Biological and Aquatic Life Use Attainment Study
Stillwater Creek

Starkey Junkyard

2003

Tuscarawas County, Ohio

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INTRODUCTION

The former Starkey Junkyard site located in Uhrichsville, Ohio is undergoing an evaluation in the Targeted Brownfield Assessment program. As part of this evaluation, the City of Uhrichsville requested that the Ohio EPA conduct an aquatic ecological assessment of Stillwater Creek.

Specific objectives of this evaluation were to:

1) Establish biological conditions in Stillwater Creek in the vicinity of the former Starkey Junkyard site by evaluating fish and macroinvertebrate communities, and
2) Determine the aquatic life attainment status of Stillwater Creek with regard to the Warmwater Habitat (WWH) aquatic life use designation codified in the Ohio Water Quality Standards.

SUMMARY

A total of 0.8 mile of Stillwater Creek was assessed in 2003 by Ohio EPA. Based on the performance of the biological communities, 0.3 miles were in full attainment and 0.5 miles were in non-attainment of the Warmwater Habitat aquatic life use (Table 1). The biological integrity of Stillwater Creek was represented by fair conditions in the impounded section of stream - adjacent to and upstream from Starkey Junkyard. Stillwater Creek in the free-flowing section downstream from the low-head dam was fully attaining the WWH aquatic life use designation. Sampling during 2003 confirmed the appropriateness of the Warmwater Habitat aquatic life use designation for Stillwater Creek. Biological results in Stillwater Creek from 2003 were largely reflective of the physical habitat conditions encountered; reduced habitat diversity in the impounded area produced lower biological diversity. It was not apparent from the results that the Starkey Junkyard site was influencing biological communities in Stillwater Creek.

Table 1. Attainment status of the existing aquatic life use for Stillwater Creek based on biological sampling conducted during July and August, 2003.

RIVER MILE Fish/Invert.	IBI	MIwb	ICI	QHEI	Attainment Status	Site Location
Stillwater Creek	*Western Allegheny Plateau (WAP) - WWH Use Designation*					
5.5 / 5.5	31*	7.0*	20*	43.5	NON	Upstream Starkey Junkyard
5.3 / 5.3	30*	<u>6.0</u>*	22*	44.0	NON	Adjacent Starkey Junkyard
5.1 / 5.1	47	9.7	42	74.5	FULL	Downstream Starkey Junkyard

* Significant departure from ecoregion biocriterion; poor and very poor results are underlined.

ns Nonsignificant departure from biocriterion (≤4 IBI or ICI units; ≤0.5 MIwb units).

Table 2. Sampling locations in Stillwater Creek, 2003. Type of sampling included fish community (F) and macroinvertebrate community (M).

River Mile	Type of Sampling	Latitude	Longitude	Landmark
5.5	F,M	40.3838	81.3469	Ust. Starkey Junkyard
5.3	F,M	40.3858	81.3476	Adj. Starkey Junkyard, upstream low-head dam
5.1	F,M	40.3880	81.3469	Dst. Starkey Junkyard/ low-head dam

METHODS

All physical and biological field, laboratory, data processing, and data analysis methodologies and procedures adhere to those specified in the Manual of Ohio EPA Surveillance Methods and Quality Assurance Practices (Ohio Environmental Protection Agency 1989a) and Biological Criteria for the Protection of Aquatic Life, Volumes I-III (Ohio Environmental Protection Agency 1987a, 1987b, 1989b, 1989c), and The Qualitative Habitat Evaluation Index (QHEI): Rationale, Methods, and Application (Rankin 1989, 1995) for aquatic habitat assessment.

Use attainment status is a term describing the degree to which environmental indicators are either above or below criteria specified by the Ohio Water Quality Standards (WQS; Ohio Administrative Code 3745-1). Assessing aquatic use attainment status involves a primary reliance on the Ohio EPA biological criteria (OAC 3745-1-07; Table 7-14). These are confined to ambient assessments and apply to rivers and streams outside of mixing zones. Numerical biological criteria are based on multimetric biological indices including the Index of Biotic Integrity (IBI) and modified Index of Well-Being (MIwb), indices measuring the response of the fish community, and the Invertebrate Community Index (ICI), which indicates the response of the macroinvertebrate community. Three attainment status results are possible at each sampling location - full, partial, or non-attainment. Full attainment means that all of the applicable indices meet the biocriteria. Partial attainment means that one or more of the applicable indices fails to meet the biocriteria. Non-attainment means that none of the applicable indices meet the biocriteria or one of the organism groups reflects poor or very poor performance. An aquatic life use attainment table (Table 1) is constructed based on the sampling results and is arranged from upstream to downstream and includes the sampling locations indicated by river mile, the applicable biological indices, the use attainment status (*i.e.*, full, partial, or non), the Qualitative Habitat Evaluation Index (QHEI), and a sampling location description.

Physical habitat was evaluated using the Qualitative Habitat Evaluation Index (QHEI) developed by the Ohio EPA for streams and rivers in Ohio (Rankin 1989, 1995). Various attributes of the habitat are scored based on the overall importance of each to the maintenance of viable, diverse, and functional aquatic

faunas. The type(s) and quality of substrates, amount and quality of instream cover, channel morphology, extent and quality of riparian vegetation, pool, run, and riffle development and quality, and gradient are some of the habitat characteristics used to determine the QHEI score which generally ranges from 20 to less than 100. The QHEI is used to evaluate the characteristics of a stream segment, as opposed to the characteristics of a single sampling site. As such, individual sites may have poorer physical habitat due to a localized disturbance yet still support aquatic communities closely resembling those sampled at adjacent sites with better habitat, provided water quality conditions are similar. QHEI scores from hundreds of segments around the state have indicated that values greater than 60 are *generally* conducive to the existence of warmwater faunas whereas scores less than 45 generally cannot support a warmwater assemblage consistent with the WWH biological criteria. Scores greater than 75 frequently typify habitat conditions which have the ability to support exceptional warmwater faunas.

RESULTS

Physical Habitat For Aquatic Life

Physical habitat was evaluated in Stillwater Creek at each fish sampling location. Qualitative Habitat Evaluation Index (QHEI) scores are detailed in Table 4. There are two distinct habitat zones within the Stillwater Creek study area: the impounded section of creek behind the low-head dam which encompassed sampling stations at RMs 5.5 and 5.3, and the free-flowing section downstream from the dam which included RM 5.1. The sampling stations upstream from the dam were characterized by 100 percent pool habitat, and a predominance of silt substrates which were extensively embedded. Downstream from the dam, cobble and gravel were the predominant bottom substrates, pool, riffle, and run habitats were common, and bottom substrates were normally/moderately embedded. The impounded flow conditions at RMs 5.5 and 5.3 resulted in reduced QHEI scores, with values of 43.5 and 44.0, respectively. These scores are reflective of marginally fair stream habitat quality. The natural flow and habitat conditions evident downstream from the dam at RM 5.1 contributed to a very good QHEI score of 74.5, important for supporting diverse biological communities. Stream habitat quality is marginally fair upstream from the dam, and very good downstream from the dam.

Fish Community Assessment

Fish communities were assessed at three Stillwater Creek sites on July 3 and August 25, 2003 (Figure 1). The three sites were located upstream from the Starkey Junkyard site (RM 5.5), adjacent to the Starkey Junkyard site and just upstream from the Uhrichsville low-head dam (RM 5.3) and immediately downstream from Starkey Junkyard (RM 5.1). The fish communities were sampled at each site twice using pulsed DC boat electrofishing equipment, with sampling distances at each site 400 meters in length. Fish were processed in the field, and included identifying each individual to species, weighing of fish, and recording any external abnormalities.

Fair to fair/poor fish communities were noted in Stillwater Creek within the impounded area (Table 3). At the most upstream station (RM 5.5), both the IBI and MIwb scores (31 and 7.0, respectively) were in the fair range, and not achieving the ecoregional biocriteria established for Warmwater Habitat (WWH)

streams and rivers in Ohio. A small decline in IBI and MIwb scores occurred at RM 5.3, with values indicative of fair to poor conditions. As occurred upstream at RM 5.5, these scores did not achieve the ecoregional biocriteria (additionally, the MIwb score did not achieve the impounded MWH criterion). A substantial improvement in the fish community was documented downstream from the dam at RM 5.1 (an area immediately downstream from the Starkey Junkyard property) with both the IBI and MIwb (47 and 9.7, respectively) achieving the WWH biocriteria. The downstream site in Stillwater Creek was reflective of very good to exceptional conditions. Physical habitat conditions in Stillwater Creek appears to be the predominant, if not sole, reason for the difference in fish community quality between stations. The reduced habitat diversity, predominance of silt and muck, and extensive substrate embeddedness of the two upstream stations significantly contributed to the reduced fish diversity. With natural physical habitat conditions, as evidenced at the downstream sampling station, the fish community easily attained the expected Warmwater Habitat criteria.

Table 3. Fish community summaries based on pulsed DC electrofishing sampling conducted by Ohio EPA in Stillwater Creek from July and August, 2003. Relative number and weight are per 1.0 km for boat sites.

Stream/ River Mile	Mean Number of Species	Total Number Species	Mean Relative Number	Mean Relative Weight (kg)	QHEI	Mean Modified Index of Well Being	Mean Index of Biotic Integrity	Narrative Evaluation
Stillwater Creek (2003)								
5.5	12.5	16	100.0	37.18	43.5	7.0*	31*	Fair
5.3	8.5	12	76.2	11.57	44.0	6.0*	30*	Fair/Poor
5.1	19.0	23	386.2	152.23	74.5	9.7	47	V Good/Exceptional

Ecoregion Biocriteria: Western Allegheny Plateau (WAP)

INDEX	WWH	EWH	MWH (Impounded)
IBI-Boat	40	48	30
MIwb - Boat	8.6	9.6	6.6

* Significant departure from ecoregional biocriterion (>4 IBI units); poor and very poor results are underlined.
ns Nonsignificant departure from biocriterion (≤4 IBI units; ≤0.5 MIwb units).

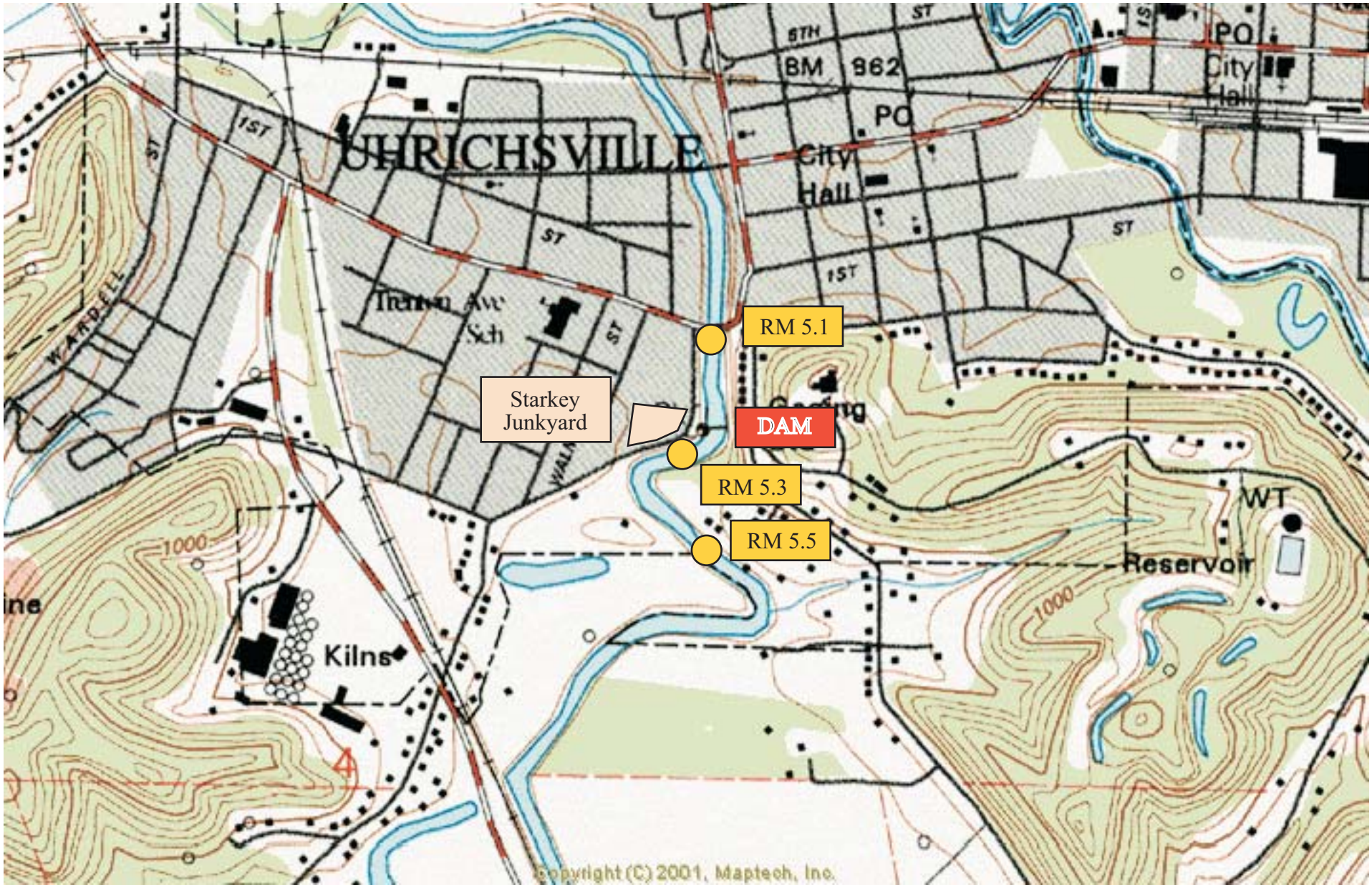

Figure 1. Map of Stillwater Creek, Uhrichsville, showing biological sampling locations, 2003.

Table 4. Qualitative Habitat Evaluation Index (QHEI) showing modified and warmwater habitat attributes for Stillwater Creek, 2003.

			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)	**Total HL MWH Attributes**	Recovering Channel	Heavy/Moderate Silt Cover	Sand Substrates (Boat)	Hardpan Substrate Origin	Fair/Poor Development	Low Sinuosity	Only 1-2 Cover Types	Intermittent and Poor Pools	No Fast Current	High/Mod. Overall Embeddedness	High/Mod. Riffle Embeddedness	No Riffle	**Total ML MWH Attributes**	**(MWH HL+1)/(WWH+1) Ratio**	**(MWH ML+1)/(WWH+1) Ratio**
River Mile	QHEI	Gradient (ft/mile)																																
(17-350) Stillwater Creek																																		
Year: 2003																																		
5.5	**43.5**	0.10	#					#			#		3	♦					1	•		•	•			•		•			6	0.50	2.00
5.3	**44.0**	0.10	#					#			#		3	♦			♦		2	•		•	•			•		•			6	0.75	2.25
5.1	**74.5**	1.52	#	#		#		#	#	#	#	#	8						0					•					•		2	0.11	0.33

Macroinvertebrate Assessment

Macroinvertebrates were collected from artificial substrates and from the natural habitats of three Stillwater Creek sites on August 25, 2003. Sites located at RM 5.5 and RM 5.3 were in the pooled reach upstream from the low-head dam. The RM 5.5 site was located upstream from the Starkey Junkyard property and the RM 5.3 site was adjacent to the property. The third sampling location was at RM 5.1, which was downstream from the property and below the dam in the free-flowing portion of the creek. The artificial substrate collection provided quantitative data and consisted of a composite sample of 5 modified Hester-Dendy multiple-plate samplers colonized for six weeks. At the time of the artificial substrate collection, a qualitative multihabitat composite sample was also collected. This sampling effort consisted of an inventory of all observed macroinvertebrate taxa from the natural habitats at each site with no attempt to quantify populations other than notations on the predominance of specific taxa or taxa groups within major macrohabitat types (e.g., riffle, run, pool, margin). Total collecting time at a site ranged from 30 to 45 minutes for three individuals. Invertebrate Community Index (ICI) scores were calculated from the sampling results and, along with the composition of taxa collected, were used to assess the status of the Warmwater Habitat (WWH) aquatic life use designation of Stillwater Creek.

The macroinvertebrate communities from the two sampling locations upstream from the dam were very similar (Table 5). Two midge taxa, *Tribelos jucundum* and *Glyptotendipes*, tolerant of slack water conditions, were predominant at the upstream and adjacent sites. The similarity of the macroinvertebrate communities at the upstream(RM 5.5) and adjacent(RM 5.3) sites and a lack of toxic tolerant taxa at the adjacent site indicate that habitat impacts related to the low-head dam are the cause of non-attainment of the WWH use in this segment of Stillwater Creek. ICI scores for the upstream and adjacent sites were 20 and 22, respectively. There did not appear to be an impact on the macroinvertebrate community associated with the Starkey Junkyard. The downstream site (RM 5.1) located below the dam reflected conditions supportive of the WWH use with a very good macroinvertebrate community and an ICI of 42. The moderately intolerant midge genus *Rheotanytarsus* and the filter feeding caddisfly genus *Cheumatopsyche* were the predominant taxa at the downstream site.

Table 5. Summary of macroinvertebrate data collected from artificial substrates (quantitative sampling) and natural substrates (qualitative sampling) in Stillwater Creek, July - August, 2003.

Stream/ River Mile	Density Number/ft^2	Total Taxa	Quantitative Taxa	Qualitative Taxa	Qual. EPT[a]	ICI	Narrative Evaluation
Stillwater Creek (2003)							
5.5	150	47	36	26	3	20*	Fair
5.3	237	50	35	28	4	22*	Fair
5.1	525	54	33	34	8	42	Very Good

Ecoregion Biocriteria: Western Allegheny Plateau (WAP)

INDEX	**WWH**	**EWH**	**MWH**
ICI	36	46	22

[a]-EPT=total Ephemeroptera (mayflies), Plecoptera (stoneflies), & Trichoptera (caddisflies) taxa richness.
*-Significant departure from ecoregion biocriterion (>4 ICI units); poor and very poor results are underlined.
ns-Nonsignificant departure from ecoregion biocriterion (≤4 ICI units).

REFERENCES

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APPENDICES

Invertebrate Community Index (ICI) scores for Stillwater Creek, 2003.

River Mile	Drainage Area (sq mi)	Number of				Percent:					Qual. EPT	Eco-region	ICI
		Total Taxa	Mayfly Taxa	Caddisfly Taxa	Dipteran Taxa	Mayflies	Caddis-flies	Tany-tarsini	Other Dipt/NI	Tolerant Organisms			
Stillwater Creek (17-350)													
Year: 2003													
5.50	367.0	36(6)	2(0)	2(2)	19(6)	1.1(2)	0.4(2)	2.5(2)	92.9(0)	10.1(0)	3(0)	4	20
5.30	367.0	35(4)	3(2)	4(4)	15(4)	4.0(2)	5.6(2)	3.5(2)	82.6(0)	7.5(2)	4(0)	4	22
5.10	367.0	33(4)	6(4)	5(4)	13(4)	6.8(2)	35.2(6)	29.7(4)	21.7(6)	1.5(6)	8(2)	4	42

Ohio EPA/DSW Ecological Assessment Section
Macroinvertebrate Collection

Collection Date: 08/25/2003 River Code: 17-350 RM: 5.50 Site: Stillwater Creek

Taxa Code	Taxa	Quant/Qual
01320	*Hydra sp*	5
03600	*Oligochaeta*	36
04666	*Helobdella triserialis*	+
05800	*Caecidotea sp*	1
06201	*Hyalella azteca*	37 +
11130	*Baetis intercalaris*	+
14950	*Leptophlebia sp or Paraleptophlebia sp*	1
17200	*Caenis sp*	7 +
22300	*Argia sp*	18 +
23804	*Basiaeschna janata*	+
23909	*Boyeria vinosa*	+
47600	*Sialis sp*	2
51206	*Cyrnellus fraternus*	2
57900	*Pycnopsyche sp*	1 +
60300	*Dineutus sp*	1 +
60900	*Peltodytes sp*	+
63300	*Hydroporus sp*	+
68201	*Scirtidae*	+
68601	*Ancyronyx variegata*	+
68708	*Dubiraphia vittata group*	2 +
68901	*Macronychus glabratus*	+
74501	*Ceratopogonidae*	8
77130	*Ablabesmyia rhamphe group*	7 +
77355	*Clinotanypus pinguis*	20
78655	*Procladius (Holotanypus) sp*	20 +
80370	*Corynoneura lobata*	4
82121	*Thienemanniella lobapodema*	4
83002	*Dicrotendipes modestus*	+
83040	*Dicrotendipes neomodestus*	6
83050	*Dicrotendipes lucifer*	33
83158	*Endochironomus nigricans*	72 +
83300	*Glyptotendipes (G.) sp*	137 +
84155	*Paralauterborniella nigrohalteralis*	13
84300	*Phaenopsectra obediens group*	13
84315	*Phaenopsectra flavipes*	7
84460	*Polypedilum (P.) fallax group*	13 +
84470	*Polypedilum (P.) illinoense*	+
84540	*Polypedilum (Tripodura) scalaenum group*	26 +
84790	*Tribelos fuscicorne*	26 +
84800	*Tribelos jucundum*	164 +
85800	*Tanytarsus sp*	6
85821	*Tanytarsus glabrescens group sp 7*	13
95100	*Physella sp*	20
96120	*Menetus (Micromenetus) dilatatus*	10
96900	*Ferrissia sp*	7
98200	*Pisidium sp*	4
98600	*Sphaerium sp*	3 +

No. Quantitative Taxa: 36 Total Taxa: 47
No. Qualitative Taxa: 26 ICI: **20**
Number of Organisms: 749 Qual EPT: 3

Ohio EPA/DSW Ecological Assessment Section
Macroinvertebrate Collection

Collection Date: 08/25/2003 River Code: 17-350 RM: 5.30 Site: Stillwater Creek

Taxa Code	Taxa	Quant/Qual
00401	*Spongillidae*	+
01320	*Hydra sp*	11
01801	*Turbellaria*	17 +
03600	*Oligochaeta*	36
06201	*Hyalella azteca*	126 +
08200	*Orconectes sp*	1
13400	*Stenacron sp*	10
14950	*Leptophlebia sp or Paraleptophlebia sp*	1
17200	*Caenis sp*	36 +
21200	*Calopteryx sp*	+
22001	*Coenagrionidae*	+
22300	*Argia sp*	42 +
43300	*Ranatra sp*	+
45900	*Notonecta sp*	+
47600	*Sialis sp*	3
51206	*Cyrnellus fraternus*	1 +
53800	*Hydroptila sp*	4
54200	*Orthotrichia sp*	37
57900	*Pycnopsyche sp*	+
59500	*Oecetis sp*	24 +
60300	*Dineutus sp*	1 +
60900	*Peltodytes sp*	+
63300	*Hydroporus sp*	+
68708	*Dubiraphia vittata group*	6
68901	*Macronychus glabratus*	+
72900	*Culex sp*	+
77130	*Ablabesmyia rhamphe group*	21 +
78140	*Labrundinia pilosella*	7
78655	*Procladius (Holotanypus) sp*	28
80370	*Corynoneura lobata*	8
80420	*Cricotopus (C.) bicinctus*	+
83045	*Dicrotendipes nervosus*	7
83050	*Dicrotendipes lucifer*	104
83158	*Endochironomus nigricans*	56 +
83300	*Glyptotendipes (G.) sp*	139 +
83820	*Microtendipes "caelum" (sensu Simpson & Bode, 1980)*	+
84155	*Paralauterborniella nigrohalteralis*	7
84470	*Polypedilum (P.) illinoense*	+
84520	*Polypedilum (Tripodura) halterale group*	+
84540	*Polypedilum (Tripodura) scalaenum group*	55
84790	*Tribelos fuscicorne*	+
84800	*Tribelos jucundum*	230 +
85625	*Rheotanytarsus sp*	7
85800	*Tanytarsus sp*	21
85821	*Tanytarsus glabrescens group sp 7*	14
87540	*Hemerodromia sp*	4
95100	*Physella sp*	26 +
96120	*Menetus (Micromenetus) dilatatus*	36
96900	*Ferrissia sp*	27
98600	*Sphaerium sp*	34 +

No. Quantitative Taxa: 35 Total Taxa: 50
No. Qualitative Taxa: 28 ICI: **22**
Number of Organisms: 1187 Qual EPT: 4

Ohio EPA/DSW Ecological Assessment Section
Macroinvertebrate Collection

Collection Date: 08/25/2003 River Code: 17-350 RM: 5.10 Site: Stillwater Creek

Taxa Code	Taxa	Quant/Qual
01320	*Hydra sp*	6
01801	*Turbellaria*	9
03121	*Paludicella articulata*	1
03360	*Plumatella sp*	1
04682	*Placobdella montifera*	+
05800	*Caecidotea sp*	+
06201	*Hyalella azteca*	+
08260	*Orconectes (Crokerinus) sanbornii sanbornii*	+
08601	*Hydracarina*	1
11130	*Baetis intercalaris*	3 +
11250	*Centroptilum sp (w/o hindwing pads)*	+
12200	*Isonychia sp*	1 +
13400	*Stenacron sp*	126 +
13570	*Stenonema terminatum*	1
16700	*Tricorythodes sp*	47
17200	*Caenis sp*	1 +
21200	*Calopteryx sp*	+
22001	*Coenagrionidae*	+
22300	*Argia sp*	1 +
23804	*Basiaeschna janata*	+
23909	*Boyeria vinosa*	+
24710	*Dromogomphus spinosus*	+
26715	*Macromia taeniolata*	+
43300	*Ranatra sp*	+
51206	*Cyrnellus fraternus*	10 +
52200	*Cheumatopsyche sp*	865 +
52570	*Hydropsyche simulans*	7 +
53800	*Hydroptila sp*	42
54200	*Orthotrichia sp*	1
60300	*Dineutus sp*	+
68708	*Dubiraphia vittata group*	+
68901	*Macronychus glabratus*	171 +
69400	*Stenelmis sp*	+
74100	*Simulium sp*	+
77130	*Ablabesmyia rhamphe group*	20 +
77500	*Conchapelopia sp*	+
77750	*Hayesomyia senata or Thienemannimyia norena*	10
80370	*Corynoneura lobata*	80
80410	*Cricotopus (C.) sp*	+
80420	*Cricotopus (C.) bicinctus*	10 +
81201	*Nanocladius (N.) sp*	+
81825	*Rheocricotopus (Psilocricotopus) robacki*	158
82141	*Thienemanniella xena*	20
83158	*Endochironomus nigricans*	+
83300	*Glyptotendipes (G.) sp*	49
84450	*Polypedilum (Uresipedilum) flavum*	138
84460	*Polypedilum (P.) fallax group*	10
85625	*Rheotanytarsus sp*	692 +
85800	*Tanytarsus sp*	20
85821	*Tanytarsus glabrescens group sp 7*	69
87540	*Hemerodromia sp*	26
93900	*Elimia sp*	12 +
96900	*Ferrissia sp*	19
98600	*Sphaerium sp*	+

No. Quantitative Taxa: 33 Total Taxa: 54
No. Qualitative Taxa: 34 ICI: **42**
Number of Organisms: 2627 Qual EPT: 8

Stillwater Creek IBI results, 2003.

River Mile	Type	Date	Drainage area (sq mi)	Number of: Total species	Sunfish species	Sucker species	Intolerant species	Percent of Individuals: 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
Stillwater Creek - (17-350)																		
Year: 2003																		
5.50	A	07/03/2003	367	13(3)	2(3)	3(3)	0(1)	20(3)	20(1)	17(3)	20(3)	17(5)	56(5)	0.0(5)	85(1)	*	36	8.0
5.50	A	08/25/2003	367	10(3)	4(5)	2(1)	0(1)	10(1)	10(1)	31(1)	28(1)	8(3)	64(5)	5.1(3)	68(1)	*	26	6.0
5.30	A	07/03/2003	367	10(3)	4(5)	2(1)	0(1)	32(3)	32(3)	34(1)	29(1)	16(5)	55(5)	2.6(3)	63(1)	*	32	6.4
5.30	A	08/25/2003	367	6(1)	3(3)	1(1)	0(1)	9(1)	9(1)	17(3)	22(3)	26(5)	52(3)	4.3(5)	48(1)	*	28	5.5
5.10	A	07/03/2003	367	19(3)	2(3)	6(5)	3(3)	46(5)	47(3)	8(5)	12(5)	13(5)	71(5)	1.1(3)	493(5)		50	10.2
5.10	A	08/25/2003	367	17(3)	2(3)	5(3)	1(1)	39(5)	41(3)	3(5)	11(5)	20(5)	68(5)	2.1(3)	230(3)		44	9.1

♦ - IBI is low end adjusted.

* - < 200 Total individuals in sample

** - < 50 Total individuals in sample

River Code: **17-350**	Stream: **Stillwater Creek**	Sample Date: **2003**
River Mile: **5.50**	Location:	Date Range: 07/03/2003
Time Fished: 2836 sec	Drainage: 367.0 sq mi	Thru: 08/25/2003
Dist Fished: 0.80 km	Basin: Muskingum 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
Longnose Gar		P	M		1	1.25	1.25	0.13	0.35	103.00
Gizzard Shad		O	M		1	1.25	1.25	0.06	0.15	44.00
Silver Redhorse	R	I	S	M	4	5.00	5.00	4.12	11.08	823.75
Golden Redhorse	R	I	S	M	6	7.50	7.50	4.02	10.81	536.00
Spotted Sucker	R	I	S		2	2.50	2.50	0.43	1.15	170.50
Common Carp	G	O	M	T	6	7.50	7.50	20.14	54.16	2,684.72
Redfin Shiner	N	I	N		7	8.75	8.75	0.02	0.05	2.14
Spotfin Shiner	N	I	M		6	7.50	7.50	0.04	0.10	5.17
Bluntnose Minnow	N	O	C	T	12	15.00	15.00	0.03	0.08	1.92
Rock Bass	S	C	C		4	5.00	5.00	0.53	1.43	106.50
Smallmouth Bass	F	C	C	M	4	5.00	5.00	1.01	2.71	201.25
Largemouth Bass	F	C	C		1	1.25	1.25	0.56	1.49	444.00
Green Sunfish	S	I	C	T	1	1.25	1.25	0.03	0.08	23.00
Bluegill Sunfish	S	I	C	P	20	25.00	25.00	0.39	1.05	15.65
Pumpkinseed Sunfish	S	I	C	P	2	2.50	2.50	0.03	0.08	12.50
Bluegill X Pumpkinseed					1	1.25	1.25	0.10	0.27	79.00
Freshwater Drum			M	P	2	2.50	2.50	5.56	14.96	2,225.00
	Mile Total				80	100.00		37.18		
	Number of Species				16					
	Number of Hybrids				1					

River Code: **17-350**	Stream: **Stillwater Creek**	Sample Date: **2003**
River Mile: **5.30**	Location:	Date Range: 07/03/2003
Time Fished: 2516 sec	Drainage: 367.0 sq mi	Thru: 08/25/2003
Dist Fished: 0.80 km	Basin: Muskingum River No of Passes: 2	Sampler Type: A

Species Name / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Gizzard Shad		O	M		1	1.25	1.64	0.34	2.94	272.00
Silver Redhorse	R	I	S	M	1	1.25	1.64	1.04	9.03	835.00
Golden Redhorse	R	I	S	M	13	16.25	21.31	5.62	48.62	346.08
Common Carp	G	O	M	T	1	1.25	1.64	2.47	21.35	1,975.00
Redfin Shiner	N	I	N		2	2.50	3.28	0.00	0.02	1.00
Spotfin Shiner	N	I	M		1	1.25	1.64	0.00	0.02	2.00
Bluntnose Minnow	N	O	C	T	14	17.50	22.95	0.03	0.27	1.79
Rock Bass	S	C	C		9	11.25	14.75	0.83	7.17	73.67
Smallmouth Bass	F	C	C	M	3	3.75	4.92	0.86	7.43	229.00
Green Sunfish	S	I	C	T	2	2.50	3.28	0.04	0.36	16.50
Bluegill Sunfish	S	I	C	P	11	13.75	18.03	0.18	1.58	13.27
Pumpkinseed Sunfish	S	I	C	P	3	3.75	4.92	0.14	1.23	38.00
	Mile Total				61	76.25		11.57		
	Number of Species				12					
	Number of Hybrids				0					

River Code: **17-350**	Stream: **Stillwater Creek**	Sample Date: **2003**
River Mile: **5.10**	Location:	Date Range: 07/03/2003
Time Fished: 2023 sec	Drainage: 367.0 sq mi	Thru: 08/25/2003
Dist Fished: 0.80 km	Basin: Muskingum 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
Longnose Gar		P	M		1	1.25	0.32	0.54	0.35	428.00
Gizzard Shad		O	M		3	3.75	0.97	0.66	0.44	177.00
Northern Pike	F	P	M		2	2.50	0.65	4.30	2.82	1,720.00
Quillback Carpsucker	C	O	M		12	15.00	3.88	12.25	8.05	816.50
Silver Redhorse	R	I	S	M	40	50.00	12.94	47.49	31.20	949.86
Black Redhorse	R	I	S	I	6	7.50	1.94	1.80	1.18	239.83
Golden Redhorse	R	I	S	M	49	61.25	15.86	18.04	11.85	294.51
Shorthead Redhorse	R	I	S	M	31	38.75	10.03	20.16	13.25	520.34
Northern Hog Sucker	R	I	S	M	9	11.25	2.91	0.79	0.52	70.11
Common Carp	G	O	M	T	6	7.50	1.94	16.75	11.00	2,233.33
River Chub	N	I	N	I	2	2.50	0.65	0.09	0.06	35.00
Gravel Chub	N	I	S	M	1	1.25	0.32	0.01	0.00	5.00
Spotfin Shiner	N	I	M		53	66.25	17.15	0.22	0.14	3.32
Sand Shiner	N	I	M	M	16	20.00	5.18	0.05	0.03	2.56
Bluntnose Minnow	N	O	C	T	14	17.50	4.53	0.05	0.03	2.93
Channel Catfish	F		C		6	7.50	1.94	7.76	5.10	1,035.00
Trout-perch		I	M		1	1.25	0.32	0.00	0.00	2.00
Rock Bass	S	C	C		16	20.00	5.18	1.84	1.21	92.00
Smallmouth Bass	F	C	C	M	14	17.50	4.53	3.92	2.57	223.86
Bluegill Sunfish	S	I	C	P	5	6.25	1.62	0.06	0.04	9.00
Sauger	F	P	S		1	1.25	0.32	0.54	0.36	435.00
Banded Darter	D	I	S	I	3	3.75	0.97	0.01	0.00	2.00
Sauger X Walleye	E	P			13	16.25	4.21	4.39	2.88	270.15
Freshwater Drum			M	P	5	6.25	1.62	10.51	6.91	1,682.00
	Mile Total				309	386.25		152.23		
	Number of Species				23					
	Number of Hybrids				1					