



WabEEK Lake

An Executive Summary of a Full Report on Conditions

Determined By

LakeScan™ Monitoring and Analysis Methods

Prepared by:

Dr. G. Douglas Pullman

Aquest Corporation

Tampa, FL

Prepared for:

WabEEK Lake Improvement Board

And

The Residents of WabEEK Lake

2013/2014



Wabeek Lake

A Report on Lake Conditions and Management Recommendations

Prepared by:

Dr. G. Douglas Pullman
Aquest Corporation
Tampa, FL

Prepared for:

Wabeek Lake Improvement Board and Residents of Wabeek Lake

2013/2014

The complete 2013 LakeScan™ report on Wabeek Lake can be viewed and downloaded from:
<https://www.dropbox.com/s/v4adoel2a7tdfcf/13AnRpt%20Wabeek.pdf>

PREFACE

The findings and conclusions in this report are all based on the LakeScan™ data acquisition and analysis tools. The method is essentially a collection of data collection methods algorithms that are used to consider a wide range of lake characteristics and ecosystem functions. These generate the empirical data necessary to construct an historical record of conditions and trends that can be used for year to year comparisons or lake to lake comparisons. These data are critical for the guidance of a lake management programs and are tied to the goals of the Lake Management Plan. LakeScan™ is the only system of lake analysis that can be used to measure progress toward meeting lake management goals (or lack of progress) and to provide the empirical data necessary to establish the objectives for future and continue program elements. Every year, the method is enhanced and improved according to a reasonably conceived schedule of development. The 2013 revisions improve the range and reliability of some of the index algorithms and allow for more meaningful comparisons of early and late season or pretreatment and post-treatment vegetation surveys.

Cost and management effort algorithms are in development and may be completed before the end of the summer of 2014. Some lakes will see these data and report updates and these clients will be notified when these changes take place. The DropBox link that is provided will not change this year. Reporting updates will be made to the same file so that no other link is necessary to access the edited file.

LakeScan™ data acquisition and analysis tools provide data that is needed to make the management process more cost effective and efficient. Decisions can be based on “real” numbers rather than visual assessments made on a boat or subjective comparisons of maps. The methodology does not suffer from the variability that is created by the use of different rakes in different kinds of plant beds. It is always interesting to compare the empirical data to subjective analysis because all too often, “impressions” are not consistent with the data analysis. The intellectual property in these reports is protected and will be aggressively defended. Those who may be considering the theft of this property are forewarned. Those who offer LakeScan™ analysis as a part of lake monitoring and management guidance programs are licensed and have received special training.

These tools and this report is most importantly, provided for the consideration and enjoyment of the many lake leaders that I have the privilege to know and to work with as we strive to improve their individual lakes. I regard many of these people as friends and it is my sincere desire that they will enjoy and profit from the review of this report. Comments and suggestions are not only appreciated, but are encouraged.

-GDP, 2014

Wabeek Lake

2013/2014 Annual Report

Executive Summary

MONITORING OBSERVATIONS, 2013

Key Findings

- ~ **The Wabeek Lake aquatic plant community is dominated by weedy and invasive species. These plants serve to destabilize the ecosystem and impair the fishery.**
- ~ **High levels of biological and structural diversity (many different plants and animals) are necessary to stabilize the lake ecosystem and minimize the occurrence and total impact of nuisance plant and animal blooms. A goal of the management program shall be to increase the plant community biodiversity value to 60.**
- ~ **The richness and diversity of the biology in Wabeek Lake is lower than levels measured in nearby lakes, but is considered to be very good for a lake of this size. The current management program appears to be helping to improve conditions in Wabeek Lake for recreation and stabilization of the ecosystem.**
- ~ **Key metric values were the highest in areas that have received the most aggressive management attention. It appears that the management program is either imposing few negative impacts or is contributing to the improvement of conditions in the aggressively monitored areas of the lake.**

Narrative

Wabeek Lake is considered to be in very good condition by all LakeScan™ lake quality measures and considered within the context of its size. Species richness (species number) is considered to be lower than most lakes, but consistent with lakes that are shallow and uniform, like Wabeek Lake. Plant community species biodiversity and morpho diversity are all considered to be very good and better than expected because the species that are present in Wabeek Lake are found in most of the AROS's.

All lakes are different. Wabeek Lake is a highly plant productive compared to most inland Michigan Lakes and comments in this report are framed within the context of lakes that are inherently plant productive. The bottom soils of the lake are rich and capable of supporting a broad range of aquatic plants. The high potential for plant production demands that the lake management program be designed to promote the growth of species that do not interfere with recreation and that support critical ecosystem functions.

Ebrid milfoil is the name applied to the various Eurasian watermilfoil hybrids that are found throughout the upper Midwest. Ebrid milfoil emerges in the early summer in Wabeek Lake and can create nuisance conditions. The management program and competition with starry stonewort has helped to reduce the relative dominance of ebrid watermilfoil in Wabeek Lake. With continued effective management and careful monitoring, it is believed that the dominance of these weeds will not increase and that they will not be a conspicuous nuisance for most of the summer.

Starry stonewort is the most aggressive large submersed aquatic plant that has ever been observed in Michigan inland lakes. It seems to easily extirpate all other plant species and can form dense, impenetrable mounds of vegetation that impeded all forms of recreation. The impact on critical ecosystem functions can probably not be underestimated. This plant is expected to be very conspicuous in 2014 and will have a dramatic impact on ecosystem fundamentals. It has reached a level in Wabeek Lake where it will boom and crash. These events cannot be predicted so the starry stonewort must be closely monitored and the management program must be flexible to address conditions as they develop.

Blue green algae can be harmful. Occasional blooms of these noxious algae have been observed in Wabeek Lake, but they have not reached an actionable level. They are being closely monitored and should they reach a certain level, action shall be taken.

LakeScan™ Plant and Weed Data at a Glance

Table ES 1.1 Year to year comparisons of critical LakeScan™ metrics and other data. The historical average is the mean of the values derived from data collected during the years that Wabeek Lake has been part of the LakeScan™ program. The Historical metric range provides the lowest and the highest values from the years that Wabeek Lake has been part of the LakeScan™ monitoring and analysis program.

Year To Year Comparison								
	Species Richness	Morpho-types	Mean C	Whole Lake BioD	BioD T2+	MorphoD	Lake Biovol ft3/acre ft	Weediness
Wabeek Lake 2013	13	9	4.5	54	40	33	82	8.3
Historical Average	11	8	2.7	51	38	31	56	8.8
Historical Metric Range	8 to 13	6 to 9	2.0 to 3.0	47 to 54	34 to 40	26 to 33	22 to 76	8.3 to 9.1

Table ES 1.2 Lake to lake comparisons of critical LakeScan™ metrics and other data. Selected Wabeek Lake LakeScan™ metrics and other important data are compared to the average or mean metric values found in 16 Michigan lakes during 2013. The Historical Trend values are derived from the regression slope (or a line) value for individual metric data for each of the 22 lakes considered in this analysis. However, data is only reported for lakes where there is more than 3 years of data. A “+” symbol indicates that the data is trending positively over the years of analysis. The “-“ symbol indicates that the data is trending negatively or toward lesser values during the years of analysis. If there was essentially no change in a metric value over the years of analysis, the “0” value is used to denote “no change”.

Lake To Lake Comparisons and Trend Analysis								
	Species Richness	Morpho-types	Mean C	Whole Lake BioD	BioD T2+	MorphoD	Lake Biovol ft3/acre ft	Weediness
<i>Metric Values</i>								
Wabeek Lake	13	9	4.5	54	40	33	82	8.3
2013 All Lake Average	18	12	5.0	60	53	45	67	5.2
2013 All Lake Range	7 to 30	6 to 20	4.0 to 5.5	37 to 75	28 to 73	28 to 67	19 to 146	0.0 to 8.3
<i>Historical Trend Analysis</i>								
Wabeek Lake	+	+	-	+	+	+	+	-
2013 All Lake Trend Analysis	+	+	-	+	+	+	-	+
2013 Trend Analysis	11 0 5	11 0 5	5 0 11	12 0 4	11 0 5	11 0 5	8 0 8	11 0 5
	Pos / Neutral / Neg	Pos / Neutral / Neg	Pos / Neutral / Neg	Pos / Neutral / Neg	Pos / Neutral / Neg	Pos / Neutral / Neg	Pos / Neutral / Neg	Pos / Neutral / Neg

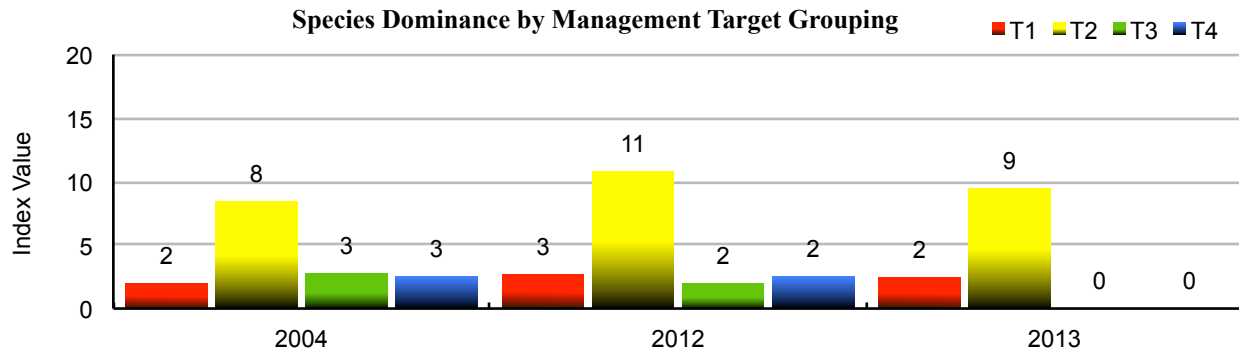


Figure ES 1.1 The quality of the Wabeek Lake plant and weed community considered from the perspective of plant species dominance. T1 species are usually exotic and highly invasive species that are aggressively targeted for control throughout most of the lake. T2 species are targeted for control in many, but not all parts of the lake. They are moderately weedy and are usually considered a significant nuisance in recreational use areas of the lake. T3 species are not usually targeted for complete control. They are typically suppressed for only a part of the growing season near boat docks and developed shorelines. T4 species are the most desirable of the aquatic plants and they are only targeted for control in MZL 4 areas where it is required that all plant growth be removed, such as beach areas.

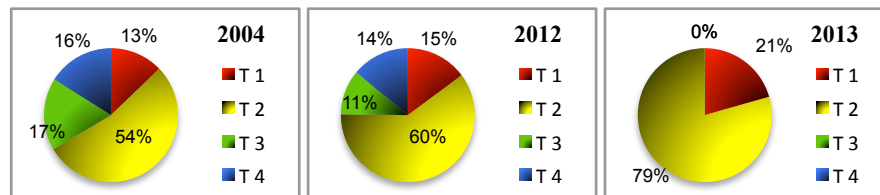


Figure ES 1.2 The quality of the Wabeek Lake plant and weed community considered from the perspective of plant species dominance. This is simply a different representation of the data presented in Figure ES 1.1. The percentages presented are the relative percent of the sum of the dominance values. These are helpful to track trends from year to year.

MANAGEMENT AND MONITORING PRESCRIPTIVES

2014 Plant Community Management Objectives

- ~ **The LakeScan™ BioD40® metric value should be 60 or more and this shall be a primary management objective in 2014. There should be a concurrent increase in the species richness with a goal of 14 species.**
- ~ **It is proposed that a new combination of systemic herbicides be applied to a small are of the lake where ebrid milfoil dominates the AROS. This systemic herbicide mixture will help to determine if the ebrid milfoil in Wabeek Lake is reproducing from seed in the late summer.**

Narrative

OVERVIEW:

The primary goal of the Wabeek Lake Management plan is to preserve, protect, and if possible, improve the biodiversity of the flora and fauna of the lake. Emphasis is placed on the large plant community since it is possible to modify and suppress parts of the community in a way that is consistent with attaining stated management goals and relieving nuisance conditions. Currently, species richness in Wabeek Lake is lower than most lakes, but the biodiversity of the lake is very good. The presence of nuisance levels of ebrid milfoil and starry stonewort in Wabeek Lake are a threat to attainment of the goals of the management plan because they could all contribute to the decline in biodiversity and the stability of the lake ecosystem. The prudent selection of management agents for the past several years has seemingly improved conditions in the lake. Extreme care must be taken to avoid the suppression one nuisance, to only create another plant nuisance.

PRIMARY MONITORING OBJECTIVES:

LakeScan™ plant community monitoring and analysis is currently the only available means or method to evaluate the effectiveness of the management program and to provide a measure of success and progress toward meeting management goals outlined in this document. Intensive plant surveys will be conducted in June and August of 2014. Other surveys may be conducted during other times of the year but these are usually used to evaluate the outcomes of the management program and monitor the potential collapse of ebrid milfoil or any other weedy species in the lake. Special effort shall be placed on monitoring the spread and dynamics of starry stonewort.

PRIMARY MANGEMENT OBJECTIVES:

Aggressive and selective control efforts shall focus on the suppression of ebrid milfoil and starry stonewort throughout the lake.

Ebrid milfoil should be suppressed in any area of the lake where it is found. The use of species specific aquatic herbicides is normally recommended to prevent the spread of the his plant to more AROS's.

TREATMENT 1: MAY/JUNE

T1 species, Ebrid milfoil and curly leaf pondweed shall be treated with species-specific herbicides in MZL 1 and 3 areas in early June, as permitted by the MI DEQ. MZL 0 areas shall not be treated unless T1 species show signs of totally dominating that part of the lake.

TREATMENT 2: JULY

Ebrid milfoil and starry stonewort can grow to nuisance levels in Wabeek Lake in July. A second herbicide treatment may be necessary to maintain acceptable recreation conditions after the Fourth of July.

TOUCH-UP TREATMENTS: ANYTIME

Starry stonewort production is unpredictable. It will be suppressed when it begins to show signs that it will form surface mats, or in areas in the lake where it threatens the production of desirable species. Treatments may occur just prior to the Fourth of July Holiday, but this is merely speculation.

Filamentous algae can bloom anytime and without warning. These are the “hairy-like” algae that range from bright green to nearly black. They can grow to nuisance levels in a matter of days. Residents of the lake are encouraged to contact their lake leaders if they see rapidly expanding filamentous algae blooms on the bottom of the lake. It is sometimes possible to treat these blooms and prevent unsightly conditions from covering vast areas of the lake. This is one part of lake monitoring where residents of the lake can play an important role in preserving positive conditions on the lake.

Blue green algae are suspended algae that form surface scums or hazes that resemble oil slicks. They can become so dense that they form surface scums that resemble spilled, green, latex paint. They smell bad and can synthesize compounds that are extremely toxic. Human exposure to intense blooms of blue green algae can sicken individuals and in very rare instances, result in death. Blue greens are present in Wabeek Lake, but they have not been observed to reach actionable levels. Should actionable levels be observed, treatments will be implemented in the lake. The algaecides that are used for these kinds of lake treatment do not result in the imposition of any special water use restrictions.

An Overview of the LakeScan™ Method, Metrics, and Analysis Tools



Aquatic Ecosystem Analysis Tools

LakeScan EcoAnalysis tools provide the only practical, comprehensive, and meaningful way to assess the quality of surface water resources. LakeScan™ is a system that provides the empirical data that is necessary to compare one lake to another or evaluate trends in a lake by comparing year to year data. It can also be used to more accurately assess the impacts and outcomes of management plans. These tools are critical to formulate appropriate and scientifically based lake management decisions and to assess the impact of changes to the resource, watershed, or changes that have been affected by management activities. They have been designed to meet or exceed the monitoring requirements of State or Federal governments and the new NPDES permitting system as it applies to the application of aquatic herbicides. LakeScan analysis tools are affordable and provide the essential record needed to know what you're getting into when enjoying surface water resources or developing plans to improve these critical habitats.

LakeScan is the ONLY available system that can provide the information that is critical to meet a wide range of aquatic resource management needs. These include:

- ~ Development of prescriptive management plans,
- ~ Evaluation of the outcomes of applied management programs,
- ~ Support the use of lake specific management tools,
- ~ Definitive measures of the impacts of invasive species,
- ~ Provide a mechanism for the comparison of conditions in different lakes,
- ~ Provide a mechanism for the comparison of lake conditions over time,
- ~ Delineation of the location and type of critical habitat characteristics,
- ~ Provide empirical evidence of efficacy for research and development efforts.

Note: This section has recently been deleted from the LakeScan™ Master Report Format because of the size of the file. Please refer to the LakeScan™ instruction manual found at:

<https://www.dropbox.com/s/kx55o63yabtheqb/14%20LakeScan%20Metrics%20HandOut.docx>

PLEASE REFER TO THE LAKESCAN™ HANDBOOK FOR DESCRIPTIONS AND DEFINITIONS