Secchi Disk Monitoring Procedure

State of Wisconsin Department of Natural Resources

Lake Monitoring Standard Operating Procedures

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Scope

A Secchi disk measures a lake's water clarity through determining the depth at which the disk is no longer visible. A Secchi disk is 8 ¼ inches in diameter and has alternate quadrants colored black and white with a line attached to the center. A lake's euphotic zone depth is generally two times the Secchi disk depth. The Secchi disk water clarity procedure is typically used on lakes but can be used on wastewater ponds, clarifiers, water storage reservoirs, waste lagoons, etc.

Factors that Affect Water Clarity

Water clarity is a measure of the amount/density of particles in the water, or the extent to which light can travel through the water column. Suspended sediments, algal growth, runoff, shoreline erosion, wind mixing of the lake bottom, and tannic and humic acids can all affect water clarity. Water clarity often fluctuates seasonally and can be affected by storms, wind, and rough fish such as carp, suckers, and bullheads. Water clarity can be expressed in terms of Secchi disk depth, turbidity, color, suspended solids, or light extinction.

Water clarity is an important measurement of lake condition. Water clarity affects the depth to which rooted aquatic plants can grow, dissolved oxygen content, and water temperature. Fish, loons and other wildlife depend on good water clarity to find food. Water clarity is often used as a measure of trophic status and can indicate ecosystem health. Water clarity is important aesthetically and can affect property values and recreational use of a waterbody.

Safety Protocols

WDNR field method safety protocols must be used when sampling. Use a stable boat for sampling and wear a personal flotation device (PFD). A two-person crew is recommended. Ensure that the anchor rope and Secchi disk rope do not become fouled in the propeller. Collecting samples in cold weather carries the risk of hypothermia and collecting samples in hot weather carries the risk of dehydration and heat stroke. Prepare with appropriate clothing, blankets, sun protection, and drinking water. Carry a fire extinguisher, cellular phone or portable radio, and a first aid kit that includes materials for cleaning wounds (antibacterial soap and clean water or ethyl alcohol).

Equipment

- Boat
- Anchor
- PFD's for all boat passengers
- Lake bathymetric map
- GPS unit with latitude and longitude of deep hole or other sampling station
- Depth finder, metered sounding rod, or metered rope
- Field Data Sheet
- Pencil
- Secchi Disk with Dacron sash cord marked at 1-ft or 0.5-m intervals
- Two placeholders, such as clothespins, for marking measurements on the line

Interference and Special Precautions

The method is based on the ability of a person to see the disk at various depths. Consequently, take the readings between 10 am and 4 pm, preferably on a sunny or only partly overcast day. The water surface should be calm with minimal wave action. Do not wear sun glasses. Remove your hat or turn it so the bill does not cover the face.

Calibration

The rope or line must be marked accurately in feet or half-meters. Dacron line is easily marked with a permanent marker. Each spring check to make sure the line has not stretched by comparing marks against a tape measure.

Procedure

1. Navigate to the deepest point of the lake or the "deep hole" station. Anchor the boat with a rope that is longer than the depth of water to prevent drift.

2. Arrange the sampling location so that it is shaded by the boat. Unshaded sites will not produce reliable readings due to glare.

3. Remove your hat and sunglasses.

4. Kneel so you are close to the surface of the water.

5. Lower the disk slowly into the water with the black and white side facing up.

6. Note the point at which the disk is no longer visible by marking this location on the rope with a spring clothespin at the surface of the water.

7. Lower the disk about 2 feet further.

8. Slowly raise the disk.

9. Note the point at which the disk reappears by again marking the point on the rope with a spring clothespin at the surface of the water.

10. The Secchi depth reading is the average between the two noted readings. Form a loop between your two hands and mark the midpoint between the two spots.

11. Record the average between the two noted readings on your data sheet to the nearest quarter foot or tenth meter.

Documentation

In addition to routine information necessary for the project objectives, record the following data:

- Person observing Secchi disk
- Lake name
- WBIC
- Date
- Time
- Sample Location/Description
- WAMS ID
- Project ID
- Station ID
- Weather conditions
- Water surface conditions
- Site depth
- Water conditions affecting observations (i.e., algae, turbidity, etc.)
- User perception of water quality
- Visual estimate of water level

Quality Assurance

For quality assurance testing the field precision of Secchi depth readings is important. Field duplicates should be collected at a rate of 10%. If there are two observers in the boat, both people should make independent Secchi disk observations and record both readings in SWIMS. The second reading should be listed as a duplicate.

Disinfection and Decontamination

Avoid or prevent invasive species contamination by following DNR field equipment disinfection protocols. Clean all equipment between lakes and at the end of the day to prevent the spread of invasive species. The boat, Secchi disk, anchor, and any other equipment used in lake water must be cleaned using current DNR standard protocol disinfection procedures:

- Boat, Gear and Equipment Decontamination and Disinfection Manual Code 9183.1 (https://dnr.wisconsin.gov/topic/Invasives/disinfection.html)

References

Wisconsin Citizen Lake Monitoring Training Manual (Secchi Disc Procedures) (revised 2020) (full version 3MB PDF) https://www.uwsp.edu/cnr-ap/UWEXLakes/Pages/programs/clmn/clarity.aspx

Updates and Tracking

Version No.	Date	Sections	Name	Approval
	06/21		Katie Hein	Hein