Biological and Water Quality Study of Rocky Fork Mohican River, Touby Run and Mansfield Foundry Wetland

Mansfield
2002

Richland County, Ohio

September 30, 2002

OEPA Report EAS/2002-9-6

prepared for

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Division of Emergency and Remedial Response
Northwest District Office

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TABLE OF CONTENTS

NOTICE TO USERS

Ohio EPA incorporated biological criteria into the Ohio Water Quality Standards (WQS; Ohio Administrative Code 3745-1) regulations in February 1990 (effective May 1990). These criteria consist of numeric values for the Index of Biotic Integrity (IBI) and Modified Index of Well-Being (MIwb), both of which are based on fish assemblage data, and the Invertebrate Community Index (ICI), which is based on macroinvertebrate assemblage data. Criteria for each index are specified for each of Ohio's five ecoregions (as described by Omernik 1987), and are further organized by organism group, index, site type, and aquatic life use designation. These criteria, along with the existing chemical and whole effluent toxicity evaluation methods and criteria, figure prominently in the monitoring and assessment of Ohio's surface water resources.

The following documents support the use of biological criteria by outlining the rationale for using biological information, the methods by which the biocriteria were derived and calculated, the field methods by which sampling must be conducted, and the process for evaluating results:

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

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

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

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

Ohio Environmental Protection Agency. 1990. The use of biological criteria in the Ohio EPA surface water monitoring and assessment program. Div. Water Qual. Plan. & Assess., Ecol. Assess. Sect., Columbus, Ohio.

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

Since the publication of the preceding guidance documents, the following new publications by the Ohio EPA have become available. These publications should also be consulted as they represent the latest information and analyses used by the Ohio EPA to implement the biological criteria.

DeShon, J.D. 1995. Development and application of the invertebrate community index (ICI), pp. 217-243. in W.S. Davis and T. Simon (eds.). Biological Assessment and Criteria: Tools for Risk-based Planning and Decision Making. Lewis Publishers, Boca Raton, FL.

Rankin, E. T. 1995. The use of habitat assessments in water resource management programs, pp. 181-208. in W. Davis and T. Simon (eds.). Biological Assessment and Criteria: Tools for Water Resource Planning and Decision Making. Lewis Publishers, Boca Raton, FL.

Yoder, C.O. and E.T. Rankin. 1995. Biological criteria program development and implementation in Ohio, pp. 109-144. in W. Davis and T. Simon (eds.). Biological Assessment and Criteria: Tools for Water Resource Planning and Decision Making. Lewis Publishers, Boca Raton, FL.

Yoder, C.O. and E.T. Rankin. 1995. Biological response signatures and the area of degradation value: new tools for interpreting multimetric data, pp. 263-286. in W. Davis and T. Simon (eds.). Biological Assessment and Criteria: Tools for Water Resource Planning and Decision Making. Lewis Publishers, Boca Raton, FL.

Yoder, C.O. 1995. Policy issues and management applications for biological criteria, pp. 327-344. in W. Davis and T. Simon (eds.). Biological Assessment and Criteria: Tools for Water Resource Planning and Decision Making. Lewis Publishers, Boca Raton, FL.

Yoder, C.O. and E.T. Rankin. 1995. The role of biological criteria in water quality monitoring, assessment, and regulation. Environmental Regulation in Ohio: How to Cope With the Regulatory Jungle. Inst. of Business Law, Santa Monica, CA. 54 pp.

These documents and this report may be obtained by writing to:

Ohio EPA, Division of Surface Water
Ecological Assessment Section
4675 Homer Ohio Lane
Groveport, Ohio 43125
(614) 836-8777

FOREWORD

What is a Biological and Water Quality Survey?

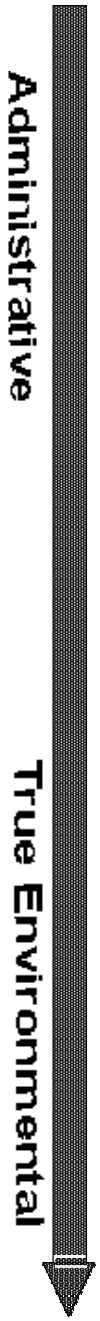
A biological and water quality survey, or "biosurvey", is an interdisciplinary monitoring effort coordinated on a waterbody specific or watershed scale. This effort may involve a relatively simple setting focusing on one or two small streams, one or two principal stressors, and a handful of sampling sites or a much more complex effort including entire drainage basins, multiple and overlapping stressors, and tens of sites. Each year Ohio EPA conducts biosurveys in 6-10 different study areas with an aggregate total of 350-400 sampling sites.

Ohio EPA employs biological, chemical, and physical monitoring and assessment techniques in biosurveys in order to meet three major objectives: 1) determine the extent to which use designations assigned in the Ohio Water Quality Standards (WQS) are either attained or not attained; 2) determine if use designations assigned to a given water body are appropriate and attainable; and 3) determine if any changes in key ambient biological, chemical, or physical indicators have taken place over time, particularly before and after the implementation of point source pollution controls or best management practices. The data gathered by a biosurvey is processed, evaluated, and synthesized in a biological and water quality report. Each biological and water quality study contains a summary of major findings and recommendations for revisions to WQS, future monitoring needs, or other actions which may be needed to resolve existing impairment of designated uses. While the principal focus of a biosurvey is on the status of aquatic life uses, the status of other uses such as recreation and water supply, as well as human health concerns, are also addressed.

The findings and conclusions of a biological and water quality study may factor into regulatory actions taken by Ohio EPA (*e.g.*, NPDES permits, Director's Orders, the Ohio Water Quality Standards [OAC 3745-1]), and are eventually incorporated into Water Quality Permit Support Documents (WQPSDs), State Water Quality Management Plans, the Ohio Nonpoint Source Assessment, and the Ohio Water Resource Inventory (305[b] report).

Hierarchy of Indicators

A carefully conceived ambient monitoring approach, using cost-effective indicators comprised of ecological, chemical, and toxicological measures, can ensure that all relevant pollution sources are judged objectively on the basis of environmental results. Ohio EPA relies on a tiered approach in attempting to link the results of administrative activities with true environmental measures. This integrated approach is outlined in Figure 1 and includes a hierarchical continuum from administrative to true environmental indicators. The six "levels" of indicators include: 1) actions taken by regulatory agencies (permitting, enforcement, grants); 2) responses by the regulated community (treatment works, pollution prevention); 3) changes in discharged quantities (pollutant loadings); 4) changes in ambient conditions (water quality, habitat); 5) changes in uptake and/or assimilation (tissue contamination, biomarkers, wasteload allocation); and, 6) changes in health,



LEVEL 1	Actions by EPA and States	NPDES Permit Issuance Compliance/Enforcement Pretreatment Program Actual Funding CSO Requirements Storm Water Permits 319 NPS Projects 404/401 Certification Stream/Riparian Protection
LEVEL 2	Responses by the Regulated Communitiy	POTW Construction Local Limits Storm Water Controls BMPs for NPS Control Pollution Prevention Measures
LEVEL 3	Changes in Discharge Quantities	Point Source Loadings - Effluent & Influent Whole Effluent Toxicity (WET) NPDES Violations Toxic Release Inventory Spills & Other Releases Fish Kills
LEVEL 4	**Changes in Ambient Conditions**	**Water Column Chemistry** **Sediment Chemistry** **Habitat Quality** **Flow Regime**
LEVEL 5	**Changes in Uptake and/or Assimilation**	Assimilative Capacity - TMDL/WLA Biomarkers Tissue Contamination
LEVEL 6	Changes in Health and Ecology, or Other Effects	Biota (Biocriteria) Bacterial Contamination Target Assemblages (RT&E, Declining Species)

Figure 1. Hierarchy of administrative and environmental indicators which can be used for water quality management activities such as monitoring and assessment, reporting, and the evaluation of overall program effectiveness. This is patterned after a model developed by U.S. EPA (1995).

ecology, or other effects (ecological condition, pathogens). In this process the results of administrative activities (levels 1 and 2) can be linked to efforts to improve water quality (levels 3, 4, and 5) which should translate into the environmental "results" (level 6). Thus, the aggregate effect of billions of dollars spent on water pollution control since the early 1970s can now be determined with quantifiable measures of environmental condition.

Superimposed on this hierarchy is the concept of stressor, exposure, and response indicators. *Stressor* indicators generally include activities which have the potential to degrade the aquatic environment such as pollutant discharges (permitted and unpermitted), land use effects, and habitat modifications. *Exposure* indicators are those which measure the effects of stressors and can include whole effluent toxicity tests, tissue residues, and biomarkers, each of which provides evidence of biological exposure to a stressor or bioaccumulative agent. *Response* indicators are generally composite measures of the cumulative effects of stress and exposure and include the more direct measures of community and population response that are represented here by the biological indices which comprise Ohio's biological criteria. Other response indicators could include target assemblages, *i.e.*, rare, threatened, endangered, special status, and declining species or bacterial levels which serve as surrogates for the recreational uses. These indicators represent the essential technical elements for watershed-based management approaches. The key, however, is to use the different indicators *within* the roles which are most appropriate for each.

Describing the causes and sources associated with observed impairments revealed by the biological criteria and linking this with pollution sources involves an interpretation of multiple lines of evidence including water chemistry data, sediment data, habitat data, effluent data, biomonitoring results, land use data, and biological response signatures within the biological data itself. Thus the assignment of principal causes and sources of impairment represents the association of impairments (defined by response indicators) with stressor and exposure indicators. The principal reporting venue for this process on a watershed scale is a biological and water quality report. These reports then provide the foundation for aggregated assessments such as the Ohio Water Resource Inventory (305[b] report), the Ohio Nonpoint Source Assessment, and other technical bulletins.

Ohio Water Quality Standards: Designated Aquatic Life Uses

The Ohio Water Quality Standards (WQS; Ohio Administrative Code 3745-1) consist of designated uses and chemical, physical, and biological criteria designed to represent measurable properties of the environment that are consistent with the goals specified by each use designation. Use designations consist of two broad groups, aquatic life and non-aquatic life uses. In applications of the Ohio WQS to the management of water resource issues in Ohio's rivers and streams, the aquatic life use criteria frequently result in the most stringent protection and restoration requirements, hence their emphasis in biological and water quality reports. Also, an emphasis on protecting for aquatic life generally results in water quality suitable for all uses.

The five different aquatic life uses currently defined in the Ohio WQS are described as follows:

1) *Warmwater Habitat (WWH)* - this use designation defines the "typical" warmwater assemblage of aquatic organisms for Ohio rivers and streams; *this use represents the principal restoration target for the majority of water resource management efforts in Ohio.*
2) *Exceptional Warmwater Habitat (EWH)* - this use designation is reserved for waters which support "unusual and exceptional" assemblages of aquatic organisms which are characterized by a high diversity of species, particularly those which are highly intolerant and/or rare, threatened, endangered, or special status (*i.e.,* declining species); *this designation represents a protection goal for water resource management efforts dealing with Ohio's best water resources.*
3) *Coldwater Habitat (CWH)* - this use is intended for waters which support assemblages of cold water organisms and/or those which are stocked with salmonids with the intent of providing a put-and-take fishery on a year round basis which is further sanctioned by the Ohio DNR, Division of Wildlife; this use should not be confused with the Seasonal Salmonid Habitat (SSH) use which applies to the Lake Erie tributaries which support periodic "runs" of salmonids during the spring, summer, and/or fall.
4) *Modified Warmwater Habitat (MWH)* - this use applies to streams and rivers which have been subjected to extensive, maintained, and essentially permanent hydromodifications such that the biocriteria for the WWH use are not attainable *and where the activities have been sanctioned and permitted by state or federal law;* the representative aquatic assemblages are generally composed of species which are tolerant to low dissolved oxygen, silt, nutrient enrichment, and poor quality habitat.
5) *Limited Resource Water (LRW)* - this use applies to small streams (usually <3 mi.^{2} drainage area) and other water courses which have been irretrievably altered to the extent that no appreciable assemblage of aquatic life can be supported; such waterways generally include small streams in extensively urbanized areas, those which lie in watersheds with extensive drainage modifications, those which completely lack water on a recurring annual basis (*i.e.,* true ephemeral streams), or other irretrievably altered waterways.

Chemical, physical, and/or biological criteria are generally assigned to each use designation in accordance with the broad goals defined by each. As such the system of use designations employed in the Ohio WQS constitutes a "tiered" approach in that varying and graduated levels of protection are provided by each. This hierarchy is especially apparent for parameters such as dissolved oxygen, ammonia-nitrogen, temperature, and the biological criteria. For other parameters such as heavy metals, the technology to construct an equally graduated set of criteria has been lacking, thus the same water quality criteria may apply to two or three different use designations.

Ohio Water Quality Standards: Non-Aquatic Life Uses

In addition to assessing the appropriateness and status of aquatic life uses, each biological and water quality survey also addresses non-aquatic life uses such as recreation, water supply, and human health concerns as appropriate. The recreation uses most applicable to rivers and streams are the Primary Contact Recreation (PCR) and Secondary Contact Recreation (SCR) uses. The criterion for designating the PCR use is simply having a water depth of at least one meter over an area of at least 100 square feet or where canoeing is a feasible activity. If a water body is too small and shallow to meet either criterion the SCR use applies. The attainment status of PCR and SCR is determined using bacterial indicators (*e.g.*, fecal coliforms, *E. coli)* and the criteria for each are specified in the Ohio WQS.

Water supply uses include Public Water Supply (PWS), Agricultural Water Supply (AWS), and Industrial Water Supply (IWS). Public Water Supplies are simply defined as segments within 500 yards of a potable water supply or food processing industry intake. The Agricultural Water Supply (AWS) and Industrial Water Supply (IWS) use designations generally apply to all waters unless it can be clearly shown that they are not applicable. An example of this would be an urban area where livestock watering or pasturing does not take place, thus the AWS use would not apply. Chemical criteria are specified in the Ohio WQS for each use and attainment status is based primarily on chemical-specific indicators. Human health concerns are additionally addressed with fish tissue data, but any consumption advisories are issued by the Ohio Department of Health and are detailed in other documents.

ACKNOWLEDGMENTS

The following Ohio EPA staff are acknowledged for their contribution to this report:

Surface Water - Mike Gray
Sediment Quality - Mike Gray
Physical Habitat - David Altfater
Biological Assessment:
    Macroinvertebrate community - Mike Gray
    Fish community - David Altfater.
Data Management - Dennis Mishne
Report coordination - David Altfater
Reviewers - Jeff DeShon, Marc Smith

INTRODUCTION

Three properties included in the City of Mansfield's USEPA Brownfield Assessment Demonstration Pilot project are located adjacent to waterways. The former Ohio Brass property lies adjacent to Touby Run, near the confluence with the Rocky Fork Mohican River. The former Tenneco Automotive/Peabody Barnes facility is located adjacent to the Rocky Fork 0.5 miles upstream from the Touby Run confluence. The third property, Mansfield Foundry's former spent foundry sand disposal area, is located adjacent to a wetland and near the Rocky Fork/ Touby Run confluence.

Ohio EPA is providing assistance to Mansfield through a technical assistance grant provided by U.S. EPA to Ohio EPA. As part of this project, the Division of Surface Water evaluated surface water, sediment, and biological conditions in Rocky Fork Mohican River and Touby Run to assess the contribution of potential contaminants from the three above identified sites. In addition, water quality conditions were evaluated in a wetland located adjacent to Mansfield Foundry's spent foundry disposal area.

Specific objectives of this evaluation were to:

1) Establish biological conditions in the Rocky Fork Mohican River and Touby Run in the vicinity of three Mansfield brownfield sites by evaluating fish and macroinvertebrate communities,

2) Establish sediment biological toxicity conditions in the Mansfield Foundry wetland,

3) Evaluate surface water and sediment chemical quality in Rocky Fork, Touby Run, and the Mansfield Foundry wetland, and

4) Determine the aquatic life attainment status of Rocky Fork and Touby Run with regard to the Warmwater Habitat (WWH) aquatic life use designation codified in the Ohio Water Quality Standards.

SUMMARY

A total of 1.7 miles of the Rocky Fork Mohican River were assessed by the Ohio EPA in 2002. Based on the performance of the biological communities, 1.5 miles of Rocky Fork were in partial attainment of the Warmwater Habitat aquatic life use and 0.2 miles were in non-attainment of the WWH use (Table 1). The partial attainment was associated with fair fish communities, while the non-attainment was caused by poor fish results and a fair macroinvertebrate community. The urbanized condition of Rocky Fork within the study segment, reduced stream habitat features, and elevated sediment contaminants contributed to the impaired biological communities. These

conditions were not associated with chemical constituents from the Tenneco, Ohio Brass, and Mansfield Foundry sites. Of particular note was the high levels of chromium, copper, nickel, and PCBs in Rocky Fork sediments throughout the study segment, apparently originating upstream from the Tenneco site.

In 1998, Ohio EPA assessed the Rocky Fork at river mile (RM) 14.3, upstream from Longview Ave. The site was in non-attainment of the WWH use. The 2002 data for this site shows a modest improvement to partial attainment. The fish community was unchanged but the macroinvertebrate ICI score improved from 26 to 32, which corresponds to moving from non-attainment to near attainment of the aquatic life use (nonsignificant departure).

A total of 0.9 miles of Touby Run were assessed by the Ohio EPA in 2002. Based on the performance of the biological communities, the entire study segment of Touby Run was in full attainment of the Warmwater Habitat aquatic life use (Table 1). Based on biological, surface water, and sediment results, the Ohio Brass site was not impacting Touby Run or Rocky Fork.

Sampling during 2002 confirmed the appropriateness of the Warmwater Habitat aquatic life use designation for Rocky Fork and the lower one mile of Touby Run. Presently, both streams are listed as Warmwater Habitat in the Ohio Water Quality Standards (WQS).

Sediment bioassays, sediment chemistry, and surface water results suggest that the Mansfield Foundry wetland is not chemically impacted by the foundry sand disposal area. Sediment chemistry results for the background wetland located up gradient from the foundry wetland had metals concentrations similar to the foundry wetland but much higher PAHs, PCBs, and pesticides. Sediment bioassay results documented no significant difference between the two onsite wetland samples and the background wetland sample, as well as when compared to the laboratory control sample. Laboratory bioassay control samples met USEPA acceptability requirements for survival and growth. Several metal parameters in surface water samples collected during the second round of sampling from the Mansfield Foundry wetland and background wetland exceeded OhioWQS criteria (no criteria exceedances were recorded during the first round of water samples). These results are probably due to adverse sampling conditions. Water levels in the wetland were very low during the second round of sampling on August 12, 2002. It was not possible to collect water samples without disturbing the underlying sediment layer and introducing some sediment into the water sample. These conditions occurred in both the Mansfield Foundry wetland and the adjacent background wetland.

RECOMMENDATIONS

Status of Aquatic Life Uses

Rocky Fork Mohican River and Touby Run aquatic life use designations have been confirmed in previous Ohio EPA biological and water quality studies. This study verified those designations listed in Ohio Administrative Code 3745-1-24.

Status of Non-Aquatic Life Uses

Physical habitat characteristics observed in Touby Run during this study verified that the Primary Contact Recreation use is appropriate. Water at several locations in the lower 0.4 miles of stream were of sufficient depth (3 feet deep over a 100 square foot area) to support the Primary Contact Recreation use. Additionally, this study verified that the Primary Contact Recreation use is appropriate for Rocky Fork.

Table 1. Attainment status of the Warmwater Habitat aquatic life use for the Rocky Fork Mohican River and Touby Run based on biological sampling conducted during June and August, 2002.

RIVER MILE Fish/Invert.	IBI	MIwb	ICI	QHEI	Attainment Status	Site Location
Rocky Fork Mohican River	*Eastern Ontario Lake Plain (EOLP) - WWH Use Designation*					
14.3 / 14.3	33*	NA	32[ns]	60.5	PARTIAL	Upstream Longview Ave.
14.1 / 14.1	26*	NA	26*	55.0	NON	Adjacent Tenneco
14.0 / 14.0	29*	NA	30[ns]	64.0	PARTIAL	Dst. Tenneco, Ust. Mansfield Foundry
13.8 / 13.8	29*	NA	36	50.0	PARTIAL	Adjacent Mansfield Foundry, Ust. Touby Run
13.6 / 13.6	32*	8.0	32[ns]	75.0	PARTIAL	Dst. Touby Run
Touby Run	*Eastern Ontario Lake Plain (EOLP) - WWH Use Designation*					
0.4 / 0.4	40	NA	42	73.5	FULL	Ust. Ohio Brass
0.1 / 0.1	37[ns]	NA	42	55.5	FULL	Adj. Ohio Brass

Ecoregion Biocriteria: Erie Ontario Lake Plain (EOLP)

INDEX	WWH	EWH	MWH[a]
IBI-Headwater	40	50	24
IBI-Wading	38	50	24
MIwb - Wading	7.9	9.4	6.2
ICI	34	46	22

[a] Modified Warmwater Habitat for channel modified areas.

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

[ns] Nonsignificant departure from ecoregion biocriterion (≤4 IBI and ICI units, ≤0.5 MIwb units).

Table 2. Sampling locations in the Rocky Fork Mohican River, Touby Run, and Mansfield Foundry wetland, 2002. Type of sampling included fish community (F), macroinvertebrate community (M), sediment (S), surface water (W), and sediment bioassay (B).

Stream/ River Mile	Type of Sampling	Latitude	Longitude	Landmark
Rocky Fork Mohican River				
14.3/14.25	F,M,S,W	40.77717	82.51716	Upstream Longview Ave./ Upstream Tenneco
14.1/14.13	F,M,S,W	40.77598	82.51563	Between Longview Ave. and Main St./ Adj. Tenneco
14.0/14.04	F,M,S,W	40.77400	82.51427	Main St./ Dst. Tenneco - Ust. Mansfield Foundry
13.8/13.75	F,M,S,W	40.77182	82.51047	Ust. Touby Run - Adj. Mansfield Foundry
13.6/13.67	F,M,S,W	40.77151	82.50959	Dst. Touby Run - Ohio Brass
Touby Run				
0.4/0.37	F,M,S,W	40.76804	82.51592	Main St./ Ust. Ohio Brass
0.1/0.03	F,M,S,W	40.77118	82.51007	Near mouth/ Adj. Ohio Brass
Mansfield Foundry Wetland				
MF03	S,W,B	40.77707	82.50973	Background wetland near Longview Ave.
MF02	S,W,B	40.77339	82.51153	Southwest corner of wetland/ far-field influences
MF01/01A	S,W,B	40.77425	82.51060	50 meters from foundry sand edge

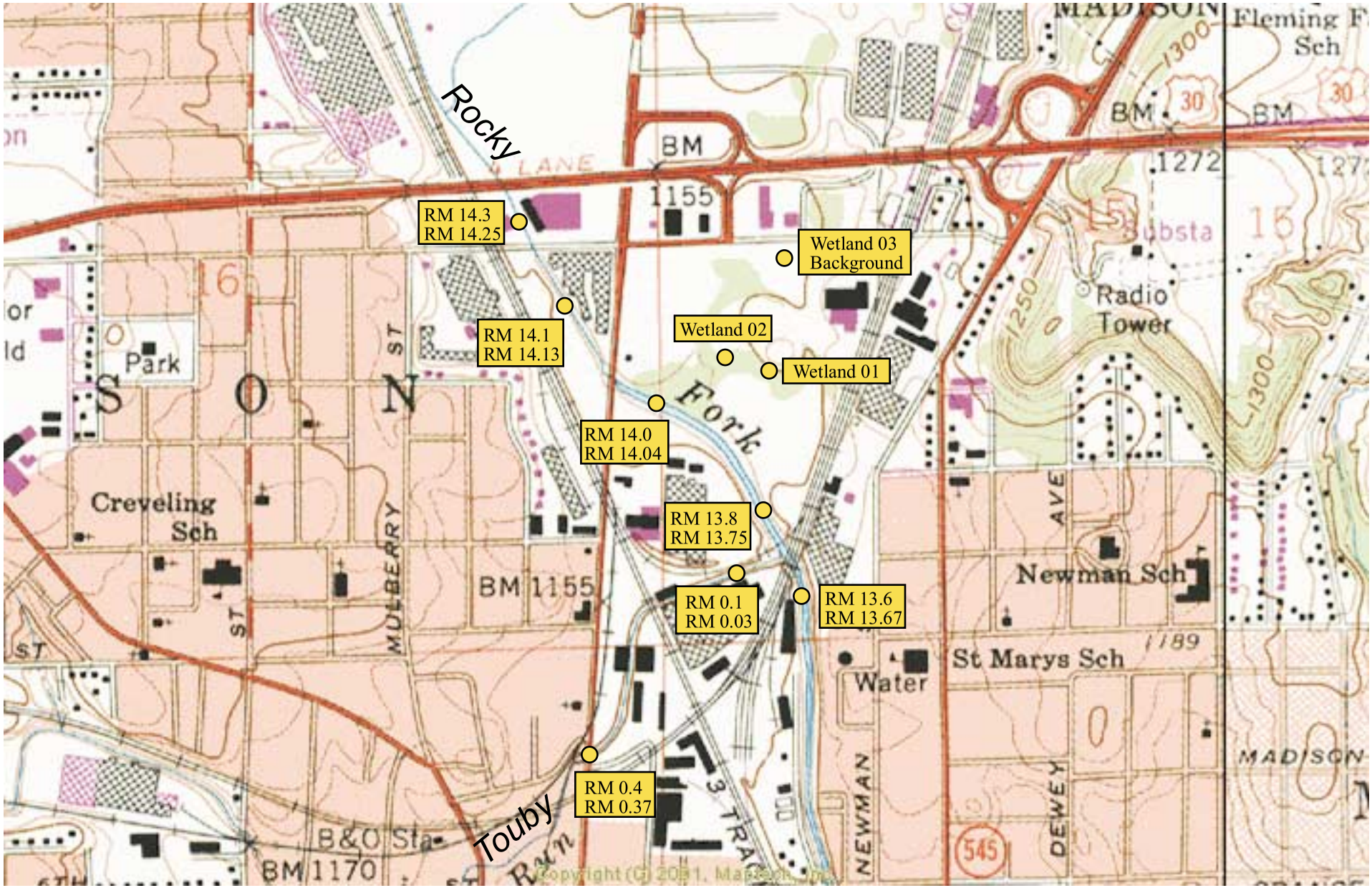


Figure 1. Map of Rocky Fork Mohican River, Touby Run, and Mansfield Foundry wetland study area showing sampling locations, 2002.

METHODS

All physical, chemical, 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), The Qualitative Habitat Evaluation Index (QHEI): Rationale, Methods, and Application (Rankin 1989, 1995) for aquatic habitat assessment, and the Ohio EPA Sediment Sampling Guide and Methodologies (Ohio EPA 2001). Sampling locations are listed in Table 2.

Determining Use Attainment Status

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 7-16). 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.

Habitat Assessment

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.

Sediment and Surface Water Assessment
Fine grain sediment samples were collected in the upper 4 inches of bottom material at each location using decontaminated stainless steel scoops. Decontamination of sediment sampling equipment followed the procedures outlined in the Ohio EPA sediment sampling guidance manual (Ohio EPA 2001). Sediment grab samples were homogenized in stainless steel pans (material for VOC analysis was not homogenized), transferred into glass jars with teflon lined lids, placed on ice (to maintain 4ºC) in a cooler, and shipped to an Ohio EPA contract lab. Sediment data is reported on a dry weight basis. Surface water samples were collected directly into appropriate containers, preserved and delivered to an Ohio EPA contract lab. 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.at.(2000) and USEPA Region 5 Ecological Data Quality Levels - EDQLs (1998).

Macroinvertebrate Community Assessment
Macroinvertebrates were collected from artificial substrates and from the natural habitats at all Rocky Fork and Touby Run sites. The artificial substrate collection provided quantitative data and consisted of a composite sample of five modified Hester-Dendy multiple-plate samplers colonized for six weeks. At the time of the artificial substrate collection, a qualitative multihabitat composite sample was also collected. This sampling effort consisted of an inventory of all observed macroinvertebrate taxa from the natural habitats at each site with no attempt to quantify populations other than notations on the predominance of specific taxa or taxa groups within major macrohabitat types (e.g., riffle, run, pool, margin). Detailed discussion of macroinvertebrate field and laboratory procedures is 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 1989b).

Fish Community Assessment
Fish were sampled twice at each site using pulsed DC electrofishing methods, with sampling distances at each site varying between 150 and 220 meters in length. Fish were processed in the field, and included identifying each individual to species, counting, weighing, 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 1989b).

Sediment Bioassay Assessment
Sediment material was collected at three wetland sites and used in sediment bioassays. Bioassay tests were conducted on two species, *Hyalella azteca*, and *Chironomum tentans*. Testing procedures followed those identified by USEPA (1994). Two sediment samples were collected from the Mansfield Foundry wetland and one sample was collected from an upgradient wetland adjacent to the Mansfield Foundry wetland.

Causal Associations

Using the results, conclusions, and recommendations of this report requires an understanding of the methodology used to determine the use attainment status and assigning probable causes and sources of impairment. The identification of impairment in rivers and streams is straightforward - the numerical biological criteria are used to judge aquatic life use attainment and impairment (partial and non-attainment). The rationale for using the biological criteria, within a weight of evidence framework, has been extensively discussed elsewhere (Karr *et al*. 1986; Karr 1991; Ohio EPA 1987a,b; Yoder 1989; Miner and Borton 1991; Yoder 1991; Yoder 1995). Describing the causes and sources associated with observed impairments relies on an interpretation of multiple lines of evidence including water chemistry data, sediment data, habitat data, effluent data, land use data, and biological results (Yoder and Rankin 1995). Thus the assignment of principal causes and sources of impairment in this report represent the association of impairments (based on response indicators) with stressor and exposure indicators. The reliability of the identification of probable causes and sources is increased where many such prior associations have been identified, or have been experimentally or statistically linked together. The ultimate measure of success in water resource management is the restoration of lost or damaged ecosystem attributes including aquatic community structure and function. While there have been criticisms of misapplying the metaphor of ecosystem "health" compared to human patient "health" (Suter 1993), in this document we are referring to the process for evaluating biological integrity and causes or sources associated with observed impairments, not whether human health and ecosystem health are analogous concepts.

RESULTS

Surface Water Quality

Chemical analyses were conducted on surface water samples collected on June 19, 2002 and August 12, 2002 from five locations in Rocky Fork, two locations in Touby Run, and three locations in the Mansfield Foundry wetland (Table 2, Appendix Tables 1-4). Surface water samples were analyzed for TAL metals, pesticides, PCBs, volatile organic compounds, and semivolatile organic compounds. Parameters which were in exceedence of Ohio WQS criteria are reported in Table 3.

For the five Rocky Fork sampling locations there were no exceedences of Ohio WQS criteria for any of the tested parameters. The only exceedence of WQS criteria from Touby Run was for bis(2-Ethylhexyl)phthalate at the mouth of Touby Run. The sample result of 25 ug/l exceeded the Outside Mixing Zone Average (OMZA) criterion of 8.4 ug/l.

Chemical analysis of the surface water samples collected from the Mansfield Foundry wetland on June 19, 2002**,** did not reveal any exceedences of Ohio WQS criteria. The second set of samples collected from the wetland on August 12, 2002, produced exceedences of the OMZA and OMZM criteria for a number of metals (Table 3). These results are probably due to adverse sampling conditions. Water levels in the wetland were very low on August 12, 2002. It was not possible to collect water samples without disturbing the underlying sediment layer and introducing some sediment into the water sample. Elevated metals levels were also recorded from the background wetland sample site on August 12, with results comparable to the Mansfield Foundry wetland.

Sediment Chemistry

Sediment samples were collected at five locations in the Rocky Fork Mohican River, two locations in Touby Run, and three locations at the Mansfield Foundry wetland area by the Ohio EPA on June 18 and 19, 2002. All stream sampling locations are indicated by river mile in Figure 2; wetland sample locations are noted by location number. Samples were analyzed for volatile and semivolatile organic compounds, pesticides, PCBs, total analyte list inorganics, percent solids, and total organic carbon. Specific chemical parameters tested and results are listed in Appendix Tables 5 and 6.

Sediment data were evaluated using guidelines established in *Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems* (MacDonald *et.al*. 2000), and USEPA Region 5, RCRA Appendix IX compounds - Ecological Data Quality Levels (EDQLs) (USEPA 1998). 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. Ecological data quality levels (EDQLs) are initial screening levels used by USEPA to evaluate RCRA site constituents. This tiered approach to evaluating sediment is consistent with OAC 3745-300-09.

Sediment collected from the most upstream location in Rocky Fork (RM 14.25 - upstream from the Tenneco property and Longview Ave.) exceeded the PEC and the TEC for a number of chemical parameters (Table 4). Of the tested parameters, chromium, copper, nickel, and PCBs exceeded

the PEC, while cadmium, lead, mercury, and zinc exceeded the TEC. Sediment from the Rocky Fork (RM 14.13 -adjacent to the Tenneco property) exceeded the PEC for chromium, copper, lead, nickel, phenanthrene, pyrene, chrysene, and PCBs. Exceeding the TEC at this site were cadmium, mercury, and zinc. The Rocky Fork (RM 14.04- at Main street and downstream Tenneco and upstream from the Mansfield Foundry) sediment sample did not exceed the PEC for any of the tested parameters, but did exceed the TEC for cadmium, chromium, copper, lead, nickel, zinc, phenanthrene, fluoranthene, pyrene, benzo(a)anthracene, chrysene, and benzo(a)pyrene. The Rocky Fork sediment sample collected at RM 13.75 (upstream from Touby Run and adjacent to the Mansfield Foundry) exceeded the PEC for copper, nickel, and PCBs and exceeded the TEC for cadmium, chromium, lead, and zinc. The Rocky Fork site downstream from Touby Run and Ohio Brass (RM 13.67) exceeded the PEC for chromium, copper, lead, nickel, zinc, fluoranthene, pyrene, and PCBs. Parameters exceeding the TEC from sediment at this site were cadmium, mercury, and 4,4'-DDT.

There are no clearly identifiable trends in the Rocky Fork sediment data. All of the sites, except RM 14.04, had metals concentrations which exceeded the PEC level for a number of compounds. PCB concentrations exceeded the PEC for all but the RM 14.04 site. The PCB concentrations at the RM 13.75 and 13.67 site exceeded the PEC by 15 to 18 times. It is not possible to attribute sediment contamination for any specific compound to any one of the brownfield assessment sites. The RM 14.25 site, upstream from the brownfield sites, had elevated concentrations of a variety of compounds similar to that observed downstream. The contamination of the Rocky Fork sediments in the study area may contribute to the impairment observed in the fish community.

The Touby Run sediment samples were collected at RM 0.37, upstream from Ohio Brass, and at RM 0.03, adjacent to the Ohio Brass facility. The upstream site exceeded the PEC for phenanthrene, fluoranthene, pyrene, benzo(a)anthracene, chrysene, and benzo(a)pyrene. The site adjacent to Ohio Brass had sample results that exceeded the PEC for phenanthrene, fluoranthene, and pyrene, while copper, lead, benzo(a)anthracene, chrysene, and benzo(a)pyrene exceeded the TEC. The sediment sampling results for the sites adjacent to and upstream from Ohio Brass are very similar. The relative lack of contamination by metals in the Touby Run sediments contrasts with the Rocky Fork results. The fish community in Touby Run attained the WWH use but did not in Rocky Fork where metals contamination of sediments was prevalent.

Three sediment samples were collected to assess the condition of the Mansfield Foundry wetland (Table 5). A site near the foundry sand disposal area, a site down gradient on the opposite side of the wetland, and a background sample from an upgradient wetland were sampled. The site adjacent to the foundry sand exceeded the TEC for arsenic, cadmium, chromium, copper, lead, nickel, zinc, and PCBs. The down gradient site exceeded the TEC for arsenic, cadmium, copper, lead, zinc, and PCBs, while the concentration of chromium and nickel exceeded the PEC. The background wetland exceeded the TEC for cadmium, chromium, copper, mercury, nickel, zinc, phenanthrene, benzo(a)anthracene, endrin, and 4,4'-DDT. Sediment concentrations of lead, fluoranthene, pyrene, chrysene, benzo(a)pyrene, and PCB’s exceeded the PEC. The concentration of metals and PCBs in the foundry wetland are at a level that may impact the biota. A number of metals and PCBs were above the TEC while chromium and nickel were above the PEC. The wetland chosen to define background conditions had metals, PAHs, pesticide, and PCB contamination.

Physical Habitat For Aquatic Life

Physical habitat was evaluated in the Rocky Fork Mohican River and Touby Run at each fish sampling location. Qualitative Habitat Evaluation Index (QHEI) scores are detailed in Table 6.

At four of the five sampling locations in the Rocky Fork, gravel and sand predominated the bottom substrates. The furthest downstream sampling location (RM 13.6) was largely represented by gravel and cobble substrates. Prior channel modification was evident at each location assessed, including a trapezoidal channel cross-section and extensive artificial bank stabilization. Instream channel development was fair to good, and surrounding land use was largely commmercial/industrial/urban. Four of the five sites were represented by pool, run, and riffle areas. One sampling location, RM 13.8, lacked riffle and run habitat, resulting in the lowest QHEI score in the Rocky Fork. Moderate silt cover and moderate embeddedness of the substrates were evident at all biological sampling locations. QHEI scores for the Rocky Fork ranged between 50.0 and 75.0. These scores are indicative of fair to good stream habitat.

Physical habitat was evaluated at two sites in Touby Run. The upstream location (RM 0.4) was represented by gravel and cobble substrates, pools over one meter deep, and good channel development. Habitat quality was reduced further downstream at RM 0.1, with substrates comprised primarily of sand and gravel, maximum pool depths of 50 cm, and fair channel development. Prior channel modification was evident at each location, including a trapezoidal channel cross-section and extensive artificial bank stabilization. QHEI scores for Touby Run were 73.5 at RM 0.4, and 55.5 at RM 0.1. These scores are indicative of good and fair stream habitat, respectively.

Fish Community Assessment

Fish communities were assessed at five locations in the Rocky Fork Mohican River and two sites in Touby Run (Figure 1, Table 7, Appendix Tables 5 and 6). Sampling locations were selected to assess contributions of contaminants from Tenneco, Mansfield Foundry, and Ohio Brass properties.

Fish communities ranged from marginally good to poor in Rocky Fork. A fair fish community was noted at the location sampled in Rocky Fork at RM 14.3 upstream from the Tenneco property (Table 7). The IBI score of 33 was in the fair range, but did not achieve the ecoregional biocriterion established for Warmwater Habitat (WWH) streams and rivers in Ohio (Table 1). A decline in the fish community of Rocky Fork was observed at RM 14.1, adjacent to the Tenneco property, with the IBI decreasing to 26 (poor range). However, reduced habitat diversity and the lack of a well-defined riffle, largely contributed to the decline in the fish community at RM 14.1. Sampling further downstream at RM 14.0 (downstream Tenneco, upstream Mansfield Foundry spent foundry disposal area) and RM 13.8 (adjacent Mansfield Foundry disposal area) indicated slightly improved conditions, with both sites having an IBI score of 29. These two sites were represented by fair fish communities; neither achieved the WWH biocriterion. The most downstream sampling location in Rocky Fork (RM 13.6 - downstream Ohio Brass and Mansfield Foundry) improved slightly from upstream locations, with an IBI score of 32 and an MIwb score of 8.0. Results from RM 13.6 reflected partial attainment of the fish community biocriteria. Fish community results from Rocky Fork suggest impairment associated with reduced habitat conditions

and urban runoff. Numerous storm sewers were located within the sampling locations.

Touby Run fish communities were in the marginally good to good range. Both sites sampled in Touby Run, RM 0.4 (upstream Ohio Brass) and RM 0.1 (adjacent Ohio Brass), achieved the WWH biocriterion. The upstream site was represented by an IBI score of 40, and RM 0.1 had an IBI score of 37. The slightly lower IBI score at RM 0.1 was largely associated with reduced habitat diversity compared with the upstream site.

Macroinvertebrate Community Assessment

The macroinvertebrate communities in five Rocky Fork and two Touby Run sites were sampled in 2002 using qualitative (multi-habitat composite) and quantitative (artificial substrate) sampling protocols. Results are summarized in Table 8. The ICI metrics with the associated scores for the Erie-Ontario Lake Plain ecoregion and the raw data are attached as Appendix Tables 7 and 8 .

The ICI scores for the five Rocky Fork sites ranged from 26 to 36 (fair to good), which spans non-attainment to attainment of the WWH use by the macroinvertebrate community. The site upstream from Touby Run (RM 13.8) and adjacent to the Mansfield Foundry had the highest ICI score in Rocky Fork and reflected attainment of the WWH use by the macroinvertebrate community. The lowest scoring site was adjacent to Tenneco (RM 14.1) and was in non-attainment of the WWH use. This was the only Rocky Fork site that did not have a riffle in the sampled segment. Riffles are an important habitat feature utilized by many macroinvertebrates, especially caddisflies and mayflies. This site scored low on both the number and percent of caddisflies in the quantitative sample as well as the number of qualitative EPT taxa. The low ICI score and resulting non-attainment of the WWH use for the RM 14.1 site is habitat related. The three Rocky Fork sites at RM 14.3, 14.0, and 13.6 had ICI scores of 30-32 which is a non-significant departure from attainment of the WWH criteria for macroinvertebrates. After accounting for habitat differences, the macroinvertebrate communities at the five Rocky Fork sampling locations did not differ significantly.

The Touby Run samples from RM 0.4 and 0.1 both had ICI scores of 42 and were in attainment of the WWH use for macroinvertebrates. The macroinvertebrate community results did not reveal any differences between the site upstream from Ohio Brass and the site adjacent to it.

Sediment Bioassays

Sediment samples were collected from two locations in the Mansfield Foundry wetland and one location in an upgradient wetland adjacent to the Mansfield Foundry wetland (Figure 1). These samples were collected and delivered to an Ohio EPA contract laboratory on July 12, 2002. Two different test organisms were used to evaluate sediment toxicity - *Chironomus tentans* and *Hyalella azteca*. Chironomus tests included evaluation of organism survival and growth, and Hyalella tests were conducted only on organism mortality. All tests were conducted for a 10-day period.

The results from the *Hyalella azteca* and *Chironomus tentans* 10-day sediment toxicity tests are listed in Table 9. The percent mortality of *C. tentans* in the MF01, MF02, and MF03 samples was

32.5, 0, and 6.25, respectively. *Chironomus tentans* survival in the three sediment samples were not significantly less than the lab control. The mean weights (growth) of *C. tentans* in the MF01, MF01, and MF03 sediment tests were 1.222, 1.205, and 1.358 mg, respectively. *Chironomus tentans* weights in the three test samples were not significantly less than the mean dry weight of 0.916 mg in the lab control sediment. *Hyalella azteca* percent mortalities were 1.25, 3.75, and 2.5 in the MF01, MF02, and MF03 sediment samples, respectively. Survival in the three wetland samples were not significantly less than in the lab control.

Table 3. Exceedences of Ohio Water Quality Standards criteria (OAC 3745-1) for chemical/physical parameters from the Rocky Fork, Touby Run, and the Mansfield Foundry wetland study area during 2002 (units are ug/l for metals and organics).

River Mile	Parameter (value)
Rocky Fork	
All sites	None
Touby Run	
0.37	None
0.03	bis(2-Ethylhexyl) phthalate (25*)
Mansfield Foundry Wetland	
MF01	None
MF02	Mercury (0.25+), Barium (306*), Cobalt (29.4*), Copper (270**), Lead (177*), Vanadium (91*), Zinc (696*)
MF03	Mercury (0.85+), Barium (579*), Cobalt (49.2*), Copper (583**), Nickel (422*), Lead (484*), Vanadium (169**), Zinc (1860**)

* Exceedence of Outside Mixing Zone Average criteria (OMZA).
** Exceedence of Outside Mixing Zone Maximum criteria (OMZM).
\+ Exceedence of Outside Mixing Zone Average criteria (OMZA)- Agricultural Use.

Table 4. Chemical parameters measured above screening levels in sediment samples collected by Ohio EPA from the Rocky Fork Mohican River and Touby Run, June, 2002. Contamination levels were determined for parameters using either consensus-based sediment quality guidelines (MacDonald et.al. 2000) or ecological data quality levels for RCRA appendix IX constituents (USEPA 1998).

Parameter	Rocky Fork RM 14.25	Rocky Fork RM 14.13	Rocky Fork RM 14.04	Rocky Fork RM 13.75	Rocky Fork RM 13.67	Touby Run RM 0.37	Touby Run RM 0.03
Cadmium (mg/kg)	2.48^{T}	2.59^{T}	1.2^{T}	1.64^{T}	2.09^{T}	0.503J	0.586J
Chromium (mg/kg)	3240^{P}	114^{P}	92.7^{T}	91^{T}	176^{P}	36.7	29
Copper (mg/kg)	285^{P}	295^{P}	49.9^{T}	218^{P}	216^{P}	21.1	40.6^{T}
Lead (mg/kg)	87.9^{T}	312^{P}	99.8^{T}	56.8^{T}	177^{P}	33.2	44.6^{T}
Mercury (mg/kg)	0.21J^{T}	0.32J^{T}	0.097J	0.080J	0.25J^{T}	0.055J	<0.35
Nickel (mg/kg)	143^{P}	84.7^{P}	47^{T}	123^{P}	94.5^{P}	10.8	10.5
Silver (mg/kg)	3.52J^{E}	1.50J^{E}	0.802J^{E}	<4.92	1.78J^{E}	0.891J^{E}	0.681J^{E}
Zinc (mg/kg)	393^{T}	253^{T}	213^{T}	282^{T}	632^{P}	108	109
Acetone (ug/kg)	480^{E}	480J^{E}	90J	150J	76J	<140	<140
4-Nitrophenol (ug/kg)	<21000	5000J^{E}	<2700	<21000	7100J^{E}	4500J^{E}	<5700
Phenanthrene (ug/kg)	<4200	2100J^{P}	300J^{T}	<4200	<3500	2400^{P}	1300^{P}
Fluoranthene (ug/kg)	<4200	<2700	630^{T}	<4200	2600J^{P}	4000^{P}	2500^{P}
Pyrene (ug/kg)	<4200	2400J^{P}	690^{T}	<4200	2500J^{P}	3600^{P}	2500^{P}
Benzo(a)anthracene (ug/kg)	<4200	<2700	280J^{T}	<4200	<3500	1500J^{P}	940J^{T}
Chrysene (ug/kg)	<4200	4800^{P}	400J^{T}	<4200	<3500	1900J^{P}	1200^{T}
bis(2-Ethylhexyl)phthalate (ug/kg)	2800J^{E}	<2700	420J^{E}	<4200	3000J^{E}	<2300	580J^{E}
Benzo(k)fluoranthene (ug/kg)	<4200	<2700	<550	<4200	<3500	<2300	880J^{E}
Benzo(a)pyrene (ug/kg)	<4200	<2700	320J^{T}	<4200	<3500	1500J^{P}	960J^{T}
PCB (aroclor 1242) (ug/kg)	640^{P}	1500^{P}	85	10,000^{P}	12,000^{P}	<23	67
PCB (aroclor 1254) (ug/kg)	230^{P}	610^{P}	74	<840	1400^{P}	23J	30
4,4'-DDT (ug/kg)	<85	<110	2.5J	<84	41J^{T}	<23	<23

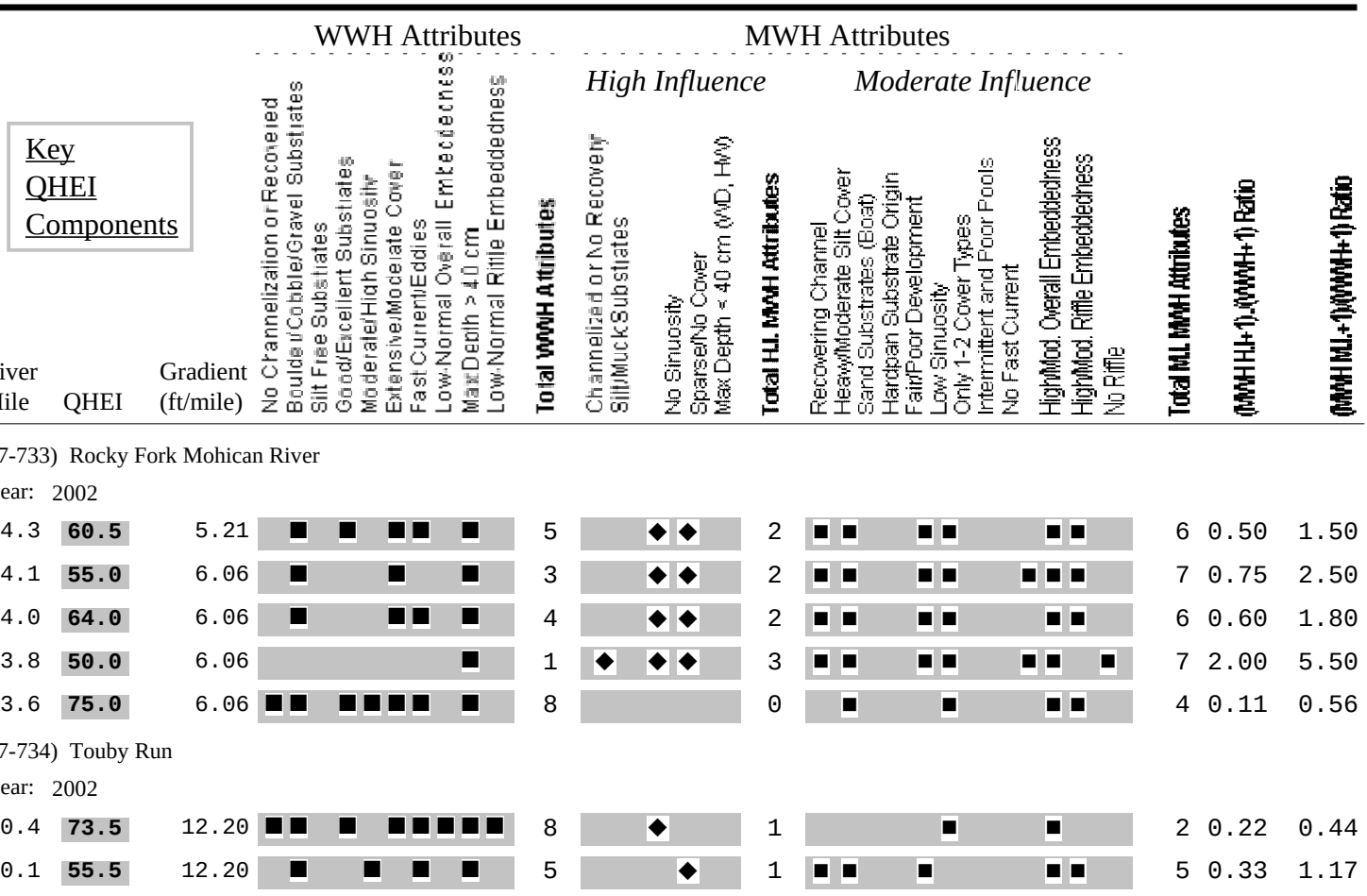
J - The analyte was positively identified, the quantitation is an estimation.
T - Threshold Effect Concentration (below which harmful effects are unlikely to occur; MacDonald *et.al.* 2000).
P- Probable Effect Concentration (above which harmful effects are likely to occur; MacDonald *et.al*. 2000).
E - Ecological Data Quality Level (USEPA 1998).

Table 5. Chemical parameters measured above screening levels in sediment samples collected by Ohio EPA from the Mansfield Foundry wetland, June, 2002. Contamination levels were determined for parameters using either consensus-based sediment quality guidelines (MacDonald et.al. 2000) or ecological data quality levels for RCRA appendix IX constituents (USEPA 1998). Sample 01A is a duplicate of sample 01.

Parameter	Mansfield Foundry Wetland 01	Mansfield Foundry Wetland 01A	Mansfield Foundry Wetland 02	Mansfield Foundry Wetland 03
Arsenic (mg/kg)	24[T]	22.8[T]	12[T]	5.37
Cadmium (mg/kg)	1.26J[T]	1.66J[T]	1.97J[T]	1.26J[T]
Chromium (mg/kg)	54.8[T]	74.9[T]	132[P]	49.5[T]
Copper (mg/kg)	99.7[T]	137[T]	85.2[T]	65.1[T]
Lead (mg/kg)	68[T]	63.3[T]	66.5[T]	139[P]
Mercury (mg/kg)	<1.5	<1.5	<1.1	0.35J[T]
Nickel (mg/kg)	35.3[T]	38.3[T]	58.1[P]	37[T]
Zinc (mg/kg)	170[T]	222[T]	333[T]	215[T]
Acetone (ug/kg)	450J	590J[E]	95J	99J
Phenanthrene (ug/kg)	<970	<990	<750	800J[T]
Fluoranthene (ug/kg)	<970	<990	<750	2700[P]
Pyrene (ug/kg)	<970	<990	<750	2700[P]
Benzo(a)anthracene (ug/kg)	<970	<990	<750	1000J[T]
Chrysene (ug/kg)	<970	<990	<750	2100[P]
Benzo(k)fluoranthene (ug/kg)	<970	<990	<750	1600[E]
Benzo(a)pyrene (ug/kg)	<970	<990	<750	1700[P]
Indeno(1,2,3-cd)pyrene (ug/kg)	<970	<990	<750	1100J[E]
Benzo(g,h,i)perylene (ug/kg)	<970	<990	<750	1300J[E]
PCB (aroclor 1242) (ug/kg)	<98	<99	250[T]	390[P]
PCB (aroclor 1254) (ug/kg)	96J[T]	77J[T]	94[T]	540[P]
Endrin (ug/kg)	<20	<20	<75	17J[T]
4,4'-DDT (ug/kg)	<20	<20	<75	26J[T]

J - The analyte was positively identified, the quantitation is an estimation.
T - Threshold Effect Concentration (below which harmful effects are unlikely to occur; MacDonald *et.al.* 2000).
P- Probable Effect Concentration (above which harmful effects are likely to occur; MacDonald *et.al*. 2000).
E - Ecological Data Quality Level (USEPA 1998).

Table 6. Rocky Fork Mohican River and Touby Run, 2002. Qualitative Habitat Evaluation Index scores and metrics.



River Mile	QHEI	Gradient (ft/mile)	Total WWH Attributes	Total H.I. MWH Attributes	Total M.I. MWH Attributes	(MWH H.I.+1)/(WWH+1) Ratio	(MWH M.I.+1)/(WWH+1) Ratio
(17-733) Rocky Fork Mohican River							
Year: 2002							
14.3	**60.5**	5.21	5	2	6	0.50	1.50
14.1	**55.0**	6.06	3	2	7	0.75	2.50
14.0	**64.0**	6.06	4	2	6	0.60	1.80
13.8	**50.0**	6.06	1	3	7	2.00	5.50
13.6	**75.0**	6.06	8	0	4	0.11	0.56
(17-734) Touby Run							
Year: 2002							
0.4	**73.5**	12.20	8	1	2	0.22	0.44
0.1	**55.5**	12.20	5	1	5	0.33	1.17

Table 7. Fish community summaries based on pulsed DC electrofishing sampling conducted by Ohio EPA in the Rocky Fork and Touby Run from June and August, 2002. Relative numbers and weight are per 0.3 km.

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
Rocky Fork (2002)								
14.3	18.0	21	1658	-	60.5	-	33*	Fair
14.1	16.5	19	872	-	55.0	-	26*	Poor
14.0	20.5	23	1360	-	64.0	-	29*	Fair
13.8	20.0	25	635	-	50.0	-	29*	Fair
13.6	17.5	20	1639	14.95	75.0	8.0	32*	Fair/M
Touby Run (2002)								
0.4	13.5	17	1341	-	73.5	-	40	Good
0.1	12.5	15	1553	-	55.5	-	37[ns]	Mar. Good

Ecoregion Biocriteria: Erie Ontario Lake Plain (EOLP)

INDEX	WWH	EWH	MWH[a]	
IBI-Headwater	40	50	24	
IBI-Wading	38	50	24	
MIwb - Wading	7.9	9.4	6.2	

[a] Modified Warmwater Habitat for channel modified areas.
C Significant departure from ecoregion biocriterion; poor and very poor results are underlined.
[ns] Nonsignificant departure from ecoregion biocriterion (≤4 IBI units, ≤0.5 MIwb units).

Table 8. Summary of macroinvertebrate data collected from artificial substrates (quantitative sampling) and natural substrates (qualitative sampling) in Rocky Fork and Touby Run during 2002.

River Mile	Density Number/ft^2	Total Taxa	Quantitative Taxa	Qualititative Taxa	Qualititative EPT[a]	ICI	Evaluation
			WWH Use Designation				
Rocky Fork							
14.3	356	41	29	28	6	32	Marginal Good
14.1	126	36	27	18	3	26	Fair
14.0	262	54	37	42	10	30	Marginal Good
13.8	197	41	35	14	3	36	Good
13.6	231	43	34	29	7	32	Marginal Good
			WWH Use Designation				
Touby Run							
0.4	211	50	41	30	6	42	Very Good
0.1	454	55	32	43	7	42	Very Good

Ecoregion Biocriteria: Erie Ontario Lake Plain (EOLP)
(Ohio Administrative Code 3745-1-07, Table 7-16

INDEX	**WWH**	**EWH**	**MWH**[b]
ICI	34	46	22

[a] EPT= total Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies) taxa richness, a measure of pollution sensitive organisms.
[b] Modified Warmwater Habitat for channel modified areas.
C Significant departure from ecoregional biocriterion; poor and very poor results are underlined.

Table 9. Results of Hyalella azteca and Chironomus tentans 10-day toxicity tests on three Mansfield Foundry sediment samples collected July 12, 2002.

Sample ID (Date Collected)	*Hyalella azteca* 10-Day Toxicity Test July 16-26, 2002 Mean Percent Mortality	*Chironomus tentans* 10-Day Toxicity Test July 16-26, 2002 Mean % Mortality	Mean Dry Weight (mg)
Lab Control Formulated Sediment	0	0	0.916
MF01	1.25	32.5	1.222
MF02	3.75	0	1.205
MF03	2.5	6.25	1.358

REFERENCES

DeShon, J.D. 1995. Development and application of Ohio EPA's invertebrate community index (ICI), *in* W.S. Davis and T. Simon (eds.). Biological assessment and criteria: tools for risk-based planning and decision making. CRC Press/Lewis Publishers, Ann Arbor.

Fausch, D.O., Karr, J.R. and P.R. Yant. 1984. Regional application of an index of biotic integrity based on stream fish communities. Trans. Amer. Fish. Soc. 113:39-55.

Karr, J. R. 1991**.** Biological integrity: A long-neglected aspect of water resource management. Ecological Applications 1(1): 66-84.

Karr, J.R., K.D. Fausch, P.L. Angermier, P.R. Yant, and I.J. Schlosser. 1986. Assessing biological integrity in running waters: a method and its rationale. Ill. Nat. Hist. Surv. Spec. Publ. 5. 28 pp.

MacDonald, D., C. Ingersoll, T. Berger. 2000. Development and evaluation of consensus-based sediment quality guidelines for freshwater ecosystems. Arch. Environ. Contam. Toxical.: Vol.39, 20-31.

Miner R. and D. Borton. 1991. Considerations in the development and implementation of biocriteria, Water Quality Standards for the 21st Century, U.S. EPA, Offc. Science and Technology, Washington, D.C., 115.

New York Department of Environmental Conservation. 1999. Technical guidance for screening contaminated sediments. Division of Fish, Wildlife and Marine Resources. 39 pp.

Ohio Environmental Protection Agency. 2000. Sediment sampling guide and methodologies, 2nd edition. Nov. 2001. Division of Surface Water, Columbus, Ohio.

___ 1987a. Biological criteria for the protection of aquatic life: Volume I. The role of biological data in water quality assessment. Division of Water Quality Monitoring and Assessment, Surface Water Section, Columbus, Ohio.

___ 1987b. Biological criteria for the protection of aquatic life: Volume II. Users manual for biological field assessment of Ohio surface waters. Division of Water Quality Monitoring and Assessment, Surface Water Section, Columbus, Ohio.

___ 1989a. Ohio EPA manual of surveillance methods and quaity assurance practices, updated edition. Division of Environmental Services, Columbus, Ohio.

___ 1989b. Addendum to biological criteria for the protection of aquatic life: Users manual for biological field assessment of Ohio surface waters. Division of Water Quality Planning and Assessment, Surface Water Section, Columbus, Ohio.

___ 1989c. Biological criteria for the protection of aquatic life: Volume III. Standardized biological field sampling and laboratory methods for assessing fish and macroinvertebrate communities. Division of Water Quality Planning and Assessment, Columbus, Ohio.

Omernik, J.M. 1987. Ecoregions of the conterminous United States. Ann. Assoc. Amer. Geogr. 77(1): 118-125.

Persaud, D., J. Jaagumagi, and A. Hayton. 1993. Guidelines for the protection and management of aquatic sediment quality in Ontario. Ontario Ministry of the Environment. Toronto. 24pp.

Rankin, E.T. 1995. The qualitative habitat evaluation index (QHEI), *in* W.S. Davis and T. Simon (eds.). Biological Assessment and Criteria: Tools for Risk-based Planning and Decision Making. CRC Press/Lewis Publishers, Ann Arbor. (in press).

Rankin, E.T. 1989. The qualitative habitat evaluation index (QHEI): rationale, methods, and application. Division of Water Quality Planning and Assessment, Columbus, Ohio.

Suter, G.W., II. 1993. A critique of ecosystem health concepts and indexes. Environmental Toxicology and Chemistry, 12: 1533-1539.

United States Environmental Protection Agency (1996). Ecotox thresholds. Office of Solid Waste and Emergency Response. EPA 540/F-95/038. January 1996.

United States Environmental Protection Agency (1998). Region 5, final technical approach for developing ecological data quality levels for RCRA Appendix IX constituents and other significant contaminants of ecological concern. April, 1998.

Whittier, T.R., D.P. Larsen, R.M. Hughes, C.M. Rohm, A.L. Gallant, and J.M. Omernik. 1987. The Ohio stream regionalization project: a compendium of results. EPA/600/3-87/025. 66 pp.

Yoder, C.O. 1989. The development and use of biological criteria for Ohio surface waters. U.S. EPA, Criteria and Standards Div., Water Quality Stds. 21st Century, 1989: 139-146.

Yoder, C. O. 1991**.** Answering some concerns about biological criteria based on experiences in Ohio, *in* G. H. Flock (ed.) Water quality standards for the 21st century. Proceedings of a National Conference, U. S. EPA, Office of Water, Washington, D.C.

Yoder, C.O. 1995. Policy issues and management applications of biological criteria, *in* W.S. Davis and T. Simon (eds.). Biological Assessment and Criteria: Tools for Risk-based Planning and Decision Making. CRC Press/Lewis Publishers, Ann Arbor.

Yoder, C.O. and E.T. Rankin. 1995. Biological response signatures and the area of degradation value: new tools for interpreting multi-metric data, *in* W.S. Davis and T. Simon (eds.). Biological Assessment and Criteria: Tools for Risk-based Planning and Decision Making. CRC Press/Lewis Publishers, Ann Arbor.

APPENDICES

Appendix Table 1. Results of chemical surface water sampling conducted by Ohio EPA in the Rocky Fork Mohican River and Touby Run study area on June 18 -19, 2002.

Stream	**Rocky Fork**	**Rocky Fork**	**Rocky Fork**	**Rocky Fork**	**Rocky Fork**	**Touby Run**	**Touby Run**
River Mile	**14.25**	**14.13**	**14.04**	**13.75**	**13.67**	**0.37**	**0.03**
Date Sampled	06/18/02	06/18/02	06/18/02	06/19/02	06/19/02	06/18/02	06/19/02
Time Sampled	04:00 PM	04:35 PM	11:35 AM	02:45 PM	02:30 PM	07:00 PM	03:10 PM
TAL Metals (ug/l)							
Mercury	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Aluminum	401	264	263	705	448	<100	<100
Silver	<10	<10	<10	<10	<10	<10	<10
Arsenic	2J	<4	<4	16	<4	<4	<4
Barium	47	47	47	5.8	48	46	45
Beryllium	<10	<10	<10	<10	<10	<10	<10
Calcium	62700	65100	66300	74000	67500	72500	71400
Cadmium	<10	<10	<10	<10	<10	<10	<10
Cobalt	<20	<20	<20	<20	<20	<20	<20
Chromium	4.9J	4.3J	2.8J	4J	3.6J	5.4J	2.5J
Copper	<20	<20	<20	<20	6.4J	8.9J	7.8J
Iron	907	759	729	1200	995	316	244
Potassium	3580	3470	3400	3550	3470	3380	3450
Magnesium	17700	18900	18800	19400	19200	19700	19600
Manganese	107	103	106	141	113	33	34
Sodium	27000	27400	27500	27700	32600	49500	47400
Nickel	<40	<40	<40	<40	<40	6.5J	<40
Lead	2.9J	2.5J	2.6J	3.6J	3.1J	<5	<5
Vanadium	<10	<10	<10	<10	<10	<10	<10
Zinc	7.7J	6.3J	5.9J	10.2J	9.3J	5.7J	5.1J
Antimony	5.6	5.6	5.1	5.5	4	<1	<1
Selenium	2	0.7J	<1.0	<1.0	<1.0	0.9J	0.8J
Thallium	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Volatile Organic Analytes (ug/l)							
Acetone	<100	<100	<100	<100	<100	<100	<100
Benzene	<5	<5	<5	<5	<5	<5	<5
Bromobenzene	<5	<5	<5	<5	<5	<5	<5
Bromochloromethane	<5	<5	<5	<5	<5	<5	<5
Bromodichloromethane	<5	<5	<5	<5	<5	<5	<5
Bromoform	<5	<5	<5	<5	<5	<5	<5
Bromomethane	<10	<10	<10	<10	<10	<10	<10
2-Butanone	<100	<100	<100	<100	<100	<100	<100
n-Butylbenzene	<5	<5	<5	<5	<5	<5	<5
sec-Butylbenzene	<5	<5	<5	<5	<5	<5	<5
tert-Butylbenzene	<5	<5	<5	<5	<5	<5	<5
Carbon disulfide	<5	<5	<5	<5	<5	<5	<5
Carbon tetrachloride	<5	<5	<5	<5	<5	<5	<5
Chlorobenzene	<5	<5	<5	<5	<5	<5	<5
Chlorodibromomethane	<5	<5	<5	<5	<5	<5	<5
Chloroethane	<10	<10	<10	<10	<10	<10	<10
2-Chloroethyl vinyl ether	<10	<10	<10	<10	<10	<10	<10
Chloroform	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0

Appendix Table 1. Continued.

Stream	**Rocky Fork**	**Rocky Fork**	**Rocky Fork**	**Rocky Fork**	**Rocky Fork**	**Touby Run**	**Touby Run**
River Mile	**14.25**	**14.13**	**14.04**	**13.75**	**13.67**	**0.37**	**0.03**
Date Sampled	06/18/02	06/18/02	06/18/02	06/19/02	06/19/02	06/18/02	06/19/02
Time Sampled	04:00 PM	04:35 PM	11:35 AM	02:45 PM	02:30 PM	07:00 PM	03:10 PM
Volatile Organic Analytes (ug/l)							
Chloromethane	<10	<10	<10	<10	<10	<10	<10
2-Chlorotoluene	<5	<5	<5	<5	<5	<5	<5
4-Chlorotoluene	<5	<5	<5	<5	<5	<5	<5
1,2-Dibromo-3-chloropropane	<5	<5	<5	<5	<5	<5	<5
1,2-Dibromoethane	<5	<5	<5	<5	<5	<5	<5
Dibromomethane	<5	<5	<5	<5	<5	<5	<5
1,2-Dichlorobenzene	<5	<5	<5	<5	<5	<5	<5
1,3-Dichlorobenzene	<5	<5	<5	<5	<5	<5	<5
1,4-Dichlorobenzene	<5	<5	<5	<5	<5	<5	<5
Dichlorodifluoromethane	<10	<10	<10	<10	<10	<10	<10
1,1-Dichloroethane	<5	<5	<5	<5	0.5J	<5	1.9J
1,2-Dichloroethane	<5	<5	<5	<5	<5	<5	<5
1,1-Dichloroethene	<5	<5	<5	<5	<5	<5	<5
cis-1,2-Dichloroethene	<5	1.1J	0.92J	0.8J	1.1J	1.3J	1.5J
trans-1,2-Dichloroethene	<5	<5	<5	<5	<5	<5	<5
1,2-Dichloropropane	<5	<5	<5	<5	<5	<5	<5
1,3-Dichloropropane	<5	<5	<5	<5	<5	<5	<5
2,2-Dichloropropane	<5	<5	<5	<5	<5	<5	<5
cis-1,3-Dichloropropene	<5	<5	<5	<5	<5	<5	<5
trans-1,3-Dichloropropene	<5	<5	<5	<5	<5	<5	<5
1,1-Dichloropropene	<5	<5	<5	<5	<5	<5	<5
Ethylbenzene	<5	<5	<5	<5	<5	<5	<5
n-Hexane	<10	<10	<10	<10	<10	<10	<10
2-Hexanone	<10	<10	<10	<10	<10	<10	<10
Hexachlorobutadiene	<5	<5	<5	<5	<5	<5	<5
Isopropylbenzene	<5	<5	<5	<5	<5	<5	<5
p-Isopropyltoluene	<5	<5	<5	<5	<5	<5	<5
4-Methyl-2-pentanone	<10	<10	<10	<10	<10	<10	<10
Methylene chloride	<5	<5	<5	<5	<5	<5	<5
Naphthalene	<10	<10	<10	<10	<10	<10	<10
n-Propylbenzene	<5	<5	<5	<5	<5	<5	<5
Styrene	<5	<5	<5	<5	<5	<5	<5
1,1,1,2-Tetrachloroethane	<5	<5	<5	<5	<5	<5	<5
1,1,2,2-Tetrachloroethane	<5	<5	<5	<5	<5	<5	<5
Tetrachloroethene	<5	<5	<5	<5	<5	<5	<5
Toluene	<5	<5	<5	<5	<5	<5	<5
1,2,3-Trichlorobenzene	<5	<5	<5	<5	<5	<5	<5
1,2,4-Trichlorobenzene	<5	<5	<5	<5	<5	<5	<5
1,1,1-Trichloroethane	<5	<5	<5	<5	<5	<5	0.79J
1,1,2-Trichloroethane	<5	<5	<5	<5	<5	<5	<5
Trichloroethene	<5	0.31J	<5	<5	0.27J	0.28J	<5
Trichlorofluoromethane	<10	<10	<10	<10	<10	<10	<10
1,2,3-Trichloropropane	<5	<5	<5	<5	<5	<5	<5
1,2,4-Trimethylbenzene	<5	<5	<5	<5	<5	<5	<5
1,3,5-Trimethylbenzene	<5	<5	<5	<5	<5	<5	<5

Appendix Table 1. Continued.

Stream	Rocky Fork	Rocky Fork	Rocky Fork	Rocky Fork	Rocky Fork	Touby Run	Touby Run
River Mile	**14.25**	**14.13**	**14.04**	**13.75**	**13.67**	**0.37**	**0.03**
Date Sampled	06/18/02	06/18/02	06/18/02	06/19/02	06/19/02	06/18/02	06/19/02
Time Sampled	04:00 PM	04:35 PM	11:35 AM	02:45 PM	02:30 PM	07:00 PM	03:10 PM
Volatile Organic Analytes (ug/l)							
Vinyl acetate	<10	<10	<10	<10	<10	<10	<10
Vinyl chloride	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
o-Xylene	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
m-,p-Xylene	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Semi-volatile Organic Analytes (ug/l)							
Phenol	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
bis-(2-Chloroethyl) ether	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
2-Chlorophenol	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,3-Dichlorobenzene	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,4-Dichlorobenzene	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Benzyl alcohol	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,2-Dichlorobenzene	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
2-Methylphenol	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
3-,4-Methylphenol	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
bis(2-Chloroisopropyl) ether	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
N-Nitroso-di-n-propylamine	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Hexachloroethane	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Nitrobenzene	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Isophorone	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
2-Nitrophenol	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
2,4-Dimethylphenol	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Benzoic acid	<25	<25	<25	<25	<25	<25	<25
bis(2-Chloroethoxy)methane	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
2,4-Dichlorophenol	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,2,4-Trichlorobenzene	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Naphthalene	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
4-Chloroaniline	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Hexachlorobutadiene	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
4-Chloro-3-methylphenol	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
2-Methylnaphthalene	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Hexachlorocyclopentadiene	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
2,4,6-Trichlorophenol	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
2,4,5-Trichlorophenol	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
2-Chloronaphthalene	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
2-Nitroaniline	<25	<25	<25	<25	<25	<25	<25
Dimethylphthalate	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Acenaphthylene	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
2,6-Dinitrotoluene	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
3-Nitroaniline	<25	<25	<25	<25	<25	<25	<25
Acenaphthene	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
2,4-Dinitrophenol	<25	<25	<25	<25	<25	<25	<25
4-Nitrophenol	9.9J	9.6J	9.5J	<25	9.5J	<25	9.6J
Dibenzofuran	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0

Appendix Table 1. Continued.

Stream	**Rocky Fork**	**Rocky Fork**	**Rocky Fork**	**Rocky Fork**	**Rocky Fork**	**Touby Run**	**Touby Run**
River Mile	**14.25**	**14.13**	**14.04**	**13.75**	**13.67**	**0.37**	**0.03**
Date Sampled	06/18/02	06/18/02	06/18/02	06/19/02	06/19/02	06/18/02	06/19/02
Time Sampled	04:00 PM	04:35 PM	11:35 AM	02:45 PM	02:30 PM	07:00 PM	03:10 PM
Semi-volatile Organic Analytes (ug/l)							
2,4-Dinitrotoluene	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Diethylphthalate	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
4-Chlorophenyl-phenyl ether	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Fluorene	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
4-Nitroaniline	<25	<25	<25	<25	<25	<25	<25
4,6-Dinitro-2-methylphenol	<25	<25	<25	<25	<25	<25	<25
N-Nitrosodiphenylamine	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
4-Bromophenyl-phenylether	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Hexachlorobenzene	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Pentachlorophenol	<25	<25	<25	<25	<25	<25	<25
Phenanthrene	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Anthracene	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Di-N-butylphthalate	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Fluoranthene	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Pyrene	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Butylbenzylphthalate	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
3,3'-Dichlorobenzidine	<10	<10	<10	<10	<10	<10	<10
Benzo(a)anthracene	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Chrysene	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
bis(2-Ethylhexyl) phthalate	3.2J	2.7J	4.2J	<5.0	<5.0	<5.0	25
Di-n-octylphthalate	<5.0	<5.0	3.2J	<5.0	<5.0	<5.0	27
Benzo(b)fluoranthene	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Benzo(k)fluoranthene	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Benzo(a)pyrene	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Indeno(1,2,3-cd)pyrene	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Dibenzo(a,h)anthracene	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Benzo(g,h,i)perylene	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
PCBs (ug/l)							
Aroclor 1016	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Aroclor 1221	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Aroclor 1232	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Aroclor 1242	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Aroclor 1248	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Aroclor 1254	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Aroclor 1260	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Pesticides (ug/l)							
alpha-BHC	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
beta-BHC	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
delta-BHC	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
gamma-BHC (Lindane)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

Appendix Table 1. Continued.

Stream	**Rocky Fork**	**Rocky Fork**	**Rocky Fork**	**Rocky Fork**	**Rocky Fork**	**Touby Run**	**Touby Run**
River Mile	**14.25**	**14.13**	**14.04**	**13.75**	**13.67**	**0.37**	**0.03**
Date Sampled	06/18/02	06/18/02	06/18/02	06/19/02	06/19/02	06/18/02	06/19/02
Time Sampled	04:00 PM	04:35 PM	11:35 AM	02:45 PM	02:30 PM	07:00 PM	03:10 PM
Pesticides (ug/l)							
Aldrin	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor epoxide	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan I	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Dieldrin	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
4,4'-DDE	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
4,4'-DDD	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan sulfate	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
4,4'-DDT	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Endrin ketone	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin aldehyde	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
alpha Chlordane	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
gamma Chlordane	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Toxaphene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

J - The analyte was positively identified, the quantitation is an estimation.

Appendix Table 2. Results of Ohio EPA chemical surface water sampling conducted in the Rocky Fork Mohican River and Touby Run, August 12, 2002.

Stream	**Rocky Fork**	**Rocky Fork**	**Rocky Fork**	**Rocky Fork**	**Rocky Fork**	**Touby Run**	**Touby Run**
River Mile	**14.25**	**14.13**	**14.04**	**13.75**	**13.67**	**0.37**	**0.03**
Date Sampled	08/12/02	08/12/02	08/12/02	08/12/02	08/12/02	08/12/02	08/12/02
Time Sampled	04:55 PM	04:50 PM	04:45 PM	02:35 PM	01:45 PM	04:35 PM	02:45 PM
TAL Metals (ug/l)							
Mercury	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Aluminum	258	557	293	4300	346	80.1J	<100
Silver	<10	<10	<10	<10	<10	<10	<10
Arsenic	<4	2.8J	2.1J	6.1	<4	<4	<4
Barium	52	54	53	89	51	43	43
Beryllium	<10	<10	<10	0.3J	<10	<10	<10
Calcium	72300	72500	74500	85600	73500	85200	79400
Cadmium	<10	<10	<10	<10	<10	<10	<10
Cobalt	<20	<20	<20	3.5J	<20	<20	<20
Chromium	3.0J	5.4J	3.3J	22.7	<20	<20	<20
Copper	<20	<20	<20	21.6	<20	<20	<20
Iron	511	855	579	7470	821	185	213
Potassium	4060	4110	4250	4860	3660	2980	3040
Magnesium	23000	22800	23400	25300	22900	24900	25000
Manganese	91	101	98	524	120	17	24
Sodium	30100	29500	30600	29700	30100	33400	34100
Nickel	<40	<40	<40	13.5J	<40	<40	<40
Lead	3.1J	4.9J	4.5J	21.2	3.9J	3.1J	3.2J
Vanadium	<10	<10	<10	13.4	<10	<10	<10
Zinc	29.3	33.5	40.7	113	21.8	17.4	15.4J
Antimony	6.7	6.8	6.8	7.5	4.8	<1	<1
Selenium	0.6J	<1.0	<1.0	0.5J	0.5J	0.6J	<1
Thallium	<0.2	<0.2	<0.2	0.22	<0.2	<0.2	<0.2

J - The analyte was positively identified, the quantitation is an estimation.

Appendix Table 3. Results of Ohio EPA chemical surface water sampling conducted in wetlands adjacent to the Mansfield Foundry fill area, June 19, 2002.

Sample Location	**Mansfield Foundry**	**Mansfield Foundry**	**Mansfield Foundry**	**Mansfield Foundry**
Sample Number	**Wetland 01**	**Wetland 01A**	**Wetland 02**	**Wetland 03**
Date Sampled	06/19/02	06/19/02	06/19/02	06/19/02
Time Sampled	05:20 PM	05:20 PM	05:55 PM	06:40 PM
TAL Metals (ug/l)		Duplicate		
Mercury	<0.2	<0.2	<0.2	<0.2
Aluminum	785	678	233	151
Silver	<10	<10	<10	<10
Arsenic	38	35	12	<4
Barium	60	57	31	52
Beryllium	<10	<10	<10	<10
Calcium	137000	134000	97600	60000
Cadmium	<10	<10	<10	<10
Cobalt	<20	<20	<20	<20
Chromium	2.7J	<20	<20	2.9J
Copper	<20	6J	<20	<20
Iron	2650	2520	1220	1020
Potassium	3610	3550	4110	8060
Magnesium	32700	31800	30100	12300
Manganese	676	661	420	274
Sodium	38100	36900	56800	84100
Nickel	15J	15J	14J	<40
Lead	4.5J	4.6J	3.9J	3.4J
Vanadium	<10	<10	<10	<10
Zinc	6.2J	8.2J	5J	11J
Antimony	<1	<1	<1	2.6
Selenium	<1	<1	<1	0.7J
Thallium	<0.2	<0.2	<0.2	<0.2
Volatile Organic Analytes (ug/l)				
Acetone	4.3J	4.6J	5.6J	4.7J
Benzene	<5	<5	<5	<5
Bromobenzene	<5	<5	<5	<5
Bromochloromethane	<5	<5	<5	<5
Bromodichloromethane	<5	<5	<5	<5
Bromoform	<5	<5	<5	<5
Bromomethane	<10	<10	<10	<10
2-Butanone	<100	<100	<100	<100
n-Butylbenzene	<5	<5	<5	<5
sec-Butylbenzene	<5	<5	<5	<5
tert-Butylbenzene	<5	<5	<5	<5
Carbon disulfide	<5	<5	<5	<5
Carbon tetrachloride	<5	<5	<5	<5
Chlorobenzene	<5	<5	<5	<5
Chlorodibromomethane	<5	<5	<5	<5
Chloroethane	<10	<10	<10	<10
2-Chloroethyl vinyl ether	<10	<10	<10	<10
Chloroform	<5	<5	<5	<5

Appendix Table 3. Continued.

Sample Location	**Mansfield Foundry**	**Mansfield Foundry**	**Mansfield Foundry**	**Mansfield Foundry**
Sample Number	**Wetland 01**	**Wetland 01A**	**Wetland 02**	**Wetland 03**
Date Sampled	06/19/02	06/19/02	06/19/02	06/19/02
Time Sampled	05:20 PM	05:20 PM	05:55 PM	06:40 PM
Volatile Organic Analytes (ug/l)				
Chloromethane	<10	<10	<10	<10
2-Chlorotoluene	<5	<5	<5	<5
4-Chlorotoluene	<5	<5	<5	<5
1,2-Dibromo-3-chloropropane	<5	<5	<5	<5
1,2-Dibromoethane	<5	<5	<5	<5
Dibromomethane	<5	<5	<5	<5
1,2-Dichlorobenzene	<5	<5	<5	<5
1,3-Dichlorobenzene	<5	<5	<5	<5
1,4-Dichlorobenzene	<5	<5	<5	<5
Dichlorodifluoromethane	<10	<10	<10	<10
1,1-Dichloroethane	<5	<5	<5	<5
1,2-Dichloroethane	<5	<5	<5	<5
1,1-Dichloroethene	<5	<5	<5	<5
cis-1,2-Dichloroethene	<5	<5	<5	<5
trans-1,2-Dichloroethene	<5	<5	<5	<5
1,2-Dichloropropane	<5	<5	<5	<5
1,3-Dichloropropane	<5	<5	<5	<5
2,2-Dichloropropane	<5	<5	<5	<5
cis-1,3-Dichloropropene	<5	<5	<5	<5
trans-1,3-Dichloropropene	<5	<5	<5	<5
1,1-Dichloropropene	<5	<5	<5	<5
Ethylbenzene	<5	<5	<5	<5
n-Hexane	<10	<10	<10	<10
2-Hexanone	<10	<10	<10	<10
Hexachlorobutadiene	<5	<5	<5	<5
Isopropylbenzene	<5	<5	<5	<5
p-Isopropyltoluene	<5	<5	<5	<5
4-Methyl-2-pentanone	<10	<10	<10	<10
Methylene chloride	<5	<5	<5	<5
Naphthalene	<10	<10	<10	<10
n-Propylbenzene	<5	<5	<5	<5
Styrene	<5	<5	<5	<5
1,1,1,2-Tetrachloroethane	<5	<5	<5	<5
1,1,2,2-Tetrachloroethane	<5	<5	<5	<5
Tetrachloroethene	<5	<5	<5	<5
Toluene	<5	<5	<5	<5
1,2,3-Trichlorobenzene	<5	<5	<5	<5
1,2,4-Trichlorobenzene	<5	<5	<5	<5
1,1,1-Trichloroethane	<5	<5	<5	<5
1,1,2-Trichloroethane	<5	<5	<5	<5
Trichloroethene	<5	<5	<5	<5
Trichlorofluoromethane	<10	<10	<10	<10
1,2,3-Trichloropropane	<5	<5	<5	<5
1,2,4-Trimethylbenzene	<5	<5	<5	<5

Appendix Table 3. Continued.

Sample Location	**Mansfield Foundry**	**Mansfield Foundry**	**Mansfield Foundry**	**Mansfield Foundry**
Sample Number	**Wetland 01**	**Wetland 01A**	**Wetland 02**	**Wetland 03**
Date Sampled	06/19/02	06/19/02	06/19/02	06/19/02
Time Sampled	05:20 PM	05:20 PM	05:55 PM	06:40 PM
Volatile Organic Analytes (ug/l)				
1,3,5-Trimethylbenzene	<5	<5	<5	<5
Vinyl acetate	<10	<10	<10	<10
Vinyl chloride	<2.0	<2.0	<2.0	<2.0
o-Xylene	<5.0	<5.0	<5.0	<5.0
m-,p-Xylene	<5.0	<5.0	<5.0	<5.0
Semi-volatile Organic Analytes (ug/l)				
Phenol	<5.0	<5.0	<5.0	<5.0
bis-(2-Chloroethyl) ether	<5.0	<5.0	<5.0	<5.0
2-Chlorophenol	<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
Benzyl alcohol	<5.0	<5.0	<5.0	<5.0
1,2-Dichlorobenzene	<5.0	<5.0	<5.0	<5.0
2-Methylphenol	<5.0	<5.0	<5.0	<5.0
3-,4-Methylphenol	<5.0	<5.0	<5.0	<5.0
bis(2-Chloroisopropyl) ether	<5.0	<5.0	<5.0	<5.0
N-Nitroso-di-n-propylamine	<5.0	<5.0	<5.0	<5.0
Hexachloroethane	<5.0	<5.0	<5.0	<5.0
Nitrobenzene	<5.0	<5.0	<5.0	<5.0
Isophorone	<5.0	<5.0	<5.0	<5.0
2-Nitrophenol	<5.0	<5.0	<5.0	<5.0
2,4-Dimethylphenol	<5.0	<5.0	<5.0	<5.0
Benzoic acid	<25	<25	<25	<25
bis(2-Chloroethoxy)methane	<5.0	<5.0	<5.0	<5.0
2,4-Dichlorophenol	<5.0	<5.0	<5.0	<5.0
1,2,4-Trichlorobenzene	<5.0	<5.0	<5.0	<5.0
Naphthalene	<5.0	<5.0	<5.0	<5.0
4-Chloroaniline	<5.0	<5.0	<5.0	<5.0
Hexachlorobutadiene	<5.0	<5.0	<5.0	<5.0
4-Chloro-3-methylphenol	<5.0	<5.0	<5.0	<5.0
2-Methylnaphthalene	<5.0	<5.0	<5.0	<5.0
Hexachlorocyclopentadiene	<5.0	<5.0	<5.0	<5.0
2,4,6-Trichlorophenol	<5.0	<5.0	<5.0	<5.0
2,4,5-Trichlorophenol	<5.0	<5.0	<5.0	<5.0
2-Chloronaphthalene	<5.0	<5.0	<5.0	<5.0
2-Nitroaniline	<25	<25	<25	<25
Dimethylphthalate	<5.0	<5.0	<5.0	<5.0
Acenaphthylene	<5.0	<5.0	<5.0	<5.0
2,6-Dinitrotoluene	<5.0	<5.0	<5.0	<5.0
3-Nitroaniline	<25	<25	<25	<25
Acenaphthene	<5.0	<5.0	<5.0	<5.0
2,4-Dinitrophenol	<25	<25	<25	<25

Appendix Table 3. Continued.

Sample Location	**Mansfield Foundry**	**Mansfield Foundry**	**Mansfield Foundry**	**Mansfield Foundry**
Sample Number	**Wetland 01**	**Wetland 01A**	**Wetland 02**	**Wetland 03**
Date Sampled	06/19/02	06/19/02	06/19/02	06/19/02
Time Sampled	05:20 PM	05:20 PM	05:55 PM	06:40 PM
Semi-volatile Organic Analytes (ug/l)				
4-Nitrophenol	9.7J	<25	<25	<25
Dibenzofuran	<5.0	<5.0	<5.0	<5.0
2,4-Dinitrotoluene	<5.0	<5.0	<5.0	<5.0
Diethylphthalate	<5.0	<5.0	<5.0	<5.0
4-Chlorophenyl-phenyl ether	<5.0	<5.0	<5.0	<5.0
Fluorene	<5.0	<5.0	<5.0	<5.0
4-Nitroaniline	<25	<25	<25	<25
4,6-Dinitro-2-methylphenol	<25	<25	<25	<25
N-Nitrosodiphenylamine	<5.0	<5.0	<5.0	<5.0
4-Bromophenyl-phenylether	<5.0	<5.0	<5.0	<5.0
Hexachlorobenzene	<5.0	<5.0	<5.0	<5.0
Pentachlorophenol	<25	<25	<25	<25
Phenanthrene	<5.0	<5.0	<5.0	<5.0
Anthracene	<5.0	<5.0	<5.0	<5.0
Di-N-butylphthalate	<5.0	<5.0	<5.0	<5.0
Fluoranthene	<5.0	<5.0	<5.0	<5.0
Pyrene	<5.0	<5.0	<5.0	<5.0
Butylbenzylphthalate	<5.0	<5.0	<5.0	<5.0
3,3'-Dichlorobenzidine	<10	<10	<10	<10
Benzo(a)anthracene	<5.0	<5.0	<5.0	<5.0
Chrysene	<5.0	<5.0	<5.0	<5.0
bis(2-Ethylhexyl) phthalate	2.8J	<5.0	8.4	2.6J
Di-n-octylphthalate	<5.0	4.1J	8.1	<5.0
Benzo(b)fluoranthene	<5.0	<5.0	<5.0	<5.0
Benzo(k)fluoranthene	<5.0	<5.0	<5.0	<5.0
Benzo(a)pyrene	<5.0	<5.0	<5.0	<5.0
Indeno(1,2,3-cd)pyrene	<5.0	<5.0	<5.0	<5.0
Dibenzo(a,h)anthracene	<5.0	<5.0	<5.0	<5.0
Benzo(g,h,i)perylene	<5.0	<5.0	<5.0	<5.0
PCBs (ug/l)				
Aroclor 1016	<0.51	<0.52	<0.52	<0.51
Aroclor 1221	<0.51	<0.52	<0.52	<0.51
Aroclor 1232	<0.51	<0.52	<0.52	<0.51
Aroclor 1242	<0.51	<0.52	<0.52	<0.51
Aroclor 1248	<0.51	<0.52	<0.52	<0.51
Aroclor 1254	<0.51	<0.52	<0.52	<0.51
Aroclor 1260	<0.51	<0.52	<0.52	<0.51
Pesticides (ug/l)				
alpha-BHC	<0.051	<0.052	<0.052	<0.051
beta-BHC	<0.051	<0.052	<0.052	<0.051
delta-BHC	<0.051	<0.052	<0.052	<0.051
gamma-BHC (Lindane)	<0.051	<0.052	<0.052	<0.051

Appendix Table 3. Continued.

Sample Location	**Mansfield Foundry**	**Mansfield Foundry**	**Mansfield Foundry**	**Mansfield Foundry**
Sample Number	**Wetland 01**	**Wetland 01A**	**Wetland 02**	**Wetland 03**
Date Sampled	06/19/02	06/19/02	06/19/02	06/19/02
Time Sampled	05:20 PM	05:20 PM	05:55 PM	06:40 PM
Pesticides (ug/l)				
Heptachlor	<0.051	<0.052	<0.052	<0.051
Aldrin	<0.051	<0.052	<0.052	<0.051
Heptachlor epoxide	<0.051	<0.052	<0.052	<0.051
Endosulfan I	<0.051	<0.052	<0.052	<0.051
Dieldrin	<0.1	<0.1	<0.1	<0.1
4,4'-DDE	<0.1	<0.1	<0.1	<0.1
Endrin	<0.1	<0.1	<0.1	<0.1
Endosulfan II	<0.1	<0.1	<0.1	<0.1
4,4'-DDD	<0.1	<0.1	<0.1	<0.1
Endosulfan sulfate	<0.1	<0.1	<0.1	<0.1
4,4'-DDT	<0.1	<0.1	<0.1	<0.1
Methoxychlor	<0.51	<0.52	<0.52	<0.51
Endrin ketone	<0.1	<0.1	<0.1	<0.1
Endrin aldehyde	<0.1	<0.1	<0.1	<0.1
alpha Chlordane	<0.051	<0.052	<0.052	<0.051
gamma Chlordane	<0.051	<0.052	<0.052	<0.051
Toxaphene	<1.0	<1.0	<1.0	<1.0

J - The analyte was positively identified, the quantitation is an estimation.

Appendix Table 4. Results of Ohio EPA chemical surface water sampling conducted in wetlands adjacent to the Mansfield Foundry fill area, August 12, 2002.

Sample Location	**Mansfield Foundry**	**Mansfield Foundry**	**Mansfield Foundry**
Sample Number	**Wetland 01**	**Wetland 02**	**Wetland 03**
Date Sampled	08/12/02	08/12/02	08/12/02
Time Sampled	05:05 PM	05:10 PM	05:25 PM
TAL Metals (ug/l)			
Mercury	<0.2	0.25	0.85
Aluminum	2110	46300	65300
Silver	<10	<10	<10
Arsenic	24.9	79.5	54.7
Barium	43.8	306	579
Beryllium	<10	2.6J	3.9J
Calcium	138000	318000	195000
Cadmium	<10	2.8J	7.7J
Cobalt	<20	29.4	49.2
Chromium	6.9J	286	405
Copper	19.8J	270	583
Iron	5270	70500	97500
Potassium	3890	11900	11300
Magnesium	37100	52700	51000
Manganese	451	2580	2860
Sodium	32800	36400	17000
Nickel	19.3J	147	422
Lead	9.3J	177	484
Vanadium	<10	91	169
Zinc	28	696	1860
Antimony	<1	3.1	7.6
Selenium	0.5J	3.6	4.6
Thallium	0.3	1.9	2.7

J - The analyte was positively identified, the quantitation is an estimation.

Appendix Table 5. Results of Ohio EPA sediment sampling conducted in the Rocky Fork Mohican River and Touby Run, August 12, 2002.

Stream	**Rocky Fork**	**Rocky Fork**	**Rocky Fork**	**Rocky Fork**	**Rocky Fork**	**Touby Run**	**Touby Run**
River Mile	**14.25**	**14.13**	**14.04**	**13.75**	**13.67**	**0.37**	**0.03**
Date Sampled	06/18/02	06/18/02	06/18/02	06/19/02	06/19/02	06/18/02	06/19/02
Time Sampled	03:45 PM	04:25 PM	11:30 AM	02:45 PM	02:25 PM	06:40 PM	03:10 PM
TAL Metals (mg/kg)							
Mercury	0.21J	0.32J	0.097J	0.080J	0.25J	0.055J	<0.35
Aluminum	14200	10200	9140	12800	12700	3170	3580
Silver	3.52J	1.50J	0.802J	<4.92	1.78J	0.891J	0.681J
Arsenic	9.1	9.15	3.52	8.54	9.55	2.24	4.85
Barium	142	102	68.6	110	109	54.1	34.9
Beryllium	0.715J	0.618J	0.525J	0.707J	0.676J	0.197J	0.23J
Calcium	24900	3390	14700	15500	27100	17900	16000
Cadmium	2.48	2.59	1.2	1.64	2.09	0.503J	0.586J
Cobalt	7.94	7.44	6.37	8.58	9.44	3.03	3.14
Chromium	3240	114	92.7	91	176	36.7	29
Copper	285	295	49.9	218	216	21.1	40.6
Iron	48600	37400	29700	33800	32700	15100	14500
Potassium	2240	1490	1410	2210	2240	584	662
Magnesium	6190	2430	4590	5560	7450	4650	4360
Manganese	617	214	440	467	317	261	352
Sodium	153	105	103	158	164	117	78.4
Nickel	143	84.7	47	123	94.5	10.8	10.5
Lead	87.9	312	99.8	56.8	177	33.2	44.6
Vanadium	59.7	27.8	25.6	33.9	32.9	12.1	12.4
Zinc	393	253	213	282	632	108	109
Antimony	1.87	2.16	0.407	1.05	0.517	<0.28	0.156J
Selenium	1.54	0.199J	0.239J	0.499J	0.583	<0.28	0.5
Thallium	0.246J	0.214	0.138J	0.271	0.253	<0.14	0.088J
Volatile Organic Analytes (ug/kg)							
Acetone	480	480J	90J	150J	76J	<140	<140
Benzene	<13	<42	<8.3	1.8J	<11	<7.0	<6.9
Bromobenzene	<13	<42	<8.3	<13	<11	<7.0	<6.9
Bromochloromethane	<13	<42	<8.3	<13	<11	<7.0	<6.9
Bromodichloromethane	<13	<42	<8.3	<13	<11	<7.0	<6.9
Bromoform	<13	<42	<8.3	<13	<11	<7.0	<6.9
Bromomethane	<26	<83	<17	<26	<21	<14	<14
2-Butanone	100J	150J	23J	45J	20J	<140	<140
n-Butylbenzene	<13	40J	<8.3	14	<11	<7.0	<6.9
sec-Butylbenzene	<13	70	<8.3	5.5J	<11	<7.0	<6.9
tert-Butylbenzene	<13	5.1J	<8.3	<13	<11	<7.0	<6.9
Carbon disulfide	15	28J	<8.3	5.1J	2.5J	<7.0	<6.9
Carbon tetrachloride	<13	<42	<8.3	<13	<11	<7.0	<6.9
Chlorobenzene	<13	<42	<8.3	<13	<11	<7.0	<6.9
Chlorodibromomethane	<13	<42	<8.3	<13	<11	<7.0	<6.9
Chloroethane	<26	<83	<17	<26	<21	<14	<14
2-Chloroethyl vinyl ether	<26	<83	<17	<26	<21	<14	<14
Chloroform	<13	<42	<8.3	<13	<11	<7.0	<6.9

Appendix Table 5. Continued.

Stream	Rocky Fork	Rocky Fork	Rocky Fork	Rocky Fork	Rocky Fork	Touby Run	Touby Run
River Mile	**14.25**	**14.13**	**14.04**	**13.75**	**13.67**	**0.37**	**0.03**
Date Sampled	06/18/02	06/18/02	06/18/02	06/19/02	06/19/02	06/18/02	06/19/02
Time Sampled	03:45 PM	04:25 PM	11:30 AM	02:45 PM	02:25 PM	06:40 PM	03:10 PM
Volatile Organic Analytes (ug/kg)							
Chloromethane	<26	<83	<17	<26	<21	<14	<14
2-Chlorotoluene	<13	<42	<8.3	<13	<11	<7.0	<6.9
4-Chlorotoluene	<13	<42	<8.3	<13	<11	<7.0	<6.9
1,2-Dibromo-3-chloropropane	<13	<42	<8.3	<13	<11	<7.0	<6.9
1,2-Dibromoethane	<13	<42	<8.3	<13	<11	<7.0	<6.9
Dibromomethane	<13	<42	<8.3	<13	<11	<7.0	<6.9
1,2-Dichlorobenzene	<13	4.7J	<8.3	<13	<11	<7.0	<6.9
1,3-Dichlorobenzene	<13	15J	<8.3	<13	<11	<7.0	<6.9
1,4-Dichlorobenzene	<13	43	<8.3	<13	<11	<7.0	<6.9
Dichlorodifluoromethane	<26	<83	<17	<26	<21	<14	<14
1,1-Dichloroethane	<13	<42	<8.3	<13	<11	<7.0	1.6J
1,2-Dichloroethane	<13	<42	<8.3	<13	<11	<7.0	<6.9
1,1-Dichloroethene	<13	<42	<8.3	<13	<11	<7.0	<6.9
cis-1,2-Dichloroethene	<13	<42	<8.3	<13	<11	<7.0	4.7J
trans-1,2-Dichloroethene	<13	<42	<8.3	<13	<11	<7.0	<6.9
1,2-Dichloropropane	<13	<42	<8.3	<13	<11	<7.0	<6.9
1,3-Dichloropropane	<13	<42	<8.3	<13	<11	<7.0	<6.9
2,2-Dichloropropane	<13	<42	<8.3	<13	<11	<7.0	<6.9
cis-1,3-Dichloropropene	<13	<42	<8.3	<13	<11	<7.0	<6.9
trans-1,3-Dichloropropene	<13	<42	<8.3	<13	<11	<7.0	<6.9
1,1-Dichloropropene	<13	<42	<8.3	<13	<11	<7.0	<6.9
Ethylbenzene	<13	<42	<8.3	<13	<11	<7.0	<6.9
n-Hexane	<26	200	<17	2.0J	<21	<14	<14
2-Hexanone	<26	<83	<17	<26	<21	<14	<14
Hexachlorobutadiene	<13	<42	<8.3	<13	<11	<7.0	<6.9
Isopropylbenzene	<13	6.6J	<8.3	<13	<11	<7.0	<6.9
p-Isopropyltoluene	<13	9.1J	<8.3	1.3J	<11	<7.0	<6.9
4-Methyl-2-pentanone	<26	<83	<17	<26	<21	<14	<14
Methylene chloride	<13	<42	<8.3	<13	<11	<7.0	<6.9
Naphthalene	<26	5.3J	<17	<26	2.5J	<14	<14
n-Propylbenzene	<13	43	<8.3	<13	<11	<7.0	<6.9
Styrene	<13	<42	<8.3	<13	<11	<7.0	<6.9
1,1,1,2-Tetrachloroethane	<13	<42	<8.3	<13	<11	<7.0	<6.9
1,1,2,2-Tetrachloroethane	<13	<42	<8.3	<13	<11	<7.0	<6.9
Tetrachloroethene	<13	<42	<8.3	<13	<11	<7.0	<6.9
Toluene	<13	<42	<8.3	<13	<11	<7.0	<6.9
1,2,3-Trichlorobenzene	<13	<42	<8.3	<13	<11	<7.0	<6.9
1,2,4-Trichlorobenzene	<13	13J	<8.3	<13	<11	<7.0	<6.9
1,1,1-Trichloroethane	<13	<42	<8.3	<13	<11	<7.0	<6.9
1,1,2-Trichloroethane	<13	<42	<8.3	<13	<11	<7.0	<6.9
Trichloroethene	<13	<42	<8.3	<13	<11	<7.0	<6.9
Trichlorofluoromethane	<26	<83	<17	<26	<21	<14	<14
1,2,3-Trichloropropane	<13	<42	<8.3	<13	<11	<7.0	<6.9
1,2,4-Trimethylbenzene	<13	20J	<8.3	18	<11	<7.0	<6.9
1,3,5-Trimethylbenzene	<13	9.6J	<8.3	6.2J	<11	<7.0	<6.9

Appendix Table 5. Continued.

Stream	**Rocky Fork**	**Rocky Fork**	**Rocky Fork**	**Rocky Fork**	**Rocky Fork**	**Touby Run**	**Touby Run**
River Mile	**14.25**	**14.13**	**14.04**	**13.75**	**13.67**	**0.37**	**0.03**
Date Sampled	06/18/02	06/18/02	06/18/02	06/19/02	06/19/02	06/18/02	06/19/02
Time Sampled	03:45 PM	04:25 PM	11:30 AM	02:45 PM	02:25 PM	06:40 PM	03:10 PM
Volatile Organic Analytes (ug/kg)							
Vinyl acetate	<26	<83	<17	<26	<21	<14	<14
Vinyl chloride	<5.1	<17	<8.3	<5.1	<4.3	<2.8	<2.8
o-Xylene	<13	<42	<8.3	2.1J	<11	<7.0	<6.9
m-,p-Xylene	<13	<42	<8.3	1.5J	<11	<7.0	<6.9
Semi-volatile Organic Analytes (ug/kg)							
Phenol	<4200	<2700	<550	<4200	<3500	<2300	<1100
bis-(2-Chloroethyl) ether	<4200	<2700	<550	<4200	<3500	<2300	<1100
2-Chlorophenol	<4200	<2700	<550	<4200	<3500	<2300	<1100
1,3-Dichlorobenzene	<4200	<2700	<550	<4200	<3500	<2300	<1100
1,4-Dichlorobenzene	<4200	<2700	<550	<4200	<3500	<2300	<1100
Benzyl alcohol	<4200	<2700	<550	<4200	<3500	<2300	<1100
1,2-Dichlorobenzene	<4200	<2700	<550	<4200	<3500	<2300	<1100
2-Methylphenol	<4200	<2700	<550	<4200	<3500	<2300	<1100
3-,4-Methylphenol	<4200	<2700	<550	<4200	<3500	<2300	<1100
bis(2-Chloroisopropyl) ether	<4200	<2700	<550	<4200	<3500	<2300	<1100
N-Nitroso-di-n-propylamine	<4200	<2700	<550	<4200	<3500	<2300	<1100
Hexachloroethane	<4200	<2700	<550	<4200	<3500	<2300	<1100
Nitrobenzene	<4200	<2700	<550	<4200	<3500	<2300	<1100
Isophorone	<4200	<2700	<550	<4200	<3500	<2300	<1100
2-Nitrophenol	<4200	<2700	<550	<4200	<3500	<2300	<1100
2,4-Dimethylphenol	<4200	<2700	<550	<4200	<3500	<2300	<1100
Benzoic acid	<21000	<14000	<2700	<21000	<18000	<12000	<5700
bis(2-Chloroethoxy)methane	<4200	<2700	<550	<4200	<3500	<2300	<1100
2,4-Dichlorophenol	<4200	<2700	<550	<4200	<3500	<2300	<1100
1,2,4-Trichlorobenzene	<4200	<2700	<550	<4200	<3500	<2300	<1100
Naphthalene	<4200	<2700	<550	<4200	<3500	<2300	<1100
4-Chloroaniline	<4200	<2700	<550	<4200	<3500	<2300	<1100
Hexachlorobutadiene	<4200	<2700	<550	<4200	<3500	<2300	<1100
4-Chloro-3-methylphenol	<4200	<2700	<550	<4200	<3500	<2300	<1100
2-Methylnaphthalene	<4200	<2700	<550	<4200	<3500	<2300	<1100
Hexachlorocyclopentadiene	<4200	<2700	<550	<4200	<3500	<2300	<1100
2,4,6-Trichlorophenol	<4200	<2700	<550	<4200	<3500	<2300	<1100
2,4,5-Trichlorophenol	<21000	<14000	<2700	<21000	<18000	<12000	<5700
2-Chloronaphthalene	<4200	<2700	<550	<4200	<3500	<2300	<1100
2-Nitroaniline	<21000	<14000	<2700	<21000	<18000	<12000	<5700
Dimethylphthalate	<4200	<2700	<550	<4200	<3500	<2300	<1100
Acenaphthylene	<4200	<2700	<550	<4200	<3500	<2300	<1100
2,6-Dinitrotoluene	<4200	<2700	<550	<4200	<3500	<2300	<1100
3-Nitroaniline	<21000	<14000	<2700	<21000	<18000	<12000	<5700
Acenaphthene	<4200	<2700	<550	<4200	<3500	<2300	<1100
2,4-Dinitrophenol	<21000	<14000	<2700	<21000	<18000	<12000	<5700
4-Nitrophenol	<21000	5000J	<2700	<21000	7100J	4500J	<5700
Dibenzofuran	<4200	<2700	<550	<4200	<3500	<2300	<1100

Appendix Table 5. Continued.

Stream	Rocky Fork	Rocky Fork	Rocky Fork	Rocky Fork	Rocky Fork	Touby Run	Touby Run
River Mile	**14.25**	**14.13**	**14.04**	**13.75**	**13.67**	**0.37**	**0.03**
Date Sampled	06/18/02	06/18/02	06/18/02	06/19/02	06/19/02	06/18/02	06/19/02
Time Sampled	03:45 PM	04:25 PM	11:30 AM	02:45 PM	02:25 PM	06:40 PM	03:10 PM
Semi-volatile Organic Analytes (ug/kg)							
2,4-Dinitrotoluene	<4200	<2700	<550	<4200	<3500	<2300	<1100
Diethylphthalate	<4200	<2700	<550	<4200	<3500	<2300	<1100
4-Chlorophenyl-phenyl ether	<4200	<2700	<550	<4200	<3500	<2300	<1100
Fluorene	<4200	<2700	<550	<4200	<3500	<2300	<1100
4-Nitroaniline	<21000	<14000	<2700	<21000	<18000	<12000	<5700
4,6-Dinitro-2-methylphenol	<21000	<14000	<2700	<21000	<18000	<12000	<5700
N-Nitrosodiphenylamine	<4200	<2700	<550	<4200	<3500	<2300	<1100
4-Bromophenyl-phenylether	<4200	<2700	<550	<4200	<3500	<2300	<1100
Hexachlorobenzene	<4200	<2700	<550	<4200	<3500	<2300	<1100
Pentachlorophenol	<21000	5600J	<2700	<21000	<18000	<12000	<5700
Phenanthrene	<4200	2100J	300J	<4200	<3500	2400	1300
Anthracene	<4200	<2700	<550	<4200	<3500	<2300	<1100
Di-N-butylphthalate	<4200	<2700	<550	<4200	<3500	<2300	<1100
Fluoranthene	<4200	<2700	630	<4200	2600J	4000	2500
Pyrene	<4200	2400J	690	<4200	2500J	3600	2500
Butylbenzylphthalate	<4200	<2700	<550	<4200	<3500	<2300	<1100
3,3'-Dichlorobenzidine	<8400	<5500	<1100	<8400	<7000	<4600	<2300
Benzo(a)anthracene	<4200	<2700	280J	<4200	<3500	1500J	940J
Chrysene	<4200	4800	400J	<4200	<3500	1900J	1200
bis(2-Ethylhexyl) phthalate	2800J	<2700	420J	<4200	3000J	<2300	580J
Di-n-octylphthalate	<4200	<2700	<550	<4200	<3500	<2300	<1100
Benzo(b)fluoranthene	<4200	<2700	460J	<4200	<3500	2200J	1300
Benzo(k)fluoranthene	<4200	<2700	<550	<4200	<3500	<2300	880J
Benzo(a)pyrene	<4200	<2700	320J	<4200	<3500	1500J	960J
Indeno(1,2,3-cd)pyrene	<4200	<2700	<550	<4200	<3500	<2300	<1100
Dibenzo(a,h)anthracene	<4200	<2700	<550	<4200	<3500	<2300	<1100
Benzo(g,h,i)perylene	<4200	<2700	<550	<4200	<3500	<2300	<1100
PCBs (ug/kg)							
Aroclor 1016	<210	<140	<27	<840	<700	<23	<23
Aroclor 1221	<210	<140	<27	<840	<700	<23	<23
Aroclor 1232	<210	<140	<27	<840	<700	<23	<23
Aroclor 1242	640	1500	85	10000	12000	<23	67
Aroclor 1248	<210	<140	<27	<840	<700	<23	<23
Aroclor 1254	230	610	74	<840	1400	23J	30
Aroclor 1260	<210	<140	<27	<840	<700	<23	<23
Pesticides (ug/kg)							
alpha-BHC	<42	<55	<2.7	<42	<35	<12	<11
beta-BHC	<42	<55	<2.7	<42	<35	<12	<11
delta-BHC	<42	<55	<2.7	<42	<35	<12	<11
gamma-BHC (Lindane)	<42	<55	<2.7	<42	<35	<12	<11
Heptachlor	<42	<55	<2.7	<42	<35	<12	<11

Appendix Table 5. Continued.

Stream	Rocky Fork	Rocky Fork	Rocky Fork	Rocky Fork	Rocky Fork	Touby Run	Touby Run
River Mile	**14.25**	**14.13**	**14.04**	**13.75**	**13.67**	**0.37**	**0.03**
Date Sampled	06/18/02	06/18/02	06/18/02	06/19/02	06/19/02	06/18/02	06/19/02
Time Sampled	03:45 PM	04:25 PM	11:30 AM	02:45 PM	02:25 PM	06:40 PM	03:10 PM
Pesticides (ug/kg)							
Aldrin	<42	<55	<2.7	<42	<35	<12	<11
Heptachlor epoxide	<42	<55	<2.7	<42	<35	<12	<11
Endosulfan I	<42	<55	<2.7	<42	<35	<12	<11
Dieldrin	<85	<110	<5.5	<84	<70	<23	<23
4,4'-DDE	<85	<110	<5.5	<84	<70	<23	<23
Endrin	<85	<110	<5.5	<84	30J	<23	<23
Endosulfan II	<85	<110	<5.5	<84	<70	<23	<23
4,4'-DDD	<85	<110	<5.5	<84	<70	<23	<23
Endosulfan sulfate	<85	<110	<5.5	<84	<70	<23	<23
4,4'-DDT	<85	<110	2.5J	<84	41J	<23	<23
Methoxychlor	<420	<550	<27	<420	<350	<120	<110
Endrin ketone	<85	<110	1.8J	<84	<70	<23	<23
Endrin aldehyde	<85	<110	<5.5	<84	<70	<23	<23
alpha Chlordane	<42	<55	<2.7	<42	<35	<12	<11
gamma Chlordane	<42	<55	<2.7	<42	<35	<12	<11
Toxaphene	<85	<55	<55	<84	<70	<46	<46
Other							
Percent Solids	39	60	60	39	47	71	72
Total Organic Carbon (mg/kg)	53000	53000	9300	72000	52000	7000	7300

J - The analyte was positively identified, the quantitation is an estimation.

Appendix Table 6. Results of Ohio EPA sediment sampling conducted in wetlands adjacent to the Mansfield Foundry fill area, June 19, 2002.

Sample Location	**Mansfield Foundry**	**Mansfield Foundry**	**Mansfield Foundry**	**Mansfield Foundry**
Sample Number	**Wetland 01**	**Wetland 01A**	**Wetland 02**	**Wetland 03**
Date Sampled	06/19/02	06/19/02	06/19/02	06/19/02
Time Sampled	05:30 PM	05:30 PM	06:05 PM	06:45 PM
TAL Metals (mg/kg)		Duplicate		
Mercury	<1.5	<1.5	<1.1	0.35J
Aluminum	12900	17100	18500	7410
Silver	3.45J	<11.9	2.11J	<7.52
Arsenic	24	22.8	12	5.37
Barium	48.4	62.1	86.2	64.3
Beryllium	0.612J	0.784J	0.788J	0.331J
Calcium	18700	27200	41000	11500
Cadmium	1.26J	1.66J	1.97J	1.26J
Cobalt	6.24	5.93J	9.69	4.67
Chromium	54.8	74.9	132	49.5
Copper	99.7	137	85.2	65.1
Iron	27900	33900	28600	17100
Potassium	1780	2180	3030	1510
Magnesium	3660	4760	5520	4170
Manganese	331	454	356	371
Sodium	392	444	434	413
Nickel	35.3	38.3	58.1	37
Lead	68	63.3	66.5	139
Vanadium	21.5	26.9	39.4	20.7
Zinc	170	222	333	215
Antimony	<1.2	<1.2	<0.9	0.68J
Selenium	0.822J	<1.2	<0.9	<0.82
Thallium	0.353J	0.347J	0.629	0.22J
Volatile Organic Analytes (ug/kg)				
Acetone	450J	590J	95J	99J
Benzene	<30	<30	<23	<20
Bromobenzene	<30	<30	<23	<20
Bromochloromethane	<30	<30	<23	<20
Bromodichloromethane	<30	<30	<23	<20
Bromoform	<30	<30	<23	<20
Bromomethane	<59	<60	<45	<41
2-Butanone	90J	120J	33J	28J
n-Butylbenzene	<30	<30	<23	<20
sec-Butylbenzene	<30	<30	<23	<20
tert-Butylbenzene	<30	<30	<23	<20
Carbon disulfide	3.7J	4.7J	<23	<20
Carbon tetrachloride	<30	<30	<23	<20
Chlorobenzene	<30	<30	<23	<20
Chlorodibromomethane	<30	<30	<23	<20
Chloroethane	<59	<60	<45	<41
2-Chloroethyl vinyl ether	<59	<60	<45	<41
Chloroform	<30	<30	<23	<20

Appendix Table 6. Continued.

Sample Location	**Mansfield Foundry**	**Mansfield Foundry**	**Mansfield Foundry**	**Mansfield Foundry**
Sample Number	**Wetland 01**	**Wetland 01A**	**Wetland 02**	**Wetland 03**
Date Sampled	06/19/02	06/19/02	06/19/02	06/19/02
Time Sampled	05:30 PM	05:30 PM	06:05 PM	06:45 PM
Volatile Organic Analytes (ug/kg)				
Chloromethane	<59	<60	<45	<41
2-Chlorotoluene	<30	<30	<23	<20
4-Chlorotoluene	<30	<30	<23	<20
1,2-Dibromo-3-chloropropane	<30	<30	<23	<20
1,2-Dibromoethane	<30	<30	<23	<20
Dibromomethane	<30	<30	<23	<20
1,2-Dichlorobenzene	<30	<30	<23	<20
1,3-Dichlorobenzene	<30	<30	<23	<20
1,4-Dichlorobenzene	<30	<30	<23	<20
Dichlorodifluoromethane	<59	<60	<45	<41
1,1-Dichloroethane	<30	<30	<23	<20
1,2-Dichloroethane	<30	<30	<23	<20
1,1-Dichloroethene	<30	<30	<23	<20
cis-1,2-Dichloroethene	<30	<30	<23	<20
trans-1,2-Dichloroethene	<30	<30	<23	<20
1,2-Dichloropropane	<30	<30	<23	<20
1,3-Dichloropropane	<30	<30	<23	<20
2,2-Dichloropropane	<30	<30	<23	<20
cis-1,3-Dichloropropene	<30	<30	<23	<20
trans-1,3-Dichloropropene	<30	<30	<23	<20
1,1-Dichloropropene	<30	<30	<23	<20
Ethylbenzene	<30	<30	<23	<20
n-Hexane	<59	<60	<45	<41
2-Hexanone	<59	<60	<45	<41
Hexachlorobutadiene	<30	<30	<23	<20
Isopropylbenzene	<30	<30	<23	<20
p-Isopropyltoluene	<30	<30	<23	<20
4-Methyl-2-pentanone	<59	<60	<45	<41
Methylene chloride	<30	<30	<23	<20
Naphthalene	<59	<60	<45	<41
n-Propylbenzene	<30	<30	<23	<20
Styrene	<30	<30	<23	<20
1,1,1,2-Tetrachloroethane	<30	<30	<23	<20
1,1,2,2-Tetrachloroethane	<30	<30	<23	<20
Tetrachloroethene	<30	<30	<23	<20
Toluene	<30	<30	<23	2.6J
1,2,3-Trichlorobenzene	<30	<30	<23	<20
1,2,4-Trichlorobenzene	<30	<30	<23	<20
1,1,1-Trichloroethane	<30	<30	<23	<20
1,1,2-Trichloroethane	<30	<30	<23	<20
Trichloroethene	<30	<30	<23	<20
Trichlorofluoromethane	<59	<60	<45	<41
1,2,3-Trichloropropane	<30	<30	<23	<20
1,2,4-Trimethylbenzene	<30	<30	<23	<20

Appendix Table 6. Continued.

Sample Location	**Mansfield Foundry**	**Mansfield Foundry**	**Mansfield Foundry**	**Mansfield Foundry**
Sample Number	**Wetland 01**	**Wetland 01A**	**Wetland 02**	**Wetland 03**
Date Sampled	06/19/02	06/19/02	06/19/02	06/19/02
Time Sampled	05:30 PM	05:30 PM	06:05 PM	06:45 PM
Volatile Organic Analytes (ug/kg)				
1,3,5-Trimethylbenzene	<30	<30	<23	<20
Vinyl acetate	<59	<60	<45	<41
Vinyl chloride	<12	<12	<9	<8.2
o-Xylene	<30	<30	<23	<20
m-,p-Xylene	<30	<30	<23	<20
Semi-volatile Organic Analytes (ug/kg)				
Phenol	<970	<990	<750	<1400
bis-(2-Chloroethyl) ether	<970	<990	<750	<1400
2-Chlorophenol	<970	<990	<750	<1400
1,3-Dichlorobenzene	<970	<990	<750	<1400
1,4-Dichlorobenzene	<970	<990	<750	<1400
Benzyl alcohol	<970	<990	<750	<1400
1,2-Dichlorobenzene	<970	<990	<750	<1400
2-Methylphenol	<970	<990	<750	<1400
3-,4-Methylphenol	<970	<990	<750	<1400
bis(2-Chloroisopropyl) ether	<970	<990	<750	<1400
N-Nitroso-di-n-propylamine	<970	<990	<750	<1400
Hexachloroethane	<970	<990	<750	<1400
Nitrobenzene	<970	<990	<750	<1400
Isophorone	<970	<990	<750	<1400
2-Nitrophenol	<970	<990	<750	<1400
2,4-Dimethylphenol	<970	<990	<750	<1400
Benzoic acid	<4900	<5000	<3700	<6800
bis(2-Chloroethoxy)methane	<970	<990	<750	<1400
2,4-Dichlorophenol	<970	<990	<750	<1400
1,2,4-Trichlorobenzene	<970	<990	<750	<1400
Naphthalene	<970	<990	<750	<1400
4-Chloroaniline	<970	<990	<750	<1400
Hexachlorobutadiene	<970	<990	<750	<1400
4-Chloro-3-methylphenol	<970	<990	<750	<1400
2-Methylnaphthalene	<970	<990	<750	<1400
Hexachlorocyclopentadiene	<970	<990	<750	<1400
2,4,6-Trichlorophenol	<970	<990	<750	<1400
2,4,5-Trichlorophenol	<4900	<5000	<3700	<6800
2-Chloronaphthalene	<970	<990	<750	<1400
2-Nitroaniline	<4900	<5000	<3700	<6800
Dimethylphthalate	<970	<990	<750	<1400
Acenaphthylene	<970	<990	<750	<1400
2,6-Dinitrotoluene	<970	<990	<750	<1400
3-Nitroaniline	<4900	<5000	<3700	<6800
Acenaphthene	<970	<990	<750	<1400
2,4-Dinitrophenol	<4900	<5000	<3700	<6800

Appendix Table 6. Continued.

Sample Location	**Mansfield Foundry**	**Mansfield Foundry**	**Mansfield Foundry**	**Mansfield Foundry**
Sample Number	**Wetland 01**	**Wetland 01A**	**Wetland 02**	**Wetland 03**
Date Sampled	06/19/02	06/19/02	06/19/02	06/19/02
Time Sampled	05:30 PM	05:30 PM	06:05 PM	06:45 PM
Semi-volatile Organic Analytes (ug/kg)				
4-Nitrophenol	<4900	<5000	<3700	<6800
Dibenzofuran	<970	<990	<750	<1400
2,4-Dinitrotoluene	<970	<990	<750	<1400
Diethylphthalate	<970	<990	<750	<1400
4-Chlorophenyl-phenyl ether	<970	<990	<750	<1400
Fluorene	<970	<990	<750	<1400
4-Nitroaniline	<4900	<5000	<3700	<6800
4,6-Dinitro-2-methylphenol	<4900	<5000	<3700	<6800
N-Nitrosodiphenylamine	<970	<990	<750	<1400
4-Bromophenyl-phenylether	<970	<990	<750	<1400
Hexachlorobenzene	<970	<990	<750	<1400
Pentachlorophenol	<4900	<5000	<3700	<6800
Phenanthrene	<970	<990	<750	800J
Anthracene	<970	<990	<750	<1400
Di-N-butylphthalate	<970	<990	<750	<1400
Fluoranthene	<970	<990	<750	2700
Pyrene	<970	<990	<750	2700
Butylbenzylphthalate	<970	<990	<750	<1400
3,3'-Dichlorobenzidine	<1900	<2000	<1500	<2700
Benzo(a)anthracene	<970	<990	<750	1000J
Chrysene	<970	<990	<750	2100
bis(2-Ethylhexyl) phthalate	<970	<990	<750	<1400
Di-n-octylphthalate	<970	<990	<750	<1400
Benzo(b)fluoranthene	<970	<990	<750	2700
Benzo(k)fluoranthene	<970	<990	<750	1600
Benzo(a)pyrene	<970	<990	<750	1700
Indeno(1,2,3-cd)pyrene	<970	<990	<750	1100J
Dibenzo(a,h)anthracene	<970	<990	<750	<1400
Benzo(g,h,i)perylene	<970	<990	<750	1300J
PCBs (ug/kg)				
Aroclor 1016	<98	<99	<75	<67
Aroclor 1221	<98	<99	<75	<67
Aroclor 1232	<98	<99	<75	<67
Aroclor 1242	<98	<99	250	390
Aroclor 1248	<98	<99	<75	<67
Aroclor 1254	96J	77J	94	540
Aroclor 1260	<98	<99	<75	<67
Pesticides (ug/kg)				
alpha-BHC	<9.8	<9.9	<37	<34
beta-BHC	<9.8	<9.9	<37	<34
delta-BHC	<9.8	<9.9	<37	<34
gamma-BHC (Lindane)	<9.8	<9.9	<37	<34

Appendix Table 6. Continued.

Sample Location	**Mansfield Foundry**	**Mansfield Foundry**	**Mansfield Foundry**	**Mansfield Foundry**
Sample Number	**Wetland 01**	**Wetland 01A**	**Wetland 02**	**Wetland 03**
Date Sampled	06/19/02	06/19/02	06/19/02	06/19/02
Time Sampled	05:30 PM	05:30 PM	06:05 PM	06:45 PM
Pesticides (ug/kg)				
Heptachlor	<9.8	<9.9	<37	<34
Aldrin	<9.8	<9.9	<37	<34
Heptachlor epoxide	<9.8	<9.9	<37	<34
Endosulfan I	<9.8	<9.9	<37	<34
Dieldrin	<20	<20	<75	<67
4,4'-DDE	<20	<20	<75	<67
Endrin	<20	<20	<75	17J
Endosulfan II	<20	<20	<75	<67
4,4'-DDD	<20	<20	<75	<67
Endosulfan sulfate	<20	<20	<75	<67
4,4'-DDT	<20	<20	<75	26J
Methoxychlor	<98	<99	<370	<340
Endrin ketone	<20	<20	<75	<67
Endrin aldehyde	<20	<20	<75	<67
alpha Chlordane	<9.8	<9.9	<37	<34
gamma Chlordane	<9.8	<9.9	<37	<34
Toxaphene	<200	<200	<150	<140
Other				
Percent Solids	17	17	22	24
Total Organic Carbon (mg/kg)	69000	70000	51000	33000

J - The analyte was positively identified, the quantitation is an estimation.

Appendix Table 7. Rocky Fork Mohican River and Touby Run, 2002. ICI scores and metrics.

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			
Rocky Fork Mohican River (17-733)													
Year: 2002													
14.30	19.3	29(4)	5(4)	2(4)	16(4)	18.1(4)	30.7(6)	2.1(2)	46.6(2)	26.7(0)	6(2)	3	32
14.10	19.5	27(4)	4(2)	1(2)	17(4)	43.3(6)	0.5(2)	4.9(2)	49.3(2)	22.1(2)	3(0)	3	26
14.00	19.6	37(4)	4(2)	2(4)	19(4)	39.2(6)	1.8(2)	2.2(2)	54.8(2)	40.7(0)	10(4)	3	30
13.80	19.7	35(4)	5(4)	2(4)	18(4)	39.1(6)	10.2(6)	4.3(2)	45.2(4)	18.6(2)	3(0)	3	36
13.60	29.5	34(4)	5(4)	4(6)	19(4)	9.5(2)	14.8(6)	1.2(2)	72.8(0)	18.6(2)	7(2)	3	32
Touby Run (17-734)													
Year: 2002													
0.40	9.6	41(6)	3(2)	4(6)	26(6)	35.3(6)	2.6(6)	10.9(4)	50.8(2)	25.2(2)	6(2)	3	42
0.10	9.7	32(4)	3(2)	3(6)	18(4)	21.2(4)	2.0(6)	20.3(6)	56.5(2)	10.7(4)	7(4)	3	42

Appendix Table 8

Macroinvertebrate taxa (qualitative and quantitative) collected in the Rocky Fork Mohican River and Touby Run, 2002.

Ohio EPA/DSW Ecological Assessment Section
Macroinvertebrate Collection

Collection Date: 07/31/2002 River Code: 17-733 RM: 14.30 Site: Rocky Fork Mohican River upst.

Taxa Code	Taxa	Quant/Qual	
01801	*Turbellaria*	9	
03600	*Oligochaeta*	16	
04685	*Placobdella ornata*		+
04935	*Erpobdella punctata punctata*		+
05900	*Lirceus sp*		+
08260	*Orconectes (Crokerinus) sanbornii sanbornii*		+
11120	*Baetis flavistriga*	133	+
11130	*Baetis intercalaris*	147	+
13400	*Stenacron sp*	40	+
13521	*Stenonema femoratum*	1	+
13561	*Stenonema pulchellum*	1	
21300	*Hetaerina sp*		+
22001	*Coenagrionidae*		+
22300	*Argia sp*	1	+
23909	*Boyeria vinosa*		+
52200	*Cheumatopsyche sp*	262	+
52530	*Hydropsyche depravata group*	285	+
63300	*Hydroporus sp*		+
65700	*Anacaena sp*		+
67800	*Tropisternus sp*		+
68901	*Macronychus glabratus*	4	+
69250	*Optioservus ovalis*		+
69400	*Stenelmis sp*	39	+
74100	*Simulium sp*	13	+
77500	*Conchapelopia sp*	70	+
77750	*Hayesomyia senata or Thienemannimyia norena*	64	+
77800	*Helopelopia sp*	11	
78450	*Nilotanypus fimbriatus*	16	+
81240	*Nanocladius (N.) distinctus*	11	
81825	*Rheocricotopus (Psilocricotopus) robacki*	27	
82820	*Cryptochironomus sp*		+
83040	*Dicrotendipes neomodestus*	5	
84450	*Polypedilum (Uresipedilum) flavum*	59	+
84460	*Polypedilum (P.) fallax group*	32	
84470	*Polypedilum (P.) illinoense*	5	
84540	*Polypedilum (Tripodura) scalaenum group*	70	+
85500	*Paratanytarsus sp*	11	
85800	*Tanytarsus sp*	11	
85821	*Tanytarsus glabrescens group sp 7*	16	
87540	*Hemerodromia sp*	11	+
96900	*Ferrissia sp*	412	

Taxa Code	Taxa	Quant/Qual

No. Quantitative Taxa: 29 Total Taxa: 41
No. Qualitative Taxa: 28 ICI: **32**
Number of Organisms: 1782 Qual EPT: 6

Ohio EPA/DSW Ecological Assessment Section
Macroinvertebrate Collection

Collection Date: 07/31/2002 River Code: 17-733 RM: 14.10 Site: Rocky Fork Mohican River upst. main

Taxa Code	Taxa	Quant/Qual		Taxa Code	Taxa	Quant/Qual
01801	*Turbellaria*		+			
03600	*Oligochaeta*		+			
05900	*Lirceus sp*	3				
06201	*Hyalella azteca*		+			
08260	*Orconectes (Crokerinus) sanbornii sanbornii*		+			
11120	*Baetis flavistriga*	2				
13400	*Stenacron sp*	266	+			
13521	*Stenonema femoratum*	4	+			
14950	*Leptophlebia sp or Paraleptophlebia sp*	2				
21200	*Calopteryx sp*		+			
21300	*Hetaerina sp*	1				
22001	*Coenagrionidae*		+			
22300	*Argia sp*	11	+			
23600	*Aeshna sp*		+			
23909	*Boyeria vinosa*	1	+			
52200	*Cheumatopsyche sp*	3	+			
68700	*Dubiraphia sp*		+			
68901	*Macronychus glabratus*		+			
77115	*Ablabesmyia janta*	2				
77120	*Ablabesmyia mallochi*	5				
77500	*Conchapelopia sp*	3				
77750	*Hayesomyia senata or Thienemannimyia norena*	7				
77800	*Helopelopia sp*	5	+			
78655	*Procladius (Holotanypus) sp*	7				
80370	*Corynoneura lobata*	4				
81231	*Nanocladius (N.) crassicornus or N. (N.) "rectinervis"*	9				
82730	*Chironomus (C.) decorus group*	5				
82820	*Cryptochironomus sp*	5	+			
84450	*Polypedilum (Uresipedilum) flavum*	2				
84460	*Polypedilum (P.) fallax group*	33				
84540	*Polypedilum (Tripodura) scalaenum group*	116	+			
84790	*Tribelos fuscicorne*	2				
85500	*Paratanytarsus sp*	24				
85821	*Tanytarsus glabrescens group sp 7*	7				
87540	*Hemerodromia sp*	2	+			
96900	*Ferrissia sp*	102				

No. Quantitative Taxa: 27 Total Taxa: 36
No. Qualitative Taxa: 18 ICI: **26**
Number of Organisms: 633 Qual EPT: 3

Ohio EPA/DSW Ecological Assessment Section
Macroinvertebrate Collection

Collection Date: 07/31/2002 River Code: 17-733 RM: 14.00 Site: Rocky Fork Mohican River dst. Main St.

Taxa Code	Taxa	Quant/Qual
01801	*Turbellaria*	1
03360	*Plumatella sp*	+
03600	*Oligochaeta*	8 +
04685	*Placobdella ornata*	+
06201	*Hyalella azteca*	3 +
08260	*Orconectes (Crokerinus) sanbornii sanbornii*	2 +
08601	*Hydracarina*	1
11120	*Baetis flavistriga*	93 +
11130	*Baetis intercalaris*	3 +
11200	*Callibaetis sp*	+
11250	*Centroptilum sp (w/o hindwing pads)*	+
13400	*Stenacron sp*	416 +
13521	*Stenonema femoratum*	2 +
13570	*Stenonema terminatum*	+
17200	*Caenis sp*	+
21300	*Hetaerina sp*	1 +
22001	*Coenagrionidae*	+
22300	*Argia sp*	5 +
28500	*Libellula sp*	+
47600	*Sialis sp*	+
52200	*Cheumatopsyche sp*	23 +
52530	*Hydropsyche depravata group*	1 +
60900	*Peltodytes sp*	+
65800	*Berosus sp*	+
68601	*Ancyronyx variegata*	+
68708	*Dubiraphia vittata group*	13 +
68901	*Macronychus glabratus*	5 +
69200	*Optioservus sp*	+
69400	*Stenelmis sp*	1 +
74100	*Simulium sp*	+
77500	*Conchapelopia sp*	16 +
77750	*Hayesomyia senata or Thienemannimyia norena*	16
77800	*Helopelopia sp*	3
78401	*Natarsia species A (sensu Roback, 1978)*	+
78450	*Nilotanypus fimbriatus*	13
80204	*Brillia flavifrons group*	+
80410	*Cricotopus (C.) sp*	30
80420	*Cricotopus (C.) bicinctus*	10 +
80430	*Cricotopus (C.) tremulus group*	10
81240	*Nanocladius (N.) distinctus*	3
82730	*Chironomus (C.) decorus group*	3 +
82820	*Cryptochironomus sp*	13 +
83040	*Dicrotendipes neomodestus*	3
84315	*Phaenopsectra flavipes*	3
84450	*Polypedilum (Uresipedilum) flavum*	13 +
84460	*Polypedilum (P.) fallax group*	20 +
84470	*Polypedilum (P.) illinoense*	16 +
84540	*Polypedilum (Tripodura) scalaenum group*	52 +
84790	*Tribelos fuscicorne*	7
85500	*Paratanytarsus sp*	26 +
85821	*Tanytarsus glabrescens group sp 7*	3
89700	*Limnophora sp*	+
95100	*Physella sp*	5 +
96900	*Ferrissia sp*	468 +

No. Quantitative Taxa: 37 Total Taxa: 54
No. Qualitative Taxa: 42 ICI: **30**
Number of Organisms: 1311 Qual EPT: 10

Ohio EPA/DSW Ecological Assessment Section
Macroinvertebrate Collection

Collection Date: 07/30/2002 River Code: 17-733 RM: 13.80 Site: Rocky Fork Mohican River upst. Touby

Taxa Code	Taxa	Quant/Qual
01320	*Hydra sp*	105
03360	*Plumatella sp*	1
03600	*Oligochaeta*	4
04964	*Mooreobdella microstoma*	1
05900	*Lirceus sp*	2
06201	*Hyalella azteca*	+
08260	*Orconectes (Crokerinus) sanbornii sanbornii*	+
11120	*Baetis flavistriga*	45
11645	*Procloeon sp*	1
13400	*Stenacron sp*	326 +
13521	*Stenonema femoratum*	12
17200	*Caenis sp*	2
22001	*Coenagrionidae*	2 +
22300	*Argia sp*	8
42700	*Belostoma sp*	+
45400	*Trichocorixa sp*	+
52200	*Cheumatopsyche sp*	100 +
52530	*Hydropsyche depravata group*	1 +
60900	*Peltodytes sp*	+
65800	*Berosus sp*	+
68901	*Macronychus glabratus*	2
77120	*Ablabesmyia mallochi*	4
77500	*Conchapelopia sp*	11
77750	*Hayesomyia senata or Thienemannimyia norena*	23
77800	*Helopelopia sp*	11
78450	*Nilotanypus fimbriatus*	15
78655	*Procladius (Holotanypus) sp*	4
80370	*Corynoneura lobata*	6
80420	*Cricotopus (C.) bicinctus*	4
81240	*Nanocladius (N.) distinctus*	11
82141	*Thienemanniella xena*	2
82730	*Chironomus (C.) decorus group*	54
82820	*Cryptochironomus sp*	4 +
83040	*Dicrotendipes neomodestus*	4
83300	*Glyptotendipes (G.) sp*	8 +
84460	*Polypedilum (P.) fallax group*	19
84470	*Polypedilum (P.) illinoense*	15 +
84540	*Polypedilum (Tripodura) scalaenum group*	61
85500	*Paratanytarsus sp*	42
95100	*Physella sp*	15 +
96900	*Ferrissia sp*	62

Taxa Code	Taxa	Quant/Qual

No. Quantitative Taxa: 35 Total Taxa: 41
No. Qualitative Taxa: 14 ICI: **36**
Number of Organisms: 987 Qual EPT: 3

Ohio EPA/DSW Ecological Assessment Section
Macroinvertebrate Collection

Collection Date: 07/30/2002 River Code: 17-733 RM: 13.60 Site: Rocky Fork Mohican River dst. Touby

Taxa Code	Taxa	Quant/Qual	
01320	*Hydra sp*	4	
01801	*Turbellaria*		+
03600	*Oligochaeta*	23	+
04964	*Mooreobdella microstoma*		+
05900	*Lirceus sp*	2	+
08260	*Orconectes (Crokerinus) sanbornii sanbornii*		+
11120	*Baetis flavistriga*	66	+
11130	*Baetis intercalaris*	2	+
13400	*Stenacron sp*	23	+
13521	*Stenonema femoratum*	18	+
17200	*Caenis sp*	1	
23909	*Boyeria vinosa*		+
42700	*Belostoma sp*		+
52200	*Cheumatopsyche sp*	97	+
52431	*Ceratopsyche morosa*	3	+
52440	*Ceratopsyche slossonae*	1	
52530	*Hydropsyche depravata group*	70	+
68901	*Macronychus glabratus*	7	
69400	*Stenelmis sp*	12	+
71900	*Tipula sp*		+
74100	*Simulium sp*	9	+
77500	*Conchapelopia sp*	88	
77750	*Hayesomyia senata or Thienemannimyia norena*	47	+
77800	*Helopelopia sp*	7	+
78401	*Natarsia species A (sensu Roback, 1978)*		+
78450	*Nilotanypus fimbriatus*	20	
80410	*Cricotopus (C.) sp*	7	+
80430	*Cricotopus (C.) tremulus group*	7	
81240	*Nanocladius (N.) distinctus*	7	
81650	*Parametriocnemus sp*	7	
81825	*Rheocricotopus (Psilocricotopus) robacki*	14	
82141	*Thienemanniella xena*	12	+
82730	*Chironomus (C.) decorus group*	20	+
82820	*Cryptochironomus sp*	14	+
83002	*Dicrotendipes modestus*		+
84450	*Polypedilum (Uresipedilum) flavum*	20	+
84460	*Polypedilum (P.) fallax group*	81	
84470	*Polypedilum (P.) illinoense*	7	
84540	*Polypedilum (Tripodura) scalaenum group*	359	+
84800	*Tribelos jucundum*		+
85821	*Tanytarsus glabrescens group sp 7*	14	
87540	*Hemerodromia sp*	7	+
96900	*Ferrissia sp*	77	

Taxa Code	Taxa	Quant/Qual

No. Quantitative Taxa: 34 Total Taxa: 43
No. Qualitative Taxa: 29 ICI: **32**
Number of Organisms: 1153 Qual EPT: 7

Ohio EPA/DSW Ecological Assessment Section
Macroinvertebrate Collection

Collection Date: 07/30/2002 River Code: 17-734 RM: 0.40 Site: Touby Run Main St.

Taxa Code	Taxa	Quant/Qual	
01320	*Hydra sp*	4	
01801	*Turbellaria*	9	+
03360	*Plumatella sp*		+
03600	*Oligochaeta*	7	+
04964	*Mooreobdella microstoma*		+
05900	*Lirceus sp*	27	+
08260	*Orconectes (Crokerinus) sanbornii sanbornii*		+
08601	*Hydracarina*	1	
11120	*Baetis flavistriga*	311	+
13400	*Stenacron sp*	2	+
13521	*Stenonema femoratum*	60	+
21200	*Calopteryx sp*		+
52200	*Cheumatopsyche sp*	21	
52430	*Ceratopsyche morosa group*	2	+
52530	*Hydropsyche depravata group*	3	+
53800	*Hydroptila sp*	1	+
63300	*Hydroporus sp*		+
63900	*Laccophilus sp*		+
69400	*Stenelmis sp*	5	+
74100	*Simulium sp*	30	+
77120	*Ablabesmyia mallochi*	3	
77500	*Conchapelopia sp*	43	+
77750	*Hayesomyia senata or Thienemannimyia norena*		+
77800	*Helopelopia sp*	7	
78350	*Meropelopia sp*	3	
78450	*Nilotanypus fimbriatus*	10	
80204	*Brillia flavifrons group*	3	
80370	*Corynoneura lobata*	29	
80410	*Cricotopus (C.) sp*	3	+
80420	*Cricotopus (C.) bicinctus*	7	+
80430	*Cricotopus (C.) tremulus group*	3	
81231	*Nanocladius (N.) crassicornus or N. (N.) "rectinervis"*		+
81650	*Parametriocnemus sp*	10	
81825	*Rheocricotopus (Psilocricotopus) robacki*	17	+
82141	*Thienemanniella xena*	26	+
82730	*Chironomus (C.) decorus group*	3	+
84315	*Phaenopsectra flavipes*		+
84450	*Polypedilum (Uresipedilum) flavum*	7	
84460	*Polypedilum (P.) fallax group*	7	+
84470	*Polypedilum (P.) illinoense*	27	+
84540	*Polypedilum (Tripodura) scalaenum group*	30	+
84750	*Stictochironomus sp*		+
84790	*Tribelos fuscicorne*	3	

Taxa Code	Taxa	Quant/Qual
85400	*Micropsectra sp*	10
85500	*Paratanytarsus sp*	13
85625	*Rheotanytarsus sp*	23
85800	*Tanytarsus sp*	33
85821	*Tanytarsus glabrescens group sp 7*	36
87540	*Hemerodromia sp*	3
95100	*Physella sp*	1
96900	*Ferrissia sp*	214

No. Quantitative Taxa: 41 Total Taxa: 51
No. Qualitative Taxa: 30 ICI: **42**
Number of Organisms: 1057 Qual EPT: 6

Ohio EPA/DSW Ecological Assessment Section
Macroinvertebrate Collection

Collection Date: 07/30/2002 River Code: 17-734 RM: 0.10 Site: Touby Run at mouth

Taxa Code	Taxa	Quant/Qual
01801	*Turbellaria*	12 +
03600	*Oligochaeta*	64 +
04680	*Placobdella sp*	+
04964	*Mooreobdella microstoma*	2 +
05900	*Lirceus sp*	8 +
08260	*Orconectes (Crokerinus) sanbornii sanbornii*	+
08601	*Hydracarina*	+
11120	*Baetis flavistriga*	230 +
13400	*Stenacron sp*	35 +
13521	*Stenonema femoratum*	121 +
21300	*Hetaerina sp*	+
22001	*Coenagrionidae*	1 +
23600	*Aeshna sp*	+
23909	*Boyeria vinosa*	+
45300	*Sigara sp*	+
52200	*Cheumatopsyche sp*	1 +
52430	*Ceratopsyche morosa group*	+
52530	*Hydropsyche depravata group*	1 +
53800	*Hydroptila sp*	34 +
60900	*Peltodytes sp*	+
63900	*Laccophilus sp*	+
65800	*Berosus sp*	+
67500	*Laccobius sp*	+
67800	*Tropisternus sp*	+
69400	*Stenelmis sp*	+
71900	*Tipula sp*	4 +
74100	*Simulium sp*	+
77120	*Ablabesmyia mallochi*	+
77500	*Conchapelopia sp*	185
77750	*Hayesomyia senata or Thienemannimyia norena*	28
77800	*Helopelopia sp*	14 +
78450	*Nilotanypus fimbriatus*	14
78655	*Procladius (Holotanypus) sp*	+
80370	*Corynoneura lobata*	184
80410	*Cricotopus (C.) sp*	+
80420	*Cricotopus (C.) bicinctus*	71 +
80430	*Cricotopus (C.) tremulus group*	43 +
80490	*Cricotopus (Isocladius) intersectus group*	+
81200	*Nanocladius sp*	+
82141	*Thienemanniella xena*	16
82730	*Chironomus (C.) decorus group*	+
83003	*Dicrotendipes fumidus*	28
83040	*Dicrotendipes neomodestus*	14
84300	*Phaenopsectra obediens group*	28
84460	*Polypedilum (P.) fallax group*	14
84475	*Polypedilum (P.) ophioides*	+
84540	*Polypedilum (Tripodura) scalaenum group*	241 +
85500	*Paratanytarsus sp*	170 +
85800	*Tanytarsus sp*	28
85821	*Tanytarsus glabrescens group sp 7*	170 +
87540	*Hemerodromia sp*	9
89700	*Limnophora sp*	+
94400	*Fossaria sp*	1 +
95100	*Physella sp*	2 +
96900	*Ferrissia sp*	44

No. Quantitative Taxa: 32 Total Taxa: 55
No. Qualitative Taxa: 43 ICI: **42**
Number of Organisms: 1817 Qual EPT: 7

Appendix Table 9. Rocky Fork Mohican River and Touby Run, 2002. IBI and MIwb scores and metrics.

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
Rocky Fk. Mohican R. - (17-733)																
Year: 2002																
14.30	D	06/18/2002	19.3	17(5)	8(5)	1(1)	4(3)	3(3)	7(3)	67(1)	53(1)	57(1)	33(3)	0.0(5)	498(3)	34
14.30	D	08/15/2002	19.3	18(5)	10(5)	1(1)	3(1)	2(1)	6(3)	56(1)	42(1)	59(1)	41(3)	0.1(5)	806(5)	32
14.10	D	06/18/2002	19.5	18(5)	9(5)	2(3)	4(3)	2(1)	7(3)	81(1)	66(1)	62(1)	23(1)	1.2(3)	138(1)	28
14.10	D	08/15/2002	19.5	15(3)	7(5)	0(1)	4(3)	2(1)	6(3)	86(1)	71(1)	65(1)	19(1)	0.3(3)	143(1)	24
14.00	D	08/15/2002	19.6	19(5)	8(5)	1(1)	4(3)	2(1)	7(3)	77(1)	69(1)	64(1)	23(1)	0.6(3)	331(3)	28
14.00	D	06/18/2002	19.6	20(5)	10(5)	2(3)	3(1)	2(1)	6(3)	74(1)	63(1)	62(1)	30(3)	0.5(3)	338(3)	30
13.80	D	08/12/2002	19.7	19(5)	7(5)	0(1)	2(1)	1(1)	4(3)	67(1)	61(1)	21(5)	35(3)	3.8(1)	215(3)	30
13.80	D	06/19/2002	19.7	18(5)	6(3)	1(1)	2(1)	1(1)	4(3)	72(1)	58(1)	40(3)	37(3)	0.2(5)	176(1)	28
Touby Run - (17-734)																
Year: 2002																
0.40	E	06/18/2002	9.6	12(3)	6(3)	1(1)	2(1)	3(3)	6(5)	61(1)	11(5)	29(5)	32(3)	0.2(5)	336(3)	38
0.40	E	08/15/2002	9.6	15(5)	8(5)	3(3)	1(1)	2(3)	5(3)	51(3)	21(3)	39(3)	42(3)	0.1(5)	886(5)	42
0.10	D	06/19/2002	9.7	11(3)	7(5)	1(1)	1(1)	1(1)	3(3)	73(1)	24(3)	62(1)	24(3)	0.0(5)	296(3)	30
0.10	D	08/12/2002	9.7	14(3)	8(5)	3(3)	3(3)	3(3)	6(5)	62(1)	10(5)	36(3)	24(3)	0.1(5)	758(5)	44

▲ - IBI is low end adjusted.

* - < 200 Total individuals in sample

** - < 50 Total individuals in sample

● - One or more species excluded from IBI calculation.

09/24/2002

Appendix Table 9. Rocky Fork Mohican River and Touby Run, 2002. IBI and MIwb scores and metrics.

River Mile	Type	Date	Drainage area (sq mi)	Number of: Total species	Sunfish species	Sucker species	Intolerant species	Darter species	Percent of Individuals: Simple Lithophils	Tolerant fishes	Omni-vores	Top carnivores	Insect-ivores	DELT anomalies	Rel.No. minus tolerants /(0.3km)	IBI	Modified Iwb
Rocky Fk. Mohican R. - (17733)																	
Year: 2002																	
13.60	D	08/12/2002	29	16(3)	2(3)	2(3)	1(1)	3(3)	43(5)	55(1)	36(1)	0.0(1)	44(3)	0.6(3)	788(5)	32	8.2
13.60	D	06/19/2002	29	19(5)	2(3)	3(3)	1(1)	3(3)	44(5)	66(1)	42(1)	0.1(1)	30(3)	0.3(3)	516(3)	32	7.9

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.

Appendix Table 10

Fish species, relative numbers, and relative weight of fish collected from the Rocky Fork Mohican River and Touby Run, 2002.

River Code: **17-733**	Stream: **Rocky Fork Mohican River**	Sample Date: **2002**
River Mile: **14.30**	Location: upst. Longview Ave	Date Range: 06/18/2002
Time Fished: 6120 sec	Drainage: 19.3 sq mi	Thru: 08/15/2002
Dist Fished: 0.40 km	Basin: Muskingum 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
Northern Hog Sucker	R	I	S	M	4	3.00	0.18	0.12	1.23	40.50
White Sucker	W	O	S	T	239	179.25	10.81	4.11	41.37	22.92
Common Carp	G	O	M	T	1	0.75	0.05	0.02	0.15	20.00
Blacknose Dace	N	G	S	T	79	59.25	3.57	0.15	1.49	2.49
Creek Chub	N	G	N	T	181	135.75	8.19	1.66	16.73	12.24
Striped Shiner	N	I	S		74	55.50	3.35	0.31	3.07	5.50
Common Shiner	N	I	S		158	118.50	7.15	0.57	5.70	4.77
Spotfin Shiner	N	I	M		1	0.75	0.05	0.00	0.04	5.00
Sand Shiner	N	I	M	M	98	73.50	4.43	0.13	1.33	1.80
Silverjaw Minnow	N	I	M		53	39.75	2.40	0.08	0.80	2.00
Fathead Minnow	N	O	C	T	2	1.50	0.09	0.00	0.05	3.00
Bluntnose Minnow	N	O	C	T	793	594.75	35.88	1.24	12.44	2.08
Central Stoneroller	N	H	N		74	55.50	3.35	0.30	3.06	5.47
Striped Sh X Common Sh		I			9	6.75	0.41	0.08	0.81	11.88
Black Bullhead		I	C	P	1	0.75	0.05	0.00	0.05	6.00
Largemouth Bass	F	C	C		8	6.00	0.36	0.11	1.06	17.50
Green Sunfish	S	I	C	T	46	34.50	2.08	0.45	4.53	13.04
Bluegill Sunfish	S	I	C	P	24	18.00	1.09	0.09	0.89	4.89
Pumpkinseed Sunfish	S	I	C	P	5	3.75	0.23	0.01	0.15	3.80
Green Sf X Bluegill Sf					1	0.75	0.05	0.03	0.27	36.00
Johnny Darter	D	I	C		204	153.00	9.23	0.15	1.51	0.98
Greenside Darter	D	I	S	M	153	114.75	6.92	0.33	3.29	2.85
Banded Darter	D	I	S	I	2	1.50	0.09	0.00	0.03	2.00
	Mile Total				2,210	1,657.50		9.93		
	Number of Species				21					
	Number of Hybrids				2					

River Code: **17-733**	Stream: **Rocky Fork Mohican River**	Sample Date: **2002**
River Mile: **14.10**	Location: upst. main St.	Date Range: 06/18/2002
Time Fished: 5520 sec	Drainage: 19.5 sq mi	Thru: 08/15/2002
Dist Fished: 0.40 km	Basin: Muskingum 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
Shorthead Redhorse	R	I	S	M	3	2.25	0.26	0.18	1.92	81.33
Northern Hog Sucker	R	I	S	M	1	0.75	0.09	0.03	0.33	42.00
White Sucker	W	O	S	T	294	220.50	25.30	5.51	57.76	25.00
Blacknose Dace	N	G	S	T	1	0.75	0.09	0.00	0.03	3.00
Creek Chub	N	G	N	T	104	78.00	8.95	1.29	13.53	16.56
Rosyface Shiner	N	I	S	I	1	0.75	0.09	0.00	0.04	5.00
Striped Shiner	N	I	S		20	15.00	1.72	0.11	1.13	7.15
Common Shiner	N	I	S		41	30.75	3.53	0.16	1.62	5.03
Sand Shiner	N	I	M	M	10	7.50	0.86	0.02	0.18	2.31
Silverjaw Minnow	N	I	M		12	9.00	1.03	0.17	1.79	18.92
Bluntnose Minnow	N	O	C	T	508	381.00	43.72	0.97	10.16	2.55
Central Stoneroller	N	H	N		4	3.00	0.34	0.04	0.38	12.00
Largemouth Bass	F	C	C		11	8.25	0.95	0.25	2.66	30.73
Green Sunfish	S	I	C	T	68	51.00	5.85	0.63	6.64	12.43
Bluegill Sunfish	S	I	C	P	28	21.00	2.41	0.10	1.05	4.79
Pumpkinseed Sunfish	S	I	C	P	2	1.50	0.17	0.01	0.06	4.00
Johnny Darter	D	I	C		47	35.25	4.04	0.05	0.54	1.45
Greenside Darter	D	I	S	M	5	3.75	0.43	0.02	0.17	4.20
Brook Stickleback		I	C		2	1.50	0.17	0.00	0.03	1.50
Mile Total					1,162	871.50		9.54		
Number of Species					19					
Number of Hybrids					0					

River Code: **17-733**	Stream: **Rocky Fork Mohican River**	Sample Date: **2002**
River Mile: **14.00**	Location: dst. Main St.	Date Range: 06/18/2002
Time Fished: 4800 sec	Drainage: 19.6 sq mi	Thru: 08/15/2002
Dist Fished: 0.44 km	Basin: Muskingum 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
Shorthead Redhorse	R	I	S	M	5	3.41	0.25	0.22	1.43	63.80
Northern Hog Sucker	R	I	S	M	1	0.68	0.05	0.02	0.11	25.00
White Sucker	W	O	S	T	328	223.64	16.44	6.09	40.10	27.21
Common Carp	G	O	M	T	6	4.09	0.30	3.83	25.25	936.72
Golden Shiner	N	I	M	T	1	0.68	0.05	0.03	0.21	47.00
Blacknose Dace	N	G	S	T	27	18.41	1.35	0.05	0.30	2.48
Creek Chub	N	G	N	T	74	50.45	3.71	0.78	5.15	15.48
Striped Shiner	N	I	S		62	42.27	3.11	0.26	1.71	6.15
Common Shiner	N	I	S		138	94.09	6.92	0.50	3.32	5.35
Spotfin Shiner	N	I	M		1	0.68	0.05	0.01	0.04	8.00
Sand Shiner	N	I	M	M	33	22.50	1.65	0.06	0.38	2.55
Silverjaw Minnow	N	I	M		48	32.73	2.41	0.07	0.45	2.10
Bluntnose Minnow	N	O	C	T	989	674.32	49.57	1.77	11.68	2.63
Central Stoneroller	N	H	N		37	25.23	1.85	0.16	1.08	6.49
Striped Sh X Common Sh		I			2	1.36	0.10	0.01	0.07	8.00
Black Bullhead		I	C	P	6	4.09	0.30	0.09	0.58	21.50
White Crappie	S	I	C		1	0.68	0.05	0.02	0.14	30.00
Largemouth Bass	F	C	C		7	4.77	0.35	0.20	1.32	42.14
Green Sunfish	S	I	C	T	79	53.86	3.96	0.58	3.79	10.68
Bluegill Sunfish	S	I	C	P	33	22.50	1.65	0.26	1.72	11.61
Pumpkinseed Sunfish	S	I	C	P	4	2.73	0.20	0.02	0.13	7.25
Green Sf X Bluegill Sf					1	0.68	0.05	0.02	0.14	31.00
Johnny Darter	D	I	C		67	45.68	3.36	0.06	0.41	1.35
Greenside Darter	D	I	S	M	41	27.95	2.06	0.07	0.48	2.59
Brook Stickleback		I	C		4	2.73	0.20	0.00	0.02	1.00
	Mile Total				1,995	1,360.23		15.18		
	Number of Species				23					
	Number of Hybrids				2					

River Code: **17-733**	Stream: **Rocky Fork Mohican River**	Sample Date: **2002**
River Mile: **13.80**	Location: upst. Touby Run	Date Range: 06/19/2002
Time Fished: 4380 sec	Drainage: 19.7 sq mi	Thru: 08/12/2002
Dist Fished: 0.40 km	Basin: Muskingum 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		29	21.75	3.43	3.06	8.32	140.88
Shorthead Redhorse	R	I	S	M	4	3.00	0.47	0.20	0.55	68.00
White Sucker	W	O	S	T	329	246.75	38.89	14.31	38.87	58.00
Common Carp	G	O	M	T	11	8.25	1.30	13.90	37.75	1,684.51
Goldfish	G	O	M	T	1	0.75	0.12	0.11	0.31	150.00
Creek Chub	N	G	N	T	28	21.00	3.31	0.37	1.02	17.79
Striped Shiner	N	I	S		29	21.75	3.43	0.14	0.37	6.21
Common Shiner	N	I	S		73	54.75	8.63	0.33	0.89	6.01
Spotfin Shiner	N	I	M		1	0.75	0.12	0.00	0.00	2.00
Sand Shiner	N	I	M	M	2	1.50	0.24	0.00	0.01	3.00
Silverjaw Minnow	N	I	M		2	1.50	0.24	0.00	0.00	1.00
Bluntnose Minnow	N	O	C	T	133	99.75	15.72	2.11	5.74	21.16
Central Stoneroller	N	H	N		1	0.75	0.12	0.00	0.01	6.00
Yellow Bullhead		I	C	T	1	0.75	0.12	0.03	0.08	41.00
Brown Bullhead		I	C	T	3	2.25	0.35	0.27	0.73	118.67
Black Bullhead		I	C	P	16	12.00	1.89	0.81	2.19	67.14
Trout-perch		I	M		1	0.75	0.12	0.01	0.02	8.00
White Crappie	S	I	C		2	1.50	0.24	0.07	0.18	44.50
Rock Bass	S	C	C		1	0.75	0.12	0.05	0.15	72.00
Largemouth Bass	F	C	C		7	5.25	0.83	0.16	0.44	31.00
Green Sunfish	S	I	C	T	80	60.00	9.46	0.48	1.30	7.98
Bluegill Sunfish	S	I	C	P	72	54.00	8.51	0.27	0.72	4.91
Pumpkinseed Sunfish	S	I	C	P	4	3.00	0.47	0.02	0.06	6.75
Green Sf X Bluegill Sf					2	1.50	0.24	0.04	0.10	24.00
Green Sf X Hybrid					1	0.75	0.12	0.05	0.13	62.00
Johnny Darter	D	I	C		11	8.25	1.30	0.03	0.07	3.01
Brook Stickleback		I	C		2	1.50	0.24	0.00	0.00	1.00
	Mile Total				846	634.50		36.82		
	Number of Species				25					
	Number of Hybrids				2					

River Code: **17-733**	Stream: **Rocky Fork Mohican River**	Sample Date: **2002**
River Mile: **13.60**	Location: dst. Touby Run	Date Range: 06/19/2002
Time Fished: 5940 sec	Drainage: 29.5 sq mi	Thru: 08/12/2002
Dist Fished: 0.40 km	Basin: Muskingum 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
Shorthead Redhorse	R	I	S	M	6	4.50	0.27	0.29	1.97	65.22
Northern Hog Sucker	R	I	S	M	14	10.50	0.64	0.72	4.80	68.29
White Sucker	W	O	S	T	269	201.75	12.31	6.31	42.23	31.29
Blacknose Dace	N	G	S	T	178	133.50	8.15	0.33	2.21	2.48
Creek Chub	N	G	N	T	224	168.00	10.25	2.66	17.79	15.83
South. Redbelly Dace	N	H	S		1	0.75	0.05	0.00	0.01	2.00
Striped Shiner	N	I	S		38	28.50	1.74	0.23	1.52	7.95
Common Shiner	N	I	S		278	208.50	12.72	1.38	9.20	6.60
Sand Shiner	N	I	M	M	40	30.00	1.83	0.10	0.66	3.30
Silverjaw Minnow	N	I	M		21	15.75	0.96	0.04	0.27	2.60
Fathead Minnow	N	O	C	T	2	1.50	0.09	0.01	0.04	3.50
Bluntnose Minnow	N	O	C	T	582	436.50	26.64	1.11	7.44	2.55
Central Stoneroller	N	H	N		105	78.75	4.81	0.61	4.06	7.71
Black Bullhead		I	C	P	1	0.75	0.05	0.01	0.06	12.00
Largemouth Bass	F	C	C		1	0.75	0.05	0.01	0.05	10.00
Green Sunfish	S	I	C	T	61	45.75	2.79	0.56	3.75	12.23
Bluegill Sunfish	S	I	C	P	11	8.25	0.50	0.06	0.42	7.64
Johnny Darter	D	I	C		193	144.75	8.83	0.18	1.20	1.24
Greenside Darter	D	I	S	M	151	113.25	6.91	0.33	2.22	2.94
Banded Darter	D	I	S	I	9	6.75	0.41	0.02	0.10	2.22
	Mile Total				2,185	1,638.75		14.95		
	Number of Species				20					
	Number of Hybrids				0					

River Code: **17-734**	Stream: **Touby Run**	Sample Date: **2002**
River Mile: **0.40**	Location: Main St.	Date Range: 06/18/2002
Time Fished: 3960 sec	Drainage: 9.6 sq mi	Thru: 08/15/2002
Dist Fished: 0.30 km	Basin: Muskingum River No of Passes: 2	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	33.00	2.46			
Blacknose Dace	N	G	S	T	332	332.00	24.76			
Creek Chub	N	G	N	T	112	112.00	8.35			
South. Redbelly Dace	N	H	S		3	3.00	0.22			
Striped Shiner	N	I	S		5	5.00	0.37			
Common Shiner	N	I	S		306	306.00	22.82			
Silverjaw Minnow	N	I	M		71	71.00	5.29			
Fathead Minnow	N	O	C	T	1	1.00	0.07			
Bluntnose Minnow	N	O	C	T	204	204.00	15.21			
Central Stoneroller	N	H	N		127	127.00	9.47			
Largemouth Bass	F	C	C		6	6.00	0.45			
Green Sunfish	S	I	C	T	48	48.00	3.58			
Bluegill Sunfish	S	I	C	P	5	5.00	0.37			
Johnny Darter	D	I	C		42	42.00	3.13			
Greenside Darter	D	I	S	M	44	44.00	3.28			
Banded Darter	D	I	S	I	1	1.00	0.07			
Brook Stickleback		I	C		1	1.00	0.07			
	Mile Total				1,341	1,341.00				
	Number of Species				17					
	Number of Hybrids				0					

River Code: **17-734**	Stream: **Touby Run**	Sample Date: **2002**
River Mile: **0.10**	Location: at mouth	Date Range: 06/19/2002
Time Fished: 3900 sec	Drainage: 9.7 sq mi	Thru: 08/12/2002
Dist Fished: 0.30 km	Basin: Muskingum 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
White Sucker	W	O	S	T	6	6.00	0.39			
Blacknose Dace	N	G	S	T	527	527.00	33.93			
Creek Chub	N	G	N	T	256	256.00	16.48			
South. Redbelly Dace	N	H	S		2	2.00	0.13			
Common Shiner	N	I	S		135	135.00	8.69			
Sand Shiner	N	I	M	M	12	12.00	0.77			
Silverjaw Minnow	N	I	M		80	80.00	5.15			
Bluntnose Minnow	N	O	C	T	225	225.00	14.49			
Central Stoneroller	N	H	N		167	167.00	10.75			
Green Sunfish	S	I	C	T	12	12.00	0.77			
Bluegill Sunfish	S	I	C	P	1	1.00	0.06			
Johnny Darter	D	I	C		126	126.00	8.11			
Greenside Darter	D	I	S	M	2	2.00	0.13			
Banded Darter	D	I	S	I	1	1.00	0.06			
Brook Stickleback		I	C		1	1.00	0.06			
Mile Total					1,553	1,553.00				
Number of Species					15					
Number of Hybrids					0					