State of Ohio
Environmental Protection Agency

Division of Surface Water

Biological and Water Quality Assessment of Wahoo Ditch

Former White Rubber Property

Portage County, Ohio

November 13, 2009

Ted Strickland, Governor
Chris Korleski, Director

Biological and Water Quality Study

Wahoo Ditch
(Former White Rubber Property)

2009

Portage County, Ohio
November 13, 2009
OEPA Report EAS/2009-11-9

prepared for
State of Ohio Environmental Protection Agency
Division of Emergency and Remedial Response

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EXECUTIVE SUMMARY

One-half mile of Wahoo Ditch was assessed by the Ohio EPA during 2009. Based on the performance of the biological communities, the entire 0.5 miles was in non-attainment of the Modified Warmwater Habitat (MWH) aquatic life use (Table 1). The upstream background site, the site adjacent to the former White Rubber property, and the downstream site were represented by poor fish and macroinvertebrate communities. Contributing factors to the poor biological quality included reduced stream habitat, the urbanized condition of the watershed (urban runoff and storm sewers), a septic discharge at Oakwood Avenue, and sediment contaminants. The poor condition of the biological communities at the upstream sampling location prevents attributing impairment of the biological communities at the adjacent and downstream sites to the White Rubber property.

RECOMMENDATIONS

The aquatic life use designation of Modified Warmwater Habitat – channel modification has been confirmed in this study and a previous Ohio EPA biological and water quality study, and should be maintained. Physical habitat conditions verified that the Primary Contact Recreation use is appropriate for Wahoo Ditch.

ACKNOWLEDGEMENTS

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

Stream sampling: Mike Gray, David Altfater, Sue Netzly-Watkins, Gunars Zikmanis, Larry Antonelli
Data support: Dennis Mishne
Report preparation and analysis: David Altfater, Mike Gray
Reviewers - Jeff DeShon, Marc Smith

INTRODUCTION

A 0.5 mile section of Wahoo Ditch was assessed during 2009, evaluating biological, sediment, and surface water resources. This study was undertaken to assess water resource conditions in Wahoo Ditch upstream, adjacent, and downstream from the former White Rubber property. This water resource project is part of a Targeted Brownfield Assessment (TBA).

Specific objectives of the evaluation were to:

- Assess biological conditions in Wahoo Ditch by evaluating fish and macroinvertebrate communities,
- Evaluate surficial sediment and surface water chemical quality in Wahoo Ditch,
- Determine the aquatic life use attainment status of Wahoo Ditch with regard to the Modified Warmwater Habitat (WWH) aquatic life use designation codified in the Ohio Water Quality Standards, and
- Perform the work to satisfy the requirements of VAP rule OAC 3745-300-09.

Wahoo Ditch is located in the Erie-Ontario Lake Plain (EOLP) ecoregion. Wahoo Ditch is currently assigned the Modified Warmwater Habitat (MWH) - Channel Modification aquatic life use designation for its entire length.

Aquatic life use attainment conditions are presented in Table 1; sampling locations are detailed in Table 2 and graphically presented in Figure 1.

Table 1. Aquatic life use attainment status for sampling locations in Wahoo Ditch, Ravenna area, 2009. The Index of Biotic Integrity (IBI) 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 Erie-Ontario Lake Plain (EOLP) ecoregion. In the Ohio Water Quality Standards, Wahoo Ditch is designated Modified Warmwater Habitat (MWH). If biological impairment has occurred, the cause(s) and source(s) of the impairment are noted.

Sample Location River Mile	Aquatic Life Use Designation	Aquatic Life Attainment Status	IBI	ICI	Stream [a] Habitat	Aquatic Life Use Impairment Cause/*Source*
2.6	MWH	**NON**	24	Poor*	44.5	Habitat, unknown contaminants, sediment PAHs/ *channelization, urban discharges-runoff, legacy sediment contaminants*
2.5	MWH	**NON**	22*	Poor*	46.0	
2.2	MWH	**NON**	26	Poor*	55.0	

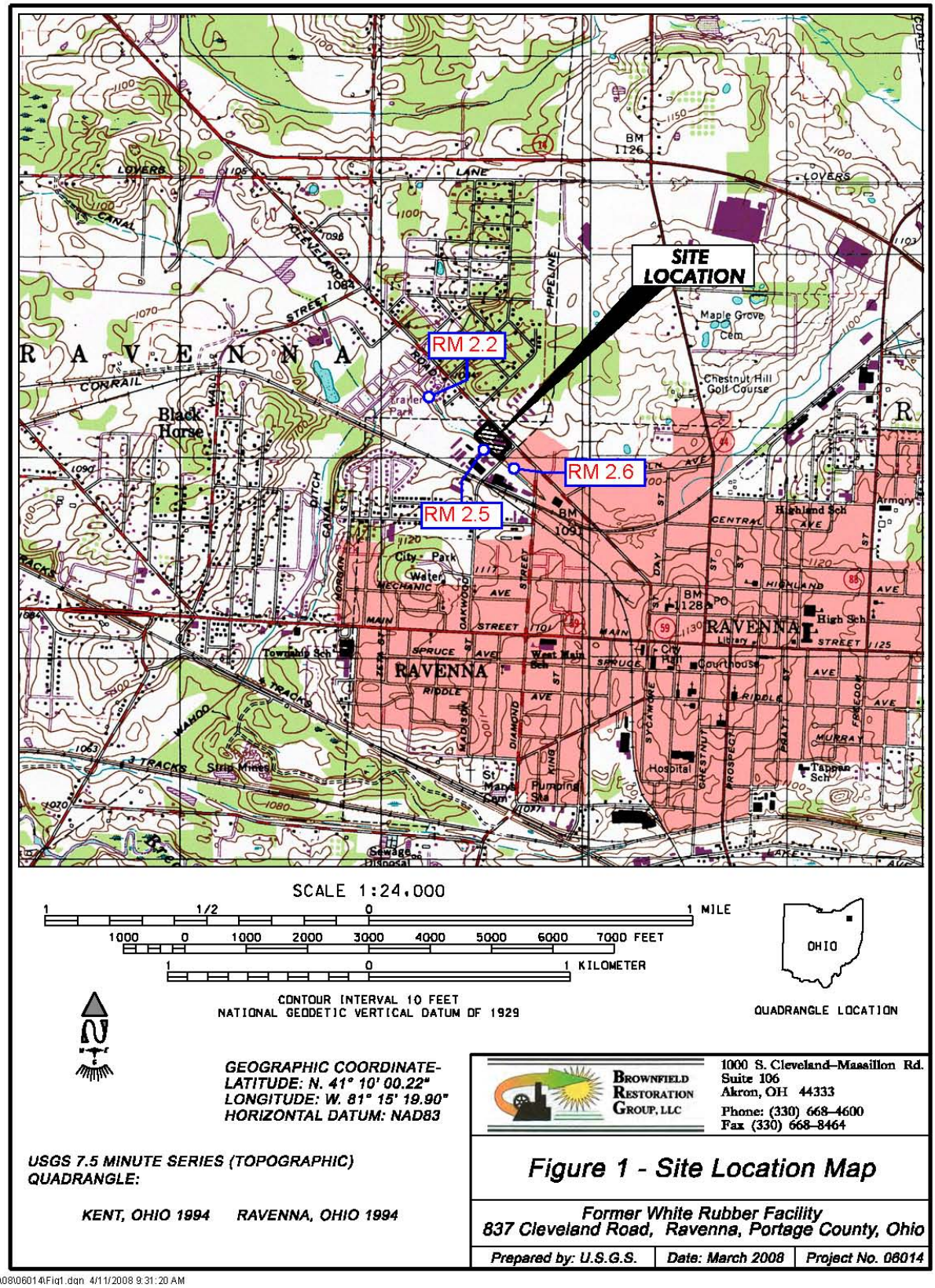
BIOCRITERIA		
INDEX - Site Type	MWH-C	WWH
IBI: Headwater	24	40
ICI	22 (fair)	34 (good)

* Significant departure from ecoregion biocriterion; poor and very poor results are underlined.
ns Nonsignificant departure from biocriterion (≤4 IBI or ICI units).
a Narrative habitat evaluations are based on QHEI scores as follows: Excellent =70-100, Good = 55-69, Fair = 43-54, Poor = 30-42 and Very Poor <30.

Table 2. Sampling locations in Wahoo Ditch, Ravenna area, 2009. Type of sampling included fish community (F), macroinvertebrate community (M), surface water (W), and sediment (S).

Stream/ River Mile	Type of Sampling	Latitude	Longitude	Landmark
2.6	F,M,W,S	41.1654	81.2546	Upstream White Rubber property, Oakwood Ave.
2.5	F,M,W,S	41.1664	81.2559	Adjacent White Rubber property
2.2	F,M,W,S	41.1688	81.2597	Downstream White Rubber property, adjacent S. Fairfield Road

Figure 1. Sampling locations in Wahoo Ditch, Ravenna area, 2009.



METHODS

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

Determining Use Attainment

Use attainment status is a term describing the degree to which environmental indicators are either above or below criteria specified by the Ohio Water Quality Standards (WQS; Ohio Administrative Code 3745-1). Assessing aquatic use attainment status involves a primary reliance on the Ohio EPA biological criteria (OAC 3745-1-07; Table 7-15). These are confined to ambient assessments and apply to rivers and streams outside of mixing zones. Numerical biological criteria are based on multimetric biological indices including the Index of Biotic Integrity (IBI) and modified Index of Well-Being (MIwb), indices measuring the response of the fish community, and the Invertebrate Community Index (ICI), which indicates the response of the macroinvertebrate community. Three attainment status results are possible at each sampling location - full, partial, or non-attainment. Full attainment means that all of the applicable indices meet the biocriteria. Partial attainment means that one or more of the applicable indices fails to meet the biocriteria. Non-attainment means that none of the applicable indices meet the biocriteria or one of the organism groups reflects poor or very poor performance. An aquatic life use attainment table (Table 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-attainment), the Qualitative Habitat Evaluation Index (QHEI), and a sampling location description. Biological results were compared to Modified Warmwater Habitat – Channel Modification (MWH-C) biocriteria. Wahoo Ditch is currently listed as MWH-C in the Ohio Water Quality Standards.

Stream Habitat Evaluation

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

Sediment and Surface Water Assessment

Fine grain sediment samples were collected in the upper four inches of bottom material at each biological location using decontaminated stainless steel scoops. Sediment samples were mixed in stainless steel pans (VOC sample jars were filled prior to mixing), transferred into glass jars with teflon lined lids, placed on ice (to maintain 4^{o}C) in a cooler, and shipped to an Ohio EPA contract lab. Sediment data are reported on a dry weight basis. Decontamination of sediment sampling equipment followed the procedures outlined in the Ohio EPA sediment sampling guidance manual (Ohio EPA 2001). Surface water samples were collected directly into appropriate containers, preserved and delivered to an Ohio EPA contract lab. Surface water samples were collected once from each location from the upper 12 inches of water. Collected water was preserved using appropriate methods, as outlined in Parts II and III of the Manual of Ohio EPA Surveillance Methods and Quality Assurance Practices (Ohio EPA 2008). Surface water samples were evaluated using comparisons to Ohio Water Quality Standards criteria, reference conditions, or published literature. Sediment evaluations were conducted using guidelines established in MacDonald *et al.* (2000), and *Ecological Screening Levels (ESLs)* (USEPA 2003). Duplicate surface water and sediment samples were collected at RM 2.5.

Macroinvertebrate Community Assessment

Macroinvertebrates were collected from the natural habitats at the Wahoo Ditch sites. This qualitative multi-habitat 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, and margin). Detailed discussion of macroinvertebrate field and laboratory procedures is contained in Biological Criteria for the Protection of Aquatic Life: Volume III, Standardized Biological Field Sampling and Laboratory Methods for Assessing Fish and Macroinvertebrate Communities (Ohio EPA 1989a, 2008b).

Fish Community Assessment

Fish were sampled once at each Wahoo Ditch site using pulsed DC wading electrofishing methods. Each fish sampling zone was 120 meters long. Fish were processed in the field, and included identifying each individual to species, counting fish, and recording any external abnormalities. Discussion of the fish community assessment methodology used in this report is contained in Biological Criteria for the Protection of Aquatic Life: Volume III, Standardized Biological Field Sampling and Laboratory Methods for Assessing Fish and Macroinvertebrate Communities (Ohio EPA 1989a, 2008b).

RESULTS

Surface Water

Chemical analyses were conducted on surface water samples collected on August 25, 2009 from three locations in Wahoo Ditch (Table 3, Appendix Table 1). Surface water samples were analyzed for volatile organic compounds, semivolatile organic compounds, and total petroleum hydrocarbons (diesel range organics, and gasoline range organics). Parameters which were in exceedence of Ohio Water Quality Standards (WQS) criteria are reported in Table 3.

Nearly all of the chemical parameters measured in Wahoo Ditch were reported as less than the Practical Quantitation Limit (PQL). Two volatile organic compounds – vinyl chloride and cis-1,2-dichloroethene – were detected both upstream and adjacent to the White Rubber property. All concentrations of these two parameters were below Ohio WQS criteria. Nutrients, ammonia-N, dissolved oxygen and bacteriological parameters were not tested as part of this evaluation. Excluding the typical wastewater chemical parameters noted above, good chemical water quality was evident in all ditch samples.

Table 3. Exceedences of Ohio Water Quality Standards criteria (OAC3745-1) for chemical/physical parameters measured in Wahoo Ditch, 2009.

River Mile	Parameter (value – ug/l)
RM 2.6	None
RM 2.5	None
RM 2.2	None

Sediment

Surficial sediment samples were collected at three locations in Wahoo Ditch by the Ohio EPA on August 25, 2009. Sampling locations were co-located with biological sampling sites. Samples were analyzed for volatile organic compounds, semivolatile organic compounds, and total petroleum hydrocarbons. Specific chemical parameters tested and results are listed in Appendix Table 2. Sediment data were evaluated using the guidelines established in *Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems* (MacDonald *et.al*. 2000), and *Ecological Screening Levels (ESLs)* (USEPA 2003). The consensus-based sediment guidelines define two levels of ecotoxic effects. A *Threshold Effect Concentration* (TEC) is a level of sediment chemical quality below which harmful effects are unlikely to be observed. A *Probable Effect Concentration* (PEC) indicates a level above which harmful effects are likely to be observed. ESL values, considered protective benchmarks, were derived by USEPA, Region 5 using a variety of sources and methods.

Table 4. Chemical parameters measured above screening levels in sediment samples collected by Ohio EPA from surficial sediments in Wahoo Ditch, August, 2009. Contamination levels were determined for parameters using consensus-based sediment quality guidelines (MacDonald, et.al. 2000) and ecological screening levels (USEPA 2003). Shaded numbers indicate values above the following: Threshold Effect Concentration –TEC (yellow), Probable Effect Concentration – PEC (red) and Ecological Screening Levels (orange). Sampling locations are indicated by river mile (RM). Concentrations are ug/kg.

Parameter	RM 2.6	RM 2.5	RM 2.2
Benz(a)anthracene	570	1865	262
Benzo(a)pyrene	571	1815	291
Benzo(g,h,i)perylene	460	1550	291
Benzo(k)fluoranthene	319	930	166
Bis(2-Ethylhexyl)phthalate	2380	11,810	569
Chrysene	672	1565	281
Dibenz(a,h)anthracene	157	640	121
Fluoranthene	984	3175	482
Indeno(1,2,3-cd)pyrene	479	1680	332
Phenanthrene	503	1790	143
Pyrene	1380	3725	506
Total PAHs	7005	21,261	3354

Sediment samples were conservatively sampled by focusing on depositional areas of fine grain material (silts and clays). These areas typically are represented by higher contaminant levels, compared to coarse sands and gravels. Fine grained depositional areas were not predominant at the three sites. Chemical parameters measured above ecological screening guidelines are presented in Table 4. PAH compounds were recorded at elevated levels at all three sampling locations, with six specific PAH chemicals above PEC levels at the site adjacent to White Rubber. Total PAHs from all three sites were

above TEC concentrations. Elevated sediment contaminants were noted upstream, adjacent, and downstream from the White Rubber property; however, the highest levels were reported adjacent to the facility. A Phase I environmental assessment of the former White Rubber property conducted in 2006 (Gaiatech 2006) documented the highest total PAH levels (80,240 ug/kg) in Wahoo Ditch sediment at the location upgradient from the facility.

Stream Physical Habitat

Physical habitat was evaluated at each fish sampling location. Physical habitat was assessed using the Qualitative Habitat Evaluation Index (QHEI); scores are detailed in Table 5. All three Wahoo Ditch sites were in an area previously channel modified. Based on previous biological and habitat results conducted by Ohio EPA, Wahoo Ditch was designated as a Modified Warmwater Habitat stream. Fair habitat quality was documented at the upstream and adjacent sites (RMs 2.6 and 2.5), and good habitat was noted downstream at RM 2.2. Stream substrates were extensively embedded with sand at each location.

Table 5. Qualitative Habitat Evaluation Index (QHEI) scores and physical attributes for fish sampling sites in Wahoo Ditch, 2009.

			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**	**(MWH H.I.+1)/ (WWH+1) Ratio**	**(MWH M.I.+1)/ (WWH+1) Ratio**
River Mile	**QHEI**	**Habitat Rating**																																			
Wahoo Ditch Year: 2009																																					
2.6	**44.5**	Fair											0			◆	◆	◆	3	●				●				●	●	●		5	4.00	9.00
2.5	**46.0**	Fair		■			■						2			◆	◆	◆	3	●	●			●				●	●	●		6	1.33	3.33
2.2	**55.0**	Good		■		■	■	■			■		5			◆			1	●	●			●				●	●	●		6	0.33	1.33

Fish Community

A total of 444 fish representing 6 species were collected from Wahoo Ditch in July, 2009. Relative numbers and species collected per location are presented in Appendix Table 3 and IBI metrics are presented in Appendix Table 4. Sampling locations were evaluated using Modified Warmwater Habitat biocriteria. Both the upstream and downstream sites were marginally achieving the MWH biocriterion (Table 6). The site adjacent to the White Rubber property was not achieving the MWH biocriterion, although the score was only two points lower than the upstream site (22 vs. 24). Fish communities were reflective of poor quality. These sites, which are in the very upper end of Wahoo Ditch, were dominated by pollution and habitat tolerant fish. Pollution tolerant fish comprised 97 percent of the catch.

Table 6. Fish community summaries based on pulsed D.C. wading electrofishing sampling conducted by Ohio EPA in Wahoo Ditch, July, 2009. Relative numbers are per 0.3 km. The applicable aquatic life use designation is MWH.

Stream River Mile	Sampling Method	Species (Total)	Relative Number	QHEI	Index of Biotic Integrity	Narrative Evaluation
2.6	Headwater	3	62	44.5	24	Poor
2.5	Headwater	3	365	46.0	22*	Poor
2.2	Headwater	5	682	55.0	26	Poor

Ecoregion Biocriteria: Erie-Ontario Lake Plain (EOLP)		
INDEX - Site Type	MWH	WWH
IBI: Headwater	24	40

* Significant departure from ecoregion biocriterion; poor and very poor results are underlined.
ns Non-significant departure from ecoregion biocriterion (≤4 IBI units).

Macroinvertebrate Community

The macroinvertebrate communities from three sampling locations in Wahoo Ditch were sampled in 2009 using qualitative (natural substrate multi-habitat composite) sampling protocols. All three sampling locations had poor macroinvertebrate communities. The upstream sampling location was dominated by a very pollution tolerant midge, Chironomus riparius. The adjacent and downstream sampling locations also had Chironomus riparius although not as the predominant organism. Pollution impacts within Wahoo Ditch were evident in the high proportion of pollution tolerant organisms within the macroinvertebrate community. Marginal habitat conditions also contributed to the poor macroinvertebrate communities. The upstream and adjacent sampling locations were heavily embedded with sand as the predominant substrate. The downstream site, while still embedded, had cobble substrates that supported a limited caddisfly community. The poor condition of the macroinvertebrate community at the upstream sampling location prevented attributing impairment of the macroinvertebrate community at the adjacent and downstream sites to the White Rubber property. Results are summarized in Table 7. The raw data are attached as Appendix Tables 5.

Table 7. Summary of macroinvertebrate data collected from natural substrates (qualitative sampling) in Wahoo Ditch, 2009.

Stream/ River Mile	Qualitative Taxa	Qualitative EPT[a]	Evaluation
2.6	21	1	Poor*
2.5	28	1	Poor*
2.2	22	3	Poor*

Ecoregion Biocriteria: Erie-Ontario Lake Plain (EOLP)		
INDEX	MWH-C	WWH
ICI	22 (fair)	34 (good)

[a] EPT=total Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies) taxa richness, a measure of pollution sensitive organisms.
* Significant departure from ecoregion narrative biocriterion; poor and very poor results are underlined.

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APPENDICES – WAHOO DITCH, 2009

Appendix Table 1. Results of chemical surface water sampling conducted by Ohio EPA in Wahoo Ditch, August 25, 2009.

Stream	**Wahoo Ditch**	**Wahoo Ditch**	**Wahoo Ditch**	**Wahoo Ditch**
River Mile	**2.6**	**2.5**	**2.5 - Duplicate**	**2.2**
Date Sampled	8/25/2009	8/25/2009	8/25/2009	8/25/2009
Volatile Organic Analytes (ug/l)				
Dichlorodifluoromethane	<1.00	<1.00	<1.00	<1.00
Chloromethane	<1.00	<1.00	<1.00	<1.00
Vinyl chloride	14.5	19.6	18.8	<2.00
Bromomethane	<1.00	<1.00	<1.00	<1.00
Chloroethane	<1.00	<1.00	<1.00	<1.00
Trichlorofluoromethane	<2.00	<2.00	<2.00	<2.00
Acrolein	<10.0	<10.0	<10.0	<10.0
1,1-Dichloroethene	<1.00	<1.00	<1.00	<1.00
Acetone	<10.0	<10.0	<10.0	<10.0
Iodomethane	<1.00	<1.00	<1.00	<1.00
Carbon disulfide	<1.00	<1.00	<1.00	<1.00
Acetonitrile	<20.0	<20.0	<20.0	<20.0
Methylene chloride	<5.0	<5.0	<5.0	<5.0
Methyl tert-butyl ether	<2.00	<2.00	<2.00	<2.00
trans-1,2-Dichloroethene	<2.00	<2.00	<2.00	<2.00
Acrylonitrile	<10.0	<10.0	<10.0	<10.0
1,1-Dichloroethane	<1.00	<1.00	<1.00	<1.00
Vinyl acetate	<10.0	<10.0	<10.0	<10.0
cis-1,2-Dichloroethene	15	18.9	18.5	10.9
2-Butanone	<10.0	<10.0	<10.0	<10.0
Bromochloromethane	<1.00	<1.00	<1.00	<1.00
Tetrahydrofuran	<2.00	<2.00	<2.00	<2.00
Chloroform	<1.00	<1.00	<1.00	<1.00
1,1,1-Trichloroethane	<1.00	<1.00	<1.00	<1.00
Carbon tetrachloride	<1.00	<1.00	<1.00	<1.00
1,1-Dichloropropene	<1.00	<1.00	<1.00	<1.00
Benzene	<1.00	<1.00	<1.00	<1.00
1,2-Dichloroethane	<1.00	<1.00	<1.00	<1.00
Trichloroethene	<2.00	<2.00	<2.00	<2.00
1,2-Dichloropropane	<1.00	<1.00	<1.00	<1.00
Methyl Methacrylate	<20.0	<20.0	<20.0	<20.0
Dibromomethane	<1.00	<1.00	<1.00	<1.00
Bromodichloromethane	<1.00	<1.00	<1.00	<1.00
2-Chloroethyl vinyl ether	<10.0	<10.0	<10.0	<10.0
cis-1,3-Dichloropropene	<1.00	<1.00	<1.00	<1.00
4-Methyl-2-pentanone	<10.0	<10.0	<10.0	<10.0
Toluene	<2.00	<2.00	<2.00	<2.00
trans-1,3-Dichloropropene	<2.00	<2.00	<2.00	<2.00
1,1,2-Trichloroethane	<1.00	<1.00	<1.00	<1.00
Tetrachloroethene	<2.00	<2.00	<2.00	<2.00
1,3-Dichloropropane	<1.00	<1.00	<1.00	<1.00
2-Hexanone	<10.0	<10.0	<10.0	<10.0
Chlorodibromomethane	<1.00	<1.00	<1.00	<1.00
1,2-Dibromoethane	<1.00	<1.00	<1.00	<1.00
Chlorobenzene	<1.00	<1.00	<1.00	<1.00
Ethylbenzene	<1.00	<1.00	<1.00	<1.00

Appendix Table 1. Continued.

Stream	**Wahoo Ditch**	**Wahoo Ditch**	**Wahoo Ditch**	**Wahoo Ditch**
River Mile	**2.6**	**2.5**	**2.5 - Duplicate**	**2.2**
Date Sampled	8/25/2009	8/25/2009	8/25/2009	8/25/2009
Volatile Organic Analytes (ug/l)				
1,1,1,2-Tetrachloroethane	<1.00	<1.00	<1.00	<1.00
m-,p-Xylene	<2.00	<2.00	<2.00	<2.00
o-Xylene	<1.00	<1.00	<1.00	<1.00
Total xylenes	<3.00	<3.00	<3.00	<3.00
Styrene	<2.00	<2.00	<2.00	<2.00
Bromoform	<1.00	<1.00	<1.00	<1.00
Isopropylbenzene	<1.00	<1.00	<1.00	<1.00
trans-1,4-Dichloro-2-butene	<2.00	<2.00	<2.00	<2.00
1,1,2,2-Tetrachloroethane	<1.00	<1.00	<1.00	<1.00
Bromobenzene	<1.00	<1.00	<1.00	<1.00
n-Propylbenzene	<2.00	<2.00	<2.00	<2.00
1,2,3-Trichloropropane	<1.00	<1.00	<1.00	<1.00
2-Chlorotoluene	<1.00	<1.00	<1.00	<1.00
1,3,5-Trimethylbenzene	<1.00	<1.00	<1.00	<1.00
4-Chlorotoluene	<1.00	<1.00	<1.00	<1.00
tert-Butylbenzene	<2.00	<2.00	<2.00	<2.00
1,2,4-Trimethylbenzene	<1.00	<1.00	<1.00	<1.00
sec-Butylbenzene	<2.00	<2.00	<2.00	<2.00
4-Isopropyltoluene	<1.00	<1.00	<1.00	<1.00
1,3-Dichlorobenzene	<1.00	<1.00	<1.00	<1.00
1,4-Dichlorobenzene	<1.00	<1.00	<1.00	<1.00
n-Butylbenzene	<2.00	<2.00	<2.00	<2.00
1,2-Dichlorobenzene	<1.00	<1.00	<1.00	<1.00
1,2-Dibromo-3-chloropropane	<5.00	<5.00	<5.00	<5.00
1,2,4-Trichlorobenzene	<1.00	<1.00	<1.00	<1.00
Hexachlorobutadiene	<1.00	<1.00	<1.00	<1.00
Naphthalene	<10.0	<10.0	<10.0	<10.0
1,2,3-Trichlorobenzene	<1.00	<1.00	<1.00	<1.00
2,2-Dichloropropane	<1.00	<1.00	<1.00	<1.00
cis-1,4-Dichloro-2-butene	<2.00	<2.00	<2.00	<2.00
1,2,4,5-Tetrachlorobenzene	<10.0	<10.0	<10.0	<10.0
1,2,4-Trichlorobenzene	<10.0	<10.0	<10.0	<10.0
1,2-Dichlorobenzene	<10.0	<10.0	<10.0	<10.0
1,3-Dichlorobenzene	<10.0	<10.0	<10.0	<10.0
1,4-Dichlorobenzene	<10.0	<10.0	<10.0	<10.0
1,4-Dioxane	<10.0	<10.0	<10.0	<10.0
1-Chloronaphthalene	<10.0	<10.0	<10.0	<10.0
1-Naphthylamine	<10.0	<10.0	<10.0	<10.0
2,3,4,6-Tetrachlorophenol	<10.0	<10.0	<10.0	<10.0
2,4,5-Trichlorophenol	<10.0	<10.0	<10.0	<10.0
2,4,6-Trichlorophenol	<10.0	<10.0	<10.0	<10.0
2,4-Dichlorophenol	<10.0	<10.0	<10.0	<10.0
2,4-Dimethylphenol	<10.0	<10.0	<10.0	<10.0
2,4-Dinitrophenol	<25.0	<25.0	<25.0	<25.0
2,4-Dinitrotoluene	<10.0	<10.0	<10.0	<10.0
2,6-Dichlorophenol	<10.0	<10.0	<10.0	<10.0
2,6-Dinitrotoluene	<10.0	<10.0	<10.0	<10.0
2-Chloronaphthalene	<10.0	<10.0	<10.0	<10.0
2-Chlorophenol	<10.0	<10.0	<10.0	<10.0

Appendix Table 1. Continued.

Stream	**Wahoo Ditch**	**Wahoo Ditch**	**Wahoo Ditch**	**Wahoo Ditch**
River Mile	**2.6**	**2.5**	**2.5 - Duplicate**	**2.2**
Date Sampled	8/25/2009	8/25/2009	8/25/2009	8/25/2009
Semi-volatile Organic Analytes (ug/l)				
2-Methylnaphthalene	<10.0	<10.0	<10.0	<10.0
2-Methylphenol	<10.0	<10.0	<10.0	<10.0
2-Naphthylamine	<10.0	<10.0	<10.0	<10.0
2-Nitroaniline	<10.0	<10.0	<10.0	<10.0
2-Nitrophenol	<10.0	<10.0	<10.0	<10.0
2-Picoline	<10.0	<10.0	<10.0	<10.0
3&4-Methylphenol	<10.0	<10.0	<10.0	<10.0
3,3'-Dichlorobenzidine	<10.0	<10.0	<10.0	<10.0
3-Methylcholanthrene	<10.0	<10.0	<10.0	<10.0
3-Nitroaniline	<10.0	<10.0	<10.0	<10.0
4,6-Dinitro-2-methylphenol	<25.0	<25.0	<25.0	<25.0
4-Aminobiphenyl	<10.0	<10.0	<10.0	<10.0
4-Bromophenyl-phenylether	<10.0	<10.0	<10.0	<10.0
4-Chloro-3-methylphenol	<10.0	<10.0	<10.0	<10.0
4-Chloroaniline	<10.0	<10.0	<10.0	<10.0
4-Chlorophenyl-phenyl ether	<10.0	<10.0	<10.0	<10.0
4-Nitroaniline	<10.0	<10.0	<10.0	<10.0
4-Nitrophenol	<10.0	<10.0	<10.0	<10.0
7,12-Dimethylbenz(a)anthracene	<10.0	<10.0	<10.0	<10.0
Acenaphthene	<10.0	<10.0	<10.0	<10.0
Acenaphthylene	<10.0	<10.0	<10.0	<10.0
Acetophenone	<10.0	<10.0	<10.0	<10.0
Aniline	<10.0	<10.0	<10.0	<10.0
Anthracene	<10.0	<10.0	<10.0	<10.0
Azobenzene	<10.0	<10.0	<10.0	<10.0
Benz(a)anthracene	<10.0	<10.0	<10.0	<10.0
Benzidine	<10.0	<10.0	<10.0	<10.0
Benzo(a)pyrene	<10.0	<10.0	<10.0	<10.0
Benzo(b)fluoranthene	<10.0	<10.0	<10.0	<10.0
Benzo(g,h,i)perylene	<10.0	<10.0	<10.0	<10.0
Benzo(k)fluoranthene	<10.0	<10.0	<10.0	<10.0
Benzoic acid	<10.0	<10.0	<10.0	<10.0
Benzyl alcohol	<10.0	<10.0	<10.0	<10.0
bis(2-Chloroethoxy)methane	<10.0	<10.0	<10.0	<10.0
bis-(2-Chloroethyl) ether	<10.0	<10.0	<10.0	<10.0
bis(2-Chloroisopropyl) ether	<10.0	<10.0	<10.0	<10.0
bis(2-Ethylhexyl) phthalate	<10.0	<10.0	8.67J	<10.0
Butylbenzylphthalate	<10.0	<10.0	<10.0	<10.0
Chrysene	<10.0	<10.0	<10.0	<10.0
Di-N-butylphthalate	<10.0	<10.0	<10.0	<10.0
Di-n-octylphthalate	<10.0	<10.0	<10.0	<10.0
Dibenz(a,h)anthracene	<10.0	<10.0	<10.0	<10.0
Dibenz(a,j)acridine	<10.0	<10.0	<10.0	<10.0
Dibenzofuran	<10.0	<10.0	<10.0	<10.0
Diethylphthalate	<10.0	<10.0	<10.0	<10.0
Dimethylphthalate	<10.0	<10.0	<10.0	<10.0
Dimethylamine	<10.0	<10.0	<10.0	<10.0
Diphenylamine	<10.0	<10.0	<10.0	<10.0

Appendix Table 1. Continued.

Stream	**Wahoo Ditch**	**Wahoo Ditch**	**Wahoo Ditch**	**Wahoo Ditch**
River Mile	**2.6**	**2.5**	**2.5 - Duplicate**	**2.2**
Date Sampled	8/25/2009	8/25/2009	8/25/2009	8/25/2009
Semi-volatile Organic Analytes (ug/l)				
Ethyl methanesulfonate	<10.0	<10.0	<10.0	<10.0
Fluoranthene	<10.0	<10.0	<10.0	<10.0
Fluorene	<10.0	<10.0	<10.0	<10.0
Hexachlorobenzene	<10.0	<10.0	<10.0	<10.0
Hexachlorobutadiene	<10.0	<10.0	<10.0	<10.0
Hexachlorocyclopentadiene	<10.0	<10.0	<10.0	<10.0
Hexachloroethane	<10.0	<10.0	<10.0	<10.0
Indeno(1,2,3-cd)pyrene	<10.0	<10.0	<10.0	<10.0
Isophorone	<10.0	<10.0	<10.0	<10.0
Methyl methanesulfonate	<10.0	<10.0	<10.0	<10.0
N-Nitroso-di-n-butylamine	<10.0	<10.0	<10.0	<10.0
N-Nitrosodi-n-propylamine	<10.0	<10.0	<10.0	<10.0
N-Nitrosodimethylamine	<10.0	<10.0	<10.0	<10.0
N-Nitrosodiphenylamine	<10.0	<10.0	<10.0	<10.0
N-Nitrospiperidine	<10.0	<10.0	<10.0	<10.0
Naphthalene	<10.0	<10.0	<10.0	<10.0
Nitrobenzene	<10.0	<10.0	<10.0	<10.0
p-dimethylamino Azobenzene	<10.0	<10.0	<10.0	<10.0
Pentachlorobenzene	<10.0	<10.0	<10.0	<10.0
Pentachloronitrobenzene	<10.0	<10.0	<10.0	<10.0
Pentachlorophenol	<10.0	<10.0	<10.0	<10.0
Phenacetin	<10.0	<10.0	<10.0	<10.0
Phenanthrene	<10.0	<10.0	<10.0	<10.0
Phenol	<10.0	<10.0	<10.0	<10.0
Pronamide	<10.0	<10.0	<10.0	<10.0
Pyrene	<10.0	<10.0	<10.0	<10.0
Pyridine	<10.0	<10.0	<10.0	<10.0
Total Cresol	<10.0	<10.0	<10.0	<10.0
Other Parameters				
Diesel Range Organics - mg/l	0.045	<0.500	<0.500	0.087
Gasoline Range Organics - ug/l	15.7	24.9	18.6	33.1

J - The analyte was positively identified, but the quantitation was below the reporting limit.

Appendix Table 2. Results of sediment sampling conducted by Ohio EPA in Wahoo Ditch, August 25, 2009.

Stream	**Wahoo Ditch**	**Wahoo Ditch**	**Wahoo Ditch**	**Wahoo Ditch**
River Mile	**2.6**	**2.5**	**2.5 - Duplicate**	**2.2**
Date Sampled	8/25/2009	8/25/2009	8/25/2009	8/25/2009
Volatile Organic Analytes (ug/kg)				
Dichlorodifluoromethane	<5.0	<5.0	<5.0	<5.0
Chloromethane	<5.0	<5.0	<5.0	<5.0
Vinyl chloride	<5.0	<5.0	<5.0	<5.0
Bromomethane	<5.0	<5.0	<5.0	<5.0
Chloroethane	<5.0	<5.0	<5.0	<5.0
Acrolein	<10.0	<10.0	<10.0	<10.0
Trichlorofluoromethane	<5.0	<5.0	<5.0	<5.0
1,1-Dichloroethene	<5.0	<5.0	<5.0	<5.0
Acetone	<5.0	<5.0	<5.0	<5.0
Iodomethane	<5.0	<5.0	<5.0	<5.0
Carbon disulfide	<5.0	<5.0	<5.0	<5.0
Methylene chloride	<5.0	6.84B	7.95B	<5.0
Methyl tert-butyl ether	<10.0	<10.0	20.1	<10.0
trans-1,2-Dichloroethene	<5.0	<5.0	<5.0	<5.0
Acrylonitrile	<25.0	<25.0	<25.0	<25.0
1,1-Dichloroethane	<5.0	<5.0	<5.0	<5.0
Vinyl acetate	<5.0	<5.0	<5.0	<5.0
2,2-Dichloropropane	<5.0	<5.0	<5.0	<5.0
cis-1,2-Dichloroethene	<5.0	5.49	11.9	<5.0
2-Butanone	<5.0	<5.0	<5.0	<5.0
Bromochloromethane	<5.0	<5.0	<5.0	<5.0
Chloroform	<5.0	<5.0	<5.0	<5.0
1,1,1-Trichloroethane	<5.0	<5.0	<5.0	<5.0
Carbon tetrachloride	<5.0	<5.0	<5.0	<5.0
1,1-Dichloropropene	<5.0	<5.0	<5.0	<5.0
Benzene	<5.0	<5.0	<5.0	<5.0
1,2-Dichloroethane	<5.0	<5.0	<5.0	<5.0
Trichloroethene	<5.0	<5.0	<5.0	<5.0
1,2-Dichloropropane	<5.0	<5.0	<5.0	<5.0
Dibromomethane	<5.0	<5.0	<5.0	<5.0
Bromodichloromethane	<5.0	<5.0	<5.0	<5.0
2-Chloroethyl vinyl ether	<5.0	<5.0	<5.0	<5.0
cis-1,3-Dichloropropene	<5.0	<5.0	<5.0	<5.0
4-Methyl-2-pentanone	<5.0	<5.0	<5.0	<5.0
Toluene	<5.0	<5.0	<5.0	<5.0
trans-1,3-Dichloropropene	<5.0	<5.0	<5.0	<5.0
1,1,2-Trichloroethane	<5.0	<5.0	<5.0	<5.0
Tetrachloroethene	<5.0	<5.0	<5.0	<5.0
1,3-Dichloropropane	<5.0	<5.0	<5.0	<5.0
2-Hexanone	<5.0	<5.0	<5.0	<5.0
Chlorodibromomethane	<5.0	<5.0	<5.0	<5.0
1,2-Dibromoethane	<5.0	<5.0	<5.0	<5.0
Chlorobenzene	<5.0	<5.0	<5.0	<5.0
Ethylbenzene	<5.0	<5.0	<5.0	<5.0
1,1,1,2-Tetrachloroethane	<5.0	<5.0	<5.0	<5.0

Appendix Table 2. Continued.

Stream	**Wahoo Ditch**	**Wahoo Ditch**	**Wahoo Ditch**	**Wahoo Ditch**
River Mile	**2.6**	**2.5**	**2.5 - Duplicate**	**2.2**
Date Sampled	8/25/2009	8/25/2009	8/25/2009	8/25/2009
Volatile Organic Analytes (ug/kg)				
m-,p-Xylene	<10.0	<10.0	<10.0	<10.0
o-Xylene	<5.0	<5.0	<5.0	<5.0
Styrene	<5.0	<5.0	<5.0	<5.0
Bromoform	<5.0	<5.0	<5.0	<5.0
Isopropylbenzene	<5.0	<5.0	<5.0	<5.0
trans-1,4-Dichloro-2-butene	<5.0	<5.0	<5.0	<5.0
Bromobenzene	<5.0	<5.0	<5.0	<5.0
1,1,2,2-Tetrachloroethane	<5.0	<5.0	<5.0	<5.0
n-Propylbenzene	<5.0	<5.0	<5.0	<5.0
1,2,3-Trichloropropane	<5.0	<5.0	<5.0	<5.0
2-Chlorotoluene	<5.0	<5.0	<5.0	<5.0
1,3,5-Trimethylbenzene	<5.0	<5.0	<5.0	<5.0
4-Chlorotoluene	<5.0	<5.0	<5.0	<5.0
tert-Butylbenzene	<5.0	<5.0	<5.0	<5.0
1,2,4-Trimethylbenzene	<5.0	<5.0	<5.0	<5.0
sec-Butylbenzene	<5.0	<5.0	<5.0	<5.0
4-Isopropyltoluene	<5.0	<5.0	<5.0	<5.0
1,3-Dichlorobenzene	<5.0	<5.0	<5.0	<5.0
1,4-Dichlorobenzene	<5.0	<5.0	<5.0	<5.0
n-Butylbenzene	<5.0	<5.0	<5.0	<5.0
1,2-Dichlorobenzene	<5.0	<5.0	<5.0	<5.0
1,2-Dibromo-3-chloropropane	<5.0	<5.0	<5.0	<5.0
1,2,4-Trichlorobenzene	<5.0	<5.0	<5.0	<5.0
Hexachlorobutadiene	<5.0	<5.0	<5.0	<5.0
Naphthalene	<5.0	<5.0	<5.0	<5.0
1,2,3-Trichlorobenzene	<5.0	<5.0	<5.0	<5.0
Xylenes, Total	<15.0	<15.0	<15.0	<15.0
Semi-volatile Organic Analytes (ug/kg)				
1,2,4,5-Tetrachlorobenzene	<250	<500	<500	<250
1,2,4-Trichlorobenzene	<250	<250	<250	<250
1,2-Dichlorobenzene	<250	<500	<500	<250
1,3-Dichlorobenzene	<250	<250	<250	<250
1,4-Dichlorobenzene	<250	<250	<250	<250
1-Chloronaphthalene	<250	<500	<500	<250
1-Naphthylamine	<250	<500	<500	<250
2,3,4,6-Tetrachlorophenol	<250	<500	<500	<250
2,4,5-Trichlorophenol	<250	<500	<500	<250
2,4,6-Trichlorophenol	<250	<500	<500	<250
2,4-Dichlorophenol	<250	<500	<500	<250
2,4-Dimethylphenol	<250	<500	<500	<250
2,4-Dinitrophenol	<250	<750	<750	<250
2,4-Dinitrotoluene	<250	<500	<500	<250
2,6-Dichlorophenol	<250	<500	<500	<250
2,6-Dinitrotoluene	<250	<500	<500	<250
2-Chloronaphthalene	<250	<500	<500	<250

Appendix Table 2. Continued.

Stream	**Wahoo Ditch**	**Wahoo Ditch**	**Wahoo Ditch**	**Wahoo Ditch**
River Mile	**2.6**	**2.5**	**2.5 - Duplicate**	**2.2**
Date Sampled	8/25/2009	8/25/2009	8/25/2009	8/25/2009
Semi-volatile Organic Analytes (ug/kg)				
2-Chlorophenol	<250	<500	<500	<250
2-Methylnaphthalene	<250	<250	<250	<250
2-Methylphenol	<250	<500	<500	<250
2-Naphthylamine	<250	<500	<500	<250
2-Nitroaniline	<250	<500	<500	<250
2-Nitrophenol	<250	<500	<500	<250
2-Picoline	<250	<250	<250	<250
3&4-Methylphenol	<250	<500	<500	<250
3,3'-Dichlorobenzidine	<250	<500	<500	<250
3-Methylcholanthrene	<250	<500	<500	<250
3-Nitroaniline	<250	<500	<500	<250
4,6-Dinitro-2-methylphenol	<250	<500	<500	<250
4-Aminobiphenyl	<250	<500	<500	<250
4-Bromophenyl-phenylether	<250	<500	<500	<250
4-Chloro-3-methylphenol	<250	<500	<500	<250
4-Chloroaniline	<250	<500	<500	<250
4-Chlorophenyl-phenyl ether	<250	<500	<500	<250
4-Nitroaniline	<250	<500	<500	<250
4-Nitrophenol	<250	<500	<500	<250
7,12-Dimethylbenz(a)anthracene	<250	<500	<500	<250
Acenaphthene	<250	<500	<500	<250
Acenaphthylene	<250	<500	<500	<250
Acetophenone	<250	<500	<500	<250
Aniline	<250	<500	<500	<250
Anthracene	<250	<500	<500	<250
Azobenzene	<250	<500	<500	<250
Benz(a)anthracene	570	2010	1720	262
Benzidine	<250	<250	<250	<250
Benzo(a)pyrene	571	1980	1650	291
Benzo(b)fluoranthene	910	2790	2260	479
Benzo(g,h,i)perylene	460	1710	1390	291
Benzo(k)fluoranthene	319	1030	831	166J
Benzoic acid	<250	<2500	<2500	<250
Benzyl alcohol	<250	<500	<500	<250
bis(2-Chloroethoxy)methane	<250	<500	<500	<250
bis-(2-Chloroethyl) ether	<250	<250	<250	<250
bis(2-Chloroisopropyl) ether	<250	<250	<250	<250
bis(2-Ethylhexyl) phthalate	2370	14,400	9220	569
Butylbenzylphthalate	<250	<500	<500	<250
Chrysene	672	1720	1410	281
Di-N-butylphthalate	<250	<750	<750	<250
Di-n-octylphthalate	<250	<500	<500	<250
Dibenz(a,h)anthracene	157J	650	631	121J
Dibenz(a,j)acridine	<250	<500	<500	<250
Dibenzofuran	<250	<500	<500	<250

Appendix Table 2. Continued.

Stream	**Wahoo Ditch**	**Wahoo Ditch**	**Wahoo Ditch**	**Wahoo Ditch**
River Mile	**2.6**	**2.5**	**2.5 - Duplicate**	**2.2**
Date Sampled	8/25/2009	8/25/2009	8/25/2009	8/25/2009
Semi-volatile Organic Analytes (ug/kg)				
Diethylphthalate	<250	<500	<500	<250
Dimethylphthalate	<250	<500	<500	<250
Dimethylamine	<250	<250	<250	<250
Diphenylamine	<250	<500	<500	<250
Ethyl methanesulfonate	<250	<500	<500	<250
Fluoranthene	984	3270	3080	482
Fluorene	<250	<500	<500	<250
Hexachlorobenzene	<250	<500	<500	<250
Hexachlorobutadiene	<250	<500	<500	<250
Hexachlorocyclopentadiene	<250	<500	<500	<250
Hexachloroethane	<250	<500	<500	<250
Indeno(1,2,3-cd)pyrene	479	1860	1500	332
Isophorone	<250	<250	<250	<250
Methyl methanesulfonate	<250	<500	<500	<250
N-Nitroso-di-n-butylamine	<250	<250	<250	<250
N-Nitrosodi-n-propylamine	<250	<500	<500	<250
N-Nitrosodimethylamine	<250	<250	<250	<250
N-Nitrosodiphenylamine	<250	<500	<500	<250
N-Nitrospiperidine	<250	<250	<250	<250
Naphthalene	<250	<500	<500	<250
Nitrobenzene	<250	<500	<500	<250
p-dimethylamino Azobenzene	<250	<500	<500	<250
Pentachlorobenzene	<250	<500	<500	<250
Pentachloronitrobenzene	<250	<500	<500	<250
Pentachlorophenol	<250	<500	<500	<250
Phenacetin	<250	<500	<500	<250
Phenanthrene	503	1860	1720	143J
Phenol	<250	<750	<750	<250
Pronamide	<250	<500	<500	<250
Pyrene	1380	4010	3440	506
Pyridine	<250	<250	<250	<250
Other Parameters				
Diesel Range Organics - mg/kg	14.2	51.0	39.8	10.9
Gasoline Range Organics - mg/kg	<0.10	<0.10	0.262	<0.10

B- Analyte detected in the associated Method Blank.

J - The analyte was positively identified, but the quantitation was below the reporting limit.

Fish Species List

River Code: **19-042**	Stream: **Wahoo Ditch**	Sample Date: **2009**
River Mile: **2.60**	Location: upstream from White Rubber	Date Range: 07/14/2009
Time Fished: 1532 sec	Drainage: 1.7 sq mi	
Dist Fished: 0.12 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
Creek Chub	N	G	N	T	16	40.00	64.00			
Green Sunfish	S	I	C	T	5	12.50	20.00			
Brook Stickleback		I	C		4	10.00	16.00			
Mile Total					25	62.50				
Number of Species					3					
Number of Hybrids					0					

Fish Species List

River Code: **19-042**	Stream: **Wahoo Ditch**	Sample Date: **2009**
River Mile: **2.50**	Location: adjacent to White Rubber	Date Range: 07/14/2009
Time Fished: 1355 sec	Drainage: 1.7 sq mi	
Dist Fished: 0.12 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	7	17.50	4.79			
Creek Chub	N	G	N	T	129	322.50	88.36			
Brook Stickleback		I	C		10	25.00	6.85			
Mile Total					146	365.00				
Number of Species					3					
Number of Hybrids					0					

Fish Species List

River Code: **19-042**	Stream: **Wahoo Ditch**	Sample Date: **2009**
River Mile: **2.20**	Location: adjacent to trailer park	Date Range: 07/14/2009
Time Fished: 1411 sec	Drainage: 1.8 sq mi	
Dist Fished: 0.12 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	4	10.00	1.47			
Western Blacknose Dace	N	G	S	T	44	110.00	16.12			
Creek Chub	N	G	N	T	218	545.00	79.85			
Fathead Minnow	N	O	C	T	1	2.50	0.37			
Green Sunfish	S	I	C	T	6	15.00	2.20			
Mile Total					273	682.50				
Number of Species					5					
Number of Hybrids					0					

Appendix Table 4. Index of Biotic Integrity (IBI) scores and metrics for samples collected from Wahoo Ditch, 2009.

River Mile	Type	Date	Drainage area (sq mi)	Number of: Total species	Minnow species	Headwater species	Sensitive species	Darter & Sculpin species	Simple Lithophils	Percent of Individuals: Tolerant fishes	Omni-vores	Pioneering fishes	Insect-ivores	DELT anomalies	Rel.No. minus tolerants /(0.3km)	IBI
Wahoo Ditch - (19-042)																
Year: 2009																
2.60	E	07/14/2009	1.7	3(1)	1(1)	1(1)	0(1)	0(1)	0(1)	84(1)	0(5)	84(1)	36(5)	0.0(5)	10(1) *	24
2.50	E	07/14/2009	1.7	3(1)	2(1)	2(3)	0(1)	0(1)	1(1)	93(1)	0(5)	88(1)	7(1)	0.0(5)	25(1)	22
2.20	E	07/14/2009	1.8	5(3)	3(3)	1(1)	0(1)	0(1)	2(3)	100(1)	2(5)	82(1)	2(1)	0.0(5)	0(1)	26

♦ - IBI is low end adjusted.

* - < 200 Total individuals in sample

** - < 50 Total individuals in sample

● - One or more species excluded from IBI calculation.

Ohio EPA/DSW Ecological Assessment Section
Macroinvertebrate Collection

Site: Wahoo Ditch
upstream from White Rubber

Collection Date: 07/14/2009 River Code: 19-042 RM: 2.60

Taxa Code	Taxa	Quant/Qual
03600	*Oligochaeta*	+
04664	*Helobdella stagnalis*	+
04820	*Haemopis septagon*	+
07820	*Cambarus (Cambarus) sp A*	+
11120	*Baetis flavistriga*	+
23618	*Aeshna umbrosa*	+
64600	*Rhantus sp*	+
67800	*Tropisternus sp*	+
74100	*Simulium sp*	+
77500	*Conchapelopia sp*	+
78401	*Natarsia species A (sensu Roback, 1978)*	+
78655	*Procladius (Holotanypus) sp*	+
78702	*Psectrotanypus dyari*	+
80430	*Cricotopus (C.) tremulus group*	+
80510	*Cricotopus (Isocladius) sylvestris group*	+
82770	*Chironomus (C.) riparius group*	+
84210	*Paratendipes albimanus or P. duplicatus*	+
84470	*Polypedilum (P.) illinoense*	+
89704	*Limnophora aequifrons*	+
95100	*Physella sp*	+
96264	*Planorbella (Pierosoma) pilsbryi*	+

Taxa Code	Taxa	Quant/Qual

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

Ohio EPA/DSW Ecological Assessment Section
Macroinvertebrate Collection

Site: Wahoo Ditch
adjacent to White Rubber

Collection Date: 07/15/2009 River Code: 19-042 RM: 2.50

Taxa Code	Taxa	Quant/Qual	Taxa Code	Taxa	Quant/Qual
03600	*Oligochaeta*	+			
04664	*Helobdella stagnalis*	+			
04935	*Erpobdella punctata punctata*	+			
04960	*Mooreobdella sp*	+			
06201	*Hyalella azteca*	+			
07820	*Cambarus (Cambarus) sp A*	+			
11120	*Baetis flavistriga*	+			
21604	*Archilestes grandis*	+			
23618	*Aeshna umbrosa*	+			
28955	*Plathemis lydia*	+			
44300	*Pelocoris sp*	+			
45300	*Sigara sp*	+			
63600	*Hygrotus sp*	+			
67700	*Paracymus sp*	+			
67800	*Tropisternus sp*	+			
71900	*Tipula sp*	+			
74100	*Simulium sp*	+			
77250	*Alotanypus venustus*	+			
77500	*Conchapelopia sp*	+			
78401	*Natarsia species A (sensu Roback, 1978)*	+			
78500	*Paramerina fragilis*	+			
80420	*Cricotopus (C.) bicinctus*	+			
80430	*Cricotopus (C.) tremulus group*	+			
80510	*Cricotopus (Isocladius) sylvestris group*	+			
82770	*Chironomus (C.) riparius group*	+			
84470	*Polypedilum (P.) illinoense*	+			
89704	*Limnophora aequifrons*	+			
95100	*Physella sp*	+			

No. Quantitative Taxa: 0 Total Taxa: 28
No. Qualitative Taxa: 28 ICI:
Number of Organisms: 0 Qual EPT: 1

Ohio EPA/DSW Ecological Assessment Section
Macroinvertebrate Collection

Site: Wahoo Ditch
adjacent to trailer park

Collection Date: 07/14/2009 River Code: 19-042 RM: 2.20

Taxa Code	Taxa	Quant/Qual
03600	*Oligochaeta*	+
04901	*Erpobdellidae*	+
06201	*Hyalella azteca*	+
06700	*Crangonyx sp*	+
07820	*Cambarus (Cambarus) sp A*	+
11120	*Baetis flavistriga*	+
21604	*Archilestes grandis*	+
23600	*Aeshna sp*	+
23909	*Boyeria vinosa*	+
52200	*Cheumatopsyche sp*	+
52315	*Diplectrona modesta*	+
71900	*Tipula sp*	+
74100	*Simulium sp*	+
77250	*Alotanypus venustus*	+
77500	*Conchapelopia sp*	+
78401	*Natarsia species A (sensu Roback, 1978)*	+
78655	*Procladius (Holotanypus) sp*	+
80001	*Orthocladiinae*	+
82770	*Chironomus (C.) riparius group*	+
84750	*Stictochironomus sp*	+
85400	*Micropsectra sp*	+
95100	*Physella sp*	+

Taxa Code	Taxa	Quant/Qual

No. Quantitative Taxa: 0 Total Taxa: 22
No. Qualitative Taxa: 22 ICI:
Number of Organisms: 0 Qual EPT: 3