New Hampshire
Volunteer Lake Assessment Program
Field Manual

This manual was developed to assist citizen volunteers in the monitoring of New Hampshire's lakes.

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NEW HAMPSHIRE DEPARTMENT OF Environmental Services

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Summertime, oh, summertime, pattern of life indelible, the fade-proof lake, the woods unshatterable, the pasture with the sweetfern and the juniper forever and ever . . . the cottages with their innocent and tranquil design, their tiny docks with the flagpole and the American flag floating against the white clouds in the blue sky, the little paths over the roots of the trees leading from camp to camp. This was the American family at play, escaping the city heat. - E. B. White

Introduction

Citizen volunteers are the foundation of the New Hampshire Department of Environmental Services' (DES) Volunteer Lake Assessment Program (VLAP). Participation in VLAP includes, but is not limited to, lake associations, individual lake residents and concerned lake visitors. The hard work of trained VLAP monitors allows DES biologists to determine a lake's water quality and monitor water quality trends over time. The volunteers help protect their waterbody and watershed by notifying DES biologists about pollutions issues that might threaten their lake. The DES analyzes and interprets water quality data for individual lakes, which are vital in assessing whether New Hampshire's lakes are meeting their designated uses. This level of assessment would not be possible without the dedicated VLAP volunteers.

This manual is a guide containing standard operating procedures for lake sampling. It is intended for use by VLAP volunteers and should be taken in the field when you conduct lake sampling. If proper procedures are not followed, the data may not be valid, and therefore not utilized for reporting or assessment purposes. This manual is ***not*** a replacement for formal training with a DES biologist.

We look forward to assisting and visiting you at your lake!

Contacts

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To better serve our volunteers, the Jody Connor Limnology Center (JCLC) operates **satellite laboratories** at these locations:

Lake Sunapee Laboratory
Colby Sawyer College
New London, NH
(603) 526-3486
Teriko MacConnell, Lab Manager
teriko.macconnell@colby-sawyer.edu

Center for the Environment
Plymouth State University
Plymouth, NH
Joe Boyer, Director
(603) 535-2926

Reminders and Field Safety

Reminders

- Watch the VLAP Training Video on YouTube prior to sampling for a refresher.
  - **www.youtube.com/watch?v=HJuHODx1BLK&feature=youtu.be**
- Label all bottles with a waterproof pen or print and affix labels prior to sampling.
- Quality control is important. Sample between 10 a.m. and 2 p.m. for accuracy and consistency.
- Most analyses have a 24-hour maximum holding period. Samples must be iced, returned to the laboratory and analyzed before the 24-hour expiration.
- Return samples to the JCLC before 3 p.m., Monday—Thursday. If using a satellite laboratory, check hours of operation before sampling.
- Weekend samplers should always collect samples on Sunday afternoon for delivery to the laboratory Monday morning.
- Complete the Volunteer Monitor Field Sampling Checklist for additional quality control while sampling.

Field Safety

- Check the weather report; ***do not*** sample during thunder and lightning, severe rain, wind, waves or fog.
- Follow all boating regulations.
- Always sample with a partner, do not sample alone.
- Dress appropriately for weather conditions.
- Always wear sunscreen and bring a hat with visor for extra protection against the sun.
- Wear an orange safety vest if sampling along a roadway or in the woods during hunting season.
- Wear arm-length gloves, use a sampling pole, and/or wear boots when collecting from locations suspected of fecal bacteria contamination or elevated cyanobacteria conditions.
- Be aware of poison ivy, oak, sumac and other types of vegetation that could cause irritation or rashes. If you come into contact with one, immediately rinse the area or wipe clean.
- Apply effective insect repellent to exposed skin and clothing to protect against disease transmitting organisms such as ticks and mosquitoes.

Lake Sampling Checklist

- ☑ Kemmerer bottle with messenger and sender
- ☑ Calibrated chain, rope, or line and clip
- ☑ Sample bottles:
  - Large white
  - Small brown (contains acid!)
  - Large brown
  - Small sterile clear bottle

  } You should have the same number of large white and small brown bottles, as determined by DES.
- ☑ Bucket for chlorophyll-a sampling
- ☑ Integrated tube (optional - alternative method for chlorophyll-a)
- ☑ Secchi disk and View Scope
- ☑ Boat
- ☑ Anchor with enough line to anchor at the deepest spot
- ☑ Life vests for everyone on the boat
- ☑ Field data sheets, volunteer monitor field sampling procedures checklist, and clipboard
- ☑ Lake map with sampling stations labeled
- ☑ Cooler with ice
- ☑ Dissolved oxygen/temperature meter
- ☑ Sampling pole (optional - for use when sampling hard to reach tributaries or areas with suspected fecal or cyanobacteria contamination)
- ☑ Phytoplankton net and bottle (optional - for lakes with cyanobacteria problems)

"Why do I need all these bottles? And what are they for?"

Conductivity, pH, Alkalinity, Turbidity, Chloride, Apparent color

Total Phosphorus (Contains ACID!)

Chlorophyll-a (Does not contain Acid)

***E. coli* (optional)**

Phytoplankton

On the Water
Weather and Precipitation Observations

The relationship between weather conditions on the day of sampling, and prior to sampling, is important when interpreting the results of that sampling event. For example, water clarity or transparency measurements can be affected by sunny or cloudy conditions, moderate to large waves at the deep spot, significant rainfall prior to sampling, as well as pollen or algae floating in the water column. Total phosphorus or nutrient levels can be affected by high or low water levels, drought conditions, significant rainfall prior to sampling, and wave action. Algal growth and positioning in the water column can also be affected by sunny or cloudy conditions, air temperature, water temperature, rainfall, and wave action. Completing the Weather and Precipitation Conditions section of your Field Data Sheet is imperative when analyzing and interpreting data for each lake's annual report. These observations should be recorded at the deep spot prior to sampling and include:

Weather Conditions

- **Cloud Cover:** Record whether it is overcast, partly cloudy, clear, or maybe it's a hazy, hot and humid summer day.
- **Air Temperature:** Estimate the average air temperature, or if you have a cell phone or thermometer on your boat, quickly check the air temperature.
- **Wind Conditions:** Record whether it is a calm day, whether there's a slight breeze, or maybe it is a very windy day with high wind gusts.
- **Wave Conditions:** Record conditions on the water's surface. Maybe it is perfectly calm or slightly rippled. Or, if it's a windy day there can be small to moderate waves, even whitecaps in some conditions.
- **Lake Level:** Record if the water level is normal, low or high for the time of year you are sampling.

Precipitation Conditions

- Record whether it is raining while you are sampling or if there was a rain event prior to sampling. If there was a rain event within three days (24-27 hrs.) prior to sampling, record when the rain occurred to the nearest 24 hr. period.
- Estimate or measure (using a rain gauge) the amount of rainfall and record on the data sheet.
- Or, if no rainfall occurred within the three day prior to sampling, record how many days it has been since the last significant rainfall.

Joy in looking and comprehending is nature's most beautiful gift. - Albert Einstein

Dissolved Oxygen and Temperature

- Locate the deep spot using triangulation, a depth finder, or GPS fathometer. Reference the sampling station map or bathymetric map for a general idea of where the deep spot is located.
- To confirm the location, properly set up the Kemmerer bottle (Figure 3 on Page 7) and fill with water. Use the weighted bottle to sound the bottom and confirm the depth on the calibrated chain. Sounding may disturb lake bottom sediment. Allow sediment to settle before collecting samples.
- Anchor at the deep spot and record the bottom depth on the field data sheets.
- Turn on the dissolved oxygen/temperature meter (DO/temp) or Clinefinder digital thermometer. Calibrate the DO/temp meter according to Standard Operating Procedures (SOPs) included with the meter. The Clinefinder digital thermometer is already calibrated and ready for use.
- Start collecting DO/temp data at the lake surface (approx. 0.1 M) and then move to 1 meter and continue moving down the water column at meter intervals until you are approximately 0.5 meters off the bottom. For example if the bottom depth is 10.0 meters, the profile would be collected at the surface and then every meter to 9.5 meters (Figure 1).
- Lower the probe to the starting depth. Allow the temperature probe extra time to stabilize at each depth as rapid changes in temperature, as experienced in the thermocline, may need extra time for the readings to stabilize. Once the readings have stabilized, record the values on the field data sheet.
- Determine the lake stratification, or thermal layers, based upon the temperature profile. The top and bottom layers will have relatively uniform temperature, less than 1℃ difference between meter depths. The middle layer, or thermocline, will exhibit greater than 1℃ difference between meter depths. The boundaries are determined when the temperature changes more than 1℃ as you move from the bottom layer to the thermocline, and then when the temperature changes less than 1℃ as you move from the thermocline to the upper layer. See Figure 2 for an example. **Note: not all lakes stratify into three distinct thermal layers. Some may only have two layers and shallow lakes typically less than four meters will have only one layer.**

Figure 1. Typical Dissolved Oxygen & Temperature Profile

Depth (m)	Temperature (℃)	Dissolved Oxygen (mg./L)
0.1	**17.0**	8.59
1.0	**17.0**	8.57
2.0	**16.9**	8.50
3.0	**16.8**	8.50
4.0	**16.5**	8.47
5.0	**13.4**	2.58
6.0	**9.7**	1.88
7.0	**8.0**	0.21
8.0	**6.8**	0.18
9.0	**6.3**	0.18
9.5	**5.9**	0.17

Figure 2. Determination of Thermal Layers

Depth (m)	Temperature (℃)	
0.1	**17.0**	
1.0	**17.0**	
2.0	**16.9**	**Upper Layer (epilimnion)**
3.0	**16.8**	
4.0	**16.5**	**Boundary**
5.0	**13.4**	
6.0	**9.7**	**Thermocline (metalimnion)**
7.0	**8.0**	**Boundary**
8.0	**6.8**	
9.0	**6.3**	**Lower Layer (hypolimnion)**
9.5	**5.9**	

Deep Spot Sampling Methods

- You should still be anchored at the deep spot. If not, follow the instructions on the previous page to locate the deep spot. If you have drifted from the deep spot, pull up the anchor, move back to the deep spot and re-deploy the anchor.
- Consult the temperature profile to identify the lake's thermal layers. You will want to collect a sample in the middle of each thermal layer. For example, Figure 2 on the previous page identified the different thermal layers. Based upon that profile you would want to collect a sample at 2, 6 and 9 meters. Record the sample depths on the field data sheet. VLAP staff will have already marked the field data sheet with pre-determined depths based upon old temperature profiles. Please change these depths as necessary based upon your current temperature profile.
- If you did not conduct a temperature profile, consult the pre-determined sample depths recorded on your field data sheet by VLAP staff. If you have any questions about where to sample, ask the VLAP staff prior to sampling, or try calling the laboratory while in the field, contact information on Page 3.
- Properly set up the Kemmerer bottle (Figure 3). Open the bottle by pulling apart both ends until you hear a click and the bottle does not close. Lower the bottle to the desired depth. The desired depth marker on the chain or calibrate line should be on the surface of the water.
- Drop the messenger down the chain to close the bottle and collect the desired sample. Pull up the bottle and check to make sure there is no sediment in the sample. If you observe any sediment, discard the water and start the process in a slightly different location such as the other side of the boat, or you may need to adjust the sample depth by 0.5 meter or more (as long as you remain in the correct thermal layer) until you get a sample free of sediment.
- At each depth, you will fill **1 large white** and **1 small brown** bottle with water. Make sure to label the bottles prior to filling them.
- Rinse the large white bottle with a small amount of water from the Kemmerer bottle and discard. Fill the white bottle to the neck. Open the small brown bottle and fill it to the shoulder from the large white bottle (Figure 4). Top off large white bottle with more water from Kemmerer bottle. ***DO NOT Rinse or overflow the small brown bottle as it contains a sulfuric acid preservative! If you overfill the bottle, immediately rinse with water.***

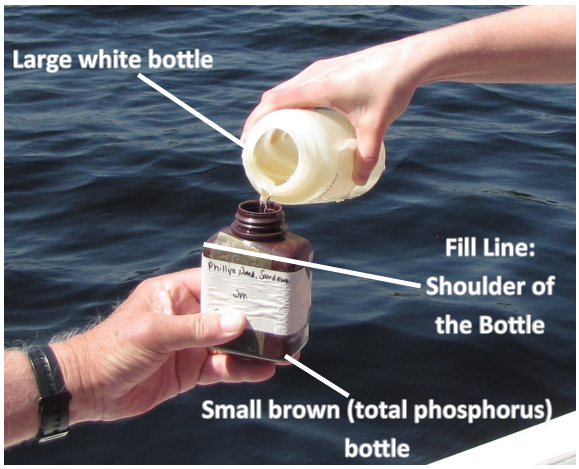
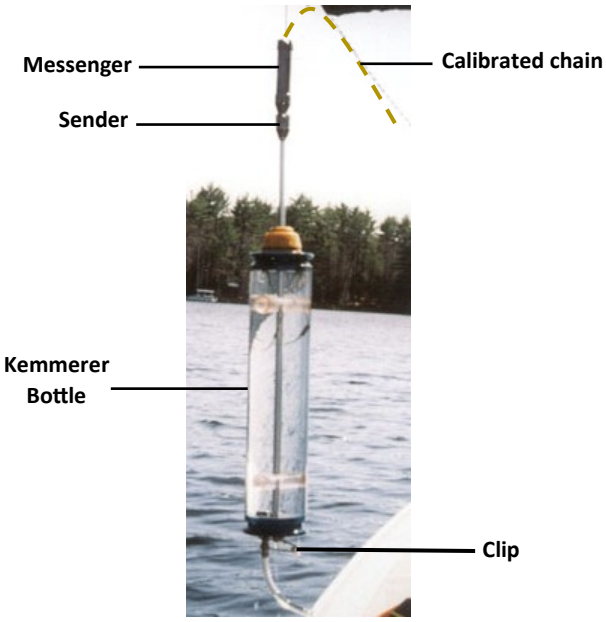


Figure 4. Total Phosphorus Bottle Filling

Figure 3. Kemmerer Bottle Set-Up



Transparency Methods

- Securely attach the Secchi disk to the calibrated chain with the clip (Figure 5).
- **Without Viewscope:** lower the Secchi disk into the water on the **SHADY** side of the boat until it disappears from view. It may help to put your own shadow over the disk or use the boat's shadow to block any surface reflection. Watch the Secchi disk and lower it until it disappears from view.

QUALITY CONTROL

Remember to complete the Volunteer Monitor Field Sampling Procedures Checklist. The checklist guides you through quality control procedures and allows you to comment if any problems arise in the field.

- **With Viewscope:** On the **SUNNY** side of the boat, put the bottom of the viewscope (Figure 6) into the water and make sure there are no air bubbles or leaks. Look through the scope and lower the Secchi disk until it disappears from view.
- Slowly pull up the disk until you can just barely see the white portion.
- Grab the chain at the water surface and determine the depth from the nearest depth markers. Estimate the depth to tenths of a meter.
- Collect at least two separate transparency readings for accuracy. Have another volunteer on the boat, or as many as would like to participate, conduct additional transparency measurements. Record each reading in the appropriate section on the Field Data Sheet. Calculate the average value of the readings and record on the Field Data Sheet.

Figure 5. Secchi Disk Set-Up

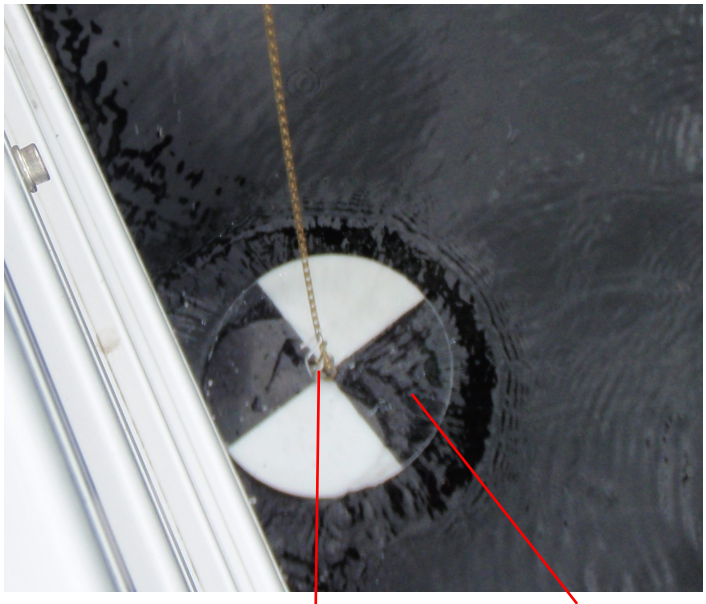
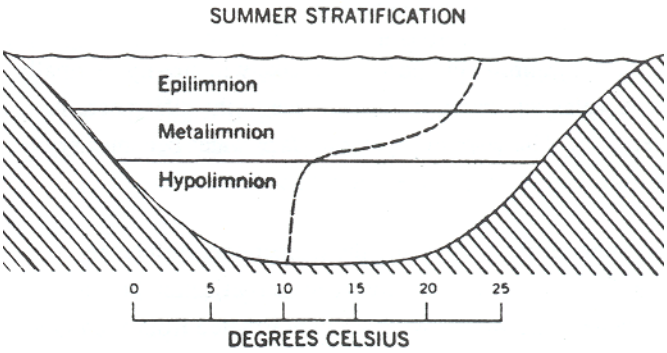


Figure 6. Using the Viewscope

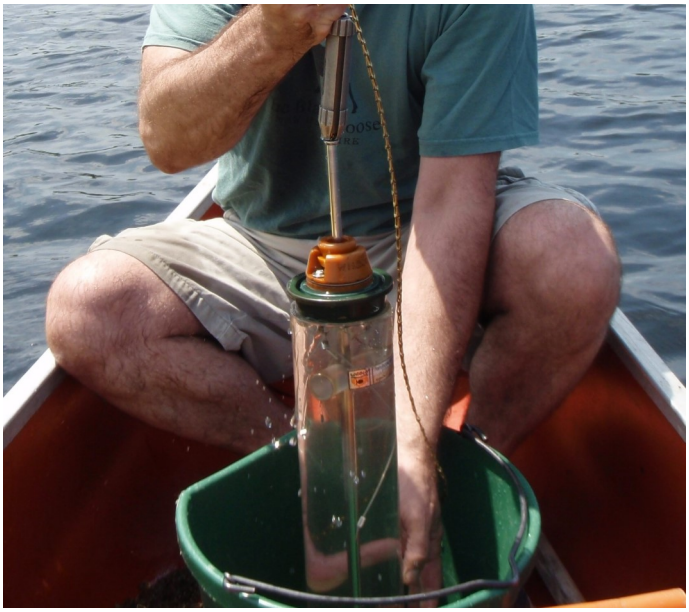
Chlorophyll-a Sampling Methods

Chlorophyll-a samples measure the amount of algal growth in the water column. Algae typically grow where there are ample sunlight and nutrients. VLAP recommends sampling from the middle of the metalimnion (thermocline) in *stratified lakes* (with thermal layers), or two-thirds of the total depth in *un-stratified lakes* (without thermal layers) to the surface.



METHOD 1: COMPOSITE

- Rinse the bucket with lake water and discard. A dirty bucket could contain material that may contaminate the sample, so make sure to rinse clean before use.
- Lower the open Kemmerer bottle to the designated starting depth, typically the deepest depth, as stated above and determined from the temperature profile, or pre-determined by VLAP staff and pre-recorded on your field data sheet.
- Close the bottle, pull it up and deposit a measured amount (either the full bottle of water, half the bottle, or a smaller measured amount) into the bucket.
- Repeat every meter to the surface. For example if you were conducting a 4-meter composite, collect an equal amount of water from 4, 3, 2, and 1 meters.
- Rinse the **large brown bottle** (does **NOT** contain acid) with a small amount of water from the bucket and discard.
- Fill the bottle with the well-mixed composited water from the bucket.
- Evaluate your field data sheet and sampling procedures checklist for completeness. If you are not collecting a phytoplankton sample, leave the deep spot and begin your tributary sampling.



Method 1: Compositing with a Kemmerer bottle and bucket

Chlorophyll-a Sampling Methods

METHOD 2: INTEGRATED TUBE

- Rinse the bucket and integrated tube with lake water and discard. A dirty bucket and/or tube could contain material that may contaminate the sample, so make sure to rinse clean before use.
- Connect the calibrated chain to the eyehook on the weighted end of the integrated tube (Figure 7).
- Lower the weighted end and chain to the desired depth. Line up depth markers on both the tube and chain on the water surface.
- Crimp the top end of the tube tightly.
- Haul the weighted end of the tube up by the chain only. Do not pull up on the tube itself.
- Place the weighted end into the bucket and un-crimp the top end of the tube (Figure 8).
- Lift the un-crimped end above your head so the open end is always higher than the water level in the tube. This allows the water to drain out of the tube into the bucket.
- Rinse the **large brown bottle** (does **NOT** contain acid) with a small amount of water from the bucket and discard.
- Fill the bottle with the well-mixed water from the bucket.
- Review your field data sheet and sampling procedures checklist for completeness. If you are not collecting a phytoplankton sample, leave the deep spot and begin your tributary sampling.

Figure 7. Integrated Tube Set-Up

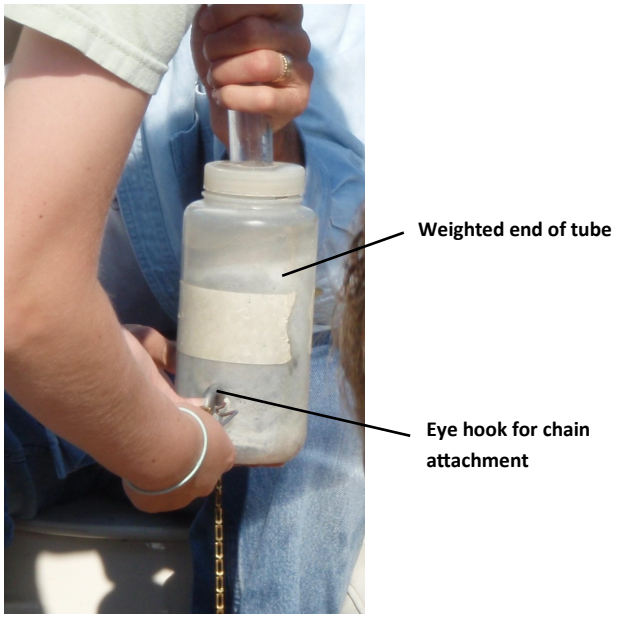


Figure 8. Using the Integrate Tube

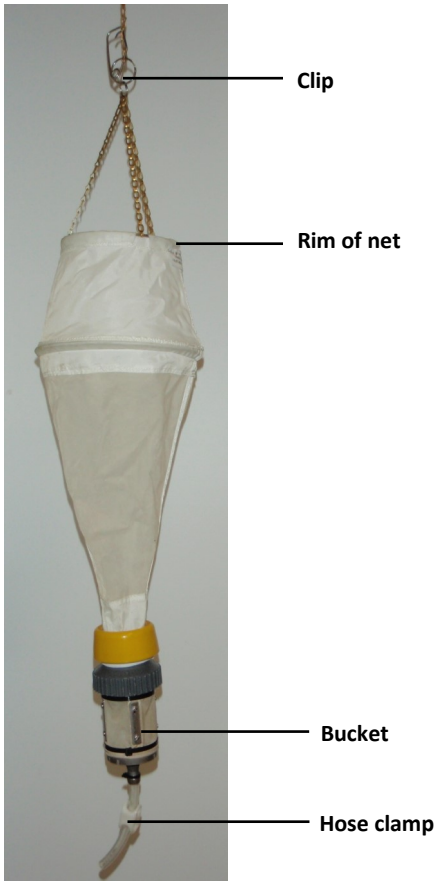
Phytoplankton Sampling Method

Phytoplankton (algae) samples are typically collected by VLAP staff during the biologist visit at lakes with historical cyanobacteria problems. However, volunteers interested in collecting phytoplankton samples outside of the biologist visit may choose to do so by notifying the VLAP Coordinator when reserving equipment.

- Label the small glass jar with the lake name, town, date, time, and the starting depth of sample. The starting depth should be the same as the chlorophyll-a sample.
- Connect the calibrated chain to the metal ring at the top of the net.
- Check the clamp on the tubing beneath the bucket and make sure it is closed tightly, clamping the tube shut (Figure 9).
- Lower the plankton net to the desired depth and put the depth marker on the water's surface.
- Slowly and steadily haul the net up vertically through the water column. If you haul too fast water will not flow through the net and you will not get a representative sample.
- When the net reaches the surface, dip it into the lake once or twice (without putting the rim back underwater) to force the plankton to the bucket at the bottom of the net.
- Open the empty plankton bottle and direct the tubing from the net to towards the bottle opening. Open the clip and empty the sample into the glass jar and preserve with 4-5 drops of Lugol's solution (supplied by VLAP). Swirl the sample gently, and put sample in cooler (Figure 10).
- Review your field data sheet and sampling procedures checklist for completeness. If you have completed your deep spot sampling, leave the deep spot and begin your tributary sampling.

Figure 10. Pouring into Bottle

Figure 9. Plankton Net Set-Up



On the Shore

Tributary Sampling Methods

Reminders

- Collect tributary samples at the same location each month. Consult your sampling station map.
- Do not sample if the tributary is not flowing or too shallow to obtain a sample free of sediment and/or debris.
- Do not sample if the sediment has been disturbed. Relocate slightly upstream to an undisturbed area and sample.
- Record tributary flow observations on the Field Data Sheet. Observations may include: low flow, moderate flow, high flows, stagnant.
- If the tributary station is hard to reach, use a sampling pole. You can make one yourself or borrow one from the JCLC.

Method

- Label **1 large white** and **1 small brown (contains acid!)** bottle per tributary sampling station.
- Rinse the large white bottle by scooping into the water flow, cap, shake and discard the rinse water downstream from where you are sampling.
- Fill the large white bottle with water and use it to fill the small brown bottle to the shoulder. ***Do not rinse or overflow the small brown bottle. It is preserved with acid!***
- Top off the large white bottle with tributary water.

Bacteria Sampling Methods

Sampling for *E. coli* bacteria is an optional test. *E. coli* are present in the intestines of all warm-blooded animals, including humans. In high concentrations, it can indicate the presence of fecal pollution and other potentially harmful pathogens. If you are interested in bacteria sampling, discuss with VLAP staff prior to your sampling event. Bacteria samples have a strict 24-hour hold time, so plan ahead when collecting samples.

Method

- Obtain a small *sterile* clear bottle (yellow lid), with label indicating such, and write in the station name, date and time collected.
- Once you have reached your sample station, remove the cap just prior to sampling and *avoid touching the inside of the bottle cap, neck or inside the bottle to prevent contamination.*
- Near-shore lake sampling: sample at approximately knee depth. Point the mouth of the bottle towards the water surface or tributary flow. Submerge completely and scoop the water in a upward U-shaped motion *away* from your body.
- Tributary sampling: Point the mouth of the bottle towards tributary flow. Submerge the bottle midway between the top and bottom of a flowing stream.
- Avoid contamination of the sample with sediment and/or organic debris.

Sterile bottle

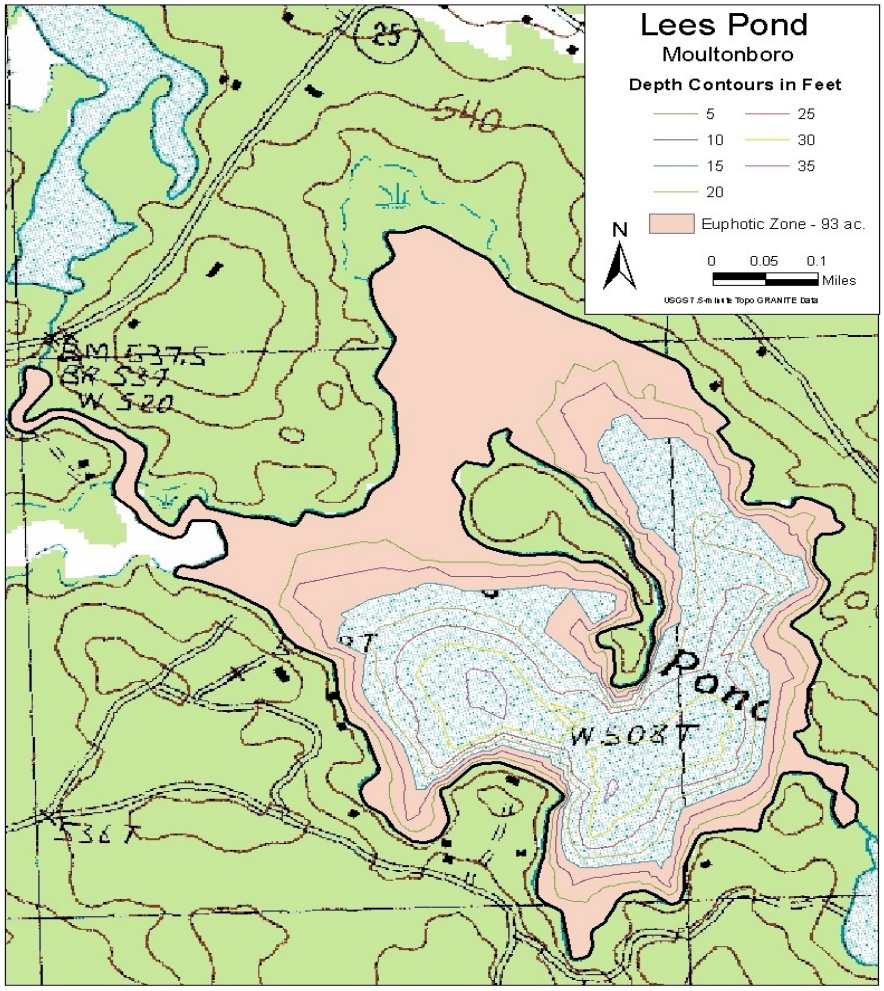
Returning to the Lab

- You should have already scheduled a sample drop-off date with the appropriate VLAP laboratory, contact information included on Page 2 of the manual. If not, please notify the laboratory that you are returning samples and the approximate time of delivery, as we cannot always guarantee the laboratories will be staffed during the busy field season, and different laboratories have different operating hours.
- Once you have finished sampling, make sure all samples are stored on ice, with ice packs, or in a refrigerator to initiate preservation.
- Samples must be returned to the laboratory and ***analyzed within 24 hours of the collection time*** for valid results. Samples may be rejected for analysis or the data invalidated if not analyzed within 24 hours.
- Inspect field data sheets and field sampling checklist to make sure you have completed all appropriate fields.
- Samples and field paperwork will be inspected upon receipt by laboratory staff. Please do not leave until this process has been completed in case we have any reminders or questions about the sampling process.
- Please notify laboratory staff of any malfunctioning field equipment so it can be serviced immediately.

The Jody Connor Limnology Center at DES

Going the Extra Mile

- Make comments on the data sheet of anything unusual such as extreme weather, construction projects, algal blooms, water color, etc. These comments help us to analyze your lake's data.
- To further protect your lake become a Weed Watcher to help identify exotic aquatic species by contacting us at (603) 271-2248 or *amy.smagula@des.nh.gov*.
- We are asking volunteers to update their lake depth contours, or bathymetry. We have a GPS fathometer unit available for use by volunteer monitors who are interested in obtaining more detailed lake bathymetry data. For additional information consult Appendix A.
- We are asking volunteers to collect fish for mercury analysis. DES continually updates information regarding the amount of mercury in freshwater fish that may be used for consumption. For additional information consult Appendix B.
- We are asking volunteers to track lake ice in and ice out dates. You can enter the information on-line at www.forms.nh.gov/onlineforms, or send the VLAP Coordinator annual updates.
- Feel free to contact VLAP staff with any questions, we are happy to help you!



Lake Bathymetric Map

Appendix A

Lake Bathymetry Data Collection via Garmin GPSMAP 168

Note: It is recommended that bathymetry data collection be conducted by a minimum of two people so one person can safely navigate the boat without distraction.

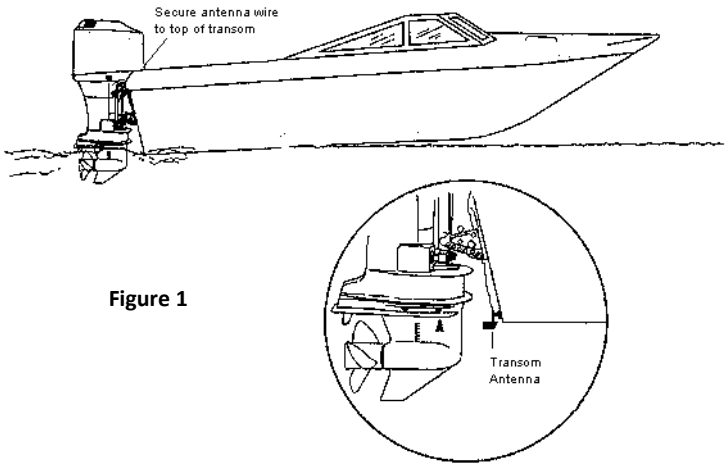


Figure 1

1. Attach suction cup mount transducer to the transom of the boat as shown in Figure 1 and tie off a portion of the cable on to transom cleat.
2. Turn unit on using the power button .
3. Agree to the warning by pressing **Enter/Mark.**
4. The initial screen will indicate the GPS is looking for Satellites (Figure 2).
5. Wait until a location is displayed by the initial screen and 3D navigation is displayed at the top of the page (Figure 3). If unit has not been used for a while this may take several minutes.

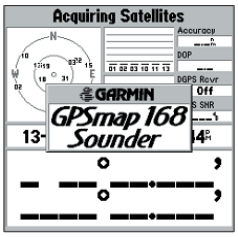


Figure 2

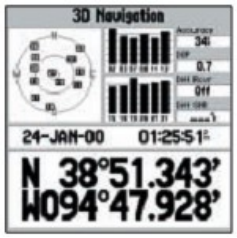


Figure 3

6. To clear all waypoint data: Press **Menu** button twice to enter menu page. The waypoint tab is active by default (Figure 4). Press **Menu** one last time to bring up the Waypoint Menu and use down arrows to highlight **Delete All** and press **Enter/Mark.** Highlight **Yes** in the confirmation message and press **Enter/Mark** to confirm the deletion. There should be no waypoints listed with 500 available after this step; this is displayed at the bottom of the screen.
7. To collect data: Press and hold **Enter/Mark** for *more than one second* you will also hear a double beep. If you hold the button for at least a second the display sticks on the New Map Waypoint screen (Figure 5) this allows you to measure the distance from your last waypoint by monitoring the section labeled From Current Location. It displays the distance from the last waypoint in feet; use this information to collect points at a regular known interval.
8. Navigate all areas of your lake documenting the coves, shoal areas and deep sites. An example of reasonably good point coverage is shown below in Figure 6. This lake was covered with less than 500 points including coves, one shoal area, and deep site.
9. Useful Notes:

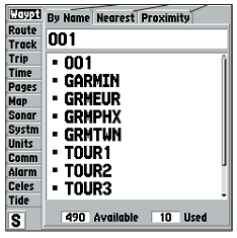


Figure 4

Figure 5

- To conserve data points, a minimum interval distance of 20 ft. should be allowed between data points. As a general rule of thumb, double the acreage of the waterbody to determine an appropriate interval distance between points. For example, if a waterbody is 50 acres in size, collect data points with an interval of 100 ft. between them.
- To conserve data points it is *NOT* necessary to collect a lot of data in depths below 5 feet. Example: if an entire cove is less than 5 feet taking a couple of points in the mouth of the cove at depth of less than 5 feet is all that is necessary.
- Always monitor the Depth portion of the New Map Waypoint screen for blank depth readings as depicted in Figure 5. This may mean that the operator of the boat is going too fast and causing cavitations near the sonar antenna.
- The Waypoint Menu Page (Figure 4) may be accessed at any time to monitor available waypoints by pressing the **Menu** button twice. After available waypoints are checked you can resume collecting data by going to step 6 (above). Waypoints are retained even when power to the GPSMAP 168 is interrupted.

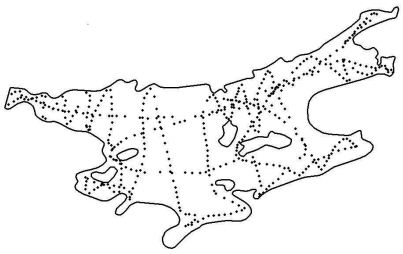


Figure 6

Appendix B

Volunteer Mercury in Fish Collection Procedure

The purpose of this program is to measure the concentration of mercury in fish from lakes and rivers throughout New Hampshire to determine the need for changes to the state's fish consumption advisory, to compare values between lakes, to evaluate trends in fish-mercury concentrations and to better characterize mercury concentrations in a variety of fish species. The fish species of interest include:

Largemouth bass, Smallmouth bass or Eastern chain pickerel

NH's fish consumption advisory advises that the consumption of the above three species of fish from any waterbody should be limited to fish 12 inches or less in length. To determine if a more restrictive waterbody-specific advisory is needed, 10 fish of one of the above three species is required. The fish should be of assorted sizes around the 10 to 14 inch size with none less than 6 inches and none greater than 20 inches.

Yellow perch

Yellow perch are found in most waterbodies and are frequently used to compare mercury concentrations between waterbodies. In order to compare an average value between lakes, at least 5 and up to 10 yellow perch in the 6 to 10 inch size range should be collected. If five fish are collected from a pond every five years, mercury trends in that pond can be evaluated.

White perch and Black crappie

These two species are popular eating fish and tend to have somewhat elevated mercury concentrations. Up to 5 fish of either or both species of various sizes can be collected.

Other species consumed

One to two fish per waterbody of other species consumed by the public can be collected and submitted for analysis.

Fish collection priorities

Up to 15 fish per waterbody will be accepted in a given year. The preference is in the order listed above and in the size ranges listed: 5 to 10 of either largemouth bass, smallmouth bass or pickerel; 5 to 10 yellow perch; and up to 5 white perch or black crappie.

Collection procedures

1. Fish should be collected according to the laws and regulations listed in the NH Freshwater Fishing Digest, published by the Fish and Game Department. A valid NH fishing license is required.
2. Place each fish in a separate plastic zip-lock freezer bag or wrap in aluminum foil. Avoid contact of the fish with unclean or painted surfaces.
3. Label the fish, either by writing with water-proof pen or pencil on the plastic bag or on heavy stock paper that is placed inside the bag or secured to the outside of the bag.
4. Each fish should have a separate label listing:
    - waterbody name and town
    - date of collection
    - common name of fish
    - name of collector
5. Fish should be submitted within 24 hours of collection if not frozen, or can be placed in a freezer within 24 hours of collection (preferably sooner) and submitted frozen within 14 days of collection.
6. Fish should be submitted for processing to the Jody Connor Limnology Center (JCLC) of the Department of Environmental Services at 29 Hazen Drive in Concord.
7. The JCLC should be notified 24 hours prior to submitting the fish. Please call 271-4793.

Contacts

For information on existing fish mercury data from specific NH waterbodies, contact Walter Henderson at 271-8802. For questions about species to collect or about the program in general, contact Walter Henderson at 271-8802 or email: walter.henderson@des.nh.gov. To access historical mercury in fish data for your lake visit the Lake Information Mapper at www.tinyurl.com/NH-LakeMapper.

Quick Reference Guide

Exotic Species

Exotic aquatic plants and animals are non-native species that have few, if any, natural predators to regulate their populations. Once introduced to a waterbody, they can quickly choke out native plants and animal habitat, disrupting the natural state of waterbodies. They are also detrimental to the economical and recreational values of our lakes and ponds. If a lake becomes infested with an exotic species, early detection is crucial in order to implement a rapid management response. Be on the lookout for the following exotic species: Variable Milfoil, Eurasian Milfoil, Water Chestnut, Fanwort, Brazilian Elodea, Hydrilla, Didymo (Rock Snot), Curly Leaf Pondweed, Zebra Mussels, Asian Clams, and Chinese Mystery Snails.

If you see a suspicious plant or animal, collect a sample and mail or bring it to the DES Jody Connor Limnology Center for identification!

Variable Milfoil

Chinese Mystery Snail

Water Chestnut

Eurasian Milfoil

Curly Leaf Pondweed

Asian Clam

Hydrilla

Brazilian Elodea

Zebra Mussels

Fanwort

Didymo (Rock Snot)

Photos courtesy of NHDES

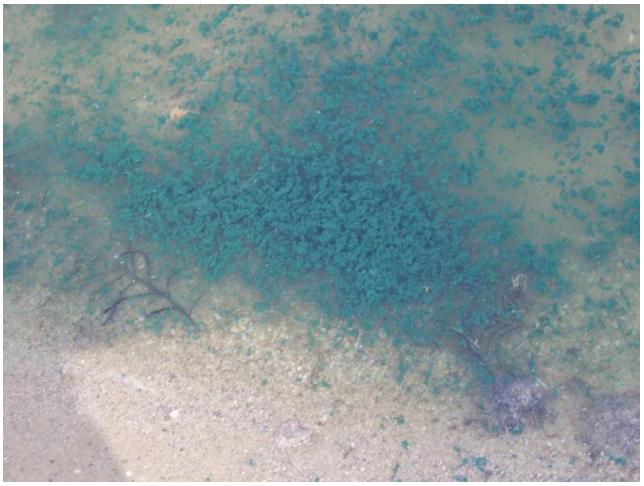
Quick Reference Guide

Cyanobacteria

Cyanobacteria, formerly known as blue-green algae, are microscopic bacteria with the ability to perform photosynthesis. They produce different photosynthetic pigments that make them appear bluish green in color. Cyanobacteria are common to many New Hampshire lakes and ponds, an under normal conditions, do not cause a problem. When cyanobacteria reach "bloom" proportions, an overabundance of cells congregate on the water's surface or within the water column. These bloom conditions are not only aesthetically displeasing, they may also be toxic. Certain species of cyanobacteria may produce toxins that can be harmful to humans, pets, wildlife, and livestock. These toxins can be dermatotoxins, neurotoxins, or hepatotoxins targething the skin, mucous membranes, central nervous system, and liver. DES takes a proactive approach to warn beach and lake users when cyanobacteria bloom occur throughout the state. However, we need you help to identify and report potential cyanobacteria blooms. Below are images of cyanobacteria blooms that have occurred in New Hampshire.

If you see a cyanobacteria bloom, please contact the cyanobacteria hotline at 848-8094 or beaches@des.nh.gov!

Eastman Pond, Grantham, NH 2009



Baboosic Lake, Amherst, NH 2006

Sebbins Pond, Bedford, NH 2011

Mont Vernon Fire Pond, Mont Vernon, NH 2010

Photos courtesy of NHDES