

Level 3 Project Study Plan

2014 Cuyahoga River Environmental Monitoring

(1) Objectives

The lower Cuyahoga River has been designated as one of 42 Great Lakes Areas of Concern (AOC) by the International Joint Commission. Past monitoring indicated impairment of aquatic biota in the river and was the basis of a Total Maximum Daily Load (TMDL) for the Lower Cuyahoga River. The causes of impairment to the river were classified as organic enrichment, toxicity, low dissolved oxygen, nutrients and flow alteration (Ohio EPA, 2003)¹. Recent monitoring by the Northeast Ohio Regional Sewer District (NEORS), however, has shown recovery of the biological community in some reaches of the river. The purposes of this study, therefore, are to determine the attainment status of the river in relation to point and nonpoint sources of pollution and measure the magnitude of some potential causes of impairment.

During the course of the study, fish communities, benthic macroinvertebrate communities, habitat and water chemistry will be surveyed at ten sites in the Cuyahoga River between River Mile (RM) 16.20 and RM 0.20. The results from these surveys will be used to characterize the overall fish and macroinvertebrate community health in the river.

Fish and macroinvertebrate community health will be evaluated through the use of Ohio EPA's Index of Biotic Integrity (IBI), Modified Index of Well-Being (MIwb), and Invertebrate Community Index (ICI). An examination of the specific characteristics of the biological communities will be used in conjunction with water quality data, the NEORS Macroinvertebrate Field Sheet, and Qualitative Habitat Evaluation Index (QHEI) results in order to identify impacts to the communities. Results will be compared to historic data to show temporal as well as spatial trends. Water chemistry data will also be compared to the Ohio Water Quality Standards to determine attainment of applicable uses (Ohio EPA, 2011).

Finally, the data collected from this study may be used to support three grants funded as part of the Great Lakes Restoration Initiative (GLRI). One of these grants is the *Cuyahoga River Larval Fish Study* funded by the U.S. Army Corps of Engineers that is being implemented by the Cuyahoga County Planning Commission. The second is a grant funded by the GLRI, from the Cuyahoga County Department of Public Works, titled *Cuyahoga AOC Urban Riparian Habitat Restoration*. The last one is the Ohio Department of Natural Resource's *Cuyahoga AOC Habitat and Fish Restoration Opportunities* grant. These projects are generally focused on restoration of habitat and fish within the Cuyahoga River.

¹ See appendix H for a list of all references.

(2) Point/Nonpoint Sources

Point Sources (Location on river)	Nonpoint Sources
Tinkers Creek (RM 16.36)	Urban runoff
Mill Creek (RM 11.49)	Landfills
West Creek (RM 11.05)	Spills
Southerly WWTC (RM 10.57)	Agricultural Runoff
Ohio Canal (RM 8.78)	
Big Creek (RM 7.20)	
Combined Sewer Overflows	
Storm Sewer Overflows	

A map has been provided in section 6 to show point sources that may be influencing the water quality at each sample location. These sources, along with the ones listed in the table above, may be impacting the health of the fish and benthic macroinvertebrate communities in the Cuyahoga River watershed.

(6) Sampling Locations

The following electrofishing and macroinvertebrate sample locations, listed from upstream to downstream, will be surveyed during the 2014 field season. Benthic macroinvertebrate and water chemistry collection sites are located near the midpoint of each electrofishing zone, indicated by RM, unless otherwise noted. GPS coordinates are recorded at the downstream end of each electrofishing zone.

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Location	Latitude	Longitude	River Mile	Description	HUC	Purpose
Downstream of Tinkers Creek	41.3678	-81.6139	16.20	Downstream of confluence with Tinkers Creek near Old Riverview Road	04110002 - Cuyahoga	Background data for fish, habitat, macroinvertebrates, and chlorophyll <i>a</i>
Upstream of Mill Creek	41.4123 41.4101	-81.6364 -81.6346	12.10 ² 11.95	Upstream of the confluence with Mill Creek (I-480)	04110002 - Cuyahoga	Evaluate Mill Creek discharge on fish, habitat and macroinvertebrates
Downstream of Mill Creek	41.4179	-81.6446	11.30	Downstream of confluence with Mill Creek	04110002 - Cuyahoga	Evaluate Mill and West Creek discharges on fish, habitat and macroinvertebrates
Upstream of Southerly WWTC	41.4196	-81.6547	10.75	Upstream of Southerly WWTC effluent discharge	04110002 - Cuyahoga	Evaluate West Creek and Southerly WWTC discharges on fish, habitat and macroinvertebrates and Southerly WWTC discharge on chlorophyll <i>a</i> levels
Downstream of Southerly WWTC	41.4242	-81.6638	10.10	Downstream of Southerly WWTC effluent discharge	04110002 - Cuyahoga	Evaluate Southerly WWTC discharge on fish, habitat, macroinvertebrates, and chlorophyll <i>a</i> levels
Upstream of Big Creek	41.4381	-81.6680	8.60	Upstream of the confluence with Big Creek	04110002 - Cuyahoga	Evaluate Big Creek discharge on fish, habitat and macroinvertebrates
Downstream of Big Creek	41.4497	-81.6815	7.00	Downstream of the confluence with Big Creek/ Upstream of habitat restoration project	04110002 - Cuyahoga	Evaluate Big Creek discharge on fish, habitat and macroinvertebrates; Southerly WWTC discharge on chlorophyll <i>a</i> levels; and effectiveness of habitat restoration in navigation channel on fish
Head of Navigation Channel	41.4619	-81.6816	5.90	Head of navigation channel/Upstream of artificial habitat near ArcelorMittal	04110002 - Cuyahoga	Evaluate effectiveness of habitat restoration in navigation channel on fish

² HD and water chemistry collection site

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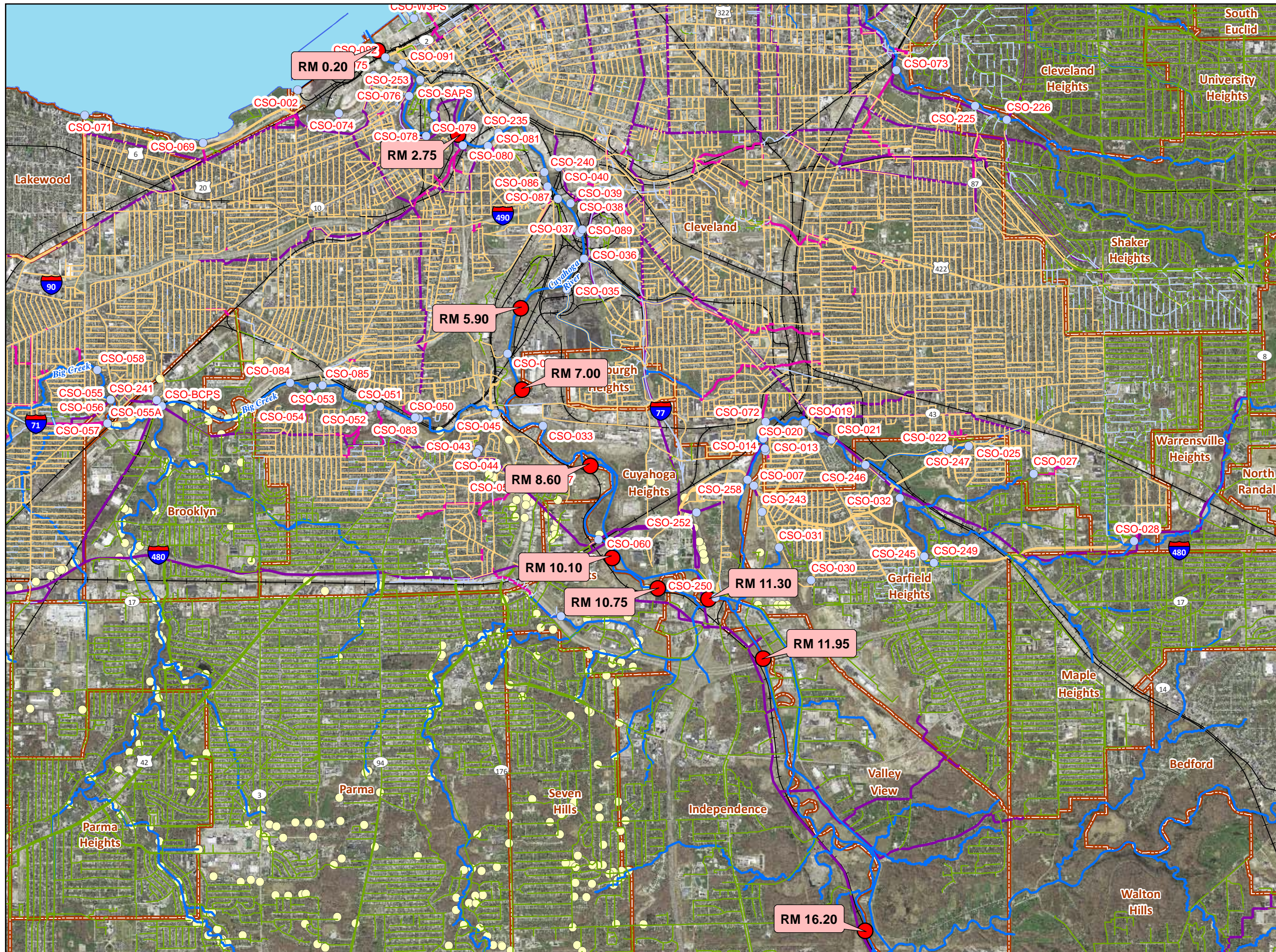
Location	Latitude	Longitude	River Mile	Description	HUC	Purpose
Abandoned Marina (formerly Scaravelli's)	41.4881	-81.6938	2.75	Mid-navigation channel/Proposed site of GLRI habitat restoration project	04110002 - Cuyahoga	Evaluate effectiveness of habitat restoration in navigation channel on fish
Cuyahoga River Mouth	41.5008	-81.7098	0.20	Near mouth of river in navigation channel	04110002 - Cuyahoga	Evaluate effectiveness of habitat restoration in navigation channel on fish

Overview Map



Cuyahoga River Environmental Monitoring

- Study Site
- ~ Stream
- CSO Outfall
- Outfall
- District Facility
- NEORSO CSO Combined Sewer
- NEORSO CSO Responsibility Sewer
- NEORSO Intercommunity Relief Sewer
- NEORSO INTERCEPTOR
- Local Combined Sewer
- Local Culverted Stream
- Local Sanitary Sewer
- Local Storm Sewer



This information is for display purposes only. The Northeast Ohio Regional Sewer District (NEORSO) makes no warranties, expressed or implied, with respect to the accuracy of and the use of this map for any specific purpose. This map was created to serve as base information for use in Geographic Information Systems (GIS) for a variety of planning and analysis purposes. The NEORSO expressly disclaims any liability that may result from the use of this map. For more information, please contact: NEORSO GIS Services, 3900 Euclid Avenue, Cleveland, Ohio 44115 ----(216) 881-6600 --- GIS@neorsd.org

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(3) Parameters Covered

Fish specimens will be identified to species level, weighed, counted and examined for the presence of external anomalies including DELTs (deformities, eroded fins, lesions and tumors). An Ohio EPA Fish Data Sheet (Appendix A) will be completed during each assessment. Quantitative fish sampling is expected to be conducted at all locations.

Macroinvertebrate community assemblages will be collected from each location. Third Rock Consultants, LLC will identify and enumerate the specimens collected from each site. All specimens will be identified to the lowest practical taxonomic level as recommended in Ohio EPA's *Biological Criteria for the Protection of Aquatic Life, Volume III* (1987b)¹. The NEORSD Macroinvertebrate Field Sheet (Appendix A) will be completed at each site during sampler retrieval or when qualitative sampling is conducted.

Stream habitat will be measured by scoring components of the QHEI at all locations, including the substrate, instream cover, channel morphology, riparian zone, bank erosion, pool/glide and riffle/run quality and gradient. The HHEI will be conducted at those sites with drainage areas less than one square mile listed under PSPs with general watershed monitoring. The Lacustrary QHEI (L-QHEI) will be performed at sites that are affected by the water level of Lake Erie. Examples of the Ohio EPA field sheets for the QHEI, L-QHEI and the HHEI can be found in Appendix A.

Water chemistry samples will be collected at each electrofishing/macroinvertebrate sampling site included in the study. Water chemistry samples will be analyzed by NEORSD's Analytical Services Division. Appendix B lists the parameters to be tested along with the detection limits and practical quantitation limits. Field measurements for dissolved oxygen, pH, temperature, conductivity and turbidity will also be performed. A Surface Water Condition Sampling Field Data Form will be completed at each site during each sampling event (Appendix A).

Benthic and water column chlorophyll *a* samples may be collected from stream locations. Chemical and physical water quality parameters to be measured in conjunction with the chlorophyll *a* samples include total phosphorus, dissolved reactive phosphorus, nitrate+nitrite, ammonia, alkalinity, turbidity and suspended solids. In the Cuyahoga River, YSI 6600EDS data sondes may be installed at

¹See Appendix H for a list of all references.

RMs 16.20, 10.75, 10.10, and 7.00 around the time that this sampling is conducted to more frequently monitor dissolved oxygen, temperature, conductivity, and pH.

(4) Field Collection and Data Assessment Techniques

Field collections for fish will be conducted at all stream locations. Sampling will be conducted using longline, backpack, or boat electrofishing techniques and will consist of shocking all habitat types within a sampling zone. Headwater and wading sites, which are 0.15 and 0.20 kilometers in length, respectively, will be surveyed by moving from downstream to upstream. Boat sites, which are 0.50 kilometers in length, will be surveyed by moving from upstream to downstream. The stunned fish will be collected and placed into a live well for later identification. The longline, backpack, and boat electrofishing zones will be assessed one to three times during the field season (June 15 - October 15).

Fish will be identified to the species level, weighed, counted, and examined for the presence of external anomalies including DELTs. Fish easily identified (commonly collected from year to year) will be returned to the site from which they are collected. Fish species difficult to identify will be brought back to the laboratory for verification by NEORSD Level 3 Fish Qualified Data Collectors (QDC). If necessary, vouchers will be sent to The Ohio State University Museum of Biological Diversity for verification by the Curator and/or Associate Curator of Fish. Voucher specimens will be collected as described in section (14).

Endangered species and those too large for preservation will not be collected as voucher specimens, but will instead be photographed. Photographed vouchers will include features that permit definitive identification of the particular species.

Fish will be preserved in 10 percent formalin in the field, soaked in tap water for 24 to 48 hours after 5 to 7 days, then transferred to solutions of 30 and 50 percent ethanol for 5 to 7 days each and, finally, to 70 percent ethanol for long-term storage. Specimens larger than six inches will be slit along the right side and then soaked in formalin for approximately 10 to 14 days before being transferred to water and solutions of 30, 50 and 70 percent ethanol. Label information will include location (description and coordinates), date, time, collectors' names and sample identification code for each specimen collected.

Macroinvertebrate sampling will be conducted using quantitative and qualitative sampling techniques. Quantitative sampling will be done using a modified Hester-Dendy multi-plate artificial substrate sampler (HD) that is colonized for a six-week period. Multiple HD samplers may be installed at one or all sampling locations in case samplers are lost due to vandalism, burial, etc. and for the purposes of providing a replicate sample. Qualitative sampling will be conducted using a D-frame dip net when HD samplers are retrieved. The NEORSD Macroinvertebrate Field Sheet will be completed during each HD retrieval.

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Ronald Maichle of NEORSD, a Level 3 QDC for Benthic Macroinvertebrate Biology, may identify specimens in the replicate sample to the lowest practical taxonomic level as recommended in Ohio EPA's *Biological Criteria for the Protection of Aquatic Life, Volume III* (1987b).

Macroinvertebrate voucher specimens for both quantitative and qualitative sampling will be collected as described in section (14). Macroinvertebrate community assemblages collected will be shipped to Third Rock Consultants, LLC (Lexington, KY) for identification and enumeration. Third Rock Consultants, LLC will identify specimens to the lowest practical taxonomic level as recommended in Ohio EPA's *Biological Criteria for the Protection of Aquatic Life, Volume III* (1987b).

A detailed description of the sampling and analysis methods utilized in the fish community and macroinvertebrate surveys, including calculations of the IBI, MIwb, and ICI, can be found in Ohio EPA's *Biological Criteria for the Protection of Aquatic Life, Volumes II* (1987a) and *III* (1987b). Methods for assessing fish and macroinvertebrate communities in lacustrine zones can be found in Ohio EPA's draft *Biological Criteria for the Protection of Aquatic Life, Volume IV* (1997).

The QHEI, as described in Ohio EPA's *Methods for Assessing Habitat in Flowing Waters: Using the Qualitative Habitat Evaluation Index (QHEI)* (2006) will be used to assess aquatic habitat conditions at each sample location. The L-QHEI will be used where appropriate and will follow Ohio EPA's draft *Methods of Assessing Habitat in Lake Erie Shoreline Waters Using the Qualitative Habitat Evaluation Index (QHEI) Approach (Version 2.1)* (2010).

The HHEI as described in Ohio EPA's *Field Evaluation Manual for Ohio's Primary Headwater Habitat Streams* (2012a) will be used, when necessary, to conduct use attainability analyses and to classify the actual and expected biological conditions in primary headwater habitat streams.

Water chemistry sampling may occur across a variety of flow conditions. Techniques used for water chemistry sampling and chemical analyses will follow the *Surface Water Field Sampling Manual* (Ohio EPA, 2013). Chemical water quality samples from each site will be collected with at least one 4-liter disposable polyethylene cubitainers with disposable polypropylene lids and two 473-mL plastic bottles. Water samples collected for analysis of dissolved reactive phosphorus will be filtered using a 0.45- μ m PVDF syringe filter and will be collected in a 125-mL plastic bottle. Bacteriological samples will be collected in a sterile plastic bottle preserved with sodium thiosulfate. All water quality samples will be collected as grab samples. Field blanks and duplicate samples will each

comprise not less than 5% of the total samples collected for this study plan, for a total frequency of quality control samples of not less than 10% of the total samples collected. With the exception of bacteriological duplicate samples, the acceptable percent RPD will be based on the ratio of the sample concentration and detection limit (Ohio EPA, 2013): Acceptable % RPD = $[(0.9465X^{-0.344}) * 100] + 5$, where X = sample/detection limit ratio. For bacteriological duplicates, duplicate samples more than 5x apart from one another (%RPD > 133.3%) will be rejected in accordance with the Ohio EPA approved method for data validation of bacteriological samples outlined in Section F of the *Ohio 2012 Integrated Water Quality Monitoring and Assessment Report* (Ohio EPA, 2012b). Those RPDs that were higher than acceptable may indicate potential problems with sample collection and, as a result, the data will not be used for comparison to the water quality standards. Acid preservation of the samples, as specified in the NEORSD laboratory's standard operating procedure for each parameter, will occur in the field. Appendix B lists the analytical method, method detection limit and practical quantitation limit for each parameter analyzed. Field analyses include the use of either a YSI-556 MPS Multi-Parameter Water Quality Meter, YSI EXO1 sonde, or YSI 600XL sonde to measure dissolved oxygen (DO), water temperature, conductivity and pH; and when necessary, a Hanna HI 98129 meter to measure pH and a Hach HQ30d meter with LDO101 probe to measure DO. Field turbidity will be measured using either a Hach 2100P Portable Turbidimeter or Hach 2100Q Turbidimeter. Specifications for these meters have been included in Appendix C.

Benthic and water column chlorophyll *a* samples may be collected if time and resources allow. Sampling methods will follow those detailed in the NEORSD *Chlorophyll a Sampling and Field Filtering Standard Operating Procedure* (SOP-EA001-00). A Chlorophyll *a* Sampling Field Sheet will be completed for each site (Appendix D). Water chemistry grab samples will be collected at the same time using the methods discussed previously and will be analyzed for nutrients, turbidity, alkalinity and suspended solids. Additionally in the Cuyahoga River, approximately 24-hours prior to each chlorophyll *a* sampling event, YSI 6600 EDS data sondes may be deployed at RMs 16.20, 10.75, 10.10 and 7.00. If installed, each data sonde will record, at fifteen-minute intervals, dissolved oxygen concentration, pH, temperature, and conductivity from the time the data sonde is deployed until the time it is retrieved. These data sondes will be placed in the stream by inserting each one into a 4.5-inch PVC pipe with holes drilled into the sides of the lower third of the pipe to allow water to pass through it. The data sondes will remain in the river for approximately 24-hours or longer following collection of the chlorophyll *a* samples.

Where possible, data assessment will include an analysis of temporal and spatial trends in the collected data. Species assemblages and individual metrics will be analyzed. Graphs that show current and historic QHEI, L-QHEI, IBI, LIBI,

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MIwb, ICI, and LICI scores and how these scores compare to attainment status of biocriteria will be prepared. Water chemistry data collected will be compared to Ohio water quality standards to determine whether any excursions from the applicable water quality criteria have occurred. It will also be used to determine any relationships among individual parameters and chlorophyll *a* concentrations. Comparisons between water quality and biological community health will only be made if at least three water quality samples have been collected from that site.

(5) Stream Flow Measurement

Stream flow will be recorded for all locations during each electrofishing pass utilizing data from the United States Geological Survey (USGS) gauge station nearest the stream location, if applicable.

Stream flow will be measured with a Marsh-McBirney FloMate Model 2000 Portable Flow Meter, a HACH FH950 Flow Meter or an Aquaflow Probe Model 6900, which measure flow in feet per second, when HD samplers are installed and retrieved. The specifications for the flow meters can be found in Appendix C.

(7) Schedule

One to three electrofishing surveys will be conducted at each site between June 15 and October 15, 2014. Surveys will be conducted at least three weeks apart. Specific dates have not been scheduled. River flow and weather conditions will be assessed weekly to determine when each electrofishing pass will be conducted.

Artificial substrate samplers will be installed at stream locations between June 15 and August 19, 2014, and retrieved six weeks later. Qualitative macroinvertebrate sampling will be conducted one time at all sites. Specific dates have not been scheduled. River flow and weather conditions will be assessed weekly to determine when the HD sampler installations and retrievals and qualitative sampling will be conducted.

QHEI, and if necessary, HHEI and L-QHEI habitat evaluations will be conducted one time between June 15 and October 15, 2014. QHEI evaluations will be conducted around the same time as one of the electrofishing surveys.

Water chemistry samples will be collected a minimum of three times from stream locations between June 15 and October 15, 2014.

Benthic and water column chlorophyll *a* samples may be collected at least one time from stream locations between June 15 and October 15, 2014. These samples will be collected under low-flow conditions.

(8) QA/QC

Quality assurance and quality control of sampling and analysis methods for habitat, fish, and macroinvertebrate evaluations will follow Ohio EPA's *Biological Criteria for the Protection of Aquatic Life, Volumes II* (1987a) and *III* (1987b), *Methods for Assessing Habitat in Flowing Waters: Using the Qualitative Habitat Evaluation Index (QHEI)* (2006), *Field Evaluation Manual for Ohio's Primary Headwater Habitat Streams* (2012a), draft *Biological Criteria for the Protection of Aquatic Life: Volume IV: Fish and Macroinvertebrate Indices for Ohio's Lake Erie Nearshore Waters, Harbors, and Lacustraries* (1997) and draft *Methods of Assessing Habitat in Lake Erie Shoreline Waters Using the Qualitative Habitat Evaluation Index (QHEI) Approach (Version 2.1)* (2010)

Electrofishing equipment will be used according to the guidelines listed in the operation and maintenance manual provided by Smith-Root, Inc. Malfunctioning equipment will not be used to collect data. Proper steps will be taken to correct any problems as soon as possible, whether by repairing in the field, at the NEORSD Environmental & Maintenance Services Center, or by contacting the supplier or an appropriate service company.

Fish species difficult to identify will be brought back to the laboratory for verification by Level 3 Fish QDC's, and if necessary, sent to The Ohio State University Museum of Biological Diversity for verification by the Curator and/or Associate Curator of Fish. Voucher specimens will be collected as described in section (14). Endangered species and those too large for preservation will not be collected as voucher specimens, but will instead be photographed. Photographed vouchers will include features that permit definitive identification of the particular species.

All macroinvertebrate community assemblages from stream locations, except for the replicate sample, will be collected and shipped to Third Rock Consultants, LLC for identification and enumeration. All specimens will be identified to the lowest practical taxonomic level as recommended in Ohio EPA's *Biological Criteria for the Protection of Aquatic Life, Volume III* (1987b). All macroinvertebrate specimens will be returned to NEORSD. At least two voucher specimens of each species, when available, will be separated into individual vials and kept as described in section (14). The remaining specimens for each site will be returned in a single container labeled with the site number and collection method and date. All specimens and accompanying chain-of-custody documentation will be retained by NEORSD and stored at the Environmental & Maintenance Services Center for a period not less than ten years.

Water samples obtained for chemical analyses will be collected, preserved (see Section 4), labeled and then placed on ice inside the field truck. The field truck

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will remain locked at all times when not occupied/visible. Sampling activities, including sample time and condition of surface water sampled, will be entered in a field log book and on the Surface Water Condition Sampling Field Data Form. The samples will then be delivered immediately to the NEORSD Analytical Services cooler, after which the door to the cooler will be locked, and the samples will be transferred to the custody of Analytical Services. The NEORSD Analytical Services Quality Manual and associated Standard Operating Procedures are on file with Ohio EPA. The Quality Assurance Officer at Analytical Services will send updates, revisions and any information on document control to Ohio EPA as needed.

For benthic and water column chlorophyll *a* sampling, three filtrations will be performed for each sample. A field filtration blank will be submitted for every 20 samples.

Calibration of YSI 6600EDS data sondes will be done according to the YSI Environmental Operations Manual. The conductivity will be calibrated first using a 1.413 mS/cm standard. Second, the pH will be calibrated using two different buffers (7 and 10 s.u.). The DO will be calibrated last with an acceptable error of 0.2 mg/L.

Once the sondes are removed from the river, the accuracy of the data that has been collected will be checked by comparing readings taken by the sondes to known standards. If the measurements taken at this time meet quality control goals, all of the data collected since the last calibration will be considered accurate. The acceptable differences for pH and conductivity will be ± 0.3 with pH 7 buffer and $\pm 10\%$ of the conductivity standard, respectively (EPA New England- Region 1, 2005). The acceptable difference for DO will be ± 0.2 mg/L. If the measurements do not meet quality control goals, best professional judgment will be used to decide if any of the data collected during that period may still be accurate. For example, the data collected from the four locations may be plotted on the same graph, and if it appears that the data points are following similar trends, they may be considered accurate. If any data that do not meet quality control goals are used, a rationale for their inclusion will be provided when the data are submitted.

(9) Work Products

Within one year of completion of the project, fish data (species, numbers, weights, pollution tolerances, the incidence of DELT anomalies, IBI or LIBI, MIwb scores), macroinvertebrate data (types and numbers of macroinvertebrates collected and ICI or LICI scores), habitat data (QHEI or L-QHEI raw data and scores) and water chemistry results will be submitted to the Ohio EPA or an Ohio EPA approved data warehouse. Additionally, reports summarizing, interpreting, graphically presenting and discussing the IBI (LIBI, where applicable), MIwb, ICI

(LICI, where applicable) and QHEI (L-QHEI, where applicable) scores, chlorophyll *a* results, and any excursions from water quality standards may be prepared for internal use.

(10) Qualified Data Collectors

The following Level 3 Qualified Data Collectors (QDC) will be involved with this study:

Name	Address	Email Address	Phone Number	QDC Specialty(s)
John W. Rhoades ¹	4747 East 49 th Street Cuyahoga Hts., Ohio 44125	rhoadesj@neorsd.org	216-641-6000	QDC - 00008 CWQA/FCB/SHA/ BMB
Cathy Zamborsky	4747 East 49 th Street Cuyahoga Hts., Ohio 44125	zamborskyc@neorsd.org	216-641-6000	QDC - 00009 CWQA/SHA
Seth Hothem	4747 East 49 th Street Cuyahoga Hts., Ohio 44125	hothems@neorsd.org	216-641-6000	QDC - 00010 CWQA/FCB/SHA/ BMB
Tom Zablontny	4747 East 49 th Street Cuyahoga Hts., Ohio 44125	zablontnyt@neorsd.org	216-641-6000	QDC - 00018 CWQA/FCB/SHA
Ron Maichle	4747 East 49 th Street Cuyahoga Hts., Ohio 44125	maichler@neorsd.org	216-641-6000	QDC - 00145 CWQA/SHA/BMB
Francisco Rivera	4747 East 49 th Street Cuyahoga Hts., Ohio 44125	riveraf@neorsd.org	216-641-6000	QDC - 00262 CWQA/SHA
Jillian Novak	4747 East 49 th Street Cuyahoga Hts., Ohio 44125	novakj@neorsd.org	216-641-6000	QDC - 00512 CWQA/SHA/BMB
Jonathan Brauer ²	4747 East 49 th Street Cuyahoga Hts., Ohio 44125	brauerj@neorsd.org	216-641-6000	QDC - 00663 SHA
Bert Remley ³	2526 Regency Road, Suite 180 Lexington, Kentucky 40503	bremley@thirdrockconsultants.com	859-977-2000	QDC - 00837 BMB

¹ NEORS Lead Project Manager

² See acknowledgement letter for conducting QHEIs (Appendix F)

³ Benthic Macroinvertebrate Identification

The following is a list of persons not qualified as Level 3 QDCs who may be involved in the project. Prior to the start of sampling, the project managers will explain to each individual the proper methods for sampling. Sampling will only be completed under the direct observation of a QDC. The lead project manager will be responsible for reviewing all reports and data analysis prepared by qualified personnel prior to completion.

Name	Address	Email Address	Phone Number
Nick Barille	4747 East 49 th Street Cuyahoga Hts., Ohio 44125	barillenn@neorsd.org	216-641-6000
Joseph Carbonaro	4747 East 49 th Street Cuyahoga Hts., Ohio 44125	carbonaroj@neorsd.org	216-641-6000
Mark Colvin	4747 East 49 th Street Cuyahoga Hts., Ohio 44125	colvinm@neorsd.org	216-641-6000

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Name	Address	Email Address	Phone Number
Tim Dobriansky	4747 East 49 th Street Cuyahoga Hts., Ohio 44125	dobrianskyt@neorsd.org	216-641-6000
Kyle Frantz	4747 East 49 th Street Cuyahoga Hts., Ohio 44125	frantz@neorsd.org	216-641-6000
Donna Friedman	4747 East 49 th Street Cuyahoga Hts., Ohio 44125	friedmand@neorsd.org	216-641-6000
Rae Grant	4747 East 49 th Street Cuyahoga Hts., Ohio 44125	grantr@neorsd.org	216-641-6000
Mark Matteson	4747 East 49 th Street Cuyahoga Hts., Ohio 44125	mattesonm@neorsd.org	216-641-6000
Mario Meany	4747 East 49 th Street Cuyahoga Hts., Ohio 44125	meanym@neorsd.org	216-641-6000
Denise Phillips	4747 East 49 th Street Cuyahoga Hts., Ohio 44125	phillipsd@neorsd.org	216-641-6000
Brandy Reischman	4747 East 49 th Street Cuyahoga Hts., Ohio 44125	reischmanb@neorsd.org	216-641-6000
Frank Schuschu	4747 East 49 th Street Cuyahoga Hts., Ohio 44125	schuschuf@neorsd.org	216-641-6000
Eric Soehnen	4747 East 49 th Street Cuyahoga Hts., Ohio 44125	soehlene@neorsd.org	216-641-6000
William Stanford	4747 East 49 th Street Cuyahoga Hts., Ohio 44125	standfordw@neorsd.org	216-641-6000
Wolfram von Kiparski	4747 East 49 th Street Cuyahoga Hts., Ohio 44125	vonkiparskiw@neorsd.org	216-641-6000
NEORSD Summer Co-op #1	4747 East 49 th Street Cuyahoga Hts., Ohio 44125	To Be Determined	216-641-6000
NEORSD Summer Co-op #2	4747 East 49 th Street Cuyahoga Hts., Ohio 44125	To Be Determined	216-641-6000
NEORSD Summer Co-op #3	4747 East 49 th Street Cuyahoga Hts., Ohio 44125	To Be Determined	216-641-6000
NEORSD Summer Co-op #4	4747 East 49 th Street Cuyahoga Hts., Ohio 44125	To Be Determined	216-641-6000

(11) Contract laboratory contact information

All bacteriological and/or chemical sample analysis will be completed by NEORSD's Analytical Services Division. Evidence of NEORSD's Analytical Services current accreditation and method dates can be found in Appendix E. The contact information for NEORSD's Analytical Service Division is:

NEORSD Analytical Services
 Mr. Mark Citriglia
 4747 E. 49th Street
 Cuyahoga Heights, Ohio 44056
citrigliam@neorsd.org
 216-641-6000

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Any fish that is not positively identified in the field, or at NEORSD, will be sent to The Ohio State University Museum of Biological Diversity for verification by the Curator and/or Associate Curator of Fish. Fish will be identified to the species level.

Dr. Ted Cavender, Curator of Fish / Mr. Marc Kibbey, Associate Curator of Fish
1315 Kinnear Road, Columbus, Ohio 43212
cavender.1@osu.edu / kibbey.3@osu.edu
614-292-7873

Identification of macroinvertebrates for stream locations will be completed by Third Rock Consultants LLC (Lexington, Kentucky) (Appendix F). Benthic macroinvertebrates will be identified to the lowest practical level as recommended by Ohio EPA (1987b). Third Rock Consultants LLC contact information:

Ms. Marcia Wooton
Third Rock Consultants LLC
2526 Regency Road, Suite 180
Lexington, Kentucky 40503
mwooton@thirdrockconsultants.com
859-977-2000

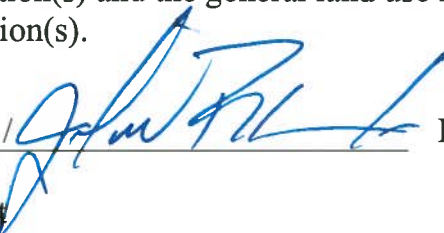
- (12) Copy of ODNR collector's permit

See Appendix G.

- (13) Digital Catalog Statement

A digital photo catalog of all sampling locations will be maintained for 10 years and will include photos of the specific sampling location(s), the riparian zone adjacent to the sampling location(s) and the general land use in the immediate vicinity of the sampling location(s).

Print/Signature: John W. Rhoades



Date: 04/30/14

- (14) Voucher Specimen Statement

NEORSD will maintain a benthic macroinvertebrate and fish voucher collection which includes two specimens, or appropriate photo vouchers, of each species or taxa collected during the course of biological sampling from any stream within the NEORSD's service area. When benthic macroinvertebrates from multiple surface waters are collected within the same year and identified by the same QDC, one voucher collection will be created to represent the specimens collected from those streams. When fish specimens from multiple surface waters are collected within

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the same year, one voucher collection will be created to represent the specimens collected from those streams. A separate collection for each sampling event will not be maintained.

NEORSD will provide specimens or photo vouchers to the Director upon request. This collection will be stored at the NEORSD laboratory in the Environmental and Maintenance Services Center.

Print/Signature: John W. Rhoades /

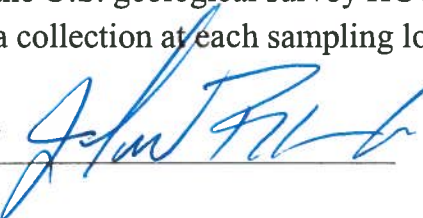


Date: 04/30/14

(15) Sample Location Statement

I attest that I will make available any and all sampling location information, including but not limited to; the name of the water body sampled, sampling location latitude and longitude, sampling location river mile where possible, general location information, the U.S. geological survey HUC 8 number and name, and the purpose for data collection at each sampling location.

Print/Signature: John W. Rhoades /



Date: 04/30/14

(16) Additional L3 Data Collector Statement

The Lead Project Manager for all stream locations is approved for all project data types.

Print/Signature: John W. Rhoades /

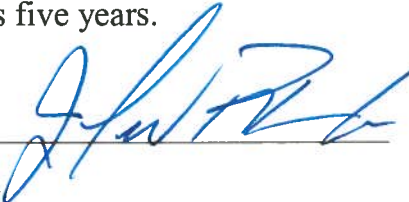


Date: 04/30/14


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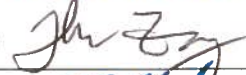
(17) Trespassing Statement

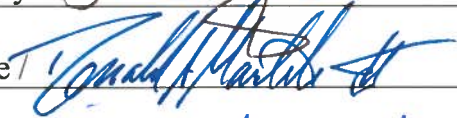
I have not been convicted or pleaded guilty to a Violation of section 2911.21 of the Revised Code (criminal trespass) or a substantially similar municipal ordinance within the previous five years.


Print/Signature: John W. Rhoades /  Date: 04/30/14


Print/Signature: Cathy Zamborsky / _____ Date: _____

Print/Signature: Seth Hothem /  Date: 4/30/14

Print/Signature: Tom Zabloutny /  Date: 4-30-14

Print/Signature: Ron Maichle /  Date: 04/30/14

Print/Signature: Jillian Novak /  Date: 4/30/14

Print/Signature: Francisco Rivera /  Date: 4/30/14