

# Stony Lake Volunteer Water Quality Testing Results for 2013

## ***2013 Results Improved Over 2012***

Over the winter, the lab results for Summer Total Phosphorus and the five Chlorophyll *a* tests were completed. These results, along with Secchi Disk Transparency readings show that the water quality for Stony Lake improved. For all three tests, the results were the best in the last four years.

## ***History***

Volunteers at Stony Lake have participated in the Cooperative Lake Monitoring Program (CLMP) for over a decade, collecting samples and reporting observations and readings that are combined with the data from 238 other inland Michigan lakes. CLMP is a partnership of the Department of Environmental Quality, Michigan Lake & Stream Association, the Great Lakes Commission, the Huron River Watershed Council, and Michigan State University. The Stony Lake Property Owners Association pays the cost to be a part of the program, all of the funds are used by CLMP for testing equipment and laboratory materials.

## STONY LAKE VOLUNTEER LAKE MONITORING PROGRAM

Test	Volunteer Opportunities
<b>Secchi Disk Transparency</b> <i>Clarity depth is an indicator of the lake's trophic status.</i> Samples are taken at least once a week from early May through late September at two locations on Stony Lake.	Ideally we would have two additional volunteers to share the load and provide a larger data pool.
<b>Total Phosphorus Concentration</b> <i>Measure of a primary nutrient that stimulates plant growth.</i> Spring samples are taken between May 1 – 5, following lake turnover. Summer samples are taken between September 18 – 22. Samples taken at Deep Basin, the deepest point on Stony Lake. Samples are sent to lab at MSU for analysis.	A second volunteer is needed to share the load.
<b>Chlorophyll <i>a</i> Concentration</b> <i>Chlorophyll <i>a</i> is a component of most plant cells, the concentration is a measure of small plants such as algae.</i> Samples are taken five times from May through September at Deep Basin, the deepest point on Stony Lake. Samples are sent to lab at MSU for analysis.	A second volunteer is needed to learn the procedure to provide backup in future years.
<b>Dissolved Oxygen and Temperature Profiles</b> <i>Oxygen in the water is needed to sustain the fish population; temperature profile is related to nutrient release and mixing.</i> Samples are taken at least once every two weeks from early May through late September at two locations on Stony Lake.	A second volunteer is needed to learn the procedure to provide backup in future years.
<b>Exotic Aquatic Plant Watch</b> <i>Identifying and mapping of invasive aquatic plants; assists in controlling and treatment process.</i> Survey conducted around perimeter of lake annually; results are logged on Google-maps.	Additional volunteers are welcome; excellent opportunity to learn about the vegetation (both native and invasive) in the lake.

## ***Want to get involved?***

Sampling is a great way to learn more about lake ecology. Our current testing program takes about an hour mid-day once a week when we take Secchi disk readings and dissolved oxygen/temperature profiles. Once a month we sample for chlorophyll *a* which adds another hour. It would be great if you could make the commitment for the entire season and have access to a boat with an anchor. But if you're just interested, you're welcome to join in, learn what's involved, and serve as a back up. Please contact John Stivers at [jhstivers@comcast.net](mailto:jhstivers@comcast.net).

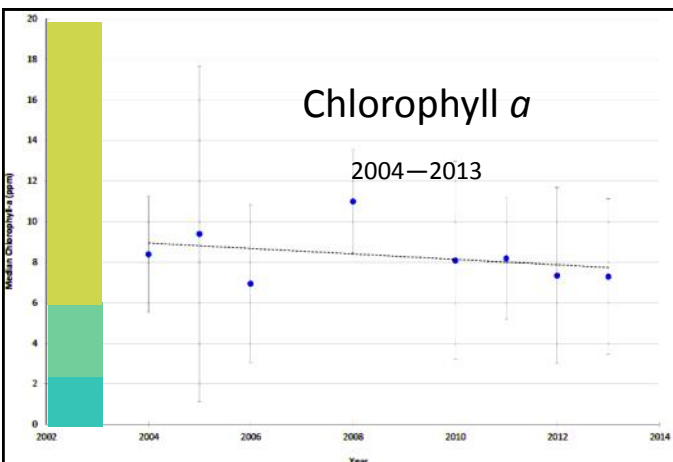
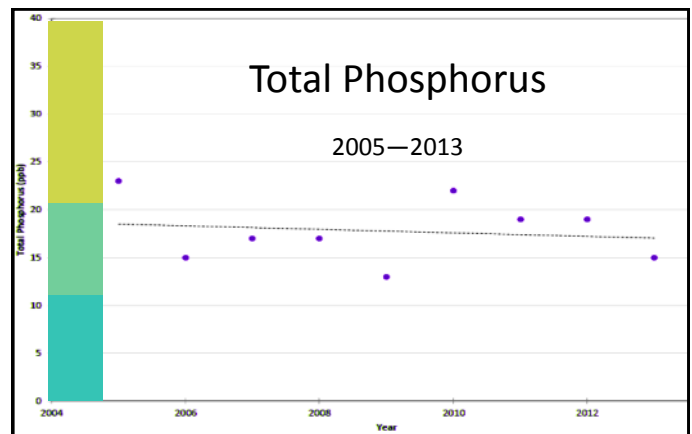
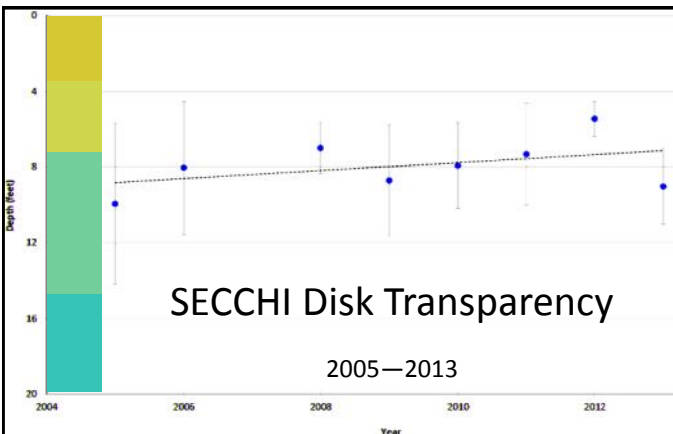
## Is Stony Lake getting older?

Lakes naturally increase in nutrients and sediment over time; human activities can also accelerate the productivity. The process is called **eutrophication**. It's often compared to human "aging" (maybe like for old folks, the lower the test results, the better). For lakes, their life stage is called the **trophic state**.

Trophic State	Oligotrophic <i>Young Lakes:</i> deep, clear lakes with little aquatic plant growth.	Mesotrophic <i>Middle Aged Lakes:</i> between Oligotrophic and Eutrophic	Eutrophic <i>Old Lakes:</i> shallow, turbid with abundant aquatic plant growth	Hypereutrophic <i>Very Old Lakes:</i> highly productive; nuisance algae and weeds
Secchi Depth (SD) Annual Average	> 15 ft	15 ft—7.5 ft	7.5 ft— 3 ft	< 3 ft
Total Phosphorus (TP) Spring/Summer	< 11 ppb	11 ppb—21 ppb	21 ppb—50 ppb	> 50 ppb
Chlorophyll <i>a</i> (CHL) 5 Sample Average	< 2.25 ppb	2.25 ppb—6.00 ppb	6.00 ppb—22 ppb	> 22 ppb
Carlson's Indices TS <sub>SD</sub> TS <sub>TP</sub> TS <sub>CHL</sub>	<38	38 – 48	48 – 61	>61

As the CLMP Annual Summary Report says, "the dividing lines between the trophic status categories are somewhat arbitrary ... and there is no broad agreement among lake scientists as to the precise point of change between each of these classifications." Limnologist (those lake scientist) generally look at seasonal averages of multiple tests; no one sample tells the tale. Because of variability in weather conditions, such as ice-out dates and summer water temperatures, having a long history of multiple tests is most instructive. We now have results dating back to 2004, which you can find on the MiCorp data exchange [www.micorps.net/data/view/search/](http://www.micorps.net/data/view/search/). That's also the repository for the data collected from the other lakes and streams all across the state.

## Stony Lake Test Results



Carlson's Indices for Stony Lake 2004—2013

Year	TS <sub>SD</sub> (Secchi Disk)	TS <sub>TP</sub> (Total Phosphorus)	TS <sub>CHL</sub> (Chlorophyll <i>a</i> )
2013	45	43	50
2012	53	47	53
2011	48	47	51
2010	48	49	51
2009	46	41	51
2008	49	45	54
2007	not reported	45	not reported
2006	48	43	50
2005	44	49	53
2004	47	47	51

## Carlson's Trophic Status Indices

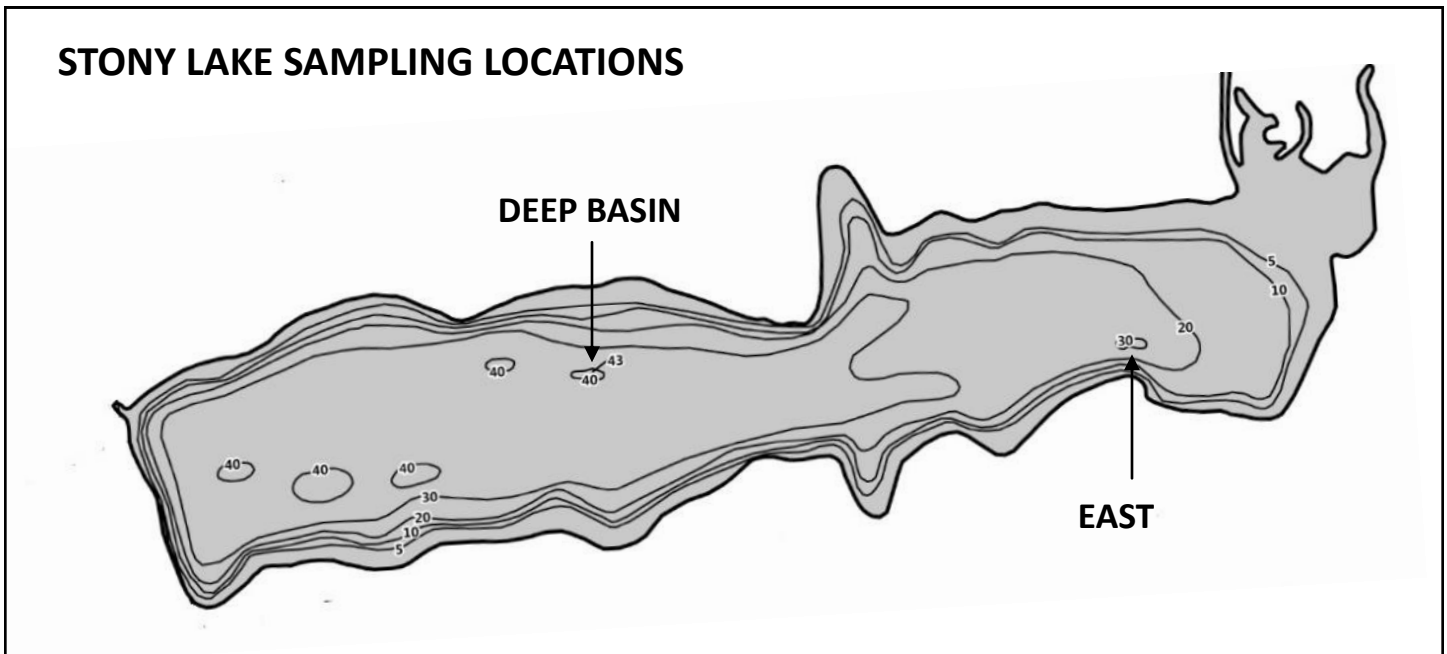
To make a more understandable evaluation of the data from different tests, those who study lakes use Carlson's Trophic Status Indices. For each of the three types of tests, the sample results for the year are averaged, then mathematically adjusted, making them a relatively comparable approximation of the "age" of our lake. When you look at the results (table at the lower right-hand corner of previous page), you see that there is considerable variability from year to year, even from test to test within the same year. A more detailed explanation of this topic is included in the CLMP Annual Summary Reports [www.micorps.net/lakereports.html](http://www.micorps.net/lakereports.html).

### Where on the lake are the samples taken?

As a general practice, the deepest points are used for testing. Depth is very important when taking Chlorophyll *a* samples, which are collected over a "water column" that is double the Secchi disk reading taken just before collecting the water. Similarly, using the deepest point gives the longest profiles for Dissolved Oxygen and Temperature readings.

On Stony Lake, the DEEP BASIN site is located off the shoreline of Camp Ao-Wa-Kiya. In 2012, with the objective to see how different conditions were, we began making some additional tests in the eastern portion of the lake as well.

The Secchi Disk Transparency readings for the two sites, though fluctuating in a similar pattern over the summer, were on average about 1.5 feet shallower (less transparent) at the EAST site. The lower clarity may be due to the difference in depth, nearness to the bank and vegetation, proximity to the inlet creeks, or wave action from the longer westerly-wind fetch.

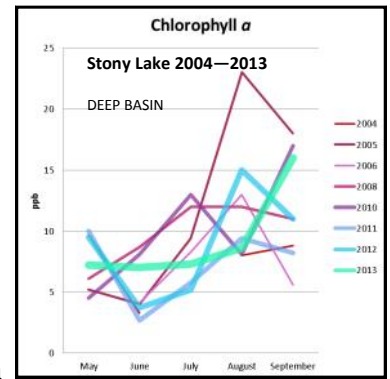


Location	Coordinates	CLMP Field ID	Testing
"Deep Basin" (since 2004) Located at the deepest point (~43 feet) off shore from Camp Ao-Wa-Kiya	N43.55983 W86.48547	640049	Total Phosphorus Chlorophyll <i>a</i> Secchi Disk Transparency Dissolved Oxygen/Temperature
"East" (since 2012) Located north of Hickey's Landing the deepest point (~30 feet) of the eastern portion of the lake	N45.56010 W86.47156	640345	Secchi Disk Transparency Dissolved Oxygen/Temperature

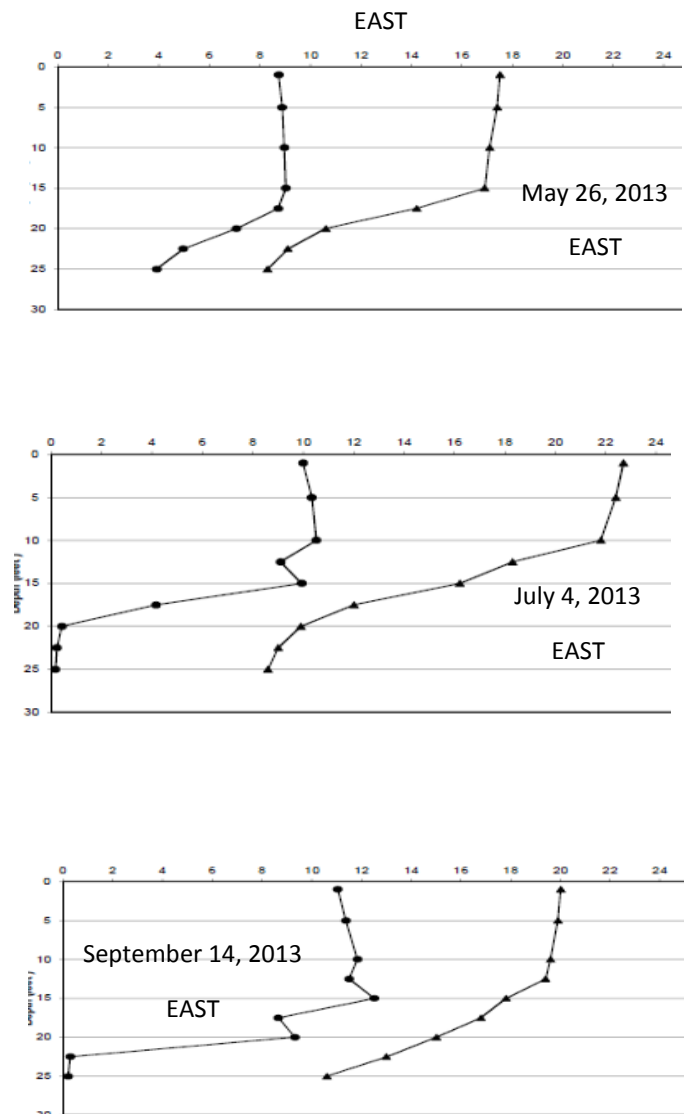
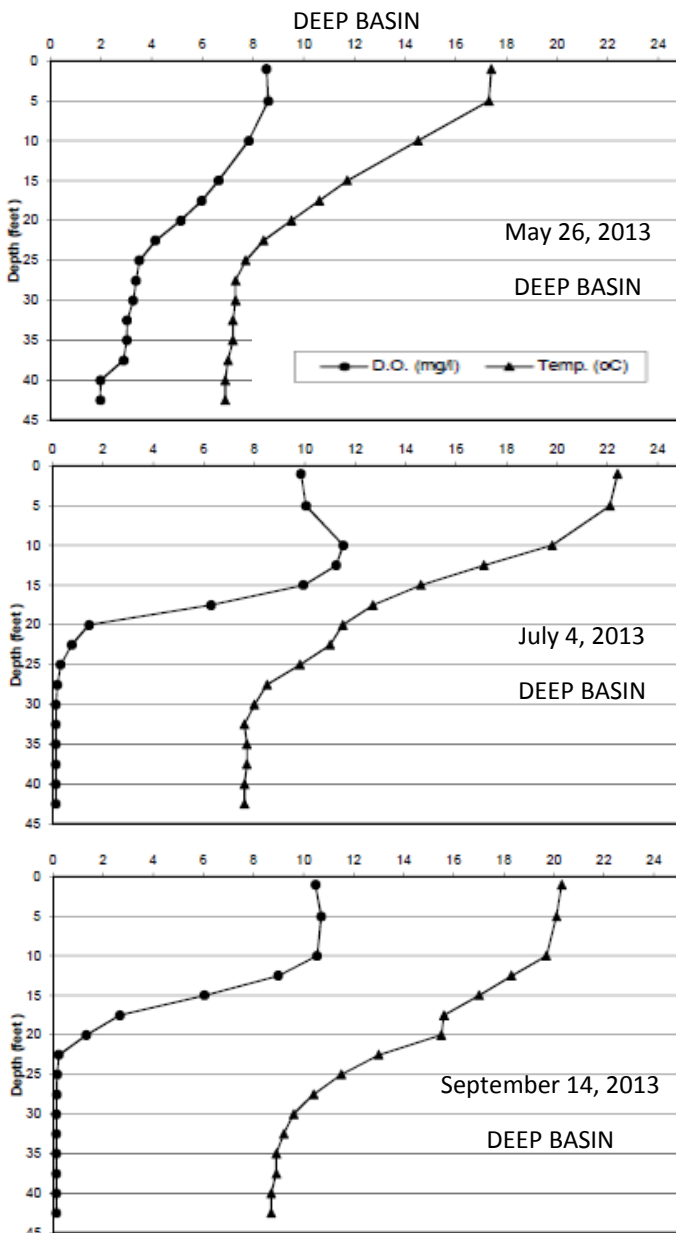
## What happens over the summer?

In the 2013 CLMP Annual Summary Report, our lake was selected as representative of one of the five characteristic lake types: “a good quality mesotrophic lake with a moderate hypolimnion volume.” (Hypolimnion? Bottom of the three zones, below the Epilimnion and Metalimnion.) “As a mesotrophic lake it produces moderate amounts of organic material that must be decomposed. Its hypolimnion has a limited oxygen supply that is gradually depleted by the decomposition of the organic material, which falls into the hypolimnion during the summer. Dissolved oxygen levels remain in the hypolimnion through the early summer, but by mid-July oxygen is gone in the deepest waters, and the hypolimnion does not regain oxygen until fall turn-over.”

Associated with this depletion of the oxygen below about 22 feet, and higher water temperatures in upper zones during the second half of the summer, is an increase in the concentration of Chlorophyll *a*, which generally peaks in August or September. Chlorophyll *a* is an indicator of algae productivity; the algae blooms, when we get them, most often occur in July and August.



## Stony Lake 2013 Dissolved Oxygen (mg/l) / Temperature (°C) Profiles



These profiles were prepared by Dr. Paul Steen, Watershed Ecologist, Huron River Watershed Council. His full report, *Graphs for the 2013 Sampling Season*, may be downloaded from the Stony Lake Property Owners web site.