
**Standard Operating Procedure for the Collection and Processing of Zooplankton and
Phytoplankton in Lakes**

Revised and Adopted June 2020

Final Copy



OKLAHOMA WATER RESOURCES BOARD
WATER QUALITY PROGRAMS DIVISION
3800 NORTH CLASSEN
OKLAHOMA CITY, OK 73118

Standard Operating Procedure for the Collection and Processing of Zooplankton and Phytoplankton Samples in Lakes

June 2020

Revision Date	Version	Description of Changes	Effective Date
January 2013	1.1		April 2013
June 2020	2.0	<ul style="list-style-type: none">• Finalized Edits• Updated Format	June 2020

STANDARD OPERATING PROCEDURE FOR THE COLLECTION AND PROCESSING OF ZOOPLANKTON AND PHYTOPLANKTON SAMPLES IN LAKES

Originally Adopted 2013

Revised June 2020

1.0 Introduction

The purpose of this document is to provide an outline of zooplankton and phytoplankton collection and processing procedures used by the Water Quality Programs Division of the Oklahoma Water Resources Board (OWRB) for all projects that are part of the Lakes Monitoring Program. Techniques for sampling will be outlined in this document; an experienced staff member will conduct further training on an as-needed basis. An example of documents pertaining to lakes sampling, including chain of custody form for Oklahoma Department of Environmental Quality (ODEQ) and field data sheets are appended at the end of this document.

2.0 Definitions/Terms

3.0 Safety

Upon reaching the sampling location, site safety determinations should be made before proceeding. Please refer to the OWRB safety manual for information on boat safety, trailering, and operating on boats (OWRB, 2017).

4.0 Quality of the Measurement

A variety of Quality Assurance/Quality Control (QA/QC) samples are routinely collected to assure that environmental samples meet the Data Quality Objectives (DQO's) outlined in the controlling Quality Assurance Project Plan (QAPP). QA/QC sampling is designed to control each step of the sampling process. The project QAPP should be consulted before trip planning to ensure the appropriate samples are collected. Blank samples are collected to ensure that field personnel are effectively cleaning the equipment used in field sampling, laboratory cleaning methods are adequate, and deionized water is clear of impurities. Duplicate samples may be collected to ensure that composite samples are properly homogenized and processed. Replicate samples may be collected to ensure that the sampling methodology employed is collecting a representative, repeatable sample. Spike or known samples may be submitted to test the efficacy of the analytical laboratory.

5.0 Personnel and Equipment

5.1 Personnel

Principal investigators for the OWRB are required to have bachelor degrees and/or experience with biological or other applicable sciences. Each sampling trip will have a designated crew leader along with other investigators. In all instances, the collection of water quality samples from lakes requires at least a two-person field crew. Investigators must be familiar with OWRB SOP documents concerning water quality and quantity collections and measurements, as well as habitat assessments and biological collections. In-house training will be conducted for the use of all meters and digital titrators used for water quality or quantity measurements. Training will follow the methods outlined in

these documents; additional training will be provided when new SOPs are developed. Field crew training will be accomplished through dry-run exercises in the laboratory to familiarize crews with sample collection, sample preservation, instrument operation, calibration, and maintenance. In addition, when new personnel are hired or new methods are developed; qualified staff will train them on sample collection, measurement, and field analysis methods via side-by-side field trips to familiarize staff with SOP requirements. When training is considered adequate, a qualified staff member will audit field staff for adherence to SOPs.

5.2 Equipment

Zooplankton is collected using a 243- μm mesh Wisconsin-style plankton net with a 12.5 cm opening and a clean 100 mL bottle labeled with lake name, date, length of tow, and collector initials.

Phytoplankton is collected using a surface grab technique, requiring a clean amber bottle labeled with lake name, date, and collector initials. Bottle size may vary depending on analytical lab.

6.0 Collection of Zooplankton and Phytoplankton Samples

6.0.1 Collection of Zooplankton Sample

1. Record the lake name, date, length of tow, and initials on the sample label.
2. Carefully inspect the nets and buckets for holes or tears.
3. Attach the collection bucket (243- μm) to the “cod” end of the net and secure.
4. Attach the bridled end of the zooplankton net to a $\frac{1}{4}$ ” calibrated tow line with markings every 1.0 m, with the first mark being 1.0 m from the mouth of the net.
5. Carefully and slowly lower the net in a constant upright position over the side of the boat. Prime the net and bucket by submersing the body of the net without water going over the mouth three times with short quick tugs.
6. Identify the true depth with the sonde and round to nearest 0.5 m above the lake bottom. Lower the net until the tow rope mark representing that depth is at the water line.
7. Retrieve the net by pulling back to the surface at a steady constant rate without stopping (0.3 m or 1 ft per second).
8. Once at the surface submerge the body of the net without water going over the mouth three times with short quick tugs to help rinse contents into the collection bucket.
9. Complete the rinsing of the net contents by spraying DI water against the outside of the net with a squirt bottle or similar tool.
10. Holding the collection bucket in a vertical position, carefully remove the bucket from the net.
11. Concentrate the contents of the collection bucket by swirling the bucket without spilling the contents. Excess lake water will filter out of the bucket from the screened sides.
12. Place on ice for storage.

6.0.2 Collection of Phytoplankton Sample

1. Record the lake name, date, and initials on the sample label.
2. It is important to prime the sample bottle three times by rinsing the containers out with sample water before filling (fill the container with a little sample water, shake it, and pour the water out).

3. Completely immerse the sample container nozzle down (0.5 meters – approximately an elbow length below the surface) and slowly allowing sample container to fill. Try to avoid aerating the sample (i.e. don't allow water to "bubble" into the container). Bring the bottle to vertical under water and cap.

6.1 Sample Processing

6.1.1 Zooplankton Processing

1. Rinse the contents of the mesh net bucket into the polyethylene jar using small volumes of DI water from a squirt bottle. Rinse bucket with DI water three to four times or until the majority of zooplankton have been removed. Drain the remaining filtrate into the labeled sample container. Fill the jar of zooplankton to the shoulder (~80 mL) with 95% ethanol.
2. In some cases, the volume of zooplankton collected in bucket may exceed jar size. Do not try to force the entire sample into a single bottle or the preservative will not function properly and the sample may be lost. In such cases, use a second bottle to preserve the additional amount of sample. Create an additional label reflecting the same information as the label for the first vial and add the information "Jar 2 of 2."

6.1.2 Phytoplankton Processing

1. While wearing Nitrile gloves un-cap bottle and carefully add 2 milliliters of Lugol's Iodine Solution.
2. Carefully re-cap bottle, ensuring that no sample escapes and invert bottle to mix Lugol's Iodine.
3. Place on ice for storage.

Upon returning to the lab, samples will be logged in on the phytoplankton-zooplankton identifier sheet and affixed with a permanent label showing lake name, identification code, date, time, depth, and collector initials. The identifier sheet is located here <S:\Monitoring\LAKES\Algae & Zooplankton info\Phyto-Zoo Identifier Sheet 2014-Present>. With the application of the permanent label the samples are stored in refrigeration until all samples of the sampling season are collected. Once all samples are collected, logged, and properly labeled; chains of custody will be created and the samples will be relocated to their respective storage container and placed in a designated cool, dry area with copies of the chains of custody.

The Zoo- and Phyto- plankton log sheet is located at:

<S:\Monitoring\LAKES\FORMS&LABELS\ZOOPHYTOCUSTODYtemplate>.

7.0 Forms

7.1 Chains of Custody

Chains of custody are documents remitted to the analytical laboratory documenting characteristics and metadata for each lake's samples. These forms are used for several purposes; they act as a legal document to show proper delivery of samples occurred and they make a general list of the parameters that should be analyzed. They are a data sheet and a legal document and should be treated with the responsibility this dictates. The date, time, length of tow (if applicable), and collector initials for each sample must be included and the form should be legible, accurate, and complete. All forms should be signed and dated by a staff member and laboratory receiving personnel at the time of delivery. For guidance on proper procedure to complete the chains of custody, refer to your supervisor

and/or crew leader. An example is located at the end of this document and at <S:\Monitoring\LAKES\FORMS&LABELS\ZOOPHYTOCUSTODYtemplate>

8.0 Data Storage

Chains of custody should be completed electronically. The network location in which to save the completed electronic chains of custody is S:\Monitoring\LAKES\Algae & Zooplankton info\Zoo_Phyto custodies . This will bring you to the folder containing the Zooplankton and Phytoplankton subfolders. Upon opening the respective folder, the chains of custody will then be saved into the correct season and year that the samples were collected in. Completed physical copies with signatures will be scanned in and along with the data from analyzed data will be reviewed and eventually uploaded to the Ambient Water Quality Monitoring System (AWQMS). Each sample should be maintained electronically in the database under its unique sample number.

9.0 References

American Public Health Association, et. al. Standard Methods for the Examination of Water and Wastewater (22nd ed.). Port City Press, Baltimore, MD., 2013

USEPA Survey of the Nation's Lakes, Field Operations Manual 22-March-2012.

