

REVIEW OF "TROPIC STATE CLASSIFICATION OF TWO NORTHERN WESTCHESTER LAKES" by Timothy Cawley, B. A. Thesis (Environmental Sciences), SUNY Purchase, June 1981

by

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SECCHI DISK AND CHLOROPHYLL MEASUREMENTS

Is aeration of Waccabuc working? You will not find the answer in this study. The secchi disk and chlorophyll data presented cover only 14 months, too short a time to determine how the water quality of Lake Waccabuc and Lake Oscaleta is changing. The trophic state index used in this study suggests that both lakes are eutrophic, but this has been known for some time. Unfortunately, there is no comparison with the data from the previous Union Carbide studies, and very little effort is made to compare Waccabuc and the non-aerated Oscaleta. The causes of algal and phytoplankton growth reflected by changes in secchi disk transparency and chlorophyll measurements are difficult to determine because nutrient analyses, dissolved oxygen, and sunlight input measurements were not made.

It is clear that there are large fluctuations in the transparency and chlorophyll content of the lakes from season to season. This will make it difficult to detect long-term changes in the conditions of the lakes. Statistical analyses of both the Union Carbide data and the data presented in this study may help.

Waccabuc seems to be less transparent and have higher chlorophyll values than Oscaleta most of the time. The greater clarity of Lake Oscaleta has been obvious the past few years. The great decrease in transparency and increase in chlorophyll values in both lakes during the spring (April/May) and fall (September/ October) noted in this study are not surprising. These are the spring and fall overturns of the lake water.

TROPIC STATE INDICES

Lake ecosystems depend on a complex interplay of many factors. Trophic state indices are an attempt to simplify the problem of determining lake quality by examining only a few key indicators. Carlson's trophic state index, as used in this paper, is merely a fancy way of presenting secchi disk transparency and chlorophyll data. The fact that the trophic state indicators parallel the secchi disk and chlorophyll data is not surprising, since the trophic state indices are calculated directly from the secchi disk and chlorophyll data. The chlorophyll analysis techniques used in this study are different from those used by Carlson, so direct comparison of the trophic state indices calculated from chlorophyll measurements in his study with those in this study may not be possible.

If Carlson's regression equation for the relationship between secchi disk readings and chlorophyll A measurements applies to Waccabuc and Oscaleta, the trophic state index calculated from the secchi disk measurements should be identical to the trophic state index calculated from chlorophyll measurements. This is obviously not the case. It would be interesting to determine the actual relationships between secchi disk readings and chlorophyll measurements in Waccabuc and Oscaleta, and consider why they are different than the other lakes studied by Carlson. Secchi disk transparency depends on several factors besides phytoplankton growth.

Seven trophic state indices besides Carlson's are mentioned. In light of the problems with Carlson's index, it would have been interesting to have seen at least a few of the other indices used and compared with Carlson's.

DATA ANALYSIS AND PRESENTATION

The data presented in this study needed to be analyzed with greater care: 1) Throwing out extreme values (p. 17) without considering why they are extreme is a bad practice, 2) Averaging values over a 14 rather than a 12 month period probably distorts the meaning of the averages, 3) It would have helped to have computed the standard deviations of the mean values, 4) The results of the weekly summer observations need to be presented to show the variation within individual months, and 5) More attention needs to be focused on the magnitude of the sampling error.

A map showing the bathymetry of the lakes and the locations of the sampling stations would help. Overall, the paper needs to be organized and focused. The abstract is too short and uninformative. Punctuation, grammar, and the format of the headings, text and references is sloppy.

RECOMMENDATIONS

Secchi disk measurements are among the oldest and simplest methods of monitoring lake water quality. Perhaps the people living in the Three Lakes area could begin their own program of weekly or monthly secchi-disk measurements in all three lakes. It should be easy to construct or purchase a standard secchi disk similar to the ones used in previous studies. The results from each 12 month period should be plotted neatly on graph paper, keeping the horizontal and vertical scales constant from year to year so that the data can be compared over the years. If possible, the Three Lakes Council should obtain the Union Carbide study data. A log recording all the measurements should be carefully maintained so that the data will be easily accessible for statistical analysis.

It seems likely that some of the large companies in the Westchester area have sophisticated computer programs for analysis of long-term trends in marketing data. Perhaps these programs could be used to analyze the lake data to see if aeration of Waccabuc really is working and to determine how the water quality in all the lakes is changing.