APPENDIX A

Lake Waynoka Bathymetric Mapping Summary

May 17, 2011

Lake Waynoka Property Owners Association, Inc.
c/o George Kinney
1 Waynoka Drive
Lake Waynoka, OH 45171

Subject: Lake Waynoka Bathymetric Mapping Summary

Dear George:

With your and Tim Reddick's assistance in the field, MAD Scientist & Associates (MAD) has completed the bathymetric mapping phase of this project. We thank you for your support during this phase of the project.

Over a three-day period in April (11-13),we collected water depths from within the lake using a combination of a highly accurate Acoustic Doppler Profiler (ADP) system known as the RiverSurveyor and a hand-held depth sonde. The RiverSurveyor was attached to the side of a pontoon boat and used to measure water depths in the main body of the lake and the larger coves. Transects were sampled from bank to bank and were spaced roughly 250 feet apart. A total of 40 transects were measured across the main body of the lake and another 35 in the large coves. The depth sonde was used to measure water depths in areas that were too narrow for the pontoon boat to easily maneuver. Multiple measurements were collected with the depth sonde in each cove. Figure 1 depicts the transect and supplemental depth measurement locations superimposed on a topographic map available on the Brown County GIS website.

The collected water depth data was converted to elevation Above Mean Sea Level (AMSL) for the lake bottom, based on a daily observation of the height of the lake surface on the spillway, which has an invert elevation of 994 feet AMSL. The elevations were then compared to the 1961 USGS Topographic map of Lake Waynoka. This map has 10-foot contour intervals, which means that current elevations could only be deemed to differ from the 1961 topographic map if the observed difference was more than 10 feet.

Based on a comparison of the 1961 topographic elevations and the current lake bottom elevations, Lake Waynoka appears to be fairly stable. Almost all measured locations have current elevations that are within 10 feet of the

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original 1961 topography, and only one quarter of the transects have elevations that differ by more than five feet from 1961. Due to the lack of resolution in the 1961 map, subtle changes could not be detected. However, through this bathymetric reconnaissance, we were able to assess general conditions and we did not observe any overt changes in water depths. To illustrate this, we developed depth profiles that provide approximate comparisons of our RiverSurveyor data and original conditions along a few representative transects.

Figure 2 illustrates topographic profiles from four of the transects that we measured, and Figure 3 shows the location of these transects on the lake. These comparisons show that the depth profiles for the transects generally agree with the original topographic maps, in that the average and maximum depths indicated for these two data sources are very similar. Because no depths differed from the original topographic map by more than 10 feet, and we do not have the appropriate resolution (*i.e.*, 1-foot intervals) maps to complete a more refined assessment of the existing depths, the 1961 map is deemed to remain the most accurate map available for interpretation of depths across the lake.

It is important to note that although the water depths measured in some of the coves did not significantly differ from the original water depths, they are very shallow and are likely to become even more shallow if subjected to high sediment loading from upstream. In the cove fed by Straight Creek, we measured minimum water depths of 1.9 feet, which translates to an elevation of 992.58 ft AMSL. This elevation is actually slightly lower than what we were able to interpret from the 1961 topo map, possibly as the result of past dredging. In addition, while recording water depths from the pontoon boat, we stayed primarily within the deepest portion of the channel, meaning that areas outside this main flow path may be shallower than 1.9 feet. The difference in elevations for the erosional outside bend and depositional inside bend of Straight Creek at the eastern-most end of Lake Waynoka is visible in the attached photographs taken in February 2011.

During our sampling, it was evident that sediment is entering the lake, which could lead to accretion (sediment build up) in some areas. Sediment present in a water column is generally called suspended solids. Total suspended solids (TSS) refers to all organic and mineral particles present in the water column, which typically enter through the erosion of exposed soil. TSS is of concern to water quality because nutrients, primarily phosphorus, as well as metals and other chemicals are often bound to these solids, consequently entering the water column attached to the suspended solids.

Because we had an ideal opportunity to capture some water quality data during a peak flow period, thirteen lake samples were collected on April 12,

2011. These samples were analyzed for TSS concentrations, to provide an indication of where sediment accumulation may present the greatest potential problems for Lake Waynoka property owners. Of the 13 samples, four had very high concentrations of TSS (Kiddie Koral, Cove 6, Straight Creek, and Cove 8), thus these areas are of particular concern. Figure 3 includes points to indicate the locations from which these TSS samples were collected. The TSS concentrations are shown in terms of milligrams of sediment per liter lake water (mg/L) on the lab output from Advanced Analytics. Note that reporting limit refers to the lowest concentration of TSS that the method is able to measure.

If you have any questions or comments, please call me at (614) 818-9156.

Best Regards,

Jennie Morgan, PhD
Professional Wetland Scientist
jennie@madscientistassociates.net

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Photograph 1. View from the east end of Straight Creek looking toward the lake. Note the sediment buildup (exposed sand/silt bar) on inside bend (left side) of Straight Creek.

Photographs 2 and 3. Views of the Straight Creek channel looking toward Hiawatha (left) and looking upstream (right).

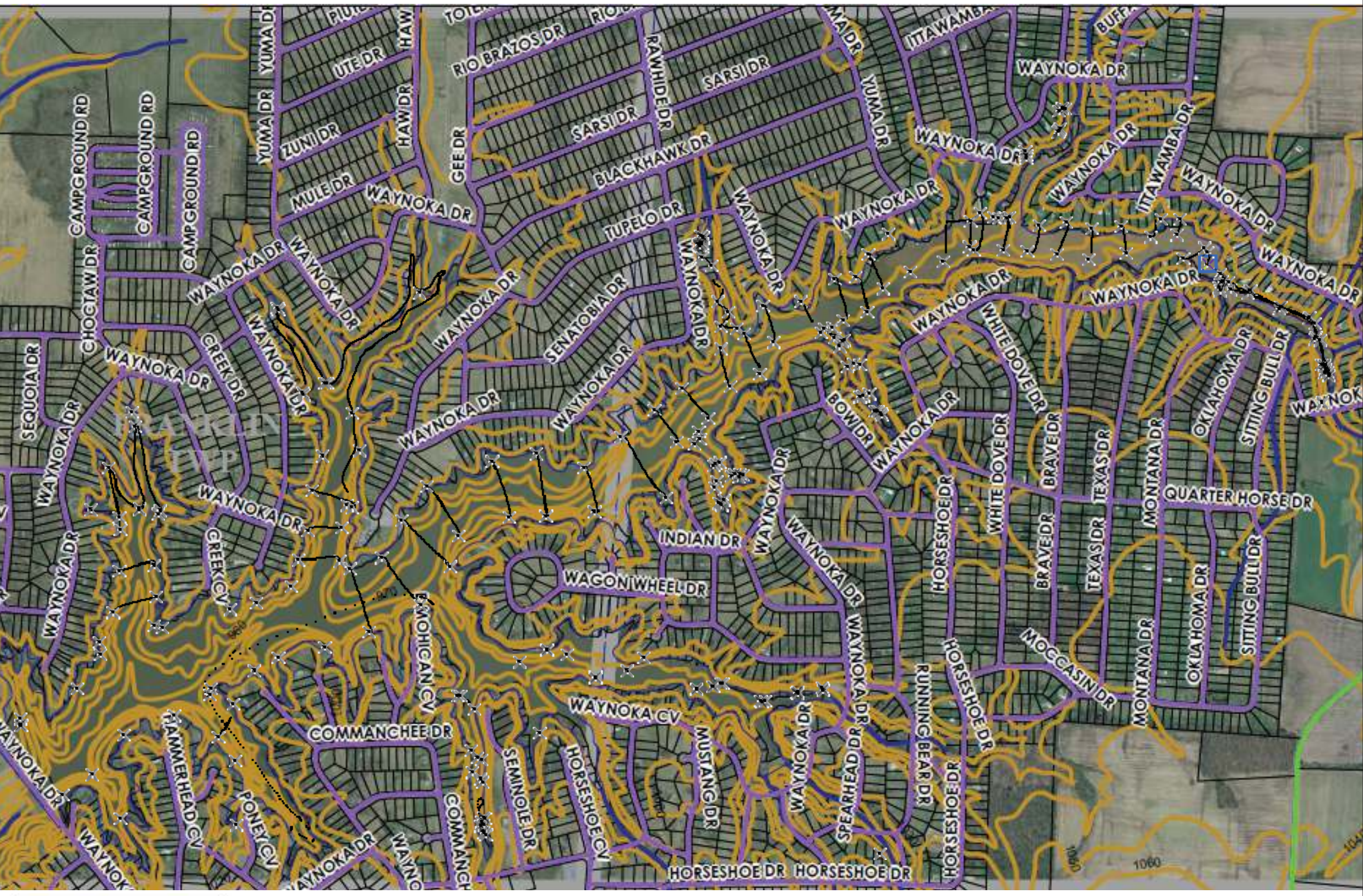

Figure 1. The locations of each transect traveled by the RiverSurveyor is shown on this aerial which is overlain with the 1961 topographic map. The black lines indicate the transect and x's indicate the starting and stopping locations. This aerial with the topographic overlay can be obtained from the Brown County GIS website.

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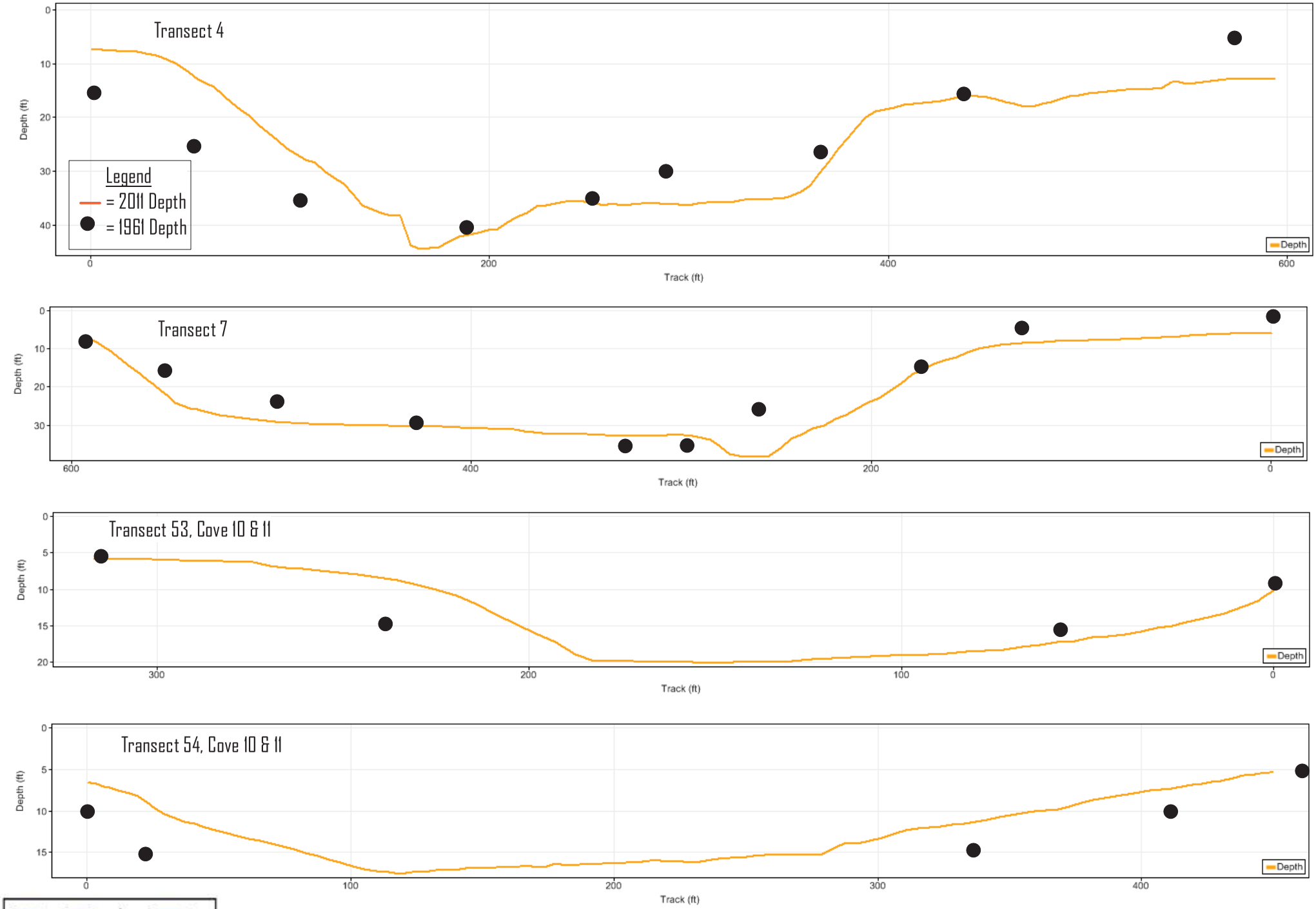

Figure 2. Selected topographic profiles from the bathymetric survey of Lake Waynoka. The x-axis shows the distance traveled between banks and the y-axis shows the water depth. Depths measured in 2011 were recorded continuously and are shown as a line, while the 1961 depths were interpolated from the 1961 USGS Topographic map and are not continuous.

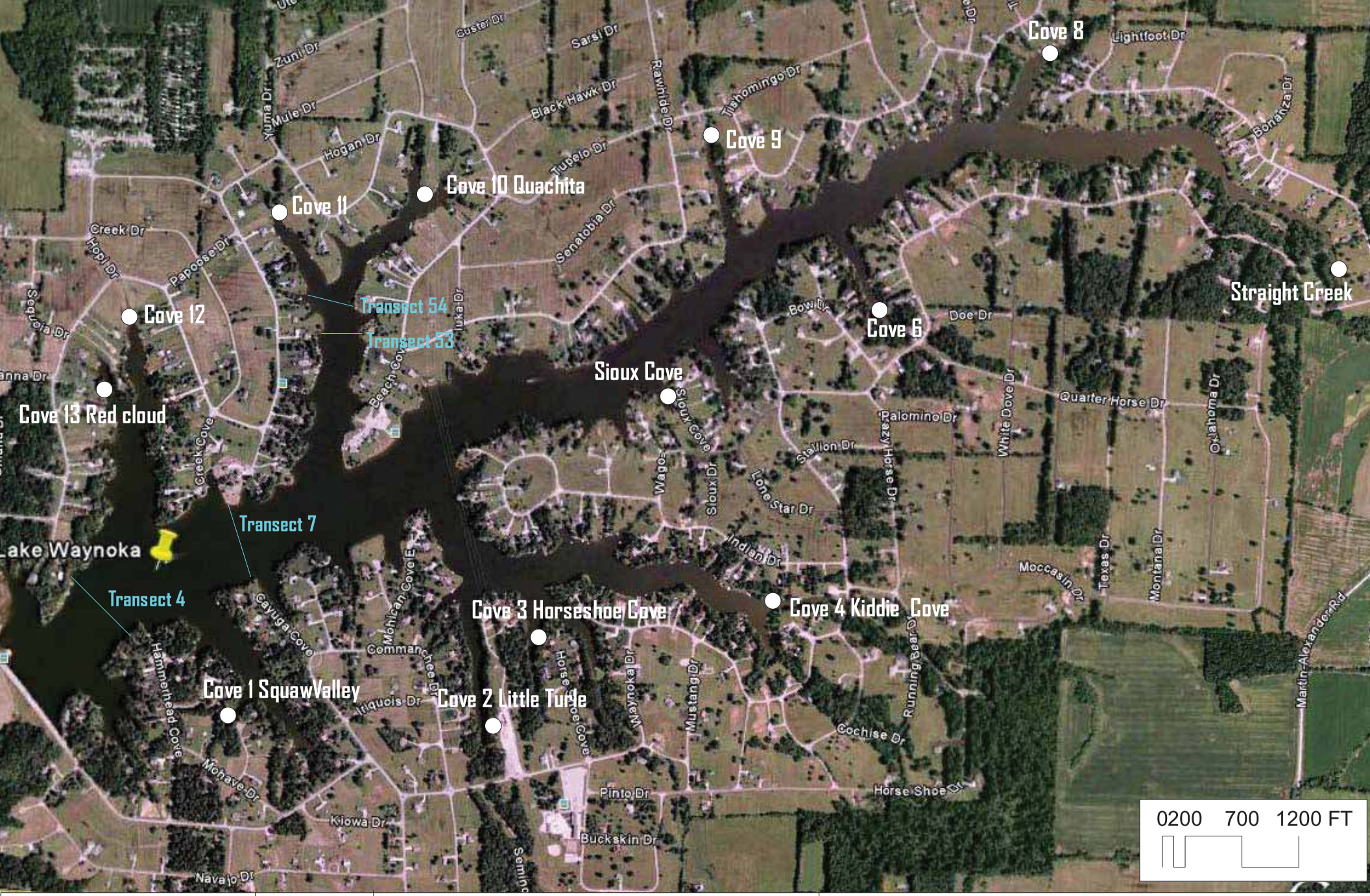

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Figure 3. Locations of Representative Transects (Depth Profile Comparisons) and Total Suspended Sediment Samples

Source of Aerial: Google Earth Pro

Lake Waynoka, Brown County, OH

Created By: JM

Created: 5-13-2011

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Project: Lake Water
P.O. Number: [none]
Project Manager: Jennie Morgan

Date Received: 4/27/11
Date Reported: 5/3/11

ANALYTICAL RESULTS

Solids, TSS-160.2

EPA 160.2

AALI I.D.	Client I.D.	Total Suspended Solids	Units	Reporting Limit	Date Collected	Date Analyzed	Notes
1104080-01	**Cove 1**	**18.0**	mg/L	3.0	4/12/11	4/29/11	
1104080-02	**Cove 2**	**18.0**	mg/L	3.0	4/12/11	4/29/11	
1104080-03	**Cove 3**	**14.0**	mg/L	3.0	4/12/11	4/29/11	
1104080-04	**Kiddie Cove**	**450**	mg/L	3.0	4/12/11	4/29/11	
1104080-05	**Sioux Cove**	**29.0**	mg/L	3.0	4/12/11	4/29/11	
1104080-06	**Cove 6**	**87.0**	mg/L	3.0	4/12/11	4/29/11	
1104080-07	**Straight Creek**	**338**	mg/L	3.0	4/12/11	4/29/11	
1104080-08	**Cove 8**	**122**	mg/L	3.0	4/12/11	4/29/11	
1104080-09	**Cove 9**	**24.0**	mg/L	3.0	4/12/11	4/29/11	
1104080-10	**Cove 10**	**18.0**	mg/L	3.0	4/12/11	4/29/11	
1104080-11	**Cove 11**	**30.0**	mg/L	3.0	4/12/11	4/29/11	
1104080-12	**Cove 12**	**19.0**	mg/L	3.0	4/12/11	4/29/11	
1104080-13	**Cove 13**	**38.0**	mg/L	3.0	4/12/11	4/29/11	

Notes and Definitions

I-03	Analyzed outside of the US EPA holding time at the request of the client.
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit

Advanced Analytics Laboratories, Inc.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

L. Eve Karnitis, President