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Division of Surface Water

Fish Community Aquatic Life Use Attainment Study Upper Mainstem Ashtabula River, 2007

Ashtabula County

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August 20, 2007

Ted Strickland, Governor

Chris Korleski, Director

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SUMMARY

Fish community assessments were conducted at three locations in 2007 along the upper reaches of the Ashtabula River mainstem in Ashtabula County to determine the attainment status for the Warmwater Habitat (WWH) aquatic life use. The objectives of the study were to verify that the WWH aquatic life use is the appropriate aquatic life use designation for this portion of the Ashtabula River and to determine if the fish communities were meeting the biological water quality criteria based on ecoregional expectations set in the Ohio Water Quality Standards. A 1995 survey of the Ashtabula River had found that this reach of the Ashtabula River was only in partial attainment of the biological water quality criteria based upon non-attainment of one of the two biological indices used to assess fish community performance based upon a sampling location at river mile (RM) 19.1 (Benetka Rd.). The 1995 survey found that the Ashtabula River mainstem was fully attaining the biological criterion for the macroinvertebrate communities at all locations monitored. The 2007 survey did not include an assessment of the macroinvertebrate communities.

The 2007 fish community survey included assessments at three locations between RM's 13.90 and 20.5, including re-sampling of the Benetka Rd. (RM 19.03) location. Habitat quality as assessed by the Qualitative Habitat Evaluation Index (QHEI) was found to be more than suitable to support the WWH aquatic life use throughout the monitored reach. Electrofishing survey results for both the Index of Biotic Integrity (IBI) and the Modified Index of Well-Being (MIwb) were in FULL attainment of the ecoregional criteria set in the Ohio Water Quality Standards for fish community integrity at the Benetka Rd. (RM 19.03) location and the two sites upstream and downstream (Table 1).

A total of 24 fish species were collected during the survey. Most notable among the species collected were the northern bigeye chub (*Hybopsis amplops amplops*) and the northern mimic shiner (*Notropis volucellus volucellus*), both listed as declining fish species in Ohio. Healthy populations of both species were found at all three sampling locations in 2007. In addition, all three sites supported robust populations of rock bass (*Ambloplites rupestris*) and smallmouth bass (*Micropterus dolomieu*) in size ranges suitable to support excellent recreational fishing opportunities.

Threats to the reach of the Ashtabula River included in the 2007 survey include: 1) natural geological and hydrological conditions within the watershed that result in extremely low summertime base flows; and 2) the presence of sea lamprey (*Petromyzon marinus*) which was confirmed through the collection of a transformer size ammocete (larval form ready to migrate to Lake Erie as an adult). The underlying geology for the Ashtabula River results in extremely low summertime base flows because of low rates of groundwater discharge to surface waters in the watershed. Shale bedrock overlain by thin tills with very low groundwater yields characterizes much of the watershed.

The presence of larval sea lamprey in the Ashtabula River study area indicates that the river is breeding habitat for this invasive species. However, the relative importance of the Ashtabula River to the sea lamprey population in Lake Erie is currently unknown. Given the past history of high non-target species mortality associated with lampricide (poison targeted to selectively kill sea lamprey) treatments in the nearby Grand River and Conneaut Creek, it is recommended that lampricide treatments of the Ashtabula be avoided. The Ashtabula River has lower base flows and a more drastic flow duration curve than either the Grand River or Conneaut Creek, thus making it even more susceptible to unpredictable changes in chemical toxicity.

It is recommended that the WWH Aquatic Life Use be maintained for the entire mainstem of the Ashtabula River. In addition, based upon the presence of thriving populations of two declining fish species, the bigeye chub and the mimic shiner at all of the monitored sites, it is recommended that the Superior High Quality Water designation under the provisions of OAC Rule 345-1-05 (E) for the Ashtabula River be maintained based upon the exceptional ecological values the river provides. Finally, based upon recommendations from the Ohio DNR Division of Wildlife, it is also recommended that the Seasonal Salmonid Habitat use defined in OAC 3745-1-07 (B)(1)(e) be extended upstream an additional 4.24 miles to RM 10.04 (the ford at Hadlock Rd.).

Table 1. Aquatic life use attainment status for stations surveyed along the Ashtabula River mainstem, 2007.

River Mile (Drainage mi ²)	IBI	MIwb	ICI	QHEI	Attainment Status	Comment
<i>Ashtabula River 07-001 (2007)</i>						
20.50 (92)	46	8.6	--	66.5	FULL ¹	low flows
19.00 (93)	48	8.5	--	78.0	FULL ¹	low flows
13.90 (106)	42	8.7	--	71.0	FULL ¹	low flows

Ecoregion Criteria: Erie Ontario Lake Plain

<u>Site Type</u>	IBI		MIwb	
	<u>WWH</u>	<u>EWH</u>	<u>WWH</u>	<u>EWH</u>
Wading	38	50	7.9	9.4

¹ Attainment status based upon comparison to the applicable biocriteria for the fish community as assessed in this study and 1995 Ohio EPA survey results determining that the macroinvertebrate community was in attainment of the applicable biocriterion.

INTRODUCTION

The Ohio Department of Natural Resources (ODNR), Division of Natural Areas and Preserves (DNAP) Scenic Rivers Program is currently (2007) conducting a study to determine if the Ashtabula River will be recommended for designation as a State Wild or Scenic River under the provisions of Chapter 1517 of the Ohio Revised Code. Part of the study includes a review of designated uses for the river as found in Chapter 3745-1 of the Ohio Administrative Code (OAC) as well as existing data regarding the attainment status with respect to applicable water quality criteria. Stream reaches that are not in attainment of at least the Warmwater Habitat (WWH) aquatic life use are generally not eligible for designation as State Scenic Rivers (Matthew Smith, ODNR DNAP, pers. comm.).

Useful biological and water quality data for the Ashtabula River upstream of the Lake Erie lacustrine portion (stream reaches above river mile 1.78) are included in a previous report prepared by Ohio EPA detailing the results of an intensive water quality survey conducted in 1995 (Ohio EPA, 1996). The results of this survey found one monitored location along the mainstem of the Ashtabula River (above the estuary and below the confluence of Ashtabula Creek and the West Branch) where the aquatic life was not considered in FULL attainment (Table 2). A site at river mile (RM) 19.1 (Benetka Rd.) was found to be in partial attainment of the biological criteria because of an imbalance in the fish community evidenced by a poor score for the Modified Index of Well Being (MIwb), one of the two indices used to assess fish community structure. The reason attributed for the partial attainment in the final study report was extreme low flow conditions that occurred during the summer of 1995 in the Ashtabula River. During that drought year, some locales along the Ashtabula River mainstem had no observable flowing water. All of the sites surveyed in 1995 were found to be in attainment of the biological criterion for macroinvertebrate communities.

The objectives of the 2007 fish community evaluations for the Ashtabula River were as follows:

1. verify that the existing WWH aquatic life use designation for the middle reach of the Ashtabula River mainstem is appropriate, and
2. determine the current attainment status with respect to the fish community as compared to the applicable biological criteria based upon the appropriate aquatic life use designation for the river.

Table 2. Aquatic life use attainment status for stations surveyed along the Ashtabula River mainstem, 1995 (Ohio EPA, 1996).

River Mile (Drainage mi ²)	IBI	Mlwb	ICI	QHEI	Attainment Status	Comment
Ashtabula River 07-001 (1995)						
27.2/26.6 (72)	42	8.6	32 ^{ns}	85	FULL	reference, low flows
19.1 (92)	47	7.1*	32 ^{ns}	76	PARTIAL	low flows
12.1/11.9 (107)	41	7.9	MG _a	78	FULL	low flows
6.3/-- (121)	42	8.1	--	73	FULL	suburban
3.5/3.6 (128)	36 ^{ns}	7.6 ^{ns}	46	64	FULL	urban
Ecoregion Criteria: Erie Ontario Lake Plain						
	IBI		Mlwb			
<u>Site Type</u>	<u>WWH</u>	<u>EWH</u>	<u>WWH</u>	<u>EWH</u>		
Headwaters (<20 mi ²)	40	50	NA	NA		
Wading	38	50	7.9	9.4		
Boat	40	48				

^a - Marginally Good: A qualitative narrative evaluation indicating attainment of the WWH biocriterion for macroinvertebrates based on best professional judgment and sample attributes such as community composition, EPT taxa richness, and QCTV scores was used when quantitative data were not available or considered unreliable due to current velocities less than 0.3 fps flowing over the artificial substrates.

^{ns} - Non-significant departure from biocriteria (<4 IBI units or <0.5 Mlwb units).

* - Indicates significant departure from applicable biocriteria (>4 IBI units or >0.5 Mlwb units).

STUDY AREA

The Ashtabula River is a tributary to Lake Erie that drains an area of 137.14 mi². The majority of the watershed is contained within Ashtabula County in Ohio, with 8.91 mi² located in Pennsylvania. The Ashtabula River mainstem originates in Munroe Township at the confluence of Ashtabula Creek and the West Branch Ashtabula River. The mainstem of the Ashtabula River is 27.55 miles long, beginning at the confluence of the East and West Branches and discharging into Lake Erie in the City of Ashtabula. The lacustrine portion (segment of the river where water levels vary with the elevation of Lake Erie) of the Ashtabula River extends to river mile 2.5. The Ashtabula River mainstem has an average gradient of 11.6 feet per mile, from an elevation of 1,033 to 573 feet above mean sea level. Principal tributaries to the Ashtabula River include Fields Brook, Hubbard Run, Ashtabula Creek, the West Branch, and the East Branch.

The physiographic setting of the Ashtabula River watershed is within the gently rolling dissected Grand River Low Plateau region of the Glaciated Allegheny Plateau, and is within the Erie-Ontario Lake Plain ecoregion (EOLP) for the

interpretation of biological data. The watershed geology is characterized by clayey low lime Wisconsinan age glacial tills deposited over deeply buried soft Devonian shales and near surface Mississippian age sandstones and shales. The lower Ashtabula River flows through the Erie Lake Plain, a low gradient coastal strip of lacustrine deposits resulting from the decline of pre-historic Lake Erie water levels following the retreat of the glaciers. The upper part of the watershed is dominated by low gradient and poorly drained ground moraines. Stream channel development within the middle reaches of the watershed, including the upper Ashtabula River mainstem, is dominated by glacial end moraines and the bedrock geology of the Portage Escarpment. The Portage Escarpment is a steep bedrock ridge paralleling the Lake Erie shoreline in northeast Ohio that constitutes the northern boundary of the Allegheny Plateau (Masteller et al., 1976). The escarpment dissects the Ashtabula River watershed, creating a high gradient stream reach where the channel has scoured to bedrock as it passes from the lower gradient upper watershed to the lake plain below.

Beneficial use designations for the Ashtabula River are listed in OAC Rule 3745-1-14. The entire Ashtabula River mainstem is currently designated with the WWH aquatic life use. The entire river is also designated for the Primary Contact Recreation, Agricultural Water Supply, and Industrial Water Supply uses as defined in OAC Rule 3745-1-07. In addition, the river is designated as a Seasonal Salmonid Habitat (SSH) stream from the mouth to State Route 11 (RM 5.8).

METHODS

All physical and biological field, data processing, and analysis methodologies and procedures utilized in this study adhere to those specified in the Manual of Ohio EPA Surveillance Methods and Quality Assurance Practices (Ohio EPA, 1989a, 2003) and Biological Criteria for the Protection of Aquatic Life, Volumes I-III and updates (Ohio EPA 1987a, 1987b, 1989b, 1989c, 2006). Qualitative Habitat Evaluation Index (QHEI) scores used to assess the habitat to support fish communities were derived and interpreted using the methodologies found in Rankin (1989, 1995) and Ohio EPA guidance (Ohio EPA, 2006c).

Use attainment status is a term describing the degree to which environmental indicators are either above or below criteria established in the Ohio Water Quality Standards (WQS) as promulgated in Chapter 3745-1 of the Ohio Administrative Code (OAC). Assessing aquatic life use attainment status involves a primary reliance upon biological water quality criteria developed by the Ohio EPA (Table 7-15 of OAC Rule 3745-1-07). These criteria are confined to ambient assessments and apply to rivers and streams outside of point source mixing zones. Numerical biological criteria are based upon multi-metric biological indices measuring the response of the lotic fish and macroinvertebrate

communities. Indices used to assess the fish community condition include the Index of Biotic Integrity (IBI) and the Modified Index of Well-Being (MIwb), while the Invertebrate Community Index (ICI) is used to assess macroinvertebrate community condition. The macroinvertebrate communities in the Ashtabula River were not assessed in this study.

Performance expectations for the basic aquatic life uses (Warmwater Habitat [WWH], Exceptional Warmwater Habitat [EWH], and Modified Warmwater Habitat [MWH] have been developed by the Ohio EPA using the regional reference site approach (Hughes et al., 1986; Omernik, 1987). This fits the practical definition of biological integrity as the biological performance of the natural habitats within a region (Karr and Dudley, 1981). Attainment of an aquatic life use is FULL if all three indices (or those available) meet the applicable criteria, PARTIAL if at least one of the indices did not attain and performance did not fall below the fair category, and NON if all indices either fail to attain or any index indicates poor or very poor performance.

Fish were collected within a 200-290 meter reach of the river using a long-line electrofishing unit (Ohio EPA, 1989b). All fish collected were identified to species, enumerated, weighed, and examined for external anomalies. Specimens were either returned to the river or preserved as voucher specimens for identification and storage at the Ohio State University Museum of Biodiversity. Weights were taken on a representative sub-sample if more than 15 individuals of a species were captured except in the case of small fish where either all individuals captured were weighed together or a sub-sample of at least 50 individuals were weighed.

Physical habitat was evaluated using the Qualitative Habitat Evaluation Index (QHEI) developed by the Ohio EPA for streams and rivers in Ohio (Rankin, 1989). Various attributes of the available habitat are scored based on their overall importance to the establishment of viable, diverse aquatic faunas. Evaluations of type and quality of substrate, amount of in-stream cover, channel morphology, extent of riparian canopy, pool and riffle development and quality, and stream gradient are among the metrics used to evaluate the characteristics of a stream segment, not just the characteristics of a single sampling site. As such, individual sites may have much poorer physical habitat due to a localized disturbance yet still support aquatic communities closely resembling those sampled at adjacent sites with better habitat, provided water quality conditions are similar.

RESULTS

All of the 2007 fish sampling locations were located in the upper portion of the Ashtabula River mainstem (Figure 1, Table 3). Land use within the study area is dominated by forest and mixed agricultural uses including hay production, low

density livestock production, and row crops. Housing densities are low, with very few homes located directly on the stream banks. The riparian corridor along the Ashtabula River within the study area was almost completely forested except for road and highway crossings, and the width of the wooded riparian corridor averages 300 feet throughout this portion of the river (Matthew Smith, ODNR, pers. comm.).

Table 3. Site location information for the 2007 fish community survey for the upper Ashtabula River mainstem, 2007.

River Mile	Station ID ¹	Location	Latitude	Longitude
20.50		State Rte 193	N 41.8467	W 80.6644
19.03	A01W20	Benetka Rd.	N 41.8485	W 80.6889
13.90		Green Hill Rd.	N 41.8516	W 80.7272

¹Identification code for the site from the STORET station code listing.

Physical Habitat for Aquatic Life

Fish habitat evaluations using the QHEI found that that fish habitat quality at all three fish sampling locations was suitable to support the WWH aquatic life use (Table 4). QHEI scores ranged from 66.5 to 78.5, with the highest score calculated at the Benetka Rd. (RM 19.03) location. Sites with habitat scores of 60 and above using the QHEI are considered to be suitable to support the WWH aquatic life use (Rankin, 1989). Bedrock substrates were prevalent throughout the study area, with boulders, boulder slabs, cobbles and gravels providing suitable substrates for riffle development and cover (Figure 2).

The available fish cover within the river at all three sites was deemed to be sparse to moderately sparse because of the limitation on pool depths resulting from the bedrock foundation of the stream channel. During high flow events the water energy cannot carve out deep pools in the hard bedrock. Instead, the energy is dissipated through widening of the stream channel, resulting in shallow water depths under low flow conditions. Woody debris does not tend to deposit within the low flow stream channel, but is instead deposited along the stream margins where it is unavailable as cover for the fish community under low flow conditions. The higher QHEI score at the Benetka Rd. (RM 19.03) site was largely the result of the presence of a deep pool (1.1 m) found beneath the covered bridge. This pool was likely formed through the focusing of water energy resulting from the constriction of the stream channel by the bridge abutments for the covered bridge at this location (Figure 3).

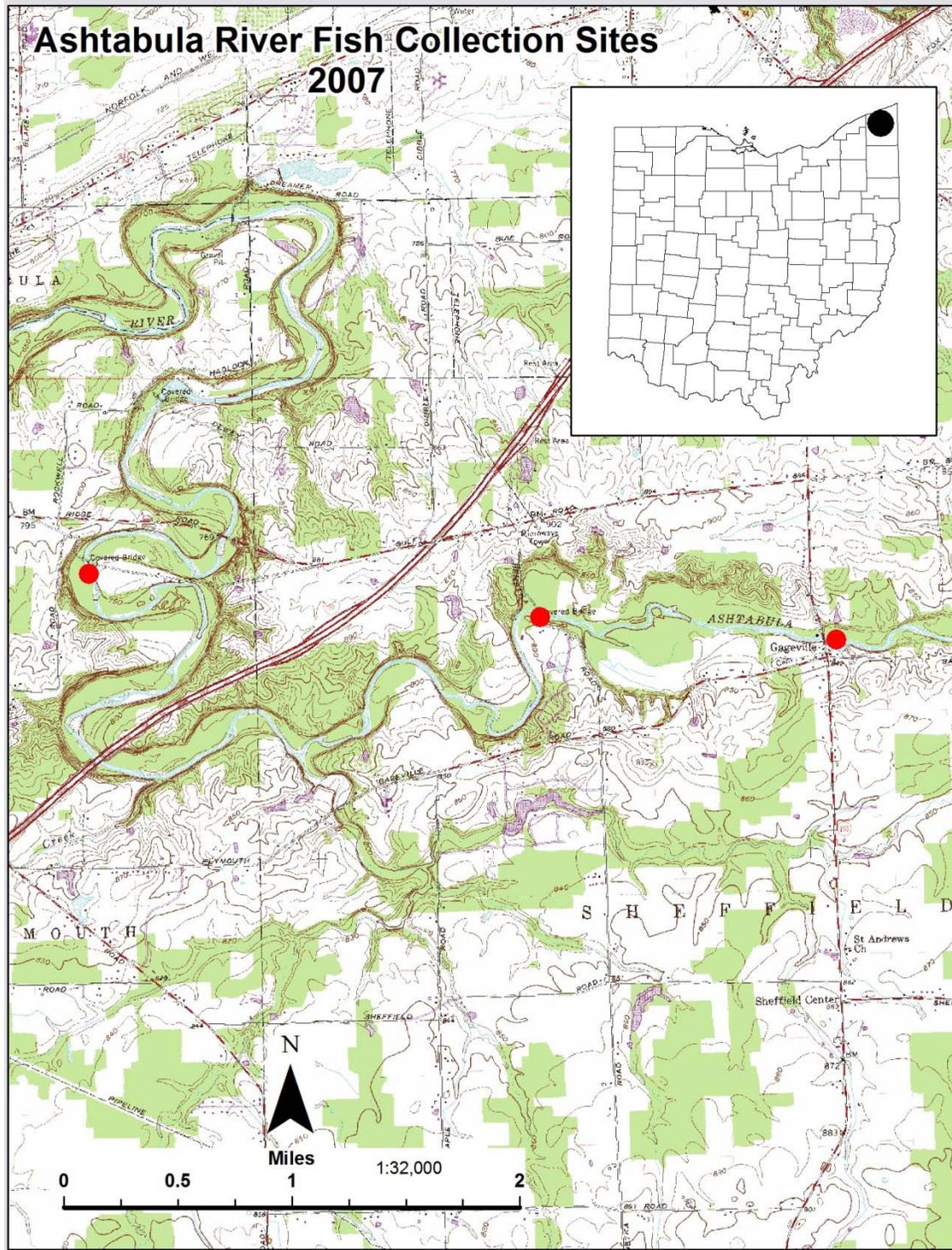


Figure 1. Fish community evaluation sites for the Ashtabula River, 2007.

Figure 3. The Benetka Rd. covered bridge (RM 19.03) over the Ashtabula River. Note how the bridge abutments constrict and focus the stream flow.



Fish Community Assessment

Assessments of the Ashtabula River mainstem using electrofishing methods found good to very good fish communities at all three of the sites monitored in 2007 (Table 5). Index of Biotic Integrity and MIwb scores were in FULL attainment of the ecoregional biocriteria for the WWH aquatic life use at all of the sites, and IBI scores were within the non-significant departure range for the EWH biocriterion at both the RM 20.5 (State Rte. 193) and the RM 19.03 (Benetka Rd.) sites. Most significant was the finding in 2007 that the RM 19.03 site was in FULL attainment for both the IBI and the MIwb, in contrast to the findings of the 1995 Ohio EPA survey (Table 6). Of the three sites assessed, the RM 19.03 site had the highest IBI score in 2007.

Notable among the species present in the collections were the presence of populations of the northern bigeye chub (*Notropis amblops amblops*) and northern mimic shiners (*Notropis volucellus volucellus*), both listed as declining species in Ohio (Table 5-2 of OAC Rule 3745-1-05). Both species were found in abundant numbers, averaging 3.9% and 20.9% of the fish collected (by number),

respectively. Predator species collected during the survey included smallmouth bass (*Micropterus dolomieu*) and rock bass (*Ambloplites rupestris*), which combined averaged 43.77% of the fish collected (by weight) in the survey area. Also observed at all of the sites were several small larval lampreys that could not be captured with the nets used in Ohio EPA electrofishing surveys. It is not known if these were native lamprey or invasive sea lamprey. However, one sea lamprey (*Petromyzon marinus*) ammocoete weighing 12 g was collected and vouchered at RM 19.03, a new record location for this species.

Information regarding the fish species collected, data collected for the calculation of the IBI and the Mlwb, and the IBI metric scores are found in the Appendices to this report.

Table 5. Fish community statistics for electrofishing assessments conducted in 2007 along the Ashtabula River.

River Mile	Number of Species	Rel. No. (no./0.3 km)	Rel. Wt. (kg./0.3 km)	Mlwb	IBI	Narrative Evaluation
20.50	19	716.9	11.50	8.6	46	Good/V. Good
19.03	21	515.0	14.41	8.5	48	Good/V. Good
13.90	16	667.5	8.86	8.7	42	Good

Ecoregion Biocriteria: Erie Ontario Lake Plain

<u>INDEX</u>	<u>WWH</u>	<u>EWH</u>
IBI - Wading	38	50
Mlwb - wading	7.9	9.4

Table 6. Fish community statistics for assessments conducted along the Ashtabula River mainstem in 1995.

River Mile	Mean Number Species	Total Number Species	Mean Rel. No. (no./0.3 km)	Mean Rel. Wt. (wt./0.3 km)	Mean Mlwb	Mean IBI	Narrative Evaluation
27.2	20.0	22	1037.3	8.1	8.6	42	Good
19.1	14.0	17	375.8	5.1	7.1*	47	Fair/V. Good
12.1	16.0	20	606.8	7.8	7.9	46	Good/V. Good
6.3	20.0	26	417.8	4.2	8.1	42	Good
3.5	18.5	22	754.6	2.1	7.6 ^{ns}	36 ^{ns}	M. Good

*Indicates a significant departure from the ecoregional biocriterion

^{ns}Indicates a non-significant departure from the ecoregional biocriterion (>4 IBI units, >0.5 Mlwb units)

DISCUSSION

The 2007 survey affirms that the WWH use is appropriate for the upper Ashtabula River mainstem, and that this portion of the stream is in FULL attainment of the biocriteria for fish. Habitat scores were more than adequate to support WWH fish communities, and there were no obvious qualitative signs of water quality impairment at any of the sites surveyed. The Superior High Quality Water designation for the mainstem of the river should also be maintained. Thriving populations of two declining species, the bigeye chub and the mimic shiner were found at all of the monitored sites in 2007 and in 1995. Maintaining water quality to protect these species and the habitat necessary for their survival should be a priority.

Differences in the MIwb scores at RM 19.03 between 1995 and 2007 can be attributed to the presence of additional fish species in the collection in 2007, and to better balance of relative weights within the sample among species. Ironically, the low MIwb score in 1995 was caused mainly as a result of the very high percentage of the relative weight being in top carnivore and darter species. Therefore, although this site had the highest IBI score found in the Ashtabula River mainstem in 1995 (Table 2), it was the only site to be found to be in NON attainment during that survey for fish. Performance of the fish community with respect to the MIwb in 2007 at all of the sites reflects the balanced fish community that would be expected in this high water quality stream.

The primary long-term threats to the water quality of the Ashtabula River are deforestation and suburban development in the watershed. As discussed in this report, the general characteristics of the Ashtabula watershed do not produce substantial groundwater-derived base flows in the river or its tributary streams. Therefore, summertime low flows are extremely low, especially during dry and drought conditions, often resulting in intermittent conditions in some portions of the river on an infrequent basis. Lack of sufficient low flow volumes in the stream is likely the main reason why the biological communities in the stream fail to reach the EWH aquatic life use. This condition is not indicative of water quality impairment, but is a natural limitation within this particular stream ecosystem.

Deforestation, especially within the stream corridor, can make the low flow conditions in the Ashtabula River significantly worse through changes to the local hydrologic regime caused by the removal of trees and the altering of the soils. Likewise, hardening of the watershed through the installation of impervious surfaces associated with urban and suburban development is also a threat to the hydrologic regime of the Ashtabula River. As the percentage of impervious surfaces in a watershed increases, the recharge of underlying groundwater decreases accompanied by more rapid transfer of runoff to surface waters. The result is higher peak flows and lower base flows. Given the extreme low flows experienced in the Ashtabula River under current conditions, it is extremely likely that unless caution is taken to insure that groundwater recharge areas and

critical forested tracts are protected, the water quality and ecological integrity of the river will be adversely affected. It is recommended that planning efforts be undertaken to develop a watershed management plan to guide these activities in the watershed.

The presence of larval sea lamprey in the upper portions of the Ashtabula River mainstem indicates that this reach is being used as breeding habitat for this invasive species. The relative importance of the Ashtabula River to the sea lamprey population in Lake Erie is currently unknown, but is currently (2007) being assessed by the U.S. Fish and Wildlife Service (USFWS) Sea Lamprey Control Unit. Past lampricide (poison targeted to selectively kill sea lamprey) treatments in the Grand River and Conneaut Creek have resulted in instances of high non-target species mortality resulting from variations in the toxicity of the chemical resulting from low flow conditions (increased contact time) and fluctuations in pH. To date, the Ashtabula River has never been treated with lampricide. It is recommended that lampricide treatments of the Ashtabula be avoided, since the river has lower base flows and a more drastic flow duration curve than either the Grand River or Conneaut Creek, thus making it even more susceptible to unpredictable changes in chemical toxicity.

Finally, Ohio EPA has received a recommendation from the Ohio DNR Division of Wildlife to extend the Seasonal Salmonid habitat (SSH) use defined in OAC 3745-1-07 (B)(1)(e) upstream from the present boundary of State Route 11 (RM 5.8) to RM 10.04 (the ford at Hadlock Rd.). The recommendation was made by Phil Hillman, the Fish Management Supervisor for the Ohio DNR District 3 Office (e mail dated July 18, 2007). It is recommended here that OAC Rule 3745-1-14 be revised to add this additional 4.24 miles of SSH use for the Ashtabula River.

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APPENDICES

River Mile	Type	Date	Drainage area (sq mi)	Number of					Percent of Individuals					Rel.No. minus tolerants /(0.3km)	IBI	Modified Iwb	
				Total species	Sunfish species	Sucker species	Intolerant species	Darter species	Simple Lithophils	Tolerant fishes	Omni-vores	Top carnivores	Insect-ivores				DELT anomalies
Ashtabula River - (07001)																	
Year: 2007																	
20.50	E	06/26/2007	92	19(3)	3(3)	2(3)	3(3)	4(3)	38(5)	10(5)	7(5)	9.1(5)	83(5)	0.2(3)	643(3)	46	8.6
19.00	E	07/02/2007	93	20(3)	3(3)	3(3)	2(1)	5(5)	47(5)	3(5)	1(5)	18.9(5)	78(5)	0.2(5)	499(3)	48	8.5
13.90	E	07/02/2007	106	16(3)	1(1)	2(1)	2(1)	4(3)	51(5)	9(5)	6(5)	9.0(5)	68(5)	0.0(5)	606(3)	42	8.7

na - Qualitative data, Modified Iwb not applicable.

◆ - IBI is low end adjusted.

* - < 200 Total individuals in sample

** - < 50 Total individuals in sample

● - One or more species excluded from IBI calculation.

Species List

River Code: 07-001	Stream: Ashtabula River	Sample Date: 2007
River Mile: 20.50	Location: upst. St. Rt. 193	Date Range: 06/26/2007
Time Fished: 5760 sec	Drainage: 92.0 sq mi	
Dist Fished: 0.29 km	Basin: Ashtabula River	No of Passes: 1
		Sampler Type: E

Species Name / ODNR status	IBI Grp	Feed Guild	Breed Guild Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Golden Redhorse	R	I	S M	11	11.38	1.59	3.72	32.31	326.67
Northern Hog Sucker	R	I	S M	39	40.35	5.63	2.38	20.65	58.89
Bigeye Chub	N	I	S I	28	28.97	4.04	0.10	0.90	3.57
Creek Chub	N	G	N T	6	6.21	0.87	0.02	0.17	3.00
Striped Shiner	N	I	S	11	11.38	1.59	0.26	2.29	23.18
Common Shiner	N	I	S	26	26.90	3.75	0.26	2.27	9.72
Sand Shiner	N	I	M M	4	4.14	0.58	0.01	0.06	1.75
Mimic Shiner	N	I	M I	275	284.48	39.68	0.49	4.23	1.71
Bluntnose Minnow	N	O	C T	46	47.59	6.64	0.14	1.23	2.95
Central Stoneroller	N	H	N	6	6.21	0.87	0.11	0.95	17.50
Stonecat Madtom		I	C I	1	1.03	0.14	0.03	0.23	25.00
Rock Bass	S	C	C	50	51.72	7.21	1.95	16.98	37.76
Smallmouth Bass	F	C	C M	13	13.45	1.88	1.13	9.85	84.22
Green Sunfish	S	I	C T	19	19.66	2.74	0.56	4.84	28.33
Bluegill Sunfish	S	I	C P	1	1.03	0.14	0.01	0.09	10.00
Blackside Darter	D	I	S	7	7.24	1.01	0.02	0.17	2.57
Greenside Darter	D	I	S M	56	57.93	8.08	0.17	1.46	2.91
Rainbow Darter	D	I	S M	84	86.90	12.12	0.14	1.18	1.57
Fantail Darter	D	I	C	10	10.35	1.44	0.02	0.16	1.70
<i>Mile Total</i>				693	716.90		11.50		
<i>Number of Species</i>				19					
<i>Number of Hybrids</i>				0					

Species List

River Code: 07-001	Stream: Ashtabula River	Sample Date: 2007
River Mile: 19.00	Location: Benetta Rd.	Date Range: 07/02/2007
Time Fished: 5378 sec	Drainage: 93.0 sq mi	
Dist Fished: 0.24 km	Basin: Ashtabula River	No of Passes: 1
		Sampler Type: E

Species Name / ODNR status	IBI Grp	Feed Guild	Breed Guild Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Sea Lamprey	E	P	N	1	1.25	0.24	0.02	0.10	12.00
Golden Redhorse	R	I	S M	8	10.00	1.94	2.71	18.79	270.88
Northern Hog Sucker	R	I	S M	28	35.00	6.80	1.14	7.90	32.54
White Sucker	W	O	S T	1	1.25	0.24	0.41	2.87	330.00
Bigeye Chub	N	I	S I	9	11.25	2.18	0.04	0.24	3.11
Creek Chub	N	G	N T	1	1.25	0.24	0.00	0.03	3.00
Redfin Shiner	N	I	N	2	2.50	0.49	0.01	0.04	2.50
Common Shiner	N	I	S	57	71.25	13.83	0.80	5.54	11.21
Sand Shiner	N	I	M M	21	26.25	5.10	0.05	0.32	1.76
Mimic Shiner	N	I	M I	87	108.75	21.12	0.16	1.12	1.48
Bluntnose Minnow	N	O	C T	4	5.00	0.97	0.02	0.16	4.67
Central Stoneroller	N	H	N	6	7.50	1.46	0.04	0.30	5.67
Rock Bass	S	C	C	62	77.50	15.05	6.50	45.07	83.82
Smallmouth Bass	F	C	C M	15	18.75	3.64	2.07	14.33	110.14
Green Sunfish	S	I	C T	7	8.75	1.70	0.14	0.96	15.71
Bluegill Sunfish	S	I	C P	1	1.25	0.24	0.01	0.04	5.00
Hybrid X Sunfish				2	2.50	0.49	0.05	0.35	20.00
Blackside Darter	D	I	S	7	8.75	1.70	0.04	0.26	4.29
Johnny Darter	D	I	C	4	5.00	0.97	0.01	0.06	1.50
Greenside Darter	D	I	S M	36	45.00	8.74	0.13	0.92	2.94
Rainbow Darter	D	I	S M	46	57.50	11.17	0.08	0.55	1.38
Fantail Darter	D	I	C	7	8.75	1.70	0.01	0.07	1.14
<i>Mile Total</i>				412	515.00		14.41		
<i>Number of Species</i>				21					
<i>Number of Hybrids</i>				1					

Species List

River Code: 07-001 River Mile: 13.90 Time Fished: 3698 sec Dist Fished: 0.20 km	Stream: Ashtabula River Location: upst. Green Hill Rd. Drainage: 106.0 sq mi Basin: Ashtabula River	Sample Date: 2007 Date Range: 07/02/2007 No of Passes: 1 Sampler Type: E
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Species Name / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Golden Redhorse	R	I	S	M	1	1.50	0.22	0.13	1.44	85.00
Northern Hog Sucker	R	I	S	M	27	40.50	6.07	2.19	24.70	54.04
Bigeye Chub	N	I	S	I	24	36.00	5.39	0.16	1.85	4.55
Creek Chub	N	G	N	T	14	21.00	3.15	0.04	0.43	1.79
Common Shiner	N	I	S		27	40.50	6.07	0.66	7.45	16.30
Sand Shiner	N	I	M	M	36	54.00	8.09	0.12	1.35	2.22
Mimic Shiner	N	I	M	I	8	12.00	1.80	0.05	0.51	3.75
Silverjaw Minnow	N	I	M		1	1.50	0.22	0.01	0.07	4.00
Bluntnose Minnow	N	O	C	T	27	40.50	6.07	0.13	1.44	3.15
Central Stoneroller	N	H	N		60	90.00	13.48	0.80	9.02	8.88
Rock Bass	S	C	C		26	39.00	5.84	1.72	19.45	44.20
Smallmouth Bass	F	C	C	M	14	21.00	3.15	2.27	25.65	108.21
Johnny Darter	D	I	C		3	4.50	0.67	0.01	0.06	1.00
Greenside Darter	D	I	S	M	51	76.50	11.46	0.28	3.10	3.59
Rainbow Darter	D	I	S	M	96	144.00	21.57	0.23	2.58	1.59
Fantail Darter	D	I	C		30	45.00	6.74	0.08	0.94	1.83
<i>Mile Total</i>					445	667.50		8.86		
<i>Number of Species</i>					16					
<i>Number of Hybrids</i>					0					