Lower Fox River Basin
Volunteer Monitoring Program

Volunteer Manual

Volunteer Responsibilities:

- Attend the volunteer training
- Read and follow DNR sampling protocol guidelines
- Collect transparency, stream flow, and water samples for total phosphorus (TP), total suspended solids (TSS), dissolved reactive phosphorus (DRP), and total nitrogen (TN) once per month (May to October)
- Package and ship water samples to the State Lab of Hygiene
    - Note: all shipping costs will be covered by the project sponsors
- After the samples are collected and shipped notify the DNR project coordinator and give them your streamflow and transparency data (if not written on the lab slip)
- Return supplies at the end of October and no later than the first week in November to the project coordinator at the DNR. Also return streamflow worksheets to coordinator.

Important Reminders:

- If possible, samples should be collected on the same date each month (or as close as possible), preferably earlier in the month in case alternative sampling arrangements need to be made, samples can be collected a minimum of 15 days apart
- Keep in mind the lab is not open on Saturday and Sunday and there is a short hold time on the DRP sample (48 hours), therefore it is best when sampling is done early in the week (Monday to Wednesday)
- Package pickups for overnight delivery at various USPS locations differ, please check the latest pickup time to plan your sampling event
- If samples are sent the day after collection, keep the samples in the refrigerator overnight
- Place yellow acid label on lab slip. Be sure the sticker contains the lot number and expiration date from the vial and attach to the front of the lab slip
- Check that all required fields are filled in on the lab slip before packing into mailer along with samples. These fields include: Name, email address, phone number, and date and time of sample collection. If these fields are not filled in, the lab cannot process the samples and upload the data into SWIMS
- Be sure the lab slip is included in the cooler with the samples. If the lab slip is left out, the lab cannot process the samples
- If collecting duplicate samples, place all samples and lab slips in the same cooler. If volunteer is shipping multiple coolers, make sure the lab slip is in the cooler with the corresponding samples
- Before shipping samples, check that the front index card shows the lab address (State Lab of Hygiene, 2601 Agriculture Dr., Madison, WI 53718) and the back of the card is filled in with volunteer address. At the end of the sampling season (October), you can remove the index card so that the cooler is not shipped back
- Contact the DNR Project Coordinator after samples are collected and shipped

- Coolers should ship back to the volunteer within a week. If cooler does not arrive within a week, please let the project coordinator know so that a new one can be shipped

Total Phosphorus, Total Nitrogen, Dissolved Reactive Phosphorus, and Total Suspended Solids Collection

Equipment

General Water Sampling Supplies

- Sharpie
- Pen or pencil
- Extension pole (PVC pipe) with rubber band to use to fasten bottle
- Nitrile or latex gloves
- Safety glasses
- Lab slips (also called "Test Request – Inorganic Surface Water & Microbiology" form) (one lab slip for each sampling site per visit)
- Waders or shoes that can get wet

Total Phosphorus and Total Nitrogen-specific Supplies

- 1.0 mL vial of sulfuric acid (H_2SO_4)
- 250 mL polyethylene bottle(s) (one per site)

Dissolved Reactive Phosphorus-specific Supplies

- 60 mL polyethylene bottle(s) (one per site)
- 50 ml syringe and capsule filter

Total Suspended Solids-specific Equipment

- 1 quart polyethylene bottle(s) (one per site)

Total Phosphorus and Total Nitrogen Sample Collection

The phosphorus sample and nitrogen sample are taken from the same bottle. A video demonstration of TP sampling can be found here: https://www.youtube.com/watch?v=1eBW3iyoNrU

1. On a 250 ml bottle circle the box next to "nutrients," check the H_2SO_4 box, and write the field number and sample location on the bottle (these are listed on your lab slip as "Field Number (Bottle Label ID)" and "Point/Outfall (or SWIMS Fieldwork Seq No)" (Figure 1). It is recommended to write on the bottles before collecting the water samples to avoid smearing.

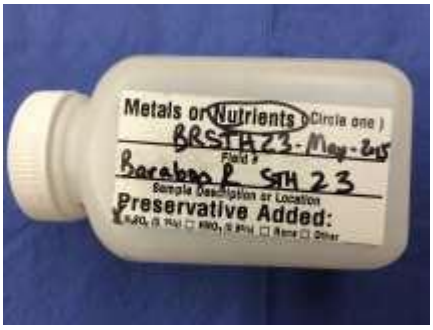


Figure 1. 250 mL polyethylene sample bottle

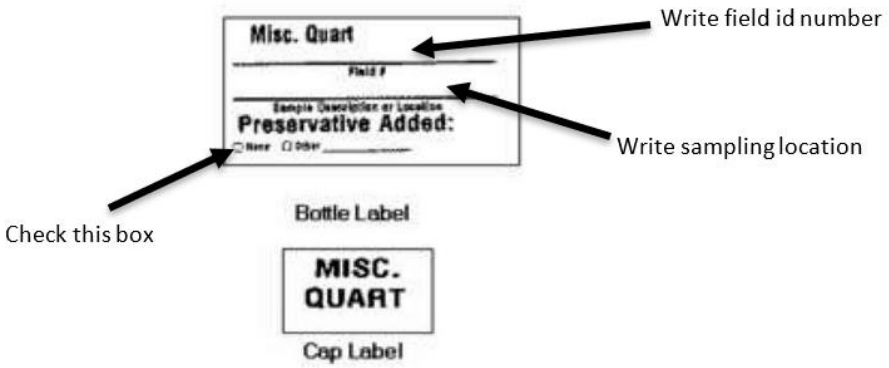
2. Locate a sampling location that is at least 10 to 20 feet upstream from a bridge crossing, in the middle of the stream channel, and is at least knee deep. **Walk upstream** to the sampling location. This ensures the sample is not contaminated by sediment that has been dislodged from the substrate.
3. Facing upstream, **rinse the 250 mL polyethylene bottle three times with water 3 to 6 inches below the water's surface. The fourth time, fill the bottle to its shoulder and cap.** Whenever possible, and especially when stream flow is swift or water levels are high, fasten the bottle to an extension pole and use that to collect stream water that is well mixed.
4. Avoid touching or allowing water at the surface / scum on the surface to touch the rim of the bottle or inside of the cap. One way to prevent this is to uncap and recap the bottle underwater. If you uncap the bottle above the water's surface, always place the cap top side down to avoid contamination.

Figure 2. Add a vial of sulfuric acid to sample. Be sure to place cap topside down to avoid contamination.

5. Wearing gloves and safety glasses, preserve the sample by **adding a vial of sulfuric acid to the 250 mL bottle** (Figure 2). (Back at home, triple rinse the empty vial with water and dispose in the garbage.) **Attach acid sticker to corresponding lab slip.** Be sure the sticker contains the lot number and expiration date.
6. **Securely cap the bottle and mix by inverting several times.**
7. Immediately place the sample on ice.

Total Suspended Solids Sample Collection

1. Write the appropriate field number and sample location on the front of the 1 quart bottle. Check the box indicating that no preservative was added.



2. Repeat steps 1 to 4 from "Total Phosphorus and Total Nitrogen Sample Collection" to collect a sample in a 1-quart polyethylene collection/sample bottle.
3. Securely cap the bottle
4. Immediately place the sample on ice.

Dissolved Reactive Phosphorus Sample Collection

1. On a 60 ml bottle write the field number and sample location on the bottle (these are listed on your lab slip as "Field Number (Sample Bottle ID)" and "Point/Outfall (or SWIMS Fieldwork Seq No)" Shown right.

2. Remove plunger from the 50 ml syringe prior to attaching the filter (shown below).

3. Attach the filter by pushing it onto the syringe tip. Note that it will only fit one correct way (shown on the right). Syringes will be reused throughout the sampling season, therefore the syringes will need to be triple rinsed each time. Triple rinse the syringe by pouring a little bit of water from the TSS bottle into the syringe and then discard.

4. Pour sample from the 500 ml TSS bottle into the syringe and fill to the top of the barrel (shown left).

5. Re-insert the plunger, slowly push the plunger down and discard about 5 ml of the solution. Triple rinse 60 mL bottle by squirting about 5 mL of water for each rinse from the syringe and filter. Cap and shake after each rinse.

6. To fill bottle, place the filter over the 60 ml bottle opening and push the plunger down (shown below). Fill bottle to its shoulder and cap. It may seem difficult, but most samples will only require about 30-45 seconds to filter 50 ml. Some sampling locations may require more than one filter per sampling event. CAUTION: Filter may rupture if too much pressure is applied. Additional water from TSS bottle may be needed to fill 60 mL bottle. Discard the filter after use.

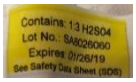
7. If reusing the syringe, either triple rinse with river water or rinse with tap water and let completely dry between uses.
8. Securely cap the bottle and immediately place on ice.

Documentation – Lab Slips

1. **Complete** the lab slip that has been provided to you for the stream site where you are making collections. Lab slips will be provided to you and should ***never*** be photocopied. **Complete a separate lab slip for each sampling site and event.** Most of the required fields on the lab slip are automatically filled out for you, but volunteers still need to fill the following fields:
    a. Time and Date of Sample Collection, including:
        i. Date (mm/dd/yyyy)
        ii. Time (24-hr clock)
    b. Who Collected the Sample, including:
        i. Your name
        ii. Your phone number
        iii. Your email
    c. **IMPORTANT!** Peel the label from the sulfuric acid bottle and place it on the front of the corresponding lab slip (on the spot indicated below). Make sure the lot number and expiration date transfer.
        i. There may be a separate sticker provided that states the lot number and expiration date, place that on the lab slip instead of using the sticker on the vial

2. Place lab slip in the provided gallon Ziploc bag and place in shipping box.
3. Transport the samples on ice and prepare them to be shipped to the State Lab of Hygiene (See Sample Packaging and Shipping).

Place sticker here.



State of Wisconsin
Department of Natural Resources
and Laboratory of Hygiene

Test Request - Inorganic Surface Water & Microbiology

** DO NOT PHOTOCOPY **

Form 4800-024 (R 8/15)

Billing and Reporting

Account Number	Field Number (Bottle Label ID)	Report to Address (Non-DNR only)		
WQ003	**WBWR-AUG**			
DNR User ID	Report to Name	City	State	Zip
VORRIH	**VORRIE, HANNAH**			
Date Results Needed (mm/dd/yyyy)		Report to Email (Non-DNR only)		

Date and Time of Sample Collection

Date (mm/dd/yyyy)	Time (24-hr clock)	End Date (mm/dd/yyyy)	End Time

Fill in "Date and Time of Sample Collection" and "Who collected the sample" boxes.

Write the Field Number (Bottle ID) and Poing/Outfall (SWIMS Fieldwork Seq # on the sample bottle

Sample Type

◯ NP Storm ◯ MW Moni ◯ SO Soil ◯ SL Sludge ◯ IF Influent (Untreated Wastewater) ◯ SE Sediment

Who collected the sample

Collected By Name	Telephone	Email

Where the sample was collected

Station ID (STORET #)	Sample Address or Location Description	
403003	**WOLF RIVER WEST BRANCH - 1ST TN RD FROM MOUTH**	
County	Waterbody ID (WBIC)	Point / Outfall (or SWIMS Fieldwork Seq No)
40-Menominee	**341900**	**246394940**

Sample Details

Sample Description / Device Description

GRAB

Enforcement? ◯ Yes ◯ No	If Field QC Sample (select one)	Depth of Sample: _____ ◯ft ◯m ◯in ◯cm
If yes, include chain of custody form.	◯ Duplicate ◯ Blank ◯ _____	
Is Sample Disinfected? ◯ Yes ◯ No	Grant or Project Number	Or Top and Bottom of Sample Interval:
If yes, how? _____	**East_TWA_1_2020**	_____ - _____ ◯ft ◯m ◯in ◯cm

Analyses Requested

If field filtered, indicate by checking the box on this sheet and noting on the lid of the sample bottle.

Plastic Quart Bottle (No chemical preservation)

☐ Sample field filtered (Check box if yes)

- ☐ Alkalinity, pH, Conductivity
- ☐ BODs Dissolved
- ☐ BODs Total (900 ml needed)
- ☐ CBODs Total (carbonaceous)
- ☐ Chloride
- ☐ Chlorophyll A (if Field Filtered, give ml__ __ __ __ __filtered)
- ☐ Color
- ☐ Fluoride
- ☐ MBAs Screening
- ☐ pH only (non compliance)
- ☐ Sulfate
- ☐ Turbidity
- ☐ _____

Solids

- ☐ Suspended Sediment
- ☐ Total Dissolved Solids
- ☐ Total Solids
- ☐ % Sand, Silt, Clay
- ☒ Total Suspended Solids (500 ml needed)
- ☐ Total Vol. Susp. Solids (inludes Total Susp. Solids)
- ☐ Total Volatile Solids (includes total solids)

60 ml Bottle (No chemical preservation)

☐ Sample field filtered (Check box if yes)

- ☒ Orthophosphate
- ☐ Silica
- ☐ NO_2 + NO_3 as Nitrogen (drinking water)
- ☐ Nitrite (NO_2) as Nitrogen

250 ml Glass Amber (Acidify w/ Sulfuric Acid)

☐ TOC ☐ DOC

250 ml Metals Bottle (Acidify w/ Nitric Acid)

☐ Sample field filtered (Check box if yes)

☐ Low Level Metals. Note: Clean sampling with special bottles

☐ TCLP (Toxicity Characteristic Leaching Procedure - use mason jar)

Total recoverable metals will be run unless otherwise instructed.

- ☐ Aluminum
- ☐ Antimony
- ☐ Arsenic
- ☐ Barium
- ☐ Beryllium
- ☐ Boron
- ☐ Cadmium
- ☐ Calcium
- ☐ Chromium, Total
- ☐ Cobalt
- ☐ Copper
- ☐ Hardness-as $CaCO_3$
- ☐ Iron
- ☐ Lead
- ☐ Magnesium
- ☐ Manganese
- ☐ Mercury
- ☐ Molybdenum
- ☐ Nickel
- ☐ Potassium
- ☐ Selenium
- ☐ Silver
- ☐ Sodium
- ☐ Strontium
- ☐ Thallium
- ☐ Titanium
- ☐ Vanadium
- ☐ Zinc
- ☐ _____
- ☐ _____

250 ml Nutrients Bottle (Acidify w/ Sulfuric Acid)

☐ Sample field filtered (Check box if yes)

- ☒ Tot.-Phosphorus
- ☐ Ammonia-N
- ☐ Tot. Dis. Phosphorus (filter, then acid perserve in 60 ml bottle)
- ☐ NO_2 + NO_3 as Nitrogen
- ☐ COD
- ☐ Total Kjeldahl-N
- ☒ Total Nitrogen

250 ml Round Bacteria Bottle

- ☐ E. coli by MPN, non-potable
- ☐ Enterococci by MPN, non-potable

For lab use:

Sample Temp _____ °C

☐ Iced

Please enclose this form in the mailer along with the sample and send to the State Lab of Hygiene.

Additional parameters or instructions to laboratory:

Field Parameters - Optional **Only fill out if directed by your project coordinator.**

Temperature - Sample (°C)		__ __ . __		Gage Height (ft)	__ __ __ __ . __
Temperature - Ambient Air (°C)		__ __ . __		Flow (cfs)	__ __ __ __ __ __ . __
DO (mg/l)		__ __ . __		Flow (MGD)	__ __ __ __ __ __
% Saturation		__ __ __ . __		Depth to Groundwater	____ ft or m __ __ __ __ __ . __ __
pH (su)		__ __ . __		Turbidity (NTU)	__ __ __ . __ __
Secchi Depth (feet or meters)	____ ft or m	__ __ __ . __		Transparency Tube (cm)	__ __ __ __ . __ __
Secchi Depth Hit Bottom?		☐ Yes ☐ No		Nitrates (mg/l)	__ __ __ __ __ __
Cloud Cover (%)		__ __ __			
Cond (µS/CM@25°)		__ __ __ __ __			

Sample Packaging and Shipping

Background

During training volunteers will be issued a cooler(s) and all the sampling equipment and documentation needed for each sampling period. Prior to monthly monitoring, you should contact the project coordinator to obtain a prepaid USPS shipping label that will enable you to send your samples to the State Lab of Hygiene (WSLH) as soon as possible after collection (see instructions below). Each month, after submission to the WSLH, these coolers will be shipped back to you from the WSLH. Please contact the project coordinator if you have not received your cooler by the date you are sampling.

Considerations/ Precautions

Samples should be shipped the day of sample collection. DRP samples must be analyzed within 2 days of collection. Do not mail samples on Fridays or Saturdays because lab staff is not present on weekends. If the ice melts completely, sample data will be flagged and unusable. If the weather is extremely warm, if you collect a sample from more than one site, and/or if you collect QA/QC samples in addition to your regular sample you should add extra ice or use multiple shipping coolers to submit your samples to the lab. Refrigerate the samples or keep them on ice until they are shipped.

Packing and Shipping Instructions

A video demonstration of packing and shipping can be found here:
https://www.youtube.com/watch?v=SrKVifeTHhM

1. Place all three sample bottles in one gallon Ziploc bag. If taking samples from multiple locations keep the samples in separate Ziploc bags. Place samples in cooler.
2. Fill one gallon size Ziploc bags with ice cubes (generally you want at least equal parts of ice and water sample in the cooler, more if it's very warm outside). Do not use ice packs
3. Insert one Ziploc bag of ice on top of the samples.
4. Double check lab slip(s) is completed, and then place lab slip(s) in a gallon Ziploc bag and place on top of the cooler but within the shipping box, being cautious not to tape the Ziploc if the box isn't fully closed when you add the packaging tape.
5. Close the box lid and wrap with reinforced shipping tape completely around the box.
6. Remove the mailing label card from the plastic envelope, and flip over so the Wisconsin State Laboratory of Hygiene address is exposed and reinsert into envelope.
7. Ship the samples to the WSLOH using USPS. Contact project coordinator to obtain the prepaid shipping label if you have not received one.

Transparency Monitoring

Background

The transparency tube is a tool used for measuring the water clarity in a stream. The transparency tube is 120 cm long x 4 cm wide, made of clear plastic, and has a valve at the bottom (some transparency tubes may be 60 cm long x 4 cm wide). A rubber stopper inserted at one end of the tube is painted black and white. When you look down into the tube a distinct "Secchi" symbol is visible at the bottom. To measure water clarity, the tube is filled with water that has been collected from a stream or river. While looking down into the tube, water is released through the valve until the black and white Secchi symbol just becomes visible. The depth of the water when the symbol becomes visible is recorded in centimeters (marked on the side of the tube). If the Secchi symbol is visible when the tube is full, the transparency reading is ">120 centimeters." A higher transparency reading in centimeters reflects higher water clarity.

Transparency can be affected by several factors. Both *dissolved* and *suspended* materials can influence water transparency. The amount of suspended solids in the water is the most important factor: the more suspended materials, the lower the water transparency. In most streams and rivers, soil particles (for example, silts and clays) contribute to lower transparency readings. Algae may also make up a portion of the suspended solids in some slow moving streams and larger rivers. Dissolved material may also affect transparency. A good example of this is the tea color of bog-influenced lakes and streams common in the northern part of the state. This "tea color" is caused by dissolved organic material.

In general, a low transparency reading most often reflects that a large amount of soil particles are being carried by the stream. These soil particles may be deposited as sediment on stream bottoms. The suspended sediment can also reduce light penetration needed for the growth of aquatic plants. When sediment is deposited on stream bottoms it can reduce habitat space needed for diverse macroinvertebrate populations or cover fish eggs, keeping them from getting the oxygen needed to survive. Sediments may also have phosphorus attached to it. High levels of phosphorus can trigger excess algae and weed growth.

Transparency Monitoring Methods

A video demonstration of transparency monitoring can be found here: https://www.youtube.com/watch?v=f7yGbsMli3s (Note: we would like the transparency measurement, the reading in cm on the side of the tube. Also you only need to take this measurement once per month)

Sample Collection

Collect the sample away from the stream bank in the main flow (well-mixed) area. Be careful not to disturb the stream bottom when you collect the water sample. If you get sediment from bottom disturbances, dump out the sample, move upstream (away from the disturbed area) and try again. For

the observer, consistency is the key. If you initially wear your eyeglasses when you take the reading, then always wear your eyeglasses to take this measurement. However, you should never wear sunglasses when you take this reading.

In Stream

1. Walk into the water at an access point downstream from the sampling location. Be careful not to stir up the bottom sediment upstream of your sampling location.
2. Face upstream (into the current) in the middle of the stream or in a well-mixed area off-shore.
3. Collect your water sample by plunging your bucket or transparency tube 8-12 inches beneath the surface or halfway down from the surface. If using a bucket, scoop away from your body and into the current.
4. Return to shore with the sample.

From Shore

To collect a sample while standing on the shore, use a bucket or sample bottle attached to a pole so that you can reach off-shore. Scoop from below the surface in the upstream direction. Be careful not to stir up the sediment upstream of your sample.

Figure 1: Transparency tube shaded by observer

Reading the Transparency Tube

1. Remove large objects from the water sample. If necessary, filter through a nylon stocking.
2. If the sample has settled, use a stirring stick to stir the sample, or pour the sample into a clean bucket and back into the transparency tube to suspend all materials.
3. Stand out of direct sunlight. If you cannot get to a shady place, use your body to cast a shadow on the tube (Figure 1).
4. If you are wearing sunglasses, remove them. Then look for the target (black and white) disc on the bottom of tube. If disc is visible, record the length of the tube (e.g., 120 cm) on the data sheet.
5. If target disc is not visible, have your partner let water out a little at a time using the valve at the bottom until disc is just visible (Figure 2). Have them stop letting water out immediately when you can just see the contrast between black and white on the disc at the bottom of the tube.
6. Read the level of water in the tube in cm using the measuring tape on the side of the tube.
7. Record the measurement on the backside of your monitoring data sheet next to Transparency Tube in cm.
8. Dump contents of tube on ground.

Figure 2: Slowly releasing water until the disc is just

Streamflow Monitoring

Background

Streamflow, or *discharge*, is the volume of water moving past a cross-section of a stream over a set period of time. It is usually measured in cubic feet per second (cfs). Streamflow is affected by the amount of water within a *watershed*, increasing with rainstorms or snowmelt, and decreasing during dry periods. Flow is also important because it defines the shape, size and course of the stream. It is integral not only to water quality, but also to habitat. Food sources, spawning areas and migration paths of fish and other wildlife are all affected and defined by stream flow and velocity. Velocity and flow together determine the kinds of organisms that can live in the stream (some need fast-flowing areas; others need quiet, low-velocity pools). Different kinds of vegetation require different flows and velocities, too.

Streamflow is affected by both forces of nature and by humans. In undeveloped watersheds, soil type, vegetation, and slope all play a role in how fast and how much water reaches a stream. In watersheds with high human impacts, water flow might be depleted by withdrawals for irrigation, domestic or industrial purposes. Dams used for electric power generation may affect flow, particularly during periods of peak need when streamflow is held back and later released in a surge. Drastically altering landscapes in a watershed, such as with development, can also change *flow regimes*, causing faster runoff with storm events and higher peak flows due to increased areas of *impervious surface.* These altered flows can negatively affect an entire ecosystem by upsetting habitats and organisms dependent on natural flow rates.

Tracking streamflow measurements overtime can give us baseline information about the stream's natural flow rate.

Definition of Terms

- Discharge: Another term for streamflow, or the volume of water moving past a designated point over a set period of time.
- Flow Regime: The pattern of stream flow over time, including increases with stormwater runoff inputs and decreases to a base-flow level during dry periods.
- Impervious Surface: A surface that does not allow water (e.g., rain) to pass through (infiltrate).
- Rating Curve: A graphical representation of the relationship between the stage height and the discharge (flow).
- Run: An area of a stream that has swift water flow and is slightly deeper than a riffle (a run will be about knee/thigh deep).
- Stage Height: Height of the water in a stream above a baseline.
- Watershed: An area of land that drains to a main water body.

Streamflow Monitoring Methods

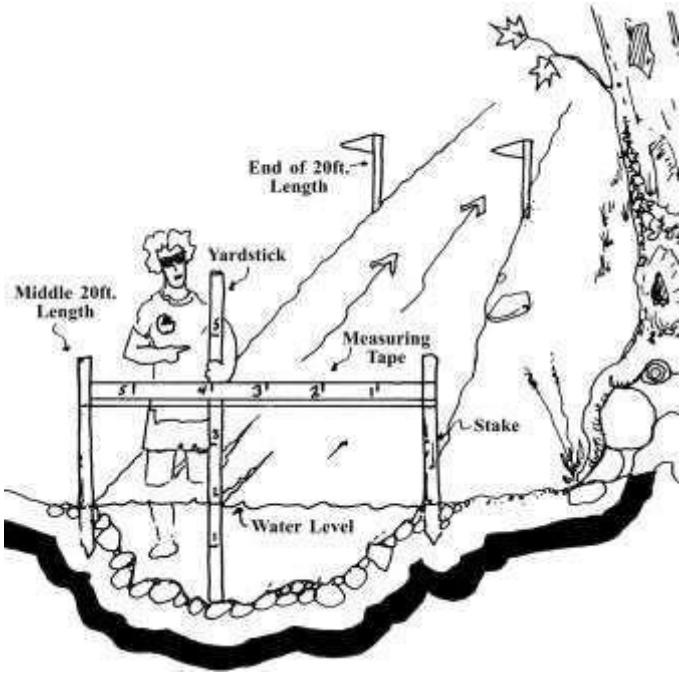
The method you are going to use in determining streamflow is known as a velocity- area approach. The task is to find out the volume of water in a 20-ft. (at least) section of stream by determining both the stream's velocity and the area of the stream section. You will first measure the width of the stream, and then measure water depth at a number of locations across the width to find the average depth at your monitoring site.

Although you will not need to do this, streamflow can be calculated by multiplying the average depth by the width to determine the average cross-sectional area (ft2) of the stream. Water velocity (ft/sec) is determined by measuring the number of seconds it takes a tennis ball float to travel along the length of stream you are studying. Since water velocity varies at different depths, (surface water moves more quickly than subsurface water because water moving against rough bottom surfaces is slowed down by friction) velocity must be corrected slightly using a correction factor to adjust your measurement to account for the effect of friction. The actual equation used to determine flow is this: Flow=Area x Corrected Velocity.

Measuring Streamflow

A video demonstration of stream flow monitoring can be found here:
https://www.youtube.com/watch?v=uXvkeHjE_0g

1. At your monitoring site, locate a straight section of stream that is at least 20 feet in length and has a uniform width. The water should be at least 6 inches deep, and have some movement. Unobstructed runs or riffles are ideal sites to choose.



2. Measure 20 feet along the length of your chosen stream segment with your measuring tape and mark both the up and downstream ends of the section with flagging.

3. Working with a partner, measure stream width (wetted edge to wetted edge) by extending a measuring tape across the stream at the midway point of your marked stream segment. Record the width in feet on your recording form. (A tape measure graduated in tenths of feet will make calculations easier.)
4. Secure the measuring tape to both shores so that the tape is taut and above the surface of the water. You might choose to attach the tape or a length of string to two stakes secured on opposite banks to create a transect line across the stream if it is impractical to secure the tape using shoreline vegetation.
5. Using your yardstick or pre-marked (in tenths of feet) D-frame net pole, measure the water depth (ft) at one-foot intervals across the stream where you measured width (and secured the measuring tape). Be sure to measure depth in tenths of feet, not in inches (See conversion chart from inches to tenths of feet on data recording form). Record depth measurements (ft) on the recording form. If your stream is greater than 20 feet wide, measure depth in 20 equal intervals across the stream.
6. Velocity will be measured by tracking the time it takes a floating object to move the marked 20-foot length of stream. You will time the floating object (in seconds) a total of four times, at different locations across the stream. Repeating your measurements across the stream, in both slower and faster areas, will help to ensure the closest approximation to the stream's true velocity. This in turn will make your flow calculations more accurate. However, be sure your float travels freely downstream (during every float trial) without catching in slack water areas of the stream. For narrower streams (less than 10 feet), you can conduct only three float trials to assess velocity.
7. Position the person who will release the float upstream from the upper flag. Position the timekeeper on the stream bank (or out of the main flow path) at the downstream flag with the stopwatch. Position the person who will catch the float downstream from the timekeeper (Note: Unless velocity is very fast, the timekeeper should be able to catch the float with a net after they have finished timing its run down the stream).
8. The float-releaser will gently drop the float into the stream a few feet upstream from the upper flag, and will alert the timekeeper to begin timing as the float passes the upstream flag (the float should have time to get up to speed by the time it passes the upper flag into the marked length of stream). If the float gets stuck on a log, rock or other obstruction, it should be released from the starting point again.
9. The timekeeper should stop the stopwatch as the float passes the downstream flag and retrieve the float using the net.
10. Record the float time for the first trial on the recording form.
11. Repeat steps 7-9 for each of the remaining float time trials in different sections of the stream.
12. Record the float time (seconds) for each trial on the recording form.
13. Select a correction factor for the site. For rough, loose rocks, course gravel or weeds use 0.8. For smooth mud, sand, or bedrock use 0.9.

Name_____ Date_____ Time_____

Stream Sampled_____ Location_____
(County, Road, Site # if known, Township, Range, Section)

Water Action Volunteers

1. SITE LOCATION

Length Assessed: _____ ft.

2. STREAM WIDTH & DEPTH

Stream Width: _____ ft.

If stream ≤ 20 ft. wide, measure depth every foot across the width. If stream is > 20 ft. wide, measure depth at 20 equal intervals across the entire width.

Interval	Depth (ft./in.)	Depth (10^{ths} ft.)	Interval	Depth (ft./in.)	Depth (10^{ths} ft.)
1	0	0	11		
2			12		
3			13		
4			14		
5			15		
6			16		
7			17		
8			18		
9			19		
10			20		
sum					sum

sum _____ ft. ← Add together → _____ ft. sum

Total Sum of depths: _____ ft.

_____ ft. (sum of depths) ÷ _____ (# of intervals) = _____ ft. (Average Depth)

Compute Ave. Cross-Sectional Area:

_____ ft. (average depth) x _____ ft. (width) = _____ $ft.^2$ (Cross-Sectional Area)

_____ $ft.^2$ (cross-sectional area) x _____ ft./sec. (corrected surface velocity) = _____ (STREAM FLOW: cubic feet per sec.)
(round to the nearest tenth)

3. VELOCITY MEASUREMENT

Float Trials	Time (seconds)
1	
2	
3	
4	
sum	

Average Float Time = _____ (sum) ÷ _____ (# of trials) = _____ sec.

_____ ft. (length assessed) ÷ _____ sec. (ave. float time) = _____ ft./sec. (Ave. Surface Velocity)

4. CALCULATING STREAM FLOW

Correction value for rough, loose, coarse, weedy bottom: 0.8
Correction value for smooth bottom: 0.9

_____ (correction value) x _____ ft./sec. (ave. surface velocity) = _____ ft./sec. (Corrected Surface Velocity)

Depth Conversion Chart

Depth Conversion Chart			
Ft/in	10^{ths} Ft	Ft/in	10^{ths} Ft
⅜-⅞	0.05	6⅜-6⅞	0.55
1-1½	0.1	7-7⅜	0.6
1⅜-2	0.15	7½-8	0.65
2⅛-2⅝	0.2	8⅛-8⅝	0.7
2¾-3¼	0.25	8¾-9¼	0.75
3⅜-3⅞	0.3	9⅜-9⅞	0.8
4-4⅜	0.35	10-10⅜	0.85
4½-5	0.4	10½-11	0.9
5⅛-5⅝	0.45	11⅛-11⅝	0.95
5¾-6¼	0.5	11¾-12	1.0

Considerations/ Precautions

To avoid bias, monitoring should be conducted at a sampling location as follows:

- Conduct all monitoring at designated sample sites/locations (see enclosed maps).
- For all water sample collections, avoid disturbing the stream water to be collected. If you will collect the sample by wading in the stream, walk upstream to the sample location and take the sample facing upstream.
- Surface samples tend to have debris and other contaminants in them and should be avoided. To avoid contamination, collect water samples 3 to 6 inches below surface. Always rinse sample bottles three times and fill it to its neck the fourth time.
- Avoid touching the rim of the bottle or inside of the cap.
- Do not collect the water sample immediately downstream of a wastewater or storm sewer outfall pipe.
- Ensure the water sample is representative of the upstream conditions. Stream reaches with major springs or major sediment deposits, such as former millpond beds, may create much localized conditions that aren't reflective of the upstream conditions and should be avoided. Also avoid reaches immediately downstream of where cattle are in the stream.
- Ensure the water sample is collected in an area with thorough mixing of stream water. Stream reaches immediately downstream from tributaries or major springs may not have complete mixing and should be avoided.
- Collect samples in a portion of the stream with the strongest flow. Straight stretches of the stream are preferred sample locations. If sampling on a curve, collect the sample in the portion with greatest flow at the outside of the bend. Slow flow areas along the banks, in eddies or immediately downstream of islands should be avoided.
- If you are sampling with an extension pole, reaching out from shore to an area of flow with some movement (not necessarily the strongest flow) is acceptable. Your safety is important!
- Do not trespass on private lands to collect sample. Use the designated access points, or seek permission from the landowner or operator to cross their land for the purpose of collecting the samples.

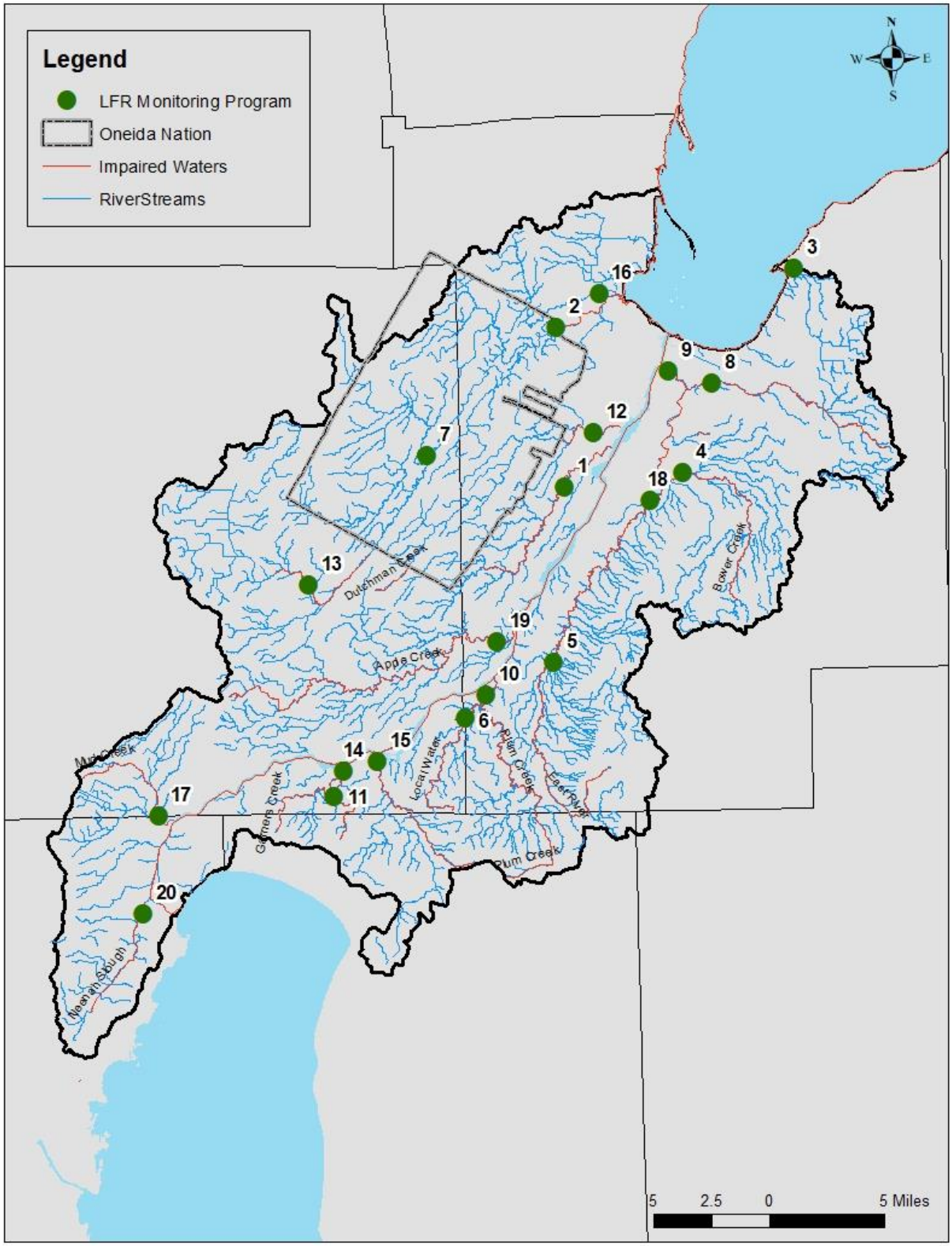
Safety

Safety precautions of a general nature should be recognized. Sampling should be done from shore whenever possible using an extension pole sampler to aid in water collection. Collecting samples in extremely hot and humid weather carries the risk of dehydration and heat stroke. Never sample during electrical storms or high wind events. Preserving nutrient samples requires the use of small amounts of acid. Caution should be used to avoid contact with skin or eyes when acidifying the sample; always wear protective gloves and eye protection. A first aid kit should always be carried for general safety considerations.

When monitoring streamflow, you will need to enter the stream channel to make width and depth measurements and to calculate velocity. Be aware of stream velocity, water depth, and bottom conditions at your stream-monitoring site. Do not attempt to measure streamflow if water velocity appears to be fast enough to knock you down when you are working in the stream. If you are unsure of water depth across the width of the stream, be sure to proceed with caution as you move across the stream, or choose an alternate point from which to measure streamflow. If you are not comfortable with the stream conditions do not measure the flow. Your safety is important!

Acronyms

- AOC – Area of Concern
- BUIs – Beneficial Use Impairments
- DPI – Diatom Phosphorus Index
- DRP – Dissolved Reactive Phosphorus
- QA/QC – Quality Assurance/Quality Control
- SWIMS – Surface Water Integrated Monitoring System
- TMDL – Total Maximum Daily Load
- TP – Total Phosphorus
- TSS – Total Suspended Solids
- WAV – Water Action Volunteers
- WBIC – Waterbody Identification Code
- WDNR – Wisconsin Department of Natural Resources
- WisCALM – Wisconsin Consolidated Assessment and Listing Methodology


Legend
LFR Monitoring Program
Oneida Nation
Impaired Waters
RiverStreams
N
W
E
S
1
2
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9
10
11
12
13
14
15
16
17
18
19
20
Dutchman Creek
Apple Creek
Bower Creek
Mud Creek
Local Water
Plum Creek
East River
Garners Creek
Duck Creek
Neenah Slough
5
2.5
0
5 Miles

Sampling Location	Stream Name	SWIMS ID	SWIMS Station Name
1	Ashwaubenon Creek	10016502	Ashwaubenon Creek - Grant Street
2	Lower Duck Creek	10038644	Duck Creek - Pamperin Park
3	Wequiock Creek	10010769	Nicolet Rd/Cty A
4	Bower Creek	10009445	Bower Creek (1) 50m Upstream of Hwy GV
5	Upper East River	53508	East River at Mallard Rd
6	West Plum Creek	10016494	Downstream of County Line Rd
7	Mid Duck Creek	453255	Duck Creek at Seminary Rd
8	Baird's Creek	53683	Baird Creek at Preble WI
9	East River	10043279	East River @ Harold Lewis Trail off Main Street
10	Plum Creek	10046999	Plum Creek - VandeHey Farm Crossing
11	Trib to Garners Cr	10047157	US CTH CE
12	Dutchman's Creek	10015851	Dutchmans Creek - Oneida Street
13	Upper Duck Creek	10029975	Duck Creek at CTH S
14	Garner's Creek	10043028	Garner's Creek - DS of Cty Z
15	Kankapot Creek	453261	Kankapot Creek - Cth Z Dodge St 100 Ft US of Bridge
16	Lancaster Creek	10034510	Unnamed Trib. (410000) - Lakeview Dr
17	Mud Creek	453258	Mud Creek - County Highway BB
18	East River (G)	53675	East River - Hwy G
19	Apple Creek	53684	Apple Creek - Rosin Rd
20	Neenah Slough	10032175	Neenah Slough #2 (100ft S of Adams St)