

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



WATER QUALITY

State of Utah
Department of Environmental Quality
Division of Water Quality

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Foreword

Utah Division of Water Quality (DWQ) Standard Operating Procedures (SOPs) are adapted from published methods or developed by in-house technical experts. This document is intended primarily 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 product or service by DWQ. Additionally, any distribution of this SOP does not constitute an endorsement of a 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.

The methodology detailed below is the protocol followed by DWQ's monitoring staff and verified by DWQ's Quality Assurance officer.

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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
12/4/2020	2	Changed name to SOP_Wetlands_Zooplankton_2021_v0	All	Previous name: SOP Zooplankton Wetlands_09092011_WetL
8/25/21	2	Updated to all wetland types.	All	Put into a new standardized format, began document control/revision tracking.

Table of Contents

1.0	Scope and Applicability	5
2.0	Summary of Method	5
3.0	Definitions.....	5
4.0	Health and Safety Warnings	6
5.0	Cautions	6
6.0	Interferences.....	6
7.0	Personnel Qualifications/Responsibilities	6
8.0	Equipment and Supplies	7
9.0	Procedure	7
10.0	Data and Records Management	9
11.0	Quality Assurance and Quality Control.....	9
12.0	References.....	9
13.0	Figures.....	10
14.0	Appendices.....	12

1.0 SCOPE AND APPLICABILITY

This document presents the Standard Operating Procedure (SOP) for the collection of zooplankton samples in wetlands using a horizontal tow sampling technique. This SOP applies to all DWQ field staff, DWQ cooperators, and volunteer monitors trained on this SOP.

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 water

IW: impounded wetland

FR: fringe wetland

m: meter(s)

ml: milliliter(s)

SAP: Sampling and Analysis Plan

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

DWQ personnel performing wetland zooplankton sampling must be familiar with sampling techniques, safety procedures, proper handling, and record keeping. Samplers are responsible for attending refresher meetings held each spring/summer to review procedures and techniques. New staff will be trained in the field by DWQ trained personnel.

Cooperators are required to read this SOP annually and acknowledge they have done so via a signature page that will be kept on-file at DWQ along with the official hard copy of this SOP (see Appendix).

8.0 EQUIPMENT AND SUPPLIES

- Copy of this SOP
- 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 carabiner clip at one end
- 250 ml plastic conical bottom centrifuge tubes (e.g. Corning 250ml polypropylene centrifuge tube, Fisher cat# 05-538-53) or 100 ml specimen jars
- 95% ethanol
- DI rinse water in squirt bottles
- Pencils and sharpies
- Clear tape
- Zooplankton sample labels (**Figure 2**)
- Field sheet (check your project-specific SAP)
- Tablet with relevant data forms and applications
- Electrical tape
- Cooler and wet ice

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 carabiner.
6. Load Wisconsin net and rope into the utility sled to transport to the sampling location.
7. Walk at least 5 m towards open water away from where macroinvertebrate collection took place (or any other activity disturbing bottom sediments).
8. 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.
9. 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.

10. 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.
11. Turn your body slightly to the right and repeat the toss as described above without emptying the net.
12. 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 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 the 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 store the samples on a shelf or in a box at room temperature for storage until delivery.
10. Prior to delivering samples to the lab, the Bug Lab requires submission information on where, when and how samples were collected via an online tool:
<http://www.usu.edu/buglab/SampleProcessing/HowToSendSamples/?item=71>

9.3 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:

USU/BLM National Aquatic Monitoring Center (BugLab)
Department of Watershed Sciences
Utah State University
5210 Old Main Hill
Logan, UT 84322-5210

10.0 DATA AND RECORDS MANAGEMENT

Before leaving the field site, be sure that all required samples have been collected, labeled, and that all appropriate field sheets, field notes, and sample tracking forms have been filled out completely and accurately. The data from the field forms is sent to the wetlands coordinator at the same time as the other field data collected for that day (ideally within 2 weeks from the date of the site visit).

Send samples to the lab at the National Aquatic Monitoring Center within one year of collection. Note the date, time, location, sampler(s), and sampling method on the field sheet and upload to the Bug Lab submission tool: <https://submission.namc.usu.edu/>.

Reach out to the specific lab if you need to store samples for longer. Procedures for handling sample results can be found in the appropriate project-specific SAP.

11.0 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 the 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.

12.0 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.

Related DWQ SOPs:

Standard Operating Procedure for the Collection of Macroinvertebrates in Wetlands

Standard Operating Procedure for the Collection of Sediment in Wetlands

Standard Operating Procedure for the Collection of Vegetation in Wetlands

Standard Operating Procedure for the Collection of Water Chemistry in Streams and Wetlands

13.0 FIGURES

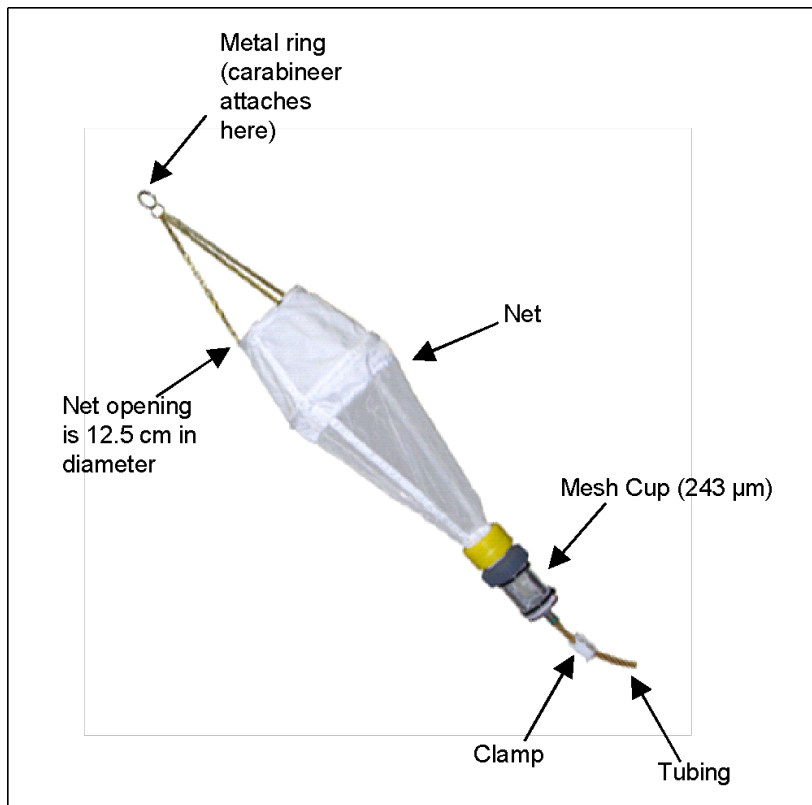


Figure 1. Wisconsin net set up for zooplankton sampling

ZOOPLANKTON SAMPLE
MLID _____
SITE NAME _____
COLLECTION DATE _____
SAMPLER TYPE _____
COLLECTOR(S) _____

Figure 2. Zooplankton sample label.

14.0 APPENDICES

APPENDIX 1 - SOP ACKNOWLEDGMENT AND TRAINING FORM

SOP Acknowledgement Form

This SOP must be read and acknowledged annually, and this form must be kept on file at DWQ.

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."

Date	Printed Name	Signature

SOP Training Form

Training is required for all new samplers and Refreshers are required annually.

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	Trainee Printed Name	Trainee Signature	Trainer Printed Name	Trainer Signature

Management Approval

Printed Name:
Signature:
Date: