

Hello all,

April 12, 2013

Some time ago I sensed that my information was not clear on how to access the DNR site to look at the Water Quality Data that I have collected during the past 20 years. So I am rewriting this description.

I use this procedure to collect a water sample on the lake, then prepare the samples (and pack them in ice) for mailing to the State Testing Laboratory in Madison. The Lab sends the results to the DNR for calculations. These results are available to all of us on the DNR website.

Meantime, I also fill out a simple form from the DNR so that I keep track of time, date and some other data for future reference. The essence of this form is represented by comments (color, perception, time, collector comments, lake level, did secchi disc hit bottom, nature of day) that are included on the first page of the website, ( I.) 'How to read information on the DNR website'. In fall after all 4 water samples are collected and processed, I then send my comments to the DNR by computer, or telephone, to a DNR website. All this information is then collated by the DNR and, the following spring, is available on the website for our, and all other, lakes.

First, I want to describe briefly how I obtain and prepare a lake water sample. Second, I describe a direct approach to accessing the DNR website. Third, I describe how to read and interpret the data on the website for Kangaroo Lake.

## **PREPARING THE LAKE WATER SAMPLES**

I collect a water sample 4 times a year. For each, when in the boat, I collect a 2-quart bottle of lake water from ~ 2 feet down in the water. I make a secchi disc reading, I record the water temperature at ~2 feet down in the water. Then I return to shore and finish several steps in the procedures in the following way.

For each sampling of water I do the following steps to prepare sample for the DNR:

- 1) record the secchi disc reading.
- 2) record the temperature of the water down at ~ 2 feet.
- 3) fill small bottle with lake water (phosphorus sample). I then acidify it with diluted sulfuric acid to 'fix' the phosphates (for Total Phosphates) and label bottle.
- 4) filter 200 milliliters of lake water to collect all the algae and their chlorophyll on the filter. The filter looks a little greenish at the end. I place this filter in a test tube to keep it clean and moist. I label the test tube. When the algae on the filter are analyzed, the DNR can determine how much N or nitrogen was in the sample.

There are 4 parameters included in the reports from the DNR including: (1) Water clarity by reading the secchi disc (2) Temperature of the water (3) Total phosphorus content in the water, and (4) Nitrogen from algal chlorophyll in the water expressed as N or nitrogen. We do not sample for O, or oxygen.

At the end of each sample collection I ice-pack the bottle of water (phosphate) and test tube with its filter, plus a data sheet, and mail it to the State Testing Laboratory.

## GETTING TO THE DNR WEBSITE

Go to: <http://dnr.wi.gov/lakes/clmn> (up comes a list of Wi counties)

Select: Door (select the word Door; don't type in county)

Appears: Citizen Lake Monitoring Report

Short list, select: Kangaroo Lake--Site 1 (South) Deep Hole

Under: Reports [If you can, place Reports on your computer

so you can access it by a single click]

Click: Details

## HOW TO READ INFORMAITON ON THE DNR WEBSITE

Here you will find major divisions ( I to iV):

### I. Annual Reports.

Shows all years for which data were collected. Table shows: Dates collected; abbreviations for: depth for SD (secchi disc), CHL (chlorophyll), TP, total phosphorus, **TSI (SD), TSI (CHL), TSI (TP)**, Lake Level, Clarity. [note: TSI is Trophic State Index.]

Now, for example, notice the number values for date 06/13/1994 for the **bold columns** that I show above. We will refer to them in IV below. We'll average the number in each of these TSI columns in IV.

See especially year 1993 to the present for which I collected data in a uniform way. Those years before 1993 were collected occasionally by others and in different ways. Some of them cannot be compared with those that I collected because the methods were not necessarily the same.

Note, Ron Barbieri collected some secchi disc samples but for a different reason than my sampling. They apply to the depth measurements for reading here, but most were done on different days (which is ok). These were related to the use of a satellite fly-over as arranged by the DNR.

You will note, too, that the number of samples I collected changed from 5 before 2010 to 4 samples per year after 2010. DNR decided to reduce the number.

But now FOR FURTHER REFERENCE, LOOK AT: 1994 and keep this date in mind.

II. Narrative Report. (This is a description of sampling.)  
(open) Bar Graph (It shows Kangaroo Lake to be Mesotrophic.)  
Parameters.  
Narrative.

III. Secchi disc graph.  
(It shows) Secchi disc average readings for each year. DNR averaged my 5 (or now 4) readings for each year. This is how far down into the water I could see the disc. It measures the density of algae in the water. This reading depth is meaningful.  
(look at) Chart, of readings. It shows how DNR derived readings for the graph.

IV. Trophic State Index Graph, (TSI graph). [This is complex.]

1) Shows a. Trophic State Index Graph (TSI).  
Left side shows trophic state: b. Hypereutrophic, Eutrophic, Mesotrophic, Oligotrophic.  
Left side shows a column: c. Numbered Column from 0 to 110 (not percentage).  
Remainder of graph shows: d. Symbols Secchi disc (round), Chlorophyll (square).  
and Total Phosphorus (triangle).  
Bottom, graph shows years: e. Here, read from 1993 when I started. Those below 1993 were not collected by me, and their history is unclear. In our example we'll use 1994 (it has better reference numbers).

Now, note on this TSI Graph (year 1994), that the round dot for Secchi is in the 50 Number Column. This corresponds to 5 feet as shown on secchi disc graph in item ( II.) above. As you look at all years, the round dots for Secchi follow the trend in the graph shown in ( II.).

Now note on this TSI Graph (year 1994, again), the square symbol for Chlorophyll. Go back to ( I.) the Annual Report page.

Note the table with dates at the left. The top legend includes: SD (ft) SD(M)  
Hit bottom CHL TP **TSI (Sec)** **TSI (CHL)** **TSI (TP)** Lake.....etc.

Select 06/13/1994. Note columns for: **TSI (Sec)** for Secchi Disc 55  
**TSI ( CHL)** for Chlorophyll 50  
**TSI (TP)** for Total Phosphorus 50

Now, their average values for the entire column for the year are ~ 55, 51, 49.  
These data will be entered onto the TSI Graph.

So now return to the Trophic State Index Graph at IV.

- 2) The one-line box shows: Symbols for Secchi (round), Chlorophyll (square), and Total Phosphorus (triangle).

Each symbol is shown in the graph for each year. Their values are taken from above (top of page):

Black dot = Secchi, or TSI (Sec). = ~ 55

Square = Chlorophyll, or TSI (Chl) = ~ 51

Triangle = Total phosphorus, or TSI (TP) = ~ 49.

On graph they are shown in the high 40 and lower portion of the 50 Numerical Box.

- 3) The five-line box describes the relationship of Chlorophyll, Total Phosphorus and Secchi readings to each other.

Line one is shown as: TSI (Chl) = TSI (TP) = TSI (Sec). The right column describes the condition.

When we look at the symbols of our data for 1994 on the graph we see that the 3 symbols nearly overlap each other. It is this condition that we have in the lake: TSI (Chl) = TSI (TP) = TSI (Sec). Thus, as stated in the box "it is likely that algae dominate light attenuation", Summary, algae are abundant in the lake.

For all of our collections, the symbols for secchi, chlorophyll and total phosphorus readings on the graph are all very close together. So at this point we'll surmise, for all years, that algae are recognized by the Trophic State Index to be abundant in the lake.

The other 4 lines in the box describe other possible relationships of the three conditions. For example, in some other lake, it can be that TSI (Chl) > (greater) TSI (Sec), along with no phosphorus. That condition is then described in adjacent box to the right. And so that lake (or condition) would read "Large particulates, such ....." None of these other conditions apply to our lake. You can read them similarly for the other TSI listings, TSI(TP)=TSI(Sec) > SI(Chl), etc.

- 4) The 7-line box, titled TSI Description, describes the meaning of the Number column on the left side of the TSI graph. The TSI number reads from 0 at the bottom to over 100 at the top of the column. It is an expression of the numerical value of accumulated data (not a percent number).

The TSI numbers shown at the left in the chart, as TSI < 30, is then described in the space to the right. This information has been gleaned from many studies, and summarized in the form of a TSI numerical designation.

Kangaroo Lake is positioned at TSI 40-50 in the chart and graph as determined by the positions (grouping) of Secchi, Chlorophyll and Total Phosphorus data. And so, for TSI 40-50, our lake is described as "Water moderately clear, but increasing chance of low dissolved oxygen in deep water during the summer."

We tend to be somewhat into 50 in more recent years (2010, 2011, 2012). If this trend continues into future years, then we would be in the TSI 50-60 column. If this continues into the future the lake will become more Eutrophic. Fish kills are very rare in the lake. Two conditions minimize this possibility. Our lake is very shallow so oxygen penetrates into the shallow water. Also, Peil Creek carries oxygen into the lake. Because this creek runs all year long in most years it contributes this oxygen into the lake. Perhaps this amount of oxygen is adequate to minimize the possibility of fish kills.

For a lake with a TSI < (less than) 30: This lake is described as "Classical oligotrophy; clear water, many algal species, oxygen throughout the year in bottom water, cold water, oxygen-sensitive fish species in deep lakes. Excellent water quality." An example of such a lake near us is Lake Michigan.

For a lake with a TSI > (greater than) 80. This lake or water body would be described as possessing "Algal scums, summer fish kills, few plants, rough fish dominant. Very poor water quality." There are such lakes in WI (I can't think of a lake name off hand, but a good example familiar to us would be a farm pond with lots of green algae floating on its surface.

The last paragraph, under the 7-line box, describes part of the DNR procedure, and refers to the Carlson website, [dipin.kent.edu/tsi.htm](http://dipin.kent.edu/tsi.htm) for more information.

(I hope this description helps to clarify this website information).

