SECCHI DISK TRANSPARENCY

Monitoring Procedures

Lakes with high water clarity or transparency are universally valued as exceptional quality resources. Lakes like Tahoe, Crater and Superior all evoke visions of crystal clear water, sandy beaches and no plants to hinder recreation. For almost 150 years a lake's clarity has been used to appraise its quality. In 1865, Professor Pietro A. Secchi lowered a painted disk into the water to measure the quality of Mediterranean bays around Italy. His disk has become a standard tool used by scientists around the world to generally assess the quality of lakes.

Dr. Secchi's disk has been standardized as a 20 centimeter (about eight inches) disk, with four alternating black and white quadrants painted on the surface. The disk is attached to a measured line and lowered into the lake until it disappears from view. The water depth at which the disk disappears is the Secchi disk depth, or value, for the lake. Obviously the deeper the disk is seen the clearer the water or the greater the transparency of the lake.

A lake's clarity or transparency is influenced by several factors, but for most lakes the amount of algae in the water is a major cause for changes in transparency. As more nutrients like phosphorus enter the lake from the watershed more algae are produced. As more algae are produced the clarity of the water decreases. In very clear lakes, Secchi disk values greater than 30 feet can be measured. On the other hand, in lakes with high nutrient inputs and abundant algae production the disk can disappear in two to three feet.

Unfortunately, the relationship between the Secchi disk value and algae as a measure of water quality is not so simple. Other factors can influence the Secchi disk value, reducing the usefulness of these measurements to appraise algae production directly. Other factors affecting Secchi disk values include: the angle of the sun in the sky, the roughness of the water surface, weather conditions (cloud cover, rain), the volunteer's eyesight, lakes shallower than their transparency, dissolved minerals in the water, suspended solids or soil particles in the water and the formation of lake marl or calcium carbonate. Consequently, Secchi disk values should only be considered as a measure of transparency and a very general indicator of algae levels. To more clearly define the levels of algae in the water, a parameter more directly measuring algae such as chlorophyll *a* must be used.

Despite these limitations, the Secchi disk value is still an important water quality measurement. When consistently done week to week and year to year, the measurements can be a useful indicator of lake quality changes and trends. Additionally, when assessed with other parameters such as chlorophyll *a* and total phosphorus, Secchi disk values can provide practical insight into a lake's water quality conditions and level of productivity or trophic status.

Equipment Checklist

- ☐ boating safety equipment and anchor
- ☐ copy of monitoring procedures
- ☐ data recording form
- ☐ pencil or indelible ink pen
- ☐ Secchi disk and measured line

Safety

As with all CLMP sampling, the Secchi disk measurements should be taken when the weather conditions are safe. Be sure to sample with all of your safety equipment onboard (life jackets, back-up oars etc.). Collect your samples on the first available day that the weather is good. Sample with a partner, remain low in the boat when collecting samples, and do not lean over the side.

Data Collection

1. Organize data collection

The Secchi disk measurements should be taken at the deepest basin in the lake. This site will be the primary sampling location for all Cooperative Lakes Monitoring Program (CLMP) sampling events and parameters in your lake. Secchi disk readings should be taken once a week or once every other week between mid-May and mid-September. It is important that measurements are taken for this entire monitoring period. At a minimum, eight equally spaced measurements from May to September are needed to calculate a representative average summer transparency value. If disk readings are not collected for the entire sampling period, a good summer value can not be calculated and the data will not be comparable to summer transparency values calculated in previous or subsequent years. Ideally measurements would also be done on the same day of each week and during the same time of day (preferably between 10:00 a.m. and 4:00 p.m.). Monitoring at the same time each day will minimize the difference in the angle of the sun's rays at the time of sampling. Before leaving the dock, make sure you have reviewed the checklist and you have all the equipment on board.

IMPORTANT NOTE

During the 2010 sampling season, the CLMP is cooperating with the U. S. Geological Survey to continue to research the feasibility of using satellites to measure lake clarity statewide. To assist this research effort CLMP volunteer samplers are asked to schedule their Secchi disk monitoring dates to correspond with the dates given in the information flyer, *Cooperative Lakes Monitoring Program Newsletter,* included in your packet. Please understand that this request is voluntary and you are not required to monitor on these dates, if not feasible. However, if possible, taking your Secchi disk measurements on these dates would significantly benefit the research project and lake monitoring in Michigan. If you have questions about the project or which dates you are asked to monitor please contact either Ralph Bednarz or Jo Latimore at the addresses given at the end of this document.

2. Proceed to your monitoring location

On the chosen monitoring day, boat out to the deepest basin of the lake. Bad weather may make monitoring dangerous. If weather conditions are hazardous on your chosen sampling day, postpone monitoring until later in the week. If weather conditions are hazardous during the entire week, it is best to skip monitoring and miss one week's data rather than to risk your safety. DO NOT take a Secchi disk reading from the end of your dock or closer to shore than the deep basin, just to get a measurement. At the deep basin monitoring location, turn off the motor and drop anchor. The boat should be anchored to ensure the Secchi disk is straight down and not drifting at an angle. Let out enough anchor line to allow the boat to back away from any turbidity stirred up when the anchor hits the bottom sediments.

3. Prepare for monitoring

When in position, take out the Secchi disk data form provided and record the date, time, weather conditions and any other conditions you believe should be noted. (Note: As with all CLMP sampling, the Secchi disk measurements should be taken when the weather is good. BE SAFE!) Other conditions may include unusually heavy boating activity, recent heavy rains and resulting silt in the water, the formation of marl in the lake and other conditions which may affect the Secchi disk value recorded. You should have already recorded on the form your lake's name, county and township location and Lake Sampling Site (Field ID) Number on the data form.

Use the Master List of Lake Sampling Site (Field ID) Numbers provided to find the correct number for your site. The Lake Sampling Site (Field ID) Number ensures that your data are entered correctly into the MiCorps online Data Exchange system and the CLMP Annual Report.

Your FIELD ID can also be found here:
http://www.micorps.net/documents/2010_SiteID_List.pdf

4. Making the Secchi disk measurement

Staying low in the boat, to avoid tipping the boat over and for better viewing of the disk, lower the Secchi disk over the **shaded** side of the boat. Continue lowering the Secchi disk by its measured line until it disappears from sight. Note the depth that it disappears. Now slowly raise the disk until it reappears. Note the depth that it reappears. The average difference, or mid-point, between the depth at which the disk disappeared and the depth it reappeared is the Secchi disk value. Record the value obtained on the Secchi disk data form. If the lake's transparency was greater than its depth (in other words, you could see the Secchi disk setting on the bottom of the lake) note this on the data form by putting the words "on bottom" in parentheses after the Secchi disk value recorded. **Do not** use sunglasses or a viewscope when taking the disk reading. If you wear glasses use untinted lenses for the reading.

Data Reporting

Continue to take the Secchi disk readings at the regularly scheduled time for the entire monitoring period of mid-May to mid-September. At the end of the season, after your last

measurement, complete the back of the data form by drawing a map of the lake, marking the sampling location and indicating the lake area and depth of the lake at the monitoring site.

Sample Secchi disk data form:

Cooperative Lakes Monitoring Program

SECCHI DISK TRANSPARENCY

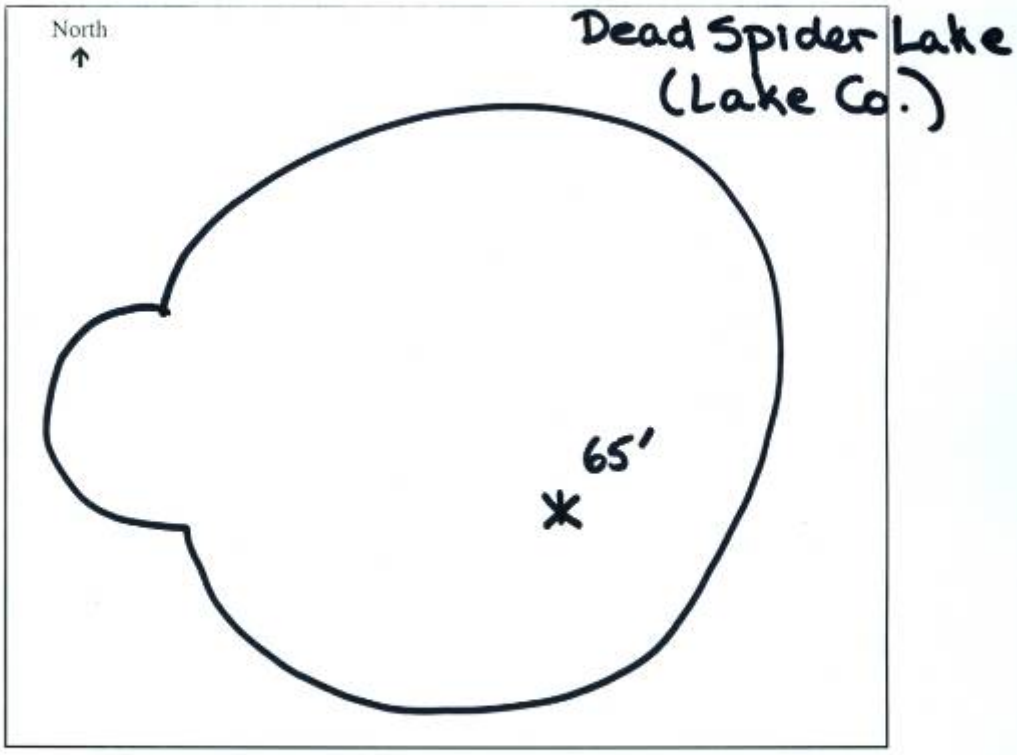
2007 data form

Michigan Clean Water Corps

Lake Name: DEAD SPIDER County: LAKE Township: INLAND
Lake Sampling Site (Field ID) Number: 380137 (see reverse and mark location on map) Circle
Latitude: 44.67° N Longitude: 85.49° W GPS / (Map)
Volunteer Monitor Name(s): Tami Phosphor & Barry Turbid

WEEKLY SAMPLING INTERVAL	DATE SAMPLED	TIME OF DAY	SECCHI DEPTH (to nearest ½ foot)	WEATHER CONDITIONS (sunny, cloudy, windy)	UNUSUAL CONDITIONS (heavy rain, boating, etc.)
May 6-12					
May 13-19	5/13/07	2:00pm	21'	Clear, Cold	
May 20-26					
May 27-Jun 2	5/27/07	2:20pm	18'	Partly Sunny	
Jun 3-9					
Jun 10-16	6/11/07	2:30pm	14'	Sunny	
Jun 17-23					
Jun 24-30	6/25/07	2:30pm	8'	Sunny	Heavy Boating
Jul 1-7					
Jul 8-14	7/9/07	3pm	18'	Sunny	
Jul 15-21					
Jul 22-28	7/23/07	3 pm	12.5'	Sunny, Windy	
Jul 29-Aug 4					
Aug 5-11	8/5/07	2:50pm	12'	Cloudy	
Aug 12-18					
Aug 19-25	8/20/07	2:15pm	13'	Cloudy	Heavy Rain 8/19
Aug 26-Sep 1					
Sep 2-8	9/4/07	2:45pm	9'	Partly Sunny, Windy	
Sep 9-15					
Sep 16-22	9/19/07	3pm	11.5'	Hazy	
Sep 23-29					

- In the box below draw an outline of your lake (i.e lake map)
- On the lake map outline, mark your Secchi disk sampling location (this should be at the deepest basin in the lake) and write in the total LAKE DEPTH at this location.
- Surface Area of Lake: 321 (acres)



- If you entered these data into the MiCorps online Data Exchange, please provide the name of the person who entered the data, and the date entered:
  Name: Barry Turbid Date: 9/20/08
  Data must be entered before October 30!
- Return completed data form to MLSA, P.O. Box 303, Long Lake, MI 48743, no later than October 30th. Make a copy of the completed data form for your records.

Submitting Data to the MiCorps Data Exchange Network

The MiCorps Data Exchange Network is an internet-based database designed to store data collected by volunteer monitors. This network allows you to enter data as well as to view data already entered into the database. As a new component to the CLMP program, we are asking volunteers to enter their own data directly into the MiCorps Data Exchange Network. The data entry web address is http://www.micorps.net/data/enter.

To enter data you will need your own username and password. To receive your username and password, email MiData@glc.org or call Anne Sturm at 734-971-9135. As soon as you have your username and password, you can begin entering your data into the MiCorps Data Exchange Network at the following website: http://www.micorps.net/data/enter. After logging in, the website provides you with easy-to-follow steps for entering your data. If at any time you have questions or run into problems please email MiData@glc.org or call Anne Sturm at 734-971-9135.

In order to be included in the MiCorps data files or presented in the CLMP Annual Report, **all data must be entered into the database no later than October 30th**. You may enter your data after each sampling event or at the end of the sampling season.

If you do not have access to a computer with internet access, please plan to use the public computers available at your local library. If due to access issues or your personal comfort level with computers, you are unable to enter your own data into the MiCorps Data Exchange Network, please email MiData@glc.org or call Anne Sturm at 734-971-9135 to make alternate arrangements for entering your data into the database.

Mail the data form to:

Michigan Lake and Stream Associations, Inc.
P. O. Box 303
Long Lake, MI 48743

After data are entered into the MiCorps Data Exchange, the data forms must be mailed, no later than October 30th. Data forms mailed after this date may not be included in the Michigan Clean Water Corps (MiCorps) data files or presented in the CLMP annual report.

Training

There is no required onsite training for this parameter. However, the Michigan Lake and Stream Associations, Inc., will be hosting training sessions for this and other parameters in late April at the annual spring conference. Attending this training is highly recommended at least once to assure quality data collection and to develop relationships among other volunteers and resource people. Training may also be offered at other sites in the weeks immediately following the annual conference. Contact one of the individuals listed in the Technical Support section below for information on alternative training locations.

Quality Assurance/Quality Control

As part of the quality assurance/quality control (QA/QC) process for the CLMP, DNRE staff may conduct side-by-side sampling for selected lakes enrolled in the CLMP. If your lake is selected for the QA/QC process, you will be contacted prior to a scheduled sampling date to arrange the side-by-side sampling.

Technical Support

Should you have any questions or comments about the Secchi disk monitoring procedures or the data form, or have problems during sampling, please contact:

Jo Latimore
Lake and Stream Outreach Specialist
Department of Fisheries and Wildlife
13 Natural Resources Building
Michigan State University
East Lansing, MI 48824-1222

Phone: 517-432-1491
FAX: 517-432-1699
Email: latimor1@msu.edu

Ralph Bednarz, CLMP Coordinator
Dept. of Natural Resources & Environment
Water Bureau
Constitution Hall – 2nd Floor South
525 West Allegan Street
Lansing, Michigan 48933

Phone: 517-335-4211 (desk)
517-241-1300 (office)
FAX: 517-335-4381
Email: bednarzr@michigan.gov

Should you have questions or comments regarding entering or retrieving your data from the MiCorps Data Exchange Network please contact:

Anne Sturm
Great Lakes Commission
2805 South Industrial Hwy., Suite 100
Ann Arbor, MI 48104

Phone: 734-971-9135
FAX: 734-971-9150
Email: MiData@glc.org