Bills Lake Association

Lake Testing Report

Updated

March, 2020

Pasture Time

To Bills Lake residents:

Last fall, Governor Gretchen vetoed 147 line items totaling almost 1 billion dollars in budget cuts for fiscal year 2020 which began on Oct. 1, 2019. This was part of the kerfuffle between her office and the legislature over the latter's submissions. "Fix the damn roads" was a major bone of contention. So was funding for education.

One of the cuts was the $150,000 that it takes to run the Co-operative Lakes Monitoring Program (CLMP) which is administered by the state of Michigan's MICorps. This means that there will be no lake tesing (with one exception) this coming summer.

As a result, there was the usual give and take this past winter as groups sought to restore programs. After all, the CLMP is the second longest Citizen Scientist/Volunteer Monitoring Program in the USA.

Negotiations resulted in a contract to continue the program, just not this year. In January, the Department of Environment, Great Lakes, and Energy (EGLE) announced a new source of funding and signed a five-year contract to maintain the program. But due to the timing of acquiring this funding and the necessary transition to initiate a new contract, the CLMP will not be funded in 2020. It will return in 2021.
.
With regard to my participation, this is a sign from heaven. 20 years is a good round number in terms of taking transparency readings, collecting samples, doing the filtering, freezing the filters, and then taking them to the DEQ (Oops, EGLE) office in Grand Rapids twice a year for transfer to Lansing where they analyze the stuff and publish the results. It's pasture time.

The Michigan Lakes and Streams Association (ML&SA) is encouraging volunteers to do the transparency reading this summer and to keep a record for data transfer next year. There is no cost to us for doing so. However, there will be no lab testing for the phosphorus and chlorophyll testing this year, hence no collections and no data results.

I plan to do the transparency tests this summer and invite anyone who wishes to learn about this simple procedure to join me. I can also teach anyone who wants to learn how to do the chorophyll tests if they are thinking about taking over this lofty position of Bills Lake Citizen Scientist but the ML&SA insists that any new volunteers must attend a training sesssion that takes place as part of their annual convention in late April or early May each year. For first timers who are interested in lake ecology, it would be excellent weekend experience. The location varies but it is usually up north.

In meantime, I would appreciate it if you would pass the word that Bills Lake needs a new lake tester. This effort began in the early 1980s due to the work of the Reinhardt family although it was limited to transparency testing and results were not published (as far as I can tell). However, their work together with mine can be found in nauseating detail in the ensuing pages.

It would be nice if this program would, in form or another, continue on Bills Lake.

Ed

What this report contains

March 7, 2020

To Bills Lake residents:

As opposed to the short report, this one contains longer explanations and lots more data. It seeks to explain not only the three procedures (transparency testing, phosphorus readings, and chlorophyll results) but what the Carlson Trophic Index is and how it rates the water in our lake. Unlike the CLMP report, it is broken down into individual years, not periods of time.

At the end are essays that I have written in previous years which contain more information and some personal observations. I think they are still relevant.

The Michigan Clean Water Corps (MICorps), created by Gov. Jennifer Grandholm, is a network of volunteer water monitoring programs. It teams with the Michigan Lake Stewardship Associations (ML&SA) effort and the Co-operative Lakes Monitoring Program (CLMP). That's us. I was trained by the ML&SA-CLMP folks at their annual conferences from 2001-2003.

MICorps has streamlined the reporting of lake data and the analysis of the results. In the ensuing pages, you will see that it has allowed me to simply enter data. The Excel program makes the graph and draws the trend line. This report does not include some of the graphs in the DEQ report which I think are confusing. Instead, I have updated this presentation with 2019 data. Since this is a pdf, I trust you know how to switch from portrait to landscape in order to properly study some of them.

As you can see, we have been doing transparency testing for quite some time, phosphorus and chlorophyll not so much. In 2012, I stopped doing the the spring phosphorus test because it involved taking a sample in mid-April when I either wasn't back from Florida or didn't have a boat in the water. Also, cold weather and an ailing hip that needed replacement that year discouraged me. Two years later, I had the other one replaced. However, the late summer test still gives us a Carlson score.

We have been able to secure an overall trophic index score involving all three tests since 2003. That's 16 (see Debacle of 2008) years. I only wish we had results from, say, 50 years ago to compare.

Ed Waits

2019 Lake Testing Results

Seechi Disk -- During the summer of 2019, an eight-inch disk the circumference of which consists of alternating black and white quadrants attached to a tape measure, was placed in the deep basin of Bills Lake once per week. This was done **15 times,** once per week. The average depth at which the disk disappeared (actually drawn back up until it could be seen) was **14.9 feet**. This gave us a Carlson Trophic Index score of **38** which places Bills Lake at the top of the mesotrophic category in terms of transparency. The best reading during the sample period -- May through September -- was **25.0** feet. The worst was **14.9** feet. The previous year's average: 14.5 feet; Carlson, 39. **Very similar results between the two years.**

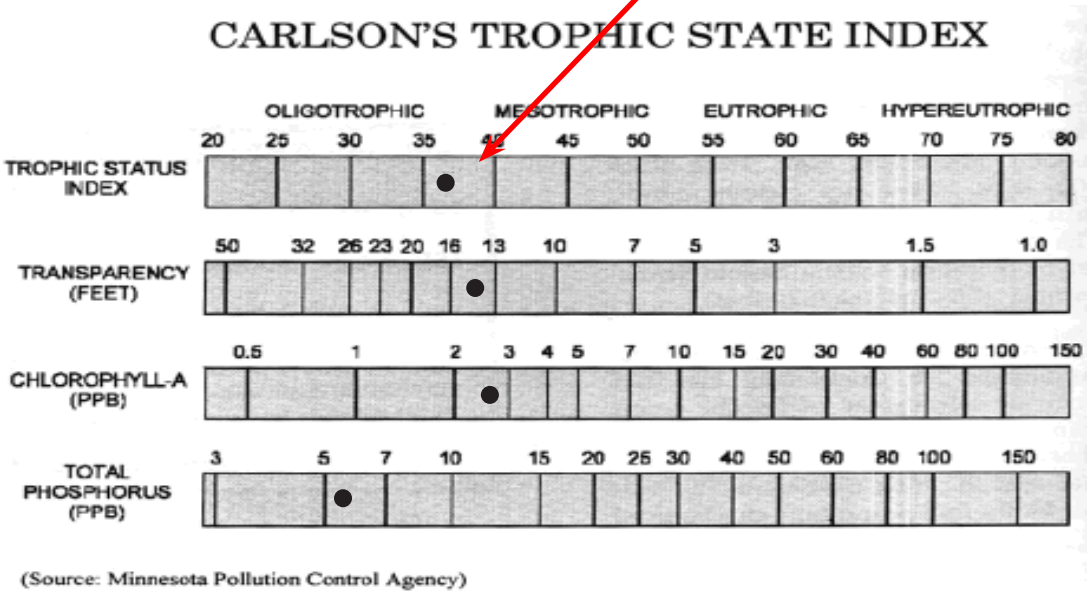
Chlorophyll -- In approximately the middle of the month from May through September, a sample of water was taken from the deep basin of Bills Lake, filtered for algae, and frozen for transport to the DEQ in Grand Rapids. The results of the testing is in parts per billion: an average of **2.7.** This parts per billion average gave Bills Lake a Carlson score of **40.** Previous year: 1.0; Carlson, 31.

Phosphorous: One sample was taken, in mid-September. This is when the lake has stratified because of the summer heat. It was frozen for transport to the DEQ office in Grand Rapids. Lab results: **6** parts per billion. Carlson Score is **30.** Previous year: 10 ppb; Carlson, 37.

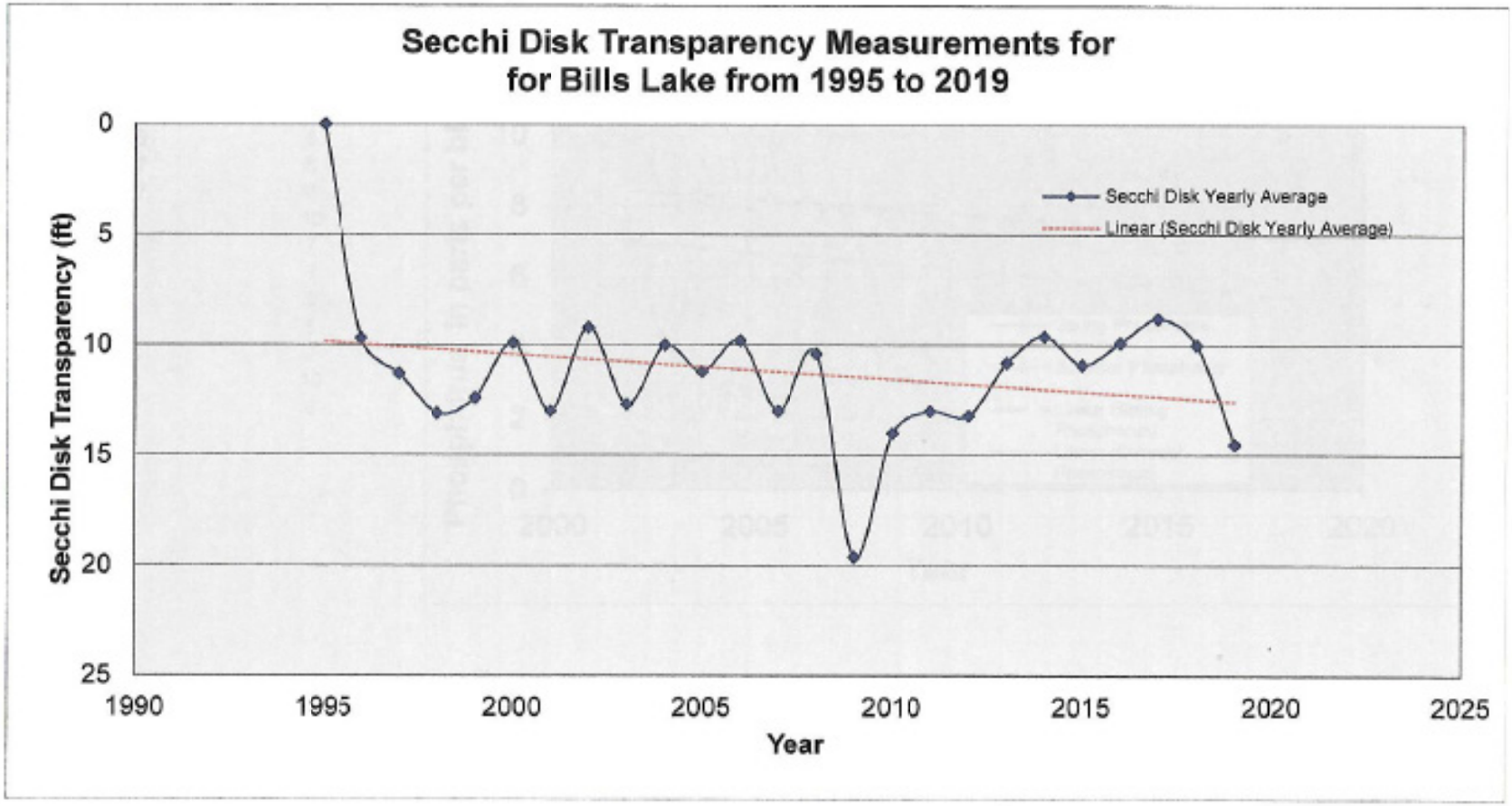
Composite Score: Because we perform these three tests, the averages of the Carlson scores can be taken together to produce a Composite Result. In 2019, our lake received a score of **36;** 2018: 36 also.
We have an oligotrophic-mesotrophic lake.

Composite Score: Carlson score of 36

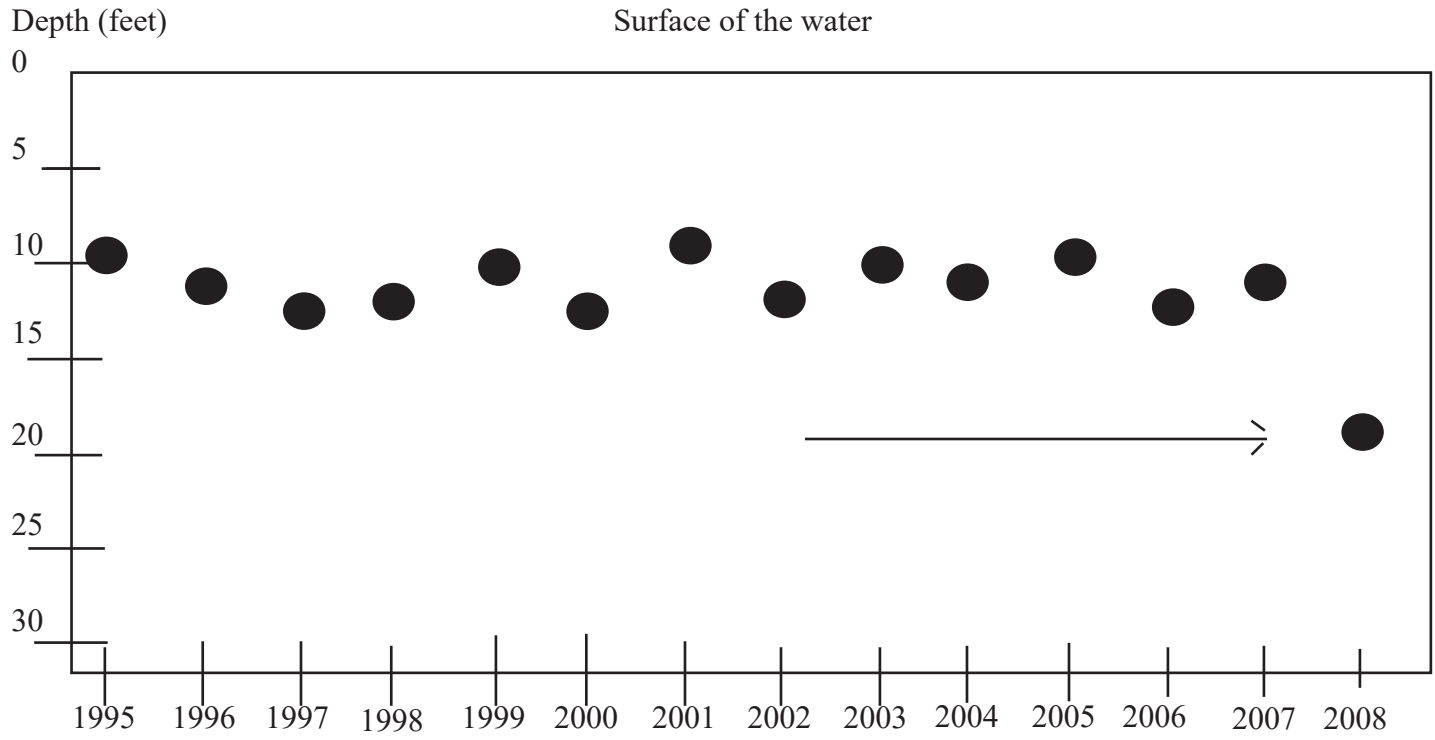
Seechi Disk: **17** readings, **14.5** feet average = Carlson score of **38**
Chlorophyll: **Five** samples, **2.7** parts per billion average = Carlson score of **40**
Phosphorous: **One** sample, **6** parts per billion = Carlson score of **30**



(Source: Minnesota Pollution Control Agency)


Secchi Disk Transparency Measurements for
for Bills Lake from 1995 to 2019
Secchi Disk Transparency (ft)
0
5
10
15
20
25
1990
1995
2000
2005
2010
2015
2020
2025
Year
Secchi Disk Yearly Average
Linear (Secchi Disk Yearly Average)

What happened in 2008?



Although Bills Lake is renowned for its lake transparency, data over the past 30 years suggests that our reputation is a bit overblown. According to the Carlson Trophic State Index, a standard by which lake clarity can be measured and compared, to be placed in the highest category is to have an average Seechi Disk reading of 15 feet or higher. Our average – the depth at which an eight-inch metal disk connected to a measuring tape can be seen before it disappears—has been a bit over 11 feet over the past 30 years. This puts us toward the top of Carlson's middle category. We are regarded as a oligotrophic-mesotrophic lake.

Not in 2008. Residents who pay attention to these things noticed how exceptionally clear our waters were throughout the summer. This was borne out by the measurements. Our average, as compared to previous years (see chart) was astronomical: almost 20 feet. The best reading was an amazing 36 feet. The worst reading – 10 feet – approached previous years' averages.

Why? Scientists from the Michigan Lake and Stream Associations (they train the local lake testers, a.k.a. citizen scientists) refer to such aberrations as "natural variabilities": sort of freak accidents. After all, the lake, as a living organism, is impacted by a variety of factors.

One such factor was our infestation of zebra mussels. We, as in the case of virtually all inland lakes in Michigan, had been plagued with them. This exotic species (not native to Michigan but instead brought in on the bottoms of boats) is both a cleaning and corrupting agent. They eat algae on the surface of the lake, thus improving transparency. But they also spit out a green substance –microcystin, akin to pond scum – which accumulated once or twice a year on our shores.

A study (which Bills Lake participated in) was conducted by the ML&SA two years ago. Results were presented by Prof. Orlando Sarnelle of Michigan State University at a lake testers workshop held at Houghton Lake on Oct. 21, 2008. He said that we in Michigan lead the nation in the number of lakes with zebra mussels. "This organism shouldn't be in an oligotrophic lake," he said, "but they are."

But are they the cause of our increased transparency? Our own Carol Dalebout of Deer Point, who has a Bachelor's degree in biology from Hope College and a Master's degree from Central Michigan University, says that the introduction of zebra mussels, which she calls "invader species," will increase the clarity of the lake. "With the clarity of the water, there will be more photosynthetic activity which will create many more weedy spots," she adds. From her experience working in labs and doing lake testing, she calls these "predictable changes."

However, Prof. Sarnelle stopped short of saying that, in the long term, zebra mussels clean up lakes and improve transparency. He admits to the short term effects but asserts that nobody really knows what the long range result is. After all, there is a concept called "collapse," the point at which the zebra mussels have done their work, have nothing to feed on, overpopulate, and lose their effect.

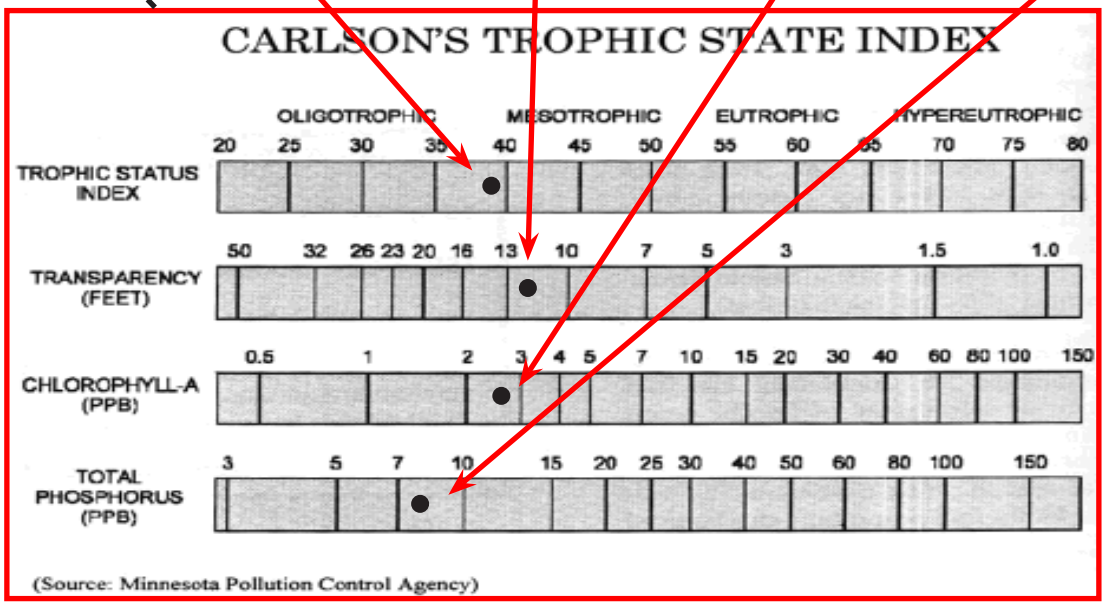
This is why we do lake testing year after year. It will be interesting to see if 2008's extraordinary readings were a one-shot natural variability or a trend toward increasing our lake's clarity. In the meantime, be sure to avoid stepping on the critters with your bare feet, especially if they are dry. And be sure to raise your motors out of the water when docked so that they don't cling to and clog intakes.

Lake Testing Composite Scores Over the Past 16* Years

The purpose of data over time is to assess trends. Because we have been conducting the three tests for over a decade, we have been able to produce Carlson data that enables us to make comparisons. The chart below gives us the Carlson results for years 2003 through last summer. We can see that the scores are remarkably consistent. We have a good (not great, but not horrible) lake in terms of water clarity and purity.

Year	Composite Score	Transparency	Chlorophyll	Phosphorous
2003	40	45	41	34
2004	38	42	38	34
2005	41	46	43	34
2006	39	42	39	36
2007	37	43	36	32
2009	37	32	39	32
2010	36	40	38	30
2011	36	38	38	32
2012	40	43	40	37
2013	38	44	37	32
2014	38	43	39	32
2015	39	44	38	36
2016	37	46	38	27
2017	38	44	38	39
2018	36	39	31	37
2019	36	38	40	30
Average	38	42	38	33

A Carlson Trophic Index chart of Bills Lake average scores over the past 16* years



The Carlson composite average over 17 years which puts Bills Lake at the top of the mesotrophic category. A description of what a mesotrophic lake looks like can be found at **http://www.mlswa.org/lkclassif1.htm**. and in the DEQ report.

* Through a series of mishaps in the summer of 2008, not enough data were collected to render a Carlson score for phosphorous and chlorophyll. However, the transparency readings were superb and the phosphorous and chlorophyll tests that were administered obtained results consistent with the above.

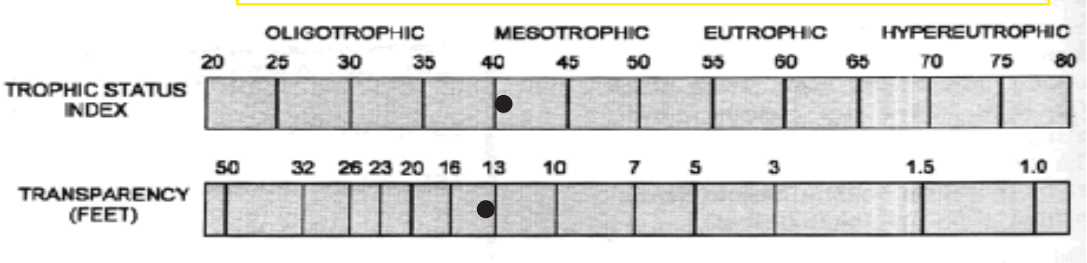
Bills Lake transparency over 25 years

Each spring, the Michigan Lake and Stream Associations, Inc provides a CLMP Annual Summary Report which lists data derived from information submitted by the volunteers. In terms of transparency, this table includes the number of readings, the maximum reading, the minimum reading, and an average. The data is then translated into a Carlson score.

Data from 1994 through 1997 was provided at our request from the ML&SA. The rest can be obtained from Annual Reports dating from 1998 to 2019 at **www.micorps.net** Click on the Lake Monitoring menu and then select Annual Reports.

Below are results of the data that we have obtained. **If someone asks you how clear the water is in Bills Lake, the most accurate answer is, on average, 12 feet.** However, our water is much more transparent in the early spring and late fall. Our Carlson score of 42 puts us at the top of the middle category but be reminded that transparency is only one test of three. It just happens to be the one conducted on our lake over the greatest number of years.

Year	Seechi Disk Average	Carlson Score
1994	12.4	41
1995	9.7	44
1996	11.3	42
1997	13.1	40
1998	12.4	41
1999	9.9	44
2000	13.0	40
2001	9.2	45
2002	12.7	40
2003	10.0	44
2004	11.2	42
2005	9.8	44
2006	13.0	40
2007	10.4	43
2008	19.6	34
2009	14.0	39
2010	13.0	40
2011	13.2	40
2012	10.8	43
2013	9.6	44
2014	10.9	43
2015	9.9	44
2016	8.8	46
2017	10.0	44
2018	14.5	39
2019	**14.9**	**38**
Average	**11.8**	**42**



Bills Lake transparency over three decades

Over the past 30-plus years, Bills Lake has been tested to ascertain the clarity of its water using a device which has become standard throughout the state. A Seechi Disk is simply an eight-inch disk — the circumference consisting of alternating black and white quadrants — which is attached to a tape measure. The person who does the testing goes to the deep basin of the lake (in our case the 90-foot area just off the tip of Deer Point -- see report cover), slides the disk into the water, and lets out enough measuring tape until he can't see the disk. Then he brings it back until he can barely see it. He records that measurement.

A Seechi disk reading, therefore, is the distance into the lake that you can see this disk just before it disappears from view. The disk is used as a standard so that clarity of lake water can be compared to that of other lakes whose testers use the same device. This is the same concept as a yardstick or a thermometer.

Everyone in the Co-operative Lakes Monitoring Program (CLMP) tests at the same time of the year. Each season, nine to 18 equally spaced readings (once per week or once per two weeks) are taken from mid-May to mid-September to gather sufficient data for an overall perspective. After all, algal species composition in lakes can change significantly during the summer months. Increased temperature can dramatically alter the transparency of the water. So can jet ski traffic.

Primarily due to the efforts of the Reinhardt family, we at Bills Lake have been fortunate to have Seechi disk results ranging from 1981 to the present and annually, the Michigan Lakes Stewardship Association distributes an updated graph showing these findings.

The top of the graph on the next page (turned sideways to make it fit: you can rotate it because it is a pdf) represents the surface of the water. The dots represent the average depth per summer that a Seechi disk could be seen when dipped into the deep basin of the lake. Generally, our average is between 10 and 15 feet.

The dotted line on the graph indicates that the waters of Bills Lake have diminished slightly in clarity over the past 30 years. Of course, it would be truly fascinating to know what the Seechi disk readings would have been, say, 50 years ago.

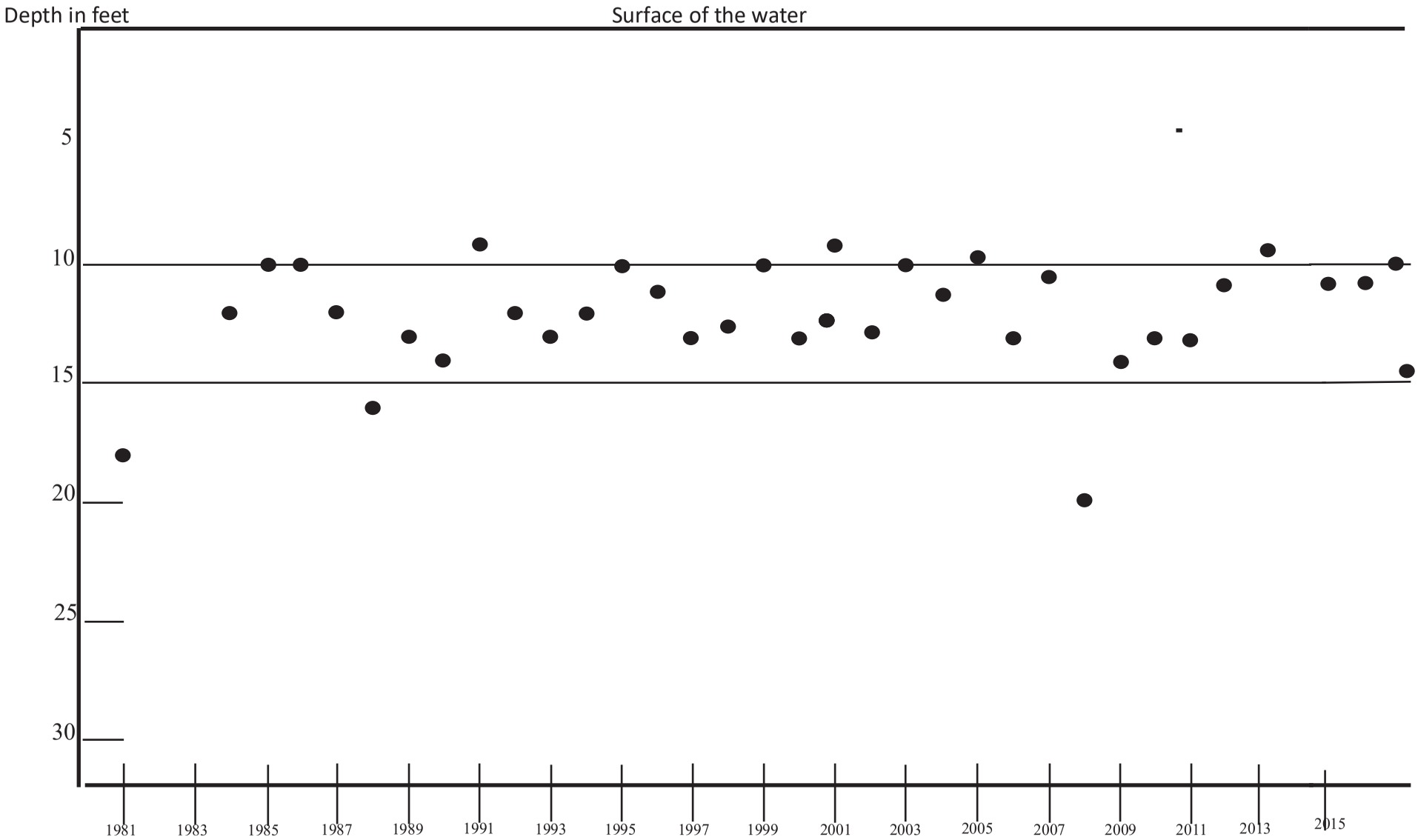
Using Carlson's Trophic State Index, Bills Lake is classified as an oligotrophic-mesotrophic lake in terms of lake clarity. But the oligotrophic-mesotrophic-eutrophic hierarchy is a measurement not merely of clarity but instead of productivity, i.e. a lake's ability to support plant and animal life. Given that the Bills Lake phosphorous and chlorophyll readings are always in the oligotrophic category and given that Bills Lake is a marl lake wherein bits of calcium carbonate are easily stirred up and suspended in the water during the summertime – thus impeding clarity — it can be concluded that the waters of Bills Lake are in between the mesotrophic and oligotrophic categories in terms of productivity potential.

A more complete discussion of lake classification can be found at

http://www.mlswa.org/lkclassif1.htm

Cooperative Lakes Monitoring Program
Summer Mean Transparency

Bills Lake, Newaygo County



Phosphorous readings over the years

A lake's clarity is influenced by several factors. In the case of Bills Lake, marl comes into play, but there are several other considerations. There may be suspended particles in the water because of boat activity. Rough waves on certain days make it difficult to see the Seechi Disk. The angle of the sun, the eyesight of the tester, and the weather conditions (cloudy, sunny, rainy) all come into play. Consequently, taken by themselves the Seechi disk readings should only be a very general indicator of algae levels. Fortunately, there are other tests.

For most lakes, the amount of algae in the water is a major cause of reduced lake transparency. As more nutrients enter the lake, more algae are produced. More algae, less clarity. As a result, the Seechi disk disappears at a reduced depth.

This doesn't seem to be the case for Bills Lake. Although our Seechi disk readings place our lake in the mesotrophic portion of the Carlson Trophic Index scale, our phosphorous readings have been remarkably good.

The test is very simple to administer. They call it a grab sample. On approximately April 15, the volunteer goes to the Deep Basin of the lake (for us, the 90 feet area just off Deer Point: see picture on cover), and dips a sample bottle elbow-deep into the water. The bottle is placed in a cooler and, after arriving back on shore, into a freezer. Shortly after, the sample is taken to the DEQ office in Grand Rapids where it is shipped to a lab in Lansing for testing. The same procedure is performed on approximately Sept. 15th.

There should be a difference in readings between the spring and summer tests. In the spring, the lake is well-mixed, i.e. the water at the top is the same as at the bottom. Thus, a phosphorous sample taken from elbow-depth will produce the same reading as that taken from the middle and bottom of a water column. Not so at the end of the summer when the water has stratified because of temperature (warm on top with predictably more algae as a result).

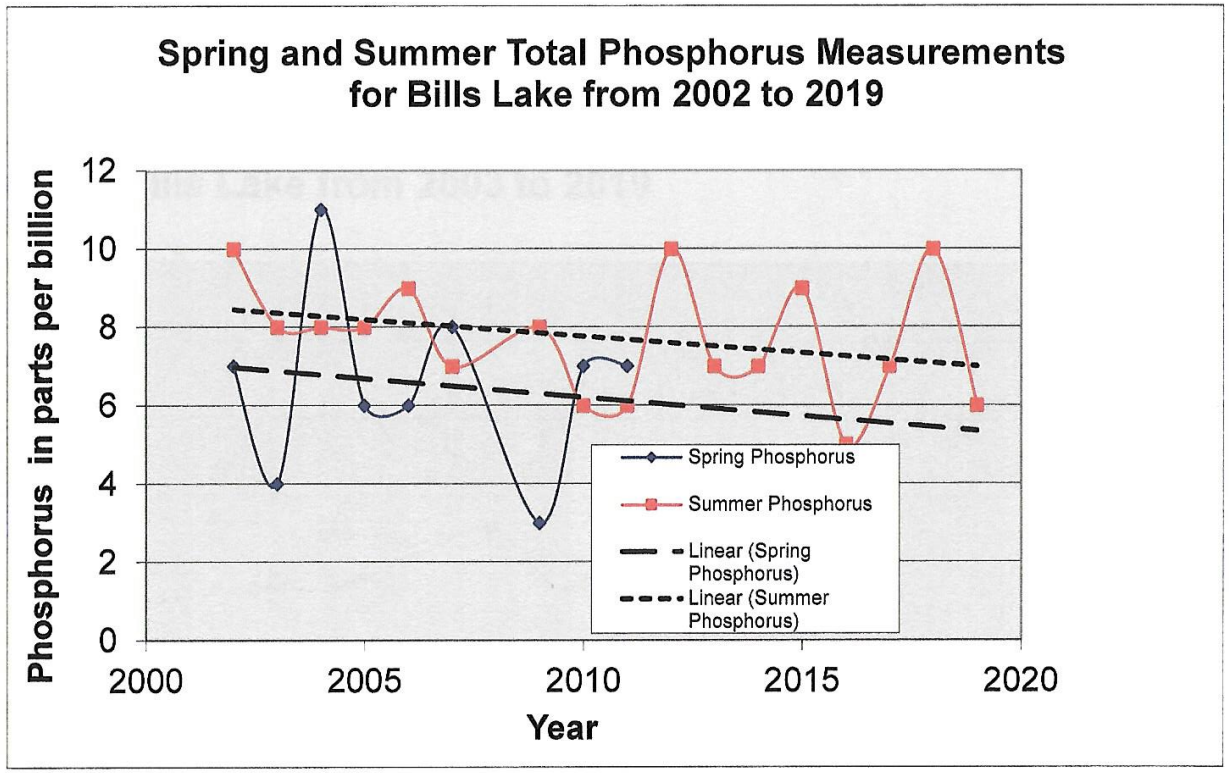
Taken year after year, we can spot a trend. Fortunately for Bills Lake, there hasn't been much of one. Phosphorous test results come back as parts per billion (ppb). Our numbers are low every year, indicating very little productivity.

In 2012, no sample was taken in the spring, due to hip replacement surgery on the part of the tester. Given that a Carlson score for phophorous is generated on the basis of only the September test, the April sample was not collected in 2013. After all, this involves a paddleboat in the water during some very cold weather and sometimes windy weather. In 2014, another hip replacement; thus, a trend.

Year	Spring	Late Summer	Carlson Score
2002	7	10	37
2003	4	8	34
2004	11	8	34
2005	6	8	34
2006	6	9	36
2007	8	7	32
2008	5	*	*
2009	3	8	32
2010	7	6	30
2011	7	6	30
2012		10	37
2013		7	32
2014		7	32
2015		9	36
2016		5	27
2017		7	32
2018		10	37
2019		6	30
Average		8	33

* A spring sample was taken, turned in, and analyzed. However, the fall sample was not turned in on time; therefore, a Carlson score was not generated.

Year	Spring Phosphorus In parts per billion	Summer Phosphorus
2002	7	10
2003	4	8
2004	11	8
2005	6	8
2006	6	9
2007	8	7
2009	3	8
2010	7	6
2011	7	6
2012		10
2013		7
2014		7
2015		9
2016		5
2017		7
2018		10
2019		**6**



NOTE:

The dotted lines are the overall trend.

Chlorophyll readings over the years

Chlorophyll is the green photosynthetic pigment in the cells of plants. The amount of algae in a lake can be estimated by measuring the chlorophyll a concentration in the water. As an algal productivity indicator, it can be used to measure how nutrient-filled a lake is.

Technically, the chlorophyll test is the hardest to administer. The volunteer has to go to the Deep Basin (the 90' area just off Deer Point), take a Seechi Disk reading, and double it to determine the extent of the sample depth. He then collects a sample using a specially-prepared jar that takes in water slowly and steadily as it is drawn up. This means that once it reaches the surface, the jar contains water from a column that goes twice as deep as you can see with a Seechi disk that day.

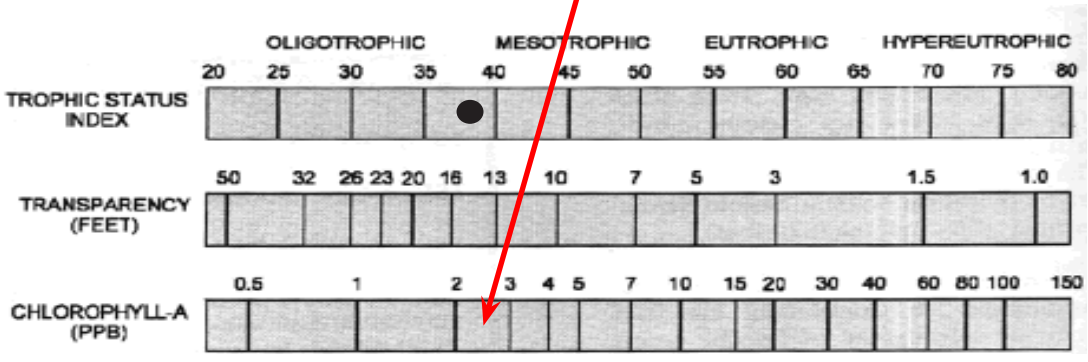
The sample is put into two dark brown jars so that light doesn't affect it. They are then stabilized with a few drops of magnesium choloride, and placed in a cooler. The volunteer immediately takes the sample back to his "lab," usually a basement sink where he strains 50cc of the water through a filter using a special tube. What comes off onto the filter are algae cells. This filter is then placed into another tube, labeled, and frozen.

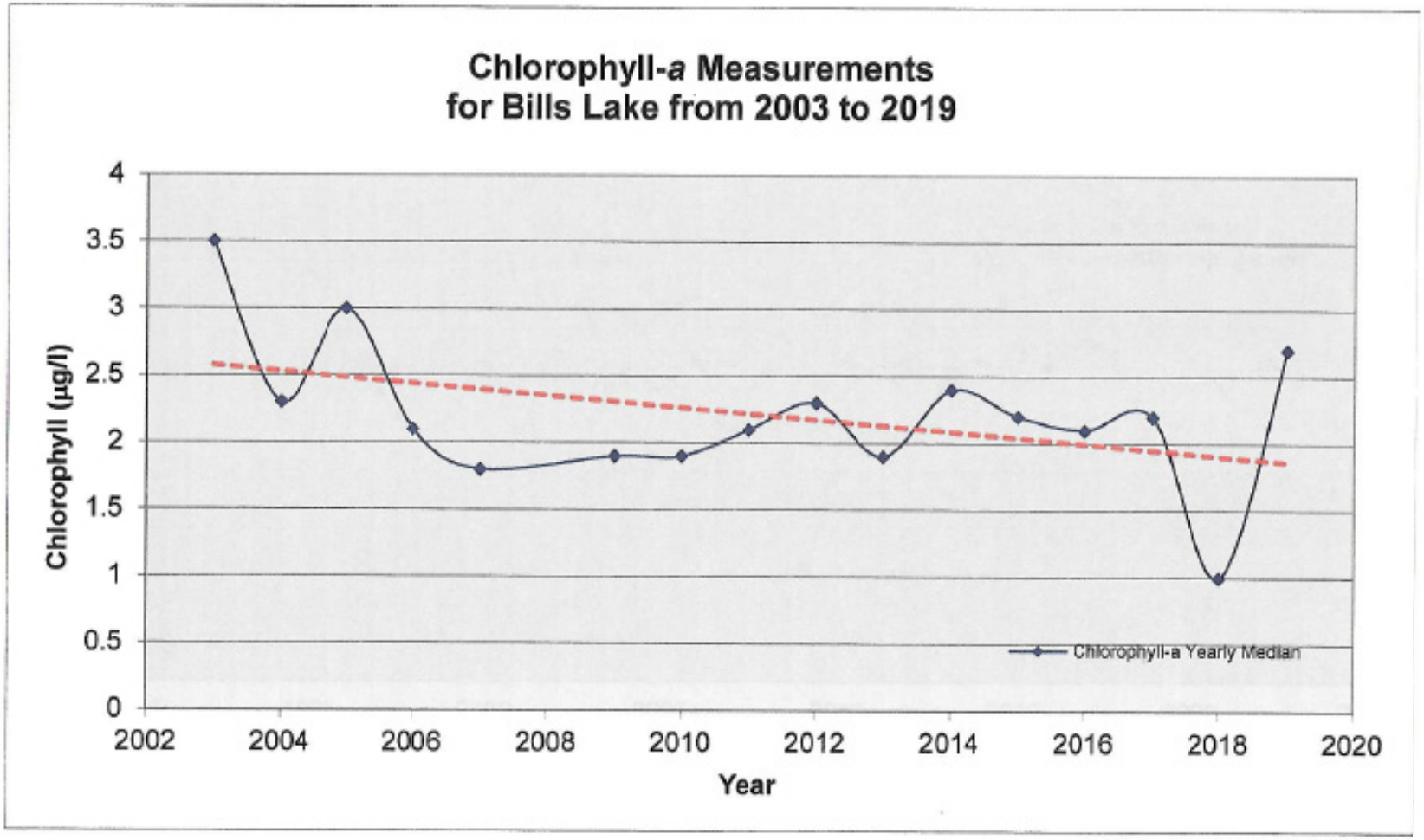
Five chlorophyll samples per summer are taken, one each in the approximate middle of the months May through September. Two of the frozen samples are transported to the DEQ office on or about June 20th. The last three are turned in with the final phosphorous test on or about Sept. 20. All samples go to a Lansing lab for analysis.

As with the phosphorous test, measurements are in parts per billion. Results of five tests per year:

Year	Average	Carlson Score
2003	3.5	41
2004	2.3	38
2005	3.0	43
2006	2.1	39
2007	1.8	36
2008	*	*
2009	1.9	37
2010	1.9	38
2011	2.1	38
2012	2.3	40
2013	1.9	37
2014	2.4	39
2015	2.2	38
2016	2.1	38
2017	2.2	38
2018	1.0	31
2019	2.7	40
Average	**2.2**	**38**

* 2008 was a disastrous year with regard to chlorophyll testing. The May reading was 1.0, very low. However, during the June test, the rope that attaches to the composite sampler came loose as the device was being retrieved; hence the sample was lost. Once a new sampler was delivered, the July reading showed, again, a low 1.1. However, the lake tester (that's me) misread the date that the final two tests -- Aug. 15 and Sept 15th -- were to be delivered to the DEQ. Thus no analysis and test results. The CLMP will not calculate a Carlson score without data from at least four of the five tests.




Chlorophyll-a Measurements
for Bills Lake from 2003 to 2019
Chlorophyll (µg/l)
4
3.5
3
2.5
2
1.5
1
0.5
0
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020
Year
Chlorophyll-a Yearly Median

Results of Bills Lake's Annual Physical Exam

Conclusion

If you are wise, you see the doctor at least once a year for a check-up. He/She runs tests, looks them over, discusses them with you, and then — even if you are healthy — says: "Looks good; S*ee you next year."*

Over the past 17 years, three tests have been conducted on Bills Lake waters periodically each summer.* The results are translated into what is known as the Carlson Trophic Index, a scale that seeks to measure the productivity of a lake. The higher the number, the more the lake is able to produce algae and weeds, not a particularly bad thing if you happen to be a fisherman but a very bad thing -- most agree -- if our lake's productivity borders on swamp-like conditions.

Instead of grading the lake in terms of a scale of A-E or 100-0 as in our school days, scientists categorize lakes using the terms oligotrophic, mesotrophic, and eutrophic. An extensive description of these terms can be found at **http://www.mlswa.org/lkclassif1.htm**.

Suffice it to say here that the lower the number, the clearer and purer the water. Using the Carlson numbers, dividing lines are roughly: oligotrophic: 20-37, mesotrophic: 38-53, and eutrophic: 54-65. The various Carlson charts presented in the previous pages and the next few pages illustrate this.

"Looks good; See you next year."

Over the past 1.7 decades, our results have been stable and consistent, despite one bad year when we endured a bout of microcystis, green pond scum that came from the initial onslaught of zebra mussels. In terms of average scores, **we are at the top of the mesotrophic category or at the bottom of the oligotrophic category,** depending on how you want to look at it.

A graph of our transparency readings, taken since 1981, shows a gradual decline in lake clarity. However, our phosphorous and chlorophyll scores are not only consistently good but put us in the bottom of the oligotrophic category. It is only the transparency that suffers throughout a typical summer, the result of warm temperatures that produce algae and increased boat traffic that stirs up sediment such as marl.

Good health can be defined as taking care of yourself *before* you get sick. To be sure, our lake ecology will continue to be hit with the results of increased population and development, i.e. the increase of paved surfaces which promote run-off of impurities into the lake, poorly maintained septic systems which deposit impurities of a different sort into the lake, and motorized boat traffic that deposits plenty of CO_2. Also, they sometimes leak gas and oil into the lake, even after being docked.

But for the most part, we are fortunate to have an educated populace that takes precautions to avoid these consequences, and reminds neighbors and guests to do the same. There is an awareness on the part of most people that, in one form or another Mother Nature bats last, either by rewarding us with an esthetically pleasing environment or by punishing us with a visually ugly result of our neglect.

* Actually, the phosphorous test has been administered for the past 17 years and the transparency test has been conducted since 1981. The purpose of this discussion is to use the results of *all three tests administered during the same summer* to form a composite average. This has occurred from 2003 through 2016.

PPBs (Parts Per Billion)

March 17, 2016

Given the Flint River situation, PPB is a term that many folks in Michigan are getting used to. In their case, it is a measurement of the amount of lead in the drinking water of the residents. In the terms of Bills Lake, parts per billion is a statistic that refers to the amount of phosphorous and chlorophyll in our lake water. The Flint River gives us an indirect frame of reference:

The U.S. Environmental Protection Agency regulatory limit for lead in drinking water is 15 ppb. However, the World Health Organization, besides declaring that no lead is the standard, says that 10 ppb is the guideline for action. The Virginia Tech researchers — whose tests finally got the attention of state officials — consider 5 ppb a cause for concern.

It's a bit complicated, of course. Part of this has to do with the number of samples and how carefully they are collected (Was the sample water that had been sitting in pipes all night and then collected first thing in the morning?). Part of it has to do with where they were taken. For instance, one set of readings taken from 271 Flint homes last summer (2015) showed an average of 27 ppb. The highest level recorded by the Virginia Tech study of Flint River water in Flint's 8th ward showed 158 ppb. The highest level recorded by a wider Virginia Tech study of the Flint River water showed 13,000 ppb (the EPA considers a water reading of 5,000 ppb to be toxic waste).

What does this have to do with Bills Lake? Not much. It's apples vs. oranges, After all, we don't drink our lake water, at least not intentionally. We test for phosphorous and chlorophyll. But our phosphorous and chlorophyll measurements are listed in parts per billion. The results over the past dozen years are on our website for all to see.

Last summer revealed amazing results in terms of our chlorophyll results. The worst reading was 3.7 ppb. The average was 2.2 ppb. Given our readings over the years (see chart and graph), we did very well last summer. However, the parameters vary. The variables involve where the samples are taken: the 90-foot deep basin off Deer Point. What if the samples were taken at other positions on the lake -- against the CLMP procedures, by the way; they want us to be consistent within ourselves and within the rest of the state.

It would be a bit like testing Flint water at different locations. When the tests are taken is also a factor. Our readings are understandably worse in August than in May. Maybe they would be worse if I took the samples in the afternoon, not morning.

Nevertheless, if chlorophyll testing is the most accurate reflection of the health of our lake—which I believe it is (see essay on next page) — then we are doing very well in terms of lake water health. The folks in Flint should be so lucky.

Let's not take it for granted.

Ed Waits

About testing the waters of Bills Lake

March 2014

On July 16 2013, Bill Dimond – who is in charge of inland lake testing for the Michigan Lake and Stream Associations' Co-operative Lakes Monitoring Program (CLMP) – visited Bills Lake to do a side-by-side chlorophyll test with me. The purpose of these randomly-selected visits is to see if procedures are performed correctly by the volunteer. Indeed, this is the fourth time in the past 14 years that someone from the CLMP has been to our lake, the first three being from Ralph Bedarz, Bill's predecessor, who has since retired.

These are very useful occasions. On the part of the ML&SA, they are a valuable public relations opportunity. On my part, they afford chances to ask questions and discuss issues. On this day, I was able to pursue a variety of topics. Given that I have performed transparency, phosphorus, and chlorophyll tests for 14 years, I have drawn some conclusions that Bill helped me confirm.

Conclusion 1: The least accurate and least valuable test is water transparency using the Seechi Disk.

Conclusion 2: The Carlson Trophic Index Composite Score is an oversimplification, a bit like the grade you received on a high school essay in English class.

Conclusion 3: The most accurate indicator of our lake's health is the chlorophyll test.

Conclusion 1: The least valuable is the transparency test using the Seechi disk. There are just too many variables. One is the eyesight of the tester. Another, as any fisherman knows, is wave action. A third is the time of day and the angle of the sun. In other words, where an 8-inch disk divided into black and white quadrants disappears and then reappears (the official measurement) might vary, depending on who is doing the test, the weather conditions, etc. A fourth variable – and for us, very important -- involves the amount of marl (calcium carbonate) that floats around. These are suspended particles that increase during the summer months when there is more activity from power boats and jet skis. We have a lot of it. It hinders clarity.

More importantly, I think that too much emphasis is put on the transparency number ("You can see down 14 feet on Bills Lake!"). In my opinion, the numbers that I report are low in terms of the bragging rights of our lake water. If you look at our composite graphs, the weakest portion at Bills Lake is the Seech disk readings. I think that our lake health is better than these results.

Conclusion 2: Bill also says that Prof. Carlson (of the famed Carlson Trophic State Index) never intended that there be an average of the three tests: transparency, phosphorous, and chlorophyll. But many of us have been trained to demand instant and simplistic answers to evaluations. A classic example occurred when you received an essay back from your high school English teacher. Although your teacher may have pointed out multiple errors and added lots of suggestions, you probably turned quickly to the almighty grade. The moment you saw it, all subsequent thought about your writing shut down (except, maybe, for thoughts about how unfair your teacher was).

The same applies to our “scores” regarding last year’s lake testing. Too many of us look at the transparency average, the least valuable of the three. We might then go to the Trophic Composite Average, again a score. In theory, by the way, the three scores on the three tests should correlate; i.e. be very close. **They aren’t.** A look at our data shows that year after year, our transparency is the worst of the three for reasons outlined above.

Conclusion 3: According to Bill (and I agree with him), the best indication of our lake’s health and clarity is the chlorophyll test. I do five of them during the summer. The procedure is quite lengthy (about an hour) and somewhat complicated. The filters then go to an MSU lab where the professionals take over. Our results, over a decade, have been consistently good. Details can be also found within these pages.

The phosphorous test also confirms the health of our lake but the sample is taken at elbow depth (actually, I can’t even reach that far down, even when I am lying flat on the floor of my pontoon). In the fall, this means that I am collecting stratified water; i.e. warmer water on the top which contains algae. In contrast, the chlorophyll sample is collected at twice the depth of that day’s Seechi Disk reading. In other words, I am bringing up some water from 20 feet down if the transparency reading that day was 10 feet. This gives a more accurate test of our lake’s health.

Congratulations. You actually read this. Questions or comments should be directed to me at 652-2629 or edwaits@charter.net