 21 ICI:
Number of Organisms: 0 Qual EPT: 1

OTTAWA RIVER
MIAKONDA DAM REMOVAL

Project Post Restoration Stream Monitoring

PROJECT NAME: OTTAWA RIVER MIAKONDA DAM REMOVAL

Project Post Restoration Stream Monitoring

PROJECT NUMBER: Not Applicable
STREAM SAMPLED: Ottawa River

SUMMARY

The removal of a 5 by 40 foot low head dam on the Ottawa River was completed in February 2003. The dam was located on property of the Erie Shores Boy Scout Miakonda Camp in Toledo Ohio. It was built in the 1930s for purposes unknown to the landowners and neighbors. A plan for habitat improvement within the impoundment, restoring riparian wetlands, and restoration of the natural river flow with a boardwalk running through the habitat complex for educational and scout activities was drafted in 2000 by a private environmental organization. A grant was secured from the National Fish and Wildlife Foundation to assist with removal of the Miakonda dam. Partners contributing funds and assistance on this project were the Erie Shores Boy Scout Council, Ottawa River Klean up Association (ORKA), the Ohio Division of Wildlife (ODOW), the USFWS Partners for Fish and Wildlife Program and private environmental firms. Biological monitoring of the Ottawa River was completed during 2011, with a sampling site located within the old Miakonda dam impoundment. Free-flowing conditions were re-established here in 2003.

Within the old Miakonda dam impoundment section (now free-flowing), biological communities were fully attaining the Warmwater Habitat (WWH) biological criteria in the Ohio Water Quality Standards. The removal of the dam and subsequent restoration to pool, riffle, and run habitat conditions resulted in good quality river habitat (QHEI = 68.5). Low fish biomass at RM 19.5 (upstream old Miakonda dam area) and reduced habitat diversity and low fish abundance at RM 14.4 contributed to partial and non-attainment of the WWH biocriteria.

AQUATIC LIFE USE ATTAINMENT – OTTAWA RIVER (OLD MIAKONDA DAM AREA) 2011.

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. Stream sites are located in the Huron Erie Lake Plain (HELP) ecoregion. In the Ohio Water Quality Standards, the Ottawa River is designated Warmwater Habitat (WWH) within the study area. Poor or very poor results are underlined.

Sample Site River Mile	Attainment Status	IBI	MIwb	ICI	QHEI	Biological Assessment
RM 19.5	**PARTIAL**	37	6.3*	34	78.0 (excellent)	Fair/ Good
RM 16.9	**FULL**	28^{ns}	7.5	30^{ns}	68.5 (good)	Fair/ Marginally Good
RM 14.4	**NON**	34	<u>5.5</u>*	28*	59.3 (fair)	Poor/ Fair

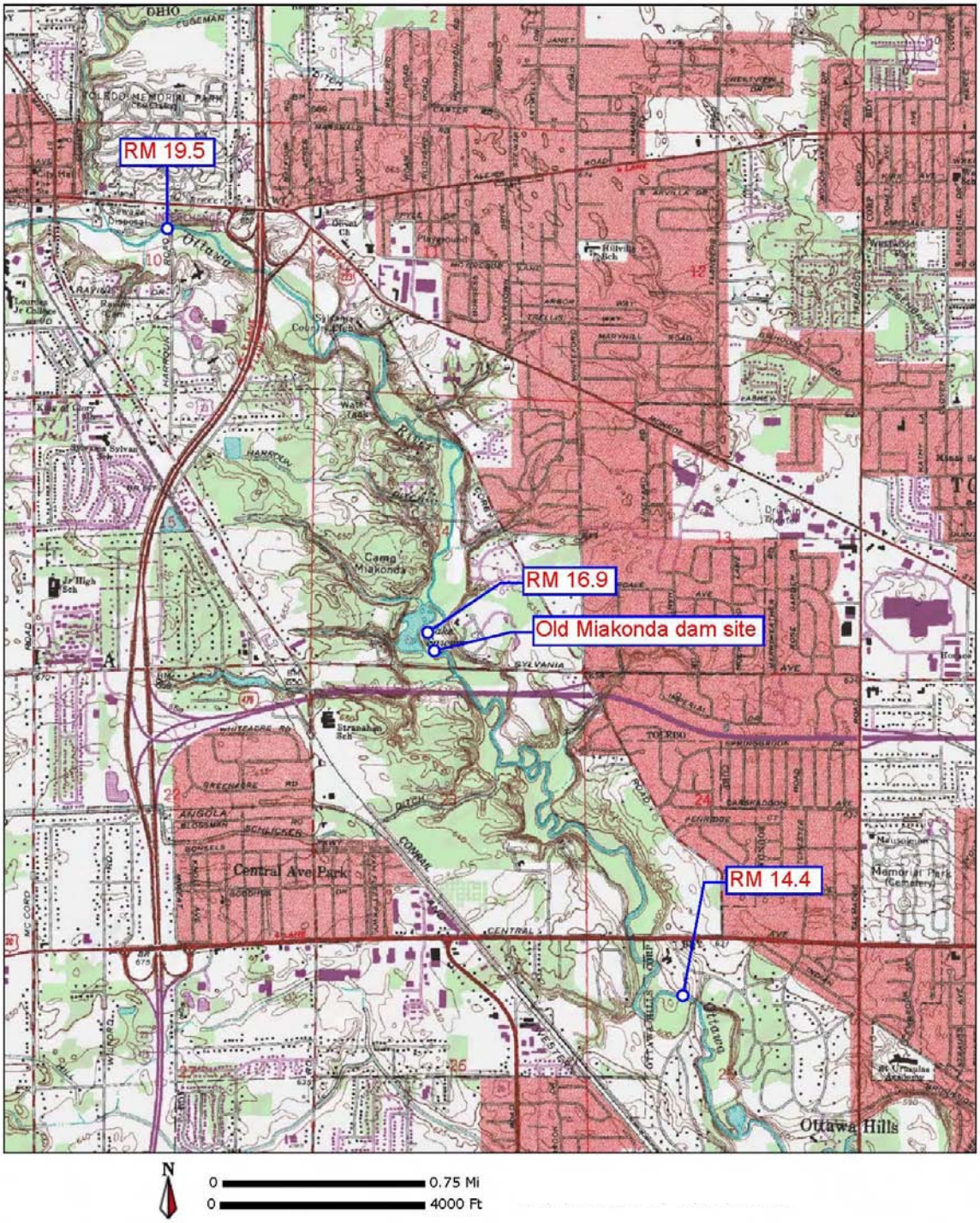
Ecoregion Biocriteria: Huron Erie Lake Plain (HELP)	
INDEX – SITE TYPE	WWH
IBI: Wading	32
MIwb: Wading	7.3
ICI	34

^{ns} Nonsignificant departure from biocriterion (≤4 IBI or ICI units, ≤0.5 MIwb units).
* Significant departure from biocriterion (>4 IBI or ICI units, >0.5 MIwb units).

Sampling locations in the Ottawa River – old Miakonda dam area, 2011.

River Mile	Latitude	Longitude	Landmark
19.5	41.71404	-83.69477	Harroun Road
16.9	41.69211	-83.67518	Upstream Sylvania Ave., within old Miakonda dam impoundment
14.4	41.67403	-83.65659	Edgehill Road

Ottawa River (old Miakonda dam area) Sampling Locations, 2011



APPENDICES – OTTAWA RIVER (OLD MIAKONDA DAM AREA) PROJECT

Appendix Table 1. Qualitative Habitat Evaluation Index (QHEI) scores for the Ottawa River.

Appendix Table 2. Index of Biotic Integrity (IBI) scores and metrics for the Ottawa River.

Appendix Table 3. Ohio EPA fish results for the Ottawa River.

Appendix Table 4. Invertebrate Community Index (ICI) scores and metrics for the Ottawa River.

Appendix Table 5. Ohio EPA macroinvertebrate results for the Ottawa River.

Appendix Table 1. Qualitative Habitat Evaluation Index (QHEI) scores and physical attributes for fish sampling sites in the Ottawa River, Miakonda dam project, 2011.

			WWH Attributes											MWH 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**																														
Ottawa River Year: 2011																																
19.5	**78.0**	Excellent	■	■		■	■	■			■		6						0						●			●	●	●		4
16.9	**68.5**	Good	■	■		■		■			■		5				◆		1		●		●		●			●	●	●		6
14.4	**59.3**	Fair	■								■		2				◆		1		●			●	●			●	●	●		6

Appendix Table 2. Index of Biotic Integrity (IBI) scores and metrics for the Ottawa River - Miakonda dam area, 2011.

				Number of					Percent of Individuals									
River Mile	Type	Date	Drainage area (sq mi)	Total species	Sunfish species	Sucker species	Intolerant species	Darter species	Simple Lithophils	Tolerant fishes	Omni-vores	Top carnivores	Insect-ivores	DELT anomalies	Rel.No. minus tolerants /(0.3km)		IBI	Modified Iwb
Ottawa River - (04300)																		
Year: 2011																		
19.50	E	07/05/2011	124	13(3)	2(3)	0(1)	0(1)	3(3)	46(5)	24(3)	13(5)	0.3(1)	52(3)	0.0(5)	384(3)		36	5.9
19.50	D	08/17/2011	124	14(3)	2(3)	1(1)	0(1)	4(3)	38(5)	23(3)	10(5)	0.0(1)	44(3)	0.1(5)	869(5)		38	6.7
16.90	D	07/07/2011	127	17(3)	2(3)	2(1)	0(1)	5(3)	13(1)	42(1)	34(3)	0.3(1)	29(3)	0.0(5)	647(3)		28	7.5
16.90	D	08/16/2011	127	14(3)	2(3)	1(1)	0(1)	3(3)	17(1)	40(1)	30(3)	0.5(1)	21(1)	0.0(5)	792(5)		28	7.5
14.40	D	07/05/2011	131	10(1)	1(1)	0(1)	0(1)	4(3)	37(5)	31(3)	3(5)	4.0(3)	69(5)	0.0(5)	78(1)	*	34	5.5
14.40	D	08/17/2011	131	16(3)	2(3)	3(3)	0(1)	4(3)	32(3)	55(1)	17(5)	0.7(1)	70(5)	0.7(5)	98(1)		34	5.5

na - Qualitative data, Modified Iwb not applicable.

♦ - IBI is low end adjusted.

* - < 200 Total individuals in sample

** - < 50 Total individuals in sample

● - One or more species excluded from IBI calculation.

River Code: **04-300**	Stream: **Ottawa River**	Sample Date: **2011**
River Mile: **19.50**	Location: Harroun Rd.	Date Range: 07/05/2011
Time Fished: 4764 sec	Drainage: 124.6 sq mi	Thru: 08/17/2011
Dist Fished: 0.40 km	Basin: Ottawa River No of Passes: 2	Sampler Type: E D

Species Name / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Central Mudminnow		I	C	T	1	0.75	0.09	0.00	0.01	6.00
Northern Pike	F	P	M		1	0.75	0.09	0.31	0.69	412.00
White Sucker	W	O	S	T	2	1.50	0.18	0.01	0.02	6.00
Common Carp	G	O	M	T	23	17.25	2.11	39.18	87.53	2,271.30
Creek Chub	N	G	N	T	96	72.00	8.79	1.24	2.78	17.27
Redfin Shiner	N	I	N		2	1.50	0.18	0.01	0.01	3.00
Striped Shiner	N	I	S		131	98.25	12.00	0.54	1.20	5.47
Common Shiner	N	I	S		1	0.75	0.09	0.01	0.02	12.00
Bluntnose Minnow	N	O	C	T	93	69.75	8.52	0.20	0.44	2.85
Central Stoneroller	N	H	N		364	273.00	33.33	1.32	2.96	4.85
Yellow Bullhead		I	C	T	4	3.00	0.37	0.16	0.35	52.50
Brown Bullhead		I	C	T	3	2.25	0.27	0.56	1.25	249.33
Green Sunfish	S	I	C	T	35	26.25	3.21	0.50	1.12	19.14
Bluegill Sunfish	S	I	C	P	8	6.00	0.73	0.07	0.15	11.00
Green Sf X Bluegill Sf					5	3.75	0.46	0.16	0.35	42.00
Blackside Darter	D	I	S		118	88.50	10.81	0.23	0.51	2.59
Logperch	D	I	S	M	1	0.75	0.09	0.01	0.02	12.00
Johnny Darter	D	I	C		18	13.50	1.65	0.03	0.07	2.33
Orangethroat Darter	D	I	S		186	139.50	17.03	0.23	0.51	1.64
	Mile Total				1,092	819.00		44.76		
	Number of Species				18					
	Number of Hybrids				1					

River Code: **04-300**	Stream: **Ottawa River**	Sample Date: **2011**
River Mile: **16.90**	Location: Sylvania Ave.	Date Range: 07/07/2011
Time Fished: 4489 sec	Drainage: 127.6 sq mi	Thru: 08/16/2011
Dist Fished: 0.40 km	Basin: Ottawa River No of Passes: 2	Sampler Type: D

Species Name / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Redfin Pickerel		P	M	P	5	3.75	0.31	0.08	1.69	20.60
Northern Pike	F	P	M		1	0.75	0.06	0.04	0.82	50.00
Golden Redhorse	R	I	S	M	5	3.75	0.31	0.13	2.81	34.20
White Sucker	W	O	S	T	52	39.00	3.18	0.13	2.83	3.32
Creek Chub	N	G	N	T	88	66.00	5.39	0.38	8.29	5.74
Emerald Shiner	N	I	M		2	1.50	0.12	0.01	0.26	8.00
Redfin Shiner	N	I	N		2	1.50	0.12	0.00	0.10	3.00
Striped Shiner	N	I	S		42	31.50	2.57	0.17	3.70	5.36
Fathead Minnow	N	O	C	T	1	0.75	0.06	0.00	0.02	1.00
Bluntnose Minnow	N	O	C	T	462	346.50	28.29	0.63	13.75	1.81
Central Stoneroller	N	H	N		620	465.00	37.97	1.25	27.29	2.68
Yellow Bullhead		I	C	T	1	0.75	0.06	0.02	0.48	29.00
Green Sunfish	S	I	C	T	70	52.50	4.29	1.11	24.26	21.13
Bluegill Sunfish	S	I	C	P	43	32.25	2.63	0.26	5.62	7.97
Green Sf X Bluegill Sf					2	1.50	0.12	0.05	1.07	32.50
Blackside Darter	D	I	S		118	88.50	7.23	0.15	3.36	1.73
Logperch	D	I	S	M	2	1.50	0.12	0.03	0.65	19.50
Johnny Darter	D	I	C		89	66.75	5.45	0.10	2.23	1.52
Orangethroat Darter	D	I	S		27	20.25	1.65	0.04	0.81	1.83
Least Darter [S]	D	I	N		1	0.75	0.06	0.00	0.02	1.00
	Mile Total				1,633	1,224.75		4.57		
	Number of Species				19					
	Number of Hybrids				1					

River Code: **04-300**	Stream: **Ottawa River**	Sample Date: **2011**
River Mile: **14.40**	Location:	Date Range: 07/05/2011
Time Fished: 3650 sec	Drainage: 131.6 sq mi	Thru: 08/17/2011
Dist Fished: 0.40 km	Basin: Ottawa River No of Passes: 2	Sampler Type: D

Species Name / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Central Mudminnow		I	C	T	2	1.50	0.91	0.01	0.08	3.50
Redfin Pickerel		P	M	P	4	3.00	1.82	0.06	0.80	18.25
Golden Redhorse	R	I	S	M	6	4.50	2.73	0.23	3.27	50.00
Shorthead Redhorse	R	I	S	M	1	0.75	0.45	0.02	0.22	20.00
White Sucker	W	O	S	T	5	3.75	2.27	0.01	0.17	3.00
Common Carp	G	O	M	T	2	1.50	0.91	5.14	74.71	3,425.00
Creek Chub	N	G	N	T	28	21.00	12.73	0.19	2.73	8.93
Striped Shiner	N	I	S		6	4.50	2.73	0.02	0.32	4.83
Bluntnose Minnow	N	O	C	T	19	14.25	8.64	0.02	0.33	1.58
Central Stoneroller	N	H	N		7	5.25	3.18	0.02	0.33	4.29
Yellow Bullhead		I	C	T	5	3.75	2.27	0.33	4.86	89.00
Green Sunfish	S	I	C	T	42	31.50	19.09	0.49	7.06	15.40
Bluegill Sunfish	S	I	C	P	9	6.75	4.09	0.14	2.05	20.89
Green Sf X Bluegill Sf					1	0.75	0.45	0.03	0.39	35.00
Blackside Darter	D	I	S		36	27.00	16.36	0.08	1.14	2.90
Logperch	D	I	S	M	6	4.50	2.73	0.05	0.67	10.17
Johnny Darter	D	I	C		26	19.50	11.82	0.03	0.40	1.38
Orangethroat Darter	D	I	S		14	10.50	6.36	0.02	0.29	1.86
Round Goby	E				1	0.75	0.45	0.02	0.24	22.00
	Mile Total				220	165.00		6.88		
	Number of Species				18					
	Number of Hybrids				1					

Appendix Table 4. Invertebrate Community Index (ICI) scores and metrics for the Ottawa River - Miakonda dam area, 2011.

River Mile	Drainage Area (sq mi)	Number of Total Taxa	Number of Mayfly Taxa	Number of Caddisfly Taxa	Number of Dipteran Taxa	Percent: Mayflies	Percent: Caddis-flies	Percent: Tany-tarsini	Percent: Other Dipt/NI	Percent: Tolerant Organisms	Qual. EPT	Eco-region	ICI
Ottawa River (04-300)													
Year: 2011													
19.50	124.6	30(4)	4(2)	3(4)	15(4)	42.0(6)	6.5(2)	2.6(2)	48.2(2)	4.1(6)	7(2)	1	34
16.90	127.6	33(4)	5(2)	1(2)	19(6)	36.7(6)	3.4(2)	13.5(2)	44.8(2)	9.8(2)	6(2)	1	30
14.42	131.6	37(4)	4(2)	2(2)	22(6)	30.8(4)	16.8(4)	5.4(2)	42.2(4)	20.4(0)	4(0)	1	28

Appendix Table 5. Ohio EPA/DSW Ecological Assessment Section Macroinvertebrate Collection

Site: Ottawa River
Harroun Rd.

Collection Date: 08/17/2011 River Code: 04-300 RM: 19.50

Taxa Code	Taxa	Quant/Qual	
00401	*Spongillidae*		+
01801	*Turbellaria*	24	+
03360	*Plumatella sp*		+
03600	*Oligochaeta*	9	
04960	*Mooreobdella sp*		+
08250	*Orconectes (Procericambarus) rusticus*		+
08601	*Hydrachnidia*		+
11120	*Baetis flavistriga*	99	+
11130	*Baetis intercalaris*	586	+
13400	*Stenacron sp*	2	+
13510	*Maccaffertium exiguum*		+
13521	*Stenonema femoratum*	23	+
22300	*Argia sp*	6	+
42700	*Belostoma sp*		+
52200	*Cheumatopsyche sp*	89	+
52530	*Hydropsyche depravata group*	17	+
53501	*Hydroptilidae*	4	
68075	*Psephenus herricki*		+
68201	*Scirtidae*		+
68901	*Macronychus glabratus*	2	+
69400	*Stenelmis sp*	3	+
77120	*Ablabesmyia mallochi*		+
77500	*Conchapelopia sp*	95	
77750	*Hayesomyia senata or Thienemannimyia norena*	7	
77800	*Helopelopia sp*		+
78450	*Nilotanypus fimbriatus*	15	
80363	*Corynoneura sp 12*	40	
80370	*Corynoneura lobata*	12	
81270	*Nanocladius (N.) spiniplenus*	7	
83840	*Microtendipes pedellus group*	22	+
84450	*Polypedilum (Uresipedilum) flavum*	462	+
84460	*Polypedilum (P.) fallax group*	44	
84470	*Polypedilum (P.) illinoense*		+
84540	*Polypedilum (Tripodura) scalaenum group*	15	+
84888	*Xenochironomus xenolabis*		+
85625	*Rheotanytarsus sp*	7	
85800	*Tanytarsus sp*	22	
85821	*Tanytarsus glabrescens group sp 7*	15	
87510	*Neoplasta sp*	1	
87540	*Hemerodromia sp*	9	+
93900	*Elimia sp*	32	+
96900	*Ferrissia sp*	16	
98600	*Sphaerium sp*	4	

Taxa Code	Taxa	Quant/Qual

No. Quantitative Taxa: 30 Total Taxa: 43
No. Qualitative Taxa: 28 ICI: **34**
Number of Organisms: 1689 Qual EPT: 7

Appendix Table 5. Ohio EPA/DSW Ecological Assessment Section Macroinvertebrate Collection

Site: Ottawa River
Sylvania Ave.

Collection Date: 08/16/2011 River Code: 04-300 RM: 16.90

Taxa Code	Taxa	Quant/Qual	
00401	*Spongillidae*		+
01801	*Turbellaria*	19	+
03360	*Plumatella sp*		+
03600	*Oligochaeta*	40	+
04960	*Mooreobdella sp*		+
08250	*Orconectes (Procericambarus) rusticus*		+
11120	*Baetis flavistriga*	140	+
11130	*Baetis intercalaris*	780	+
11250	*Centroptilum sp (w/o hindwing pads)*	14	
13400	*Stenacron sp*	22	+
13521	*Stenonema femoratum*	5	+
22001	*Coenagrionidae*		+
22300	*Argia sp*	32	+
23909	*Boyeria vinosa*		+
24107	*Nasiaeschna pentacantha*		+
52200	*Cheumatopsyche sp*	88	+
52530	*Hydropsyche depravata group*		+
68075	*Psephenus herricki*		+
68708	*Dubiraphia vittata group*		+
68901	*Macronychus glabratus*	8	
69400	*Stenelmis sp*	3	+
77500	*Conchapelopia sp*	16	
77750	*Hayesomyia senata or Thienemannimyia norena*	16	
77800	*Helopelopia sp*	16	
78450	*Nilotanypus fimbriatus*	80	+
78655	*Procladius (Holotanypus) sp*		+
80370	*Corynoneura lobata*	24	
81250	*Nanocladius (N.) minimus*	32	
81825	*Rheocricotopus (Psilocricotopus) robacki*	16	
82141	*Thienemanniella xena*	40	
82730	*Chironomus (C.) decorus group*		+
82820	*Cryptochironomus sp*		+
83040	*Dicrotendipes neomodestus*	97	+
83300	*Glyptotendipes (G.) sp*	32	
83820	*Microtendipes "caelum" (sensu Simpson & Bode, 1980)*	16	
83840	*Microtendipes pedellus group*	32	
84450	*Polypedilum (Uresipedilum) flavum*	402	+
84460	*Polypedilum (P.) fallax group*	177	
84470	*Polypedilum (P.) illinoense*		+
84520	*Polypedilum (Tripodura) halterale group*		+
84540	*Polypedilum (Tripodura) scalaenum group*	64	+
84700	*Stenochironomus sp*	16	
84888	*Xenochironomus xenolabis*		+
85625	*Rheotanytarsus sp*	32	
85800	*Tanytarsus sp*	97	
85821	*Tanytarsus glabrescens group sp 7*	225	
93900	*Elimia sp*	1	+
95100	*Physella sp*	1	+
96900	*Ferrissia sp*	38	+

No. Quantitative Taxa: 33 Total Taxa: 49
No. Qualitative Taxa: 32 ICI: **30**
Number of Organisms: 2621 Qual EPT: 6

Appendix Table 5. Ohio EPA/DSW Ecological Assessment Section Macroinvertebrate Collection

Site: Ottawa River
Edgehill Rd.

Collection Date: 08/17/2011 River Code: 04-300 RM: 14.42

Taxa Code	Taxa	Quant/Qual	
01320	*Hydra sp*	8	
01801	*Turbellaria*	3	+
03600	*Oligochaeta*	3	+
06700	*Crangonyx sp*		+
08250	*Orconectes (Procericambarus) rusticus*		+
11120	*Baetis flavistriga*	5	
11130	*Baetis intercalaris*	301	+
13400	*Stenacron sp*	32	+
13521	*Stenonema femoratum*	4	+
21200	*Calopteryx sp*		+
22300	*Argia sp*	43	+
24107	*Nasiaeschna pentacantha*		+
45400	*Trichocorixa sp*		+
52200	*Cheumatopsyche sp*	186	+
52530	*Hydropsyche depravata group*	1	
68700	*Dubiraphia sp*		+
68901	*Macronychus glabratus*	10	+
69400	*Stenelmis sp*	1	+
72700	*Anopheles sp*		+
72900	*Culex sp*		+
77120	*Ablabesmyia mallochi*	8	
77500	*Conchapelopia sp*	3	
78140	*Labrundinia pilosella*	3	
78401	*Natarsia species A (sensu Roback, 1978)*		+
78450	*Nilotanypus fimbriatus*	3	
78655	*Procladius (Holotanypus) sp*		+
80370	*Corynoneura lobata*	6	
80410	*Cricotopus (C.) sp*	8	
81825	*Rheocricotopus (Psilocricotopus) robacki*	21	
82141	*Thienemanniella xena*	2	
82730	*Chironomus (C.) decorus group*	3	
82820	*Cryptochironomus sp*		+
83003	*Dicrotendipes fumidus*	8	
83040	*Dicrotendipes neomodestus*	25	
83840	*Microtendipes pedellus group*		+
84210	*Paratendipes albimanus or P. duplicatus*	8	
84450	*Polypedilum (Uresipedilum) flavum*	84	
84460	*Polypedilum (P.) fallax group*	81	
84470	*Polypedilum (P.) illinoense*	3	
84540	*Polypedilum (Tripodura) scalaenum group*	32	+
84700	*Stenochironomus sp*	3	
85261	*Cladotanytarsus vanderwulpi group sp 1*		+
85500	*Paratanytarsus sp*	11	
85625	*Rheotanytarsus sp*	11	
85800	*Tanytarsus sp*	17	
85821	*Tanytarsus glabrescens group sp 7*	21	+
87540	*Hemerodromia sp*	2	
93900	*Elimia sp*	15	+
95100	*Physella sp*	15	
96900	*Ferrissia sp*	122	+
98600	*Sphaerium sp*		+

No. Quantitative Taxa: 37 Total Taxa: 51
No. Qualitative Taxa: 27 ICI: **28**
Number of Organisms: 1112 Qual EPT: 4