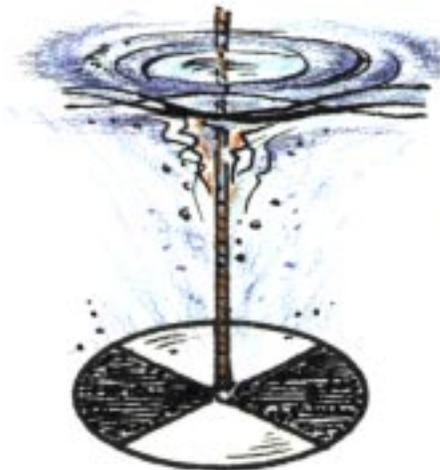


# SELF-HELP LAKE MONITORING HANDBOOK

## SECCHI MONITORING PROCEDURES

Wisconsin Department of Natural Resources  
Lake Management Program



secchi disk

**Before you get started... be sure to read the following pages to familiarize yourself with the equipment you will be using.** The procedure that you will follow in sampling your lake is done for a specific reason. *It is very important that you follow the sampling procedures exactly as they are laid out in the following pages to ensure good, consistent high quality data.* The following provides you with sufficient background on the equipment design and procedures.



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Self-Help Lake Monitoring, FH/3

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# Table of Contents

SELF-HELP PROGRAMS - COORDINATORS .....	4
WIS DEPARTMENT OF NATURAL RESOURCES - REGIONS .....	5
INTRODUCTION .....	6
ABOUT THE SECCHI DISK .....	7
WATER COLOR.....	9
LIGHT PENETRATION .....	9
WHEN TO TAKE THE SECCHI READING.....	9
VARIATIONS IN DATA.....	9
PUBLIC PERCEPTION OF WATER QUALITY .....	10
SAMPLING CHECKLIST .....	11
HOW TO USE THE SECCHI DISK.....	12
FILLING OUT THE DATA SHEET .....	14
BIBLIOGRAPHY AND ADDITIONAL REFERENCES .....	18
WHAT ELSE DOES THE SELF-HELP PROGRAM OFFER? .....	19



# SELF-HELP PROGRAMS - COORDINATORS



**Questions?** When questions arise about the program and the sampling procedures or the equipment you are using, please call the DNR Self-Help Lake Monitoring Office in Madison or call the region nearest you:

**Please see page 5 for a map.**

**Central Office (Madison) (608)266-3599**

Dan Ryan (Northern Region-West)	(715)635-4073
Dave Blumer (Northern Region-West)	(715)635-4078
Laura Herman (Northern Region-East)	(715)365-8984
Sandy Wickman (Northern Region-East)	(715)365-8951
Tiffany Lyden (Vilas County)	(715)479-3648
Deb Konkel (West Central Region)	(715)839-2782

Greg Sevener (Northeast region, Upper Green Bay Basin)	(715)582-5013
Crystal Olson (Northeast region, Wolf River Basin)	(920)492-5845
Mary Gansberg (Northeast region, Wolf River Basin)	(920)492-5799
Jim Reyburn (Northeast region, Lower Fox River Basin)	(920)448-5135
Vacant (Northeast region, Lake Shore)	(920)746-2886
Scott Provost (Northeast region, Upper Fox)	(920)787-4686 ex 3017

Susan Graham (South Central Region)	(608)275-3329
Heidi Bunk (Walworth & Waukesha Counties)	(414)229-0819
John Masterson (Sheboygan Co)	(414)229-0845
Ben Benninghoff (Washington & Ozaukee Counties)	(414)263-8701
Craig Helker (Kenosha & Racine Counties)	(262)884-2357

internet Web Site:

**<http://www.dnr.state.wi.us/org/water/fhp/lakes/shlmmmain.htm>**

**Before you get started... *be sure to read the following pages to familiarize yourself with the equipment that you will be using.*** The procedure that you will follow in sampling your lake is done for a specific reason. *It is very important that you follow the sampling procedures exactly as they are laid out in the following pages to ensure good, consistent high quality data.* The following provides you with sufficient background on the equipment design and procedures.



## INTRODUCTION

Thank you for joining the Self-Help Volunteer Lake Monitoring Network. You are one of about a thousand volunteers currently monitoring the water clarity of Wisconsin's lakes.

Everyone wants to ensure that the water quality of Wisconsin's 15,000 lakes remains high or even improves. Yet keeping track of each and every waterbody is a nearly impossible task.

With over a million acres of water, Wisconsin lakes contribute significantly to the economy of individual communities and the state. Our lakes offer diverse recreational opportunities, and important habitat for fish, waterfowl and other wildlife.

The Self-Help Lake Monitoring Network, one component of the Wisconsin Lakes Partnership, provides an opportunity for you to take an active role in maintaining quality water. Through Self-Help, you can learn more about your lake and help us gain a better understanding of our state's lakes. As a volunteer taking Secchi disk readings, you can see how your lake's clarity compares to similar Wisconsin lakes and watch for long-term changes in water quality. Most importantly, you can share your knowledge and the information gathered with your Lake Association and other lake residents.

The volunteer alliance between involved citizens and the Department of Natural Resources was inaugurated in 1986 and is the core of Wisconsin's Lake Partnership. In this first year, volunteers throughout the state monitored 129 lakes. By 2001 the program grew to include monitoring on 722 lakes. Some volunteers monitor more than one lake. Some lakes are monitored in more than one location, particularly if the lake has two or more basins or is very large. Many volunteers share monitoring responsibilities with a friend or a group of friends.

After collecting Secchi data for one year or more,

some volunteers choose to go on to the Trophic State Index monitoring. Trophic State Index (TSI) volunteers collect phosphorus and chlorophyll samples and record temperature profile information five times a year in addition to conducting their regular Secchi depth monitoring.

The funding for TSI monitoring is currently being moved to the small-scale lake management planning grant program. Secchi volunteers who have monitored for one year and are interested in chemistry monitoring are encouraged to contact their Self-Help coordinator (see p. 4 & 5) for information on the small-scale grant application process. Grant availability may be limited.

Other volunteer opportunities are listed on page 19 of this manual.

### **The Self-Help Lake Monitoring Program has Six Primary Goals:**

1. To help you learn more about basic limnology or Lake Science. By collecting, summarizing and reviewing your data, you will increase your understanding of the overall water clarity of your lake. Water clarity data is one indicator of water quality.
2. To help volunteers learn about basic lake sampling procedures. Taking Secchi disk readings carefully, regularly and according to procedures provides valuable information about your lake.
3. To document water clarity changes over time by summarizing the data you collect. This is particularly important to those lakes where little data now exist.
4. To document and distinguish between natural seasonal variations in water clarity and long-term trends. Eight years of Secchi disk data provides a good indication of whether the water clarity of your lake has been degraded, is improving, or staying about the same.

5. To compare water clarity of hundreds of lakes throughout the state using the statewide Self-Help Summary Report.

6. After several years of monitoring, resource management specialists can help you decide whether or not your lake should receive more intensive monitoring and/or management attention.

## **Teamwork = Success**

The Self-Help Lake Monitoring Program is a team effort with three primary players-

1. You.
2. DNR Self-Help Coordinator and local staff that work nearest your lake.
3. DNR Self-Help central office staff in Madison.

You are the most important player in the lake monitoring network. You know your lake on a day-to-day basis. You know the best spots to fish and what birds visit or nest on the lake. You know when the lake freezes over and the ice goes out and you know your neighbors and friends who also love and use the lake. You volunteered to participate because of your genuine concern for the lake and your desire to learn more about it. Collecting water clarity data is a step in the right direction to gaining a better understanding of your lake.

The second group of players is the DNR Self-Help Coordinator and his or her staff. They work out of one of the Regional offices around the state. The table and map (p.4-5) show each coordinator's area of coverage and lists the Self-Help Staff for each area. You may already know them or worked with them in the past. If you have questions about your lake and the monitoring you are doing, the local staff are the first people you should contact to help answer your questions.

The third group of players is the DNR Self-Help staff in Madison. Data you collect will be phoned in using the Secchi line or entered onto the Self-Help Web page. All data collected is

recorded in the central office database. The Central Office staff maintain and analyze the Self-Help data, keep track of awards, mail out the reports, and logistically keep the program running smoothly.

The sampling season ends when you close your cabin for the winter or when ice covers the lake. In late winter or early spring you can expect to receive a report about your lake. This annual report includes text, graphs and pictures that help the volunteer understand how the data collected relates to their lake. The report also includes a summary of past data collected on the lake. Reports are also available on the Web.

A supplement may be included with the report that summarizes the data by region and from a statewide perspective. This enables you to compare your data with data collected from other similar Wisconsin lakes.

All volunteers receive *Lake Tides*, a quarterly publication of the Wisconsin Lakes partnership. Several pages of each publication are dedicated to Self-Help news. This Self-Help news covers current developments in the program and maintains the volunteers' connection to one another.

## **ABOUT THE SECCHI DISK**

Volunteers observe and document lake water quality by measuring water clarity with a Secchi disk. This 8-inch black and white disk is lowered into the water on a marked rope until it can no longer be seen. This depth is recorded. This is a measure of the water clarity or transparency of the lake. This simple procedure provides a pulse on the health of the lake and is a crucial record for long-range planning.

Suspended sediment, algae and natural coloring affect water clarity. Suspended sediment may be the result of land use activities in the watershed such as erosion from cropland, barnyard runoff, construction sites or runoff from city streets. Sediment may enter from a river or stream

draining into the lake. In a shallow lake, sediment can be mixed from the lake bottom during heavy wind. Rough fish such as carp can stir up bottom sediments and make the lake appear muddy. A lake with a lot of sediment will appear cloudy, muddy or brown and the Secchi disk may disappear from view within a few feet of the water's surface.

Algae (microscopic plants naturally found in all lakes) also affect water clarity. Some lakes contain more algae than others do. Free-floating algae (phytoplankton) is a vital part of the food chain. Algae provides food for microscopic animals (zooplankton) that are eaten by fish and ducks. Too much algae can disrupt the natural balance of a lake ecosystem and can be unsightly. Excessive algae can make swimming and other activities less enjoyable. Certain kinds of algae, blue-green in particular (which is sometimes classified as a bacteria), cause noxious odors when it dies and decays. These algae also produce natural toxins that may be dangerous and even deadly to animals, including cows and dogs, that ingest them.

The Secchi disk can provide a relative estimate of how much algae is present in a lake where there is little sediment turbidity. However, it will not reveal what kinds of algae are present.

Other natural factors can affect Secchi transparency including water color, wind waves, sun and the observer's experience. Also eyesight varies between individuals, which may result in slightly different readings.

**Trophic state** is another measure of water quality. Lakes can be divided into three categories based on trophic state - eutrophic, mesotrophic and oligotrophic.

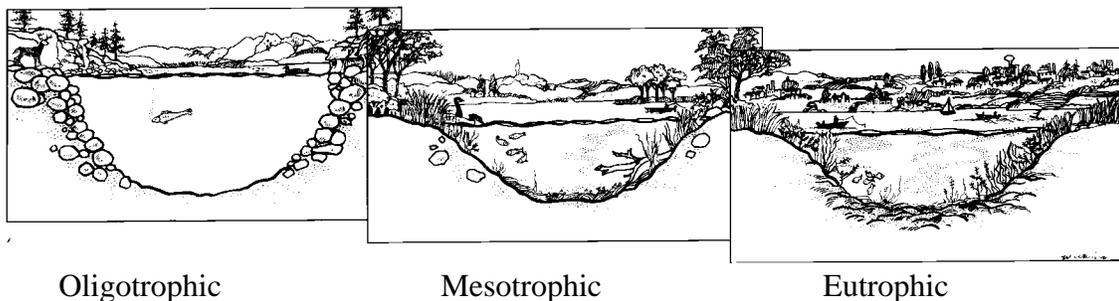
**Eutrophic** lakes (very productive or fertile) contain abundant algae and may appear green in color. The water clarity in a eutrophic lake is low, meaning the Secchi disk disappears when submerged only a few feet. A eutrophic lake is not necessarily an unhealthy lake, but often has abundant plant growth or algae blooms. Eutrophic lakes often support large fish populations but are also susceptible to oxygen depletion.

In contrast, a less productive lake is referred to as **oligotrophic**. In oligotrophic lakes, the Secchi disk may be visible to great depths, indicating high water clarity. Oligotrophic lakes generally contain little algae, fewer plants and often have low fish densities.

**Mesotrophic** lakes lie between the oligotrophic and eutrophic stages. Mesotrophic lakes often have low dissolved oxygen levels in late summer. Their **hypolimnions** (the cold, bottom water) limit cold water fish and cause phosphorus cycling from sediments.

By knowing the Secchi depth, general lake productivity can be estimated. To estimate trophic state, we must have enough data collected over several years, particularly in the summer months when algae blooms are most prevalent.

**Figure 1 Natural Stages in the Life of a Lake**



Source: Understanding Lake Data

Lakes in Wisconsin range from very oligotrophic to very eutrophic.

A natural aging process occurs in all lakes, causing them to change from oligotrophic to eutrophic over time, and eventually filling in (Figure 1). People can accelerate this aging process.

Each volunteer will receive a copy of *Understanding Lake Data*. This UW - Extension publication does a great job of helping us understand information about lake water quality and how to interpret lake data. If you need a copy, contact your Self-Help coordinator.

## WATER COLOR

Some lakes that naturally appear brown in color like tea contain tannic acids, a product of decay. Light does not penetrate as deep in dark colored water. In these tannic stained lakes, secchi depth may be low although algae are usually less abundant. A low secchi disk reading in a stained lake does not necessarily indicate that the lake is eutrophic. Plant densities may also be lower in stained lakes since sunlight is not able to penetrate far into the water column.

Water color may change over the sampling season. Seasonal color changes most likely reflect changes in algae productivity. If a lake turns unusually green for a few weeks in July, the change is probably the result of an algae bloom. (Algae may also be brown or orange in color, which could affect the color of the water.)

To fully understand variations in Secchi depth water color observations must be recorded.

## LIGHT PENETRATION

Secchi disk transparency can indicate the depth to which the lake contains enough oxygen to support fish and other aquatic life. Generally, light can penetrate to a depth 1.7 times greater than the Secchi depth. For example, if the Secchi Disk transparency is 12 feet, light can

actually penetrate to 20 feet. In this lighted or *photic* zone, oxygen is produced by algae and aquatic plants. These plants provide good habitat for fish and invertebrates. Oxygen may become depleted below the photic zone in deep productive lakes due to bacterial decomposition of dead plants and animals.

Without oxygen, phosphorus and other nutrients may be released from the lake sediments. Phosphorus in the bottom water will eventually be circulated to the surface water during the lake's mixing periods. This is called internal cycling of nutrients. Internal nutrient cycling can trigger algae blooms, aquatic plant growth, and taste and odor problems.

## WHEN TO TAKE THE SECCHI READING

The weather can affect the depth at which you can no longer see the Secchi disk. Wind-generated waves interfere with your reading. Position of the sun in the sky and cloud cover also affects readings. *For these reasons, the Secchi disk reading should be taken on clear calm days between 10 a.m and 4 p.m.* The sun should be directly overhead and waves and clouds will not interfere with your reading.

Ideally, a reading should be taken once a week, but once every two weeks is fine. Try to schedule sampling as part of your routine to make it convenient and regular. Include it as part of your weekend fishing trip or family outing on the lake. Take reading no more often than once every five days.

The most important time to collect data is June through August, the prime recreational months and the time when algae blooms are most prevalent. Statewide analysis essentially relies on information for those months. Secchi disk data cannot be averaged over the course of an entire year due to seasonal variations. Averages of summer data results (June, July and August) appear in the statewide data summary report.

Spring and fall Secchi readings also tell a story about your lake. These readings tell you when there is spring run-off into the lake or when there are spring or fall algal blooms.

Some volunteers may collect data in April and continue until November while others may start in June and continue through September. If you cannot take a reading at your normally scheduled sampling time, do not worry about it. Just try to get out as soon as possible after that time. If you think you will not be able to continue monitoring due to illness, schedule conflicts or other problems, please let us know as soon as possible. If you do not think you will be able to continue monitoring, you can help us tremendously by providing the name of a neighbor or friend who may be interested in taking your place as a Self-Help volunteer. Contact your region coordinator or the central office.

## VARIATIONS IN DATA

Taking one Secchi disk reading may not have much value since it measures the water clarity of the lake only on that one occasion. That time might have been during an algae bloom or after a heavy rainfall which will not represent typical conditions. Secchi disk transparency data collected regularly over time provides the most accurate picture of your lake.

We expect to see variations in the data because a lake is an ever-changing system. There are also seasonal variations. By taking regular measurements during the ice-free period we can determine the normal seasonal variations for a lake and its over all condition.

After a period of years, we will be able to answer two major questions:

1. What is the trophic state of the lake based on water clarity data. Is your lake generally more eutrophic or more oligotrophic?
2. Does the data indicate whether the lake water quality is improving, declining, or remaining the same over time?

## PUBLIC PERCEPTION OF WATER QUALITY

As part of data collection, we ask your opinion of the water quality of the lake when you take the Secchi disk reading. With these observations, public opinion assessment of water clarity can be made. This information can help determine water quality standards for lakes. There are no right or wrong answers to these questions and your answer may change throughout the summer or throughout the years.

Volunteers will note the algal content of the water. Is there so much algae that you want to shower after swimming? Do you not want to go swimming? We want to understand your opinion of what constitutes good or poor water quality along with the Secchi disk readings you take.

We anticipate that regional trends will appear. In other words, people living in one area of the state will have similar perceptions of what they consider to be acceptable water clarity.

Wisconsin hopes to share this data with other states and participate in the mapping of regional public perceptions of water clarity that extend beyond our state boundaries.



## SAMPLING CHECKLIST

Before going out to take Secchi disk readings, be sure the conditions are right for sampling:

### Weather conditions:

- Sunny or partly sunny/cloudy
- Wind - calm to breezy (NO WHITECAPS)

### Time of day and date:

- between 10 am and 4 pm.
- At least five days since you took your last reading
- Ice off to ice on with June, July and August being the most important months

### Make sure you have:

- Boat anchor
- Secchi Disk
- 2 Clothespins
- Notebook with sampling instructions
- Data Sheets
- Personal Flotation Device

### After returning home, be sure to:

- Dry the Secchi rope. The rope will mold if wound when damp.
- Once the rope is dry, wind it on to the dowel. Store it in a dry place away from mice or other chewing rodents.

When taking the Secchi disk readings, please follow all instructions precisely. It is extremely important that the data you collect be accurate. If for any reason you cannot sample when scheduled, skip that sampling period and go out at the next convenient time.

# HOW TO USE THE SECCHI DISK

Figure 2

1. Use the map of your lake and its marked sampling site(s) to proceed to the first site.



2. Anchor your boat at the sampling site. **Remove your sunglasses.** Unwind the Secchi disk rope from the dowel.

3. Lean over the shady side of the boat and slowly lower the disk into the water until it can no longer be seen. If you are using a pontoon boat to take your secchi disk readings, be sure to kneel down on the floor of the boat to take your readings so you are closer to the surface of the water.



4. When the secchi disk just disappears from view, mark the rope at the water level with a clothespin.



5. After you have marked the spot with the clothespin, lower the disk a few more feet into the water. Slowly raise the disk. When the disk reappears, mark the rope at the water level with the second clothespin. The clothespins may be several inches or a foot apart or may be right next to each other. Lowering the disk and bringing it back into view is done so your eyes become accustomed to looking into the water.



6. Bring the disk back into the boat.

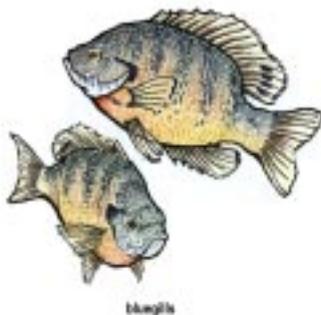
7. Average the two readings by forming a loop between the two clothespins. Slide one clothespin to the center of the loop to mark it. Remove the other clothespin. The clothespin mark will be your secchi reading.



8. Carefully count the number of feet from the disk until you reach the clothespin. Round off to the nearest 1/4 foot.

9. Record the measurement on your data sheet and complete the other questions on the data sheet.

10. If you are monitoring more than one site or lake, proceed to the next location and repeat steps 1-9.



## FILLING OUT THE DATA SHEET (FIGURE 3)

1. You should have received your Waterbody number, storet number and volunteer ID during your training session.
  - The **Master Waterbody Identification Code (WBIC)** is a number assigned to your lake. Your WBIC tells us exactly which lake you are monitoring.
  - The **storet number** is assigned to a specific monitoring site on your lake. If you decide to change where you are taking secchi disk readings it is very important that you contact your Self-Help Coordinator. He or she will assign a new storet number for that site. The data that you collect is tied to a specific storet number.
  - Each volunteer has their own **volunteer ID** number. That way, data is tied to a specific location and a specific volunteer.

If you do not know your Waterbody identification number, storet number or volunteer ID, please call your region coordinator or the Central Office staff to obtain it. These numbers need to be placed on all data sheets.

2. While you are sampling on your lake, record the data on the white "Field Data Form". Use the same form until it is filled up, or too wrinkled from wind and water.
3. Use four digits for the date. Example: May 19 is 0519. July 6 is 0706. You do not need to include the year since data is submitted annually.
4. Round off the Secchi disk reading to the nearest quarter foot. It is best to record your fractions of a foot as a decimal since that is how it is entered on the Secchi Line. Example: 12 1/4 feet is 12.25 feet. The \* on your telephone key pad acts as the decimal point on the Secchi line.
5. It is possible that the Secchi disk will be visible even when it is resting on the bottom of the lake. Record the depth as always. Be sure to fill in "1" if the disk is still visible on the bottom of the lake.
6. Record the water level on your lake. It helps to use the shoreline or your pier as a guide to indicate whether the lake level is high, low or normal. If there is staff gauge on the lake, please record the numerical value in the space provided.
7. Hold your Secchi disk one foot under the surface of the water to determine if the water is clear or murky.
8. The color of the water is measured using the Secchi disk as a guide while at the monitoring site. Lower the disk about a foot into the water. Ask yourself the question: Does the white of the disk look white, or does it appear green or brown? If it appears white, then the water color is "blue" and appearance is "clear". The Secchi line will only accept one color, so if the water is, for instance, bluish-green, you will have to select the one color that best describes the appearance. Color cards may be used in the future - in this case, the

color of the water would be compared to colors on a card and a numeric value assigned to the color.

9. Indicate your perception of the water quality. Refer only to the condition of the water column. You can record the amount of aquatic plants around the shoreline or other problems in the observation section of your data sheet. Your perception of the water should reflect how much algae is in the water. **On a scale of 1-5, rate your perception of the water quality with 1 being the best and 5 being the worst.**
10. Include any comments about the weather, water conditions (calm etc.), wildlife sightings, plant densities or other information that will help us better understand your lake in the Observation section of the data sheet. If you need more data sheets or have other questions, you may also include those comments in this section.
11. Once back inside, transfer your data to the carbonless data form. This form will make it easier to call your data in to the secchi line or use the Web site.
  - The Web site address is: <http://www.dnr.state.wi.us/org/water/fhp/lakes/shlmmain.htm>  
To submit data go to the Submit Data tab.
  - The toll-free number for the secchi line is: **1-888-947-3282**. Observations noted on the data sheet cannot be called in to the secchi line. Observations will be entered from the data sheets that you mail to the central office. If you have any problems while trying to enter your data into the Secchi Line, press 9 to speak to someone in the Central Office.
12. After calling in or entering the data onto the Web site, check the column that says "Called In?" on the data form. This will allow you to keep track of what data you have entered into the Secchi Line
13. All data for the year must be entered into the Secchi Line or the Web site by November 1. Please do not enter data into the Secchi Line after November 1 because the system will recognize it as the next year. If you find data that has not been entered, e-mail or mail your data sheets to Self-Help staff and they will get it into the database.

When the blue page of the Secchi Data form is full, or at the end of your sampling season, send it to the Madison Self-Help Office using the business reply envelope provided. These forms easily detach from your copy, and should be mailed as soon as possible so we can include your lake observations and comments into the database. The earlier we receive your data, the sooner we can finish analyzing your data and mail your annual report. We will use your data sheet to verify information gathered on the secchi line. Please retain the pink copy of the form for your own records.

All data that you collect must be incorporated into the DNR's Lakes Database. The data that you collect can get into the main database in one of three ways:

- \* called in to the Secchi Line phone system
- \* entered on-line at the Web site
- \* mailed in to the Central office.

TIPS FOR USING THE WISCONSIN SELF-HELP LAKE MONITORING DATA FORM

Waterbody #	Storet # (Use separate form for each site)	Lake Name	County	Year	Toll-free Secchi Line Phone: 1-888-947-3282						
2102300	573102	Sparkling Lake	Marathon	1999							
Volunteer ID # for each volunteer who sampled on each date	Date Use 4 digits e.g., May 19 = 0519	Time Round to nearest hour	Secchi Depth Round to nearest quarter of a foot	Hit Bottom 1=Yes 2=No	Lake Level 1=High; 2=Low; 3=Normal; 4=Gauge	Appearance 1=Clear 2=Murky	Water Color 1=Blue; 2=Green; 3=Brown; 4=Red; 5=Yellow	Percep- tion 1-5	Date Called in		
102, 5, 40516	0609	3	5.75	2	1	1		2			
Observations: <i>Sunny, wind 5 mph SE. About 20 geese on the South Bay this morning.</i>											
102	0623	11	4	2	1	2	3	3	4/25		
Observations: <i>Partly cloudy, calm. Heavy rain during thunderstorm last night. Saw 3 mergansers and a muskrat today.</i>											

- Waterbody ID#** A unique identification number for the lake. Please use a separate form for each lake.
- Storet #** A 6-digit site number for the specific sample location on the lake.
- Year** Year in which sampling took place. The Secchi Line phone system automatically records the current year.
- Volunteer ID** Please include the ID numbers of ALL volunteers that assisted with a sample. This will allow all participants an opportunity to be acknowledged for their assistance. If you need someone else's ID number please call your region coordinator.
- Date** Enter the date using four digits (i.e. May 19th would be 0519)
- Time** Round the time to the nearest hour. 1-12. Remember to sample between 10 am. and 4 pm.
- Secchi Depth** Round the Secchi clarity depth to the nearest quarter of a foot
- Hit Bottom** Indicate whether or not the Secchi disc touched the bottom of the lake before it disappeared from view.
- Lake Level** 1= high, 2 = low, 3= normal, OR 4 = enter numerical staff gauge reading.  
When you call your data into the Secchi Line, you will hear "3 = no change" but the database will register a 3 as "normal level".
- Appearance** Describe the clarity of the lake water by looking at the white area of the Secchi disc when it's lowered to a depth of 1 foot.
- Water Color** Describe the color of the water by looking at the white area of the Secchi Disc when it's lowered to a depth of 1 foot. (Blue = no color)
- Perception** Circle the number that best describes your opinion of how suitable the lake water is for recreation and aesthetic enjoyment for that day  
1= Beautiful, could not be any nicer  
2= Very minor aesthetic problems; excellent for swimming and boating enjoyment  
3= Swimming and aesthetic enjoyment of lake slightly impaired because of algae levels  
4= Desire to swim and level of enjoyment of lake substantially reduced because of algae. Would not swim, but boating is OK.  
5= Swimming and aesthetic enjoyment of lake nearly impossible because of algae levels
- Lake Observations** Comment on the weather, plants, animals, etc. you observe during sampling. If you need more space feel free to attach another page. These comments will be entered into the system after each data sheet is mailed to the Madison office in a business reply envelope.
- Mail to** After calling in data, please mail original in postage paid envelope (or to Self-Help Lake Monitoring, WI DNR, PO Box 921, Madison WI 53707) by Nov. 1.

Figure 3

The data you collect will be summarized in an annual report that you will receive after your sampling season. Limnologists suggest that after eight years of collecting Secchi data, we can begin to tell if the water clarity is getting better, getting worse, or staying the same.

Your annual report (Figure 4) will show the dates you sampled, and your secchi disk reading in feet as well as in meters. Please check your annual report with your original data sheet to verify the data. The observations you made for each sampling day will be recorded on your annual report.

You will also receive a summary of water clarity readings (Figure 5) . This will indicate the summer (June, July and August) mean of clarity and the minimum and maximum reading for the summer sampling period. A graph will summarize your Average Summer Secchi Depth readings (figure 5).

Figure 4

**Self-Help Lake Monitoring 2001 Annual Report**

<b>BOLTON LAKE</b>					LAKETYPE: stratified spring				
Vilas County					DNR REGION: NO				
WATERBODY NUMBER: 2323400					GEOREGION: NE				
GROUP	SITE NAME	STORET #	VOLUNTEER NAME		VOLUNTEER #				
594	DEEP HOLE	643228	HAROLD MEDINGER		594				
GROUP	DATE	Time	SD (ft)	SD (m)	TSI (SD)	Lake Level	Clarity	Color	Perception
594	06/16/2001	13:00	9.00	2.74	46	Low	Clear	Blue	2
594	06/21/2001	13:00	9.00	2.74	46	Low	Clear	Blue	2
594	07/07/2001	13:00	10.00	3.05	44	Low	Clear	Blue	2
594	07/21/2001	13:00	11.00	3.35	43	Low	Clear	Blue	2
594	08/01/2001	13:00	11.00	3.35	43	Low	Clear	Blue	2
594	08/13/2001	14:00	13.00	3.96	40	Low	Clear	Blue	2
594	08/24/2001	13:00	12.00	3.66	41	Low	Clear	Blue	2
594	09/09/2001	13:00	13.00	3.96	40	Low	Clear	Blue	1
594	09/22/2001	13:00	13.00	3.96	40	Low	Clear	Blue	1

DATE	VOLUNTEER OBSERVATIONS
06/16/01	Sunnyday, two loons, and the water is calm.
06/21/01	Partly cloudy, slight waves, two loons, and one eagle.
07/07/01	Partly cloudyand two loons.
07/21/01	Four loons, sunnyand windy.
08/01/01	Cloudy and windy.
08/13/01	Cloudy, calm, and two loons.
08/24/01	Clear and four loons.
09/09/01	Cloudy, windy and two loons.
09/22/01	Clear and sunny, two loons, and the colors starting to show.

Figure 5

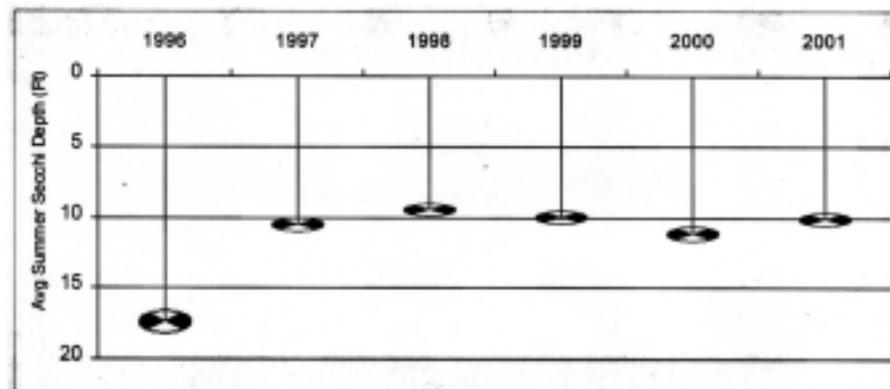
**BOLTON LAKE - Vilas County**

WATERBODY ID: 2323400  
 SITE: DEEP HOLE  
 STORET: 643228



Table 1: Summary of water clarity readings (Summer average includes June, July and August data only)

Year	Summer Water Clarity Average (Ft)	Minimum Reading	Maximum Reading (Ft)	Number of Readings	Sampling Period
1996	18.4	8.0	30.0	5	6/96 - 8/96
	11.2	10.0	13.0	6	6/97 - 8/97
	10.0	9.0	11.0	8	6/98 - 8/98
1999	10.6	9.0	13.0	7	6/99 - 8/99
2000	11.8	9.0	15.0	6	6/00 - 8/00
2001	10.7	9.0	13.0	28	6/01 - 8/01



**Figure 6**

<b>Trophic Class</b>	<b>Trophic Range</b>	<b>Secchi Disk (ft)</b>
Oligotrophic	<40	>8
Mesotrophic	40-50	6-7
Eutrophic	>50	<5

*Source: Understanding Lake Data*

You can determine the trophic classification of your lake based on your Secchi disk readings. The trophic state index (TSI) is a quantitative measure used to compare one lake to another. Your secchi disk reading is put into a logarithmic equation resulting in a number that can be used to assess the degree of eutrophication.

TSI values represent a continuum ranging from very clear, nutrient poor water (low TSI's) to extremely productive, nutrient rich water (high TSI's).

Wisconsin uses the Carlson Trophic State Index for secchi readings. Carlson's TSI is set up so a TSI of 0 represents a secchi reading of 64 meters (or 210 feet). Each halving of transparency represents an increase of 10 TSI units. In other words, each 10 TSI units means the algal biomass is doubled. TSI is a useful tool for assessing the lake's current condition and for monitoring change over time.

TSI	Meters	Feet
00	64	210
10	32	105
20	16	52.5
30	08	26
40	04	13
50	02	06.6

The divisions between trophic state in a lake are not hard and fast. Lake water quality will also vary over time. Therefore we use generalized labels to define these states.

## **BIBLIOGRAPHY AND ADDITIONAL REFERENCES**

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## WHAT ELSE DOES THE SELF-HELP PROGRAM OFFER?

**TROPHIC STATE INDEX (TSI) MONITORING:** After one year of water clarity monitoring, volunteers may be able to begin water chemistry monitoring. The chemistry volunteer collects and reports on clarity, water temperature, and collects water samples for phosphorus and chlorophyll testing by the State Lab of Hygiene five times a year. This information is used to determine the trophic state of your lake. Training and equipment are provided by the DNR.

**Note:** The funding for TSI monitoring is currently being moved to the small-scale lake management planning grant program. Secchi volunteers who have monitored for at least one season and are interested in chemistry monitoring should contact their self-help coordinator for information on the small-scale grant application process. Grant availability may be limited.

**DISSOLVED OXYGEN (DO) MONITORING:** Current chemistry volunteers may also collect dissolved oxygen readings on their lake. Dissolved oxygen readings are taken five times a year (at the same time that samples for phosphorus and chlorophyll are collected). Your coordinator will provide all the equipment and training necessary to do the dissolved oxygen tests and will assign the depths at which the dissolved oxygen samples should be taken.

The funding for dissolved oxygen monitoring may be limited. If a volunteer or lake association has a dissolved oxygen meter these readings may also be entered into the database. We just need to flag the database with the information that the readings were collected using a dissolved oxygen meter. Your self-help coordinator can tell you if equipment is available.

**AQUATIC PLANT MONITORING:** Aquatic plants are an indicator of lake health. Over time the type of vegetation and size of plant beds may change in response to changes in water quality and human activity. Aquatic plant monitoring is tailored to each volunteer, or group of volunteers' abilities, interest and time commitment. Some volunteers choose to map the beds of submergent, emergent and floating aquatic vegetation on their lake. Other volunteers are trained to collect and press their lake's aquatic plants, identify the plants and map the plant beds. Learning what aquatic vegetation is present in your lake is a good way to monitor for the presence of aquatic exotics.

**EURASIAN WATER MILFOIL WATCH:** All volunteers are eligible to watch for Eurasian water milfoil (EWM). EWM is a non-native (exotic) plant that continues to invade many lakes throughout the state. This plant can dominate a lake's habitat and displace native species. Watching for milfoil is easy and involves patrolling your lake a couple of times a summer and watching your shorelines for plant fragments and checking the plant beds throughout the lake.

Volunteers receive a packet of information on how to identify the plant, reporting forms, a laminated sample of EWM, and instructions on when and where to look for EWM. Early identification often makes eradication and control easier.

**PURPLE LOOSESTRIFE WATCH:** All volunteers are eligible to watch for purple loosestrife. Purple loosestrife is a beautiful but aggressive non-native (exotic) flowering plant that displaces native wetland vegetation. Because the plant is often confused with native wetland plants like pickerel weed and smartweed, volunteers are provided with materials to make identification easier. Once

familiar with the plant, monitoring involves patrolling your lakes' shoreline and the surrounding area at least once in mid August looking for the bright magenta flowers. If a new infestation is found, a report citing its location is sent to DNR officials. In some cases, a volunteer may opt to use traditional control measures like cutting, pulling, or chemically treating new pioneering plants and/or isolated small infestations. Larger infestations may require chemical or biological control efforts. In this case, a volunteer may be recruited to rear and release beetles that feast on purple loosestrife. Reporting forms and instructions for monitoring and control are also provided. Contact your coordinator for information.

**ZEBRA MUSSEL WATCH:** The Zebra mussel is a non-native (exotic) species that has been introduced to Wisconsin's lakes. Once in a lake, these mussels spread rapidly and have the potential to alter a lake's natural community. By watching for mussels, volunteers can help us understand these organisms and hopefully slow their spread.

Zebra mussels attach themselves to almost anything including docks, boats, rocks, sticks, plants, and other mussels. Beautiful swimming areas can become a foul smelling mess of broken and discarded shells. By monitoring for zebra mussels, volunteers can help to understand these organisms and hopefully slow their spread. Volunteers complete shoreline surveys and brief inspections of docks, boats and other places where zebra mussels like to hide out. They may set up a substrate sampler at a designated location on their lake. Surveys are done, and reports are sent to the DNR several times during open season on their lake. Volunteers interested in becoming a zebra mussel watch volunteer should contact their self-help coordinator.

**LOON WATCH:** In 1978 the Sigurd Olson Environmental Institute initiated a loon conservation program in Wisconsin, and later a similar program in Minnesota. In 1988 these two loon projects merged into one program known as Loon Watch. It is estimated that the loons in Michigan, Minnesota and Wisconsin comprise nearly æ of the loon population outside of Alaska. You can volunteer to help monitor these precious birds. Though not specifically a part of the Self-Help Lake Monitoring Network, we encourage volunteers to get involved in this very worthwhile program. For more information contact the Sigurd Olson Environmental Institute at 715-682-1220 or by e-mail at [loonwatch@northland.edu](mailto:loonwatch@northland.edu).

**LAKE MONITORING OPPORTUNITIES FOR YOUTH:** Self Help Lake Monitoring and Adopt-A-Lake (an environmental education program for youth K-12) work in partnership to provide youth with monitoring opportunities. Interested youth groups, school groups, teachers, lake association members, or other adult youth leaders can apply to monitor a lake in their community for one or more of these programs. Contact your Self Help Coordinator or the Adopt-A-Lake Coordinator at 715-346-3366 for more information.

**LAKE FACILITATOR:** Interested volunteers with at least one year of experience are selected to assist regional self-help coordinators with volunteer training and equipment distribution. Lake Facilitators are also needed to write regional articles for newsletters, work with Adopt-A-Lake projects, and assist with re-training sessions.

**ISLAND WATCH:** Special island watchers observe and maintain islands in Wisconsin's inland lakes. Activities are tailored to meet the needs of individual islands and interests of the volunteer.



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## Welcome to Wisconsin's Self-Help Citizen Lake Monitoring



Click on picture to start slide show and learn more about Self-Help

**Self-Help Citizen Lake Monitoring**, and the Self-Help Volunteer Lake Monitors have been an integral part of the Wisconsin lake scape since 1986. Citizens who live on their lake and know their lake better than anyone else have volunteered themselves to their lake and their community in a partnership with the Department of Natural Resources. This concept was so successful that Self-Help Citizen Lake Monitoring was expanded to include volunteer opportunities for chemistry, dissolved oxygen monitoring, and aquatic plant surveys. Since its beginning, over 3200 volunteers have participated in the program on over 1000 different lakes.

The Department of Natural Resources provides all equipment to the volunteer. Training of the volunteers is provided by either DNR or University of Wisconsin - Extension staff. Volunteers provide their time, expertise, energy and a willingness to share information with their lake association or other lake residents. The information gathered by the volunteers is used by lake biologists, fisheries staff, water regulation and zoning, U.W. Extension office, Lake Associations and other interested

individuals.

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A brief guide to lake processes and how to interpret lake data.

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Timeline, summary reports, etc.

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List of Telephone numbers and Email addresses of the Self-Help crew

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