

The Ohio Water Sentinel Program Surface Water Monitoring Protocol

Watershed: _____
 HUC 8 HUC 12

Date:

Name:

Contact Info:



Protocol template written by Amanda Keith & edited by the Sierra Club Ohio Chapter Water Committee. Conducted by the Ohio Water Sentinel Program. Elements of this study plan and protocol were taken from the Ohio EPA's Credible Data Rules.

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Introduction

There is a demonstrated need for increased water monitoring and testing in Ohio. The Clean Water Act requires states to test their waters regularly but, unfortunately, neither the Ohio Environmental Protection Agency nor the Ohio Department of Natural Resources has the capacity to monitor all of Ohio's 199,000 miles of rivers and streams. Thus it is critical for concerned citizens to monitor their waterways and establish baseline water quality data.

Modeled after the Sierra Club's nationwide Water Sentinel Program, the Clean Water Campaign provides water monitoring equipment and a series of trainings to volunteers to empower them to monitor their waterways and track changes in watershed health. Water Sentinels report data to the campaign quarterly and help develop program area conservation goals, advocacy plans, and timelines for success. Water Sentinel data is used to educate students, landowners, watershed groups, and the general public. The purpose of this protocol is to collect consistent and comparative data throughout the monitoring process in order to effectively assess the conditions of Ohio's watersheds.

Purpose of Study

The purpose of this study is to evaluate surface water sites by collecting samples quarterly to better understand water quality. Samples will be collected on established stream, tributary, and river site locations during daylight hours, at varying flow conditions, once each season. Sampling consistently and facing diverse sampling conditions will help volunteers observe and hypothesize about changes in water quality. Once they have submitted their data, and the campaign has analyzed their results, volunteers will gain a better understanding of stream ecology and local watershed health.

Parameters and Methods

Chemical Parameters

Volunteers will measure water temperature, conductivity, total dissolved solids, salinity, nitrate/nitrite, pH, total alkalinity, total hardness, total chlorine, and free chlorine.

Water temperature, conductivity, total dissolved solids, and salinity will be measured with EXTECH ExStik EC400 meters. Nitrate/nitrite as well as pH, total alkalinity, total hardness, total chlorine, and free chlorine will be measured with test strips.

All samples will be measured upon collection in the field; holding time and sample preservatives are not a consideration. Sample parameters were chosen based on water quality learning opportunities, ease-of-use, and affordability.

Table 1 – Chemical Parameters

Parameter	Analysis Tool/Method	Range
Temperature	EXTECH ExStick EC400	0.0°C to 65°C
Conductivity	EXTECH ExStick EC400	0 µS/cm to 199.9 µS/cm 200 to 1999 µS/cm 2.00 to 19.99 mS/cm
Total Dissolved Solids	EXTECH ExStick EC400	0 to 99.9ppm 100 to 999ppm 1.00 9.99ppt
Salinity	EXTECH ExStick EC400	0 to 99.9ppm 100 to 999ppm 1.00 9.99ppt
Total Nitrate and Nitrite	Water Works Nitrate and Nitrite strips	0ppm to 50ppm 0ppm to 10ppm
pH	Water Works 5-Way Water Check strips	6.2 to 8.4
Total Alkalinity	Water Works 5-Way Water Check strips	0ppm to 240ppm
Total Hardness	Water Works 5-Way Water Check strips	0ppm to 425ppm
Total Chlorine	Water Works 5-Way Water Check strips	0ppm to 10ppm
Free Chlorine	Water Works 5-Way Water Check strips	0ppm to 10ppm

Water Sentinels will collect samples using a plastic bucket, plastic container, or glass container, and will specify type on data forms. The bucket or container will be rinsed with stream water at the site location prior to data collection. If multiple samples are taken in one site area, Water Sentinels will gradually work upstream so as not to impact the quality of the samples.

Observational/Visual Parameters

In addition to chemical parameters, volunteers will also monitor and record flow rate, turbidity, 48 hr. rainfall, as well as general observations and presence of industrial activity development.

Table 2 – Observational/Visual Parameters

Parameter	Analysis Tool/Method	Range
Flow Rate	Observational skills training	0-Dry to 5-Flood
Turbidity ¹	Observational skills training	0-Clear to 3-Turbid
48 Hr. Rainfall	Precipitation records	Day of sampling + two days before

Incident Reporting: Water Alert Reporting Network (W.A.R.N.)

Water Sentinels utilize the W.A.R.N. form and training method to record and report suspected incidences of pollution or misconduct that could potentially harm our waterways. The goal of W.A.R.N. is to ensure that state regulators are aware of these incidents and that they address them in a timely and appropriate manner. All reports submitted will be reviewed by the campaign and referred to the appropriate authority. We strongly encourage individuals to also file reports with the correct authority and, in the case of an imminent threat or emergency, to call 911.

¹ Turbidity may also be measured with Ohio Sediment sticks. Water Sentinels will follow appropriate protocols and record results under Observations, Comments, and Suggestions.

Monitoring Sites

Table 3 – Monitoring Sites Locations

#	Site Name	Description	Latitude	Longitude

Schedule for Data Collection and Reporting

Volunteers will collect data once quarterly and will submit results online within a reasonable timeframe. Volunteers who do not have Internet access may mail their results to their staff coordinators or to the Sierra Club Ohio Chapter office at 131 N. High St., suite 605, Columbus, OH 43215.

Table 4: Schedule Chart

	Month	Week	Time
Spring			
Summer			
Fall			
Winter			

Quality Control Measures

Calibration and Care of Equipment

- Manufacturer’s recommendations will be followed for all equipment.
- ExStik meters will be calibrated according to manufacturer’s instructions.
- ExStik meters will be rinsed prior to sampling and between sampling sites.
- Coordinators replace test strip bottles when bottles reach expiration dates.

External QA/QC measures:

Water Sentinels are required to attend in-field trainings with a staff coordinator or Water Sentinel and will be asked to perform sample collection and monitoring under supervision. Once Water Sentinels are able to monitor successfully without guidance, they will be allowed to monitor their sites with a monitoring buddy.

Grab Sample Split-Testing

Water Sentinels will receive training on how to collect grab samples in lab-certified containers and how to complete Chain-of-Custody forms. Further instructions are provided to Water Sentinels through the “Ohio Water Sentinel Grab Sample Protocol” document. Depending on funding, the campaign may pay for and coordinate grab sample events. As an alternative, staff coordinators may ask the Ohio EPA, Ohio DNR, sewer districts, or health departments to conduct sampling and cover the costs of sampling.

Documentation of Procedures

Water Sentinels will pay close attention when recording their results on their paper forms and when submitting data online. They will also keep copies of their paper forms in case staff coordinators have questions or need clarification on an entry.

Water Sentinel Training

Volunteers who attend Water Sentinel Trainings will be taught sampling protocols, data collection, and data entry. Volunteers graduate as Water Sentinels once they have received both classroom and in-the-field trainings.

Safety procedures presented during training include the following:

- Sample with a buddy
- Sample during daylight hours
- Do not sample during a rain event
- Do not trespass onto private property
- Be cautious of slippery surfaces, high currents, or unsafe weather conditions
- Wear gloves
- Wear closed-toe shoes, waders, or boots
- Wash hands with soap and water after all sample handling

Date Presentation and Interpretation

The Clean Water Campaign will analyze results and post data, analysis, and maps to the online Water Sentinel Resource Portal. Water Sentinels may request for specific-watershed analysis to be emailed or mailed to them; this type of service may take up to two months depending on the staff coordinator's workload.

Data presentation will include site locations and data results that are visually shown using mapping software and GIS platforms. Data may also be presented through visual analysis methods, such as charts and graphs in powerpoint presentations.

Data interpretation will include comparison of sites, seasons, chemical and visual parameters, and additional considerations that Water Sentinels request; not all requests may be fulfilled depending on the current resources and abilities of the campaign.

Data will also be submitted to watershed groups, on request, to assist with their watershed management planning on request. Additionally, sites monitored on landowner property will be submitted to landowners, on request. Site data and analysis that local and state agencies, colleges and universities, and/or other non-profits find useful or interesting will be sent to them via email or mail, on request.

Trespassing

The Sierra Club Ohio Chapter Water Sentinel Program has not been guilty of a trespassing violation. All samples will be collected via public access: from a bridge or site in a public park/common property. Sites located on landowner property will not be sampled unless the landowner has signed a Landowner Authorization form beforehand.

Sampling Procedure

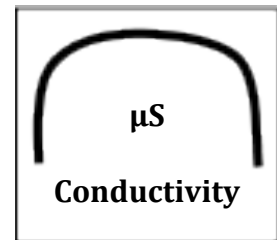
Prepare your Sampling Container

1. Thoroughly wash and rinse your sampling container or bucket.
2. **Option A:** Enter *downstream* of monitoring site and walk towards the middle of the stream. Stand against current with water flowing toward you.
Option B: Stand on bridge and attach rope securely to bucket.
3. Rinse sample container with stream water and pour rinse-water behind you.
4. Repeat 3x.
5. Fill container.

Chemical Monitoring

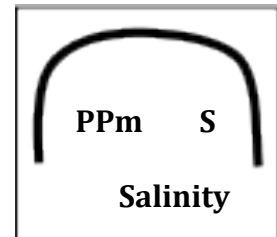
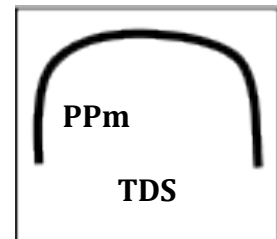
Calibrate meter

6. Pour 20mL of calibration solution into plastic vial.
7. Turn on meter and remove cap.
8. Switch meter to Conductivity mode (μS).
9. Place meter electrodes in solution.
10. Press and hold CAL for 7 seconds.
11. Device will flash SA and END.
12. Unhold CAL.
13. Rinse meter electrodes with distilled water.



Measure Conductivity, Total Dissolved Solids, Salinity, and Water Temperature

14. Turn on meter with ON/OFF button.
15. Switch meter to Conductivity mode (μS).
16. Place meter electrodes in water sample.
17. Allow reading on screen to stabilize.
18. Record reading.
19. Switch mode by holding CAL.
20. Record reading.
21. Once complete, rinse electrodes with distilled water.



Measure Nitrate/nitrite, pH, total alkalinity, total hardness, total chlorine, and free chlorine will be measured with test strips.

22. Follow specific instructions on bottle.

Data Reporting Protocol

Paper Data Forms

- Record surface water measurements on the surface water reporting form.
- Include assigned Index Numbers. If sampling a new site for the first time, leave blank.
- Existing Sites: use established site names
- New Sites: use the following format: “stream name” at “nearest road”
- Keep copies of your completed forms.

Finding latitude and longitude points

- **Option A:** Use a GPS and check your points with www.google.com
- **Option B:** Write down the nearest address of your site.
- Visit <http://itouchmap.com/latlong.html>
- **Option C:** Write down the nearest address of your site.
- Visit <http://nepassisttool.epa.gov/nepassist/nepamap.aspx>

Use Decimal Format

Latitude: **41.390423**

Longitude: **-80.23235**

Finding 48 Hr. Rainfall

- Add precipitation for the day you monitored, plus two days before.
- **Option A:** Visit <http://www.wunderground.com/history>
- **Option B:** Find precipitation records with weather.gov, newspapers, or rain gages.

Online Data Entry

- Copy results from your paper form to the online form
- Check your work before choosing Submit.
- Email your coordinator if you think you made a mistake while entering data.

Cleaning and Caring for your Sampling Containers and Kits

Sampling Containers

- Wash before and after use with soap and water.
- Store inside and away from direct sunlight and heat exposure.

ExStik meters

- After calibration and sampling use, rinse electrodes with distilled water.
- Store inside and away from direct sunlight and heat exposure.

Test Strips

- Store inside and away from direct sunlight and heat exposure.