Addison County River Watch Collaborative

Water Sampling Field Manual for Volunteers

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Updated: April, 2022 by Matt Witten, Project Leader

A. CONTACTS

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B. SAMPLING SCHEDULE

2022 sampling has two different tracks*:

1. LaRosa Partnership Program (LPP) sampling, which will take place on a twice-monthly basis from May through August (samples go to Vermont Agricultural and Environmental Lab, or "VAEL," in Randolph)
2. Recreation site monitoring and special monitoring of three tributaries in the upper New Haven River Watershed, which will take place once/month, June-early September (samples go to Endyne Lab in Williston)

Sampling days for these two tracks overlap to some extent. Below are the sampling dates:
April 26 (first samples to VAEL)
May 10
May 24
June 7 (first NHR & swimming hole samples to Endyne)
June 21
July 5 (NHR & swimming hole samples to Endyne)
July 19

August 2 (Last samples to VAEL) (NHR & swimming hole samples to Endyne)
September 6 (last NHR & swimming hole samples to Endyne)

*We also plan to do "storm sampling" once or twice to capture samples of high-flow events.

Sampling will occur during the early morning hours with delivery to the Addison County Regional Planning Commission offices at 14 Seminary Street, Middlebury, VT, no later than: **09:30 AM.**

A 2022 sampling schedule is contained in the field sampling binder for each watershed. This schedule identifies the sample sites in each watershed, as well as the scheduled analyses.

FIELD SAMPLING KITS

Your field sampling kit includes the following:

- □ Volunteer Field Notebook, including:
  - 2022 Sampling Schedule
  - 2022 List of Sample Sites and location information
  - 2022 *Water Quality Monitoring Sites by Watershed* map
  - Chart of Bottle Requirements
  - Field Data Sheets
  - Water Sampling Field Manual for Volunteers
  - Spare labels, blank

- □ Cooler with ice packs
- □ Thermometer
- □ Waterproof pens, ball-point pens
- □ Sampling poles (for use as necessary) with dipper on the end

C. PREPARING FOR SAMPLING

In the weeks prior to a schedule sampling date, a Collaborative member will pick up the bottle order from the labs we use (VAEL and Endyne).

Upon receipt of the VAEL-issued Pre-Log and bottle orders from both VAEL and Endyne, the QA Coordinator will check these against the pre-log request and 2022 Sampling Schedule to ensure that correct bottles and labels were received for the scheduled sampling sites, field QC samples, and analyses. Corrections will be identified, where appropriate. If sufficient time is available, replacement labels/bottles will be ordered from the labs. Otherwise, blank labels will be utilized to fill in for missing or incorrect labels. The QA Coordinator or Project Laboratory Contact will communicate with the labs to ensure that the corrected labels are properly logged in with the bottle order at the close of the sampling event.

In the week or so prior to each scheduled sampling date, watershed coordinators will assemble at the Addison County Regional Planning Commission offices. Tasks at this pre-sampling meeting (also called "bottling party") will include:

- □ Review quality control issues that may have arisen in the field or in the labs during the previous event(s) and discuss corrective action where necessary.
- □ Make necessary updates to the Water Quality Field Manual or Sampling Schedule as necessary.
- □ Distribute sampling bottles, and label the bottles for scheduled sites and analyses in each watershed. To keep in mind while preparing bottles for sampling:

    - Place each label on correct sample bottle type – double check
    - Bunch bottles from the same site together in one or two plastic bags
    - Distribute ice packs evenly among coolers
    - Check each cooler for pen, thermometer, spare bottles, complete binder, etc.

- □ Identify sites for field QC samples and distribute de-ionized water, where appropriate.

D. COLLECTING SAMPLES

1. Preparation:

Before you begin sampling, please complete the following sections on the Field Data Sheet:

- □ Date samples collected
- □ Sampler(s)' names
- □ Previous 3 days weather
- □ Today's weather

Load ice and frozen ice packs into the sample cooler.

If the sampling event includes *E.coli* analysis, please <u>do not</u> collect samples any earlier than 7:00 AM. (If samples are collected any earlier than this, it is very difficult to accomplish delivery to the Lab before the 6-hour holding time for *E.coli*).

2. At each sample site:

Please complete the following sections on the ACRWC Field Data Sheet:

- □ DEC log-in code (this is the number in bold right above the bar code on the sample labels). It should be the same code for all scheduled analyses at the given site – but sometimes this has not been the case, so please review each label carefully.
- □ Sample ID (this is the ACRWC sample station identification, e.g., NHR6.2)
- □ Sample Type (this describes whether the sample is a Field Duplicate [DUP], a Field Blank [BLK], or a regular sample [R]).
- □ Sample Time (record the same sample time for all the bottles collected at a given site).
- □ Air Temperature (measure before water; keep thermometer in the shade)
- □ Water Temperature (immerse thermometer in the stream – near where you intend to sample – for at least one minute. Record to the nearest degree).
- □ Water Level ***(See details about "judging flow levels" below)***

- □ Water Color
- □ % Algal Growth
- □ Note any observations / comments (*e.g.*, might include signs of wildlife activity, cows in stream, dead animals, notable erosion or other physical anomalies in stream bank).

Judging Flow Levels

Flow (discharge magnitude) is an essential observation to be made during the collection of water samples. The water quality of a river or stream can change dramatically during and immediately following a precipitation or snow melt event. It is important to consider the concentration of a parameter and the duration of flow conditions at the time of sample collection. A quantitative discharge measurement in a gauged stream is the most precise method and necessary when collecting water quality samples for loading studies. However, a ***qualitative*** streamflow observation can greatly increase the value of a water sample result when this is not possible.

Low - conditions are low relative to the entire range of flows experienced at site (greater than or equal to these levels 75% of the time).

- Generally occur during late winter (January-February) and late summer (July-September)
- Often the streambed is partially dry with channel bars exposed and it is possible to walk along the edge of a dry streambed

Moderate - at a mid-level or average streamflow conditions, or most typical flows experienced in the stream (levels experienced 50% of the time).

- Can occur at any time of year
- ~90- 100% of the stream bed is under water, but not up to the sharp incline of the stream bank

High - Stream is well-above an average level of flow (greater than or equal to these levels only 25% of the time).

- Generally occur during spring and fall, but can occur due to rainfall any time of year
- Stream is full from bank to bank ("bank-full flow") but not spilling onto floodplain

Flood – Stream is exceeding bank-full levels and accessing floodplain (if exists).

- Generally occur less than 5% of time
- Also indicated by submergence or active transport of terrestrial and woody vegetation

Do not sample during flood conditions due to safety

Low flow example:

Moderate Flow Example:

High Flow Example:

Flood Example:

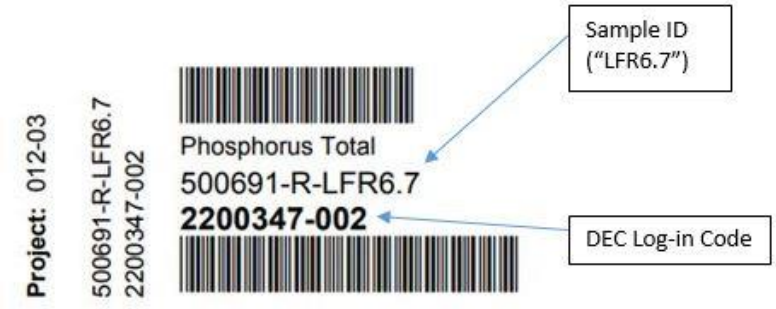
Try to collect samples from the same spot on the river every time, or as close as conditions will safely allow. Please be sure the spot you are collecting from is representative of the river at the site, is in the main current (deepest part of the channel), and is not stagnant water. At many of our sites, this will require wading (with waders or without). Make safety a priority. Use the buddy system. Do not wade into waters that are swiftly moving, and/or greater than 3 feet in depth. An alternative to wading is to use a pole (in combination with a Common Collection Container or "dipper") that extends the sampling person's reach.

Sampling with a Common Collection Container ("dipper") when wading into the stream is not the best option:

1. At the site, extend the pole into the stream and rinse the container (usually a 1-liter Nalgene bottle) three times with the stream water to be sampled.
2. With the container as close to the main current as possible, plunge it into the stream, top down, at ideally one foot below surface, or halfway between surface and bottom, if water is shallow. Do not disturb bottom sediments.
3. Turn the container into the flow, allow air bubbles to escape and fill the bottle.
4. For those sample bottles that require rinsing (TN, Cl), use water from the Common Collection Container to rinse the sample bottle, discarding the rinse water each time.
5. Then fill the bottle (after rinsing 3x TN and Cl, but NOT rinsing glass TP vial). You may need to return to the river several times with the Common Collection Container to fill all bottles.

Filling Field Duplicates:
Field Duplicate samples must be taken immediately after collecting the Regular sample. Start the entire process over again, i.e., rinse the Common Collection Container ("dipper") again 3 times and then collect the Field Duplicate, rinsing the vial or bottle 3x if TN or Cl, but NOT rinsing the glass vial for TP. The goal of the field duplicate is to capture any variation in either sampling method or of changeability of the water column.

Fill in the sample time on each bottle to be collected at the site (this is easier to do when the labels are dry). ***The same sample time and date should be recorded for all the bottles collected at a given site***, and this sample time must match the sample time recorded on the Field Data Sheet. The Vermont Agricultural and Environmental Lab requests that we use a **ball-point pen** to mark the labels – as water-proof pens (Sharpie- type) can be too thick to read.



Collect water samples following the instructions below:

a. Make sure you select the correct bottle(s) labeled for the current site. Make sure your label is correct.
b. Try to disturb as little bottom sediment as possible. Stand facing upstream. You will collect the water from your upstream side in the main current.
c. When ready to sample, remove the cap/lid. Be very careful not to contaminate the bottle by touching any portion of the inside of the lid or bottle.
d. Hold the bottle near its base and plunge it (with its opening downward) below the water surface. Position your sample bottle 8" to 12" beneath the surface or mid-way between the surface and the bottom if shallow. (If you are using the sampling pole/dipper, turn the bottle upside down and plunge it into the water facing upstream.)
e. Turn the bottle underwater into the current and away from you. In slow-moving reaches push the bottle away from you in an upstream direction.
f. In all cases, be careful not to collect water that has sediment from bottom disturbance.
g. The bottle should be filled to its appropriate fill line, as detailed in Section 3, specific to each bottle type. Recap the bottle carefully. Do not touch the inside of the bottle or its cap. Make sure that the cap is seated properly and is not cross-threaded because that would lead to sample leakage and the bottle will not be processed by the lab.
h. Place the sample in the iced cooler.
i. Once all the scheduled sample bottles are collected at the site, place a check under the appropriate column(s) for Analysis Requested on the ACRWC Field Data Sheet. This check confirms that you have checked that the sample time has been recorded on each label, and that the DEC Log-in code and Sample ID recorded on the bottle label match the record on the ACRWC Field Data Sheet.

3. Specific Instructions for Each Bottle Type:

NO RINSE

E. coli:
Select the labeled clear plastic, sealed, 100ml sample bottle.
Remove the seal around the lid at the sample location.
Fill the bottle exactly to the 100ml line. Do not underfill or overfill.

Total Phosphorus:
Select a labeled 75ml glass sample tube (with white lid).
This label will be marked ***'Phosphorus Total'.***
Fill the tube so that the bottom of the meniscus rests on the black line pre-marked on the outside of the tube by VAEL. Do not underfill or overfill.

RINSE 3 times with RIVER WATER to be sampled.

Total Nitrogen
Select a labeled 50ml plastic sample tube (with blue cap).
Rinse tube 3 times with river water.
Fill the tube to the 50 ml line. Do not underfill or overfill.
Be careful not to cross-thread the cap.

Chloride
Select a labeled 50ml plastic sample tube (with green or purple cap).
Rinse tube 3 times with river water.
Fill the tube to the 50 ml line. Do not underfill or overfill.
Be careful not to cross-thread the cap.

4. Quality Control Samples (Field Duplicates and Lab Duplicates):

QC Sample collection sites and parameters will vary throughout the sampling season therefore samplers must pay close attention to their sampling instructions and sample labels.

The ACRWC Project Leader or Project QA Coordinator will inform you if your team is collecting QC samples ("Field Dups" or "Lab Dups").

a. Field Duplicate:

The Field Duplicate ("Field Dup") is a replicated sample collected at a slightly different point in time but the same space as the regular sample. The Field Duplicate is used to assess precision and accuracy of the samplers' ability to capture the conditions in the body of water. It is meant to reflect any variation in either sampling method or of changeability of the water column. Field Duplicates are processed for all the same analyses that are scheduled for the regular sample at the assigned site.

Field Duplicate samples will be designated "D" on the sample labels just before the scheduled Site ID (e.g., 500691-D-LFR6.7). Collect the Field Duplicate immediately after collecting the Regular sample.

Fill each bottle with river water per the instructions above. The Field Duplicate bottles should be collected immediately after (and in the same manner as) the regular ("R") sample bottles. If you are using a common collection container (either attached to a pole sampler or hand-held during a wading sample collection), rinse the collection vessel three times in the water to be sampled. Fill the collection container, and decant river water into the regular sample and then repeat the procedure (i.e., rinse the collection vessel 3 times) and subsequently fill the Field Duplicate bottles. Fill to the appropriate line, as described in Section 3 (previous page), specific to each analysis type. Replace the bottle caps securely.

Record the sample time and date on the labels of the Field Duplicate sample bottles. These bottles will have the **same sample time** as was recorded for the regular sample collected at the site. Place Field Duplicate bottles in the iced cooler.

Complete a sample record on the ACRWC Field Data Sheet (on a separate line), filling in the appropriate DEC log-in code, Sample ID, and Sample Time.

Place a check under the appropriate column(s) for Analysis Requested on the ACRWC Field Data Sheet. This check confirms that you have checked that the sample time has been recorded on each label, and that the DEC Log-in code and Sample ID recorded on the bottle label match the record on the ACRWC Field Data Sheet.

b. Lab Duplicate

Laboratory Duplicates help to determine if there are any laboratory errors. The laboratory splits a sample into two, runs both samples, and compares them for quality assurance. Laboratory Duplicates are taken for 10% of all parameters sampled, but **only phosphorus laboratory Duplicates must be collected in the field by partners.** This is because there is not enough sample water in a single TP tube to conduct TP analysis of both the regular and lab duplicate sample, so a second sample is needed to complete the lab duplicate TP analysis.

The field collection procedure for the Lab Duplicate is the same procedure as for the field duplicate. The label on the vial will be hand-written ahead of time by ACRWC coordinators to pair up with a Regular sample. Reminder: similar to the Field Dup, collect the Lab Duplicate immediately after collecting the Regular sample.

5. In Case of Bottle Loss, Breakage, or Contamination

If a sample bottle is inadvertently broken, lost downstream, or contaminated during handling, do not use it for sample collection. Use a new bottle instead (where possible, a set of spare bottles will be issued in your sample kits). Use provided blank labels to affix to the replacement bottle and mark it with the correct Sample Site ID, DEC Log-in Code, Sample Date, Sample Time and requested Analysis. Make a note of your actions in the comments section of the ACRWC Field Data Sheet.

If a blank label is not available, mark the sample info directly on the bottle using a ball-point pen. The Project Leader can provide labels upon delivery to ACRPC offices.

E. DROPPING OFF SAMPLES AND SAMPLING MATERIALS:

Samples must be delivered to the Addison County Regional Planning Commission (ACRPC) offices no earlier than 8:00 AM and no later than **09:30 AM** on the day of sampling. Do not leave samples unattended. The Project Leader (or designated alternate) will check in your samples for completed sample labels, and will sign off on the chain of custody section in the ACRWC Field Data Sheet. Original field data sheets will be retained in the master project binder at ACRPC offices. Field samplers may make copies of these field data sheets to take with them.

The QA Coordinator will enter sample times from the Field Data Sheets to the VAEL Pre-Log sheet. A check will also be done against the original Sampling Schedule to ensure that all scheduled samples were collected and delivered to ACRPC offices. If problems were encountered in the field, the volunteers will help to document the issues encountered.

Sample bottles (and ice/ ice packs) will be consolidated from volunteer's coolers to one (or more) coolers for transport to Vermont Agricultural and Environmental Lab (VAEL) in Randolph or to the Endyne Laboratory in Williston.

The Project Laboratory Contact or QA Coordinator (the "Lab Runner") will transport the samples to a pick-up point or to VAEL. If the sampling event includes *E.coli* samples, delivery to the Endyne Laboratory must occur by 12:00 Noon on the sample date. The Lab Runner must fill out the **Lab Runner Log** to document transport times and any incidents occurring during transport and/or delivery and filtering.

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