I. Project Contacts

Christina Anderson
Wisconsin Department of Natural Resources
101 S. Webster St.
Madison, WI 53707
christina.anderson@wisconsin.gov
608-266-3599

Kris Stepenuck
University of Wisconsin Extension
445 Henry Mall, Rm 202
Madison, WI 53706
kfstepenuck@wisc.edu
608-265-3887 (M, T, F)

Ron Dolen
Wisconsin Department of Natural Resources
101 S. Webster St.
Madison, WI 53707
ronald.dolen@wisconsin.gov
608-267-9352
II. **Project Background and Goal**

Phosphorus is the most visible, widespread water pollutant in Wisconsin. In more than 80% of our state’s lakes, high levels of phosphorus can trigger excess algae and weed growth. When these excess plants die and decompose, oxygen levels drop dramatically and can lead to fish kills.

Streams act like conveyor belts, delivering phosphorus directly to lakes. Additionally, phosphorus is associated with excess sediments covering stream bottoms, the most common biological impairment in streams. Phosphorus in streams and lakes originates naturally from rocks, but its major sources today are usually associated with human activities: soil erosion, human and animal wastes, septic systems, detergents, and runoff from farmland or lawns.

An analysis of phosphorus often includes both total phosphorus and soluble reactive phosphorus. Volunteers will only sample for total phosphorus, which is considered a better indicator of nutrient status because its levels remain more stable than soluble reactive phosphorus. Total phosphorus includes particulate phosphorus—which is attached to bottom sediments and contained in plant and animal fragments suspended in water—and soluble phosphorus. Soluble reactive phosphorus dissolves in water and readily aids plant growth, but its concentration varies widely over short time periods as plants take it up and release it.

The goal of the project is to characterize the total phosphorus concentrations most commonly occurring in the streams during the primary algae and aquatic plant “growing season” of May through October.

III. **Volunteer Time Commitment**

Volunteers must commit to attending a one-hour training in its entirety prior to beginning participation in this monitoring project. Once trained, most volunteers will monitor one site monthly from May to October. Once at the monitoring site, it takes about five minutes to conduct the sampling. Volunteers must commit to sending in up to six water samples to the Wisconsin State Lab of Hygiene (WSLH) as soon as possible after sampling. All postage will be paid by the project sponsors, but the volunteer will need to package the sample on ice in a cooler that will be provided, email a WAV staff person to obtain a printable FedEx shipping label via email, print
and affix that mailing label to the cooler, and arrange for the package to be picked up by FedEx and/or delivered to a local drop off point for FedEx delivery. In all, we estimate the time commitment per volunteer to be approximately 6 to 8 hours per year (including travel time to/from their monitoring site) if one site is monitored.

IV. Volunteer Duties

Volunteers will take grab samples in streams to monitor total phosphorus as a potential cause of biological impairment. **Phosphorus water samples should be collected once per month, for six months from May through October. Each sample should be collected approximately 30 days apart, with no samples collected within 15 days of one another.**

All grab samples should be shipped via FedEx to the Wisconsin State Lab of Hygiene in Madison for total phosphorus analysis.

<table>
<thead>
<tr>
<th>Monitoring Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>Total Phosphorus</td>
</tr>
<tr>
<td>grab samples</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Nov      Dec Jan     Feb     Mar     April   May      June July Aug Sept Oct</td>
</tr>
<tr>
<td>No samples collected</td>
</tr>
</tbody>
</table>

V. Field Sampling and Preservation Methods

A. Overview

The following water sampling requirements are taken from the Wisconsin State Lab of Hygiene protocols. All water samples collected for analysis need to comply with the equipment and procedures that follow.

B. Equipment

- Waders (or shoes that can get wet)
- 250 mL polyethylene bottle (with “metals or nutrients” label)
- Extension pole (PVC pipe or stick) with bottle fastener (rubber bands) (Optional)
- Vial of sulfuric acid (H₂SO₄, generally 1.0 ml at 1:3 concentration)
- Waterproof pen or marker (a sharpie)
- Lab slips (also called “WSLH Inorganic test request forms”) (1 sheet for each sampling point; lab slips are unique and should not be photocopied)
C. Considerations/ Precautions

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

- **Avoid disturbing the sample.** If the sample is collected by wading in the stream, walk upstream to the sample location and take the sample facing upstream. Also avoid surface water and your hands from touching the rim of the bottle or inside of the cap.

- **3 to 6 inches below surface, rinse sample bottles three times and completely fill them the fourth time.** Surface samples tend to have debris and other things floating on the surface and should be avoided.

- **Not immediately downstream of a wastewater or storm sewer outfall pipe.**

- **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 downstream of where cattle are in the stream.

- **Has thorough mixing of the stream water.** Stream reaches immediately downstream from tributaries or major springs may not have complete mixing and should be avoided.

- **In portion of stream with greatest or strongest flow.** This may or may not be in the middle of the stream. In general, relatively straight reaches of the stream are preferred. However, if a meander section of the stream is selected for sampling, the sample should be collected in the portion with greatest flow at the outside of the meander. Slow flow areas along the banks, in eddies or immediately downstream of islands should be avoided. Note: If sampling with an extension pole, reaching out from shore to an area of flow with some movement (and not necessarily to an area of strongest flow) is sufficient. Your safety is most important!

- **Don’t trespass on private lands to collect sample.** Use a public access point, such as a road right of way, or seek permission from the landowner or operator to cross land for the purpose of collecting the samples.
D. Collection method

1. Locate a sampling location that is at least 10 to 20 feet away 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.

2. On a 250 ml bottle: circle the word “nutrients,” check the H₂SO₄ box, and write the field number and sample location (these are listed on your lab slip as “point or outfall number” and “sample address or location”) (see Figure 1).

3. Facing upstream, rinse the bottle three times with water 3 to 6 inches below the water surface. On the fourth time, fill the bottle completely and cap. If the site is not easily accessible or water levels are too high, fasten the bottle to an extension pole (i.e., PVC pipe or stick) and sample water that is well mixed.

4. Avoid allowing surface water and your hands from touching the rim of the bottle or inside of the cap. (One way to prevent surface water from touching these surfaces is to uncap and recap the bottle underwater.)

5. Preserve the sample by adding a vial of sulfuric acid to the 250 mL bottle.

6. Securely cap the bottle and mix by inverting several times.

7. Transport the sample on ice and prepare it to be shipped to the State Lab of Hygiene.

E. Documentation

A separate lab slip must be submitted for each sample. Lab slips will be provided for you by DNR staff and should not be photocopied. Most of the required fields on the lab slip are automatically filled out for you, but volunteers still need to fill the following fields:

- “Collected by” (your name)
- “Begin or Grab Date” (mm/dd/yyyy)
- “Begin Time” (24-hr clock)

* In some instances water depth may be very shallow. When sampling during low flow ensure that the sample is not contaminated with sediment dislodged from the substrate.
• In the bottom right box, check “YES”, write your initials and the date to indicate that the sample has been preserved. (The lab will check pH for us.)

VI. Delivery of Samples to the State Lab of Hygiene

A. Overview
Madison area volunteers should deliver their samples directly to the Wisconsin State Lab of Hygiene (2601 Agriculture Drive Madison, WI 53718). Volunteers outside of the Madison area should contact Christina Anderson, Ron Dolen or Kris Stepenuck via email to obtain a prepaid FedEx shipping label to send samples to the State Lab of Hygiene as soon as possible after collection (see instructions below).

B. Equipment
• 250 mL polyethylene bottle (with “metals or nutrients” label)
• Lab slips (also called “WSLH Inorganic test request forms”) (1 for each sampling point; lab slips are unique and should not be photocopied)
• Shipping coolers
• Small Ziploc baggies (quart size)
• Large Ziploc bags (gallon size)
• Large plastic liner (provided by WSLH)
• Ice
• Plastic cable tie
• Shipping tape
• Mailing label card (provided by WSLH)

C. Packing and Shipping Instructions
1. Place sample bottle(s) in separate quart-size Ziploc bags and securely close. DO NOT place multiple 250 mL bottles in the same bag.
2. Line cooler with the large plastic bag provided.
3. Fill the liner bag with ice and sample bags.
4. Twist plastic liner bag closed.
5. Securely seal the bag with a plastic cable tie to prevent leakage during shipping.
6. Double check lab slip(s) is completed, and then place lab slip(s) in a gallon Ziploc bag and place on top of the bag.
7. Close the box lid and wrap with reinforced shipping tape completely around the box on both ends.

8. Remove the mailing label card from the plastic envelope, and flip over so the WSLH address is exposed and reinsert into envelope.

9. Check “River Water” in the appropriate box on the “contents” label located on the left of the address.

10. Ship the samples to the laboratory by FedEx. Use the address pre-printed on the State Lab of Hygiene shipping label.

D. Considerations/ Precautions

Samples should be shipped as soon as possible, ideally within 1-2 days. Holding times are longer than one week, but the clock begins immediately after sampling and the lab needs them quickly in order to process samples on time. However, do not mail samples on Fridays or Saturdays because lab staff is usually not present on weekends. If the ice melts completely, sample data will be flagged and unusable. Refrigerate the samples or keep them on ice until they are shipped.
E. Questions? Contact:
Volunteers should feel free to contact Christina Anderson (608-266-3599), Ron Dolen (608-267-9352), or Kris Stepenuck (608-265-3887 or 608-264-8948) with questions or concerns about any aspect of the project.

VII. QA/QC—Duplicate samples

A. Overview
The Water Action Volunteers Stream Monitoring Program (WAV) is implementing a protocol to document the accuracy and precision of the field data collected by volunteers. Water samples collected by DNR field staff go through a similar quality assurance/quality control (QA/QC) protocol. These tests document the accuracy and precision of the data collected and look at natural variability and sampling error.

Ten percent of the samples in the WAV program that are monitored for total phosphorus (TP) will be chosen each year to participate in collection of quality assurance/quality control (QA/QC) samples. The samples are randomly selected from the list of stations that are monitored.

Two types of QA/QC samples will be collected by volunteers: field blank and field replicate (duplicate) samples for total phosphorus. If your site(s) have been selected at random for QA/QC sampling, you will be notified by email and/or phone. To carry out sampling, please read the following instructions.

The result of this additional sampling is that you will be mailing a total of three phosphorus samples to the lab following one of your site visits: one regular sample, one duplicate, and one blank. Each sample should be placed in a separate Ziploc baggie. Refrigerate or ice the samples until you are ready to ship, ideally within 1-2 days.

B. Equipment
- Distilled water
- 250 mL polyethylene bottle (with “metals or nutrients” label)
- Extension pole (PVC pipe or stick) with bottle fastener (rubber bands) (Optional)
- Vial of sulfuric acid (H₂SO₄, generally 1.0 ml at 1:3 concentration)
- Waterproof pen or marker
- Lab slips (also called “WSLH Inorganic test request forms”) (1 for each sampling point; lab slips are unique and should not be photocopied)

C. Collection method

Please prepare this sample at the same time as your regular samples, as follows:

**Collect, preserve, and ship a second sample from the same location** following the directions on pages 4-7 of this manual, **but write “DUPLICATE” on the bottle after the field number.** Find the lab slip that is pre-marked “DUPLICATE” near the upper right corner, fill the required fields, and place in the Ziploc bag containing lab slips.

VIII. QA/QC—Blank samples

A. Equipment
- Distilled water
- 250 mL polyethylene bottle (with “metals or nutrients” label)
- Vial of sulfuric acid (H₂SO₄, generally 1.0 ml at 1:3 concentration)
- Waterproof pen or marker
- Lab slips (also called “WSLH Inorganic test request forms”) (1 for each sampling point; lab slips are unique and should not be photocopied)

B. Collection method

Please prepare this sample after the collection of your regular samples, as follows:

**Rinse and fill a 250 ml bottle with distilled water. Preserve and ship the sample** following the same directions on page 5-7 of this manual, **but write “BLANK” on the bottle after the field number.** Find the lab slip that is pre-marked with the words “BLANK” near the upper right corner, fill the required fields, and place in the Ziploc bag containing lab slips.