



The River Mile

Water Quality Monitoring Methods and Protocols

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General Protocols

Field Data Forms

A field data form is used to document all information collected during monitoring activities. Field data forms may be digital (Survey123) or paper. Survey123 forms are available on the Survey123 app or at TheRiverMile.org website. Data recorded on paper forms must be transferred into a digital form, either in the appropriate Survey123 form or excel spreadsheet (available on TheRiverMile.org).

Wading Gear and Personal Flotation Devices

Always wear an approved personal flotation device (PFD) when wading in stream and rivers. The PFD must fit properly, be rated for the person's weight, be in good condition, and be stored dry. A PFD must also be worn when waders or hip boots are worn.

Wear hip boots or chest waders. Boots and waders provide protection from cold, pollutants, and underwater objects. Be aware of the possibility of slipping and going underwater when wearing boots or waders. Avoid tight-fitting hip boots or chest waders; these can be difficult to remove in emergency situations.

Wading Protocol

Check with the local management agency for any important notifications about lake/river conditions, including lake levels, slippery conditions, ice, and water velocity BEFORE VISITING. Once at the site, examine the section of stream or river in which you plan to wade before entering. Do not attempt to enter a stream for which values of depth multiplied by velocity exceed 10 ft²/s. [Depth (in ft) x velocity (ft/s) = 10 ft²/s (or less)]

Watch for debris floating downstream such as logs, aquatic vegetation, or "rafts" of animals seeking higher ground. Also, beware of sand channels that can shift underfoot and become quicksand. Always be aware of the stream stage, especially in situations where the stream level can rise rapidly.

Sample Bottle Cleanup

Before each field trip, clean the sample bottles and/or depth samplers. Use a non-phosphate detergent and tap water. Soak the sample container in detergent solution for 30 minutes. Wearing powderless disposable gloves, scrub the inside and outside with a soft brush. Rinse well with tap water. Rinse a final time with deionized water.

After Rinse all sample bottles with distilled water 3-5 times. This may be done in the classroom. Allow bottles to dry in open air before re-sealing with lids. Store sample bottles closed in a dry location.

Water Quality Sampling Methods

For single point surface sampling, a Nalgene sample bottle may be used to collect samples. For composite samples, such as multiple depth or width samples, an isokinetic sampler is used to collect water samples. Sample may then be transferred into a washed sample bottle. All sample bottles should be labeled in a distinguishing manner, or labeled with date, time, and location if being transported back to the classroom for analysis.

Steps for Surface Water Collection

1. Identify the monitoring point using a GPS and record the latitude and longitude on the data form
2. Take a photo of the monitoring point (if possible)
3. Take a sample bottle and reach out into the water at arm's length. Completely submerge the bottle and fill the bottle with water. Empty the bottle on the shore. Repeat 3 times.
4. Fill the sample bottle again by completely submerging the bottle under the water. Be sure the water sample is free of sediment or other debris.
5. Repeat steps 1-4 for each sample bottle (one for each test)

Turbidity Measuring Methods

Turbidity Tube

1. Collect a large water sample using either surface or depth sampling methods
2. Ensure the tubing clamp is closed and the stoppered end of the turbidity tube is firmly on the ground. Keep the stoppered end against the ground to prevent leaks.
3. Fill the tube with water.
4. While looking down the open end of the tube, release the tubing clamp and slowly release the water until you can see the white sections of the disk at the bottom of the tube. Immediately close the tubing clamp.
5. Record the level of water remaining in the tube, indicated by the centimeter measurements or NTU on the side.

6. Repeat the procedure two more times with different people taking the reading each time.
7. Average the measurements and input the average as the measurement on the data form.

Secchi Disk

Reading for Secchi depth must be taken between 9:00 AM and 3:00 PM.

1. Lower the Secchi disk on the shady side of a dock or boat while observing its descent.
2. Stop lowering the Secchi disk when the white sections are no longer visible.
3. Pull up the disk slightly until it is just visible. The white sections may be seen only as a greenish or brownish “glow”.
4. Lower the disk again the white sections just disappear.
5. Note the point on the rope that meets the surface of the water and measure the length of wet rope to the nearest hundredth of a meter (0.01m).
6. Repeat the procedure once more.
7. Average the two measurements and record the average as the measurement on the data form.

Other Methods

Air Temperature

Measure the air temperature at the same time the water temperature is being measured. Report any air temperature measurements to the nearest 0.5°C.

1. Place thermometer about 5ft (1.5m) above the ground in a shaded area protected from strong winds but open to air circulation. Avoid areas that may radiate heat, such as metal walls, rock exposures, or near vehicles.
2. Allow 3-5 minutes for the thermometer to equilibrate then record the time and temperature.

YSI 556 Multi-probe Meter Procedures

The YSI 556 Meter requires 3 people to operate.

Probe Sample Collector: Responsible for lowering the probe into the water.

Meter Operator: Responsible for handling the digital meter display and relaying the reading to the Hydrologic Recorder.

Hydrologic Recorder: Responsible for recording data from the meter and identifying the latitude and longitude coordinates of the monitoring point. The Hydrologic Recorder is also responsible for photographing the site and recording the air temperature and weather conditions.

Directions for Use

1. Install the probe cable onto the meter by plugging the connector to the meter, matching prongs with holes.
2. Attach the probe to the pole and allow to hang far enough for the probe to swing freely.
3. Remove the probe's clear plastic cover. Do not spill the liquid out of the plastic cover.
4. Attach the metal probe cover to the probe and screw on hand-tight. Do not touch any part of the probe sensors. Do not over-tighten the metal cover.
5. Take the meter, attached to the pole, and carefully reach over the water at arm's length.
6. Lower the pole and probe until the probe cable is at least 6" below the surface but not more than 12" deep. The cable is marked with these lengths.
7. Be sure the probe does not touch the bottom or any rocks. Be sure the water around the probe is clear of debris and kicked-up sediment.
8. Gently but rapidly move the probe through the water in a side-to-side motion to provide a fresh water sample to the sensors. Do not stir up debris or sediment.
9. Press the On/Off key on the meter or select Run from the main menu to display the run screen.
10. Wait five minutes for the readings on the display to stabilize.
11. Read the results to the data recorder
12. Bring the probe back to shore. Turn off the meter.
13. Remove the metal probe cover and replace the plastic cover over the probe sensors.
14. Disconnect the probe and cable from the pole.
15. Disconnect the probe cable from the meter.
16. Dry off all meter pieces and place back into the case.

1. Make sure all meter operators are ready to take readings and that the air temperature thermometer is set up and equalized.
2. Hydrologic Recorder: Take photos of the monitoring point and record the weather data.
Meter Operator: Unpackage the meter, attach the probe cable to the meter, and turn the meter on to make sure it is working. Turn the meter off.
Probe Sample Collector: Unscrew the plastic cover from the probe and attach the metal probe guard to the probe. Attach the probe cable to the extension pole.
3. Meter Operator: Hold the meter in your hand using the strap to secure the meter to your hand. Turn the meter on once the probe is submerged
Probe Sample Collector: Using the pole, extend the probe out over the water and submerge 6-12" (15-30cm) below the surface of the water.
4. Meter Operator: Wait five minutes for probe reading to equalize. Report each parameter reading to the Hydrologic Recorder
Hydrologic Recorder: Take air temperature reading and record the probe readings for each parameter. Make sure to indicate that a digital meter is being used for the readings.
5. Once readings have been taken,
Probe Sample Collector: Remove the probe from the water. Detach the probe cable from the extension pole. Remove the metal probe guard from the probe and replace the plastic cover over the probe.
Meter Operator: Turn the meter off. Detach the probe cable from the meter. Dry off the probe and probe cable and place the meter, probe cable, and probe back into the case.
Hydrologic Recorder: Save the data and prepare for the next reading.
6. Repeat steps 1-6 for each monitoring point.

Meter Supervision

Meter usage must be under the supervision of a responsible adult. The adult does not need to operate the meter, but must ensure that at no time is it misused or handled inappropriately. Remember the school and the requesting teacher and responsible for the equipment and replacement costs if the meter, probe, or cable is damaged.

Handling

The supervising adult needs to ensure that at no time is the meter handled roughly. The meter is a computer, and should not be dropped, submerged, shaken, or left exposed to the elements.

Students must be trained on how to use the YSI 556 meter. Instructors should discuss with students how to handle any equipment used for field study. Ensure that all students who will be using the meter understand the responsibility they have for ensuring the meter and associated equipment are handled in a safe and professional manner. A training agreement for safe handling form must be filled out for each student using or maintaining the meter.

Cleaning

Care must be taken to keep the meter clean and free of dirt and debris at all times. Be sure to clean off all surfaces prior to placing back in the case. This may need to be done after each use. Under no circumstances should you return the meter, probe, or cord to the case without cleaning.

Do not use any solvents or cleaning products on the equipment. Use a soft cloth and distilled water to clean the probe, cable, and meter. Use only distilled water or 7.0 pH calibration fluid inside the plastic probe cover. A small amount of liquid (2-3 Tablespoons) is necessary to keep the probe moist. Replace liquid inside the probe periodically if it is contaminated or cloudy.

Before returning the equipment, please make sure the meter, probe, cable, case, supplies, and other items in the case are clean and ready for use by the next school. It is your responsibility to clean the equipment and ensure that it is ready for use.

Packing

Be sure to carefully pack all items in the case. Each piece of the equipment has its own compartment within the case. Make sure the cable is rolled in such a manner that it fits within the empty space between the foam packaging and the case.



Student Agreement for Safe Handling YSI 556 Multi-probe Water Meter

I, _____, by signing below acknowledge that I:

- 1) Have been trained to handle the YSI 556 Multi-probe Water Meter in a safe and responsible manner, and
- 2) Agree to do my best to ensure the safety, proper handling, and maintenance of all YSI equipment.

Student Signature

Date

Teacher Signature

Date