VOLUNTEER STREAM MONITORING PROGRAM

FIRELANDS COASTAL TRIBUTARIES

Study Plan

2023

Firelands Coastal Tributaries Watershed Program

OLD WOMAN CREEK NATIONAL ESTUARINE RESEARCH RESERVE

ERIE Conservation DISTRICT

NOAA NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION U.S. DEPARTMENT OF COMMERCE

Firelands Coastal Tributaries Watershed Program
Volunteer Stream Monitoring Plan

Submitted by Breann Hohman, Coordinator
Erie Soil and Water Conservation District

Purpose

The purpose of the Firelands Coastal Tributaries Volunteer Stream Monitoring Plan is to enhance the stewardship of Firelands watersheds by increasing knowledge of local water quality. The primary goal of this plan is to provide credible water quality data to drive necessary stewardship changes that support watershed health. A secondary goal of this plan is to document water quality trends over time and use the data as an evaluation tool for improvement projects.

Program Objectives

1. Quantify watershed health for select watersheds in the Firelands area through annual monitoring and analysis.
2. Engage members of the Firelands community in annual water quality monitoring data collection.
3. Increase awareness of watershed condition and stewardship needs for stakeholders in monitored watersheds.

Organization

The Firelands Coastal Tributaries Watershed Program was created in 2006 with the award of an ODNR Watershed Coordinator grant. This program, initiated by 14 original stakeholders, is currently operated through a partnership between the Old Woman Creek National Estuarine Research Reserve (OWC NERR) and the Erie Soil and Water Conservation District (SWCD). The coordinator of the program has lead the community through watershed planning, stewardship education, grant funded watershed improvement projects, and the development of citizen-based stream monitoring.

The Volunteer Stream Monitoring Program began in 2008 with Old Woman and Pipe Creeks; Mills Creek was added in 2011. A Monitoring Committee made up of staff members from Erie SWCD and OWC NERR, along with interested volunteers, guided the development of this program. This committee met for the first several years to create the framework of the program. Since then, the Erie SWCD and OWC NERR have continued to develop the program formulating workgroups needed when significant shifts have occurred in the program. Additionally, a “monitoring group” composed of stakeholders of the program may also assist to evaluate the program, review new materials, and provide guidance on needed changes to ensure success.

1. **Erie Soil and Water Conservation District**
   The Erie Soil and Water Conservation District (SWCD) became the 84th District in Ohio in 1953, and was established for the purpose of protecting, preserving, and restoring the natural resources in our area. The District was organized under the State of Ohio, Revised Code 1515, and is governed by a board of five supervisors who are elected by the landowners of Erie

County. The SWCD employs the coordinator of the stream monitoring program and operates the program through funds provided by the Office of Coastal Management.

   a. Roles of the Coordinator include program management, volunteer coordination, training, data uploads (Water Reporter), data analysis, development of watershed report cards, education/outreach for program and findings.

2. **Old Woman Creek National Estuarine Research Reserve**
   Designated in 1980, Old Woman Creek NERR is part of a national network of 30 State-Federal partnership coastal reserves that address state and regional coastal management needs through research, education, and stewardship. The Old Woman Creek NERR's program is administered by NOAA in collaboration with the Ohio Department of Natural Resources, Office of Coastal Management.

   a. The Old Woman Creek NERR provides direct funding and support to the Erie Conservation District to implement the stream monitoring program. Provided support includes the analysis of water quality samples collected by volunteers, assistance with data management, quality assurance/control, data analysis, and participation with the Lake Erie Volunteer Science Network (LEVSN). The Reserve also maintains equipment at their site and serves as a kit pick-up location for volunteers.

3. **Volunteers**
   Volunteers serve as the main data collectors of this program. They are trained citizens given specific protocols and site assignments to collect monthly samples as part of this program. Further description of volunteer requirements and responsibilities is listed below.

Study Area

The Firelands area consists of Erie and Huron Counties. In this area, there are seven small tributaries that flow directly into Lake Erie: Cold Creek, Mills Creek, Pipe Creek, Sawmill Creek, Old Woman Creek, Chappel Creek, and Cranberry Creek. Six of the seven listed creeks are on the USEPA Section 303d List of Impaired Waters. Sawmill Creek is the only small tributary in the Firelands that meets criteria for a healthy stream. Maps for the watersheds that are currently being monitored, including specific monitoring locations, can be found in Appendix A.

1. **Mills Creek Watershed**
   Mills Creek is a 42.4 square mile watershed. Its headwaters begin in the community of Bellevue, and it empties into Sandusky Bay on the west end of the City of Sandusky. Most of the watershed is rural/agricultural landuse (67%) with more than a quarter being urbanized development and less and 7% natural area. The watershed is located within the Karst geological region and there is high interaction between ground and surface water. The watershed has two large industrial discharges one being a limestone quarry and the other a wastewater treatment plant. Both discharges occur in the upper portion of the watershed.

2. Pipe Creek Watershed

Pipe Creek is a 48.5 square mile warm water habitat watershed that combines three separate direct tributaries: Pipe Creek, Hemminger Ditch, and Plum Brook. All three sub-basins empty into East Sandusky Bay, which is located in the western basin of Lake Erie. The watershed is nearly equal in agriculture and urban land uses with less than 15% in natural areas. This watershed has the highest rate of urbanization within the Firelands, with the highest development located at the lower portion of the watershed. The watershed also has two limestone quarry discharges and is part of the karst geological region. Pipe Creek is on the USEPA's impaired waters list for not meeting aquatic life use due to excessive sediment, nutrients, and bacteria as well as habitat alterations.

3. Old Woman Creek Watershed

Old Woman Creek is a 27 square mile watershed with headwaters in Huron County that flow through Erie County and empty into the west end of the central Lake Erie basin. The watershed is broken into two branches that merge into a central channel upstream of a naturally functioning freshwater estuary. Land use in the watershed is mostly row crop agriculture (66%) followed by natural areas (20%) and rural development with a small village at the center of the watershed. The watershed geology consists of shale and sandstone with the Berea Escarpment separating the upper and lower watershed at the Village of Berlin Heights. Old Woman Creek is on the USEPA's impaired waters list for not meeting aquatic life use due to excessive sediment, nutrients, and bacteria as well as habitat alternations.

4. Chappel Creek Watershed

Chappel Creek is a 24 square mile watershed that begins in Huron County and empties into Lake Erie's Central Basin between the City of Huron and the City of Vermilion. The land use of this watershed consist of 58% agriculture, 9% urban, and 33% natural area. The natural areas are almost entirely forested land. The watershed is narrow along with a narrow floodplain due to Chappel Creek is on the USEPA's impaired waters list for not meeting aquatic life use due to excessive sediment, nutrients, and habitat alteration.

5. **Site Descriptions** – Sampling locations selected provide a representation of the respective watershed as a whole and provide comparable data sets both among and within each watershed. Factors included in site selection included, but were not limited to, surrounding land use, drainage area, accessibility, practicability of sampling for specific parameters, and previously recorded water quality data. Site list and year added can be found in Table 1, detailed information for each site is in Appendix B.

Table 1. Description of sites monitored as part of the Firelands Coastal Tributaries Volunteer Stream Monitoring Program.

Watershed	Site	Type	Lat	Long	Year Added
Mills Creek	Goodrich Rd	Stream	41.32574	-82.81145	2015
Mills Creek	Strecker Rd E	Stream	41.32574	-82.81145	2014
Mills Creek	Strecker Rd W	Stream	41.32574	-82.81145	2012
Mills Creek	Miller Rd W	Stream	41.37573	-82.77488	2012
Mills Creek	Miller Rd E	Stream	41.37573	-82.77488	2014
Mills Creek	Strub Rd	Stream	41.40961	-82.73696	2012
Mills Creek	Mills Creek Golf Course	Stream	41.44062	-82.73209	2013
Pipe Creek	Strecker Rd	Stream	41.324760	-82.767710	2008
Pipe Creek	Portland	Stream	41.338400	-82.748700	2016*
Pipe Creek	Patten-tract Rd	Stream	41.365350	-82.727940	2008
Pipe Creek	Bogart Rd	Stream	41.396500	-82.708520	2008
Pipe Creek	Oakland Ave	Stream	41.429000	-82.685380	2011
Pipe Creek	Perkins Ave	Estuary	41.432560	-82.683650	2008
Old Woman Creek	Liles Rd	Stream	41.273479	-82.453316	2008
Old Woman Creek	Andress Rd	Stream	41.30204	-82.46514	2015
Old Woman Creek	Bellamy Rd	Stream	41.314902	-82.481357	2008
Old Woman Creek	Bellamy Rd 2	Stream	41.320662	-82.483260	2009
Old Woman Creek	Rt 61	Stream	41.318468	-82.492657	2008
Old Woman Creek	Mason Rd	Stream	41.330674	-82.481357	2008
Old Woman Creek	Tennant Rd W	Stream	41.298600	-82.509790	2008
Old Woman Creek	Hoffman Woods	Stream	41.319200	-82.527460	2008
Old Woman Creek	Chapin Rd	Stream	41.34325	-82.52091	2008
Old Woman Creek	Berlin Rd	Stream	41.348920	-82.512570	2008
Old Woman Creek	Darrow Rd	Estuary	41.364922	-82.504653	2008**
Old Woman Creek	Estuary Overlook	Estuary	41.367390	-82.507170	2008**
Old Woman Creek	Estuary Outlet	Estuary	41.382061	-82.514289	2008**
Chappel Creek	Townsend-Angling Rd	Stream	41.22415	-82.46879	2022
Chappel Creek	Ogan Rd	Stream	41.26197	-82.43596	2022
Chappel Creek	Harmon Rd	Stream	41.30563	-82.40755	2022
Chappel Creek	Thrope Rd	Stream	41.33148	-82.45518	2022
Chappel Creek	Darrow Rd East	Stream	41.36446	-82.42531	2022
Chappel Creek	Poorman Rd	Stream	41.38082	-82.4307	2022

* Pipe Creek replaced Harris Rd and Mason Rd (2008) with Portland Rd in 2016

**Old Woman Creek Estuary Sites are part of the NERR System-wide Monitoring Program

Sampling Parameters

Water quality monitoring described in this plan relate to chemical parameters of the surface water. Several parameters are sampled in the field by volunteer monitors, while others are performed in the laboratory at the Old Woman Creek NERR from a grab sample taken at the time of field sampling. Table 2 lists regularly sampled parameters; additional information about each parameter can be found in the Volunteer Stream Monitor Handbook.

Table 2. Parameters that are regularly sampled as part of the Firelands Coastal Tributaries Volunteer Stream Monitoring Program.

Parameter	Analysis	Equipment/Method	Accuracy	Range
pH	Field	YSI Pro Plus/Quattro Meter	±0.2 pH units	-14 pH units
Temperature	Field	YSI Pro Plus/Quattro Meter	±0.3° C of reading	0° to 50° C
Dissolved Oxygen	Field	YSI Pro Plus/Quattro Meter	For 0 to 20 mg/L: Between ±0 mg/L and ±0.2 mg/L	0 to 50 mg/L
Conductivity	Field	YSI Pro Plus/Quattro Meter	±1% of reading	0 to 3000 mS/cm
Total Suspended Solids	Field	Ohio Sediment Stick	0.5 in	0-36 in
Turbidity	Lab	Hach 2100AN Turbidimeter following USEPA Method 180.1	Between 0 to 1000 NTU ±2% plus 0.01 NTU; Between 1000 to 4000 NTU ±5%; Between 4000 and 10000 NTU ±10%	0 – 10,000 FNU
Soluble Reactive Phosphorus	Lab	Seal AQ300 Discrete Analyzer following USEPA 365.1 Rev 2.0 (1993) and Standard Methods 4500-PF (1999 forward)	n/a	0.005 – 1.000 mg P / L
Nitrate	Lab	Measured as (NO2 + NO3) – NO2 using a Seal AQ300 Discrete Analyzer and following USEPA-132-A Rev 1	n/a	0.012–2.000 mg N / L
Nitrite	Lab	Seal AQ300 Discrete Analyzer following USEPA 354.1 Rev 2.0 (1993) and Standards Methods 4500-NO2B (23^{rd} edition)	n/a	0.0009–0.2000 mg N / L

Table 3. Description of back-up tests conducted in the field for parameters that fall outside of the "What's Normal" range.

Parameter	Analysis	Equipment/Method	Accuracy	Range
pH	Field	Aquacheck pH test strip	±1 pH units	4-9 units
Temperature	Field	Alcohol thermometer	±1° C of reading	0° to 50° C
Dissolved Oxygen	Field	Hach Kit Model OX-2P	1 mg/L	1-20 mg/L

Sampling Methods

1. **Monitoring schedule** –The sampling is conducted monthly from April to November. Sampling event time period is from dawn on the third Sunday of the month until noon the following Monday (Approximately 28-30 hours). All samples must arrive to the Laboratory at Old Woman Creek Reserve by 1:00pm for analysis.

2. **In-field Data Collection**

   a. *Monitoring Protocol* – Volunteers collect observations for temperature, pH, dissolved oxygen, conductivity, total suspended solids, and several metadata parameters in the field. Volunteers also collect a grab sample for additional analysis to be completed by the Old Woman Creek NERR laboratory. In the monitoring kit toolbox, a clipboard contains a workflow that follows the protocol for monitoring (Appendix C). This process, created by the monitoring group, includes activities related to pre-monitoring, collecting observations, and collecting a grab sample.

   b. *Back-up Testing* – As part of the monitoring protocol, volunteers are required to compare their observations to a "What's Normal" card inside their kit toolbox. This card presents typical ranges for observations related to temperature and DO. The card also provides a narrative rating for the TSS observed through the Ohio Sediment Stick. If the volunteer's observation does not follow the range on the "What's Normal" card they will need to perform an additional test for that parameter to "back up" the data.

3. Laboratory Analysis

   Within 24 hours of arrival at the Old Woman Creek Analytical Laboratory, whole water samples are measured for turbidity using a Hach 2100AN turbidimeter and filtered through 0.45 µm membrane filters. Filtrate is refrigerated (4 ˚C) until analysis, which occurs within five days for orthophosphate, nitrate, and nitrite. Each of these three parameters is measured colorimetrically using a Seal AQ 300 discrete analyzer. Orthophosphate is measured via molybdenum blue reaction following USEPA 365.1 Rev 2.0 (1993) and Standard Methods 4500-PF (1999 forward). Nitrite is measured by coupling diazotized sulfanilamide with *N*-(1-naphthyl)-ethylenediamine dihydrochloride (NEDD) following USEPA 354.1 Rev 2.0 (1993) and Standards Methods 4500-NO2B (23^{rd} edition). Nitrate is measured via cadmium reduction, which reduces the nitrate in a water sample to nitrite. Therefore, it is nitrite + nitrate that is measured directly, so nitrate is reported using the formula: nitrate = (nitrite + nitrate) – nitrite. After reduction, the method for nitrate follows a similar chemical reaction as nitrite, where diazotized sulfanilamide is coupled with NEDD following USEPA-132-A Rev 1. All samples measured from Pipe and Mills Creeks receive a ×5 pre-dilution for nitrate analysis due to the elevated concentrations of this nutrient commonly found in these streams.

The OWC Analytical Lab includes several quality assurance quality control (QA/QC) checks during nutrient analysis, including analyzing a high standard at the end of each run, analyzing a check standard every ten samples, and analyzing a deionized water blank every ten samples. If the high standard, any of the check standards, or any of the blanks are >15% off from expected values, samples between offending checks are re-analyzed. An additional QAQC procedure for nitrate is performed by including a nitrite standard in each nitrate run. If the nitrate standard recovery is less than 85% of the nitrite standard, samples for the entire run are re-analyzed.

Equipment and Maintenance

1. Monitoring Kit
    a. When a volunteer comes to pick a FCT Stream monitoring kit, they receive a toolbox kit full of water quality monitoring supplies and safety materials, two 2-gallon buckets, a rope with attached carabineer, Ohio Sediment Stick, and 500ml sample bottles. A copy of the Monitoring Kit Inventory, which includes a specific list of monitoring supplies in the toolbox, is in Appendix D.

2. Calibration
    Calibration is the process of assessing and adjusting the accuracy of the monitoring instrument to a known standard or reference for a given parameter. In this program, calibration frequency was guided by the manufacturer's recommendation, equipment use, age of equipment, and environmental influences. Below is a description of the calibration methods and frequency to be performed using the YSI Pro Plus/Quattro: pH, DO, conductivity. Calibration records are to be kept in a digital format, and uploaded as metadata for each sampling event into Water Reporter. Sample Calibration sheet can be found in Appendix E.
    a. pH
        i. Frequency - At beginning and midpoint of sampling season (April/July) all units will received a full reset to default values then 2-point calibration (pH 7 & pH 10) following the manufacturer's instructions. Each month of sampling, all units will test pH 7 & pH 10 standards for accuracy readings. Both the pH and the mV observations should be recorded for each standard and compared to the previous months records. If any observation is ±12mV then the unit has drifted beyond an acceptable range and must be calibrated by following the above calibration steps.

    b. Dissolved Oxygen – Every month before sampling, all units should be reset to default settings and calibrated for dissolved oxygen using the manufacture's directions for a % saturation calibration.

    c. Conductivity – Since conductivity is considered the most stable of the three parameters needing calibration, this will only need to be completed at the beginning and midpoint of sampling season (April/July) for all units. Calibrate for specific conductance following the manufacturer's instructions.

Calibration Reference Table

Parameter	Calibration Type	Calibration Frequency
pH	2-point (7 & 10)	April & July and/or when mV drift is > than 12
Dissolved Oxygen	% Saturation	Monthly (during season)
Conductivity	Specific conductance	April & July

3. Service
    a. To maintain working order of the YSI Pro Plus/Quattro, each unit should be inspected monthly before the sampling event.

        i. Typical Monthly Maintenance
            1. Battery check/replacement – batteries in the YSI Pro Plus/Quattro are checked for power level. If battery life is less than 50 %, the batteries are replaced before the next sampling event. Kits also contain a spare set of batteries.
            2. Sensor fouling/cleaning –sensors are checked for build-up that may cause inaccurate readings. If found, the manufactures cleaning instructions are followed. Kits are also checked for debris and dirty towels/vests, and restocked with clean items as needed.
            3. Broken/missing equipment – probes, glassware and other items are checked to ensure proper function and safety. Any items found missing or broken are replaced before the next sampling event.

    b. Reagents & Buffers
        i. Expiration dates of all reagents and buffers/standards are checked one month before the sampling season begins (March). Any items that are due to expire are replaced. When using standards for calibration they must be fresh.

        ii. The pH 10 buffer is highly susceptible to CO2 absorption, which can result in changes in the pH value over a short period of time. As such, any pH 10 buffer remaining at the end of the sampling year is disposed of and not held to the following year.
        iii. All reagents and standards should be kept according to manufacturer's instructions.

    c. Storage – There are two storage types needed to properly maintain the YSI Pro Plus/Quattro based on the time between uses.
        i. *Short-term* – Short term storage is defined at periods of inactivity less than 30 days (during the active sampling season). When a kit is returned from a monitoring event, the cable is to be disconnected from the handheld unit and the guard is to be replaced with a storage container containing a small amount

of tap water. The water should not submerge the sensors and is strictly to create a 100% saturated air environment.

   ii. *Long-term* – Temperature and conductivity storage procedures are the same for both long and short-term; however, pH and Do sensors require additional steps which include removing from the cable. Once removed, the pH sensor should be stored in a pH 4 solution using the provided storage cups. The DO sensor should be stored dry. Ports should be covered with provided plugs to prevent water entering the port.

d. Equipment replacement and service
   i. With proper maintenance

Volunteers

Volunteers are vital in achieving the goals of this monitoring plan. While program coordination and data analysis is performed by the two partnering agencies, the volunteers perform the actual data collection in the field. To maintain a high level of confidence in the collected data, volunteers are required to attend trainings and demonstrate the ability to follow monitoring protocols established in this plan. Additional requirements of volunteers is the physical ability to perform fieldwork and provide transportation to and from assigned sites.

1. **Responsibilities**
   a. Perform stream monitoring activities when scheduled
      i. Follow written protocol for collecting data
      ii. Ensure proper use of equipment
      iii. Follow safety guidelines
      iv. Fully complete data sheet
      v. Return data sheet and grab sample within the established timeframe of monitoring event.
      vi. Provide timely response to coordinator regarding kit pick up/drop off before monitoring events
      vii. Inform coordinator of scheduling conflicts in timely manner
      viii. Report low supplies and missing or damaged equipment to coordinator
      ix. Attend required training sessions
      x. Provide own transportation

2. **Recruitment**
   a. *Pre-Season Recruitment* – Volunteer recruitment is conducted 2-3 months before the sampling season and is coordinated by the Erie SWCD. Recruitment begins with surveying previous volunteers for their desire to return for another season. Additional recruitment seeking new volunteers follows for any remaining or new sites available. Potential volunteers are sought through outreach on social media, local newspaper, and direct contact. In the event that a site(s) is left with no volunteer commitment, the Erie SWCD and Old Woman Creek will make the decision to cover the sampling until a volunteer can be found or forgo the site for that sampling year.

b. *In-Season Recruitment* – When potential volunteers approach the monitoring program mid-season, they may fill any un-monitored sites following one-on-one training or chose to shadow an existing volunteer. In the event there are no open sites, the volunteer is offered the chance to shadow an existing volunteer and be added to the pre-season recruitment list.

3. **Training** – Annual training is required for every volunteer participating in the stream monitoring program. Training will include the use of a volunteer monitoring handbook and an annual in-person event.

   a. *New Volunteers* – are required to attend a full day training provided by the coordinator before the monitoring season commences. This training will include a lecture and hands-on learning format. The lecture portion will cover the importance of stream monitoring and provide a primer on the parameters monitored as part of this program. The hands-on portion of the workshop will focus on skill building for the volunteers. Each volunteer will have the opportunity to explore the kit, learn the protocol, and use the equipment. The coordinator and assisting partners will closely observe each volunteer's ability to ensure accurate execution of the monitoring protocol. Additional training may be required if a volunteer's ability is not acceptable by the end of the training day.

   b. *Returning Volunteers* – All volunteers are required to receive annual training as part of this program. However, returning volunteers may be excused from a portion of the training at the coordinator's discretion.

   c. *Personal Training* – In the event a volunteer(s) cannot attend the full day training, the coordinator may choose to provide a one-on-one training session to that volunteer(s). This session may be shortened in length but will still cover all material of the full training.

Data Entry & Analysis

1. **Field Datasheet** – Volunteers are required to collect their sampling information on a field datasheet created by the program coordinator and reviewed by the monitoring group. Information collected include meta and sampling data (Appendix F).

Table 4. Description of data and metadata collected as part of the Firelands Coastal Tributaries Volunteer Stream Monitoring Program.

Data	Data Type	Description
Watershed name	Meta	Creek Name
Site name	Meta	Road/park location
Date	Meta	Date of sampling event
Time	Meta	Time of sampling event
Monitor name(s)	Meta	Name of person(s) collecting the data
Weather	Meta	Narrative for current/previous 24 hours
pH buffer reading	Meta	Reading taken of pH 7 & 10 buffer standards from YSI Pro Plus/Quattro measured in units
Temperature	Observation	Reading taken from YSI Pro Plus/Quattro, measured in °C
Dissolved Oxygen	Observation	Reading taken from YSI Pro Plus/Quattro, measured in mg/L
Conductivity	Observation	Reading taken from YSI Pro Plus/Quattro, measured in SPC µs/cm
pH	Observation	Reading taken from YSI Pro Plus/Quattro, measured in units
Total Suspended Solid	Observation	Reading taken from Ohio Sediment Stick in inches then converted to mg/L following table listed on datasheet
Comments	Meta	Narrative of additional observations made by the monitor such as water color, smell, algae presence, activities occurring near site, wildlife, etc.

2. Data Entry

a. *Water Reporter* – Water Reporter is an online data management and communication tool utilized by the LEVSN. The Firelands Coastal Tributaries Watershed Program has a designated account managed by the program coordinator. Each month, data collected will be entered into the Water Reporter spreadsheet template (Appendix G) by OWC NERR staff. One completed file will be submitted to the program coordinator for review and upload to the WaterReporter.org virtual database.

b. *Report Card* – Data taken from the Water Reporter spreadsheet template will be transferred into the scoring workbook created by the monitoring group to convert the observations to scores based on water quality thresholds.

3. Annual Analysis

a. *Report Card* – Annual reports for data collected in a given sampling year are presented through watershed report cards. Watershed report cards are a type of community based social marketing tool that helps summarize water quality data for a monitored stream. The report card process scores individual observations to a water quality threshold to build a site and watershed rating. This process is led by the program coordinator with the assistance of OWC NERR staff. Details of this process can be found in the Firelands Coastal Tributaries Watershed Report Card Methodology Paper.

b. *LEBAF/Water Reporter* - As part of the LESVN partnership, Water Reporter contains prewritten scripts for providing an analysis on Lake Erie Baseline Assessment Framework (LEBAF) parameters on a regional scale. LEBAF is a process for standardizing data collection, analysis and communication that empowers local groups to elevate the credibility of their data and tell a regional story about the health of Lake Erie watersheds. Details for this analysis are found in the LESVN standard operating procedures.

4. **Trends Analysis** – A minimum of ten years of data is required to complete a trends analysis for the watershed. The most recent trends analysis was completed in 2022 and is available through the program coordinator. The next trends analysis process is not expected to occur until 2031.

Communication

1. *Water Reporter* – Data collected through this program will be uploaded periodically to the WaterReporter.org virtual database. This database automatically updates graphical maps to display current and historic data for each site sampled. Station Cards and watershed maps are embedded on the ErieConserves.org website on the stream monitoring page and will be used periodically through social media.

2. Distribution of Report Cards
   a. *Direct Mailings* – Over 1500 copies of the watershed report cards are directly mailed to residents within their respective watersheds. Funding allows all addresses in the Old Woman Creek watershed to receive a mailed copy, while Pipe Creek and Mills Creek are restricted to stream-adjacent landowners greater than 5 acres. Local, State, and Federal officials, and volunteers, receive each watershed report card.

   b. *Hard copies* – As funding allows, additional hard copies are printed and made accessible to the public at the Old Woman Creek NERR and Erie SWCD, and for use in programing by the partnering organizations.

3. Virtual media platforms – Current report cards along with the previous 2 years will be available online at ErieConserves.org and will be shared on various social media platforms on World Water Day. Additionally, the Erie SWCD and Old Woman Creek NERR will share digital copies of the Report Cards to their respective stakeholder email lists.

4. Presentations – Each year the report cards will be presented at the Volunteer Stream Monitor Chili Dinner before their official release to the public. Additional presentations are done by request.

Program Evaluation

In addition to evaluating each sample event for accuracy, precision, reproducibility, and consistency, the Erie SWCD and OWC NERR will evaluate the program's overall results of that sampling season and program implementation. Each year the group will identify successes and challenges for seven critical areas of the monitoring program. This may also include gathering feedback from the volunteer monitors. The monitoring group will create action items for any identified challenges to be implemented over the following year.

1. Volunteer recruitment and coordination
2. Parameters sampled
3. Monitoring protocol
4. Equipment and maintenance
5. Data Management
6. Data Analysis
7. Public Communication

The evaluation meeting will be recorded as a summary of the discussion point(s) for each category listed above and specifically list any action items expected to be implemented in the following sampling year. A summary will be shared with the stream monitoring group and kept as record by the program coordinator.

Appendices List

A. Watershed Maps
B. Detailed Site Description Table
C. Monitoring Protocols
D. Monitoring Kit Inventory Check List
E. Calibration Record Sheet
F. Field Data Sheet
G. Water Reporter Data Template

Resources

This list provides information on how to receive a copy of documents and information related to the tools and procedures of the FCT Volunteer Stream Monitoring Program.

Old Woman Creek Laboratory Standard Operating Procedures and Methods

Contact

- Steve McMurray, Research Coordinator, Old Woman Creek NERR
  Steven.Mcmurray@dnr.ohio.gov
- Jacob Cianci-Gaskill, SWMP Coordinator, Old Woman Creek NERR
  Jacob.Cianci-Gaskill@dnr.ohio.gov

Lake Erie Baseline Assessment Framework Standard Operating Procedure (Version 7.30, July 2022)
https://drive.google.com/file/d/1xmULA4gzUmiik19_-c1omu48sugL_Jk-/view

Contact

- Cleveland Water Alliance (Coordinator - Lake Erie Volunteer Science Network)
  https://clevelandwateralliance.org/levsn
- Erie Soil and Water Conservation District (LEVSN Erie County HUB site)

Lake Erie Volunteer Science Network
https://clevelandwateralliance.org/levsn

The Development Process for Old Woman Creek and Pipe Creek Report Cards (updated to include Mills Creek, March 2014)

Contact

- Breann Hohman, Assistant Director, Erie Soil and Water Conservation District
  bhohman@eriecounty.oh.gov
- https://erieconserves.org

Firelands Coastal Tributaries Volunteer Stream Monitoring Handbook

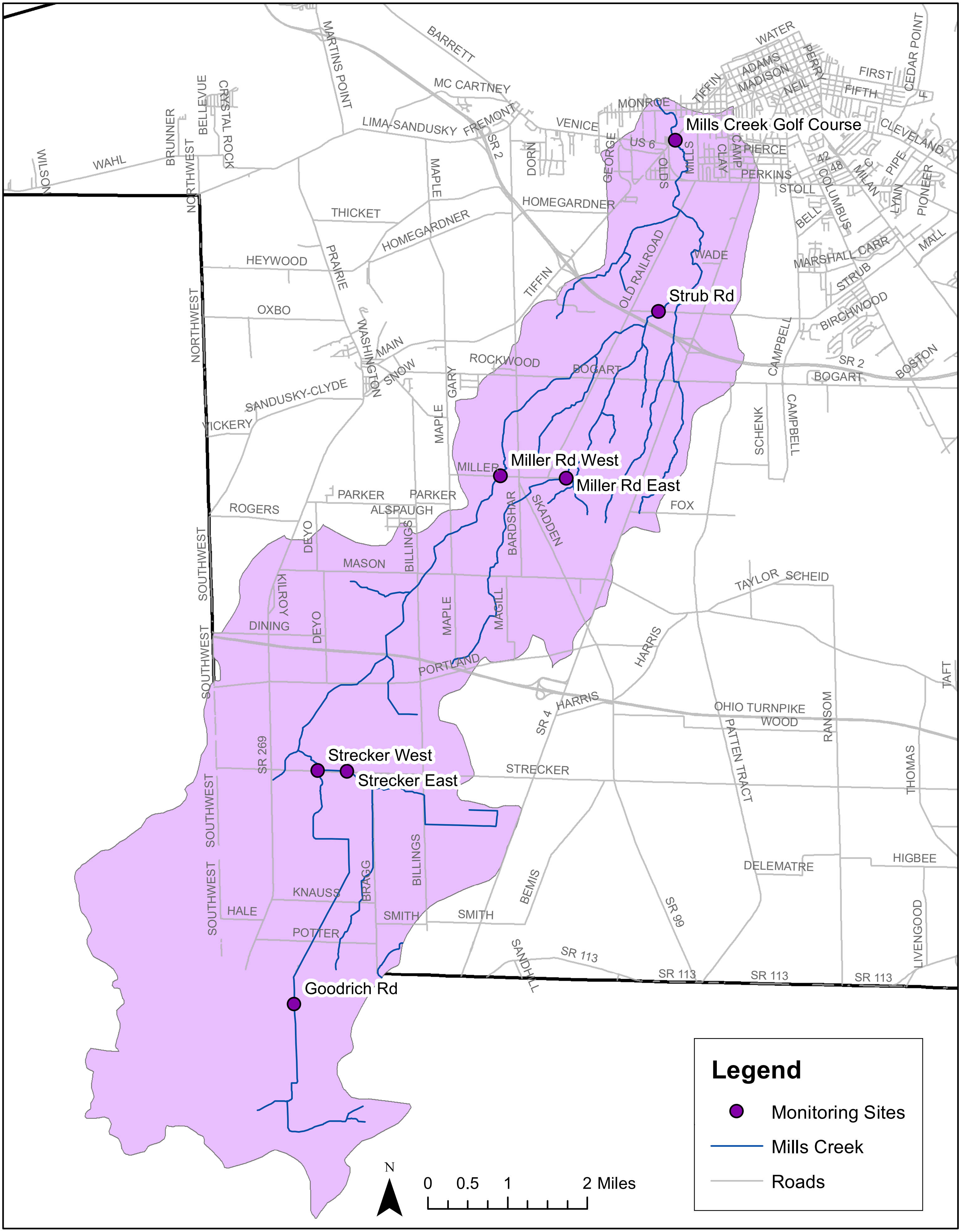
Contact

- Breann Hohman, Assistant Director, Erie Soil and Water Conservation District
  bhohman@eriecounty.oh.gov
- https://erieconserves.org

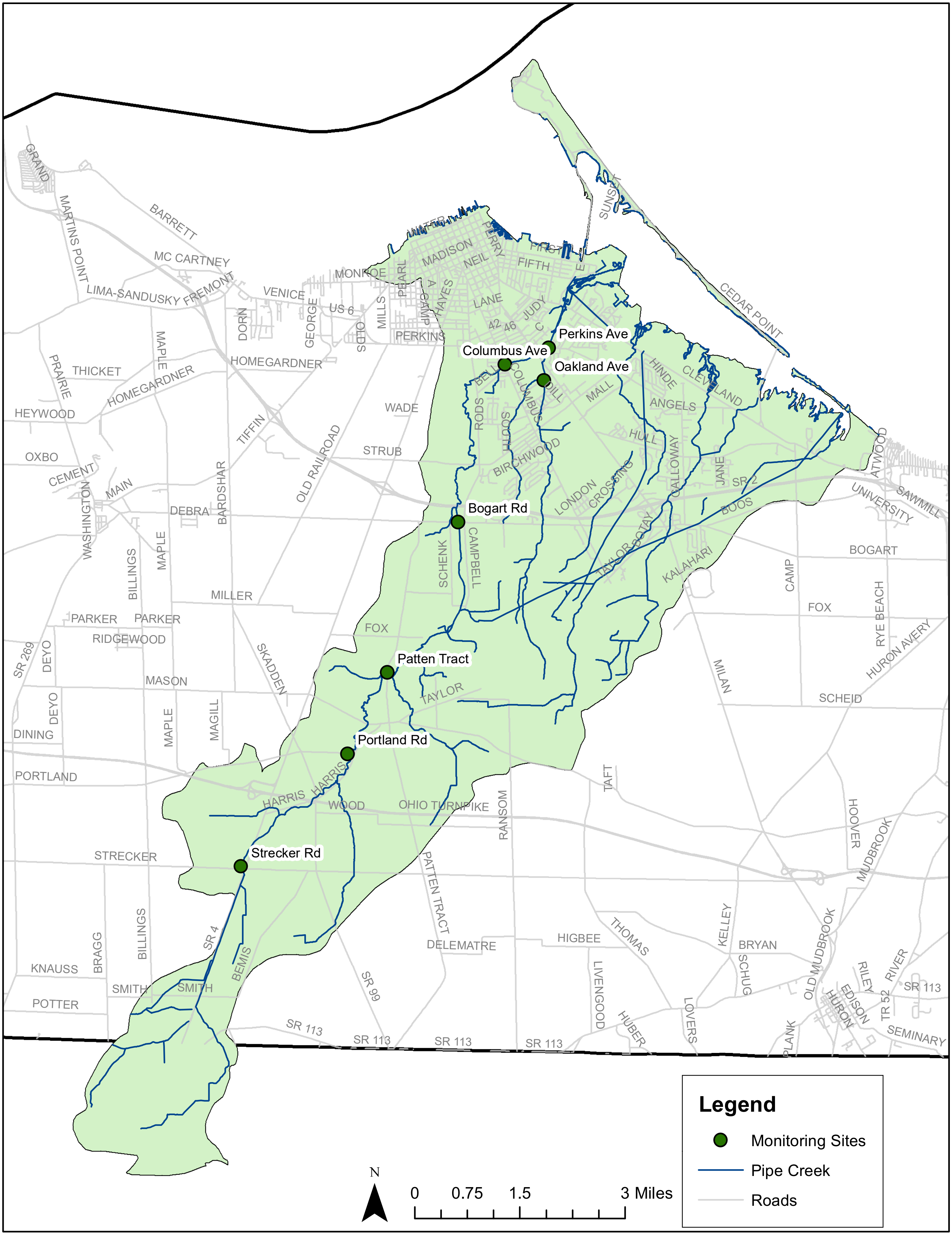
Appendix A

Watershed Maps

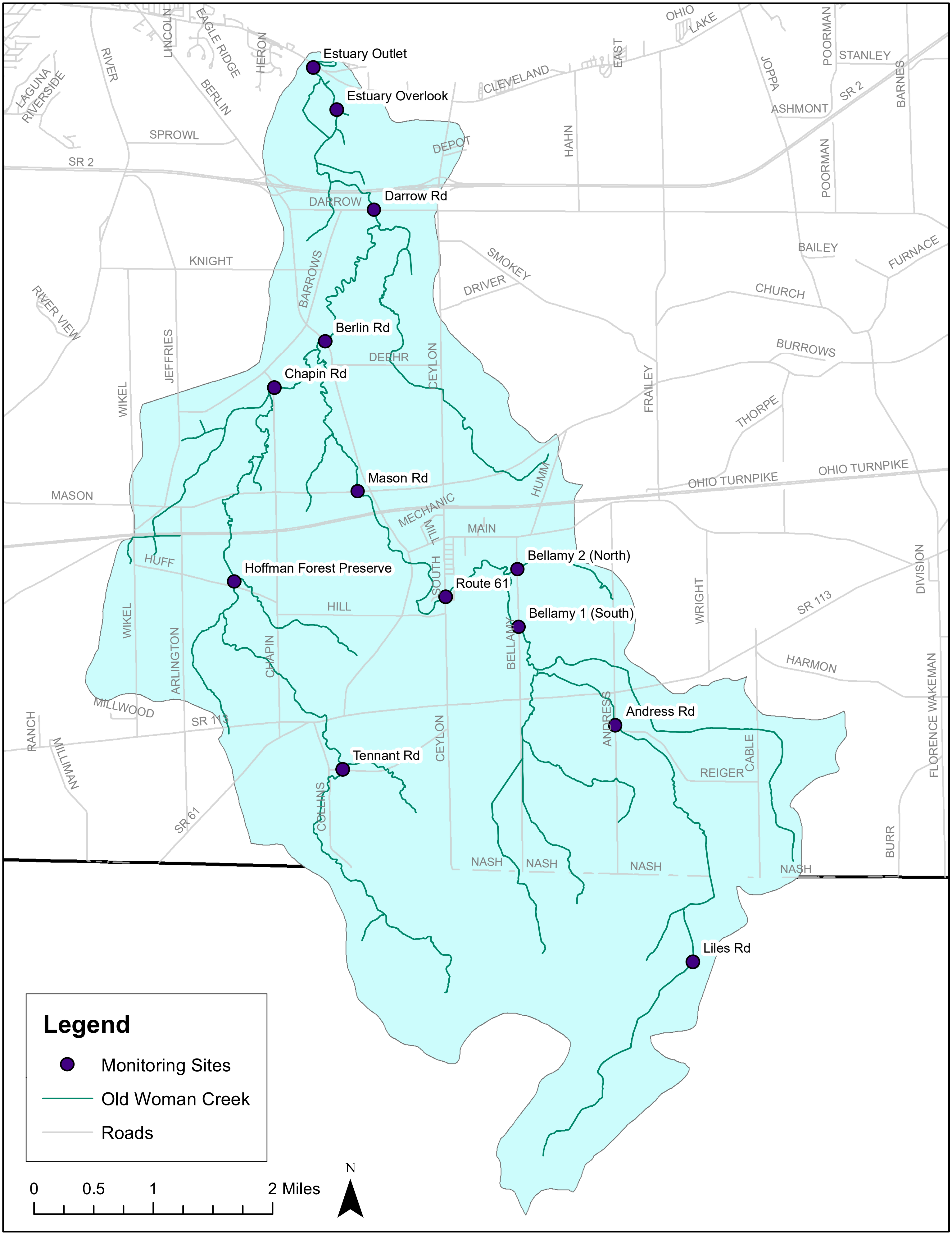
Mills Creek Monitoring Sites



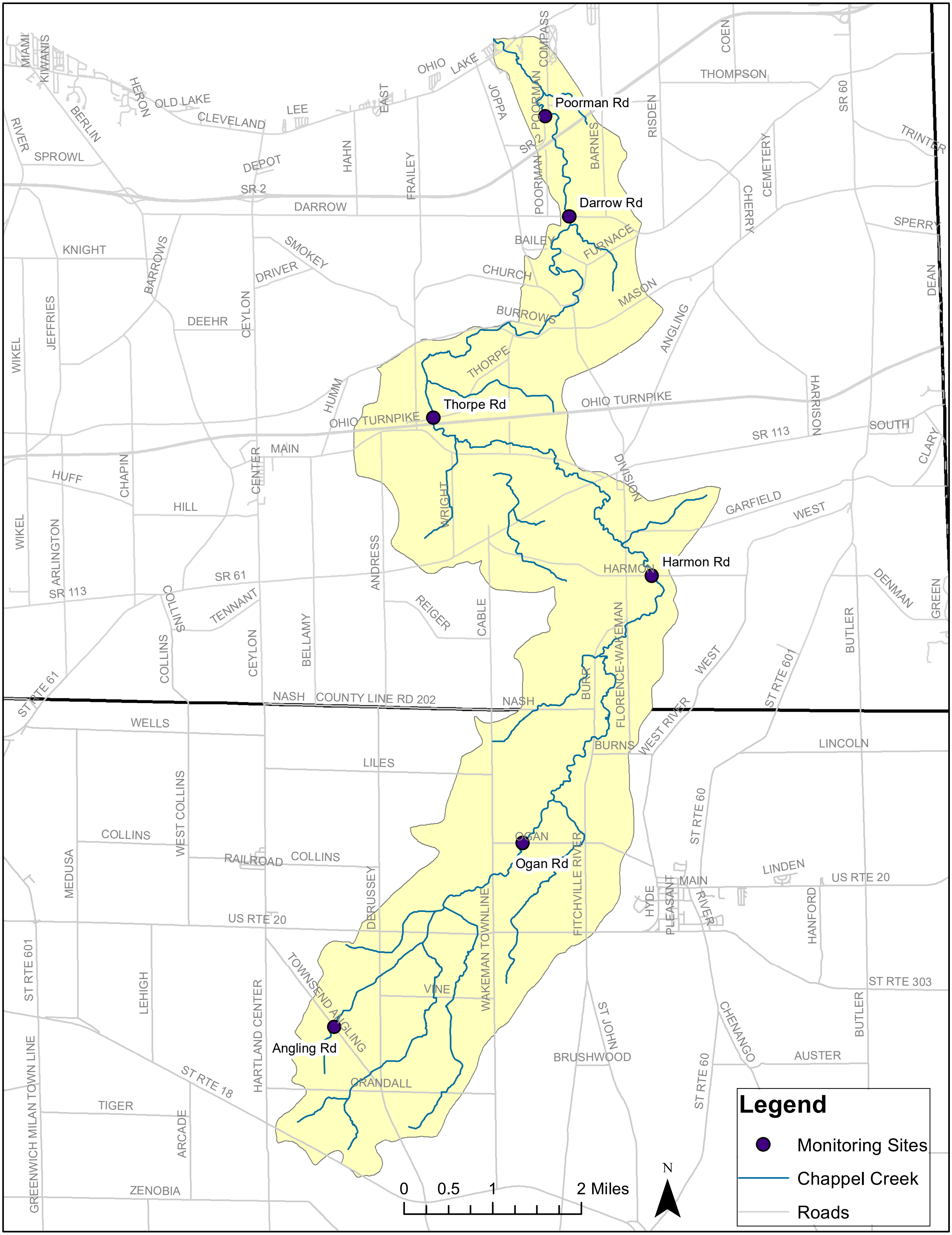
Pipe Creek Monitoring Sites



Old Woman Creek Monitoring Sites



Chappel Creek Monitoring Sites



Appendix B

Detailed Site Description Table

FCT Volunteer Stream Monitoring Sites

Watershed	Site	Type	Lat	Long	Drainage	% Forest	%Urban	% Impervious	% Water/Wetland	Stream Var Index	Year Added
Mills Creek	Goodrich Rd	Stream	41.32574	-82.81145	0.08	0.45	49.40	35.50	0.45	0.61	2015
Mills Creek	Strecker Rd E	Stream	41.32574	-82.81145	4.08	1.48	6.82	2.93	2.66	0.61	2014
Mills Creek	Strecker Rd W	Stream	41.32574	-82.81145	1.17	2.57	1.08	0.39	0.15	0.61	2012
Mills Creek	Miller Rd W	Stream	41.37573	-82.77488	27.00	4.21	17.60	6.55	1.22	0.61	2012
Mills Creek	Miller Rd E	Stream	41.37573	-82.77488	2.09	9.92	5.73	1.25	1.01	0.61	2014
Mills Creek	Strub Rd	Stream	41.40961	-82.73696	33.60	5.07	15.70	5.67	1.29	0.62	2012
Mills Creek	Mills Creek Golf Course	Stream	41.44062	-82.73209	41.30	5.47	19.10	7.26	1.57	0.62	2013
Pipe Creek	Strecker Rd	Stream	41.324760	-82.767710	6.70	3.57	17.80	7.17	1.60	0.60	2008
Pipe Creek	Portland	Stream	41.338400	-82.748700	12.80	4.38	14.90	5.28	2.05	0.60	2016*
Pipe Creek	Patten-tract Rd	Stream	41.365350	-82.727940	14.70	4.92	15.30	4.87	1.86	0.61	2008
Pipe Creek	Bogart Rd	Stream	41.396500	-82.708520	19.00	9.31	14.60	4.18	1.97	0.61	2008
Pipe Creek	Columbus Ave	Stream	41.429730	-82.692760	22.70	9.10	16.10	4.66	1.86	0.62	2008
Pipe Creek	Oakland Ave	Stream	41.429000	-82.685380	3.01	26.10	45.50	8.24	3.78	0.62	2011
Pipe Creek	Perkins Ave	Estuary	41.432560	-82.683650	27.90	11.00	22.50	6.29	2.08	0.62	2008
Old Woman Creek	Liles Rd	Stream	41.273479	-82.453316	1.64	13.10	5.47	0.74	0.30	0.64	2008
Old Woman Creek	Andress Rd	Stream	41.30204	-82.46514	3.03	13.70	4.53	0.59	0.66	0.64	2015
Old Woman Creek	Bellamy Rd	Stream	41.314902	-82.481357	8.45	14.10	4.62	0.64	0.89	0.63	2008
Old Woman Creek	Bellamy Rd 2	Stream	41.320662	-82.483260	0.67	19.40	8.24	1.79	1.70	0.63	2009
Old Woman Creek	Rt 61	Stream	41.318468	-82.492657	9.71	14.90	5.46	0.84	0.93	0.62	2008
Old Woman Creek	Mason Rd	Stream	41.330674	-82.481357	10.70	17.10	6.90	1.33	1.07	0.62	2008
Old Woman Creek	Tennant Rd W	Stream	41.298600	-82.509790	2.16	12.40	5.08	0.91	0.29	0.61	2008
Old Woman Creek	Hoffman Woods	Stream	41.319200	-82.527460	4.95	19.10	6.19	0.98	1.46	0.60	2008
Old Woman Creek	Chapin Rd	Stream	41.34325	-82.52091	9.52	21.00	7.65	1.33	1.45	0.62	2008
Old Woman Creek	Berlin Rd	Stream	41.348920	-82.512570	21.80	19.50	7.44	1.39	1.56	0.63	2008
Old Woman Creek	Darrow Rd	Estuary	41.364922	-82.504653	24.60	21.10	7.81	1.49	2.17	0.63	2008**
Old Woman Creek	Estuary Overlook	Estuary	41.367390	-82.507170	26.10	21.80	8.26	1.59	2.62	0.64	2008**
Old Woman Creek	Estuary Outlet	Estuary	41.382061	-82.514289	26.40	21.90	8.31	1.59	2.95	0.64	2008**
Chappel Creek	Townsend-Angling Rd	Stream	41.22415	-82.46879	1.03	22.8	5.54	0.89	1.55	0.63	2022
Chappel Creek	Ogan Rd	Stream	41.26197	-82.43596	5.7	19.6	6.25	1.08	0.5	0.65	2022
Chappel Creek	Harmon Rd	Stream	41.30563	-82.40755	12.7	22.2	5.19	0.8	0.91	0.69	2022
Chappel Creek	Thorpe Rd	Stream	41.33148	-82.45518	18.3	24.1	5.99	0.98	1.49	0.66	2022
Chappel Creek	Darrow Rd East	Stream	41.36446	-82.42531	22.1	25.6	6.16	1.01	1.7	0.71	2022
Chappel Creek	Poorman Rd	Stream	41.38082	-82.4307	23.1	27.2	6.33	1.03	1.82	0.71	2022

Appendix C

Monitoring Protocols

FCT STREAM MONITORING PROTOCOL

PRE-SAMPLING
1. Turn unit on 5 minutes before sampling.
2. Begin filling out datasheet (site, date, weather, ect)

COLLECTING SAMPLE
1. Put on safety vest and watch traffic when approaching the bridge
2. Retrieve sample from upstream side of bridge. - Hold bucket face down with ample rope hanging over bridge. Secure rope by stepping on one end. Drop bucket do not throw. (Repeat with second bucket)
3. Bring samples back to vehicle, do not perform tests on bridge.

USING THE YSI METER
1. Take sleeve off YSI probe and place in water, gently shake probe to make sure no bubbles are trapped in the guard.
2. Gently move the probe in a circular motion simulate flowing water, but do not create bubbles. Note: DO readings should be climbing or stable (if dropping the motion is too slow). As numbers begin to stabilize (unit will beep and "AS" will stop flashing the screen will freeze)
3. Write readings on datasheet
4. Repeat with bucket 2
5. Compare readings from datasheet to the **"WHAT'S NORMAL"** card on the monitoring kit lid -If readings are not normal for temperature, pH, or DO perform back-up test and make note in comments section on datasheet. - BACK-UP TESTS - Temperature – use glass thermometer - pH – use test strips - DO – Use blue Hach Kit

COLLECTING A GRAB SAMPLE
1. Check to make sure the grab sample bottle states the correct site
2. Collect water sample from bucket one filling entire bottle.

USING THE OHIO SEDIMENT STICK (Turbidity Tube)
1. Stand with tube in your shadow
2. Pour water into tube in small increments, checking to see when the small black dot at the bottom of the tube disappears
3. Read the height of water in tube and write on datasheet
4. Use table on datasheet to convert inch measurement to mg/l TSS

Remember to include additional information you think may be important about the site in the comments sections such as: kit/equipment issues, dead wildlife, things that seem odd.

Last updated 2023

HACH®

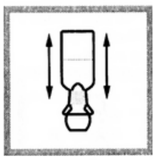
Dissolved Oxygen Test

0.2 to 4 and 1 to 20 mg/L O_2
For test kit 146900 (Model OX-2P) DOC326.98.00014

1) Fill the BOD bottle (round bottle with glass stopper) with sample water by allowing the sample water to overflow the bottle for 2-3 minutes. Avoid turbulence and bubbles in the sample while filling.

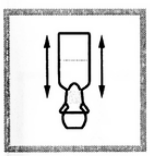
2) Incline the bottle lightly and stopper the bottle carefully to avoid trapping air bubbles. If bubbles become trapped, discard the sample and repeat the test.

3) Remove the stopper and one Dissolved Oxygen 1 Reagent Powder Pillow and one Dissolved Oxygen 2 Reagent Powder Pillow. Stopper the bottles carefully to avoid trapping air bubbles.



4) Invert the bottle and shake several times until the powders are dissolved. Flocculent (floc) precipitate will form. Brownish-orange precipitate indicates oxygen is present.

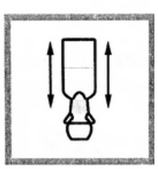
5) Wait for floc to settle to approximately half the bottle volume. Floc will slowly settle if high concentrations of chloride are present. In this case. Wait 4-5 minutes before proceeding.



6) Invert and shake the bottle again to mix.

7) Wait for floc to settle to approximately half the bottle volume. Floc will slowly settle if high concentrations of chloride are present. In this case wait 4-5 minutes before proceeding.

8) Remove the stopper and one Dissolved Oxygen 3 Reagent Powder Pillow. Stopper the bottle.



9) Invert and shake the bottle several times. Floc will turn yellow if oxygen is present.

10) Add one full measuring tube of sample to the bottle.

11) Add Sodium Thiosulfate Solution by drops (KEEP DROPPER VERTICLE THE ENTIRE TIME). Count the drops until the color changes from yellow to colorless. Swirl to mix after each drop. The number of drops is equal to the test result in mg/L.

Fieldsheet for The Ohio Sediment Stick

Developed with a citizen's action mini-grant from
Ohio DNR Division of Soil & Water Conservation

Caution! Your safety is important to us! Please take all necessary precautions whenever you use the Ohio Sediment Stick. Always take the water sample from a safe location. If you cannot wade a stream or river because of high flow conditions, or for any other reason, consider using a bucket that you lower from a bridge or other safe overhang into the stream or river to obtain a water sample to pour into the Sediment Stick. (See "Taking a Sample" below).

Purpose To estimate amount of soil sediment impacting a stream by estimating the turbidity of stream water.

Equipment Needed Sediment stick; tape to measure tenths of a foot; float; time keeping device; calculator.

Taking a Sample Either walk up stream to a point of regular flow or position the sample collecting person along the streambank. Hold the stick halfway between the surface and bottom. When the tube is oriented with it's open end upstream, it will fill with water. If high flow conditions exist, consider using a bucket that you lower from a bridge of safe overhang to collect a sample that can be poured into the Sediment Stick. Continue to keep sample in bucket stirred.

Reading the Stick Holding the stick in your shadow and perpendicular to the ground, pour out water until you can just see the 0.4 inch black dot target on the tube bottom. Rock the tube as needed to keep material suspended. Read the height of the water column from the markings on the stick to the nearest 1/4" (inch). Disregard the color of the water (it may be greenish or brownish); it is the suspended soil material that will affect your view of the target. Repeat this procedure once more. Use the averaged height to estimate total suspended solids (TSS).

Estimating Turbidity Water turbidity refers to the material suspended in the water that refracts light. Ohio EPA uses total suspended solids (TSS) to assess turbidity. You can convert Ohio Sediment Stick readings to TSS by using the conversion table on the back of this field sheet. Use the TSS estimate to calculate sediment load in pounds per day using four steps, also on the back.

Ohio EPA research indicates that Ohio Sediment Stick readings predict a laboratory analysis of TSS at 90%. This is not perfect, but accurate enough to estimate changing sedimentation rates in streams that may be attributed to problems in the upper watershed. Repeated monitoring with the stick establishes how sedimentation rates in your stream are changing due to problems in the upper watershed.

Water Rating You can estimate water quality quickly by using the Stick readings. The conversion table on the back of this field sheet is followed by the water quality scale based on analysis of unimpacted stream data for the state of Ohio.

Lake Soil & Water Conservation District
125 East Erie Street, Painesville Ohio 44077
phone: (440) 350-2730 fax: (440) 350-2601

Disclaimer: The author, publisher, Lake SWCD, and the ODNR are not engaged in rendering specific advice on water quality by this Fieldsheet. The purpose of this Fieldsheet is to provide accurate and authoritative information of a general character only. For advice and assistance on testing the water quality of any streams and rivers at a given time for a specific purpose, the services of a professional should be obtained.

Sources Ken Moore, Elyria Water Works, Lorain, Ohio, unpublished, 1996
Robert Carlson, Ph.D., Kent State University, unpublished, 1996
Paul Anderson & Robert Davic, Ph.D, Ohio EPA Division of Surface Water, Twinsburg Field Office, 2001, in preparation
Paula Brown, Ohio EPA Modeling Section, Columbus Office, 1998

Estimating Total Suspended Solids: TSS

Use this table to convert Stick readings to an estimate of the weight of solids suspended in the water column. Table is based on research by Anderson and Davic, 2001, in preparation.

I. Total Suspended Solids: TSS
(Turbidity)

______ mg/l

Stick(in)	TSS(mg/l)	Stick(in)	TSS(mg/l)	Stick(in)	TSS(mg/l)
0.5	1750.5	10.0	33.7	24.0	10.6
1.0	702.1	11.0	29.7	25.0	10.0
1.5	411.4	12.0	26.5	26.0	9.5
2.0	281.6	13.0	23.8	27.0	9.1
2.5	209.8	14.0	21.6	28.0	8.6
3.0	165.0	15.0	19.7	29.0	8.2
3.5	134.6	16.0	18.1	30.0	7.9
4.0	112.9	17.0	16.7	31.0	7.6
4.5	96.7	18.0	15.5	32.0	7.2
5.0	84.1	19.0	14.4	33.0	6.9
6.0	66.1	20.0	13.5	34.0	6.7
7.0	54.0	21.0	12.6	35.0	6.4
8.0	45.3	22.0	11.9	≥ 36.0 =	< 6.2
9.0	38.7	23.0	11.2		

II. Water Quality

______Excellent
______Normal
______Impaired
______Severely Impaired

This scale is based on Ohio statewide reference site data published by Brown, 1988.

TSS < 10mg/l = excellent water quality
TSS 10-28mg/l = normal water quality
TSS 29-133mg/l = impaired stream
TSS > 133mg/l = severely impacted stream

Estimating Stream Flow: Q

Step 1: Estimate stream flow velocity in feet per second (f/s).
Measure a length of 10 feet in a straight section of stream channel. Record the time it takes a float to move that 10 feet in the area of deepest flow. To get a reliable estimate, make three readings and take the average.

III. Stream Flow

Flow Velocity:

______ f/s

Reading 1: 10ft ÷ ______seconds = ______f/s
Reading 2: 10ft ÷ ______seconds = ______f/s
Reading 3: 10ft ÷ ______seconds = ______f/s

Total = ______f/s ÷ 3 = ______average f/s
velocity

Rate of Flow:

______ cfs

Step 2: Find the stream cross-sectional area in square ft (ft^2).
In a straight section of stream, measure the width at the water's surface and bottom channel. For averaged depth, take measurements at one-foot intervals and divide by the number of readings.
$(W^s + W^b) \div 2 \times D$ = Area:

______ft + ______ft = ______ft ÷ 2 = ______ft. x______ft = ______ft^2
surface bottom ave.width depth area (sq. ft.)

Step 3: Find the rate of flow in cubic feet per second (cfs).
Velocity [step 1] × area [step 2] = rate OR ______f/s × ______ft^2 = ______cfs
velocity area (sq. ft.) rate

Estimating Stream Load of Soil Sediment: lbs/day

Step 4: Convert total suspended solids reading to pounds of sediment per day (lbs/day)

IV. Sediment Load

______ lbs/day

TSS reading × conversion factor × rate (cfs) [step 3] = pounds per day
OR
______TSS (mg/l) × 5.39 = ______ x ______ cfs = ______
turbidity rate load lbs/day

Appendix D

Monitoring Kit Inventory Check List

FCT Monitoring Kit Inventory Check List

Kit Number	PC-1	PC-2	PC-3	PC-4	PC-5	OWC-5				
pH Test Strips										
Writing Utensils										
Scissors										
Batteries										
Screw Driver										
Clipboard w/Following Sheets:										
- 4 Blank Data Sheets										
-Hach Kit Sheet										
-Safety Sheet										
-FCT protocal										
Thermometer										
Hach DO Kit										
Blue Block/White Card										
Towel										
Safety Vest-2										
Small Pouring Bottle										
Squirt Bottle										
pH Rinse Water										
First Aid Kit										
Empty Waste Bottle										
Gloves										
Trash Bag										
Paper Towels										

Comments:

Appendix E

Calibration Record Sheet

Date of Calibration: _____________ **Instrument # (cable/Unit):** ________ **Technician:** _____________

YSI Temperature___________ **Air Temperature**_____________ **Temperature Accurate:** Y N

True Barometric Pressure at Calibration __________________ **DO membrane changed?** Y N

pH probe date: _________________________

Calibration / Check Table:

Were calibrated sensors reset to Default before calibration? Y N

	Previous Month values	**Pre Cal / Check**	**Cal Required?***	**Post Cal**	**Notes**
Specific Conductivity (µS/cm)					
DO (% Saturation)					
pH 7					
pH 7 mV (range 0 ± 50 mV)					
pH 10					
pH 10 mV (range -165 to -180 mV from 7 buffer mV)					

Post Cal Diagnostics (view .glp file and reading the values for the day's calibration):

Conductivity Cal Cell Constant ____________ Range 5.0 +/- 1.0 is acceptable

DO Sensor Value (uA) ____________ (Membrane dependent, see DO Cal Tips)

pH Slope ____________ (≈ 55 to 60 mV/pH, 59 ideal) **pH Slope % of ideal** ___________

[slope x 3] =_____________________ Is it between 165 &-185? Y or N

***Calibration Reference Table**

Parameter	Calibration Type	Calibration Frequency
pH	2-point (7 & 10)	April & July and/or when mV drift is > than 12
Dissolved Oxygen	% Saturation	Monthly (during season)
Conductivity	Specific conductance	April & July

Appendix F

Field Data Sheet

WATER QUALITY MONTORING DATA SHEET

Firelands Coastal Tributaries Watershed Program
Updated 2023

Watershed Name:______________________________

Site Name:____________________________________

Monitor(s):____________________________________

Date:____/____/______ Time:__________ AM/PM

Temp:__________ Kit # ____________________

(Check all that apply)

	Site Conditions		Dominant Weather in last 24 hrs
	No/little Flow		Mist/fog
	Normal Flow		Heavy Precipitation
	Faster Flow		Moderate Precipitation
	Very Fast Flow		Light Precipitation
	Snow/frozen ground		Overcast (90-100% cover)
	Muddy/wet ground		Broken Clouds (90-100% cover)
	Dry ground		Scattered Clouds (10-50% cover)
	Other (comments)		Clear Skies

TAKE GRAB SAMPLE

BUCKET 1

Parameter	Reading	Unit
Temperature		°C
DO		mg/L
Conductivity		SPC µs/cm
pH		
TSS (turbidity)	in	mg/l

BUCKET 2

Parameter	Reading	Unit
Temperature		°C
DO		mg/L
Conductivity		SPC µs/cm
pH		
TSS (turbidity)	in	mg/l

Comments:

Sediment Stick Conversion Table

Inch	mg/l	Inch	mg/l	Inch	mg/l	Inch	mg/l
0.5	1750.5	6.0	66.1	16.0	18.1	26.0	9.5
1.0	702.1	7.0	54.0	17.0	16.7	27.0	9.1
1.5	411.4	8.0	45.3	18.0	15.5	28.0	8.6
2.0	281.6	9.0	38.7	19.0	14.4	29.0	8.2
2.5	209.8	10.0	33.7	20.0	13.5	30.0	7.9
3.0	165.0	11.0	29.7	21.0	12.6	31.0	7.6
3.5	134.6	12.0	26.5	22.0	11.9	32.0	7.2
4.0	112.9	13.0	23.8	23.0	11.2	33.0	6.9
4.5	96.7	14.0	21.6	24.0	10.6	34.0	6.7
5.0	84.1	15.0	19.7	25.0	10.0	35.0	6.4

If reading is ≥ 36 inches = < 6.2

WATER QUALITY MONTORING DATA SHEET

Firelands Coastal Tributaries Watershed Program
Updated 2023

Interpret Readings of Ohio Sediment Stick

TSS Reading (mg/l)	Water Quality
<10	Excellent
10-28	Normal
29-133	Impaired
>133	Severely impacted

Sample Drop-off Locations and Times

Samples must be in before noon on Monday of our sampling week.

Erie Soil and Water Conservation District
2900 Columbus Ave, Rm 131
Sandusky, OH 44870
M-F 8am-4:30pm

Old Woman Creek Reserve
2514 East Cleveland Rd.
Huron, OH 44839
8am-5pm (M-F), Saturday 1pm-5pm*

Contacts:

Erie Conservation District

Breann Hohman
419-626-5211 or
419-602-7900(cell)

Katie Burnsworth
419-626-5211 or
440-665-8442(cell)

Old Woman Creek Reserve

Jacob Cianci-Gaskill
567-623-4875 or
585-733-9943(cell)

Steve McMurray
567-623-4874 or
910-233-9561(cell)

Appendix G

Water Reporter Data Template

station_id	FCT	collection_date	ammonia_	cond_uscm	do_mgl	nitrate_mg	nitrite_mgl	nitrogen_m	ph	srp_p_ppb	temp_c	turbidity_n	notes
OWC_19	1_Tenant West												
OWC_2	2_Andress												
OWC_11	3_Hoffman												
OWC_1	4_Chapin												
OWC_12	5_Liles Road												
OWC_5	6_Bellamy 2												
OWC_3	7_Bellamy 1												
OWC_15	8_Route 61												
OWC_14	9_Mason												
OWC_6	91_Berlin												
CC_Darrow	Darrow East												
CC_Harmon	Harmon												
MC_5	M1_Golf Course												
MC_8	M2_Mills Strub												
MC_4	M3_Miller West												
MC_3	M4_Miller East												
MC_7	M5_Strecker West												
MC_6	M6_Strecker East												
MC_2	M7_Goodrich												
CC_Ogan	Ogan												
OWC_9	OWC-VC-Darrow Rd												
PC_7	P1_Perkins												
PC_5	P2_Oakland												
PC_3	P3_Columbus												
PC_1	P4_Bogart												
PC_6	P5_Patten Trac												
PC_8	P6_Portland												
PC_9	P7_Strecker												
CC_Poorman	Poorman												
CC_Thorpe	Thorpe												
CC_Angling	Townsend-Angling												