



## Sand Lake Management Update

May 1, 2017

PLM Lake & Land Management is in the process of converting all mapping of inland lakes to a Geographical Information System (GIS) based software. This new approach will greatly increase our accuracy in the mapping process and provide our customers with the highest level of professional data available in the aquatic industry. Increased accuracy in mapping will result in an increase in the effectiveness of treatments and better representation of spatial data communication between PLM, our customers, and regulatory agencies.

Until recently, lake managers relied on historical data collected and distributed by the State of Michigan to determine the overall acreage and depth contours of inland lakes where data was available. Many of the surveys were conducted in the 1940s and 1950s and were surprisingly accurate for their time. However, many were not. Changes in shoreline features, additions of canals and changes in water depths have not been represented accurately over time.

The advancement of Biobase depth contour mapping provided a more accurate representation of lake depths where utilized, but did not always provide accurate shoreline representation and overall lake acreage. It was not until PLM began digitizing the shorelines of the lakes we manage that we noticed discrepancies between what was thought to be “known” acreage and actual acreage digitized from recent aerial imagery using ArcMap.

Sand Lake, Lenawee County has historically been thought to be 440 acres. PLM completed a Biobase mapping project in 2014 that updated the depth contours, lake vegetation density and volume calculations. However, the lake size was not shown to be inaccurate during this process. In April, 2017, Sand Lake was digitized using ArcMap and calculated to be 550.79-acres. The lake was digitized in a second GIS software program (Global Mapper) for verification and again was reported to be in the 550-acre range. These results indicate a 25% discrepancy from the historic acreage.

As a result, updated maps and volume calculations have been completed for Sand Lake. I have attached copies of the map progressions as we have worked to gain the most complete and accurate information available to base management decisions.

Sand Lake was originally scheduled to receive a whole-lake volume Fluridone treatment this spring based on the previously “known” acreage and volumes. Delays in permitting and lack of milfoil growth in early April allowed us time to update the spatial data wherein the discrepancy in size of the lake was noted. We were able to relay the new information to the MDEQ and revise our permit application to reflect the new area and volume calculations. However, during this time a thermocline (a measurable difference between warmer surface waters and cooler bottom waters) was starting to develop on many lakes throughout Michigan due to spells of warm weather. A thermocline is detected by using a water quality probe to measure water temperature at one meter intervals below the surface. A change in temperature in one meter of over 1-2 degree Celsius indicated a formation of a

thermocline. In order to achieve a whole-lake volume treatment, Fluridone must be applied before the formation of a thermocline.

Given thermoclines were starting to develop, we were required to revise the treatment protocol to a “thermocline” depth opposed to the “whole-lake volume”. SePRO, the manufacturer of the Fluridone product, Sonar, agreed that the thermocline treatment would be effective and extended the warranty to cover the revised treatment protocol.

What this revised treatment protocol means is that instead of achieving a whole-lake volume concentration of Fluridone, we are going to be targeting the water above the thermocline (~20 feet deep). We will be measuring the depth of the thermocline prior to treatment and adjusting product amounts based on the calculated volume of water above it. The thermocline acts as a barrier between the surface waters and the deeper parts of the lake. There is very little transfer of water and dissolved gases between the thermocline and deeper water, keeping the product applied in the upper layer of water where it can have the most effect on the target plant species.

Traditionally, a whole-lake volume treatment will hold a more constant level of Fluridone for a longer period of time, but thermocline treatments can also have the same effect, especially when a majority of the lake volume is above the thermocline depth, as in the case of Sand Lake. Approximately 88% of the lake water volume is contained in the top 20 feet of water volume.

Thermocline depth treatments have been used routinely over the past few years for Fluridone treatments and have been shown to be very effective. We have also incorporated a flexible bump-up treatment timing in which we can base the bump-up treatment timing on actual Fluridone concentration to achieve the optimal concentration for the required contact time.

The initial treatment will take place when a stable thermocline has developed lake-wide. During early spring, thermoclines may develop and dissipate depending upon environmental conditions, such as cold nights and high winds. Usually, by the beginning of May thermoclines are steady and treatments can proceed. Unfortunately, we cannot always predict thermocline patterns and will apply the first treatment when the lake conditions dictate. This may require postponing the treatment schedule.

Fig. 1. Historic Image of Sand Lake, Lenawee County. Michigan Conservation Dept. 1941.

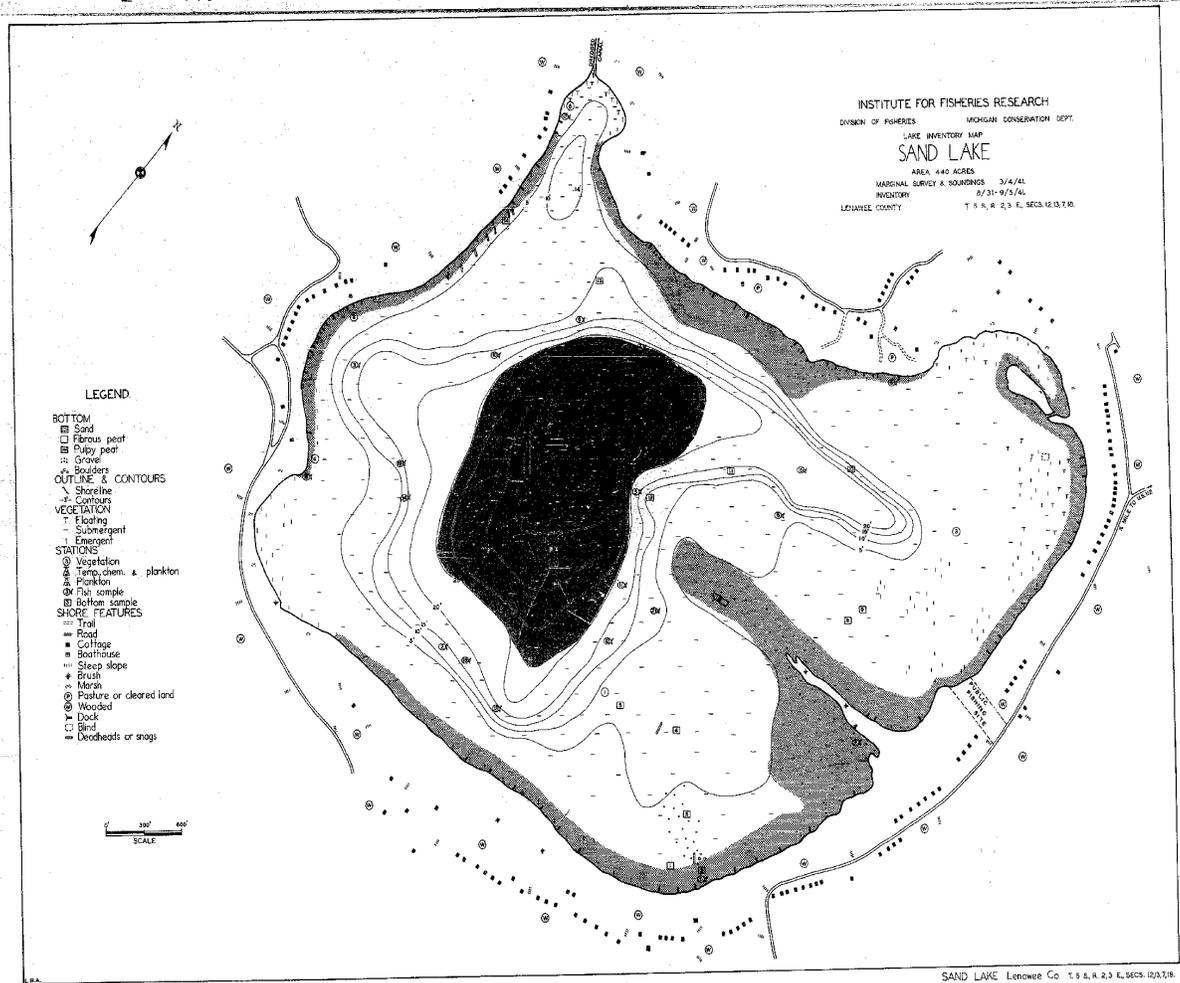


Fig 2. Sand Lake Revised Shoreline & Depth Contours with Biobase

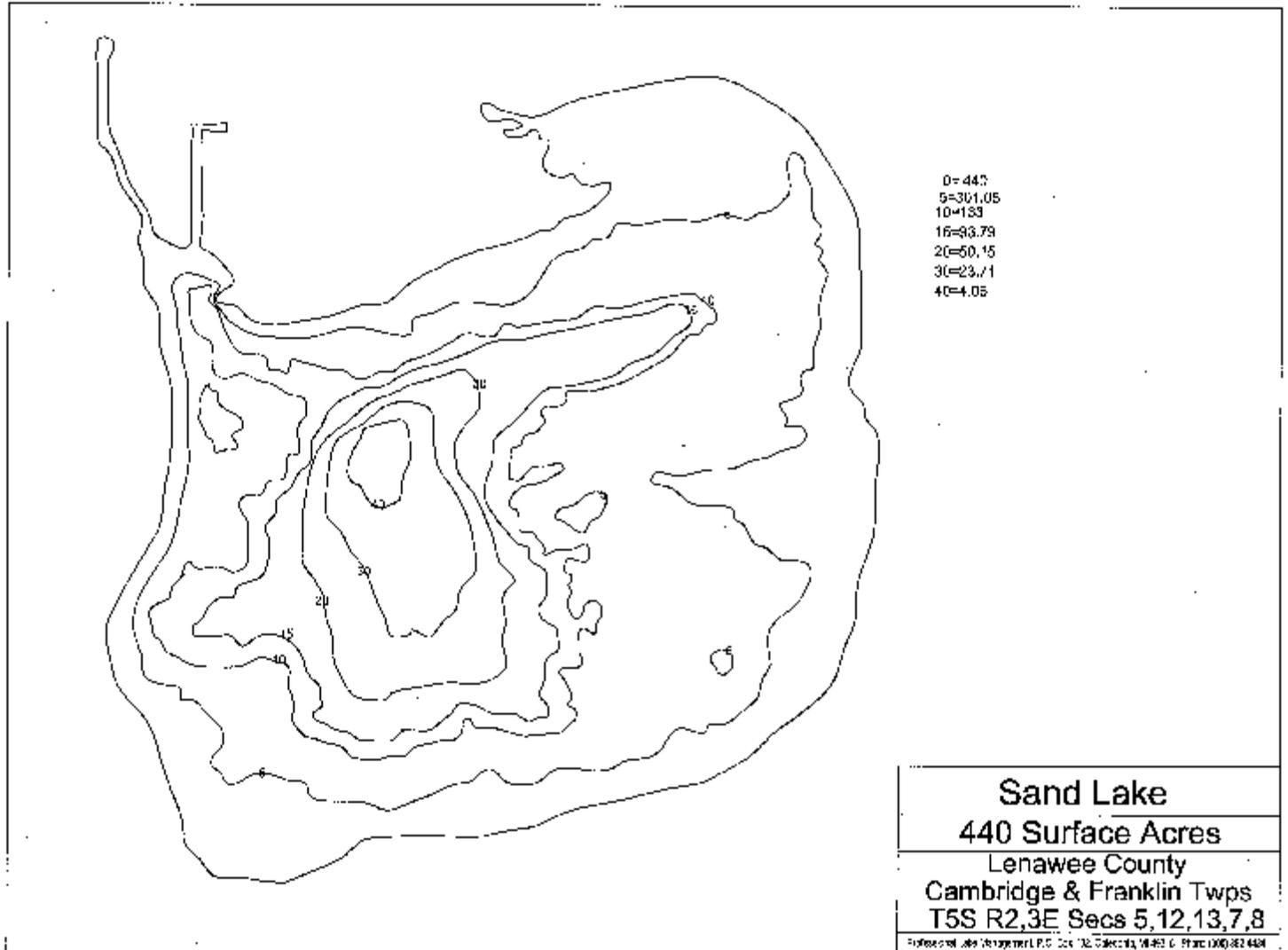


Fig 3. New ArcMap Image of Sand Lake with Biobase Contours and Revised Acreage

