White Lake Monitoring Results for 2014

by the

White Lake Association

with additional volunteer assistance from the

White River Watershed Partnership

Site Id: 610330

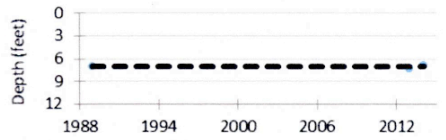
White Lake (East), Muskegon County

2014 CLMP Results

Cooperative Lakes Monitoring Program

Secchi Disk Transparency (feet)

Year	# Readings	Min	Max	Average	Std. Dev	Carlson TSI
2014	11	5.5	8.5	6.8	1.0	49
2013	14	5.0	11.0	7.3	1.6	48
1989	20	2.0	8.5	7.0	1.0	49
2014 All CLMP Lakes	3050	2.0	50.0	13.1	2.1	41

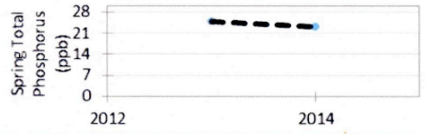


Chlorophyll-a (parts per billion)

Year	# Samples	Min	Max	Median	Std. Dev	Carlson TSI
2014	4	6.3	9.3	7.7	1.4	51
2013	5	3.3	21.0	6.8	7.1	49
2014 All CLMP Lakes	583	<1.0	23.5	2.0	2.9	37

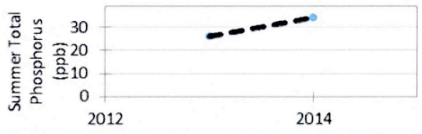
Spring Total Phosphorus (parts per billion)

Year	# Samples	Min	Max	Average	Std. Dev
2014	1	23	23	23.0	NA
2013	1	25	25	25.0	NA
2014 All CLMP Lakes	164	3 W	77	13.2	11.1

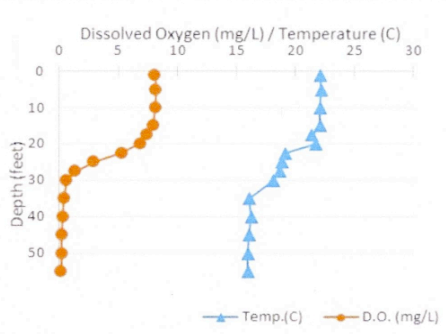


Summer Total Phosphorus (parts per billion)

Year	# Samples	Min	Max	Average	Std. Dev	Carlson TSI
2014	1	34	34	34.0	NA	55
2013	1	26	26	26.0	NA	51
2014 All CLMP Lakes	180	4 T	62	13.5	7.9	41



Aug Dissolved Oxygen and Water Temperature Profile



Summary

Average TSI	2014	2013	1989
White (East)	52	50	49
All CLMP Lakes	40	NA	NA

With an average TSI score of 52 based on Secchi transparency, chlorophyll-a, and summer total phosphorus, this lake is rated as an eutrophic lake. The lake keeps some dissolved oxygen in the bottom waters through early summer, but by late summer the bottom water is completely devoid of oxygen.

There is too little data to assess long term trends. CLMP recommends eight years of consistent monitoring in order to develop a strong data baseline.

*= No sample received W= Value is less than the detection limit (<3 ppb) T= Value reported is less than the reporting limit (5 ppb). Result is estimated.
<1 = Chlorophyll-a: Sample value is less than limit of quantification (<1 ppb).

What the results mean

The so-called limiting nutrient in White Lake is phosphorus, meaning that it is the first essential element to be used up by living organisms. The amount of phosphorus available determines the lake's maximum annual biological production. The **Summer Total Phosphorus** level is the best gauge of available phosphorus. The first two years of observations show that phosphorus levels remain elevated. No significance should be attached at this point to the slightly higher summer value for 2014 than in 2013; the increase is within the range of usual inter-annual variations. Nonetheless, the 2014 value of 34 ppb lies above the original target value for delisting of the Eutrophication and Undesirable Algae BUI, suggesting the need for continued monitoring.

This picture is reinforced by the recent values for **Chlorophyll-a**, a measure of the amount of algae floating in the lake. We are not seeing highly undesirable levels of algal growth, except at the far upper end of the lake, where the White River contributes 90% of the annual phosphorus load. The absence of excessive algae growth lake-wide in part reflects the health of the rooted plant community. If those larger plants were not taking up nutrients, we would see much heavier growth of algae.

The **Secchi Disk Transparency** is a measure of water clarity---the greater the clarity, the higher this value will be. The lake's average clarity has remained remarkably constant, even when compared to values going back to the 1980s, about the time zebra mussels became abundant. Recent observations also are nearly the same as those reported by Luttenton for 2004 – 05 (Ref. 1). Historical data show that the water was significantly less clear in the 1970s, likely due to the absence of zebra mussels, as well as to the presence of sewage treatment effluents that were later diverted out of the watershed. (Ref. 2)

Lake scientists roll up all the foregoing parameters into a single measure of biological productivity, the **Carlson Trophic Status Index (TSI)**. White Lake's current average TSI value of 52 puts it in the mildly eutrophic (over-enriched) category. By continuing to monitor over the next several years, we will be able to detect any significant trends in the lake's trophic status.

References

1. Luttenton, M., Steinman, A., and Rediske, R. White Lake Water Quality Assessment Final Report. Annis Water Resources Institute CMI PO#:761P4002241. April, 2007

2. Freedman, P., Canalae, R., and Auer, M. 1979. The impact of wastewater diversion spray irrigation on water quality in Muskegon County lakes. U. S. EPA, Washington, D. C. EPA-905/9-79-006-A.