

INSTRUCTIONS FOR LAKE WATER QUALITY MONITORS

I. General Information And Things to Remember:

- a. Your boat must be securely anchored in order for accurate readings to be taken. Also, it is important to come as close as possible to the same site location from one week to the next.
- b. Samples should be taken at weekly intervals. A difference of two or three 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. In regard to the weather, it is better to change the test date by one day if a calm, sunny day is than to take samples on a cloudy day or a day with relatively large waves. Please make plans in advance with your sampling partner if you are unable to do it on a given date.
- c. The data sheets should be filled out fully. All data on these sheets is very important, and without it the samples can not be analyzed.
- d. data sheets must be completed in pencil. (Pen, and especially felt tipped markers run when wet, and valuable samples or data can be lost.)
- e. Temperature profiles should at least pinpoint the boundary of the epilimnion and metalimnion. (See below) Also, the bottom temperature should always be taken. If time permits, more complete temperature profiles are encouraged.
- f. The tube sampler should be lowered to just above the metalimnion. Thus, all the water collected should be essentially the same temperature. In other words, the tube sampler should collect a column of water which includes the entire epilimnion, but none of the metalimnion (See below).

II. Specific Procedures:

a. Secchi Disk

- i. Function: To measure the transparency of the lake water.
- ii. Rationale: Changes in the water clarity due to changes in algal populations, silt, or water color are reflected in the Secchi Disk depth
- iii. **Important Details:**
 1. The Secchi Disk should be used as close to noon as possible. This insures that the maximum amount of sunlight enters the lake. Any time between 9 a.m. and 3 p.m. is acceptable.
 2. The Secchi Disk should always be lowered on the shaded side of the boat.
 3. The view scope should always be used while viewing the Secchi Disk. Do not use shaded glasses or sun glasses.
 4. 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).
- iv. **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). Look through the view scope, and 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. The disk is then raised until light can just be seen reflecting upward from the white surface of the disk. Record the point of reappearance. The average between these two points (the point of disappearance and the point of reappearance) is taken as the Secchi Disk depth. Record it on the data sheet using meters and tenths.

b. Digital Thermometer

- i. Function: To measure the thermal profile of the water column
- ii. Rationale: The development of thermal layers in lakes is of great importance to the lake's biology and productivity. Therefore, it is very important to know if the lake is stratified, and if so, the depth of the boundaries between the major layers. The boundaries are determined by measuring the temperature at various depths and looking for large changes in temperature. (Table 1). As a general rule of thumb, the boundary between the mixed layers (the epilimnion and the hypolimnion) and the layer of rapid temperature change (the metalimnion) is defined as the depth at which the *temperature changes more than one degree Celsius per meter depth (or one-half degree Celsius per half meter)*.
- iii. **Important Details and Procedures:**
 1. Turn the temperature meter on and set the temperature readings to record in degrees Celsius. Submerge the tip of the thermocouple cable into the water and record the temperature in degrees Celsius on your data sheet (the first reading should be recorded at 0.1 meters) Continue lowering the temperature cable down in 1/2 meter increments, let the temperature reading stabilize, and record the temperature data at the corresponding depth on the data

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

2. If a region of rapid temperature decrease (thermocline) appears above 2.0 meters, this thermocline should be ignored. Thermoclines shallower than 2.0 meters are usually temporary, and often will disappear when the weather changes.

c. **Chlorophyll Tube (Integrated Sampler)**

- i. Function: To collect water from the surface down to a given depth, with all depths represented equally.
- ii. Rationale: As the tube is lowered, water from each depth between the surface and final depth is collected. Therefore, an integrated sample is obtained from the lake.
- iii. **Important Details:**
 1. The depth to which the sample is taken is determined by the temperature profile. The weighted tip of the sampling tube should reach down to, **but not include**, the area of rapid temperature change (the thermocline or metalimnion). Utilizing the data from Table 1, the temperature is stable from the surface (0.1 meter) down to 6.5 meters, decreasing by no more than 0.3 degrees Celsius per half-meter depth. Between 6.5 meters and 7.0 meters, the temperature decreases by 0.7 degrees Celsius and continues to decrease rapidly (greater than 0.5 degrees Celsius per one-half meter) down to 8.5 meters. The zone of rapid temperature decrease between 7.0 meters and 8.5 meters **defines the thermocline**. Thus, a sample should be collected down to 6.5 meters. This includes the upper warm water layer (epilimnion), but excludes the zone of rapid temperature decrease (metalimnion or thermocline).
- iv. **Procedures:**
 1. Rinse a two liter blue bottle with lake water and set it in a handy spot.
 2. The weighted tip of the integrated sampler is placed in the water and slowly lowered to the appropriate depth (in the case of our example from Table 1, the tube is lowered to 6.5 meters). The rope which is attached to the weighted end should be slack throughout this procedure. *Note: The tube should not be kinked while lowered into the water column.*
 3. Once at the appropriate depth, the tube is kinked (folded tightly) at a point above the water level. Holding the kinked end of the tube at a constant depth, raise the tube end by the attached line. This will insure that as the bottom of the tube is raised, no water will leak out. *Note: Make sure you continue to kink the hose while raising the opposite end of the tube with the attached line.*
 4. The weighted end of the tube should be placed in the mouth of the blue bottle, and then the tube should be unkinked. The tube is emptied by raising the part of the tube just above the water line (the end of the tube which you had kinked), letting gravity pull the water out of the full portion of the tube and dispensing it into the blue bottle. Be careful not to let water back flow into the unused portion of the tube.
 5. If the blue bottle is not one-half full at this point, repeat steps 2 through 4 above until you have at least one-half bottle.
 6. Once you have collected an adequate volume of sample water, place the blue bottle in the shade (or a cooler if you have one).

d. **Searching For Milfoil**

- i. Function: To identify an invasion of this non-native species as early as possible.
- ii. Rationale: Milfoil can be eradicated if the colony is isolated and treated before it becomes widespread.
- iii. **Important Details:**
 1. Milfoil is often spread by boats visiting from infected lakes. Therefore, our primary area of interest is the shallow water surrounding the boat ramp.
 2. The search area should extend from the western end of the dam to halfway across the property to the east of the launching ramp and out to 20 feet water depth.
- iv. **Procedures:**
 1. One member of the team should idle slowly in the target area while the other member searches the bottom of the lake for milfoil using the view scope. If a suspected sample is located, mark or triangulate the location and notify the coordinator.

TABLE 1
FINDING THE THERMOCLINE

DEPTH IN METERS	TEMPERATURE CELSIUS	
.1	18.0°	
.5	18.0°	
1.0	18.0°	
1.5	18.0°	
2.0	18.0°	
2.5	18.0°	
3.0	17.8°	Epilimnion
3.5	17.6°	
4.0	17.5°	
4.5	17.3°	
5.0	17.3°	
5.5	17.0°	
6.0	16.9°	
6.5	16.8°	*Bottom of Epilimnion Sample Taken to Here
7.0	16.1°	
7.5	15.5°	Metalimnion or
8.0	14.9°	Thermocline
8.5	14.2°	(Layer of Rapid Change)
9.0	14.1°	
9.5	14.1°	
10.0	14.0°	Hypolimnion
10.5	14.0°	
Bottom	13.0°	

* CHANGE GREATER THAN 1 DEGREE PER METER OR ½ DEGREE PER ½ METER