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Bob Craycraft

LAKES LAY MONITORING PROGRAM VOLUNTEER MONITOR LAKE SAMPLING INSTRUCTIONS (2021)

INTRODUCTION

Contact Information

The following instructions and sampling procedures are for use by Lakes Lay Monitoring Program (LLMP) participants. **If any questions arise concerning these sampling procedures, or the program in general, please contact Bob Craycraft (862-3696 or bob.craycraft@unh.edu).**

Any suggestions concerning these directions or the volunteer monitoring activities are encouraged and will help us greatly in our efforts to keep the program current.

Make sure to check for lake specific information (e.g. variations in sampling frequency and lenght of the sampling season) that may be applicable to your lake.

General Information and Things to Remember

Your boat must be securely anchored at the designated sampling station in order to take representative readings. It is important to come as close as possible to the same location from one week to the next. Locate your site with respect to three landmarks (triangulation) or two imaginary lines for consistency. Alternatively, use the pre-designated coordinates to return to the sampling site using global positioning system navigation.

Sampling should be taken at predetermined intervals to provide the data necessary to observe trends which develop over the summer sampling season and which are necessary to detect seasonal water quality fluctuations. A difference of several days is not critical if the weather or circumstances do not permit sampling, but every effort should be made to sample consistently at weekly intervals. Please make plans in advance with your team partner to cover your sampling station if you are unable to sample in a given time period.

All data sheets and zip-lock inserts should be filled out completely. All data on these sheets are important, and without them important information could be lost.

All data sheets must be completed in pencil (pen and felt-tipped markers run when wet, and valuable samples or data can be lost).

All depth measurements should be made from the point where the line touches the water surface, not from the gunwale. This includes measurements collected with the Clinefinder, the Secchi Disk and the composite tube sampler.

Clinefinder digital thermometers remain "on" at all times and have a battery life of approximately two to three years. *Note: battery power should be assessed at the beginning of the sampling season and the batteries replaced if:*

1) *The batteries were not replaced within the last two years.*
2) *The LCD temperature readout appears faint.*

We can supply the three alkaline AA batteries and zip ties that hold the batteries in place or, should you ship the Clinefinder to us, we can replace the batteries for you.

The newer Clinefinders are assembled with T-15 head screws, and we can provide a T-15 screwdriver if needed.

Should a Clinefinder completely lose power, it will display "-Cal" and will have to be returned for recalibration.

When replacing the Clinefinder batteries follow these steps:

- Remove the four screws from the back of the Clinefinder and carefully separate the two clamshell halves to expose the battery compartment. *Note: the internal compartment can pressurize so work the two clamshell halves apart gently to avoid damaging the internal wiring that connects to the two halves.*
- Once open, cut the zip tie, that holds the batteries in place, to facilitate battery removal.
- Replace the three batteries <u>one by one:</u> remove one old battery and replace it with a new battery. Repeat the process two more times. *Note: if you remove all three batteries at once the meter will lose power and will require recalibration*.
- Take a new zip tie and thread it through the rear of the battery compartment and "zip" it into place to secure the batteries.
- Ensure the gasket between the two clam shell haves is in place and reassemble the two clamshell halves.
- Screw in the four screws, being careful not to over-tighten and strip the plastic into which the screws lock.
- The meter should be ready for use with a two-to-three-year battery life.

You may find it convenient to separate your equipment into two crates, one for on-lake procedures and one for on-shore.

On-lake equipment:

- Anchor with enough rope for your sampling location – two anchors is better, to maintain position
- Cooler with ice
- Blank data sheet (optional – a clip board)
- Two pencils
- Secchi disk with line marked at half-meter increments or using a metric fiberglass measuring tape.
- View scope
- Clinefinder digital thermometer
- Composite tube (integrated) sampler
- A two-liter amber/brown bottle to collect the primary water sample

On-shore equipment:

- Filtration unit consisting of receiving funnel, pump, and collection container
- Filter paper
- Tweezers
- Either a 60- or 125-milliliter amber/brown bottle to hold a cyanobacteria sample
- A 60-milliliter white/translucent bottle to hold a dissolved color sample
- A 250-milliliter white/translucent bottle, prewashed with acid and labeled “Corrosive”, to collect a total phosphorus sample
- Graduated cylinder
- Plastic titrating cup (aka beaker)
- Burette – thin graduated plastic tube with dispensing nozzle
- Indicator solution in drip dispensing bottle
- Titrant solution in plastic squeeze bottle

Figure 1. Sampling equipment

Note: items in your kit may look slightly different (data sheets not shown).

PROCEDURES – On the Lake

A. Water Transparency (Secchi Disk Depth)

Function:

To measure the transparency of the lake water at the sampling station.

Rationale:

Water clarity fluctuations correlate to differences in algal populations, silt, and water color.

Important Details:

The view scope (PVC pipe with Plexiglas plate) should always be used while viewing the Secchi Disk. *Never take a Secchi Disk reading while wearing sunglasses or tinted glasses.*

All equipment must be in good working order. The paint on the Secchi Disk should not be chipped or discolored. If the Secchi Disk is chipped or discolored, it can be repainted with flat black and flat white Rustoleum paint (never use gloss finishes when repainting the Secchi Disk). Also, the inside of the view scope should be painted black to reduce glare.

The view scope should be examined prior to each sampling trip. If the Plexiglas plate is coated with dust, clean the plate off with tap water. Dust on the Plexiglas plate will yield artificially low water transparency readings.

The Secchi Disk measurement should be taken as close to noon as possible. This ensures that the maximum amount of sunlight enters the lake. However, any time between 9 AM and 3 PM is acceptable.

The Secchi Disk should always be lowered on the shaded side of the boat.

Procedures:

1. Once anchored at your sampling station, place the view scope into the water so the Plexiglas plate is flush with the water. There should be no air bubbles between the Plexiglas plate and the water; if necessary, tilt the view scope to allow air bubbles to escape.

2. Look through the view scope and wait 30 seconds while your eyes to adjust to the darker lighting. Slowly lower the Secchi Disk until it disappears from view, immediately stop lowering the line and mark the point of disappearance (where the line just touches the water). Lower the disk a few more inches below the point of disappearance. Raise the disk until light can just be seen reflecting upward from the white surface of the disk and mark the point of reappearance.

3. The average between these two points (the point of disappearance and the point of reappearance) is taken as the Secchi Disk transparency.

4. Record the Secchi Disk transparency on the data sheet. Repeat the procedure in order to collect a second Secchi Disk measurement to confirm the first result.

B. Digital Thermometer

Function:

To measure the thermal profile of the water column at the sampling location.

Temperature profiles should at least pinpoint the *thermocline,* the mid-lake layer, that is sandwiched between an upper warm water layer (epilimnion) and a bottom cold water layer (hypolimnion).

More complete temperature profiles are encouraged to better assess the degree of temperature stratification throughout the water column.

Rationale:

The development of thermal layers in lakes is of great importance to the lake's biology and productivity. Therefore, it is important to know if the lake is stratified.

When the lake is stratified, it is important to document the location of the major layers. The boundaries are determined by measuring the temperature at one-half meter intervals and looking for large temperature changes **(Table 1)**.

As a general rule of thumb, the thermocline is identified by recording a continuous decrease in water temperature readings between successive one-half meter increments. A temperature decrease of one degree Celsius per meter depth (or one-half degree Celsius per half meter) over a span of several meters is used to locate the upper and lower limits of the thermocline. Refer to the examples of summer temperature profiles in Table 1.

Important Details:

Clinefinders (Figure 2) remain "on" at all times and have a battery life of approximately two to three years. *Note: battery power should be assessed at the beginning of the sampling season*. See discussion above.

Procedures:

1. Place the Clinefinder in a shady spot in the boat, allow the temperature reading to stabilize, and record the air temperature on the datasheet.

2. Submerse the tip of the Clinefinder cable into the water, wait 15 seconds or until the temperature readings stabilize, and record the temperature in degrees Celsius on your datasheet (the first reading should be recorded at 0.1 meters).

Figure 2. Clinefinder

3. Continue lowering the temperature cable down in ½ meter increments. Let the temperature reading stabilize for 15 seconds, and record the temperature data at the corresponding depth on the datasheet.

Note: it is important to make sure the temperature cable is vertical when recording the temperature readings, otherwise inaccurate data may be recorded.

Table 1: Temperature Profile

Depth (meters)	Temperature (Celsius) May 19	Temperature (Celsius) June 27	Temperature (Celsius) August 5	Temperature (Celsius) Sept 8
0.1 (surface)	13.9	23.4	27.1	21.0
0.5	14.0	23.4	26.9	21.0
1.0	14.0	23.2	26.6	21.0
1.5	14.0	23.2	26.3	21.0
2.0	14.0	22.4	26.1	21.0
2.5	14.0	22.4	26.1	20.7
3.0	14.0	22.3	25.8	20.7
3.5	14.0	22.2	25.1	20.7
4.0	13.0	22.1	24.3	20.7
4.5	11.7	21.1	23.5	20.5
5.0	10.6	19.9	20.6	20.5
5.5	9.6	17.7	17.4	20.5
6.0	9.0	15.3	15.5	20.1
6.5	8.7	12.9	13.1	17.1
7.0	8.5	11.0	11.5	14.5
7.5	8.1	10.7	10.9	13.8
8.0	7.7	10.1	10.2	11.7
8.5	7.7	9.5	9.6	10.0
9.0	7.6	8.9	9.0	9.4
9.5	7.6	8.4	8.5	8.8
10.0	7.5	8.1	8.3	8.4
10.5	7.5	7.8	8.3	8.2
11.0	7.5	7.8	8.3	8.2
11.5	7.4	7.7	8.1	8.1
12.0	7.3	7.6	8.0	8.0

The Gray shaded area indicates the extent of the epilimnion on the respective sampling dates while the thermocline is un-colored and the hypolimnion is shaded light blue.

C. Composite Tube (Integrated) Sampler and the Collection of a Water Sample

Function:

To collect water from the surface down to the maximum extent of the upper warm water layer (epilimnion), with all depths represented equally.

Rationale:

The temperature and light concentrations in the upper warm water layer are conducive to algal growth. Consistent collection of a representative surface water sample, among sampling dates, facilitates the detection of both short-term water quality fluctuations and long-term trends.

Important Details

The depth to which the sample is taken is determined by the temperature profile. The weighted end of the tube should reach down to, but not include, the layer of rapid temperature change (the thermocline).

The upper, relatively constant temperature layer should be measured to the nearest half-meter and should vary by no more than one-half degree Celsius between successive one-half meter increments (see exception below).

Viewing the data from Table 1, we see that the temperature is stable from the surface (0.1 meter) down to 3.0 meters on August 5, changing by less than 0.5 degrees Celsius per half-meter depth. Between 3.0 meters and 9.5 meters, the temperature decreases rapidly (greater than 0.5 degrees Celsius per one-half meter). The zone of rapid temperature decrease between 3.0 meters and 9.5 meters defines the thermocline. So, using this example, the August 5 water sample should be collected down to 3.0 meters, which includes the upper warm water layer but excludes the zone of rapid temperature decrease.

In some instances, particularly during hot periods and calm periods, one can experience false temperature stratification. For example, the June 27 temperature data displayed in Table 1 do not change significantly between successive depths from the surface down to a depth of 4.0 meters, with the exception of a 0.8 degree Celsius difference between 1.5 and 2.0 meters. The true thermocline is actually located at the point where the temperature continues to drop by 0.5 or more degrees Celsius per half meter depth. In the June 27 example, the thermocline is located between 4.0 and 9.5 meters.

Procedures:

1. Rinse the tube sampler by lowering the hose into the lake, to the maximum extent possible, and slowly raise the un-kinked hose to fully flush the sampler. Always uncoil the line that is attached to the weight to allow the hose to descend vertically into the water column.

    a. Place the weighted end of the integrated sampler in the water and slowly lower the hose to the appropriate depth (in the case of our example from August 5 in Table 1, the tube is lowered to 3.0 meters). The rope which is attached to the weighted end should be slack throughout this procedure. *Note: the tube should not be kinked when it is lowered into the water column.*

    b. Once the appropriate depth is reached, kink the tube (fold the tube tightly) about one-half meter above the point where the hose comes in contact with the lake water. Hold the kinked end of the tube at a constant depth and raise the tube up by the attached line which is connected near the weighted end of the tube. This will ensure

that as the bottom of the tube is raised, water will not leak out. *Note: make sure you continue to kink the hose while raising the opposite end of the tube with the attached line.*

c. Place the weighted end of the tube into the mouth of the two liter amber bottle, and un-kink the hose. Slowly raise the hose from the opposite end and let the entire contents of the hose drain into the amber bottle. Be careful not to let water backflow into the unused portion of the tube.

d. Cap your sampling bottle, invert the bottle five times, remove the cap and dump the lake water into the lake. *This ensures the sampling bottle has been rinsed with your water sample*.

2. Place the weighted end of the integrated sampler in the water and slowly lower the hose to the appropriate depth (in the case of our example from Table 1, the tube is lowered to 3.0 meters). The rope, which is attached to the weighted end, should be slack throughout this procedure. *Note: the tube should not be kinked when it is lowered into the water column.*

3. Once the appropriate depth is reached, kink the tube (fold the tube tightly) about one-half meter above the point where the hose comes in contact with the lake water. Hold the kinked end of the tube at a constant depth and raise the tube up by the attached line which is connected near the weighted end of the tube. This will ensure that as the bottom of the tube is raised, water will not leak out. *Note: make sure you continue to kink the hose while raising the opposite end of the tube with the attached line.*

4. Place the weighted end of the tube into the mouth of the two liter amber bottle, and un-kink the hose. Slowly raise the hose from the opposite end and let the entire contents of the hose drain into the amber bottle. Be careful not to let water backflow into the unused portion of the tube. *Note: never touch the end of the tube near the weight; always grab the weight to guide the tube into the sampling bottle.*

5. If the two liter amber bottle is not one-half full at this point, repeat steps 2 through 4 above until the bottle is at least one-half full.

6. Once you have collected an adequate volume of sample water, place the amber bottle in an ice filled cooler.

PROCEDURES – On Shore

D. Filtration of Chlorophyll Sample:

Function:

To filter out all algae from a given quantity of lake water, and provide the sample to UNH for determination of the chlorophyll *a* pigment content.

Rationale:

The filters are of such a fine pore size (0.45 microns) that essentially no algae or bacteria can pass through. Once the sample has been filtered and the filter has been preserved (dried and frozen), the sample provides us with a convenient means of estimating the algal abundance through the analysis of the chlorophyll pigment content.

Important Details:

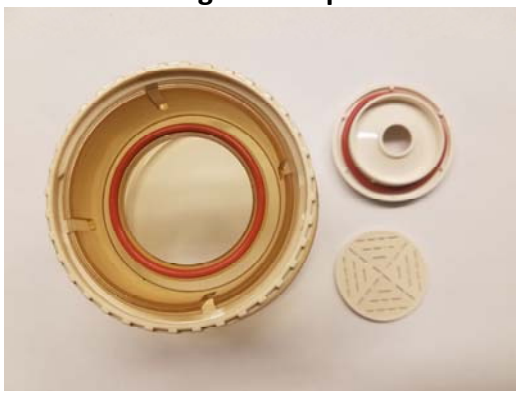
The filtration is best done indoors in an area that is not exposed to direct sunlight. Exposure to direct sunlight can degrade the chlorophyll pigments and must be avoided.

Be sure to fill out all pertinent information on both the large field data sheet and the small data sheet. Information should be recorded in pencil.

The filtration unit contains two gaskets that are critical to the functioning of the system. Should these gaskets become dislodged, they should be re-installed to create a good seal. Otherwise, the vacuum pressure will not be sufficient to pull the lake water through the filter.

There is a plate, upon which the filter sits, that can be dislodged. If the plate falls out, make sure you replace it with the grided side up. If the plate is installed upside-down, water will filter much more slowly through a few narrow slots.

Figure 3. Proper gasket placement and dislodged filter plate.



Procedures:

1. Unscrew the receiving funnel of the filtration unit and place a white filter on the filter holder, using a pair of tweezers or by lifting the filter out of the box with a blue piece of wax paper that separates the white filters from one another. Under no circumstances should the white filters be touched.

2. Replace the receiving funnel. *Note: when screwing the receiving funnel on the filtration setup, be careful not to cross-thread the receiving funnel.*

3. Invert the two liter sampling bottle five times immediately prior to pouring out a water sample.

4. Fill the receiving funnel to the 250 milliliter mark with unfiltered lake water contained in the two-liter amber bottle. If using a manually operated hand pump, squeeze the handle until the vacuum pressure builds and water passes through the white filter. Periodically squeeze the handle, as needed, until all water passes through the white filter. Alternatively, if using an electric pump, plug in/turn on the pump and allow the entire volume of lake water to pass through the filter and collect in the lower chamber.

5. After 250 milliliters of lake water is filtered, empty the bottom chamber. *Caution; do not disturb the filter; additional water will be filtered through the upper chamber in the next step.* If using an electric pump, the filtration units are equipped with an overflow bottle, but this should not be allowed to fill with water. These safety bottles are designed to avoid the water from entering the electric pump. To fully protect the electric pumps, the safety bottle should be kept upright during the filtration process.

6. Repeat steps 3 and 4.

7. Unscrew the collar and take the filter from the filter holder. **Do not discard the filtered water remaining in the lower chamber.** The filter should be carefully handled by the edges (using tweezers or the blue wax paper) and placed upright on the back of a fully labeled (in pencil) paper insert. The filter should be dried in a dark location, such as a cabinet drawer or a shoe box, for a minimum of eight hours while drying the filter overnight is preferable.

8. When the filter is absolutely dry, place it in the Ziplock bag along with the small label sheet and placed in a freezer. The label should contain the following information: Lake, Site, Date, Depth, Monitor, Volume Filtered (total volume = 500 milliliters), Drying Time.

E. Dissolved Water Color

Function:

To measure the color of the water due to dissolved humic substances and other dark-colored organic material.

Rationale:

Water color is a factor that influences the Secchi disk transparency. We are interested in filtered water which doesn't contain any particulate debris.

Procedures:

1. After performing a chlorophyll filtration in Section D, fill a 60 ml translucent plastic bottle approximately half-way with **filtered lake water** (the lake water remaining in the bottom chamber of the filtration apparatus).

2. Dump the lake water out of the 60 milliliter bottle. *You have rinsed the sampling bottle with filtered lake water.*

3. Now fill the 60 milliliter sampling bottle to the neck with filtered lake water and place the labeled bottle in the freezer. The label should contain the following information: Lake, Site, Date, Depth, Monitor.

F. Phosphorus

Function:

To measure the concentration of total phosphorus in the lake water.

Rationale:

Phosphorus is generally the limiting nutrient to growth in New Hampshire lakes. Excess phosphorus leads to increased algal productivity and growth in New Hampshire lakes, and high phosphorus levels can also be an indication of problems around the lake, such as excessive fertilizer runoff and sediment erosion that can be documented as short-term phosphorus "spikes."

Procedures:

1. Invert the two liter amber bottle five times.

2. Fill a pre-labeled 250 ml translucent acid-washed bottle (labeled corrosive) with lake water from the two liter amber bottle. The label should contain the following information: Lake, Site, Date, Depth, Monitor. *Warning, the sampling bottles contain one milliliter of concentrated sulfuric acid so use extreme caution when collecting these samples.* Fill the phosphorus bottle to the neck of the container, cap the bottle and freeze the sample. *Note: be careful not to touch the inside of the cap or bottle as our bodies contain high concentrations of phosphorus that can contaminate the sample.*

G. Cyanobacteria

Function:

To measure the concentration of phycocyanin (a photosynthetic pigment associated with cyanobacteria) in the water sample.

Rationale:

Cyanobacteria can be associated with green water events oftentimes referred to as "blooms," and some species are known to produce liver and nervous system toxins.

Procedures:

1. Invert the two liter amber bottle five times.

2. Fill a pre-labeled amber bottle (either a 60 milliliter or 125 milliliter bottle depending

upon what you were provided) to the neck with lake water that was collected in the 2 liter amber bottle. The label should contain the following information: Lake, Site, Date, Depth, Monitor.

3. Cap the bottle and freeze the sample. *Note: always leave room for expansion since this bottle is frozen and could crack if overfilled.*

H. Alkalinity

Function:

To measure the bicarbonate buffering capacity (resistance to acidification) of lake water.

Rationale:

Alkalinity, or buffering capacity, is an important parameter to assess in New Hampshire where the lakes are often acidic and poorly buffered against atmospheric fall-out. Alkalinity can also serve as an early indicator of lake acidification.

Important Details:

Titrations should always be done against a white background.

Alkalinity samples will be analyzed from water contained in the two liter amber (integrated) sample bottle.

Two endpoints are critical. If more than one monitor in your group is performing the alkalinity titrations, make sure all analysts come to agree on the correct endpoint colors.

Procedures:

1. Invert the two liter amber bottle five times and pour out approximately 50 ml of the lake water sample into a graduated cylinder. Transfer the lake water into plastic titrating cup (aka beaker).

2. Swirl around the sample, in the plastic cup, and pour out the sample. *You have effectively rinsed both the graduated cylinder and beaker.*

3. Invert the two liter amber bottle five time and pour out 100 ml of the lake water sample into a graduated cylinder. Transfer the lake water into plastic titrating cup (aka beaker).

4. Add 12 drops of indicator solution, labeled Alkalinity Indicator, from the dispensing bottle.

5. Insert the tip of plastic titrant bottle, labeled Alkalinity Titrant, into the top of the plastic burette. Squeeze the titrant bottle carefully and fill burette with 10 ml of titrant. Gently tap the tip of the burette to remove any air bubble before proceeding. Refill the burette with alkalinity titrant as needed to replenish any solution that was lost when you dislodged the air bubble.

6. Hold the burette with one hand so that thumb and forefinger can squeeze the glass bead located in the rubber tubing. Add the titrant slowly, drop by drop, while stirring the solution with a stirring rod held in the other hand. Titrate until the water loses the blue coloring and becomes a lavender gray color.

7. Record the number of milliliters (mls) used to reach this first endpoint. Record to the nearest tenth (e.g. 5.4 ml); each line on the burette is 0.1 ml.

8. Continue titrating until the solution becomes a very faint pink. At this point in the titration, the water will become "pinker" as more titrant is added, so it is very important to titrate only until the first signs of pink!

9. Record the <u>total volume</u> of titrant to reach this second endpoint (in other words, the volume of titrant that you used since you began titrating, not since the gray endpoint). For example, if it took 5.4 ml to reach the gray endpoint, plus, 0.6 ml to reach the pink endpoint, the total ml used for the second endpoint would be 6.0 ml. Make sure both endpoints are included on the data sheet.

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LAKES LAY MONITORING PROGRAM

LAY MONITOR DATA SHEET (2021)

SID:_____
ID:_____

MONITOR #1 NAME:_____
MONITOR #2 NAME:_____
MONITOR #3 NAME:_____
LAKE NAME:_____
SITE NAME:_____

AIR TEMP:_____ºC
DATE:_____
SAMPLING TIME: Start_____ **Finish**_____
SITE DEPTH:_____
SECCHI DISK TRANSPARENCY_____**meters**

Weather (circle the best descriptor)

Sky	Clear	Hazy	Cloudy	Overcast
Lake	Calm	Ripples	Waves	White Caps
Wind	Calm	Breezy	Gusty	Windy

Precipitation (Circle the best descriptor below)

None	Past 12 hrs	Past 24 hrs	Past 48 hrs	Past 72 hrs

Temperature Profile

Depth (m)	Temp (°C)	Depth (m)	Temp (°C)
0.1 (Surface)		9.5	
0.5		10.0	
1.0		10.5	
1.5		11.0	
2.0		11.5	
2.5		12.0	
3.0		12.5	
3.5		13.0	
4.0		13.5	
4.5		14.0	
5.0		14.5	
5.5		15.0	
6.0		15.5	
6.5		16.0	
7.0		17.0	
7.5		18.0	
8.0		19.0	
8.5		20.0	
9.0		21.0	

Note: Check surface and bottom temperatures first. Check intermediate depths only if temperature change is found. Indicate the bottom depth.

Comments/Observations (see reverse):

LAKE EUTROPHICATION PUBLIC PERCEPTION SURVEY

IF YOU CIRCLE MORE THAN ONE CHOICE FOR A AND/OR B, WE CANNOT USE THE SURVEY DATA THAT WEEK.

A. Please circle the one number that best describes the physical condition of the lake water today.

1. Crystal clear water.
2. Not quite crystal clear, a little algae visible.
3. Definite algae greenness, yellowness or brownest apparent.
4. High algae levels with limited clarity and/or mild odor apparent.
5. Severely high algae levels with one or more of the following:
   _massive floating scums on lake washed up on shore
   _strong foul odor
   _fish kill.

B. Please circle the one number that best describes your opinion on how suitable the lake water is for recreation and aesthetic enjoyment today.

1. Beautiful, could not be any nicer.
2. Very minor aesthetic problems; excellent for swimming, boating, enjoyment.
3. Swimming & aesthetic enjoyment slightly impaired because of algae levels.
4. Desire to swim & level of enjoyment of the lake substantially reduced because of algae levels.
5. Swimming and aesthetic enjoyment of the lake nearly impossible because of algae levels.

View Scope Comparison Study

We invite interested persons to take part in a study assessing the usefulness of the View Scope when collecting water clarity (Secchi Disk) data. In addition to the weekly water clarity readings that you collect (using the view scope), we are interested in obtaining monthly water clarity data using the four methods described below. Make sure you report weather or lake conditions on front page. **Please take 2 readings under each condition (Sunny/Shady Side, With/Without View Scope) and record each value.**

Take Secchi Disk reading from the shady side of the boat **without** the view scope	Secchi Disk Depth 1)_____meters 2)_____meters
Take the Secchi Disk reading from the sunny side of the boat **without** the view scope	Secchi Disk Depth 1)_____meters 2)_____meters
Take the Secchi Disk reading from the shady side of the boat **with** the view scope	Secchi Disk Depth 1)_____meters 2)_____meters
Take the Secchi Disk reading from the sunny side of the boat **with** the view scope	Secchi Disk Depth 1)_____meters 2)_____meters
Take the Black Disk reading from the sunny side of the boat **with** the view scope	Secchi Disk Depth 1)_____meters 2)_____meters

Comments/Observations
(Continued From Front of Page):

Laboratory Processing

Time: Start_____ Finish_____
Date:_____

[1]**Integrated chlorophyll samples**: Chlorophyll Filter
Lakewater volume filtered: _____ml
Filter drying time: _____hrs
Depth sampled: Surface - _____meters

[2]**Point chlorophyll samples**: Chlorophyll Filter (if taken)
Lakewater volume filtered: _____ml
Filter drying time: _____hrs
Depth sampled: Surface - _____meters

[1]**Integrated color sample**: 60 ml bottle of filtered water
_____ YES _____ NO

[2]**Point color sample**: 60 ml bottle of filtered water (if taken)
_____ YES _____ NO

Specific Conductivity sample: 60 ml bottle
(if taken) Depth of sample:_____meters

Alkalinity Sample Results:
Depth sampled: 0-_____meters
Gray endpoint: _____ml
Pink endpoint: _____ml
(estimate to the nearest 0.1ml)

pH Sample (if taken) Depth sampled:_____
pH Value_____

*** Denotes For FBG Use**

*_____
*_____
*_____
*_____
*_____

Optional Samples

[1]**Integrated Total Phosphorus**: 250ml acid washed bottle
_____YES _____NO *_____

[2]**Point Total Phosphorus**: 250 ml Acid Washed bottle
_____YES _____NO _____Depth *_____

[1]Sample collected in the surface waters using the integrated sampler (weighted garden hose).
[2]Sample collected using the point sampling bottle.. Samples are collected at the request of the CFB.

Turner Trilogy Results (if measured):
Sampling Depth: _____ (meters)
Phycocyanin: _____ (RFU)
Phycocyanin: _____ (*u*g/l)
Chlorophyll *a*: _____ (RFU)
Chlorophyll *a*: _____ (*u*g/l)

Turner Aquafluor Results (if measured):
Sampling Depth: _____ (meters)
Phycocyanin: _____ (*u*g/l)
Phycoerythrin: _____ (*u*g/l)
Chlorophyll *a*: _____ (*u*g/l)

FluoroQuik Fluorometer Results (if measured):
Sampling Depth: _____ (meters)
Phycocyanin: _____ (*u*g/l)
Phycoerythrin: _____ (*u*g/l)
Chlorophyll *a*: _____ (*u*g/l)

Return to: Attn: Bob Craycraft
University of New Hampshire
G18 Spaulding Life Sciences
38 Academic Way
Durham NH 03824-3544
Voice: (603) 862-3696
Email: bob.craycraft@unh.edu

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Integrated Sample		Point Sample	
Chl *a* 663	_____/_____	Chl *a* 663	_____/_____
Chl *a* 664	_____/_____	Chl *a* 664	_____/_____
Chl *a* 665	_____/_____	Chl *a* 665	_____/_____
Chl *a* 750	_____/_____	Chl *a* 750	_____/_____
Diss. Color 440	_____	Diss. Color 440	_____
Diss. Color 460	_____	Diss. Color 460	_____
Diss. Color 493	_____	Diss. Color 493	_____
Diss. Color 750	_____	Diss. Color 750	_____
Diss. Color 880	_____	Diss. Color 880	_____

Volunteer Monitor Signature:_____