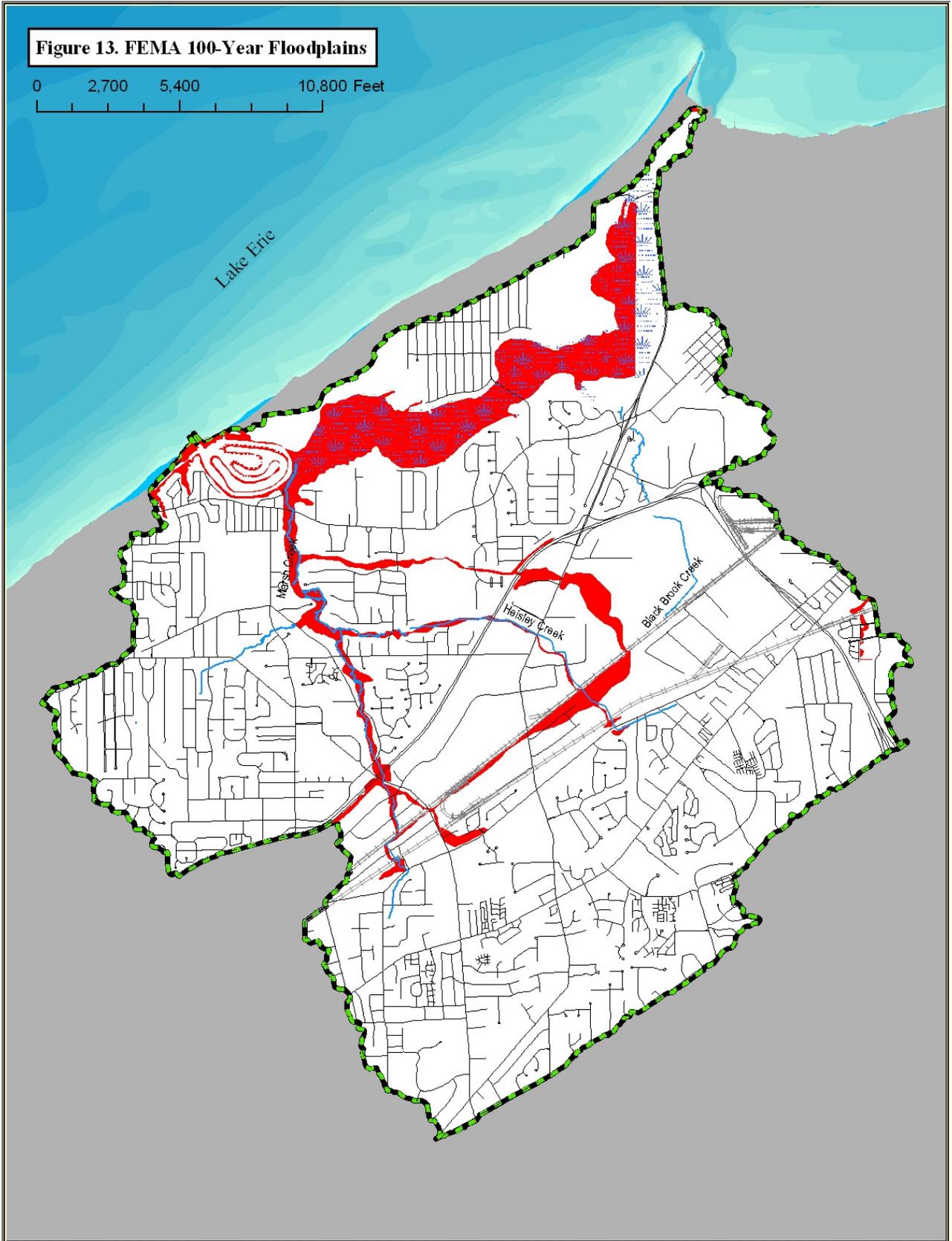


Figure 13. FEMA 100-Year Floodplains

0 2,700 5,400 10,800 Feet



Headwater Habitat Evaluations

The Lake County Soil and Water Conservation District conducted 21 primary headwater stream habitat evaluations within the Mentor Marsh watershed. Primary headwater habitats are described by the Ohio EPA as streams with a defined bed and bank, drainage areas less than one square mile and pool depths less than 40 centimeters. These primary headwater streams account for 69% of the total flow length of streams in the State of Ohio.

These evaluations were conducted according to guidelines set forth in the Field Evaluation Manual for Ohio's Primary Headwater Habitats. The methodology in this manual allows the user to define a primary headwater stream as a Class III, Class II, or Class I stream.

(From the Field Evaluation Manual for Ohio's Primary Headwater Habitat Streams):

The Three Types of Primary Headwater Streams in Ohio:	
(1) Class III-PHWH Stream	(cool-cold water adapted native fauna)
(2) Class II-PHWH Stream	(warm water adapted native fauna)
(3) Class I- PHWH Stream	(ephemeral stream, normally dry channel)

Class III streams are perennial streams that exhibit the highest quality of headwater stream habitat. These streams are defined by having a very high score on the Headwater Habitat Evaluation Index (HHEI >70) and the Headwater Macroinvertebrate Field Evaluation Index (HMFEI >19) and will typically have species of obligate salamanders with larval stages greater than 12 months and three or more species of cool water benthic macroinvertebrates. Class II streams are usually intermittent streams; however they could have perennial flow in some instances. Intermittent streams are typically flowing for large portions of the year, but may become dry during the summer months. Class II streams will score between 30 and 70 on the HHEI and between 7 and 19 on the HMFEI. Class I streams are ephemeral streams and generally will have poor habitat conditions and little to no biological activity. They will score very low on both the HHEI (<30) and the HMFEI (<7), and do not provide good habitat for salamanders or macroinvertebrates. These streams are typically dry and only flow during wet weather events.

(From the Field Evaluation Manual for Ohio's Primary Headwater Habitat Streams):

Perennial flow (continuous, permanent)	= either Class III or Class II PHWH stream
Interstitial flow (interrupted)	= either Class III or Class II
Intermittent flow (temporary, summer-dry)	= Class II
Ephemeral flow	= Class I

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

All locations were assessed for quality of headwater habitat, presence or absence of biological indicator species, dissolved oxygen, temperature, salinity, conductivity, and pH.

The information collected on primary headwater streams has been used to:

- Administer Erosion and Sediment Control Regulations
- Evaluate and review U.S. Army Corps of Engineers and OEPA permit applications
- Raise public awareness on natural resources
- Monitor pollution abatement projects
- Assist in NPDES Phase II implementation
- Obtain grant funding

Methods

The first step in conducting this study was obtaining recent aerial photography of the area as well as digital stream and topography data. Stream assessment locations were chosen on all 1st order streams and larger that were shown on the USDA Soil Survey for Lake County. Using recent aerial photography, an assessment location is chosen that is as far downstream as practical and is also representative of the majority of the stream habitat. District staff conducted seven days of field work and assessed a total of 34 headwater streams. Each headwater stream assessment starts with the delineation of a 200ft sample reach. Once the sample reach has been determined; a salamander and macroinvertebrate sample is collected, two digital photographs are taken, in-situ chemistry is recorded (temperature, pH, dissolved oxygen, salinity, and conductivity). These measurements are taken first as they require non-turbid water for accurate recordings. Once this data is acquired, a drawing of the stream reach is completed, a pebble count is conducted, and the pool depths and bankfull widths are measured. Additional information such as the floodplain quality, riparian width, and gradient are also noted. A detailed explanation of the methodology is provided in the Field Evaluation Manual for Ohio's Primary Headwater Streams.

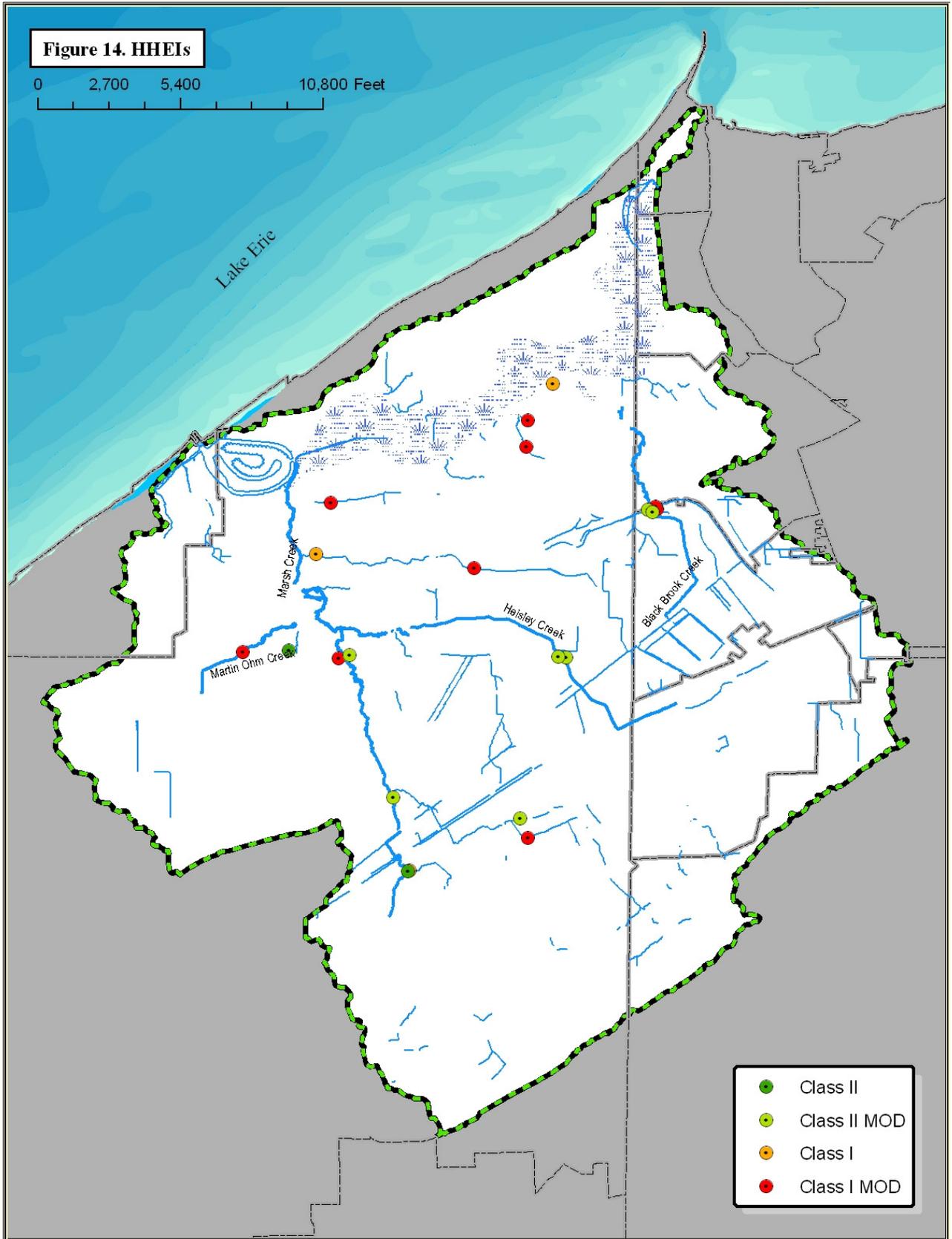
Any voucher specimens that were collected are taken to a lab where salamanders and macroinvertebrates are preserved for permanent storage. Samples are identified to the lowest taxonomic level possible by District staff. The presence of biological indicator species from these vouchers is also used to determine the quality of the headwater stream according to HHEI methodology.

Results

A total of 21 assessments were complete. Figure 14 shows the distribution and classification of the HHEI assessments. Of the 21 sites that were assessed, none were determined to be a Class III Primary Headwater Habitat Stream. There were 9 primary headwater habitats that were designated Class II habitats. Two sites exhibited both sufficient HHEI score and biology to warrant the designation. The remaining 7 sites did not have the requisite biology. The Class II designation was awarded from the HHEI score. The types of species present and the lack of diversity in the samples would indicate severe water quality impacts in these streams. Most of the Class II channels have been modified and would be candidates for restoration projects. The larger percentage of Class II habitats, when compared to state trends, is likely due to the inclusion of impacted Class III habitats.

Figure 14. HHEIs

0 2,700 5,400 10,800 Feet



The remaining 12 sites that were determined to be primary headwater habitats were designated as Class I streams. These sites were ephemeral channels that exhibited limited biology and were designated based on HHEI scores only. All but 3 of the channels have been modified and would be candidates for restoration projects. Data collected from the sites indicate that they are severely impacted by both channel modifications and water quality impacts. While these streams are not providing any aquatic habitat they are very important for sediment retention, nutrient reduction, and stormwater control. Impairment of these streams ability to provide these functions could result in downstream degradations.

2006 Integrated Water Quality Report

The entire HUC-11 in which the watershed is located is listed in the 2006 (DRAFT) Integrated Report Section 303(d) Reporting Category as water that is impaired or threatened and a TMDL is needed. (Figure 15) Appendix D.1.1 of that report lists the Status of the Watershed as having Impairment of Water Quality Standards, both Aquatic Life Use and Recreation Use. (Figure 16) The next field monitoring is scheduled to occur in 2014 and the TMDL is projected to occur in 2016. Appendix E.2 of the 2006 Integrated Report lists the Aquatic Life use as WWH (Warm Water Habitat) and LRW (Limited Resource Water) from sampling year 2000. The watershed has 0% of the primary tributaries in full attainment, 5% in partial attainment, and 95% in non-attainment. (Figure 17) The high magnitude causes include Organic Enrichment/Dissolved Oxygen and Flow Alteration. The high magnitude sources are Combined Sewer Overflows and Urban Runoff/Storm Sewers (NPS). Sanitary sewers and storm sewers are not interconnected in the watershed. The watershed assessment unit contains both Doan Brook and Euclid Creek, which have a long history of CSO's. Figure 18 shows the 303(d) list of impaired waters of Ohio.

The 303(d) report does not provide an accurate description of water quality conditions in the Mentor Marsh watershed. The inaccuracies are due to the extremely small watershed size, and therefore inclusion into a larger HUC with streams such as Doan Brook and Euclid Creek. Further compounding the problem is the lack of a standard for developing TMDLs for wetlands. Without this methodology, TMDLs and load reductions can not be provided in the watershed action plan.

Ohio Sport Fish Consumption Advisory

The Mentor Marsh Watershed was not listed in the 2006 Ohio Sport Fish Consumption Advisory. However, any listing for Lake Erie would be appropriate due to it's close proximity and hydrologic connection to the Mentor Marsh Watershed. Channel Catfish 16" and over from all waters of Lake Erie are listed as "Do Not Eat! Fish high in PCBs and other contaminants!"

Wetlands

Without exception the most significant wetland in the watershed is Mentor Marsh, the central resource for which this document was prepared. The marsh has been extensively studied, starting in the 1800's with the Burroughs Nature Club, and continued by the Cleveland Museum of Natural History, the University of Akron, the Ohio State University, Lake SWCD, OEPA, ODNR, and a host of others. The floral communities within the wetland have changed numerous times in response to human and natural disturbances, such as flooding, salt pollution, and fires. (Fineran, 2003). Prior to the salt intrusion, the marsh was largely a swamp forest with interior cattail-nightshade areas and was as alder or buttonbush wetlands. According to Whipple the swamp forest was encroaching on the other areas until the water became to saline for the swamp forest to grow or it was flooded due to an increase in beaver habitat.(Whipple, 1999) The marsh is now largely dominated by Phragmites and only small areas of swamp forest remain.

Numerous other smaller, yet no less insignificant, wetlands are present in the watershed. Figure 19 shows the amount of wetlands identified in the 1987 Ohio Wetlands Inventory. The amount of wetlands shown south of State Route 2 to Jackson Street is quite significant. Neither the Ohio GAP analysis (2004 data) nor the OEPA Land Cover analysis (2005 data) identifies wetlands to that extent. (Figure 20 and Figure 21). Further discussion on wetlands is present in Section 6. Mentor Marsh Watershed Impairments and Problems Summary.

Lakes and Reservoirs

Numerous small lakes and ponds are located in the watershed. The majority of the ponds are “dug” ponds or “groundwater” ponds. These ponds are very small, less than 1-acre, and used for landscaping, stormwater treatment, and/or fishing. The only sizeable lake is the 33-acre Veteran’s Park Lake. No reservoirs are located in the watershed. Figure 22 shows the locations of surface water (including open water wetlands) in the Mentor Marsh Watershed.

Figure 15. 2006 Integrated Water Quality Report Appendix D

Appendix D.1.1. Status of Watershed Assessment Units

Assessment Unit	Size (sq mi)	Impairment of Aquatic Life Use	Water Quality Standards	Recreation Use	Human Health (Fish Consump.)	AU Category	Priority Points	Next Field Monitoring	Projected TMDL
04110001 030	East Branch Black River (headwaters to downstream Coon Creek)								
	95.8	Yes	Yes	Yes	5	9	2021	2007	
04110001 040	East Branch Black River (downstream Coon Creek to mouth)								
	125.8	Yes	Yes	Yes	5	8	2021	2007	
04110001 050	Black River; Lake Erie tributaries East of Black River to West of Porter Creek)								
	100.8	Yes	Yes	Yes	5	7	2021	2007	
04110001 060	West Branch Rocky River								
	190.2	Yes	No	Yes	5	4	2021	2006	
04110001 070	Rocky River; East Branch Rocky R.; Lake Erie tributaries (West of Porter Cr. to West of Cuyahoga R.)								
	139.8	Yes	No	Yes	5	5	2021	2006	
04110002 010	Cuyahoga River (headwaters to downstream Black Brook)								
	148.9	Yes	Unknown	Yes	5	1	2020	2022	
04110002 020	Cuyahoga River (downstream Black Brook to downstream Breakneck Creek)								
	139.9	Yes	No	Yes	5	1	2020	2022	
04110002 030	Cuyahoga River (downstream Breakneck Creek to downstream Little Cuyahoga River)								
	112.2	Yes	No	Yes	5	2	2020	2022	
04110002 040	Cuyahoga River (downstream Little Cuyahoga River to downstream Brandywine Creek)								
	153.9	Yes	Yes	Yes	5	2	2020	2022	
04110002 050	Cuyahoga River (downstream Brandywine Cr. to downstream Tinkers Cr.); excluding Cuyahoga R.								
	138.1	Yes	No	Yes	5	2	2020	2022	
04110002 060	Cuyahoga River (downstream Tinkers Creek to mouth); excluding Cuyahoga R. mainstem								
	115.6	Yes	Yes	Unknown	4A		2020		
04110003 010	Lake Erie tributaries (East of Cuyahoga River to West of Grand River); excluding Chagrin River								
	119.0	Yes	Yes	Unknown	5	6	2014	2016	
04110003 020	Chagrin River (headwaters to downstream Aurora Branch)								
	119.5	Yes	No	Unknown	5	3	2019	2007	
04110003 030	Chagrin River (downstream Aurora Branch to mouth)								
	145.1	Yes	Yes	Unknown	5	6	2019	2007	

**Ohio EPA 2006 Integrated Report Appendix E.2
Watershed Assessment Unit (WAU) Results**

**Figure 16. 2006
Integrated Water Quality
Report Appendix E**

HUC11 **WAU Description** **WAU Size (mi²)**: 119.0
 04110003 010 Lake Erie tributaries (East of Cuyahoga River to West of Grand River);
 excluding Chagrin River

Integrated Report Assessment Category: 5 **Priority Points: 6**
Next Scheduled Monitoring: 2014

Aquatic Life Use Assessment

Subcategories of ALU: WWH,LRW Sampling Year(s): 2000
 Impairment: Yes (5)

Stream Size Category	Raw Data		% Attainment			WAU Score		
	Data Available	No. Attaining	Full	Partial	Non	Full	Partial	Non
Secondary Tributaries								
< 5 mi ²	2 Sites	0 Sites						
Primary Tributaries								
5-20 mi ²	5 Sites	0 Sites	0.0	5.0	95.0			
20-50 mi ²	2 Sites	0 Sites						
Principal Streams						0	5	95
50-500 mi ²	Sites							
	Miles	Miles						

High Magnitude Causes

Organic Enrichment/DO
 Flow Alteration

High Magnitude Sources

Combined Sewer Overflows
 Urban Runoff/Storm Sewers (NPS)

Recreation Use Assessment

Subcategory of Use: Primary Contact
 Impairment: Yes (5) Geometric Mean: 896
 No. Ambient Sites: 0 No. Ambient Sampling Records: 0 75th %ile: 3300
 No. of NPDES MOR Sites: 2 No. of NPDES MOR Records: 39 90th %ile: 6380
 Other:

Fish Consumption Assessment

Waters Sampled: No Impairment: Unknown (3)
 Stream Miles Monitored: 0.00 Stream Miles Impaired: 0.00 Pollutants (Waterbody):
 Lake Acres Monitored: 0.0 Lake Acres Impaired: 0.0
 (See "www.epa.state.oh.us/dsw/fishadvisory/index.html" for more detailed information.)

WAU Comments

A report developing TMDLs for pollutants impairing aquatic life uses in the Euclid Creek watershed was approved by U.S. EPA on September 27, 2005. The TMDL report is available at <http://www.epa.state.oh.us/dsw/tmdl/index.html>. Monitoring in support of the development of TMDLs was conducted in the Euclid Creek and Doan Brook watersheds in 2000. This assessment unit will remain in Category 5 until TMDLs for all pollutants impairing all beneficial uses, including recreation in Euclid Creek and aquatic life and recreation in Doan Brook, are completed.

Figure 17. 2006
Integrated Water
Quality Report
Aquatic Life Use
Status

Ohio 2006 Integrated Report Aquatic Life Use Status Watershed Assessment Units

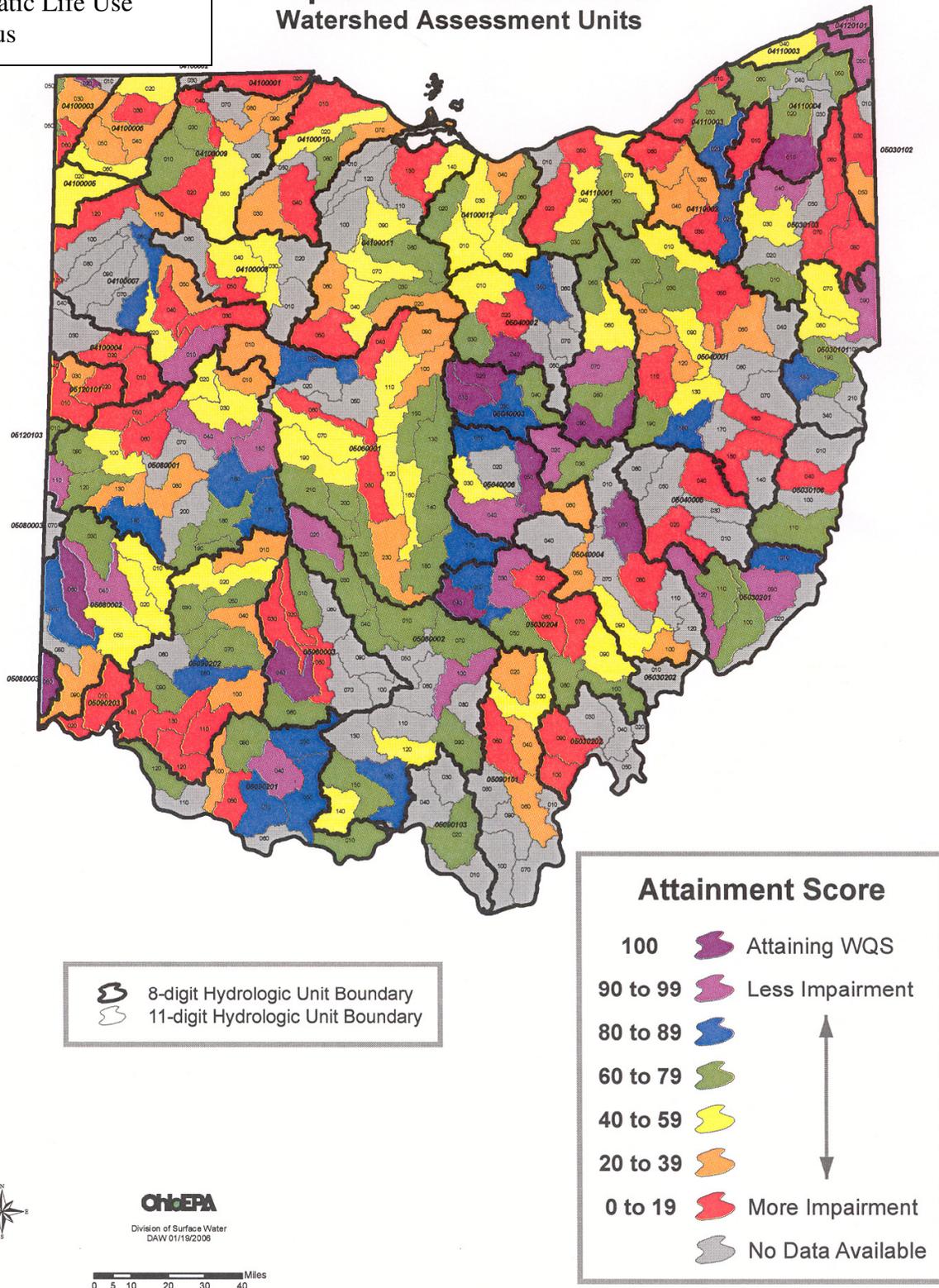
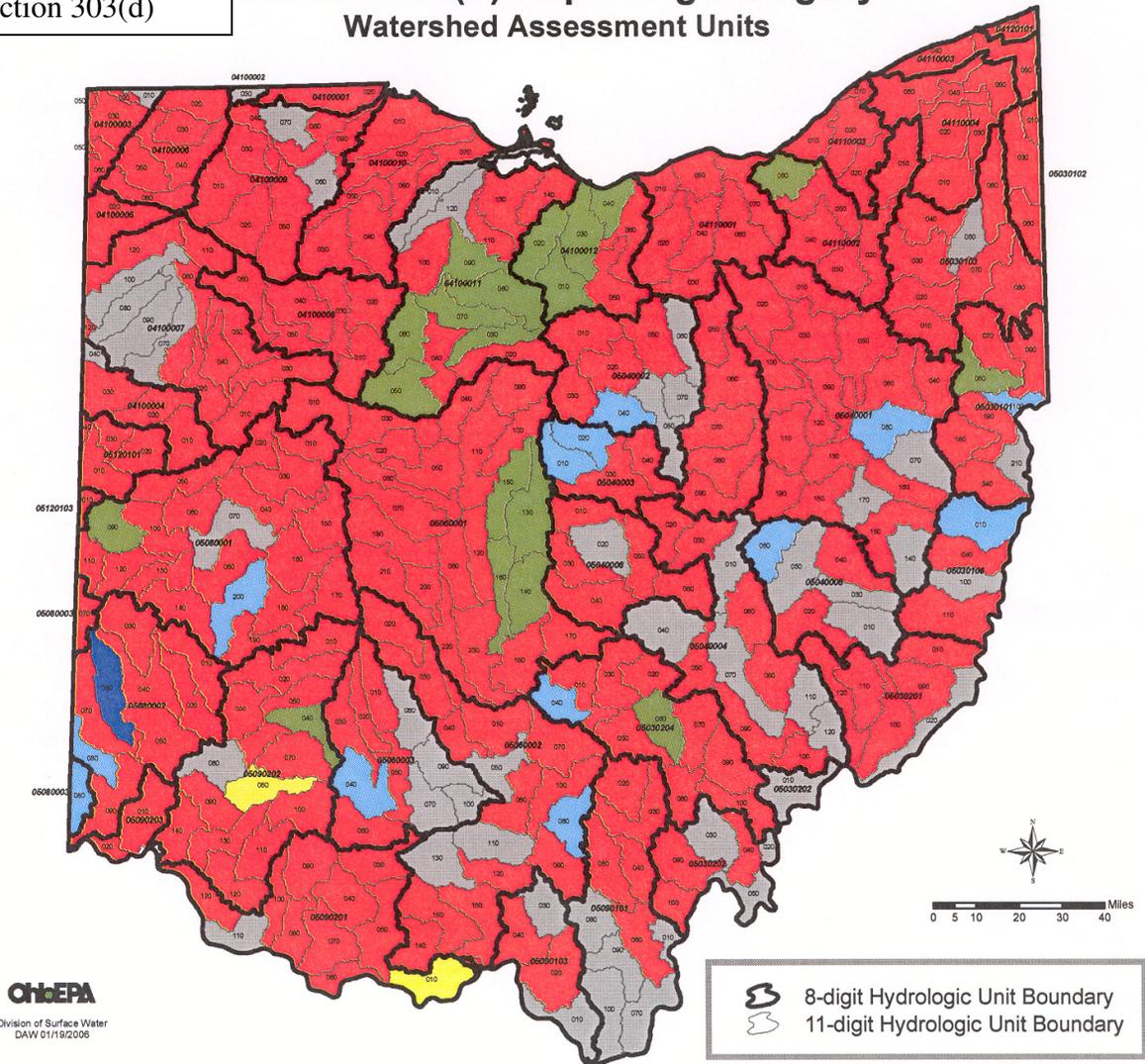


Figure 18. 2006
Integrated Water
Quality Report
Section 303(d)

Ohio 2006 Integrated Report Section 303(d) Reporting Category Watershed Assessment Units



OhioEPA
Division of Surface Water
DAW 01/19/2006

 8-digit Hydrologic Unit Boundary
 11-digit Hydrologic Unit Boundary

Reporting Category and Definition

- 1  All designated uses are met.
- 2  Some of the designated uses are met, but there is insufficient data to determine if remaining designated uses are met.
- 3  Insufficient data to determine whether any designated uses are met.
- 4A  Water is impaired or threatened, and a restoration plan (an approved TMDL) has been completed for all known causes.
- 4B  Water is impaired or threatened, but a restoration plan (an approved TMDL) is not needed because other required control measures will result in attainment of WQS.
- 5  Water is impaired or threatened, and a TMDL is needed.

Figure 19. 1987 Ohio Wetlands Inventory

0 2,700 5,400 10,800 Feet

