



# Environmental Protection Agency

## Quality Assurance Project Plan (QAPP) for the Biological and Water Quality Study of the Grand and Ashtabula Watersheds, and Eastern Lake Erie Tributaries, 2024



Ohio EPA Technical Report AMS/2024-GALET-1

Division of Surface Water

July 2024

TMDL DEVELOPMENT | ● ○ ○ ○ ○

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## **Group A: Project Management and Information/Data Quality Objectives**

### **A1. Title Page**

Quality Assurance Project Plan (QAPP)  
for the Biological and Water Quality Study of the Grand and Ashtabula  
Watersheds, and Eastern Lake Erie Tributaries, 2024.

Ashtabula, Geauga, Lake, Portage, and Trumbull counties.

July 2024

Version 2.0 - Effective 2024

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## A2. Approval Page

Quality Assurance Project Plan for the Biological and Water Quality Study of the Grand and Ashtabula Watersheds, and Eastern Lake Erie Tributaries, 2024.

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List of Acronyms - (Glossary of Terms can be found [here](#))

2C	Priority Pollutant Analyte List Form
ALU	Aquatic Life Use
AMS	Assessment and Modeling Section
BNA	Base/Neutral and Acid
BOD	Biochemical Oxygen Demand
C	Celsius
Ca	Calcium
cBOD	Carbonaceous Biochemical Oxygen Demand
Cl	Chlorine
CWA	Clean Water Act
DDAGW	Division of Drinking and Ground Waters
DES	Division of Environmental Services
DQO	Data Quality Objective
DSW	Division of Surface Water
DO	Dissolved Oxygen
DOC	Dissolved Organic Carbon
EA3	Ecological Assessment and Analysis Application
EPA	Environmental Protection Agency
FEG	Fish Evaluation Group
GFO	Groveport Field Office
GC/MS	Gas Chromatograph/ Mass Spectrometer
H <sub>2</sub> SO <sub>4</sub>	Sulfuric Acid
HNO <sub>3</sub>	Nitric Acid
HUC	Hydrological Unit Code
IBI	Index of Biotic Integrity
ICI	Invertebrate Community Index
ID	Identification
IR	Integrated Report
ITS	Information Technology Services
K	Potassium
Mg	Magnesium
Na	Sodium
MIwb	Modified Index of well-being
NPDES	National Pollutant Discharge Elimination System
NPS	Nonpoint Source
OAC	Ohio Administrative Code
OEPA	Ohio Environmental Protection Agency
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance/Quality Control
QAM	Quality Assurance Manager
QHEI	Qualitative Habitat Evaluation Index
PCB	Polychlorinated Biphenyl

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pH	Potential Hydrogen
PWS	Public Water Supply
RL	Reporting Limit
RM	River Mile
S-VOCs	Semi-volatile Organic Chemicals
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
SM	Standard Method
SOP	Standard Operating Procedure
SO <sub>4</sub>	Sulfate
SOCC	State of Ohio Computer Center
TMDL	Total Maximum Daily Load
TOC	Total Organic Carbon
TSD	Technical Support Document
WAU	Watershed Assessment Unit
WQ	Water Quality
WQS	Water Quality Standards
WWTP	Wastewater Treatment Plant

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## Document Format

This Quality Assurance Project Plan follows the Quality Assurance Project Plan Standard, Directive Number **CIO 2105-S-02.0**, effective July 18, 2023.

## A4. Project Purpose, Problem Definition, and Background

### Watershed Monitoring and Assessment History

As part of Ohio's statewide monitoring strategy, biological and water quality assessments will be done during the 2024 field season in the Grand River, Ashtabula River, and Eastern Lake Erie Tributaries watersheds. The study area encompasses Ashtabula, Geauga, Lake, Portage and Trumbull counties, spans three 8-digit hydrologic unit codes (HUCs) and is composed of 38 12-digit watershed assessment units (WAUs). The HUCs and their description are listed in Table 3 and Figure 2 is a map of the watershed with station IDs. Information collected as part of this survey will support the Data Quality Objectives (DQOs) listed in A7.

The Ashtabula River, Grand River, and Eastern Lake Erie Tributaries have historically been assessed separately. The biological, chemical, and physical water quality of the Ashtabula River watershed was last assessed in 2011 and found 88% of sites (excluding the lacustrine sites) to be in attainment of Clean Water Act (CWA) goals. Impairments were due to several causes associated with urban influence, including direct habitat alterations and sediment contamination, specifically at Strong Brook, due to inappropriate waste disposal. Intermittent flow tends to recur annually in the Ashtabula watershed and may be regarded as a "natural" condition that may impact the assimilative capacity and biology in streams within the watershed.

The Ashtabula River was designated a State Scenic River on October 30, 2008. The mainstem is designated Scenic starting at river mile 27.54, downstream to river mile 2.3. The East Branch of the Ashtabula River from river mile 12.0, downstream to the mouth of the East Branch is designated Scenic. The West Branch is designated Scenic from North Richmond Road bridge crossing at river mile 9.05, downstream to the mouth of the West Branch.

The Ashtabula River watershed was last assessed in 2011, and the Loading Analysis Plan for that survey summarizes management actions to address impairments in the watershed. Many impaired sites will be included in multi-watershed Total Maximum Daily Load (TMDL) projects for bacteria (recreation use), sediment (aquatic life use), and habitat restoration plan (aquatic life use). TMDL reports identify and evaluate water quality problems in impaired water bodies and propose solutions to bring those waters into attainment with water quality standards.

The Grand River watershed was last assessed in two separate surveys; the Grand River (lower) watershed was assessed in 2003-04, and the Grand River (upper) watershed was assessed in 2007. The 2007 study of the Grand River (upper) watershed found that approximately 64% of the sites assessed were meeting Clean Water Act (CWA) goals. Historical impairments within the Grand River (upper) watershed were primarily the result of habitat alterations, flow limitations due to impoundments, organic enrichment, and high Total Dissolved Solids (TDS). The 2003-04 study of the Grand River (lower) watershed found approximately 80% of sites to be in attainment of CWA goals. Exceptional biological richness was noted in the Grand River (lower) report; the physical habitat of the mainstem and its tributaries have been minimally altered and remain largely intact. Any identified impairments were localized and centered around urban/suburban areas.

The Grand River was designated Wild and Scenic on January 17, 1974. The Wild segment is designated from Harpersfield covered bridge downstream, to Northfolk and Western Railroad. Starting at the State Route 322 bridge to Harpersfield covered bridge, the Ashtabula River is designated Scenic.

The Grand River (upper) watershed TMDL Report was approved by U.S. EPA on April 10, 2013. TMDLs were calculated for nutrients (total Kjeldahl nitrogen, total phosphorus and ammonia), total dissolved solids, habitat and *E. coli* bacteria. Recommendations for regulatory action resulting from this TMDL analysis included an effluent limit for total phosphorus for one facility and monitoring for total Kjeldahl nitrogen, ammonia and total phosphorus for several other small facilities. It was recommended that nonpoint sources of direct habitat alterations be addressed by bank and riparian restoration, stream restoration and investigation into dam modification or removal. Recommendations for nutrients, total dissolved solids and bacteria included tying unsewered areas into sewer systems where feasible and further investigating sources in some locations. TMDL recommendations for bacteria included inspecting and replacing or repairing failing home sewage treatment systems (HSTS), and agricultural best management practices. In some cases of natural impairment, wetland restoration and/or conservation easements may improve water quality. Nonpoint sources are typically addressed by voluntary actions.

The Grand River (lower) watershed TMDL report was approved by U.S. EPA on April 12, 2012. TMDLs were calculated for total phosphorus, flow regime and *E. coli* bacteria. Recommendations to address nonpoint sources of pollution included increased inspections and subsequent enforcement actions regarding HSTS that were not functioning properly. Recommendations to address the effects of hydrologic alteration and pollutants from urban runoff and storm water included installing best management practices that retain or infiltrate storm water on-site at construction and post-construction locations. Agricultural runoff recommendations included conventional management practices designed to abate pollutant loading from cropland landscapes. Livestock that have access to streams should be provided with alternative water supplies and fencing installed to prevent their access to the streams. It was also recommended that riparian corridors be preserved wherever possible.

The Lake Erie Central Basin Tributaries were last assessed in 2015. This survey included Lake Erie tributaries slightly east of Cleveland to the Conneaut. The sites included in the 2024 survey will include Lake Erie tributaries east of Fairport Harbor to Conneaut Creek. The 2015 study found 42% of the sites assessed were meeting Clean Water Act (CWA) goals. Impairments were due to urban runoff/storm sewers and combined sewage overflows (CSOs), in addition to natural habitat and flow conditions. In addition to other sources, contaminated sediments were found to be another cause of nonattainment, specifically in Arcola Creek and Church Creek.

Conneaut Creek was designated Wild and Scenic on October 6, 2005. From river miles 23.93 to 7.39 it is designated Wild, and from river mile 7.39 to river mile 2.0 Conneaut Creek is designated Scenic.

There is currently no Total Maximum Daily Load (TMDL) report available for the Lake Erie Central Basin Tributaries. More information on previous studies done in the Grand and Ashtabula watersheds, and Eastern Lake Erie Tributaries can be found at Ohio EPAs TMDL page published at:

<https://epa.ohio.gov/divisions-and-offices/surface-water/reports-data/total-maximum-daily-load-tmdl-program>

## A5. Project Task Description

During the 2024 sampling year, the biological, physical, and chemical integrity of the Ashtabula and Grand River watersheds, and Eastern Lake Erie Tributaries will be assessed at 117 locations (Figure 2, Appendix 2).

The Ashtabula River and its tributaries are located in the northeast corner of Ashtabula County. Conceptually the Ashtabula River is formed by the West and East Branches (65 mi<sup>2</sup>, 16.5 mi. long and 31 mi<sup>2</sup>, 10.7 mi. long, respectively). From this juncture the Ashtabula River flows 39.7 miles and drains 127 mi<sup>2</sup> until it meets Lake Erie. The majority of the Ashtabula River watershed is largely made up of forest, grass/pasture, and row crop, but includes some urban development near the Lake Erie shoreline.

The Grand River and its tributaries are located in five counties: Ashtabula, Geauga, Lake, Portage and Trumbull. Beginning in the southeast corner of Geauga County, the mainstem continues for roughly 103 miles and empties into Lake Erie. The watershed is a mixture of forest, agricultural land uses such as cultivated crops and pasture lands, and urban land uses. The mainstem and its tributaries drain roughly 707 mi<sup>2</sup> and flow through many towns and villages, including West Farmington, North Bloomfield, Orwell, Roaming Shores, Chardon, and Painesville.

The Eastern Lake Erie Tributaries are located in two counties: Ashtabula and Lake. Some of the larger tributaries include the Conneaut River, Arcola Creek, and Cowles Creek. The Conneaut Creek basin drains an area of 37.7 mi<sup>2</sup> in Ohio and originates south of Conneautville in Crawford County, Pennsylvania. The mainstem is 56.8 river miles in length, with 23.83 miles in the state of Ohio. Arcola Creek watershed drains an area of 23.5 mi<sup>2</sup> in both Lake and Ashtabula counties before flowing into Lake Erie. Cowles Creek drains 20.6 mi<sup>2</sup> of land in Ashtabula County and covers areas in Geneva, Harpersfield, Saybrook, and Austinburg townships.

Sampling will be focused largely on biological and habitat monitoring to determine achievement of the designated Aquatic Life Use (ALU) biocriteria. Water chemistry sampling will be conducted watershed-wide to determine whether water quality criteria, where applicable, are exceeded for a given parameter, as well as for generating statistical and weight-of-evidence relationships between the biological communities and ambient chemical concentrations. Water quality sondes and chlorophyll- $\alpha$  sampling will be co-located in areas of historical or suspected nutrient over-enrichment. Several public water supply intakes exist on streams in the study area and will be chemically assessed for the public drinking water supply use. Bacteriological monitoring (*Escherichia coli*) will be conducted in various streams to determine achievement of recreational use criteria. Sport fish will be collected at select locations and their tissues processed for bioaccumulated contaminants pursuant to the human health beneficial use in the Ohio Fish Tissue Consumption Monitoring Program.

Following the survey, the results of the Grand River, Ashtabula River, and Central Lake Erie Tributaries watersheds will be synthesized into a Technical Support Document (TSD). While the TSD is the primary support document for the TMDL program, the TSD also supports numerous additional Ohio EPA programs and regulatory actions including but not limited to Director's Orders, National Pollutant Discharge Elimination System (NPDES), Water Quality Standards, Public Water Supply, Ohio Nonpoint Source Assessment, and the biennial Integrated Water Quality Monitoring and Assessment Report (The 305 [b] and 303[d] report).

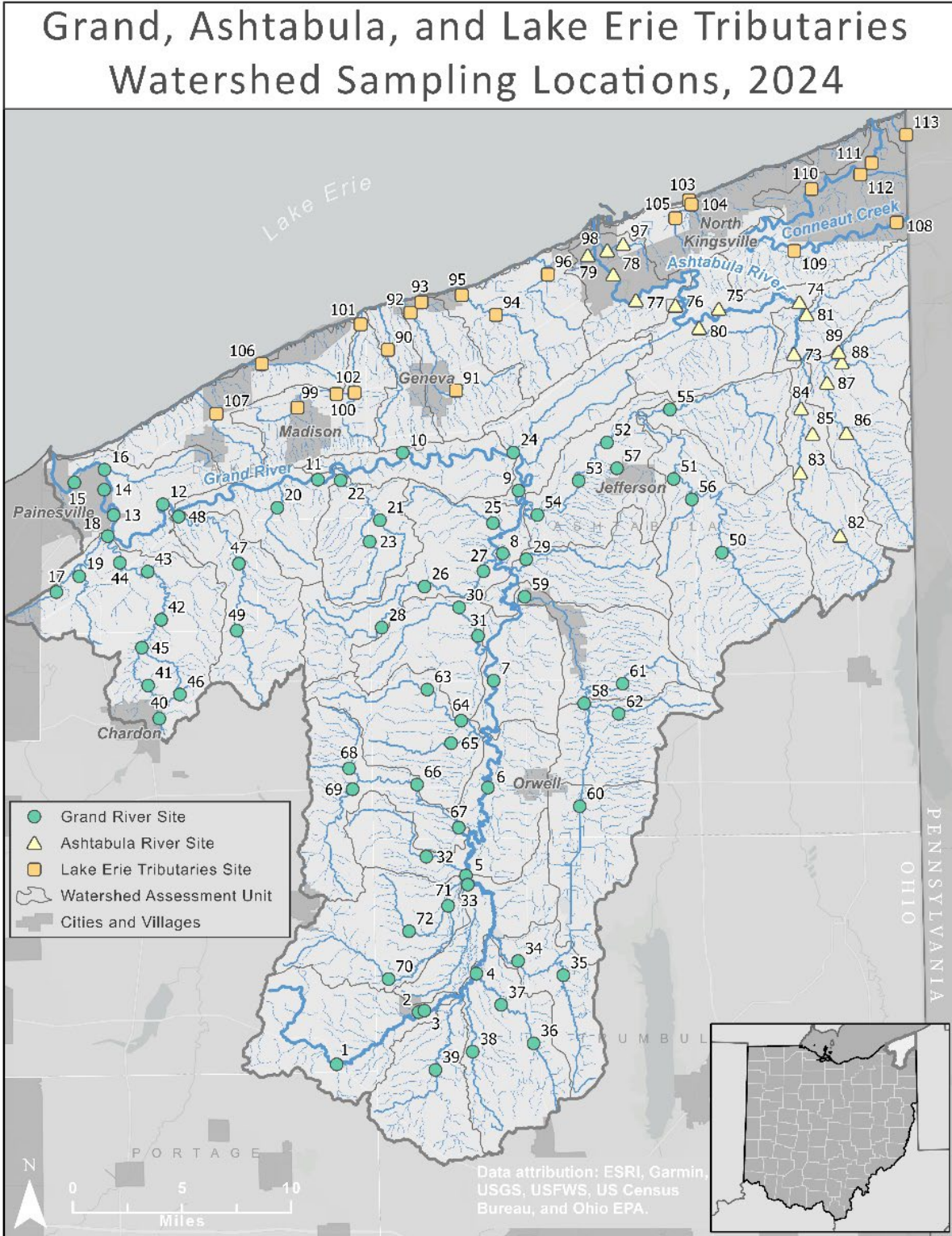
Depending on the sampling type, field season will run from May 1 to October 31, 2023. The index period for fish and nutrient sampling is during the summer low flow period of June 15 – October 15. The macroinvertebrate sampling index period is slightly shorter, from June 15 – September 30. Bacteria sampling to evaluate recreation use will be conducted within a 90-day period during the recreation season, May 1 to October 31. The draft TSD is usually completed within 2-3 years following the conclusion of field work.

**Table 1 – List of Watershed Assessment Units (WAU) in Study Area**

HUC8	HUC10	HUC12	
04110003	Ashtabula-Chagrin		
	04110003 01	Ashtabula River	
		04110003 01 01	East Branch Ashtabula River
		04110003 01 02	West Branch Ashtabula River
		04110003 01 03	Upper Ashtabula River
		04110003 01 04	Middle Ashtabula River
		04110003 01 05	Lower Ashtabula River
	04110003 02	Arcola Creek-Frontal Lake Erie	
		04110003 02 01	Indian Creek-Frontal Lake Erie
		04110003 02 01	Wheeler Creek-Frontal Lake Erie
		04110003 02 03	Arcola Creek
		04110003 02 04	McKinley Creek-Frontal Lake Erie
04110004	Grand		
	04110004 01	Headwaters Grand River	
		04110004 01 01	Dead Branch
		04110004 01 02	Headwaters Grand River
		04110004 01 03	Baughman Creek
		04110004 01 04	Center Creek-Grand River
		04110004 01 05	Coffee Creek-Grand River
		04110004 01 06	Swine Creek
	04110004 02	Rock Creek	
		04110004 02 01	Upper Rock Creek
		04110004 02 02	Middle Rock Creek

HUC8	HUC10	HUC12	
		04110004 02 03	Lower Rock Creek
	04110004 03	Phelps Creek-Grand River	
		04110004 03 01	Phelps Creek
		04110004 03 02	Hoskins Creek
		04110004 03 03	Mill Creek-Grand River
		04110004 03 04	Mud Creek
		04110004 03 05	Plumb Creek-Grand River
	04110004 04	Griggs Creek-Mill Creek	
		04110004 04 01	Griggs Creek
		04110004 04 02	Peters Creek-Mill Creek
		04110004 04 03	Town of Jefferson-Mill Creek
	04110004 05	Three Brothers Creek-Grand River	
		04110004 05 01	Three Brothers Creek-Grand River
		04110004 05 02	Bronson Creek-Grand River
	04110004 06	Big Creek-Grand River	
		04110004 06 01	Coffee Creek-Grand River
		04110004 06 02	Mill Creek
		04110004 06 03	Village of Mechanicsville-Grand River
		04110004 06 04	Paine Creek
		04110004 06 05	Talcott Creek-Grand River
		04110004 06 06	Big Creek
		04110004 06 07	Red Creek-Grand River
04120101	Chautauqua-Conneaut		
	04120101 04	Sixmile Creek-Frontal Lake Erie	
		04120101 04 09	Turkey Creek-Frontal Lake Erie
	04120101 06	Conneaut Creek-Frontal Lake Erie	
		04120101 06 05	Marsh Run-Conneaut Creek
		04120101 06 06	Town of North Kingsville-Frontal Lake Erie

**Figure 1 - Sampling Locations Map**



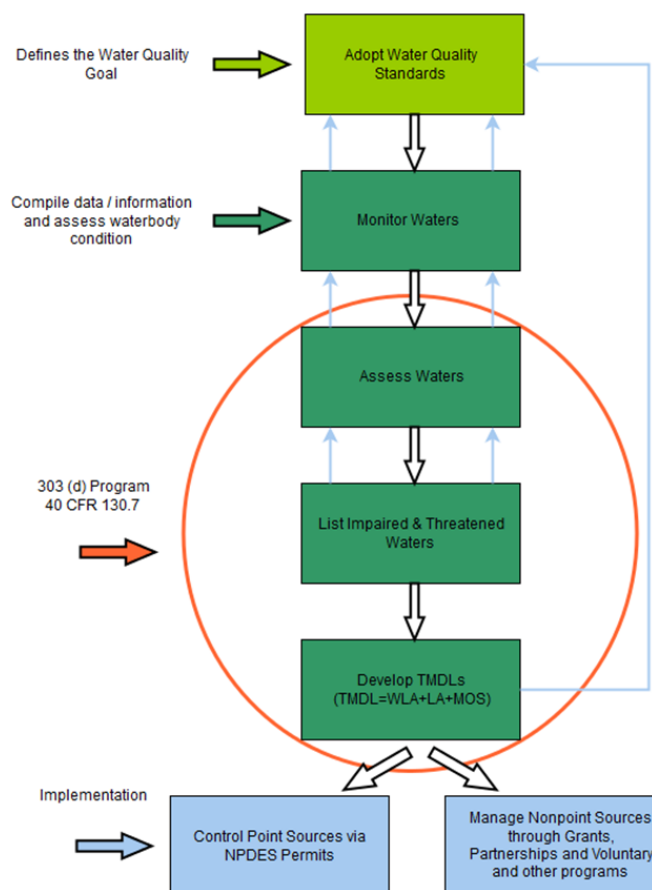
## A6. Information/Data Quality Objectives and Performance/Acceptance Criteria

The data collected during this watershed survey fulfills multiple objectives:

- Assess and report on the status of Water Assessment Units (WAUs) as required by the Clean Water Act (CWA) 305(b) and 303(d).
- Assess causes and sources of impairment.
- Support water quality standards development.
- Provide data for the Ohio Fish Tissue Consumption Monitoring Program.
- Support the National Permit Discharge Elimination System (NPDES) permitting.
- Total Maximum Daily Load (TMDL) development and implementation.
- Determine and evaluate water quality trends at watershed, stream, and site level scales.

**Figure 2 – Water Quality-Based Approach of the Clean Water Act**

**Water Quality-Based Approach of the Clean Water Act**



Source: <https://www.epa.gov/tmdl/overview-identifying-and-restoring-impaired-waters-under-section-303d-cwa>

## Monitor and Assess Ohio's Waters

Under Section 305(b) of the Clean Water Act (CWA), Ohio EPA is required to assess and report on the quality of Ohio's waters. Ohio EPA determines attainment/non-attainment status of water quality standards in three main ways:

- Three aquatic community indices serve as the principal arbiters of Aquatic Life Use (ALU) attainment or condition status of Ohio's lotic waters: Index of Biotic Integrity (IBI), Modified Index of well-being (MIwb) and the Invertebrate Community Index (ICI). Where quantitative macrobenthos data are unavailable, corresponding narrative equivalents derived from qualitative sampling are used in lieu of ICI scores (Ohio EPA 2015). Further explanations of Ohio EPA's biocriteria can be found in Ohio Administrative Code (OAC) Chapter 3745-1-07 and additionally at <https://epa.ohio.gov/static/Portals/35/rules/01-all.pdf>
- *E. coli* is used as an indicator to determine attainment/non-attainment of recreational uses as codified in OAC 3745-1-07. Water quality must meet a 90-day geometric mean and a statistical threshold not to be exceeded more than 10 percent of the time. Each WAU will have at least 1 site sampled. Most effort will focus on streams with public access that are more highly used for recreation.
- Chemical concentrations in fish tissue are used to determine attainment/non-attainment of non-drinking water human health water quality standards and for the development of fish consumption advisories.

Under Section 303(d) of the CWA Ohio EPA is federally obligated to list impaired and threatened waters by determining attainment/non-attainment status of water quality standards. To support this objective, at the following data is planned to be collected: fish and macroinvertebrate community assemblages, physical stream habitat evaluation (Qualitative Habitat Evaluation Index, or QHEI), organic and inorganic water column chemistry (parameters in Appendix 4), continuous sonde measurements, continuous temperature measurements, *E. coli* bacteria, and fish tissue chemical concentrations.

## Assess Causes and Sources of Impairment

Chemical and physical monitoring is a direct measure of the CWA goal and can be used to determine the factors that limit biologic attainment. Specific objectives for each planned measurement are included below:

- **Physical Habitat Assessments:** The Qualitative Habitat Evaluation Index (QHEI) (Rankin 1989, 1995, and Ohio EPA 2006) is a method that evaluates microhabitat necessary to support biological assemblages consistent with Ohio's tiered ALU designations. Channel morphology, lithography, gradient, and riparian conditions are fundamental components of riverine habitat, affecting the diversity, structure, organization, and viability of aquatic communities. Because the QHEI explicitly measures the presence, absence, or relative function of these key attributes, it serves as an important and cost-efficient monitoring tool to describe and rank macrohabitat

quality, evaluate habitat effects in surface water assessments, and aid in establishing ALU potential for underperforming waters.

- **Inorganic Surface Water Chemistry:** A standard suite of inorganic surface water chemical parameters will be collected at sites listed in Appendix 2. Impairment due to chemical contaminants in the water column can be assessed by comparing water column chemical concentrations to numeric criteria in Ohio EPA's rules: aquatic life (Table 35-1), wildlife (Table 35-12), recreation/aesthetics (Table 37-1), water supply (Table 33-1) and human health (Table 34-1).
- **Nutrient Enrichment:** The water quality parameter sondes will be deployed to capture about 48 continuous hours of hourly diel dissolved oxygen flux, pH, temperature, and specific conductance measurements. Benthic and/or sestonic chlorophyll *a* samples are to be collected during every sonde deployment if site conditions are appropriate. Continuous measurements will be evaluated against water quality criteria and, along with chlorophyll *a* results, will be used to provide lines of evidence for causes of biological impairment such as nutrient or organic enrichment.
- **Organic Surface Water Chemistry:** Water column samples will be analyzed for organic constituents (see Appendix 4 for parameters) at a subset of sites. Sites were selected based on local knowledge of dischargers or legacy issues. Semi-volatile organic carbons (s-VOCs) (USEPA Method 625) testing will generally be focused on industrial facilities, municipal areas with categorical users of these constituents, and/or historic reference locations. Once one SVOC pass is conducted district WQ staff may evaluate the data to determine whether more passes are necessary. This evaluation should be based on parameters with results above method detection. Herbicide (USEPA Methods 515.1 and 525.2) testing will be focused in agricultural areas and used as an indicator of potential overall agrichemical impact to biology. Organochlorine insecticides (USEPA Method 608/8081) mostly are compounds that are no longer used and are typically not water soluble. For that reason, these constituents will generally only be sampled if there is evidence of legacy pollution or knowledge of current site conditions warrant an investigation. Each site where pesticides will be collected will be sampled a minimum of two times. The objective of two passes is to screen whether select organic constituents are present in the water column; a statistic evaluation or geometric mean does not need to be calculated for each site. Samples for agricultural chemicals such as herbicides will be collected early in the sampling season to coincide with typical timing of applications.
- **Sediment:** Sediment sampling is an important component of a pollution monitoring program. The analytical results serve as valuable lines of evidence for identifying impacted areas, determining the magnitude and extent of contamination, and elucidating probable causes and sources of beneficial use impairment that may not be detected in water column sampling alone. Sediment contaminant data can be used to locate historical, intermittent, point and nonpoint contaminant sources, or contaminant concentrations of concern, which include

direct discharge, groundwater infiltration, soil erosion, aerial deposition, and sediment translocation and redeposition.

### Support Water Quality Standards Development

- **Use Designations:** All data collected as part of this survey will form the basis of UAAs for unassessed waters, verify or reaffirm existing beneficial uses, or readjust the current aquatic life use designations as appropriate for updates to the WQS.
- **Antidegradation:** The collection of biological and habitat data will support updates to the State's list of special high-quality waters.

### Provide Data for the Ohio Fish Tissue Consumption Monitoring Program

Fish tissue samples will be collected from 11 locations as part of the Ohio Fish Tissue Consumption Monitoring Program. Sampling locations may vary based on the availability of sport fish collected at each location. Fillet samples of regulation-size sport fish will be tested for organochlorinated pesticides, PCBs, mercury, lead, cadmium, arsenic, and selenium. Results will be used in the Ohio Sport Fish Consumption Advisory Program and used to determine attainment status of non-drinking water human health criteria in the Integrated Report.

### Support NPDES Permitting

A list of NPDES permitted dischargers in the survey area is presented in Appendix 3. Survey data will be collected to provide the NPDES program with necessary biological and/or chemical sampling data. Stream water and effluent chemistry samples will be collected to specifically assess eight wastewater treatment plant (WWTP) discharges at Huntsman Advanced Materials America LLC, Detrex Corp, Chardon, Conneaut, Geneva, Painesville, Morton Salt Inc, and Middlefield Cheese Coop WWTPs.

### TMDL Implementation

The Total Maximum Daily Load (TMDL) program, established under Section 303(d) of the Clean Water Act, focuses on identifying and restoring polluted rivers, streams, lakes, and other surface water bodies. TMDLs are prepared for waters identified as impaired on the 303(d) list in the Integrated Report. A TMDL is a written, quantitative assessment of water quality problems in a water body and contributing sources of pollution. It specifies the amount a pollutant needs to be reduced to meet Water Quality Standards (WQS), allocates pollutant load reductions, and provides the basis for taking actions needed to restore a water body. The objectives of the TMDL process are to estimate pollutant loads from the various sources within the basin, define or characterize allowable loads to support the various beneficial uses, and to allocate pollutant loads among different pollutant sources through appropriate controls (e.g., NPDES permitting, storm water management, 319 proposals, NPS controls or other abatement strategies). The components of the TMDL process supported by this survey are primarily the identification of impaired waters, verification (and re-designation if necessary) of beneficial use designations, gathering ambient information that will factor into the wasteload allocation, and ascribing causes and sources of use impairment. These data are necessary precursors to the development of effective control or abatement strategies.

## A7. Distribution List

This QAPP will be distributed to the following division management and staff, saved on the DSW collaboration site and posted on the DSW Biological and Water Quality Monitoring and Assessment webpage.

**Table 2 – Distribution List**

<b>Name/Title</b>	<b>Contact Email/Phone</b>	
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## A8. Project Organization

**Table 3 – Roles and Responsibilities.**

Individual(s) Assigned:	Responsible for:	Authorized to:
<b>DSW Central Office Administration</b>		
Mark Johnson DSW Chief	Overall administration of division.	Confirm project existence; approve staff and capital resources; approve plans; edit reports.
Erin Sherer Assistant Chief	Overall administration of division.	Confirm project existence; approve staff and capital resources; approve plans; edit reports.
Ashley Ward Assistant Chief	Overall administration of division.	Confirm project existence; approve staff and capital resources; approve plans; edit reports.
Joby Jackson Assistant Chief	Overall administration of division.	Confirm project existence; approve staff and capital resources; approve plans; edit reports.
<b>Standards and Technical Support</b>		
Melinda Harris Standards and Tech Support Section Manager	Quality management (QAPPs, SOPs); staff training; water quality standard rules.	Approve plans and edit reports.
Mariah Hood Standards and Tech Support Lead Worker	Water quality standard criteria development and rule updates.	Help plan study. Make recommended beneficial use changes.
Bob Miltner Standards and Tech Support Lead Worker	Water quality standard criteria development and rule updates.	Help plan study. Review project actions and documents in relation to listed responsibilities.
Richard Budnik Standards and Tech Support Staff	Represent agency in fish and wildlife consumption and contact advisory matters.	Help plan study. Make waterbody specific consumption and contact advisory recommendations.
Katherine Harris Standards and Tech Support Staff	DSWs quality management program.	Develop and implement field QA/QC guidelines. Track field QA/QC and staff training.
<b>NPDES/Permitting</b>		
Walter Ariss Municipal NPDES Section Manager	NPDES permitting guidance and rule development.	Ensure NPDES staff involvement in planning, provide technical guidance and communication assistance to project team, and coordinate with NPDES staff to review and edit reports.

<b>Individual(s) Assigned:</b>	<b>Responsible for:</b>	<b>Authorized to:</b>
<b>Assessment and Modeling</b>		
Mari Piekutowski Assessment & Modeling Section Manager	Overall management of monitoring section.	Assign staff; approve plans; edit reports.
Heidi Babos-Ford Ecological Assessment Unit Lead Worker	Track project progress, manage data, create EA3 database queries for reports, and compile information for Integrated Report.	Create and edit sampling stations in EA3 database. Upload fish, bug and chemistry data into EA3. Review and comment on reports. Write assigned Integrated Report sections.
Paul Gledhill Modeling and Assessment Unit Lead Worker	Modeling and assessment technical guidance and review. Dissolved oxygen surveys, stream flow measurements, and chemistry sampling.	Help plan study. Schedule and complete assigned field activities. Tabulate data and write discussion for technical report.
James Kiourtsis Modeling & Assessment Unit Supervisor	Supporting modeling field crews with supplies, equipment, and training.	Obtain approvals and signatures; develop budgets; conduct field audits; edit reports.
Ashton Spencer Modeling & Assessment Unit Staff	Dissolved oxygen surveys, stream flow measurements and chemistry sampling.	Help plan study. Schedule and complete assigned field activities. Tabulate data and write discussion for technical report.
Ben Rich Ecological Assessment Unit Supervisor	Support biological field crews with supplies, equipment, and training.	Obtain approvals and signatures; develop budgets; conduct field audits; edit reports.
Brian Alsdorf Ecological Assessment Unit Fish Crew Leader	Fish population and stream habitat assessments.	Help plan study. Schedule and complete assigned field activities. Tabulate data and write discussion for technical report.
Ben Foster Ecological Assessment Unit Study Coordinator Macroinvertebrate Crew Leader	Macroinvertebrate population assessments. Overall study coordination.	Plan and coordinate study. Schedule and complete assigned field activities. Tabulate data and write discussion for technical report.
<b>TMDL</b>		
Joshua Griffin TMDL and IR Unit Manager	Oversee coordination of biennial Integrated Report; TMDL program management.	Assign staff; approve plans; edit reports.
Ruth Briland TMDL and IR Unit Supervisor	Coordination of biennial Integrated Report update; TMDL program development.	Assign and support staff; edit reports.
Shante Eisele TMDL & IR Unit Staff	Develop TMDL reports. Oversee data collection and management.	Write assigned TMDL sections. Complete technical data management tasks associated with QA spreadsheet and EA3.

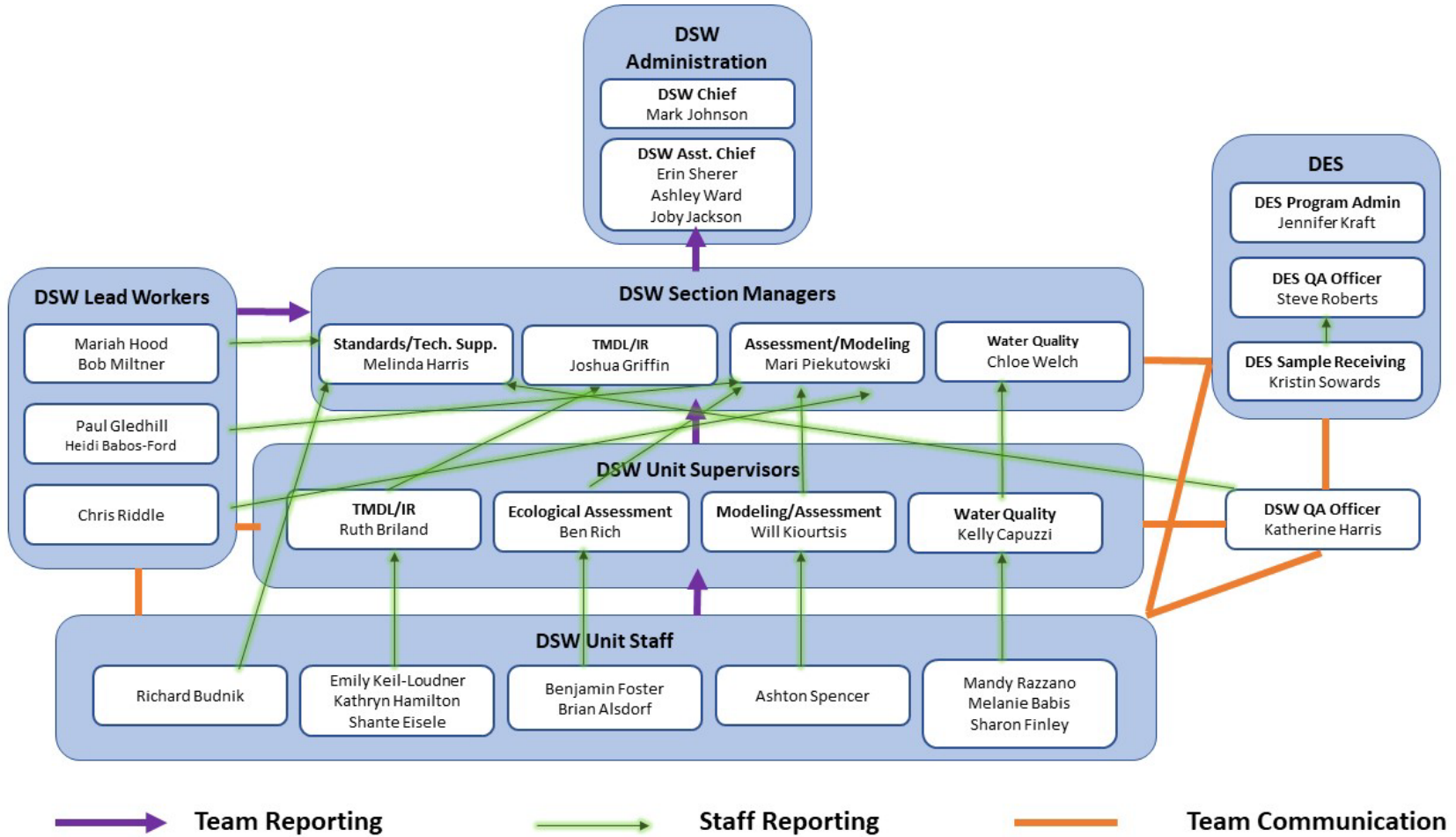
<b>Individual(s) Assigned:</b>	<b>Responsible for:</b>	<b>Authorized to:</b>
Kathryn Hamilton TMDL & IR Unit Staff	Lead TMDL projects.	Write assigned TMDL sections.
Emily Keil-Loudner TMDL & IR Unit Staff	Lead TMDL projects.	Write assigned TMDL sections.
<b>Water Quality</b>		
Chloe Welch Water Quality Section Manager	Overall management of water quality section.	Assign staff; approve plans; edit reports.
Kelly Capuzzi Water Quality Section Supervisor	Support water quality field crews with supplies, equipment, and training.	Obtain approvals and signatures; develop budgets; conduct field audits; edit reports.
Mandy Razzano, Water Quality Staff Northeast Region	Water and sediment data collection, validation, and management.	Help plan study. Schedule and complete assigned field activities. Tabulate data and write discussion for technical report.
Melanie Barbis Water Quality Staff Northeast Region	Water and sediment data collection, validation, and management.	Help plan study. Schedule and complete assigned field activities. Tabulate data and write discussion for technical report.
Sharon Finley Water Quality Staff Northeast Region	Water and sediment data collection, validation, and management.	Help plan study. Schedule and complete assigned field activities. Tabulate data and write discussion for technical report.
<b>DSW Northeast Region</b>		
Patricia Vannah, Environmental Manager	Support water quality field crews located in Northeast Region. Manage permitting staff.	Provide support for water quality staff located in Northeast Region. Manage coordination with NPDES permitting staff.
Erm Gomes Permitting Lead Worker Northeast Region	Technical lead for NPDES permitting in Northwest Region.	Provide technical information to study team and coordinate with NPDES permitting staff. Review and suggest changes to reports.
<b>Division of Environmental Services</b>		
Jennifer Kraft Program Administrator	Overall administration of laboratory activities.	Help solve laboratory information management system problems. Develop analytical methods and SOPs.
Steve Roberts QA Officer	DES quality management program.	Oversee data completeness, validation, and delivery.
Kristin Sowards Sample Receiving Coord.	Intake of laboratory samples, coordination with field staff	Help solve daily sample scheduling and sample submission issues.
<b>Division of Drinking and Ground Waters</b>		
Allison Reed Central Office Emerging Contaminants	Harmful Algal Bloom program implementation	Coordinate with DSW on drinking water intake and inland lake monitoring.
Callie Nauman Central Office Emerging Contaminants	Harmful Algal Bloom program implementation	Coordinate with DSW on drinking water intake and inland lake monitoring.

## **A9. Project Quality Assurance Manager Independence**

The Project QAM shall be independent of environmental information operations. The Project QAM's independence is ensured through separation of sections and reporting chains within Ohio EPA's Division of Surface Water. The Project QAM has oversight authority and responsibilities for planning, documenting, coordinating, and assessing effectiveness of the QAPP. The QAM has authority to access and discuss quality-related issues with senior management outside of the direct supervisory chain as necessary.

### A10. Project Organization Chart and Communication

Figure 3 –Organization Chart.



## **A11. Personnel Training/Certification**

All staff who conduct surface water sampling, whether from streams or lakes, receive initial training by someone experienced in the proper techniques required, usually a supervisor or veteran employee. Mandatory refresher training is done on an annual basis for all Agency surface water samplers. Annual boating safety refresher training is required by internal safety policy SP 10-12. Employees who operate watercraft must also demonstrate proficiency in boat operation to their supervisor on an annual basis. Supervisors should also conduct an annual field audit to verify standard operating procedures are followed.

## **A12. Documents and Records**

Microsoft® SharePoint is used as a document library. Access is through Ohio EPA's SharePoint collaboration site.

<https://ohiodas.sharepoint.com/sites/EPA-DSW/waterqual/SitePages/Home.aspx>

Examples of documents posted to this location include:

Pre-sampling documents:

- Preliminary information sheets.
- Property access forms.
- Draft and final QAPP versions.

Project documents:

- All data files.
- Draft report sections.
- Changes to sites, staff, parameters, etc. should be filed in the project folder by the study team leader.
- Project photos will be moved to and stored in the Lynx Photo System. All files and original data sheets will be initially retained by Ohio EPA at the Groveport Field Office while the survey report is being finalized in accordance with established retention schedules.
- Long term survey information and data storage will take place at the State's Storage Facility in accordance with established retention schedules.

Changes in project leadership or major actions which might affect the DQOs require an updated QAPP and signoff sheet. The study team leader shall retain copies of all management reports, memoranda, and all correspondence between team members.

For analytical samples the original chain of custody form is delivered to DES along with the samples and retained by the Laboratory. A copy of the form may be kept in a binder by the sample collector as well. After water samples are analyzed and the results are approved by the DES QA Officer the data will be released to Sample Master® and subsequently uploaded to DSW's Ecological Assessment and Analysis Application (EA3). The sample collector reviews laboratory sheets for completeness and accuracy, validates field QC, adds comments and completes edits if necessary and approves the sheet. All data approved in EA3 is sent to U.S. EPA's Water Quality Exchange.

Original fish and QHEI data sheets will be retained at the Groveport Field Office. Data from the field sheet is manually entered into the EA3 database using the appropriate data entry screen. The sheets are double entered to minimize mistakes.

## **Group B: Implementing Environmental Information Operations**

### **B1. Identification of Project Environmental Information Operations**

The site selection process for aquatic life beneficial uses is designed to systematically sample principal streams in the targeted study area with enough locations to ensure alignment with the DQOs listed in Section A7. Principal streams are roughly defined as those that drain a surface area  $>8$  mi<sup>2</sup>, though smaller drainages may be sampled as deemed necessary. Each WAU (HUC 12) is independently evaluated to determine its existing, relevant characteristics that contribute to the fulfillment of study objectives. These characteristics include, but are not limited to historical biological impairment, active watershed TMDLs, known and suspected point and nonpoint discharges, land use changes (e.g., agriculture to urban, forest to agriculture, etc.), historical reference sites, unlisted/undesigned streams in the WQS, known restoration activities, and other miscellaneous local impacts that may contribute to beneficial use impairment.

For WAUs with monotonous character (consistent land use, few/no known water quality issues, lack of development, etc.), one sampling location will be placed at or near the HUC outlet, preferably where biological sampling has been historically conducted. Larger, longer streams that flow across multiple WAUs are additionally evaluated holistically to ensure adequate longitudinal sampling coverage. Available USGS gage sites may be selected to obtain accurate stream flow data for load calculation purposes. The site selection process for the recreation beneficial use is designed to obtain a representative picture of conditions in an assessment unit as well as to evaluate areas of significant stream recreation. A minimum of one site per WAU is desired, though more sites may be included as recreation uses deem necessary.

A summary of the planned sampling effort is shown in Appendix 1. A detailed list of sampling sites and the type of sampling at each is shown in Appendix 2. A list of facilities regulated by individual NPDES permit is shown in Appendix 3.

## **B2. Methods for Environmental Information Acquisition**

The version 2023 of the Surface Water Field Sampling Manual can be found at:

<https://epa.ohio.gov/static/Portals/35/bioassess/2021-DSW-FieldSamplingManual-Main.pdf>

### **Stream Habitat Evaluation**

Physical habitat is evaluated based on methods described in Qualitative Habitat Evaluation Index (QHEI); Rationale, Methods, and Application (Rankin 1989, 1995, and Ohio EPA 2006). Various attributes of the available habitat are scored based on their overall importance to the establishment of viable, diverse aquatic faunas. Habitat attributes scored include the type and quality of substrate, amount of instream cover, channel morphology, extent of riparian canopy, pool and riffle development and quality and gradient are among the metrics used to evaluate the characteristics of a stream segment, not just the characteristics of a single sampling site.

### **Biological Community Assessment**

Fish and macroinvertebrate sampling protocols are detailed in Ohio EPA 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 2015b). Published at:

[https://epa.ohio.gov/static/Portals/35/documents/BioCrit15\\_Vol3.pdf](https://epa.ohio.gov/static/Portals/35/documents/BioCrit15_Vol3.pdf)

A combination of quantitative and qualitative methods will be employed to monitor benthic macroinvertebrate communities. Quantitative collections are made using modified Hester-Dendy multiple plate artificial substrate samplers, deployed at all biomonitoring sites draining more than 20 mi<sup>2</sup>, or at reference sites regardless of size. Once deployed, artificial substrates are left to colonize, in-stream, for a minimum six-week period. Qualitative sampling will be conducted at all biomonitoring stations. This sampling method consists of a basic inventory of macroinvertebrate taxa from natural substrates, noting dominant taxa among major habitat types.

Fish will be sampled at each designated location using pulsed DC headwater, wading, backpack, or boat electrofishing methods depending on stream size at each sampling zone. Sites may be sampled once, twice, or more through the summer sampling season. Reasons why sites may be sampled twice (or even more) during the sampling index period could include: sites downstream from permitted dischargers, reference site locations, sites that did not meet goals during the first sampling pass, or areas that are prone to greater fluctuations or system instability. Typically, at least 4 weeks should elapse between sampling at a particular site. The number of passes may be adjusted as necessary based on best professional judgment of the Ohio EPA field staff. Reasons for a single pass monitoring at sites may include extremely difficult or time-consuming access, work delays related to weather, or the emergence of alterations (natural or otherwise) at points of access or sampling reach, rendering replication of the initial effort hazardous or costly. At least 10 percent of fish sampling locations will receive a second electrofishing sampling event. Fish are processed in the field, which includes identifying each specimen to species level, counting individuals at all sites, weighing individuals at wading and boat sites, and recording external abnormalities. Some specimens are preserved for

further identification in the laboratory (if necessary) or to document new or noteworthy species records.

### Surface Water

When feasible, surface water physical and chemical testing will be done to coincide with biological monitoring. Ideally these samples will be collected across a variety of flow conditions. A minimum of five sets of samples will be collected. If this is not feasible, sites where  $n < 3$  will be noted in the report to question the validity of any arithmetic or geometric mean calculated.

Inorganic surface water chemical parameters will be collected at every site listed in Appendix 2. Physical water quality measurements will be taken with a multimeter probe each time a grab sample is collected. Analytical methods and laboratory reporting levels for chemical and physical parameters for different media samples collected within the study are listed in Appendix 4.

Surface water grab samples will be collected and preserved using appropriate methods as outlined in the Surface Water Field Sampling Manual for water column chemistry, bacteria, and flows. This document is hereafter referred to as the Surface Water Field Sampling Manual. Samples are delivered via overnight courier to Ohio EPA's Division of Environmental Services (DES) for analyses. Field measurements of dissolved oxygen, pH, temperature and conductivity will be made using YSI Professional Plus or ProDSS meters.

Laboratory reporting limits are adequate to evaluate most pollutants. Potential exceptions include nitrate-nitrite and ammonia. It is common for nitrogen to become depleted during the summer in aquatic environments. In instances where a value is needed to calculate a mean concentration and the result is below reporting limit (RL), the reported "value" will be used in the calculation.

### Water Quality Sonde Deployments

A subset of the stream assessment sites are designated as nutrient sites. Continuous multi-parameter measurement sondes will be deployed during stable, baseflow conditions for this assessment. Ideally, two sonde surveys will be carried out at each nutrient assessment site. Water quality sondes will be placed at select locations indicated as a nutrient site on Appendix 2 to evaluate diel measurements of dissolved oxygen, pH, temperature, and conductivity. The goal of each sonde deployment is to capture about 48 continuous hours of hourly measurements. Sestonic and benthic chlorophylla samples are to be collected during each sonde deployment, as site conditions allow. All sampling, analysis and procedures adhere to those specified in the *Surface Water Field Sampling Manual – Appendix II for water quality parameters and flows*. Section F of Appendix II outlines equipment preparation, deployment, equipment retrieval, data management, quality control testing, and maintenance.

### Bacteria

Attainment/non-attainment of recreational uses will be determined using E. coli criteria codified in OAC 3745-1-37, Table 37-2. Water quality must meet a 90-day geometric mean and a statistical threshold not to be exceeded more than 10 percent of the time. Bacteria sampling to evaluate

recreation use will be done within a 90-day period that falls from May 1<sup>st</sup> to October 31<sup>st</sup>. Each site will have at least 5 samples analyzed for *E. coli*. Water samples will be collected into appropriate containers, cooled to 4°C, and transported to a contract laboratory and/or Ohio EPA's DES within six hours of sample collection. All samples will be analyzed for *E. coli* bacteria using U.S. EPA-approved methods.

### Chlorophyll

Benthic and sestonic chlorophyll- $\alpha$  will be collected and preserved using appropriate methods, as outlined in Appendix II of the *Surface Water Field Sampling Manual* and delivered to Ohio EPA- DES for analyses.

### Sediment

Fine-grained, multi-incremental sediment samples will be collected in the upper four inches of bottom material using either decontaminated stainless steel scoops or dredges. Potential sediment sampling parameters are listed in Table 4. Collected sediment will be placed into appropriate containers, placed on ice (to maintain <6°C) and shipped to Ohio EPA-DES for analysis. Sampling and decontamination protocols will follow those listed in Appendix III of the *Surface Water Field Sampling Manual*.

### Fish Tissue

Tissue fillet and whole body samples will be collected from fish of regulation size and species preferred for analysis may include Spotted Bass (*Micropterus punctatus*), Largemouth Bass (*Micropterus salmoides*), Smallmouth Bass (*Micropterus dolomieu*), Flathead Catfish (*Pylodictus olivaris*), Walleye (*Sander vitreus vitreus*), Saugeye (*Sander vitreus vitreus x Sander canadensis*), White Bass (*Morone chrysops*), Common Carp (*Cyprinus carpio*), Freshwater Drum (*Aplodinotus grunniens*), buffalo and Channel Catfish (*Ictalurus punctatus*). When possible, composite samples (by species) should include a minimum of three fish, yielding at least 150 grams of tissue. At each fish tissue sampling location, an attempt will be made to collect five fish species for analysis. Fish will be collected using standard electrofishing methods (Ohio EPA 2015b). Sampling locations are listed in Table 2 and the parameters to be analyzed are listed in Table 4. Fish used for tissue analysis will be filleted in the field or at the Ohio EPA Groveport Field Office using decontaminated stainless-steel fillet knives. Samples will be wrapped in aluminum foil, placed in a sealed plastic bag, along with necessary site documentation. Temporary storage in the field may take one of two forms. Samples may be stored on wet ice for a period not exceeding 48 hours. For longer periods of field storage, samples must be placed on dry ice. Collection, decontamination, and field processing of tissue samples will follow protocols listed in the *Ohio EPA Fish Tissue Collection Guidance Manual* (Ohio EPA 2021). From the field, fish tissue samples will be stored and inventoried in chest freezers at the Ohio EPA Groveport Field Office prior to delivery to DES. For more information on inland lakes sampling, please see the *Quality Assurance Project Plan (QAPP) for Inland Lakes Assessments – Statewide Project 2023 (draft, TBD)*.

### **B3. Integrity of Environmental Information**

Sample Master® software is used by DES to manage laboratory information. The sample collector logs into the system and places an order by selecting the appropriate project, stations to be sampled, and test group(s) to be analyzed. The program creates a chain of custody form and container labels for each site.

The analytical methods to be used in this study are provided in Appendix 4 along with the preservatives, holding times, and reporting limits. SOPs for the analytical methods are available upon request.

### **B4. Quality Control**

#### **Stream Habitat Evaluation**

To ensure technical proficiency and promote standardized observations between and among all Ohio EPA field staff tasked with macrohabitat assessment, participation in annual QHEI refresher training is required. The training pre-dates the onset of sampling activities by several weeks, is field-based, and typically organized and lead by a senior Fish Evaluation Group (FEG) biologist. Participants are asked to independently generate a QHEI from one or several target stream segments; this followed by a group discussion, on-site, where each component of each of the five metrics that comprise the QHEI are reviewed in detail. In this way, all investigators are obliged to revisit guidance material and reaffirm the various definitions, categories, and related classifications that underpin this key assessment tool. The annual refresher has proved an efficient method to discipline observations made by front-line field staff and as such has served as a practical check on investigator drift.

#### **Water Quality Sonde Deployments**

Sondes will be calibrated according to manufacturer specification prior to deployment. A calibration record is kept for all sondes at the Groveport Field Office (GFO). After each deployment, sondes undergo a precision quality control check, for more details see section F and Appendix II of the *Surface Water Field Sampling Manual*. All field quality control requirements and data validation methods are detailed in the *Surface Water Field Sampling Manual*.

#### **Surface Water Chemistry**

Ten percent of the total number of water samples will be submitted to the laboratory as field quality control samples. About five percent will be duplicates, including replicates if natural variability is a concern, and about five percent will be blanks, including field blanks and equipment blanks. Matrix spike duplicates will be collected for organic water samples at a minimum of five percent. Data will be validated based on the results of the field quality control samples as outlined in Appendix IV in the *Surface Water Field Sampling Manual*. The laboratory will validate data according to the requirements defined in the applicable analytical method (see Appendix 4). Field instruments will be calibrated according to manufacturer guidelines. Field instruments utilizing electrochemical sensors must be calibrated daily.

## Chlorophyll

Ten percent of the total number of chlorophyll samples collected will be quality control samples. Approximately five percent will be blanks and five percent will be duplicates. Equipment blanks for benthic and sestonic samples are collected following two separate procedures that are each outlined in Appendix II of the *Surface Water Field Sampling Manual*. Duplicates are collected as two aliquots pulled from the same sample, designed to measure the variability in sample processing (not sample collection). Chlorophyll data will be validated based on the results of the blanks and duplicates as outlined in Appendix IV in the *Surface Water Field Sampling Manual*.

## Sediment

Ten percent of the number of sediment samples should be collected as quality control samples, approximately 5 percent should be duplicates and 5 percent equipment blanks. Field duplicate samples are collected to determine laboratory analytical variability and/or field compositing techniques and of sediment heterogeneity within a single collected sample. Quality control sampling protocols will follow those listed in Appendix III of the *Surface Water Field Sampling Manual*. Sediment data will be validated based on the results of the equipment blanks and duplicates as procedures outlined in Appendix IV in the *Surface Water Field Sampling Manual*.

## **B5. Instruments/Equipment Calibration, Testing, Inspection, and Maintenance**

All instruments/equipment will be inspected prior to each use. All field meters are service annually by the manufacturer to verify that they are operating within specifications. Parts are repaired or replaced at this time if necessary.

The appropriate calibration procedure, as specified in the instrument's user manual, must be followed. All calibration solutions used will be checked for expiration dates before utilized. All equipment is assigned a logbook that will detail the equipment's calibration and maintenance history. For more details see Section D and Appendix II of the *Surface Water Field Sampling Manual*. Other equipment used will follow specifications provided in the biological and habitat methods cited.

## **B6. Inspection/Acceptance of Supplies and Services**

Supplies and consumables will be inspected upon receipt by the field sampling teams. Nearly all supplies utilized for this project are maintained and used during Ohio EPA's normal business operations. The field team leaders will be responsible for ensuring that all sample containers and all needed supplies and consumables are available in advance of all field work. It will be their responsibility to maintain and replenish stock when needed. Consumable supplies include, but are not limited to: sample containers, acid preservatives, Lugol's iodine solution, ethyl alcohol, buffers, filters and miscellaneous supplies such as distilled water, disposable gloves, and towels. Field personnel will confirm that all reagents are within applicable shelf life.

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## **B7. Environmental Information Management**

Data collected for this project and other data previously collected by Ohio EPA will be used to develop data summaries for each waterbody.

The data management process is shared by the Division of Surface Water (DSW) and Division of Environmental Services (DES). DES uses Sample Master® software to manage laboratory information and DSW uses the Ecological Assessment and Analysis Application (EA3) to manage data. These programs are linked together to allow the transfer of information between the two systems. EA3 software is used to assign a permanent six-digit station ID number to each sampling location and to create a project name to associate locations so data can subsequently be exported and assessed in groups.

Field measurements are collected instantaneously using a multi-parameter meter and saved in an internal file storage system. These files are downloaded to the manufacturer's software, exported to Microsoft Excel® and then uploaded to Sample Master® so field data can be associated with chemistry data in the database.

Field and chemistry data tabulated in Sample Master® are eventually uploaded into EA3. Then, in EA3, the sample collector will review each data sheet for accuracy, validate field QC, add comments and complete edits, if necessary, before approving the sheet. This data is then available for use in IR reports. All agency files are ultimately backed up and housed in the State of Ohio Computer Center (SOCC).

The project leader will maintain the project file in a dedicated folder on SharePoint. The goal or objective is to have a complete record of all decisions about modifications of data collection, validation, or interpretation between the QAPP signoff and project report completion. To achieve this, the project leader will need to be included on emails or otherwise receive summaries of all actions that meet the above description. Project photos should all be filed in the Lynx photo management system.

## **Group C: Assessment, Response Actions and Oversight**

### **C1. Assessment and Response Actions**

#### **Assessments**

Periodic assessment of field sites, field equipment, and laboratory equipment is necessary to ensure that data obtained meets project needs. This is an ongoing process that continues every day during project implementation, as well as on larger scale assessments that take place less frequently (*e.g.*, annually). The assessments generally focus on readiness and consistency of implementation but also are looking for continual improvement opportunities.

Daily assessments (for each day of project activities, as applicable) include assessment of field equipment and supplies, laboratory equipment and supplies, completeness of the day's samples and associated field notes, future needs, etc.

## Response Actions

Despite best preparations, assessments may find situations requiring corrective actions. Small day-to-day level assessment findings are often addressed by the individual doing the assessment in the field or in the laboratory and are common enough to the process to not necessitate a formal response.

Laboratory personnel are aware that response may be necessary. Many of these will result in changes to the analytical reporting via data qualifiers and comments, for more information see Appendix IV of the *Surface Water Field Sampling Manual* if:

- QC data are outside the warning or acceptable windows for precision and accuracy;
- Blanks contain target analytes above acceptable levels;
- Undesirable trends are detected in spike recoveries or relative percent difference (RPD) between duplicates;
- There are unusual changes in detection limits;
- Deficiencies are detected by the laboratory and or project QA officers during any internal or external audits or from the results of performance evaluation samples;
- Inquiries concerning data quality are received.

Corrective action implementation will be determined by the likelihood that the situation may affect the quality of the data. Field corrective actions will be brought to the attention of the study team for consideration as to their impact on the data, their potential interest to other sampling teams/subcontractors, any future considerations for process improvement, and for their potential inclusion to the quarterly reports. Laboratory corrective actions will follow regular laboratory procedures and SOPs. Any laboratory corrective action with the potential to affect data quality will be conveyed to the study team leader by the laboratory.

## Reporting and Resolution of Issues

Any audits or other assessments that reveal findings of practice or procedure that do not conform to the written QAPP will be corrected as soon as possible. The study team and QA coordinator will be notified regarding deviations.

## Data Completeness

Success of the project will be judged by the resulting data fulfilling the needs outlined in the data objectives. Potential data gaps will be monitored as the project progresses and the project schedule will be revised to fill these gaps where they are determined to be significant or to potentially impact the fulfillment of project objectives.

## C2. Oversight and Reports to Management

The project leader or district supervisor will receive regular updates from field staff throughout the sampling season and will report to division management during Senior Management Team meetings. Any problems that jeopardize completion of the project will lead to memorandum and consultation with program management and quality assurance staff.

The final TSD will report all study results and findings. Aquatic life use attainment will be determined by biological criteria. Causes and sources of aquatic life use impairment will be identified and supported by water chemistry, sediment chemistry, and stream habitat evaluations. Public water supply use will be determined on surface water chemistry and recreational use will be determined on bacteriological results.

## **Group D: Environmental Information Review and Usability Determination**

### **D1. Environmental Information Review**

Data verification will be conducted by the study team with assistance from other DSW staff. This process will confirm that sample results received are congruent with samples submitted and parameters requested from the laboratory. The process will also result in summaries of any differences between initial sampling and methods planned in the QAPP and results reported and available. Differences may result from samples not being collected (due to weather, scheduling, etc.), samples not being submitted (due to accidents like broken containers, or delays resulting in being past holding times, etc.), problems at the laboratory (methods changing, containers or equipment breaking), or other reasons. It is also possible that additional sampling would take place because of field observations/conditions. Documenting deviations from the QAPP is the responsibility of the project leader.

The DES laboratory does the initial validation on all data and may qualify data based on laboratory QA/QC alone or with feedback from the sampler (regarding specific sampling procedures, variable sampling matrix, conditions, blank contamination, duplicate agreement, matrix spike recovery, etc.). The data user can evaluate the data given their knowledge of sampling conditions, expected variability given location and matrix, data uses, etc.

All fish, macroinvertebrate, and habitat data are hand-entered into the EA3 database using a double data entry method. This helps to minimize data entry errors. Final approval of data involves a reconciliation between the paper forms and the electronic data which is completed by the data collector or a database administrator in the Ecological Assessment Unit.

Upon approval in EA3, field and laboratory data cannot be revised without intervention from database administrators in the Agency's Office of Information Technology Services (ITS).

### **D2. Useability Determination**

Biological and habitat field sampling results will be verified and validated based on field staff experience and qualifications and adherence to training and QA/QC procedures for current and new field staff available in Subsection 1, Part A (macroinvertebrates) and Subsection 2, Part A (Fish and Habitat) in *Biological Criteria for the Protection of Aquatic Life: Volume III. Standardized Biological Field Sampling and Laboratory Methods for Assessing Fish and Macroinvertebrate Communities*.

In addition to verifying data completeness, the study team will oversee data validation for the project that will include confirmation of sample holding times, proper preservatives, sample containers, analysis methods, QA/QC results (including assessment of results for blanks, spikes, and duplicates), etc. This will be an ongoing effort, concluding in a data validation summary to be included in the final report.

The study team will make final decisions regarding validity and usability and will evaluate the sample collection, analysis, and data reporting processes to determine if the data is of sufficient quality to meet the project objectives. Data validation involves all procedures used to accept or reject data after collection and prior to use. These include screening, editing, verifying, and reviewing. Data validation procedures ensure that objectives for data precision and bias will be met, that data will be generated in accordance with the QAPP and SOPs, and that data are traceable and defensible. The process is both qualitative and quantitative and is used to evaluate the project.

The laboratory QA staff will conduct a systematic review of the analytical data for compliance with the established QC criteria using batch and sample QA/QC information including spike, duplicate, and blank results. All technical holding times will be reviewed, the laboratory analytical instrument performance will be evaluated, and results of initial and continuing calibration will be reviewed and evaluated.

Field QC sample results will be evaluated using procedures available in the *Surface Water Field Sampling Manual*. Much of this work is facilitated by a centralized automated QC data evaluation Excel file. Use of this file is explained in the document "QC Tracking and Data Qualification" available in SharePoint in DSW Quality Management/Documents/DSW Procedures.

For most DSW chemical water quality data, data validation is generally confined to evaluation of blank results, duplicate/replicate results, paired parameter results and confirming that samples were properly preserved/prepared (including filtration, etc. - if indicated by the method). Standards for evaluation of analytical results of those QC sample types and general field samples are described in Appendix IV, Section A of the *Surface Water Field Sampling Manual*.

Issues related to biological and habitat data uncertainty, including any patterns of analytical or field QC uncertainties, will be assessed by field staff and their management. For most situations, issues can be addressed with acknowledgement of factors captured in the sample metadata which can confirm, explain, and document the data quality concern. Significant, persistent, or unresolved issues will be brought to the attention of the project study team, division QC personnel, and Ecological Assessment Unit and/or DSW management for further evaluation. This combination of personnel will assess how to best label affected data for storage in the EA3 database and how to eliminate or limit any similar problems going forward. Consideration will also be given on how best to memorialize data limitations or anomalies as the data is transferred to other databases, including the WQ Portal, so that future users of the sampling data are aware of any data quality issues or limitations.

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## Appendices

### Appendix 1. Summary of Sampling Effort

Type of Sample	# of sites	# of passes	Total #
<b>Biology</b>			
Fish	109	120 (approx.)	120 (approx.)
Macroinvertebrate (Quantitative)	44	1	44
Macroinvertebrate (Qualitative)	65	1	65
<b>Fish Tissue</b>			
Fish Tissue	14	1	14
<b>Water Quality</b>			
Inorganic Samples	115	5	575
Nutrient (sonde deployment & Chlorophyll <i>a</i> )	49	2	98
PCBs & SVOcs	10	2	20
Herbicides & Pesticides	31	2	62
<b>Sediment Quality</b>			
Metals	55	1	55
Pesticides/PCBs and Semi-volatile Organics	55	1	55
<b>Bacteria</b>			
<i>E. coli</i> Cultures	59	5	295

## Appendix 2. Streams, Sampling Locations, and Sampling Types

Refer to key at the end of the table for sampling types.

Station	River Code	Site Name	River Mile	Area (mi <sup>2</sup> )	HUC12	County	Lat.	Lon.	(refer to key in footnote) Sampling	Map #
G01S07	03-001-000	GRAND R. E OF PARKMAN @ U.S. RT. 422	95.38	14.20	04110004 01 02	Trumbull	41.352800	-81.038600	F,QL,C,N	1
G01K20	03-001-000	GRAND R. UPST WEST FARMINGTON PWS @ WOODS CURTIS RD.	88.5	32.10	04110004 01 02	Trumbull	41.387500	-80.960500	F,QT,C,B,N	2
G02S03 R	03-001-000	GRAND R. @ HYDE RD.	83.45	85.40	04110004 01 04	Trumbull	41.411400	-80.914200	F,QT,C,O2,S,B,N	3
G01K18	03-001-000	GRAND R. @ COUNTY LINE DONLEY RD.	75.58	126.00	04110004 01 05	Ashtabula	41.476500	-80.921900	F,QT,C,B	4
G01W06 R	03-001-000	GRAND R. @ U.S. RT. 322	65.88	210.00	04110004 03 03	Ashtabula	41.534600	-80.901100	F,QT,C,O2,S B,N	5
G01K08	03-001-000	GRAND R. @ U.S. RT. 6	55.62	251.00	04110004 03 05	Ashtabula	41.605400	-80.894400	F,QT,FT,C S,B,N	6
G02K52	03-001-000	GRAND R. @ CAMP BEAUMONT	45.1	383.00	04110004 05 02	Ashtabula	41.689600	-80.884400	F,QT,C,N	7
G02W17	03-001-000	GRAND R. @ TOTE RD.	36.30	543.00	04110004 06 01	Ashtabula	41.755000	-80.874400	F,QT,C	8
G02W19R	03-001-000	GRAND R. @ BRANDT RD.	28.45	554.00	04110004 06 03	Lake	41.757500	-80.971400	C,O,S	9
502530	03-001-000	GRAND R. AT PAINESVILLE @ ST. RT. 84	8.45	685.00	04110004 06 07	Lake	41.719200	-81.228100	F,QT,FT,C,O2,S , B	10
G02S13 R	03-001-000	GRAND R. AT PAINESVILLE @ N. END OF PARK, ADJ. GOLF COURSE	6.1	687.00	04110004 06 07	Lake	41.736100	-81.236100	C,O,S,B,N	11
G02P15	03-001-000	GRAND R. N OF PAINESVILLE, UPST. UNIROYAL	4.6	698.00	04110004 06 07	Lake	41.751900	-81.237500	F,QT,FT,C,O,S,N	12
G02P19	03-001-000	GRAND R. N OF PAINESVILLE, UPST. DIAMOND SHAMROCK	3.6	699.00	04110004 06 07	Lake	41.749360	-81.255353	F, QT, FT,C,O,S,N	13
G02S14	03-001-000	GRAND R. UPST. PAINESVILLE WWTP, DST. LAGOONS	3.1	700.00	04110004 06 07	Lake	41.745600	-81.263100	B	14
G02P21	03-001-000	GRAND R. AT PAINESVILLE @ ST. CLAIR ST.	2.7	701.00	04110004 06 07	Lake	41.741100	-81.262500	F,QT,FT,C,O1 &2,S,B,N,	15
G02W09	03-004-000	RED CREEK @ MOUTH	0.01	9.50	04110004 06 07	Lake	41.749400	-81.235600	F,QL,C,O2,S,B	16
G99Q07	03-005-000	KELLOGG CREEK @ BUTTON RD.	5.4	4.20	04110004 06 06	Lake	41.668600	-81.279700	F,QL,C,O2,S,B	17

Station	River Code	Site Name	River Mile	Area (mi <sup>2</sup> )	HUC12	County	Lat.	Lon.	(refer to key in footnote) Sampling	Map #
200593	03-005-000	KELLOGG CREEK NEAR MENTOR, UPST. MORLEY RD	3.3	5.20	04110004 06 06	Lake	41.686700	-81.259700	F,QL,C,O2,S,B	18
G99Q04	03-005-000	KELLOGG CREEK NEAR MOUTH @ ST. RT. 86	0.2	13.10	04110004 06 06	Lake	41.705300	-81.233600	F,QL,C,O2,S,B,N	19
G02P10	03-006-000	ELLISON CREEK SW OF PAINESVILLE @ PROUTY RD.	0.57	5.80	04110004 06 06	Lake	41.678900	-81.259200	F,QL,C	20
200604	03-007-000	TALCOTT CREEK S OF MADISON, UPST. FORD RD.	1.5	5.20	04110004 06 05	Lake	41.722500	-81.083100	F,QL,C	21
G99Q08	03-009-000	MILL CREEK (GRAND R. RM 23.58) DST. ADKINS RD.	4.8	5.10	04110004 06 02	Ashtabula	41.713100	-80.992500	F,QL,C	22
G02G10	03-009-000	MILL CREEK @ DOTY RD.	1.48	20.30	04110004 06 02	Ashtabula	41.739900	-81.026600	F,QT,C,B,N	23
200608	03-009-001	TRIB. TO MILL CREEK (4.34) E OF THOMPSON @ MOSELEY RD.	2	3.60	04110004 06 02	Ashtabula	41.698900	-81.001900	F,QL,C	24
G02W03	03-010-000	COFFEE CREEK SW OF AUSTINBURG @ LAMPSON RD.	0.06	12.20	04110004 06 01	Ashtabula	41.756400	-80.873300	F,QL,C,B,N	25
G02K50	03-012-000	BRONSON CREEK @ SWEITZER RD.	0.82	7.60	04110004 05 02	Ashtabula	41.709900	-80.892500	F,QL,C	26
300204	03-013-000	TRUMBULL CREEK @ ST. RT. 534	6.23	13.10	04110004 05 02	Ashtabula	41.668600	-80.953900	F,QL,C	27
G02K51	03-013-000	TRUMBULL CREEK @ RIVERDALE RD.	2.05	19.60	04110004 05 02	Ashtabula	41.678100	-80.901800	F,QT,C,B,N	28
300207	03-014-000	SPRING CREEK @ CALLAHAN RD.	2.76	6.50	04110004 05 02	Ashtabula	41.641900	-80.992500	F,QL,C	29
300208	03-015-000	THREE BROTHERS CREEK @ CAMP BEAUMONT	1.99	17.40	04110004 05 01	Ashtabula	41.685500	-80.863700	F,QL,C,B	30
300181	03-017-000	CROOKED CREEK @ HIGLEY RD.	3.51	8.20	04110004 03 04	Ashtabula	41.654300	-80.923800	F,QL,C	31
G01K01	03-017-000	CROOKED CREEK @ CALLENDER RD.	1.62	9.30	04110004 03 04	Ashtabula	41.635300	-80.907400	F,QL,C,B	32
300185	03-019-000	MILL CREEK @ SWEET WEST RD.	2.3	9.00	04110004 03 03	Trumbull	41.489400	-80.956500	F,QL,C	33
G01K17	03-021-000	COFFEE CREEK @ COMBS RD.	0.23	7.30	04110004 01 05	Trumbull	41.470500	-80.920400	F,QL,C	34
G02S06 R	03-022-000	BAUGHMAN CREEK @ FENTON RD.	3.30	15.50	04110004 01 03	Trumbull	41.419200	-80.877200	F,QT,C,O2,S,B,N	35
300175	03-022-001	DEACON CREEK @ HYDE OAKFIELD RD.	1.38	9.30	04110004 01 03	Trumbull	41.409300	-80.837600	F,QL,C,S,N	36
300174	03-023-000	CENTER CREEK @ ST. RT. 45	6.25	6.40	04110004 01 04	Trumbull	41.364500	-80.864900	C	37
G01K13	03-023-000	CENTER CREEK @ COREY HUNT RD.	3.03	11.60	04110004 01 04	Trumbull	41.390400	-80.892800	F,QL,C,S,N	38
300172	03-024-000	MUD RUN @ HOUSEL-CRAFT RD.	4.05	8.50	04110004 01 04	Trumbull	41.359700	-80.918500	F,QL,C	39
300169	03-025-000	DEAD BRANCH @ GEAUGA EASTERLY RD.	5.05	12.70	04110004 01 01	Geauga	41.348100	-80.951700	F,QL,C,B	40
G02S16 R	03-100-000	BIG CREEK UPST. CHARDON WWTP @ U.S. RT. 6	16.42	1.10	04110004 06 06	Geauga	41.583900	-81.190300	F,QT,C,O2,S,B	41
G02S15	03-100-000	BIG CREEK N OF CHARDON @ WOODIN RD.	14.06	5.60	04110004 06 06	Lake	41.605800	-81.199700	F,QL,C,B,N	42

Station	River Code	Site Name	River Mile	Area (mi <sup>2</sup> )	HUC12	County	Lat.	Lon.	(refer to key in footnote) Sampling	Map #
G02G16	03-100-000	BIG CREEK @ ST. RT. 608	9.35	15.70	04110004 06 06	Lake	41.649300	-81.187400	F,QL,C	43
G02W22	03-100-000	BIG CREEK @ WILLIAMS RD.	4.98	27.70	04110004 06 06	Lake	41.681400	-81.198600	F,QT,C	44
G02W23	03-100-000	BIG CREEK @ FAY RD.	2.47	36.00	04110004 06 06	Lake	41.687500	-81.223100	F,QT,C,S,B,N	45
G02W24	03-104-000	JENKS CREEK NEAR MOUTH, ADJ. ROBINSON RD.	0.1	2.80	04110004 06 06	Geauga	41.631100	-81.204700	F,QL,C	46
G99Q11	03-105-000	CUTTS CREEK NEAR CHARDON @ CUTTS RD.	1.2	0.90	04110004 06 06	Lake	41.599700	-81.171700	F,QL,C,B	47
G99Q12	03-110-000	PAINE CREEK W OF THOMPSON @ ROAD AT HELLS HOLLOW	6.1	20.80	04110004 06 04	Lake	41.685800	-81.117800	F,QT,C	48
G02P01	03-110-000	PAINE CREEK E OF PAINESVILLE @ SEELEY RD.	0.46	27.70	04110004 06 04	Lake	41.717500	-81.170600	F,QT,C,S,B,N	49
200599	03-111-000	BATES CREEK SW OF THOMPSON @ RADCLIFF RD.	2.2	12.70	04110004 06 04	Lake	41.641400	-81.120600	F,QL,C	50
G02G13	03-120-000	MILL CREEK @ CLAY RD.	25.67	21.60	04110004 04 02	Ashtabula	41.687400	-80.690300	F,QT,C	51
G02S04 R	03-120-000	MILL CREEK @ NETCHER RD.	17.80	49.00	04110004 04 02	Ashtabula	41.736900	-80.731900	F,QT,FT,C,O2,S,B,N	52
G02S05 R	03-120-000	MILL CREEK @ DOYLE RD.	9.69	80.00	04110004 04 03	Ashtabula	41.761900	-80.790300	F,QT,FT,C,O2,S,B,N	53
G02G17	03-120-000	MILL CREEK @ MILL CREEK RD. (CALPIN RD.)	6.49	87.00	04110004 04 03	Ashtabula	41.736800	-80.816000	F,QT,C	54
G02P07	03-120-000	MILL CREEK W OF JEFFERSON @ ST. RT. 45	2.94	101.00	04110004 04 03	Ashtabula	41.714700	-80.853100	F,QT,FT,C,SB,N	55
G02G12	03-121-000	GRIGGS CREEK NE OF JEFFERSON @ GIDDINGS RD.	2.03	14.60	04110004 04 01	Ashtabula	41.783000	-80.733800	F,QL,C,B	56
200614	03-122-000	ASKUE RUN SE OF JEFFERSON @ DENMARK RD.	0.1	5.60	04110004 04 02	Ashtabula	41.723100	-80.716100	F,QL,C	57
G02S08	03-124-000	CEMETERY CREEK DST. JEFFERSON WWTP @ POPLAR ST.	1.25	5.00	04110004 04 03	Ashtabula	41.744700	-80.781900	F,QL,C,O2,S,B,N	58
G01W02	03-130-000	ROCK CREEK UPST RESERVOIR @ DODGEVILLE RD.	9.64	52.00	04110004 02 02	Ashtabula	41.589300	-80.814700	F,QT,C,B,N	59
G01W05R	03-130-000	ROCK CREEK @ CEMETERY BRIDGE ADJ ST. RT. 166	0.95	70.00	04110004 02 03	Ashtabula	41.660600	-80.865600	F,QT,C,O2,S,B,N	60
300199	03-130-003	SNYDER DITCH @ MOORE RD.	0.60	18.30	04110004 02 01	Ashtabula	41.521100	-80.820300	F,QT,C,B	61
300200	03-133-000	WHETSTONE CREEK @ ST. RT. 46	2.00	4.00	04110004 02 03	Ashtabula	41.601800	-80.780400	F,QL,C	62
300198	03-134-000	LEBANON CREEK @ INSTITUTE RD.	1.93	4.20	04110004 02 02	Ashtabula	41.581900	-80.784500	F,QL,C,S	63
300184	03-140-000	HOSKINS CREEK @ ST. RT. 534	4.88	5.70	04110004 03 02	Ashtabula	41.600300	-80.953100	F,QL,C	64
G01K19	03-140-000	HOSKINS CREEK @ HURLBURT RD.	2.01	13.50	04110004 03 02	Ashtabula	41.579300	-80.923700	F,QL,C,B,N	65
200624	03-141-000	INDIAN CREEK N OF WINDSOR @ MONTGOMERY RD.	1.30	3.90	04110004 03 02	Ashtabula	41.564400	-80.932800	F,QL,C,S,B,N	66
300190	03-150-000	PHELPS CREEK @ U.S. RT. 322	5.14	23.50	04110004 03 01	Ashtabula	41.537500	-80.963600	F,QT,C,N	67

Station	River Code	Site Name	River Mile	Area (mi <sup>2</sup> )	HUC12	County	Lat.	Lon.	(refer to key in footnote) Sampling	Map #
G01K06	03-150-000	PHELPS CREEK @ WINDSOR RD. EXTENSION	1.23	25.70	04110004 03 01	Geauga	41.508400	-80.927400	F,QT,C,B,N	68
300189	03-151-000	N. BR. PHELPS CREEK @ HUNTLEY RD.	0.94	6.30	04110004 03 01	Geauga	41.548900	-81.023300	F,QL,C,B	69
300192	03-152-000	S. BR. PHELPS CREEK @ U.S. RT. 322	0.58	11.80	04110004 03 01	Trumbull	41.535000	-81.020600	F,QL,C,S,N	70
G01K16	03-160-000	SWINE CREEK @ CURTIS MIDDLEFIELD RD.	8.18	11.80	04110004 01 06	Trumbull	41.408800	-80.991500	F,QL,C	71
200628	03-160-000	SWINE CREEK E OF MESOPOTAMIA @ ST. RT. 87	1.80	17.60	04110004 01 06	Trumbull	41.456700	-80.938100	F,QL,C,S,B,N	72
300179	03-162-000	ANDREWS CREEK @ GIRDLE RD.	3.62	4.80	04110004 01 06	Ashtabula	41.440300	-80.972800	F,QL,C,B	73
A01S02 R	07-001-000	ASHTABULA R. DST. EAST/WEST BRANCHES @ HILLDOM RD.	27.00	65.20	04110003 01 03	Ashtabula	41.818040	-80.623090	F,QT,FT,C,O2,S,B,N	74
502810	07-001-000	ASHTABULA R. AT KELLOGGSVILLE @ KELLOGGSVILLE RD.	23.8	88.40	04110003 01 04	Ashtabula	41.852202	-80.617266	F,QT,FT,C,S	75
A01W20	07-001-000	ASHTABULA R. W OF GAGEVILLE @ BENETKA RD.	19.03	94.00	04110003 01 04	Ashtabula	41.848900	-80.688900	F,QT,C,S,B,N	76
A01K09	07-001-000	ASHTABULA R. UPST. ASHTABULA @ GREEN HILL RD.	13.9	113.00	04110003 01 04	Ashtabula	41.851600	-80.727200	F,QT,FT,C,O1&2,S,B	77
502760	07-001-000	ASHTABULA R. UPST. ASHTABULA @ STATE RD.	6.24	121.00	04110003 01 05	Ashtabula	41.855600	-80.762200	F,QT,C	78
301398	07-001-000	ASHTABULA R. @ TANNERY HILL RD.	3.42	127.00	04110003 01 05	Ashtabula	41.873110	-80.781850	F,QT,C,O1&2,S,B,N	79
301777	07-001-000	ASHTABULA R. AT ASHTABULA, UPST AND ACROSS FROM FIELDS BROOK	1.6	132	04110003 01 05	Ashtabula	41.890197	-80.799971	S	80
301474	07-001-000	ASHTABULA R. AT ASHTABULA, JUST DST. FIELDS BROOK	1.58	135	04110003 01 05	Ashtabula	41.89146	-80.798542	S	81
A01K02	07-001-000	ASHTABULA R. AT ASHTABULA, DST. FIELDS BROOK	1.25	136	04110003 01 05	Ashtabula	41.894955	-80.79284	S	82
502800	07-001-002	STRONG BROOK AT ASHTABULA @ LAKE AVE.	0.46	2.70	04110003 01 05	Ashtabula	41.884377	-80.806261	F,QL,C,O1&2,S,B	83
301396	07-001-003	TRIB. TO ASHTABULA R. (16.98) UPST. GAGEVILLE RD.	0.43	17.30	04110003 01 04	Ashtabula	41.836400	-80.706680	F,QL,C	84
301395	07-003-000	ASHTABULA CREEK @ REGER RD. (TWP. RD. 417)	0.28	17.30	04110003 01 03	Ashtabula	41.844000	-80.611200	F,QL,C,S,B,N	85
301394	07-004-000	W. BR. ASHTABULA R. @ HALL RD.	11.28	7.60	04110003 01 02	Ashtabula	41.696950	-80.585680	F,QL,C	86
301392	07-004-000	W. BR. ASHTABULA R. @ SCHRAMBLING RD.	6.3	15.10	04110003 01 02	Ashtabula	41.739240	-80.619690	F,QL,C	87
A01K12	07-004-000	W. BR. ASHTABULA R. @ GRAHAM RD.	2.7	31.00	04110003 01 02	Ashtabula	41.781700	-80.617800	F,QT,C,N	88
301391	07-004-001	TRIB. TO W. BR. ASHTABULA R. (3.50) @ CAINE RD.	0.92	6.80	04110003 01 02	Ashtabula	41.764830	-80.608020	F,QL,C,B	89
301390	07-005-000	E. BR. ASHTABULA R. @ TURNER RD.	7.97	9.30	04110003 01 01	Ashtabula	41.739678	-80.559357	F,QL,C	90
301388	07-005-000	E. BR. ASHTABULA R. @ ADAMS RD. (UPPER CROSSING)	2.4	21.00	04110003 01 01	Ashtabula	41.798450	-80.594330	F,QT,C,B,N	91

Station	River Code	Site Name	River Mile	Area (mi <sup>2</sup> )	HUC12	County	Lat.	Lon.	(refer to key in footnote) Sampling	Map #
301385	07-005-002	TRIB. TO E. BR. ASHTABULA R. (1.35) @ SCRIBNER RD.	1.1	4.90	04110003 01 01	Ashtabula	41.811750	-80.580820	F,QL,C	92
301386	07-005-003	TRIB. TO E. BR. ASHTABULA R. (1.35/0.80) @ HILLDOM RD.	0.3	8.90	04110003 01 01	Ashtabula	41.818800	-80.583420	F,QL,C	93
303276	07-006-000	Wheeler Creek @ Center Rd	2.75	6.80	04110003 02 02	Ashtabula	41.825933	-80.982797	F,QL,C,B	94
502700 R	07-007-000	COWLES CREEK UPST. GENEVA @ BARNUM RD.	7.24	6.80	04110003 02 02	Ashtabula	41.798100	-80.923100	F,QT,C,O2,S,B	95
A01P17	07-007-000	COWLES CREEK UPST. GENEVA-ON-THE-LAKE @ ST. RT. 534	0.9	14.20	04110003 02 02	Ashtabula	41.850300	-80.962200	F,QT,C,S,B,N	96
303274	07-007-001	Tributary to Cowles Creek (RM 0.2) @ Golf Course	0.9	5.60	04110003 02 02	Ashtabula	41.857137	-80.952313	F,QL,C,B	97
303272	07-008-000	Indian Cr @ Ninevah Rd	3.65	5.10	04110003 02 01	Ashtabula	41.847722	-80.886543	F,QL,C	98
303107	07-008-000	INDIAN CK E OF GENEVA-ON-THE-LAKE @ MYERS RD.	0.65	15.30	04110003 02 01	Ashtabula	41.861309	-80.916564	F,QL,C,B,N	99
303273	07-009-000	Red Brook @ Wade Rd	2.3	7.90	04110003 02 01	Ashtabula	41.874041	-80.839979	F,QL,C,S,B	100
A01W09	07-010-000	FIELDS BROOK AT ASHTABULA @ STATE RD.	1.84	1.50	04110003 01 05	Ashtabula	41.893100	-80.772600	C,O,S,B,N	101
A01W14	07-010-000	FIELDS BROOK AT ASHTABULA @ COLUMBUS AVE.	0.89	3.40	04110003 01 05	Ashtabula	41.889000	-80.786800	F,QL,C,O1&2,S,N	102
A01K18	07-011-000	ARCOLA CREEK AT MADISON @ RIDGE RD.	7.4	7.80	04110003 02 03	Lake	41.788600	-81.063900	F,QL,C,O,S	103
A01W24	07-011-000	ARCOLA CREEK E OF NORTH MADISON @ M.H. SUPPLY CO.	5.04	11.10	04110003 02 03	Lake	41.798878	-81.028189	F,QL,C,O2,S,N	104
A01K17	07-011-000	ARCOLA CREEK NEAR MOUTH, DST. CASHEN RD.	0.7	20.30	04110003 02 03	Lake	41.843100	-81.006700	F,QT,C,O,S,B,N	105
303278	07-011-003	Tributary to Arcola Creek (RM 4.32) adj. U.S. Rt. 20	0.1	4.90	04110003 02 03	Ashtabula	41.797815	-81.013039	F,QL,C	106
A01P15	07-012-000	Whitman Creek @ W of Kingsville-on-the-Lake @ SR 531	0.06	8.50	04120101 06 06	Ashtabula	41.921400	-80.713300	F,QL,C,O1&2,S,B	107
304516	07-012-001	Unnamed Trib to Whitman Creek S of SR 531	0.10	3.90	04120101 06 06	Ashtabula	41.918490	-80.711250	F,QL,C,O1&2,S,N	108
A01P14	07-012-001	Tributary to Whitman Cr (0.32) E of Ashtabula @ LaBounty Rd.	1.14	1.70	04120101 06 06	Ashtabula	41.909700	-80.725800	F,QL,C,O1&2,S	109
304559	07-012-002	SE TRIB TO WHITMAN CK @ LABOUNTY RD	1.10	1.70	04120101 06 06	Ashtabula	41.909813	-80.725755	C,O,S	110
303279	07-022-000	Church Creek @ McMackin Rd.	0.65	4.00	04110003 02 04	Lake	41.817888	-81.094799	F,QL,C,O2,S	111
303280	07-024-000	Red Mill Creek @ U.S. Rt. 20	1.7	6.30	04110003 02 04	Ashtabula	41.785372	-81.135757	F,QL,C,O2,S,B,N	112
502900	07-100-000	CONNEAUT CREEK NEAR OHIO/PA BORDER @ FURNACE RD.	23.24	154.00	04120101 06 05	Ashtabula	41.903900	-80.529400	F,FT,QT,C,S	113

Station	River Code	Site Name	River Mile	Area (mi <sup>2</sup> )	HUC12	County	Lat.	Lon.	(refer to key in footnote) Sampling	Map #
A01P09	07-100-000	CONNEAUT CREEK SE OF CONNEAUT @ STATE RD. (CO. RD. 354)	17.2	158.00	04120101 06 05	Ashtabula	41.886400	-80.620800	F,QT,C,B	114
502870	07-100-000	CONNEAUT CREEK AT CONNEAUT @ KEEFUS RD.	6.69	175.00	04120101 06 05	Ashtabula	41.927100	-80.604300	F,QT,C	115
A01P07	07-100-000	CONNEAUT CREEK AT CONNEAUT @ MAIN ST.	2.56	187.00	04120101 06 05	Ashtabula	41.943632	-80.550568	F,QT,FT,C,S, B,N	116
A01P05	07-100-001	SMOKEY RUN S OF CONNEAUT @ WELTON RD	0.2	3.90	04120101 06 05	Ashtabula	41.936100	-80.560800	F,QL,C	117
A01P03	07-200-000	TURKEY CREEK E OF CONNEAUT @ STATE LINE RD.	1.37	7.80	04120101 04 09	Ashtabula	41.961700	-80.519400	F,QL,C	118

M – modified reference site. R – reference site.

<u>Code</u>	<u>Sample Type</u>	<u>Code</u>	<u>Sample Type</u>	<u>Code</u>	<u>Sample Type</u>
F	Fish	B	<i>E. coli</i> bacteria	S	Sediment
FT	Fish Tissue	C	Inorganic Chemistry	N	Nutrient Site
QL	Macroinvertebrate – Qualitative	O1	Organics – PCBs & S-VOCs	PWS	Public Water Supply
QT	Macroinvertebrate – Quantitative (HD)	O2	Organics – Pesticides & herbicides		

### Appendix 3. NPDES Permitted Facilities

Ohio Permit Number	Facility Name	Design Flow (MGD) <sup>1</sup>	Average Flow (MGD)	Type of Waste	Stream and River Mile at Discharge	County
<b>041100030105 Lower Ashtabula River</b>						
3IF00002*ND	Huntsman Advanced Materials Americas LLC	0.22	0.32	Organic Chemical Plant	Fields Brook, via the Diamond Shamrock tributary RM 0.50	Ashtabula
3IF00017*QD	Detrex Corp	0.76	0.55	Organic Chemical Plant	Fields Brook at River Mile RM 1.83	Ashtabula
<b>041100040606 Big Creek</b>						
3PB00010*JD	Chardon WWTP	5.0	1.808	Municipality	Big Creek RM 16.1	Geauga
<b>041201010605 Marsh Run-Conneaut Creek</b>						
3PD00002*QD	Conneaut WWTP	9.0	3.0	Municipality	Conneaut Creek RM 0.3	Ashtabula
<b>041100030202 Crowles Creek</b>						
3PD00014*TD	Geneva WWTP	2.0	2.0	Municipality	Cowles Creek RM 4.73	Ashtabula
<b>041100040607 Red Creek-Grand River</b>						
3PD00029*PD	Painesville WPC Plt	15.0	6.0	Municipality	Grand River RM 2.85	Lake
3IE00030*KD	Morton Salt Inc	0.99	0.115	Inorganic Chemical Plant	Grand River RM 0.4	Lake
<b>041100040106 Swine Creek</b>						
3IH00076*ED	Middlefield Orig Cheese Coop	0.02	0.01	Food Processor	Phelps Creek at RM 8.62 via an unnamed tributary RM 1.0	Geauga

<sup>1</sup> Design flows that are greater than 1.0 million gallons per day (MGD) classify a facility as a major discharger

## Appendix 4. List of Physical/Chemical Parameters and Reporting Limits

Parameter	Method	Water (RL)	Sediment (RL)	Fish Tissue
<b>Oxygen Demand</b>				
BOD, 5 day	SM 5210B	2 mg/L		
cBOD, 20 day	OEPA 310.2	2 mg/L		
COD	SM 5220D	20 mg/L		
<b>Physical Properties</b>				
Alkalinity	USEPA 310.1	5 mg/L		
Hardness	USEPA 200.7	10 mg/L		
Dissolved Oxygen (mg/l and % saturation)	Field Meter/Sonde	0 mg/L 0% sat		
pH	Field Meter/Sonde	0 s.u.		
pH		0 s.u.	0 s.u.	
Specific Conductance	SM 2510B	1 µS/cm		
Specific Conductance	Field Meter/Sonde	1 µS/cm		
Temperature	Field Meter/Sonde	0 °C		
Total Dissolved Solids	SM 2540C	10 mg/L		
Total Suspended Solids	SM 2540D	5 mg/L		
% Solids	SM 2540G		0%	
% Lipids	OEPA 581.5			0%
<b>Nutrients</b>				
Ammonia-N	USEPA 350.1	0.05 mg/L	7 mg/kg	
Nitrate-Nitrite	USEPA 350.1	0.5 mg/L		
Nitrite	USEPA 353.2	0.02 mg/L		
Total Kjeldahl Nitrogen	USEPA 351.2	0.2 mg/L		
Total Phosphorus	USEPA 365.4	0.02 mg/L	50 mg/kg	
Orthophosphate (as P)	USEPA 365.4	0.01 mg/L		
Total Organic Carbon	SM 5310B	2 mg/L	0.1%	
Dissolved Organic Carbon	SM 5310C	2 mg/L		
<b>Anions</b>				
Carbonate/Bicarbonate	SM 2320B			
Chloride	USEPA 325.1	5 mg/L		
Sulfate	USEPA 375.2	10 mg/L		
<b>Cations</b>				
Aluminum	USEPA 200.7	200 µg/L	200 µg/L	
Barium	USEPA 200.7	15 µg/L	15 µg/L	
Calcium	USEPA 200.7	2 mg/L	2 µg/L	
Iron	USEPA 200.7	50 µg/L	50 µg/L	

Parameter	Method	Water (RL)	Sediment (RL)	Fish Tissue
Magnesium	USEPA 200.7	1 mg/L	1 µg/L	
Manganese	USEPA 200.7	10 µg/L	10 µg/L	
Potassium	USEPA 200.7	2 mg/L	2 µg/L	
Sodium	USEPA 200.7	5 mg/L	5 µg/L	
Strontium	USEPA 200.7	30 µg/L	30 µg/L	
<b>Metals</b>				
Zinc	USEPA 200.7	10 µg/L	8 mg/kg	
Arsenic	USEPA 200.8/SM 3113B	2 µg/L	0.8 mg/kg	0.05mg/kg
Beryllium	USEPA 200.8		20 µg/L	
Cadmium	USEPA 200.8/SM 3113B	0.2 µg/L	0.08 mg/kg	.004 mg/kg
Chromium	USEPA 200.8	2 µg/L	0.8 mg/kg	
Cobalt	USEPA 200.8		2 µg/L	
Copper	USEPA 200.8	2 µg/L	0.8 mg/kg	
Lead	USEPA 200.8/SM 3113B	2 µg/L	0.8 mg/kg	0.04 mg/kg
Nickel	USEPA 200.8	2 µg/L	0.8 mg/kg	
Selenium	USEPA 200.8/SM 3113B	2 µg/L	0.8 mg/kg	0.05 mg/kg
Silver	USEPA 200.8		0.08 mg/kg	
Titanium	USEPA 200.7		50 µg/L	
Vanadium	USEPA 200.7		50 µg/L	
Mercury	USEPA 245.1/SM 3113B		0.02 mg/kg	0.02 mg/kg
<b>Bacteria</b>				
Escherichia coliform	USEPA 1603	2 CFU		
<b>Algal Biomass</b>				
Chlorophyll <i>a</i>	USEPA 445.0	2 µg/L		
<b>Organic Compounds</b>				
Chlorinated Herbicides	USEPA 515.1	40 µg/L		
Acid Herbicides	USEPA 525.2	200 µg/L		
Semi-volatile organics	USEPA 625	2-20 µg/L		
Semi-volatile organics	USEPA 8270C	2 – 10 mg/l	0.4-2 mg/kg	
Organochlorine Pesticides	USEPA 8082A/OEPA 590.1	1-10 µg/L	4 µg/kg	10 µg/kg
PCBs	USEPA 8082A/OEPA 590.1		20 µg/kg	50 µg/kg

## Appendix 5 – Safety Contacts and Hospital Locations

Safety:	
County Wildlife Office	County Sheriff:
Ashtabula County – (330) 802-9171 Geauga County – (330) 245-3035 Lake County – (330) 245-3034 Portage County – (330) 245-3040 Trumbull County – (330) 245-3037	Ashtabula County – (440) 576-0055 Geauga County – (440) 286-1234 Lake County – (440) 350-5517 Portage County – (330) 296-5100 Trumbull County – (330) 675-2508
OEMA:	State Highway Patrol:
Ashtabula County – (440) 576-9148 Geauga County – (440) 279-2170 Lake County – (440) 354-3434 Portage County – (330) 297-3607 Trumbull County – (330) 675-2666	Ashtabula County – (440) 969-1155 Geauga/Lake County – (440) 564-5477 Portage County – (330) 297-1441 Trumbull County – (330) 898-2311
Hospitals:	
Ashtabula County Medical Center 2420 Lake Ave Ashtabula, OH 44004 (440) 997-2262	UH Conneaut Medical Center 158 W Main Rd Conneaut, OH 44030 (440) 593-1131
UH Geauga Medical Center 13207 Ravenna Rd Chardon, OH 44024 (440) 285-6000	Trumbull Regional Medical Center 1350 E Market St Warren, OH 444483 (330) 841-9011

## Appendix 6 – Chemistry Sample Type/Parameter Crosswalk

Parameter	Chemistry	Nutrient Site	Large River Chemistry	Streams - PWS	Streams - O1	Streams - O2
SampleMaster Test Group	TG Stream Survey	TG Stream Survey Nutrient	TG Large River Summer	TG DSW Reservoir 4DW	sVOCs	Herbicides Pesticides
Alkalinity	X	X	X			
Aluminum	X	X	X			
Ammonia	X	X	X			
Anatoxin-a				X		
Arsenic	X	X	X			
Atrazine (ELISA)				X		
Barium	X	X	X			
BOD-5			X			
Bromide						
Cadmium	X	X	X			
Calcium	X	X	X			
Chloride	X	X	X			
Chlorophyll <i>a</i>			X			
Chromium	X	X	X			
COD	X	X	X			
Conductivity (Lab)	X	X	X			
Copper	X	X	X			
Corrected Conductance	X	X	X	X		
Cylindrospermopsin				X		
Dissolved Oxygen	X	X	X	X		
DOC						
Hardness, Total	X	X	X			
Herbicides (multiple analytes)						X
Insecticides (see Pesticides)						
Iron	X	X	X			
Lead	X	X	X			
Magnesium	X	X	X			
Manganese	X	X	X			
Microcystins				X		
Nickel	X	X	X			
Nitrate + nitrite	X	X	X	X		

Parameter	Chemistry	Nutrient Site	Large River Chemistry	Streams - PWS	Streams - O1	Streams - O2
<b>Nitrite</b>	X	X	X			
<b>Orthophosphate, dissolved</b>		X	X			
<b>Pesticides (multiple analytes)</b>						X
<b>pH</b>	X	X	X	X		
<b>Potassium</b>	X	X	X			
<b>Saturation</b>	X	X	X	X		
<b>Saxitoxin</b>				X		
<b>Selenium</b>	X	X	X			
<b>Sodium</b>	X	X	X			
<b>Strontium</b>	X	X	X			
<b>Sulfate</b>	X	X	X			
<b>sVOCs - Organics (81 analytes)</b>					X	
<b>Temperature</b>	X	X	X	X		
<b>TKN</b>	X	X	X	X		
<b>TOC</b>	X	X	X			
<b>Total Dissolved Solids</b>	X	X	X			
<b>Total Phosphorous</b>	X	X	X	X		
<b>Total Suspended Solids</b>	X	X	X			
<b>Turbidity</b>						
<b>Uncorrected Conductance</b>	X	X	X	X		
<b>Zinc</b>	X	X	X			