STANDARD OPERATING PROCEDURE FOR COLLECTION OF ZOOPLANKTON SAMPLES USING A HORIZONTAL TOW

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	Adapted from GSL wetlands field manual and put into new standardized format, began document control/revision tracking

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1.0 SCOPE AND APPLICABILITY

This document presents the standard operating procedure (SOP) for collecting zooplankton samples in wetlands that are shallow enough to facilitate the need for a horizontal tow sampling technique. Shallow wetlands, for the purpose of this SOP, are defined as those that are not deep enough for standard plankton collection techniques using a vertical tow (a vertical tow collects an integrated water column sample, moving the net vertically through the water column but keeping the net at least 0.5 m from the bottom).

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. Lawrence Gray (Utah Valley University) and is a modification of procedures described in the following documents: (Baker; et al. 1997 and U.S. EPA 1998).

Zooplankton are heterotrophic plankton and serve as the link between primary producers (phytoplankton) and predators, such as aquatic insects and fish. The abundance and species composition of the zooplankton are often good indicators of the physical, chemical, and habitat conditions of the wetlands (Gray 2011).

This procedure, based on one sample collection point, gives a qualitative to semi-quantitative snapshot of zooplankton populations. In each wetland there may be spatial variation of zooplankton populations, especially if predatory fish are present in the open water. There may also be seasonal variation depending upon the reproductive periods of the species present.

2.0 SUMMARY OF METHOD

Zooplankton samples are collected with a standard zooplankton tow net (mesh size 243 µm) using a horizontal tow technique. Each sample is a composite consisting of five 5-meter tows. Net contents are rinsed into a sample container and preserved with 95% ethanol. Care is taken not to include bottom materials and areas with an abundance of duckweed or surface mat algae are avoided.

3.0 DEFINITIONS

DI – deionized or distilled water

m – meter(s)

ml – milliliter(s)

SAV – submerged aquatic vegetation

µm – micrometer(s)

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.

Rinse nets thoroughly with DI water between sites to avoid any potential cross contamination of samples and wetland systems.

Samples should be preserved in the field.

Tow nets should be pulled at an appropriate, constant speed so that the net does not sink to the bottom.

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 (net clogging or dragging).

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

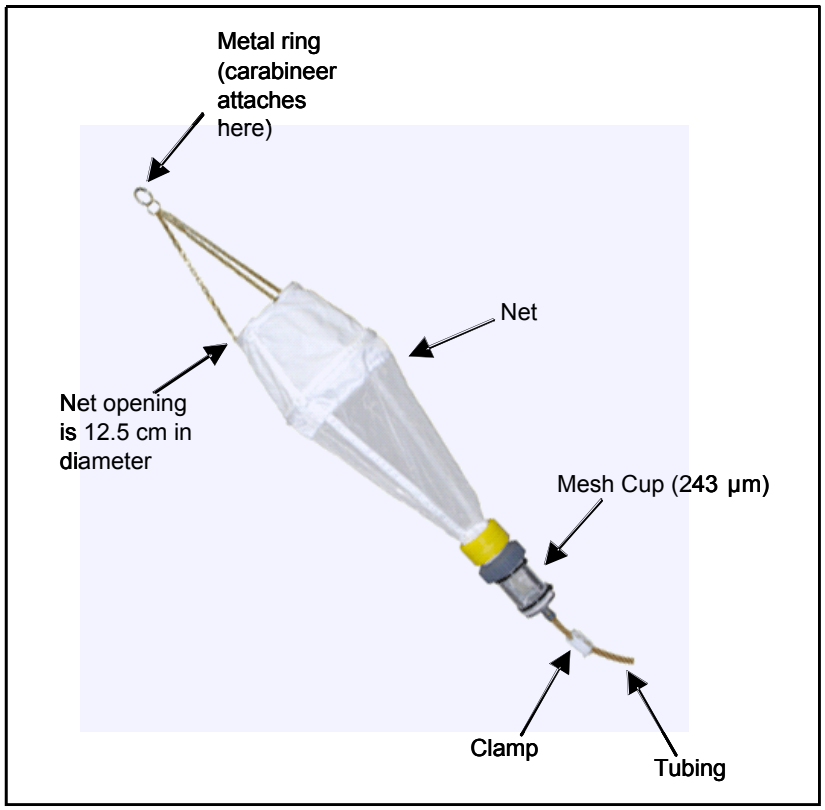
7.0 PERSONNEL QUALIFICATIONS/RESPONSIBILITIES

Monitors collecting zooplankton 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

____ Plastic, high-sided utility sled or float tube (fishing type) for toting equipment
____243 µm Wisconsin net with tube and clamp (**Figure 1**)
____7-8 m rope (marked off at every meter) with carabineer clip at one end
____250 ml plastic conical bottom centrifuge tubes (e.g. Corning 250ml polypropylene centrifuge tube, Fisher cat# 05-538-53)
____95% ethanol
____DI rinse water in squirt bottles
____Pencils and sharpies
____Clear tape
____Zooplankton sample labels (**Figure 2**)
____Chain of Custody (COC) form (**Appendix 2**)
____Field sheets and field notebook (Note: the same field sheet is used for both zooplankton and macroinvertebrate sampling)
____Electrical tape
____Cooler and wet ice

Figure 1. Wisconsin net set up for zooplankton sampling



9.0 PROCEDURE

9.1 Sample Collection

1) Prior to each use, carefully clean and thoroughly rinse the interior of the plankton net and mesh cup with DI water. Collections will be made using a 243-µm mesh Wisconsin-style plankton net with a 12.5 cm opening.
2) Carefully inspect the net and mesh cup for holes or tears.
3) Attach the mesh cup (243-µm) to the end of the net and secure.
4) Make sure the clamp is on the tubing and closed securely.
5) Attach the metal ring of the plankton net to a calibrated rope with markings every 1 m, using the carabineer.
6) Walk at least 5 m towards open water away from where macroinvertebrate collection took place (or any other activity disturbing bottom sediments).
7) Toss the 243 µm mesh zooplankton net into the open water 5 m out from the sampler.. Care should be taken to place the net into water that has not been clouded up with the sediment you disturbed when walking.
8) Start pulling the net back once it is about half-way submerged (i.e. let the net settle into the water but do not let it sink). Pull the net back at an upward angle so that the opening does not dip downwards towards the bottom. The goal is to sample the water column, not the bottom or surface.
9) Once you have the net retrieved, pick it up out of the water immediately to prevent backwash and loss of sample. If vegetation is present in the net when you retrieve it, pull it out gently and discard.
10) Turn your body slightly to the right and repeat the toss as described above without emptying the net.
11) Repeat steps 7.0-10.0 until you have made a total of 5 tows to form a composite sample.

9.2 Sample Processing and Preservation

1) Return to the vehicle or staging area with the net after collecting the sample.
2) Carefully remove the 243 µm mesh cup from the net (clamp on tubing should be closed).
3) Hold the cup and tubing over a 250 ml centrifuge tube (hereafter referred to as the sample container) and open the clamp. Some water will drain from the tubing into the sample container.
4) Use just enough DI water to rinse the remaining sample from the mesh cup so that the sample container is three-fourths of the way full with sample + water.

5) Fill the sample container the rest of the way with 95% ethanol (leaving little to no headspace) and replace cap. Seal the jars with electrical tape around the lid to prevent leakage.

6) Prepare the sample label (**Figure 2**), attach the sample label to the sample container, and cover the label with clear tape.

7) Place samples in a cooler with wet ice. These samples do not need to be stored on ice but they cannot withstand high summer temperatures and should remain cool.

8) Before using the zooplankton net at the next site, rinse the net thoroughly with DI water to avoid any potential cross contamination of samples and wetland systems.

9) After returning from the field, fill out a COC form, and store the samples with the form on a shelf or in a box at room temperature for storage until delivery (samples may be delivered to the laboratory in batches).

Figure 2. Sample label (U:\WQ\PERMITS\MONITORS\Labels\zooplanktonHT_Gray lab_ label.doc)

ZOOPLANKTON (95% ETOH) - Gray Lab
Site ID:_____
_____
STORET: _____ # Bottles: 1 of 1
Samplers: _____Date:_____
Water Depth (m):_____
Collection Method: Composite of 5 horizontal tows (each tow 5 m)

10.0 LABORATORY ANALYTICAL METHODS

Zooplankton samples will be examined for taxa present and community composition. Taxa will be identified to the lowest practical taxon. At least 100-200 individuals will be counted and identified from each sample. The methodology and quality assurance and quality control procedures for this analysis and analyzing laboratory can be obtained from:

Dr. Lawrence J. Gray, Senior Ecologist (ESA)
Dept. of Biology, Utah Valley University, 800 W. University Parkway
Orem, UT 84058
(801) 863-8558
FAX: (801) 863-8054
grayla@uvu.edu
http://research.uvu.edu/Gray/

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

Replicate zooplankton samples should be collected at a minimum rate of 1 replicate for every 10 regular samples. The replicate sample should be collected by the same field team member who performed the associated normal sample collection. To perform the replicate sampling, clean the net after processing the first sample, return the same location where first sample was located (or use two nets), turn about 45 degrees, walk another 5 m into open water, and collect the replicate sample following the procedures in **Section 9.1**. Note on the field sheet that a replicate was collected. Refer to the program/project specific quality assurance plan or sampling and analysis plan for performance goals for replicate measurements.

13.0 REFERENCES

Baker, John R., David V. Peck, and Donna W. Sutton (editors). 1997. Environmental Monitoring and Assessment Program Surface Waters: Field Operations Manual for Lakes. EPA 620-R-97-001. USEPA, Washington D.C.

Gray, L.J. 2011. Macroinvertebrate and zooplankton communities in the impounded wetlands of the Great Salt Lake May-November 2010. Completion Report prepared for the Utah Department of Environmental Quality, Division of Water Quality, SLC, UT.

U.S. Environmental Protection Agency. 1998. Lake and reservoir bioassessment and biocriteria: Technical guidance document. EPA 841-B-98-007. Office of Wetlands, Oceans and Watersheds, USEPA, Washington, D.C.

14.0 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