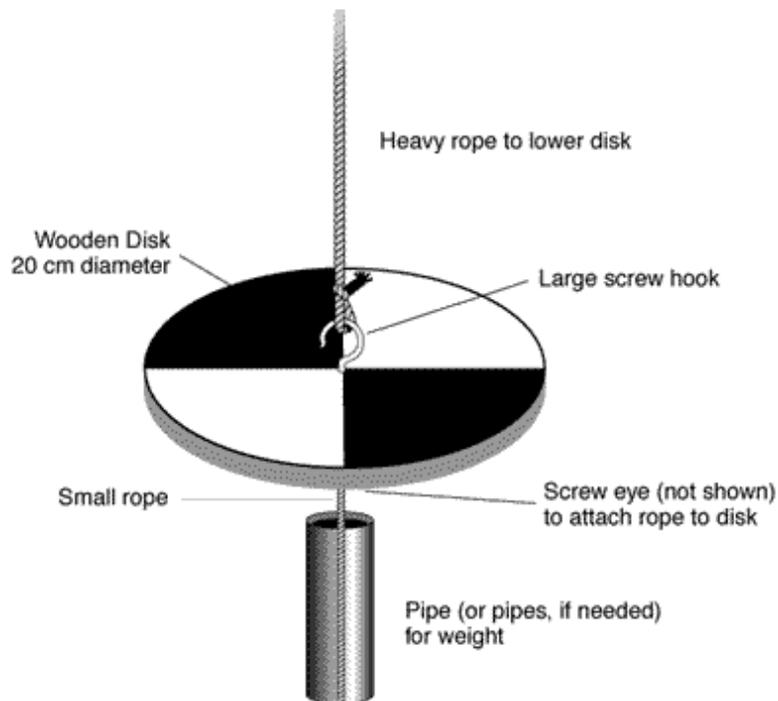


Standard Operating Procedure (SOP) 3.1.5.1

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Water clarity (transparency) and Color Using a Secchi Disc.

Turbidity is a measurement of the cloudiness in water and is caused by suspended sediments and plankton. Clarity for ponds, lakes, bays, estuaries, and oceans is measured with a Secchi Disk. The measurement is referred to as a Secchi Disk Transparency.



Determining Secchi Depth:

Equipment

Disks: For freshwater lakes the black and white Secchi Disc should be used. Normally a Secchi Disk 20 cm in diameter is used. For large, deep, oligotrophic freshwater lakes it may be more suitable to use an all white oceanographic disc. For salt-water bodies of water, such as oceans, bays, or estuaries, use an oceanographic Secchi Disc (all white) with a standard diameter of 51cm.

Measuring Line:

- A. Marked line:** A number of programs use a marked line (1/4 to 1 foot or portions of meters). Periodically check for shrinkage by comparing the marked line against a measuring tape.
- B. Unmarked line:** Use an unmarked line to lower the Secchi Disk and then use a measuring tape or yard/meter stick to measure the line and determine the Secchi transparency depth.

Measuring Secchi Depth:

1. To prevent glare from affecting the normal vision of the disk, position yourself with the sun at your back, on the shaded side of a vessel, bridge or dock. Do not wear sunglasses.
2. Lower Secchi Disk into water until it just disappears (extinction depth).
3. Read depth from the calibrated line. For an unmarked line use a clothespin to mark the line.
4. Raise Secchi Disk until it just appears. Read depth from calibrated line or for an unmarked line mark with another clothespin.
5. Add readings from Steps 1 and 2. Divide by 2. With the unmarked line, and clothespins measure from the disk to the halfway mark between the two clothespins.
6. Records as Secchi Disk Transparency.

Usually Secchi readings are made while standing on docks, bridges or large vessels. In these cases the observer is commonly more than one body length above the water surface. This limits the ability of the observer to determine the exact point at which the line intersects the surface when measuring the extinction depth. When making Secchi disk readings, be aware that the resolution of the data is dependent on the increments of measurement on the calibrated line. Report the results as being on one of those marks, or halfway between. For example if your line is marked in increments of whole meters and if the reading is between 2 and 3 meters, then call it 2.5 meters. In other words report the results in terms of either whole or half increments.

In some cases Secchi readings may be made from a small vessel where the observer is very close to the water surface. When the observer is close to the water surface a clothespin or similar device may be attached to the line at the water surface to mark the extinction depth. The line may then be brought out of the water and a ruler or measuring tape may be used to determine the exact extinction depth.

If the Secchi disk reaches the bottom and is still visible, then an extinction depth is not able to be determined at that location. Instead just record the fact that the disk was seen on the bottom and record the depth to the bottom at that location.

Whenever making Secchi readings use the same type of disk and procedure for all readings. Always record the location, date, time, weather conditions, name of the observer(s), tide (if applicable), the size and type of disk, the use of any view scopes or similar devices, and the type of color scale used (Forel-Ule scale, Borger scale, etc.).

Tips: It is best to make Secchi depth measurements between 10:00 am and 2:00 pm.

If time trend data is being collected it is important to use the same disk if possible or an identical disk at the least. As disks age please keep them clean, free of scratches and good operable condition.

Determining Color

In marine or estuarine environments, to determine color, use a Secchi disk and a Forel-Ule color scale. With the sun at your back and with the Secchi disk near its extinction depth, determine the best match with the Forel-Ule scale. In some cases wave action, current flow, or boat movement make Secchi observations difficult; in these cases raise the disk to the depth that minimizes the interference caused by surface movement but still allows for adequate color. In clear water never lift the Secchi disk above a depth of one meter for a color measurement.

Forel-Ule color scale kits contain two sets of standards contained in plastic viewing comparators. One set (comparator) is for low Forel-Ule numbers and the other is for high Forel-Ule numbers. The viewing comparators are designed with an empty viewing square between two standards. The standards consist of colored liquid inside of clear glass. There are four empty viewing squares and eight standards in each comparator. To make a color reading, look at the Secchi Disk through the empty viewing squares and find the standard that is the best match. When recording the Forel-Ule color always give the Roman numeral, with the corresponding Arabic number in parenthesis.

Note: The Forel-Ule kit may come with clear, colorless distilled water vials for use in the viewing holes in the comparators. When in place these equalize conditions between the viewing holes and the standard chambers. Some observers prefer not to use these colorless vials because of glare resulting from reflected sunlight. Be consistent within your program. Either all of the observers or none of the observers in your program should use the vials. If you all decide not to use the vials in the

comparators then document that on your data sheet or in your standard operating procedures.

In fresh water environments, you may also want to use a Forel-Ule color scale. If you determine that use of a Forel-Ule scale is not appropriate, and if another color scale is used instead (e.g., Borger scale, etc.) then make sure to use the same scale for all monitoring events for consistency purposes.

Tip: Always record the size and type of disc and the type of color scale used (Forel-Ule scale, Borger scale, etc.).

*Image From G.L.O.B.E. Teachers Guide 1997