New York State Department of Environmental Conservation

Division of Water
Standard Operating Procedure:

Collection of
Water Column Samples for the
Rotating Integrated Basin Studies (RIBS) Program
As part of the Statewide Ambient Water Quality Monitoring Strategy

April 2020

Approval Signatures

Preparation/Revision: Gavin Lemley — 4/27/20
Date

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DOW Quality Assurance Officer — *Date*

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Note: Division of Water (DOW) SOP revisions from year 2016 forward will only capture the current year parties involved with drafting/revising/approving the SOP on the cover page. The dated signatures of those parties will be captured here as well. The historical log of all SOP updates and revisions (past & present) will immediately follow the cover page.

SOP 210 Update Log[1]

Prepared/Revised By:	Date	Approved By	Revision No:	Summary of Changes
John Donlon	04/2010	Rose Ann Garry	210-11 -1	
DOW Staff	03/2014	Jason Fagel	210-14 -1	
DOW Staff	03/2015	Rose Ann Garry	210-15 -1	
DOW Staff	04/2016	Rose Ann Garry	210-16 -1	Removed artifacts from historical procedures about timing duration of trips; updated mercury sample collection procedures; update of staff titles to provide consistency with QAPP
Alexander J. Smith	04/2017	Rose Ann Garry	210-18 -1	Update to include a new section on the collection of grab samples for general water column constituents at RIBS screening network sites
Alexander J. Smith	03/2018	Rose Ann Garry	210-18 -1	Updates to sample ID number and corresponding SOP and QAPP references. Fixed inaccuracies in Mercury preservation and bottle volume. Inserted contact information for new toxicity testing laboratory.
Jeff Lojpersberger, Gavin Lemley	04/2019	Rose Ann Garry	210-19-1	Inserted HABs Sampling language
Jason Fagel	05/2019		210-19-2	Updates to CH/DH Hg sampling procedures
Brian Duffy, Gavin Lemley, SMAS staff	04/2020		210-20.COV-1	Updates for COVID-19 procedural changes. Removed mention of field duplicate samples. Updated mercury preservation and holding time to reflect changes in 2019. Other minor updates for accuracy and consistency.

[1] The detailed 'Update Log' for DOW SOPs was adopted in 2016. The log may not be complete for updates conducted prior to 2016.

[2] 'Nonsubstantive changes' include updating references, correcting typographical errors, and clarifying certain language to make the document more useful and effective.

Table of Contents

1. Scope and Applicability

1.1 This standard operating procedure covers the collection of representative ambient flowing water column samples for the purpose of chemical, biological and physical analysis in the assessment of water quality for the Rotating Integrated Basin Studies (RIBS). It includes samples collected from streams and rivers of various depths and velocities using depth-integrating samplers, discrete -depth samplers, single grab samples, compositing and non-compositing techniques, field measurements, sample preservation, and quality assurance.

1.2 This document does not cover guidelines for planning water quality activities, the design of monitoring programs or data assessment.

1.3 This SOP is to be followed unless project objectives or physical conditions make it inappropriate. In such a case, the exact procedures followed, or deviations from the SOP must be documented on the field sheet or in the field logbook, and the information submitted to the Division of Water Quality Assurance Officer for possible incorporation into future updates to this SOP.

1.4 COVID-19 update: In order to minimize exposure and to protect staff while continuing to execute the core mission of Division of Water and its water quality monitoring programs, modifications were developed that incorporate social distancing recommendations driven by COVID-19. Modifications to protocols for collection of water quality data as part of the RIBS program and continued collection of quality data have been inserted in this document. All sampling scenarios described in this SOP require that samplers wear gloves throughout the day to minimize direct contact with equipment surfaces. This is in addition to described protocols requiring samplers to wear gloves to minimize sample contamination. Where applicable, all protocols within should be conducted in accordance with guidance provided in DOW Guidance for Field Work During COVID-19 Pandemic (SOP #603-20).

2. Summary of Method

2.1 The RIBS program sampling procedures are designed to provide the most representative samples, given time, staff and resource constraints.

2.2 COVID-19 update: Socially distanced sampling teams to respect social distancing

a. Samplers maintain separate duties and vehicles and adhere to SD protocols
b. All sampling duties should be determined for the pair of samplers prior to start of sampling day and plan should be adhered to for the duration of the day.
    i. Sampler 1 - duties include calibration and operation of multiprobe for collection of in situ parameters and all note taking and field sheet completion.
    ii. Sampler 2 - duties include collection of water quality samples including cleaning of sampling equipment and filling of sample bottles (including QC), preservation of samples in coolers.
    iii. Items such as traffic safety equipment may be assigned to whichever sampler the team designates and carried in that sampler's vehicle.
c. If crew is taking separate vehicles, equipment and supplies needed for each set of designated duties should be carried by samplers in respective vehicles.

2.3 A RIBS Quality Assurance Project Plan (QAPP) must be approved by the Division of Water's Quality Assurance Officer before any samples are collected.

2.4 Two distinct water quality sampling networks (screening network and routine network) exist in the RIBS program requiring different levels of rigor for sample collection method based on the network objectives.

2.5 Water chemistry sampling conducted at screening network locations is meant only to enhance macroinvertebrate assessments of water quality by providing some indication of possible sources of impact. Water column constituent data from the screening network is not meant to provide an exhaustive representation of in-stream condition over any length of time. Therefore, at screening network locations a direct grab sample is employed and considered adequate for the intended purposes of the network.

2.6 The routine network provides information on an annual basis for a large range of waterbodies statewide. Water column chemistry samples are collected four times, annually. These sites are co-located with United States Geological Survey (USGS) gage stations to facilitate loading calculations for TMDL development and other watershed planning initiatives. Therefore, given the anticipated use of these data greater representation of in-stream conditions is required of the sampling protocol. As a result sampling methods at routine sites utilize a composite sample collected from a cross section of the stream's width and depth for parameters that are amenable to compositing.

2.7 The collection of water column samples at multiple depths at routine sites is accomplished through the use of specially designed discrete depth water collection equipment such as Kemmerer water samplers, and flow-orienting depth integrating suspended-sediment samplers. Water column samples collected across a stream's depth and width are composited in a sample splitting churn. These methods may also be applied from time to time in special surveys of water quality where greater rigor than a direct grab sample is warranted. The details of these special surveys are typically contained in project specific quality assurance project plans (QAPPs) and are not covered here. However, the sampling methods used in these types of surveys may call upon the information contained within this SOP.

2.8 Parameters that may have their composition and proportions altered by compositing (e.g.phenols) are not to be field composited. Collection of water column samples for these parameters must be achieved through direct grabs similar to that used in the RIBS screening network or other special handling methods. Refer to the Procedures section of this SOP for specific water collection practices.

2.9 This SOP should be used in conjunction with the SOP #101-20.COV - Sample Handling, Transport, and Chain of Custody (COC), SOP #103-19 - Equipment Cleaning, SOP #211-20.COV - Calibration, Maintenance, and Storage of Multi-probe Meters used in Field Sampling and SOP# 212-19 Collection of Harmful Algal Bloom Samples (or most current versions). During sampling under COVID-19 and social distancing, further reference to SOP #101-20.COV and #211-20.COV equates to SOP #101-20.COV and SOP #211-20.COV,

3. Definitions

3.1 Composite sample: A sample that is made up of a number of grab samples that are collected from across a section of a stream's width and depth.

3.2 Depth-integrating suspended sediment sampler: A depth-integrating suspended sampler is designed to accumulate a water/suspended sediment sample from a stream vertical at such a rate that the velocity in the nozzle is nearly identical to that of the stream. This results in the collection of a sample that has a water/suspended sediment ratio similar to that of the stream.

3.3 Dip: One complete cycle of the depth-integrating suspended sampler from the water surface to the bottom and back again.

3.4 Field Blank: To assess the potential for contamination from field conditions during sampling. A container of deionized/distilled water is included with the supplies for a sampling event. At a predetermined sampling site, the field crew opens the designated container of field blank water brought into the field. The deionized/distilled water is exposed to the air for approximately the same amount of time that it takes to collect a sample then pours the water directly into parameter specific sample bottles. The field blank is processed along with the environmental samples.

3.5 Grab sample: A single discrete sample taken from a specific point and collected in the shortest time possible not to exceed 15 minutes.

3.6 Discrete Depth sampler: A device, such as a Kemmerer designed to collect water samples at designated points in the water column. The sampler is lowered to the desired depth by a rope with a weighted messenger attached. The silicone end seals are tripped closed with the messenger, sealing the bottle contents from any further contact with the stream water. See section 11.4 for detailed procedures on use.

3.7 Quality Assurance Project Plan (QAPP): A document that describes project-specific plans for sampling, analysis and quality assurance, quality control, to ensure the results of a project generate data of a quality necessary to address the project objectives

3.8 Representative sample: a small quantity from the population being studied that has the same biological, chemical, and physical composition and proportions as those present in the population being studied. It represents in time and space the conditions that are determined by the objectives and scope of the study.

3.9 Stream depth: The stream depth is the vertical height of the water column from the existing water surface level to the channel bottom.

3.10 Stream wetted width: The stream wetted width is the horizontal distance along a line from shore to shore.

3.11 Transect line: A line delineated by two points on opposite streambanks, used as a location reference in collecting multiple samples across a river or stream.

3.12 Transect: Sampling conducted at a point along the transect line across a river or stream.

3.13 Trip: A unit that refers to the number of times the depth-integrating suspended sampler and sample bottle are brought above the water surface and the collected water is emptied into a sample splitting churn.

3.14 Water column: The vertical section of water between the waterbody surface and the stream bottom.

4. Health and Safety Warnings

4.1 This standard does not address all safety concerns associated with conducting field sampling and the handling of chemical reagents. Staff are directed to follow the appropriate health and safety practices covered in the Division of Water Health and Safety Program Safety is more important than the task. Regardless of the reason, if conditions at the monitoring site are considered unsafe, suspend sampling, and leave the site. Be aware of, and assess potential safety concerns at each sampling location before beginning to collect a sample.

4.2 COVID-19 update: For Health and Safety concerns related to COVID-19 and social distancing refer to DOW Guidance for Field Work During COVID-19 Pandemic (SOP #603-20).

4.3 Always work with at least one partner when collecting ambient water quality samples.

4.4 Never wade in swift or high water. Use a wading rod to steady yourself and to test for deep water, debris, and muck.

4.5 Know what is upstream of a sampling site before entering the stream. An unexpected dam release could leave a sample collector stranded and in trouble in the stream.

4.6 Do not sample near or from power sources; power lines, and boat motors.

4.7 Wear and maintain assigned personal protective equipment. A reflective vest must be worn when sampling from a bridge.

4.8 Bridges with high railings must be sampled using proper equipment that allow samplers to maintain footing on the roadbed. Contact the sampling coordinator if you need to obtain this equipment.

4.9 Cover all cuts and abrasions before sampling.

4.10 Wear proper field clothing to prevent hypothermia, heat exhaustion, sunstroke, drowning, or other dangers.

4.11 Be fully aware of all lines of communication in case of an emergency. When working in remote areas, either on little traveled roads or away from roads, always carry a cell phone or other emergency communication device (if cell phone coverage is lacking or questionable), as described in the Division of Water Health and Safety Program.

4.12 When sampling from a boat, the field team should follow the boating safety procedures described in the Division of Water Boating Safety Program.

5. Personnel Qualifications

All staff responsible for collecting water quality samples for the RIBS project shall be familiar with the procedures outlined in this standard, the RIBS Quality Assurance Project Plan and the Division of Water Health and Safety Program, prior to conducting water quality sampling, and shall receive training as detailed in the RIBS QAPP.

6. Equipment and Supplies

The equipment needed for the collection of ambient water quality samples includes, but is not limited to the following:

6.1 Point samplers Kemmerer Water Sampler Depth-integrating suspended sediment sampler (Flow-orienting, US DH- 81 Adapter, or other similar DH model) and bottles.

6.2 Rod for use with DH-81.

6.3 Expandable Open Water Sampling Pole (“swing sampler”)

6.4 Sample collection bottles (1-quart Mason jars, 1-Liter plastic bottle or similar).

6.5 Sample containers as provided by analytical laboratories, ALS Environmental, NYSDEC Toxicity Testing lab or bacteriological laboratories.

6.6 Line and messengers

6.7 Rope

6.8 Sample splitting churn

6.9 Stainless steel pail

6.10 Maps

6.11 Personal protective equipment, including but not limited to; non-powdered Nitrile or latex gloves, boots and reflective vest, first aid kit, cell phone, and/or another emergency communication device.

6.12 Field sheets/log book, Chain of Custody forms (COC), pens, pencils, clipboard, and labels.

6.13 Global Positioning System (GPS)

6.14 Approved QAPP

6.15 Multi-parameter meter to measure pH, dissolved oxygen, specific conductance, temperature, and barometric pressure (YSI 556, Pro-Plus, or ProDSS, meter manual and/or quick calibration reference, copy of SOP, and calibration equipment). Cholorphyll-*a* and phycocyanin will be recorded when using a YSI ProDSS.

6.16 For filtering metals and DOC: GeoTech Peristaltic pump w/ 0.45 Micron Versapor dispos-a-filter™ and tubing for filtering soluble constituents prior to chemical analysis.

6.17 For filtering orthophosphate: 60 CC Syringes w/ Luer tip (ex. Krackeler 24-8881560224-CS) with syringe filters 0.45 µm (ex. Cole-Parmer EW-02915-92) for orthophosphate samples.

6.18 Tap water, Wet wipes for hand cleaning or hand sanitizer, Kim wipes or paper towels, garbage bags, waste container or bag

6.19 Deionized or distilled water

6.20 Coolers, wet ice, shipping tape and Zip-lock bags.

6.21 Pocket knife for HABs rock scrape sample (if needed)

6.22 COVID-19 update: For Health and Safety concerns and equipment and supplies used for minimizing risk related to COVID-19 refer to DOW Guidance for Field Work During COVID-19 Pandemic (SOP #603-20).

7. Prevention of Sample Contamination

7.1 Never eat, drink, or smoke when collecting and handling samples.

7.2 Always clean hands (soap and water, wet wipes, antiseptic cleaner) before and after collecting or handling samples. Sampling personnel should wear new, clean gloves at each sampling site. If gloves become contaminated, they must be replaced.

7.3 Protect sampling equipment from damage and ambient contaminants both during transport and sampling efforts. Contact with stream embankments, objects in streams, bridge rails, sides of boats and other objects, may compromise the integrity of equipment. And samples. *Extra care must be used when handling equipment made of brittle material to prevent breakage*

7.4 Sample integrity is critical in obtaining meaningful data from water quality samples. Introduction of contaminants into the sample from sampling equipment, sample preparation, sample handling, improper collection methods and the location of the sampling site can influence sample constituents. Following proper collection and handling procedures will help ensure sample integrity.

7.5 When collecting and transferring samples, one person (clean hands) is responsible for handling the sample bottles and ensuring that the sample is not contaminated by incidental contact with sampling equipment or other materials. The second person (dirty hands) is responsible for all activities that do not involve direct contact with the samples.

7.6 Following proper storage, cleaning, and handling of all sampling equipment will minimize the introduction of contaminants to the sample. Refer to the Division of Water SOP #101-20.COV

- Sample Handling, Transport, and Custody and SOP#103-19 Equipment /Cleaning (or most current versions) for proper procedures.

7.7 New sample splitting churns are to be washed with phosphate free liquid detergent (Liqui-Nox ®) prior to first use.

7.8 Avoid introducing more suspended sediment into the sample than is normally present in the water column. If the sampler hits the stream bottom, sediments that are stirred up may result in larger amounts of sediment in the sample than are present in the water column, resulting in erroneous data. Always enter a river or stream downstream of the sampling site and use caution when lowering sampling collection equipment to avoid stirring up bottom sediments.

8. Preparation for Sample Collection

The analysis of water column samples involves the detection of substances in low concentrations. It is important that the most appropriate sampling device be used to collect the water sample, and that sample integrity be maintained from the time of collection through analysis in order to reduce the possibility of sample contamination.

8.1 Prior to sample collection check bottle set received from the analytical laboratory to verify all required bottles are included and not broken. Contact the Sampling Coordinator (see current RIBS QAPP for staff assignments and contact information) if there are any issues with the bottle set.

8.2 A representative stream sample is essential as water constituents may vary over the cross section of a stream. Groundwater influence, point and nonpoint discharges, tributary inflows and channel characteristics are a few of the factors that influence water quality. Proper sampling site location and following appropriate sample collection procedures help ensure a representative sample is collected.

8.3 Since many pollutants adhere to suspended sediment particles in the stream, a representative water column stream sample must contain a representative proportion of sediment particles. This is accomplished by properly deploying the appropriate sampling device.

8.4 Do not rinse the sample bottles with the sampling medium unless directed specifically to do so. Bottles provided by the analytical laboratory are certified and pre-cleaned and do not require rinsing.

8.5 Avoid sampling near river or stream banks, piers, man-made obstructions, in stagnant water, or from an eddy, which may create variations in flow patterns.

8.6 Determination of the appropriate sampling method and device is based on stream type and parameters to be analyzed. The goal is to minimize loss or introduction of the parameter being analyzed and to ensure that the water sample is representative of the chemical, biological and physical characteristics of the stream being studied. See Section 9 for detailed procedures for selecting the appropriate sampling method.

8.7 Determine what special collection requirements, if any, are needed to maintain the integrity of the parameters to be analyzed. For example, a water sample cannot be aerated when collecting for volatile organics. If there is a question about special requirements, check with

The Sampling Coordinator (see current RIBS QAPP for staff assignments and contact information) for verification of parameter specific information.

8.8 Based on the parameters to be analyzed and quality control samples to be collected, determine the quantity (volume) of water that must be collected An additional two (2) liters of water is required to allow for proper rinsing of and mixing in the sample splitting churn. Refer to SOP # 101-20.COV Sample Handling, Transport, and Chain-of-Custody (or the most current version) for sub-sampling requirements from the sample splitting churn (filling of individual bottles to be filled for various parameters).

8.9 Assess the site's physical characteristics such as stream velocity, depth, width, sources of inflows and accessibility. Determine the number and location of sampling transects based on stream uniformity of flow (discharge) and field parameters (such as pH, water temperature, specific conductance, and dissolved oxygen). At a minimum five transects should be collected across the stream width. All transects should be equally spaced. In general, uniform streams require fewer transects while streams showing wider variations between flow and field parameters require more transects. To ensure a representative sample establish more transects with fewer trips/ dips.

8.10 Regardless of the method of collection, all sampling equipment employed should be free from contaminants prior to sampling. Refer to SOP #103-19 Equipment Cleaning (or the most current version).

8.11 Assemble the necessary sampling equipment and set up a clean work space away from automobile and boat emissions.

8.12 The first water sample collected at a sampling site is used to rinse the sampling devices and sample splitting churn.

8.13 When using depth-integrating suspended sediment sampler (DH-81), glass bottle containers, if possible, should be site-dedicated. Clean the nozzle according to SOP #103-19 Equipment Cleaning (or most current version).

9. Selection of Sampling Devices

For many sampling locations, selection of the sampling device must be done on arrival, since conditions vary throughout the sampling season. Some streams can be waded most of the year except for during high flows in the spring, so the sampling device may be different for different sampling events (see Figure 1).

9.1 Assess whether the river or stream can be safely waded. If it can be waded and the site is part of the routine network, use a hand-held depth-integrating suspended sediment sampler (DH-81 or similar model) to collect surface water samples. If it can be waded and the site is part of the screening network use a 1L glass or plastic sample bottle for a direct grab to collect surface water samples. These methods apply to collection of surface water for standard chemical parameters only (special collection methods for toxicity testing, phenolic samples, toxicity testing, filtering samples and quality control samples are detailed in sections 11.7-11.10).

9.2 In the case of a routine network site, if the stream cannot be waded then samples are to be collected using the Kemmerer sampler from a bridge. Where current speed is strong, a weight should be attached to allow the sampler to drop straight down through the water column. In the case of a screening network site that cannot be waded, sample collection should not be attempted.

9.3 For routine network sites, if there is no bridge at the site, either a boat must be employed to collect samples, see Section 11.5 for boat use with depth-integrating or point samplers or use the DH -81 with the expandable open water sampling pole from both banks, see section 11.3 for detailed procedures

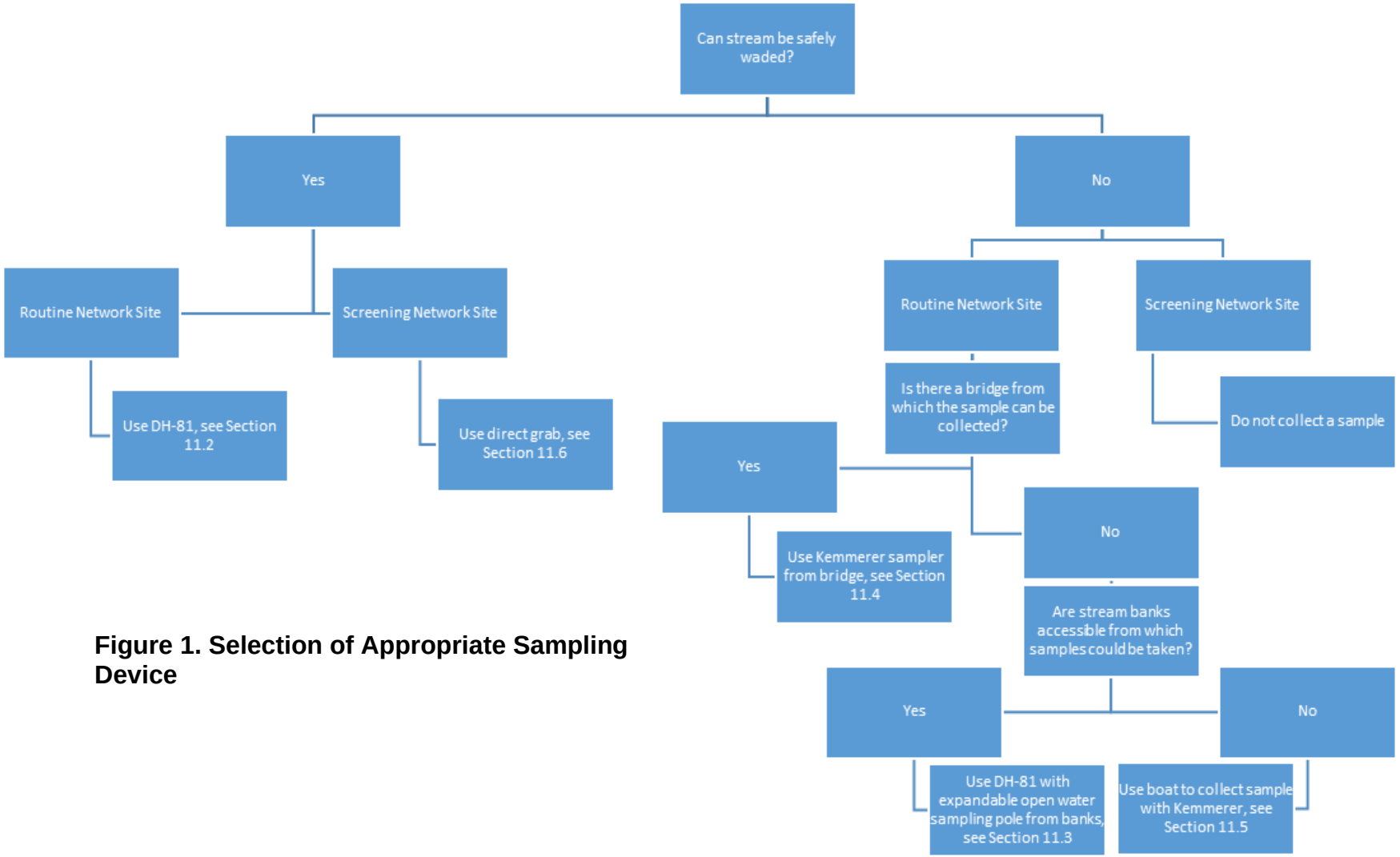

Figure 1. Selection of Appropriate Sampling Device

10. Collection of Field Parameters

Field parameter measurements (temperature, pH, conductance, dissolved oxygen, chlorophyll-a [ProDSS only] and phycocyanin [ProDSS only]) should be taken directly from the water column whenever possible, in the part of the stream that has a flowing volume of water. Do not sample in quiet waters near shore. If this is not possible because of a short cable or other problems with direct access to the water, collect water from the stream in a polypropylene bucket and place the probe into the bucket to measure the parameters. See SOP#211-20.COV Calibration, Maintenance, and Storage of Multi-probe Meters used in Field Sampling for calibration requirements.

10.1 Dissolved Oxygen (D.O) – Use a multi-parameter probe or a dissolved oxygen meter. Make sure that the equipment has been calibrated following the manufacturer's specifications or procedures in SOP #211-20.COV. Record both dissolved oxygen and percent saturation. Make certain the meter is recording the parameter in units that correspond to the units printed on the field sheet. If not, the meter must be reprogrammed for the units on the field sheet.

10.2 Specific conductance – Use a multi-parameter probe or an appropriate specific conductance meter. Make sure that the equipment has been appropriately calibrated following the manufacturer's specifications.

10.3 pH – Use a multi-parameter probe or a pH meter. When calibrating the meter, select a high and low pH buffer that reflect the expected pH range of the stream. Make sure that the equipment has been appropriately calibrated following the manufacturer's specifications. Record the pH value and if the meter being used is a YSI Model 556, record the millivolt output of the sensor on the field sheet.

10.4 Water Temperature – Use a multi-parameter probe. Temperature is a factory-calibrated parameter.

10.5 Barometric Pressure - Record the barometric pressure for the sampling date from a barometer, local airport or weather station report. Some multi-parameter meters have built-in barometers.

10.6 Chlorophyll-*a* and phycocyanin – Use a YSI ProDSS multi-parameter probe. Refer to SOP #211-20.COV for details. These parameters are currently only collected during RIBS screening sampling.

11. Collection of Water Samples

COVID-19 update: To minimize risk of exposure, DOW Guidance for Field Work During COVID-19 Pandemic (SOP #603-20) recommends maintaining social distancing. By adhering to predetermined roles, samplers will be able to maintain 6 feet of separation. Care should be taken during sampling protocols described below to be mindful of proximity of the other sampler and adhere to social distancing.

11.1 Samples for Low-level Mercury Analysis

11.1.1 **COVID-19 update: Samples or low-level mercury analysis will be suspended until appropriate protocols can be developed to allow for representative samples to be collected or social distancing recommendations have been lifted.**

11.1.2 **Collect trace Hg samples before all other activities at site.**

11.1.3 Before beginning sample collection, assess the area around the sampling site for potential sources of trace metal contamination. Consider the proximity to vehicle exhaust, corroded or rusted bridges, pipes, poles or wires and the prevalence of airborne dust/dirt. If possible, adjust sampling location to be out of influence of trace metal contamination. Note any potential contamination sources on field sheets.

11.1.4 Never smoke or directly breathe on the sample bottle/container.

11.1.5 Put on waders and any other site-specific safety gear except for gloves and other "clean" items.

11.1.6 Designate one person to be "clean hands" (CH). Only CH may contact the LL Hg sample bottle, including collection and transfer from and back to the inner sample bottle bag. CH once gloved is not to touch anything but the LL Hg bottle.

Designate the other person to be "dirty hands" (DH). DH has responsibility for handling everything **Except** the LL Hg bottle.

Members of the sampling team are to maintain the same CH/DH roles through the entire day of sample collection.

11.1.7 Bring the cooler and the personal protective equipment (PPE) storage container/bag to the water's edge. Place cooler and PPE storage container on a stable area, away from potential contamination sources. Except for retrieving items from or placing items in the cooler or the PPE storage container these containers are to remain covered/closed at all times. When the lid of the cooler or PPE container must be removed, always position the 'inside' of the lids so that it will not come in contact with any other surfaces.

11.1.8 Put on PPE:

11.1.8.1 All gloves to be used for LL Hg sampling will be stored in the PPE container and in the LL Hg bottle kit provided by the laboratory. There are two types of gloves used in the LL Hg sample collection process, LL Hg free gloves and powder free

general use nitrile sampling gloves. LL Hg free gloves will be bagged separately from the powder free general use nitrile sampling gloves. **Clean Hands (CH) will only wear the LL Hg free gloves** and Dirty Hands (DH) will wear the powder free general use nitrile sampling gloves.

11.1.8.2 The analytical laboratory will provide 1 pair of LL Hg free gloves bagged with the LL Hg sample bottle. CH will put on the DOW provided LL Hg free gloves before opening inner bag with the laboratory LL Hg free gloves. The LL Hg free gloves sent by the laboratory will be the outer pair of gloves for CH. There is no fundamental difference in the level of cleanliness between the DOW provided-LL Hg free gloves and the laboratory provided-LL Hg free gloves. Note: the purpose for using double gloves for CH is to minimize time needed to re-glove if during the sample collection process the outer pair of LL Hg free gloves becomes contaminated or compromised (ripped).

11.1.8.3 DH opens the PPE storage container, making sure the inside of the lid is not in contact with the ground and puts on two pairs of powder free general use nitrile sampling gloves.

11.1.8.3.1 DH then holds open the LL Hg free glove bag while CH opens inner glove bag and removes two pairs of LL Hg free gloves. An inner and outer pair of gloves. If the laboratory-provides a pair of LL Hg free gloves, CH would only remove one pair of LL Hg free gloves during this step.

11.1.8.3.2 Once CH has removed a pair of LL Hg free gloves they immediately put them on and does not touch anything except the LL Hg free sample bottle.

11.1.8.4 DH seals outer bag/ replaces lid on storage tub.

11.1.9 DH gets double-bagged sample bottle out of cooler.

11.1.10 DH unseals outer bag, holds open for CH. CH opens inner bag without removing it from the outer bag and removes the laboratory-provided outer gloves and puts them on. CH then removes the LL Hg free bottle and folds over (does not seal the inner bag) and stuffs it inside the outer bag.

11.1.11 From the time the sample bottle is removed from the inner bag, until the time it is returned, CH should make a reasonable effort to keep the container away from their body and clothing. Both samplers are to avoid breathing directly on the inner bag, sample container, or sample.

11.1.12 DH reseals outer bag, places bags back into cooler.

11.1.13 CH wades out to sampling location, approaching the sample point from downstream.

11.1.14 Facing and reaching upstream, CH plunges the still capped, empty sampling container underwater to the desired depth (4-6” below the surface), taking care to avoid any surface scum or sheens.

11.1.15 Holding the bottle away from their body, with the opening facing upstream, CH uncaps the bottle underwater, allows it to fill, and re-caps the bottle underwater (keep cap underwater during filling). Fill to the bottle to the shoulder, point where the bottle constricts to become the neck.

11.1.16 CH wades back to the bank and staging area.

11.1.17 DH removes bags from cooler and holds open outer bag for CH.

11.1.18 CH places sample bottle in the inner bag and re-seals.

11.1.19 DH re-seals outer bag and records details of the sample collection on the Sample Label that is secured to the outer bag.

11.1.19 DH returns bagged sample bottle to the cooler and completes any remaining sample notes/paperwork for LL Hg collection.

11.1.20 Perform Matrix Spike (MS)/Matrix Spike Duplicate (MSD) collection (if ordered for that sampling location)

11.1.20.1 Both DH and CH change gloves prior to performing MS. In most cases, changing only outer gloves is sufficient.

11.1.20.2 The sampling procedures from Sections 11.1.7 through 11.1.19 above are repeated with the designated MS sample bottle.

11.1.19.3 Both DH and CH change gloves prior to performing MSD. In most cases, changing only outer gloves is sufficient.

11.1.22.4 The sampling procedures from Sections 11.1.7 through 11.1.19 above are repeated with the designated MSD sample bottle.

11.1.21 Perform Field Blank (FB) procedure (if ordered for that sampling location)

11.1.21.1 Both DH and CH change gloves prior to performing FB. In most cases changing only outer gloves is sufficient.

11.1.21.2 DH opens cooler and remove bagged FB (a sample bottle filled with DI water)

11.1.21.3 DH opens outer bag and holds open for CH. If using the laboratory-provided outer gloves, CH should remove them from inside the outer bag and put them on.

11.1.21.4 CH removes FB from the inner bag, folds inner bag over, and stuffs back into the outer bag

11.1.21.5 DH reseals outer bag and returns it to the cooler

11.1.21.6 Standing parallel to the prevailing wind current as much as possible, CH opens the FB bottle and exposes the DI water to the atmosphere, while holding the cap in a manner so that it does not come in contact with clothing or any other object. The

exposure time should be roughly equal to the time it took to perform the sample collection. The FB is recapped at the conclusion of the exposure period.

11.1.21.7 DH removes the FB bag from the cooler and holds open for CH.

11.1.21.8 CH places the FB in the inner bag and reseals.

11.1.21.9 DH reseals the outer bag and records sampling information on the sample label secured to the outer bag.

11.1.21.10 DH places the FB in the cooler and returns the cooler to the vehicle.

11.1.22 Team removes PPE.

11.1.23 Completes any remaining sample notes/paperwork for LL Hg collection.

11.1.24 Collect other samples and readings at site.

11.2 **Depth-Integrating Suspended Sediment Sampler - Wading (DH-81 or similar model**)

11.2.1 This sampling method allows the collection of a water sample to be collected continuously through a vertical column of the stream depth.

11.2.2 Assemble the wading rod and nozzle head and secure the site dedicated collection bottle into the nozzle head.

11.2.3 Enter the water downstream from where the sample will be collected so as not to stir up bottom sediments at the sampling site.

11.2.4 Select the first transect point in the portion of the stream that appears to have the highest flowing volume of water.

11.2.5 The first water collected is used to rinse the sample splitting churn and determine the rate of descent/ascent and the number of dips. A uniform rate of descent/ascent should be maintained while raising and lowering the sampler through the water column. The transit rate is a function of the type of collection bottle or bag, size of sampler nozzle, and the desired sample volume.

11.2.6 After rinsing the sample splitting churn thoroughly discard the water downstream from the sample collection site.

11.2.7 Orient sampler with nozzle facing upstream and into the flow while standing downstream of sampler.

11.2.8 Lower the sampler through the water column to the bottom of the stream without disturbing the bottom sediment. Stirred up bottom sediments may enter through the nozzle, resulting in erroneous data. In the summer months when wading streams with very shallow water (less than 8 inches deep), remove the glass jar from the handheld sampler and dip directly into the water column, taking care not to disturb the stream

bottom. Note on the field sheet under sampling equipment “bottle” to reflect how grabs were taken.

11.2.9 Raise sampler to the water surface level. A uniform rate of descent/ascent (typical rate should be 1 ft/sec) should be maintained while raising and lowering the sampler through the water column.

11.2.10 One complete cycle from the water surface level to the stream bottom and back again is referred to as a "dip."

11.2.11 Repeat dips until the sample bottle is about 75% full and keep track of the number of dips on a field sheet. Do not fill the sample bottle more than 75%, as it will act as a sediment trap.

11.2.12 Each time the sampler and sample bottle is brought up and emptied into the churn is considered a "trip." A trip is made up of the same number of dips along each transect.

11.2.13 The number of trips to be collected at each transect is determined by the total volume of water that is required to fill all bottles and the number of transects.

11.2.14 The number of dips per trip depends upon the stream depth and the speed with which the sample bottle fills.

11.2.15 To ensure a representative sample establish more transects and fewer trips/ dips. Minimum 5 transects, typically 10 depending on stream width with 5-10 dips per trip to ensure representative sample.

11.2.16 Move to the next transect and continue the sample collection using the same number of trips and dips as was established at the first transect. The trips and dips must remain constant at all transects.

11.2.17 The number of transects, trips and dips should remain consistent for subsequent sampling events at the site and under similar conditions.

11.2.18 After sampling is complete, record the number of transects, trips, and dips, and any deviations from standard sampling procedures on field sheets or in a logbook.

11.2.19 Rinse the sampling equipment, including the site dedicated collection bottle and filtering equipment with distilled/deionized water (DI). After the DI rinse wipe the sampling churn and sampling devise with a Kimwipe®. Check to make sure there is no slime or residue remaining on the sampling devise or inside of the churn. Perform a second DI water rinse. The DI water rinse is to be done between sample sites and at the end of the sampling day.

11.3 **Depth-Integrating Suspended Sediment Sampler-with expandable open water sampling pole (DH-81 model)**

11.3.1 This sampling method allows the collection of a water sample to be collected continuously through a vertical column of the stream depth, while standing on the stream banks.

11.3.2 Assemble the pole and nozzle head and secure the site dedicated collection bottle into the nozzle head.

11.3.3 Follow remaining steps as above, 11.2.4 through 11.2.19.

11.4 Discrete Depth Point sampler--Kemmerer Sampler

11.4.1 Determine the number of discrete depths to be sampled using a Kemmerer sampler by following the guidance in Section 8.9. The more homogeneous the stream flow the fewer discrete depth samples are needed, at a minimum, three depths--top, middle and bottom-- are required at each sampling transect. Take the sample from the deepest depth first then move up the water column to the middle section, and finally to the top section. When lowering the sampler to the deepest depth use caution not to stir up bottom sediments.

11.4.2 Set sampler to the open position by following the manufacturer's instructions for setting the end seals. This is done by either pulling the trip head into the trip plate or by holding the top and bottom stoppers and giving a short, hard pull to the bottom stopper.

11.4.3 Lower the sampler to desired depth while holding the messenger and feeding the sampler cord through the sampler. Release the messenger or trip mechanism used to close both of the end seals.

11.4.4 Raise the sampler, remove the lid from the sample splitting churn, and pour water from the drain valve or one of the sampler ends into the churn. Replace the churn lid between pours to prevent debris from contaminating the sample.

COVID-19 update: If a second sampler (a second set of hands) is needed for removing the churn lid between pours, social distancing rules should be adhered to (*i.e.*,the sampler operating the Kemmerer should step 6 feet away from the churn to allow the second sampler to remove the churn lid).

11.4.5 Rinse the sampler and sample splitting churn with the first collected water.

11.4.6 Repeat the above steps at each of the desired depths and transects across the stream for actual sample collection (see Section 8.8).

11.4.7 After sampling at a site is completed, rinse the equipment with distilled/deionized water. After the DI rinse, wipe churn or sampling device with DI and a Kimwipe, rinse again with DI water. After churn is rinsed run DI water thru the filtering set-up; tube, filter and pump. DI water rinse is to be done between sample sites.

11.4.8 After sampling is completed for the day, rinse the point sampler with distilled/deionized water, let dry in the “opened” position and store the sampler in the “closed” position.

11.5 Boat Sampling – Depth-Integrating or Point Sampler

11.5.1 Follow steps as outlined for discrete depth sampler with the following precautions.

11.5.2 COVID-19 update: As recommended by DOW Guidance for Field Work During COVID-19 Pandemic (SOP #603-20), boat sampling should be conducted only where appropriate social distancing can be maintained.

11.5.3 Field team must follow the boating safety procedures as described in the Division of Water's Boat Safety program.

11.5.4 When possible turn off the boat motor and anchor properly before sampling.

11.5.5 Designate one person to run the boat and a second to collect the sample to avoid possible contamination from boating operations.

11.5.6 Take care to prevent sampling equipment from swinging into the sides of the boat or any nearby structures such as piers or docks.

11.6 Direct Grab

A single grab sample taken directly in the stream is the most efficient way of collecting water column samples for screening network sampling locations or at routine network locations when the nature of the parameter to be analyzed is not amenable to field compositing collection techniques. If a direct sample cannot be collected, the sample collection equipment must be constructed of an inert material or material compatible with the parameter being analyzed. Ropes or extension poles can be used to lower collection equipment into the water column. Detailed procedures for the most commonly collected parameters are listed below.

11.6.1 Enter the water downstream from where the sample will be collected.

11.6.2 Select the area of the stream having the representative flow.

11.6.3 Face upstream and into the flow.

11.6.4 Orient a site dedicated collection bottle (1L plastic or 1-quart Mason jar) with the opening towards the flow and in front of you. For some grab samples where compositing is not preferred, for example samples for phenols, mercury, or bacteria, the collection bottle will double as the sample bottle used for shipment to the laboratory.

11.6.5 To avoid introducing surface scum keep the collection bottle or sample container capped, and invert the sample container before submerging.

11.6.6 Lower the collection bottle or sample container 6 to10 inches below the water surface.

11.6.7 Uncap the collection bottle or sample container underwater to avoid introducing surface scum into the bottle.

11.6.8 Tilt the collection bottle or sample container to a 45-degree angle with the flow and hold it steady. Avoid agitation or aeration to the sample.

11.6.9 Allow the collection bottle or sample container to fill with water.

11.6.10 Cap the collection bottle or sample container while it is still submerged underwater. For non-composite sample, collection is complete.

11.6.11 For general water chemistry parameters, excluding phenols and mercury, empty the contents of the collection bottle into the sample splitting churn. Use of the sample splitting churn facilitates the collection and mixing of an adequate volume of water to fill all required

sample containers. The mixing provided by the churn ensures that each of the sample containers represents the entire volume of water collected at each site. Follow the procedures for preparing and handling the sample splitting churn (Sections 11.2). Continue to add additional grab samples from the collection bottle to the churn until sufficient volume has been obtained for the sample analyses required. Using the churn, split sample among necessary sample bottles following methods defined in depth integrated suspended sediment and discrete depth point sampling (Sections 11.2, 11.3, and 11.4 respectively).

11.6.12 As in the procedures outlined for depth-integrated sample collection (Sections 11.2), follow rinsing procedures for collection bottles and sample splitting churn.

11.7 Phenolic Compounds

11.7.1 Phenol Direct Grab - Do not composite sample.

11.7.1.1 Select the area of the stream having the representative flow.

11.7.1.2 Continue by following procedures in Section 11.6 for a direct grab sample. Collect a grab water sample directly into a glass sample container. Note: These sample bottles contain preservatives, do not rinse or overfill bottle

11.7.2 Phenol Alternative Method –Expandable Open Water Sampling Pole ("swing sampler").

11.7.2.1 Do not composite sample.

11.7.2.2 Use Expandable Open Water Sampling Pole ("swing sampler") with glass bottle attached.

11.7.2.3 Select area of the stream with the representative flow that can be accessed safely.

11.7.2.4 Collect a grab water sample with swing sampler. Minimize agitating the sample.

11.7.2.5 Fill the phenol bottle directly from this collection bottle.

11.8 Toxicity Testing – Bridge and Wading

11.8.1 Sampling from a bridge

11.8.1.1 Composite sample following the procedures outlined in Section 11.4.

11.8.1.2 ***Note: These bottles must be rinsed***. Rinse the sample container three times with the site water.

11.8.1.3 Fill the sample bottle to the neck with the composite sample that was collected into the churn.

11.8.2 Sampling - Wading

11.8.2.1 For streams wider than 15 ft composite sample directly into sample bottle taking a portion of sample from a number of transects across the stream. Collecting an equal volume from each transect. For streams less than 15ft wide select the area of the stream's most representative flow (i.e., mid-stream and at mid-depth).

11.8.2.2 Face upstream into the flow

11.8.2.3 Rinse the sample container three times with site water.

11.8.2.4 Orient sample container in front of you and with the opening towards the flow

11.8.2.5 Uncap the sample container. Invert the uncapped sample container and allow the container to fill with water.

11.8.2.6 Fill the sample container to the neck and cap.

11.9 Filtered Samples—dissolved metals, dissolved organic carbon, orthophosphate

11.9.1 For dissolved metals and dissolved organic carbon samples, water should be drawn from the sample splitting churn and filtered through a 0.45 micron filter. To ensure consistency throughout the RIBS program, filtering equipment will be provided by the Central Office staff and consist of (1) Geo-pump Peristaltic Pump Series I, (2) Tygon tubing, and (3) Versapor Filter capsule with 0.45µm- Dispos-A-Filter.

11.9.1.1 The filter capsules are designed to filter large volumes of water and should be sufficient to process all sampling locations for dissolved metals analysis for one day. If flow conditions are such that the filter becomes visibly clouded or the flow becomes diminished during filtering, the cartridge should be replaced immediately and noted on sample field sheets.

11.9.1.2 It is not necessary to continue churning during filtration since filtered samples are to be drawn after the collection of whole water samples (unfiltered, raw water).

11.9.1.3 Set up pump in a clean area in the sampling vehicle. Attach the pump to a power source in the sampling vehicle.

11.9.1.4 Put on a pair of clean disposable gloves. Obtain a filter capsule and the appropriate laboratory bottle with an affixed label with the dissolved notation.

11.9.1.5 Remove the protective cap from one end of the filtration tubing and place the end of the tubing into the sample water in the churn. Make sure the cap is kept clean.

11.9.1.6 Remove the plastic packaging from the filter capsule. Store filter capsule in original packaging between sampling sites to minimize cross-contamination.

11.9.1.7 Remove the adapter from its plastic container. Attach the threaded end of the adapter to the appropriate end of the filter. Note the arrow indicating the path of flow on the filter.

11.9.1.8 Attach the barbed end of the adapter to the other end of the filtration tubing (after removing the protective cap). Remove the bottle top from the sample container. Place the cap in a clean spot.

11.9.1.9 Turn on the pump. Rinse the filtering system (tubing and filter) for at least 30 seconds before beginning collection of filtered sample. This is a rinse and is to be discarded. Check filter for the presence of air bubbles. If any bubbles are seen, gently shake the filter to eliminate bubbles before continuing to collect the sample.

11.9.1.10 Continue to filter filling the dissolved parameter sample containers.

11.9.1.11 Shut off pump.

11.9.1.12 Place the bottle into the shipping cooler.

11.9.1.13 Remove the tubing from the sample water contained in the churn

11.9.1.14 Purge the filter and tubing by turning on the pump allowing the water in the tubing and filter to empty. Elevate the end of the tubing from the churn, keeping the filter lower than the pump to expedite the process. When finished, rinse the tubing and the filter with DI or tap water. The tubing and filter are stored in a plastic bag between sites.

11.9.1.15 Replace the protective cap on both ends of the filtration tubing and the packaging over the filter. Filters are high volume, and may be reused at other sites sampled the same day. Filters are to be discarded after each day of sample collection. Do not reuse this filter if you believe the current site will carry over contaminants into the water sample of the next sampling site, or if flow has been substantially reduced due to a clogged filter.

11.9.1.16 Unplug pump. Cover unit to keep it free from dust and debris in its carrying case.

11.9.1.17 At the end of the day, discard the filter. Make sure the tubing is free of sample water; rinse with distilled/deionized water.

11.9.1.18 Place the adapter in the plastic container and make sure the protective caps are put on the ends of the filtration tubing.

11.9.2 For the Ortho P filter process obtain a 60 CC single use disposable Luer tip syringe and 0.45 µm disposable filter

11.9.2.1 With clean gloved hands extract water from sampling churn by submerging tip of syringe in churn water, hold syringe body with one hand pull plunger with free hand until syringe is full.

11.9.2.2 Insert disposable filter on syringe and discharge water through filter directly in to lab supplied bottle for Ortho P, discard syringe and filter.

11.10 Harmful Algal Bloom Samples

11.10.1 The type of HAB sample to be collected (shorebloom, river sample or rock scrape) and the specific methods to be utilized will depend on the project specifications and should be detailed in the project-specific QAPP and conditions present at the site at the time of collection. The procedures are established in SOP# 212-19 Collection of Harmful Algal Bloom Samples. The three most common HABs sample types used to be collected in rivers are below.

11.10.2 Shorebloom (SB): To be collected when HABs are visually apparent, SB samples are collected at the location along the shoreline with

the perceived densest concentration of HABs, often at the windward shoreline or along the shore in protected coves, where material can accumulate and tends not to mix. SB samples are direct grab samples that that are collected by skimming the water surface to collect HABs material. Samples are to be collected directly into sample bottles.

11.10.2.1 Label the bottle with the sample date and time, location/site names, and name of sample collector per project-specific QAPP.

11.10.2.2 While wearing disposable vinyl gloves, skim the bottle just below the surface of the bloom, capturing both water and bloom material.

11.10.2.3 Allow the bottle to fill with water and bloom material.

11.10.2.4 Cap the bottle, rinse off any algae or other materials deposited on the outside of the bottle.

11.10.2.5 Dispose of vinyl gloves**.**

11.10.2.6 Record the sample information per project-specific QAPP.

11.10.3 Raw water (R): R samples are direct grab samples collected in flowing water systems in areas where a HAB is not visually apparent. These procedures are established in SOP# 210-20.COV Collection of Water Column Samples for the RIBS Program but should be modified to collect directly into the sample bottle rather than a compositing sample container.

11.10.4 Rock Scape (S): S samples are collected by compositing discrete collections of epiphytic material taken from several rocks throughout the site. These procedures are slightly modified from those established in SOP# 208-19 Biological Monitoring of Surface Waters in New York State

11.10.4.1 Samplers will target visible accumulations of benthic algal growth, but if none is apparent, up to 4 rocks (pebbles, cobbles or boulders) will be collected from throughout the site and their surfaces will be scraped with a sharp knife into the sample bottle.

11.10.4.2 Ambient water can be added to the bottle to aid in washing off the knife or scraper.

11.11 Quality Control Samples

11.11.1 Equipment Blanks: Equipment blanks are collected to determine if sample contamination for any parameter might be occurring via contaminated sampling equipment. Therefore, deionized/distilled water must be run through all the equipment used to collect the environmental samples. After rinsing all equipment with DI water, fill the sampler with DI water, swirl it gently to make certain the water contacts all inner surfaces, then pour into the churn. Approximately 10 liters of the deionized/ distilled water are needed. After filling the

churn, process as a normal RIBS sample. Equipment blanks will have the suffix 'EB' added to the sample ID.

11.11.2 Matrix Spikes/Matrix Spike Duplicates (MS/MSD): Due to the larger volume of sample required by the analytical laboratory, collect approximately 10 liters of sample water, and process an additional bottle set as a regular sample. All MS/MSD bottles must be labeled as such.

12. Troubleshooting

12.3 **Sampling schedule** - Adhere to the sampling schedule whenever possible. Based on yearly agreements, the analytical laboratories expect a specific number of samples each week as part of a sample delivery group (SDG), which is a group of samples that all move together through the analytical processes in the lab. If all scheduled samples cannot be collected during the assigned week, contact Sampling Coordinator (see current RIBS QAPP for staff assignments and contact information) . This may involve sending someone from Central Office to sample or a rescheduling of sampling. The Sample Coordinator must also contact the analytical laboratory if rescheduling is to occur.

12.4 **Construction** - If a sampling bridge is found to be under construction or repair, the possibility of sample contamination due to these activities must be considered, and a decision made whether to proceed with sampling. If possible, talk with the work crew to find out the length of time the bridge will be under construction. If the bridge is closed to traffic, you may still be able to walk out and collect the sample. If the construction activities have altered the flow of the river or stream through temporary dams or supports, such alterations must be noted on the field sheets. If the bridge is under major repair, sampling may have to be cancelled for a period of time, or the site moved. Contact the Sampling Coordinator for resolution.

12.5 **Broken equipment or supplies**

12.5.1 Try not to cancel sampling. Improvise but remember not to compromise the collection of a representative water column sample. Note ALL modifications from standard procedures on the field sheet.

12.5.2 Recalibrate the multiprobe meter if you suspect the validity of any reading. For dissolved oxygen, recalibrate if there is any significant change in barometric pressure or altitude. If the multiprobe meter is not functioning, continue collecting water samples.

12.5.3 If pump filter or tubing are clogged or otherwise not working, and thus, the dissolved metals containers cannot be filled, collect the remainder of the samples where the container is filled directly from the churn. Contact the Sampling Coordinator immediately upon return to office for replacement parts. Make note on the Chain of Custody to the lab that all or some of the dissolved metals samples have not been filtered.

12.5.4 If there are any problems with the functioning of the churn, contact the Sampling Coordinator immediately upon return to office for replacement or replacement parts.

12.5.5 If there is a missing or broken container from the set of bottles sent by the analytical laboratory, collect the remainder of samples. **Note on the field sheet and chain of custody which parameters were not collected**.

12.5.6 Notify the Sampling Coordinator of broken equipment or to replenish supplies. If equipment needs to be repaired, coordinate with the Sampling Coordinator to send equipment to the manufacturer for repairs. The Sampling Coordinator may supply spare equipment to use in the interim.

13. Post-Sampling Procedures

13.3 Discrete Depth samplers should be rinsed with distilled/deionized water after sample collection is completed at the end of each day and allowed to dry in the "open" position.

13.4 The sample splitting churn should be rinsed thoroughly with distilled/deionized water after sample collection is completed at the end of each day.

14. Sample Handling, Transport, and Chain-of-Custody

14.3 Samples must be handled in accordance with the NYSDEC DOW SOP# 101-20.COV for Sample Handling, Transport, and Chain-of-Custody.

14.4 Chain of Custody Record/Laboratory Request Form (Figure 1) must be completed by sampling personnel and submitted to the analytical laboratory with the samples. Complete the form as follows:

14.4.1 Project Name: RIBS Routine

14.4.2 Contact: [Current Sampling Coordinator, See current RIBS QAPP for staff assignments]

14.4.3 Sample ID/Date/Time:
Water column samples are assigned sample ID numbers that are a combination of three - four elements depending on the type of sample, i.e. water sample or QAQC water sample: Station_ID (NYSDEC assigned) + MMDDYYYY (date) +W (for "Water" matrix), for a water chemistry sample. For QAQC water samples one of the following "EB" for equipment blank, "FB" for field blank, "MS" for matrix spikes and matrix spike duplicates is added to the end of the sample ID. These groupings create a unique element for each station visit, required by the Stream Monitoring and Assessment Section Database.

For example, the ID consists of the following components, in this exact order, and separated by a "-" for an equipment blank QAQC water sample from a tributary to the Lower Hudson River: 12-LHUD_T2-1.3-MMDDYYYY-W-EB:

- Station_ID
  - Basin Number (ex: 12)
  - LOCATION ID (ex: LHUD_T2)
  - Date (MMDDYYYY)
  - River mile (ex: 1.3)

- Matrix medium abbreviation (ex: W)
- Quality Control Identifiers (ex: EB)

14.4.4 Analysis Requested: Indicate in the appropriate columns of the form which groups of parameters are to be analyzed (e.g., RIBS Routine or Screening suite, Mercury 1631, etc.). Also indicate whether the sample has been acidified.

14.4.5 Figure 2. Analytical Laboratory Services Chain of Custody/Sample Submission Form

CHAIN OF CUSTODY — Page _1_ of _1_

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation
Division of Water

Project Name: **RIBS ROUTINE**	Case Code: **RIB20**	NYSDEC SDG: **042720R9W** ([Monday's MMDDYY][team][matrix])
Contract No.: **C010495**	Sampler Collector:	Sampler Phone No.:
Project Coordinator: Gavin Lemley	☐ **Report to Project Manager**	☐ **Bill to Project Manager** Bill to: **Jason Fagel**
Address: **425 Jordan Rd, Troy, NY 12180**	Address: **625 Broadway, 4th Floor Albany, NY 12233-3502**	Address: **625 Broadway, 4th Fl Albany, NY 12233-3502**
Phone: **518-402-8202**	Phone: **518-402-8156**	Phone: **518-402-8156**
Email: **gavin.lemley@dec.ny.gov**	Email: **StreamData@dec.ny.gov**	Email: **Jason.fagel@dec.ny.gov**

Matrix Codes: WW = Wastewater; GW = Groundwater; W = Ambient Water; SE = Sediment; SL = Sludge; T = Tissue; O = Other __DI WATER____

Analyses Ordered (list)

Preservative Codes: (Please include in (...) on "Analyses Ordered" line): 1 = Cool to < 6°C; 2 = 0.008% $Na_2S_2O_3$; 3 = H_2SO_4 to pH < 2; 4 = HNO_3 to pH < 2; 5 = NaOH to pH > 12; 6 = 5 mL/L 12N HCl; 7 = 5 mL/L BrCl; 8 = HCl to pH < 2; 9 = H_3PO_4 to pH < 2; 10 = Protect from light; 11 = Freeze to < -10°C; 12 = Other

SITE ID	Collection Date	Matrix Code	EQUIP. Blank (EB)	FIELD Blank (FB)	MS/MSD	Collection Time	No. of Containers	RIBS ROUTINE	MERCURY			Location Info/ NYSDEC Notes	Lab Sample ID/ Lab Notes
03-EMIL-5.1	4/ /20	W						x					
01-BUFF-1.7	4/ /20	W						x					
01-TONA-19.4	4/ /20	W						x					
01-TONA-19.4	4/ /20	W			X			x					
01-TONA-19.4	4/ /20	W	X					x					

Special Analysis Instructions:

Special Reporting Instructions:
Sample ID to be reported as: **"SITE ID-collection date (MMDDYY)-Matrix Code-[Quality Control Code if noted (EB/FB)]"** (dashes included)
EXAMPLES: "13-ROND-9.9-101018-W" (regular field sample)
"13-WALK-18.6-101018-W-EB" (equip. blank sample)

Relinquished by Sampler:	Date:	Time:	Received by:	Date:	Time:	Laboratory Receipt Notes:
Relinquished by:	Date:	Time:	Received by:	Date:	Time:	Sample Temp.: _____ °C Properly Preserved: Y / N Samples Intact: Y / N

14.5 *Shipping Procedures*

To safely ship samples please follow the guidelines as described in NYSDEC-DOW SOP#101-20.COV and note the following conditions:

14.5.1 During the summer, coolers may be pre-chilled by placing wet ice or ice packs into the coolers prior to adding the bottles with collected samples. Samples should be shipped only with "wet" ice and not with ice packs ("blue" ice).

14.5.2 Group all containers from the same site together in a labeledplastic zipper bag inside the same cooler. The lab will separate the samples upon their arrival. All bottles should be placed in an upright position.

14.5.3 All samples must be shipped on the day of collection due to short holding times of many parameters.

14.5.4 Do not mail samples on a Friday or when the following day is a holiday. They will not be unpacked until the following Monday, and some parameters will be beyond the holding time.

14.5.5 Mailing addresses for RIBS Sampling Program analytical laboratories for water samples are as indicated below:

ALS Life Sciences | Environmental (for chemistry samples)
ATTN: Janice Jaeger
1565 Jefferson Road, Building 300, Suite 360
Rochester, NY 14623
Telephone: (585) 288-5380

AquaTOX Research, Inc. (for toxicity testing samples)
ATTN: Frank Doherty
1201 E. Fayette Street
Syracuse, NY 13210
Telephone: (315)479-1499

Upstate Freshwater Institute (for HABs SB and R samples)
ATTM: Gina Kehoe
224 Midler Park Drive
Syracuse, NY 13206
Telephone: (315) 431-4962 ext. 115

SUNY ESF (for HABs R and RS samples)
Boyer Lab
Attn: Dominique Derminio
307 Stadium Place
341 Jahn Lab
Syracuse, NY 13210

14.5.6 Sample coolers will be shipped by UPS. Telephone the courier service for sample pick up or drop coolers off at a shipping facility If problems arise, contact the Sampling Coordinator. Use preprinted UPS labels and ship according to Central Office instructions received at the beginning of the sampling season.

15. Data and Records Management

15.3 Field sheets (Table 3) provide a record of each sampling event. It is very important that field sheets are filled out completely. The information is necessary use of the data (for

example, when results are put into the database, sampling equipment must be recorded. If the field sheet does not indicate which sampling device was used, the information in the database will be incomplete. Field sheets are used to record:

15.3.1 A description of the sampling site including latitude and longitude;

15.3.2 *In-situ* measurements of water quality with appropriate units--water temperature, dissolved oxygen, pH, specific conductance, and algal parameters as well as barometric pressure used in calibrating the multiprobe meters;

15.3.3 Field observations sufficient to reconstruct the sampling event without relying on the sample collectors' memories, including sample collectors' names, date and time of sample collection, and weather conditions; and flow observation

15.3.4 The specific samples that were collected, including the type of analyses requested and the number of transects, trips and dips.

15.4 If for any reason changes are made to the sampling procedures as stated in SOP, record the change on the field sheets.

15.5 Central Office staff will supply field sheets to sampling teams with the sampling location and station ID pre-printed. Sampling teams are to copy the "master" sheet and fill in the date and time the sample is collected for each sampling event. The date and time on the field sheet **must** match the date and time recorded on the lab sheets and labels. The sample delivery group (SDG) number and the names of the sampling staff **must** also be entered on the field sheets. The sample delivery group (SDG) number is made up of 6 numeric and 1 alpha characters. The first 2 numbers indicate the month of sampling (ex. 05 for May, 10 for October) and the next 2 numbers indicate the Monday date of the week the sample is collected, numerals 5 and 6 are the year, the last character is W, for a water sample. A copy of each completed RIBS field sheet (Figure 2) must be sent to the Central Office within 30 days of sample collection by US mail, or scanned and emailed. Central Office staff use the field sheets to enter information into the Stream Monitoring and Assessment Section Database, in preparation for uploading to the EPA data warehouse (STORET).

15.6 Each set of equipment includes a logbook that serves as the record of calibration checks, repair work, routine maintenance and cleaning performed on the instrument. Dates, times, comments, and names of individuals performing the work are to be noted in the logbooks. The recording of the calibration data, maintenance, and repair work is necessary to counter challenges to the quality, integrity and acceptability of the field data.

16. Quality Assurance/Quality Control

16.3 The samples that are collected for analyses must accurately represent the stream being sampled and be unaffected by the collection procedures. The objective of this quality assurance methodology is to establish and maintain standards that will ensure the integrity of the water samples collected.

16.3.1 Prior to use, check all equipment to ensure good operating condition and cleanliness.

16.3.2 Follow manufacturer's specifications in carrying out routine maintenance on sampling equipment.

16.3.3 To the extent possible and practical, backup equipment should be available.

16.3.4 All sampling equipment (buckets, churn, sampler, etc.) should be cleaned and rinsed with distilled (de-ionized) water. Refer to SOP#103-19 Equipment Cleaning.

16.3.5 At each sampling site, equipment should be rinsed with ambient water before a sample is collected and rinsed with distilled water after sampling is completed for the day.

16.3.6 After sampling a site that has known or suspected contamination problems, sampling equipment should be washed with a phosphate free detergent, then scrubbed with water, and finally rinsed with distilled water.

16.3.7 A record of equipment cleaning, and calibration should be maintained in a dedicated equipment log book.

16.3.8 Whenever possible, use site-dedicated sample collection equipment; if this is done, note on the field sheet.

16.3.9 Whenever possible, over the course of the day, sampling should progress from the sites with the best water quality to the poorest.

16.3.10 The sample equipment must be appropriate for the samples being analyzed.

16.3.11 All instruments used in the field must be calibrated following manufacturers' instructions. Frequency for calibrating instruments should be based on these sources as well. At a minimum, instruments should be calibrated once during each week of sampling, and Dissolved Oxygen must be calibrated daily before sampling. All calibrations must be recorded in the instrument’s logbook.

16.3.12 Sampling equipment should be replaced when the equipment is damaged (scratches, nicks or dents) exposed to highly contaminated waters, or when routine equipment cleaning is impaired.

16.3.13 All sampling equipment should be stored covered or wrapped and maintained in a manner that minimizes or prevents contamination from ambient sources.

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TABLE 1 – SAMPLE HANDLING SPECIFICATIONS –Water Column					
Parameter	**Sample Type**	**Sample Container**	**Bottle Filling**	**Preservation Method**	**Holding Time**
Alkalinity	Composite or Grab w/ mixing (collect from churn)	Plastic; Glass	NO HEADSPACE; do not aerate	Chill to ≤6ºC	48 hours
Ammonia	Composite or Grab w/ mixing	Plastic; Glass	Fill to neck	H2SO4 Chill to ≤6ºC	48 hours
Chloride	Composite or Grab w/ mixing	Plastic; Glass	Fill to neck	Chill to ≤6ºC	48 hours
Carbon, *total organic*	Composite or Grab w/ mixing	Glass	To top	H2SO4 Chill to ≤6ºC	28 days
Carbon, *dissolved organic*	Composite or Grab w/ mixing, Filtered	Glass	To top	H2SO4 Chill to ≤6ºC	28 days
Chlorophyll-*a*	Composite or Grab w/ mixing	Amber glass	Fill to neck	Chill to ≤6ºC	48 hours
Chlorophyll-*a direct field measurement*	In-situ	none	N/A	N/A	N/A
Conductance-*direct field measurement*	In-situ	none	N/A	N/A	N/A
Conductance-*laboratory measurement*	Composite or Grab w/ mixing	Plastic	Fill to neck	Chill to ≤6ºC	48 hours
Dissolved Oxygen-*direct field measurement*	In-situ	none	N/A	N/A	N/A
Fluoride	Composite or Grab w/ mixing	Plastic only	Fill to neck	Chill to ≤6ºC	48 hours
Hardness	Composite or Grab w/ mixing	Plastic; Glass	Fill to neck	HNO3 Chill to ≤6ºC	48 hours
Harmful Algal Blooms	SB or R: Grab	Plastic; Glass	Fill to neck	None	48 hours
Metals, *Total Recoverable*	Composite or Grab w/ mixing	Plastic; Glass	Fill to neck	HNO3 Chill to ≤6ºC	6 months
Metals, *Dissolved*	Composite or Grab w/ mixing, Filtered	Plastic; Glass	Filter	HNO3 Chill to ≤6ºC	6 months
Mercury, *Total Low Level*	Grab	Glass; Teflon	Fill to shoulder	No preservative* / Chill to ≤6ºC	48 hours

TABLE 1 – SAMPLE HANDLING SPECIFICATIONS –Water Column					
Parameter	**Sample Type**	**Sample Container**	**Bottle Filling**	**Preservation Method**	**Holding Time**
Nitrate-Nitrite	Composite or Grab w/ mixing	Plastic; Glass	Fill to neck	H2SO4 Chill to ≤6ºC	48 hours
Nitrate	Composite or Grab w/ mixing	Plastic; Glass	Calculated value	--	calculated value
Nitrite-NO_2	Composite or Grab w/ mixing	Plastic; Glass	Fill to neck	H2SO4 Chill to ≤6ºC	48 hours
Nitrogen, Kjeldahl	Composite or Grab w/ mixing	Plastic; Glass	Fill to neck	H2SO4 Chill to ≤6ºC	48 hours
pH-*direct field measurement*	In-situ	none	N/A	N/A	N/A
pH-*laboratory measurement*	Composite or Grab w/ mixing	Plastic	Fill to neck	Chill to ≤6ºC	48 hours
Phenolic Compounds	Grab	Amber Glass only	Fill to Top	H2SO4 Chill to ≤6ºC	48 hours
Phosphorous, *Orthophosphate*	Composite or Grab w/ mixing, Filter	Plastic; Glass	Filter Fill to neck	Chill to ≤6ºC	48 hours
Phosphorous, Total	Composite or Grab w/ mixing	Plastic; Glass	Fill to neck	H2SO4 Chill to ≤6ºC	48 hours
Phycocyanin-*direct field measurement*	In-situ	none	N/A	N/A	N/A
Solids: Total	Composite or Grab w/ mixing	Plastic; Glass	Fill to neck	Chill to ≤6ºC	48 hours
Solids: Total Dissolved	Composite or Grab w/ mixing	Plastic; Glass	Fill to neck	Chill to ≤6ºC	48 hours
Solids: Total Suspended	Composite or Grab w/ mixing	Plastic; Glass	Fill to neck	Chill to ≤6ºC	48 hours
Solids: Total Volatile	Composite or Grab w/ mixing	Plastic; Glass	Fill to neck	Chill to ≤6ºC	48 hours
Sulfate	Composite or Grab w/ mixing	Plastic; Glass	Fill to neck	Chill to ≤6ºC	48 hours
Toxicity Testing Sample	Composite or Grab w/ mixing	Plastic	Pre rinse before filling to neck	Chill to ≤6ºC	48 hours

TABLE 1 – SAMPLE HANDLING SPECIFICATIONS –Water Column					
Parameter	**Sample Type**	**Sample Container**	**Bottle Filling**	**Preservation Method**	**Holding Time**
Turbidity	Composite or Grab w/ mixing	Plastic; Glass	Fill to neck	Chill to ≤6ºC	48 hours

*****RIBS LL Hg sampling uses a modified version of standard method 1631.

TABLE 2 –BOTTLE TYPE AND FILLING ORDER (some parameters are grouped together in one bottle)		
Parameter	Sample Container/ Preservation	Filling Order
Grab Samples (not from churn)		
Mercury, *Total Low Level*	1 500 ml amber glass (fill to shoulder*) / Ice	1
Harmful Algal Bloom, SB, R or RS	Plastic or glass bottle / Ice	2
From Sample Splitting Churn		
Alkalinity	1 – 250 ml plastic (no head space) / Ice	3
Chlorophyll-*a*	1 – 1 liter amber glass / Ice	4
TDS, NO2, Cl, F, SO4	1 -250 ml plastic / Ice	5
Turbidity	1- 125 ml plastic screw top jar / Ice	6
NH3, TKN, TPO4, NO3 – NO2	1 – 250ml plastic / H2SO4 / Ice	7
Total Metals	1- 125ml plastic / HNO3 /Ice	8
Dissolved Metals	1 – 125ml plastic / cannister filtered / HNO3 / Ice	9
Dissolved Organic Carbon	3 – 40ml glass vials / cannister filtered with H_2SO_4 / Ice	10
Dissolved OPO4	1 - 250 ml plastic, syringe filter/ Ice	11

Toxicity Testing Sample (if scheduled)	2 liter plastic / Ice	12

*****RIBS LL Hg sampling uses a modified version of standard method 1631.

Figure 3. WATER CHEMISTRY FIELD SHEET (EXAMPLE)

NYSDEC Division of Water **RIBS Routine Field Sheet** **Region 4 – Week of 4/27/2020**

General Information and Chemistry:

Sampling Date: 04/ /2020	Station ID: 06-DILA-5.4
Sampling Time:	Location: Unadilla River
Samplers:	SDG: 042720R4W
Sampled from: Bridge Waded Shoreline*	Equip: Kemmerer Depth-Integrated Pail* Bottle*
Sampling Specifics: # of Transects: _____	# of Dips (per transect): _____ # of Trips: _____
Dissolved Oxygen (mg/L):	Dissolved Oxygen (% sat.):
Specific Conductance (µS/cm):	Water Temperature (°C):
pH:	Flow characterization: Low Normal High
Additional samples: □ Equipment Blank	□ Field Blank (Hg) □ Matrix Spike □ Toxicity

Other observations/comments/method exceptions*: _____

_____

*Note reason for method exception, especially if not depth/width integrating.

Assessment of Recreational User Perception:

Circle the one answer which best describes your ability to participate in **primary** contact recreation:

a) Beautiful. Could not be nicer. Ability to swim, wade, dive water ski etc. fully attained.
b) Minor aesthetic problems, but still excellent for primary recreation.
c) Primary contact recreation slightly impacted.
d) Desire to participate in primary contact recreation substantially reduced.
e) Awful! Primary contact recreation impossible.
f) Not applicable (headwater/high flows/dry, etc.).

Circle the one answer which best describes your ability to participate in **secondary** contact recreation:

a) Beautiful. Could not be nicer. Ability to fish and boat fully attained.
b) Minor aesthetic problems, but still excellent for secondary contact recreation.
c) Secondary contact recreation slightly impacted.
d) Desire to participate in secondary contact recreation substantially reduced.
e) Awful! secondary contact recreation impossible.
f) Not applicable (headwater/high flows/dry, etc.)

Weather Conditions (Current): Sun Rain Clouds Weather Conditions (Past 24 hours): Sun Rain Clouds

Water Clarity:	0	1	2	3	4	5	6	7	8	9	10
	Clear					Intermediate				Turbid	
Phytoplankton: (suspended)	0	1	2	3	4	5	6	7	8	9	10
	Natural					Intermediate				Severe	
Periphyton: cover	0	1	2	3	4	5	6	7	8	9	10
	Natural					Intermediate				Severe	
Macrophyte: cover	0	1	2	3	4	5	6	7	8	9	10
	Natural					Intermediate				Severe	
Odor:	0	1	2	3	4	5	6	7	8	9	10
	Natural					Intermediate				Noxious	
Trash:	0	1	2	3	4	5	6	7	8	9	10
	None					Intermediate				Landfill	
Discharges/Pipes:	0	1	2	3	4	5	6	7	8	9	10
	None					Intermediate				Dominant	

Circle all the variables that negatively affect your opinion of recreational use of the waterbody today:

Water Clarity Phytoplankton Periphyton Macrophytes Odor Trash Discharges/Pipes

None Other: _____

Please scan and email completed field sheet to: StreamData@dec.ny.gov