STANDARD OPERATING PROCEDURE FOR COLLECTION OF PHYTOPLANKTON SAMPLES

WILLARD SPUR 2011 MONITORING ACTIVITIES

State of Utah
Department of Environmental Quality
Division of Water Quality

Revision 1
Effective 9/9/2011

Utah Division of Water Quality (DWQ) Standard Operating Procedures (SOPs) are adapted from published methods, or developed by in-house technical experts. The primary purpose of this document is for internal DWQ use. This SOP should not replace any official published methods.

Any reference within this document to specific equipment, manufacturers, or supplies is only for descriptive purposes and does not constitute an endorsement of a particular product or service by the author or by DWQ. Additionally, any distribution of this SOP does not constitute an endorsement of a particular procedure or method.

Although DWQ will follow this SOP in most instances, there may be instances in which DWQ will use an alternative methodology, procedure, or process.

REVISION PAGE

Date	Revision #	Summary of Changes	Sections	Other Comments
9/9/2011	1	Not applicable	Not applicable	New SOP. Adapted from lakes sampling protocol. Began document control/revision tracking.

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1.0 SCOPE AND APPLICABILITY

This document presents the standard operating procedure (SOP) for collecting phytoplankton samples in the Willard Spur wetlands using a vertical integrated sampler.

This SOP applies to any Utah Division of Water Quality (DWQ) monitor or cooperator performing wetlands sampling. This SOP was developed with assistance from Dr. Samuel Rushforth (Rushforth Phycology) and is a modification of procedures used by DWQ for collection of phytoplankton samples in lakes (see DWQ's Lake Sampling SOP).

Phytoplankton sampling is intended to collect photoautotrophs in the water column, which reflect the biological water quality of the aquatic ecosystem. DWQ's lake phytoplankton sampling efforts collect water with an integrated vertical water column sample from twice the secchi depth up to a maximum of two meters. The concept in lake sampling is to obtain water and phytoplankton from the photic zone. However, in the Willard Spur wetlands, waters being sampled are typically less than 1 m deep and light is generally available to photoautotrophs at the bottom of these shallow sites. Therefore phytoplankton sampling is performed by collecting an integrated vertical sample from the surface to the bottom. In situations where water is so shallow that the integrated vertical sampler cannot an adequate volume of water without disturbing bottom sediments, a grab sample is collected using the sampling bottle.

2.0 SUMMARY OF METHOD

Phytoplankton samples are collected from the water column using a vertical integrated sampler or using grab sampling techniques. Care is taken not to include bottom materials and areas with an abundance of duckweed or surface mat algae are avoided. Samples require no field preservation and are placed on ice until they can be refrigerated.

3.0 DEFINITIONS

m – meter(s)

ml – milliliter(s)

SAV – submerged aquatic vegetation

Modified Vertegrator - This is the State of Utah's term for an integrated vertical sampler, modified for wetlands sampling. This sampler allows a composite water sample to be collected from the first meter of the water column (surface sample). It is constructed of a one meter long PVC tube with a valve on the bottom and a rubber cork on top.

PVC - Polyvinyl chloride

4.0 HEALTH AND SAFETY WARNINGS

Field personnel should take appropriate precautions when operating watercraft and working on, in, or around water. All boats should be equipped with safety equipment such as personal flotation devices (PFD's), oars, air horn, etc. Utah's Boating Laws and Rules shall be followed by all field personnel.

Field personnel should be aware that hazardous conditions potentially exist at every waterbody. If unfavorable conditions are present at the time of sampling, the sample visit is recommended to be rescheduled. If hazardous weather conditions arise during sampling, such as lightning or high winds, personnel should cease sampling and move to a safe location.

5.0 CAUTIONS

Care should be taken not to include bottom materials disturbed by wading or collection of benthic samples. Areas with duckweed or surface mat algae should be avoided.

6.0 INTERFERENCES

Anything that makes the sample more difficult to visualize in the laboratory can cause interference with results. Try to minimize duckweed, algae, sediment, etc. in the sample.

High turbidity or dense SAV may also interfere with sample collection.

Samples should not be exposed to extreme cold or hot temperatures during storage (not in a hot vehicle or in a freezer).

7.0 PERSONNEL QUALIFICATIONS/RESPONSIBILITIES

Monitors collecting phytoplankton samples must read this SOP annually and acknowledge they have done so via a signature page (see **Appendix 1**). New field personnel must also demonstrate successful performance of the method. The signature page will be signed by both trainee and trainer to confirm that training was successfully completed and that the new monitor is competent in carrying out this SOP. The signature page will be kept on-file at UDWQ along with the official hard copy of this SOP.

8.0 EQUIPMENT AND SUPPLIES

___ Copy of this SOP
____Plastic, high-sided utility sled or float tube (fishing type) for toting equipment
____Clean, plastic ½ gallon sample bottles

____Funnel
____Modified Vertegrator (**Figure 1**)
____Pencils and sharpies
____Sample labels
____Phytoplankton sample labels (**Figure 2**)
____Sample tracking forms (**Appendix 2**)
____Field notebook
____Cooler and wet ice

Figure 1. Modified Vertegrator for phytoplankton sampling

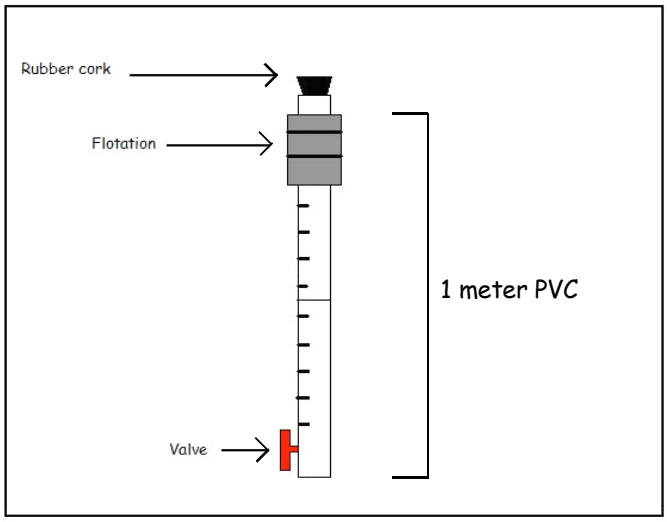

Figure 2. Sample label (U:\WQ\PERMITS\MONITORS\Willard Spur\Field Sampling\Labels\Phyto & Zoo\ Phytoplankton (5163or5523).doc)

PHYTOPLANKTON - (WET ICE) RUSHFORTH PHYCOLOGY

Site ID:_____

_____

STORET: _____ Replicate #:_____

Samplers: _____Date:_____

Collection Method: Vertegrator, 1 L sample

9.0 PROCEDURE

1) Upon arrival to the sampling site, rinse the Modified Vertegrator and funnel 3 times with ambient water.
2) Label the sample bottle.
3) Gather sampling equipment and either walk out (using the sled) or move the boat to at least 5 m towards open water away from where macroinvertebrate collection took place (or any other activity disturbing bottom sediments).
4) Measure the water depth in meters and record in field notes.
5) Open the sample bottle and insert the funnel.
6) Take the cork off the top of the Modified Vertegrator and twist the valve on the bottom end until it is in the “un-lock” position.
7) Hold the Modified Vertegrator upright and lower it through the water column, avoiding the bottom sediments. Cork the Modified Vertegrator securely and then slowly raise it to water surface. Before lifting the Modified Vertegrator above the water surface, twist the valve to the “lock” position. Tilt the sampler back and forth to thoroughly mix the water sample. Twist the valve back to the “un-lock” position and aliquot the water into the appropriate sample bottle using the funnel.
8) Repeat steps 6 and 7 as many times as necessary to fill the sample bottle, being careful to not disturb bottom sediments.
9) Cap the sample bottle.
10) Immediately place sample in a cooler with wet ice; these samples should not be left out in the sunlight.
11) After returning from the field, fill out a Sample Tracking form, and store the samples with the form in the refrigerator and in the dark for storage until delivery (samples may be delivered to the laboratory in batches).

9.1 Sampling Very Shallow Waters

1) If the water to be sampled is too shallow to use the Modified Vertegrator without disturbing bottom sediments, use the sample bottle itself to collect a grab sample.
2) Label the sample bottle.
3) Remove the bottle cap.
4) Carefully dip the bottle beneath the surface of the water to fill, sampling as much of the water column as possible without disturbing the bottom sediments.
5) When bottle is full, replace cap.
6) Immediately place sample in a cooler with wet ice; these samples should not be left out in the sunlight.

7) After returning from the field, fill out a Sample Tracking form, and store the samples with the form in the refrigerator and in the dark for storage until delivery (samples may be delivered to the laboratory in batches).

10.0 LABORATORY ANALYTICAL METHODS

Phytoplankton samples will be analyzed quantitatively for community composition; analysis involves direct observation and enumeration of the dominant algae present in the water column sampled. Species are identified to the lowest possible taxonomic category (generally species) and counted. The methodology and quality assurance and quality control procedures for this analysis and analyzing laboratory can be obtained from:

Dr. Samuel R. Rushforth
Rushforth Phycology, LLC
Orem, UT
(801) 225-5736
sam@rushforthphycology.com
http://rushforthphycology.com/201.html

11.0 DATA AND RECORDS MANAGEMENT

Note the date, time, sampler(s), and sampling method on the field sheet as indicated. Monitors should review the field sheet for completeness and accuracy in the field before leaving the site. Make sure information on the field sheet is consistent with the information on the sample container label.

Upon returning to the office, both the monitor collecting the sample and the field team leader sign/initial that they have reviewed the field sheet. The field sheet is then scanned and the PDF file saved into the shared “Monitors” folder. The original form is placed in the project file.

The data from the field form is entered into the water quality database at the same time as the other field data collected for that day (ideally with 2 weeks from the date of the site visit).

12.0 QUALITY ASSURANCE AND QUALITY CONTROL

Field quality control samples that may be performed for phytoplankton sampling include blanks and duplicates.

Blanks are used to check for cross-contamination between samples. For blanks, rinse the Modified Vertegrator and funnel 3 times with DI water. Then pour 2 liters of DI water through the Modified Vertegrator, capturing the water into a sample bottle, and treat as a regular sample. Refer to the program or project specific quality assurance plan or

sampling and analysis plan for the required frequency of blank phytoplankton sample collection.

Duplicates are used to assess variability in sample collection and analysis. For the field duplicate, use the Modified Vertegrator to fill 2 sample bottles. In very shallow waters, collect two sample bottles in close succession using the grab sampling procedure discussed in **Section 9.1**. At least one field duplicate should be performed for every 10 regular samples, or at a frequency indicated in a program or project specific quality assurance plan or sampling and analysis plan.

13.0 REFERENCES

Not applicable to this SOP.

APPENDICES

Appendix 1 - SOP Acknowledgment and Training Form (front and back)

(U:\WQ\PERMITS\MONITORS\QAQC\Helpful Templates\SOP Acknowledgement and Training Form.doc)

DWQ SOP Acknowledgement and Training Form
2/28/2011
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SOP Acknowledgement and Training Form

This SOP must be read and this form signed annually. This form must be kept with the current version of the SOP.

Document Title:	
Document Revision Number:	
Document Revision Date:	

Please sign below in accordance with the following statement: "I have read and understood the above referenced document. I agree to perform the procedures described in this SOP in accordance with the document until such time that it is superseded by a more recent approved revision."

Printed Name	Signature	Date

SOP Acknowledgement and Training Form (continued)

Trainee: Sign below to acknowledge that training on this SOP was received, understood, and all questions/concerns were addressed by the trainer.

Trainer: Sign below to acknowledge that training on this SOP was completed for the individual listed and that trainee is competent to perform the procedures described within.

Date of Training	Trainee Printed Name	Trainee Signature	Trainer Printed Name	Trainer Signature