
Lake Trace Vegetation Survey Report

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Submitted To:

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Introduction

Located in Sanford, North Carolina, Lake Trace is a 315-acre lake surrounded by a gated community known as Carolina Trace. Lake Trace was formed in the early 1970's after a dam was constructed along the Upper Little River. Carr Creek also feeds into the lake and has caused concerns related to sedimentation and reduced water quality. Lake Trace remains the centerpiece of the surrounding community and golf courses and has remained actively managed throughout the years. Access to the lake has been limited to residents only and gasoline powered engines are not permitted to maintain a quality lake and shoreline environment.

Recently, a non-native submersed aquatic plant species, hydrilla (*Hydrilla verticillata*), has become established in Lake Trace. Hydrilla is a federal noxious weed in the United States and has the potential to reduce access, navigation, and recreational opportunity for members of the Carolina Trace community. The primary objective for this vegetation survey was to identify and quantify regions of the lake where hydrilla has become established and also generate a bathymetry map. A secondary objective was to measure water quality parameters within the lake, focusing attention at Carr Creek and the southern portions of the lake.

Methods

Point-Intercept Survey

The lakewide aquatic vegetation survey of Lake Trace occurred on September 27th, 2023 following a boat-based point-intercept method coupled with echosounding (sonar) techniques. A total of 149 georeferenced points were sampled based on a 100 meter grid pattern (Figure 1). Upon arriving at each point, a double-sided rake was thrown to collect submersed vegetation.

Vegetation collected per rake was quantified using a species-specific relative density estimate from 0 to 4 based on rake coverage (**0**: not present, **1**: <25% or trace coverage, **2**: 50% or sparse coverage, **3**: 75% or moderate coverage, **4**: 100% or very dense). When applicable, the occurrence of floating and/or emergent shoreline species were documented at each point.

Echosounding (Sonar) Survey

In addition to the point-intercept rake samples, survey boats were equipped with high definition sonar units that have the ability to record plant biovolume (%), or plant height occupancy within the water column, along with lake depths along the surveyed track. Sonar data collected during this survey were uploaded to BioBase C-Map, a cloud-based processing service, to extract bathymetry estimates and submersed plant biovolume from the sampled tracks. The processed sonar logs were then exported as tabular data and post-processed in ArcGIS Pro (v. 3.0.3) for mapping and analytics.

Water Quality Survey

Water quality parameters (temperature, pH, conductivity, Chlorophyll *a*, and dissolved oxygen) were measured using a Eureka Waterprobes Manta 2 data logger at three sites within the lake (Figure 2). These sites were identified by researchers as possible areas of water quality concern due to ongoing construction.

Results and Discussion

Overall Vegetation

Of the 149 points completed during the 2023 survey of Lake Trace, 82 (55%) points contained aquatic vegetation (Table 1). The dominant plant species was hydrilla, which was discovered at 80 (54%) points (Table 1; Figures 3 to 4). Other submersed vegetation present were macroalgae (*Chara* spp.) at 1% occurrence and filamentous algae (*Spirogyra* sp.) at 1% of occurrence (Table 1). Two shoreline species, creeping water primrose (*Ludwigia* spp.) and parrotfeather (*Myriophyllum aquaticum*), were observed at 3 and 2% occurrence, respectively (Table 1).

Based on survey efforts, hydrilla has become well distributed within the lake, and the plant covers an estimated 123 acres of the waterbody (Figure 3). The mean biovolume of all submersed vegetation within Lake Trace was 15%, with the highest biovolume recorded in the Carr Creek arm and throughout the southern portion of the lake (Figure 5). Generally, submersed vegetation was present in water depths that were < 6 feet (Figures 5 and 6).

Water Quality

The water quality measurements recorded during the 2023 survey at Lake Trace fell within

the expected parameters of a North Carolina Piedmont lake (Table 2). There was no indication that water quality measurements taken were environmentally concerning.

Conclusions and Management Implications

- The 2023 survey effort found hydrilla to be the dominant submersed aquatic plant in Lake Trace. Hydrilla can exhibit aggressive growth habits and interfere with recreational activities as well as the ecological function of aquatic systems. Management of hydrilla can be difficult and take several years to control. It is recommended that the hydrilla population at Lake Trace be managed to avoid continued distribution of the plant to nearby Piedmont systems. Further, hydrilla monitoring should continue over time.
- Echosounding (sonar) data measured the deepest portion of Lake Trace at 16 feet (just below the dam in the northern reaches of the lake). The mean depth throughout the lake measured at 5.8 feet. The echosounding conducted during 2023 efforts serves as baseline data for future work to evaluate variations in Lake Trace bathymetry over time.

References

For specific information concerning plant identification and aquatic plant management, please visit <https://aquaticweeds.wordpress.ncsu.edu>.

Tables and Figures

Table 1: Overview of fall 2023 aquatic vegetation survey results at Lake Trace.

Scientific Name		Relative Abundance	
		#	%
Survey Overview			
Total Surveyed Points		149	
Total Vegetated Points		82	55%
Submersed Species			
Hydrilla	<i>Hydrilla verticillata</i>	80	54%
Chara	<i>Chara spp.</i>	2	1%
Filamentous Algae	<i>Spirogyra spp.</i>	2	1%
Emergent Species			
Creeping Water Primrose	<i>Ludwigia spp.</i>	4	3%
Parrotfeather	<i>Myriophyllum aquaticum</i>	3	2%

Table 2: Overview of water quality measurements taken at Lake Trace during the 2023 fall survey.

Site	1	2	3	Mean
Temperature (°C)	22.05	22.43	22.39	22.29 ± 0.1
pH	7.54	6.92	6.81	7.09 ± 0.19
Conductivity (uS/cm)	55.6	58.7	56.3	56.87 ± 0.77
Chlorophyll (ug/l)	4.89	10.36	17.68	10.98 ± 3.03
Dissolved Oxygen (% Saturation)	99.6	92.3	97.3	96.4 ± 1.76

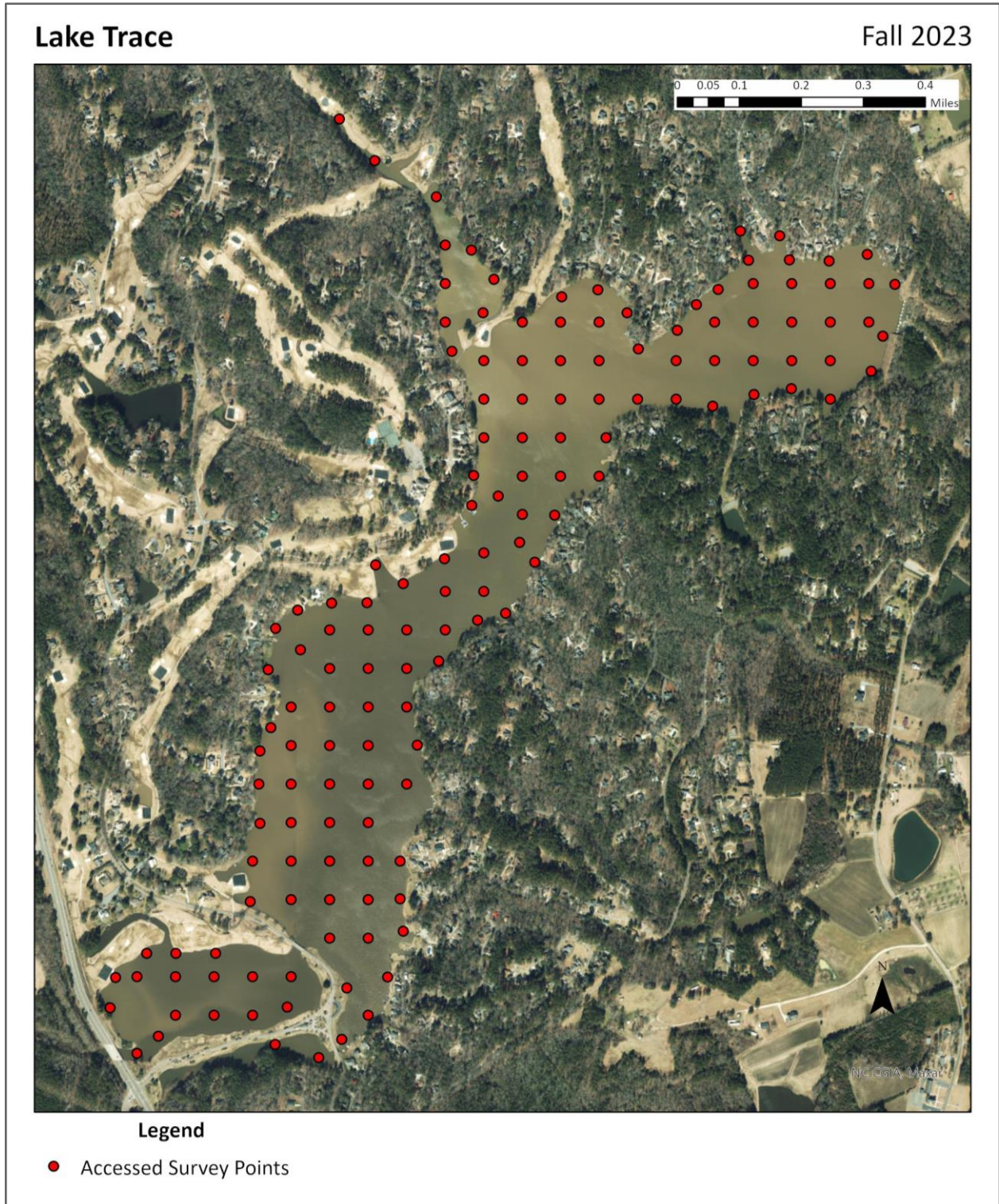


Figure 1: The 149 point-intercept locations visited during the fall 2023 survey of Lake Trace.



Figure 2: Site locations where water quality measurements were sampled at Lake Trace during the 2023 fall survey.

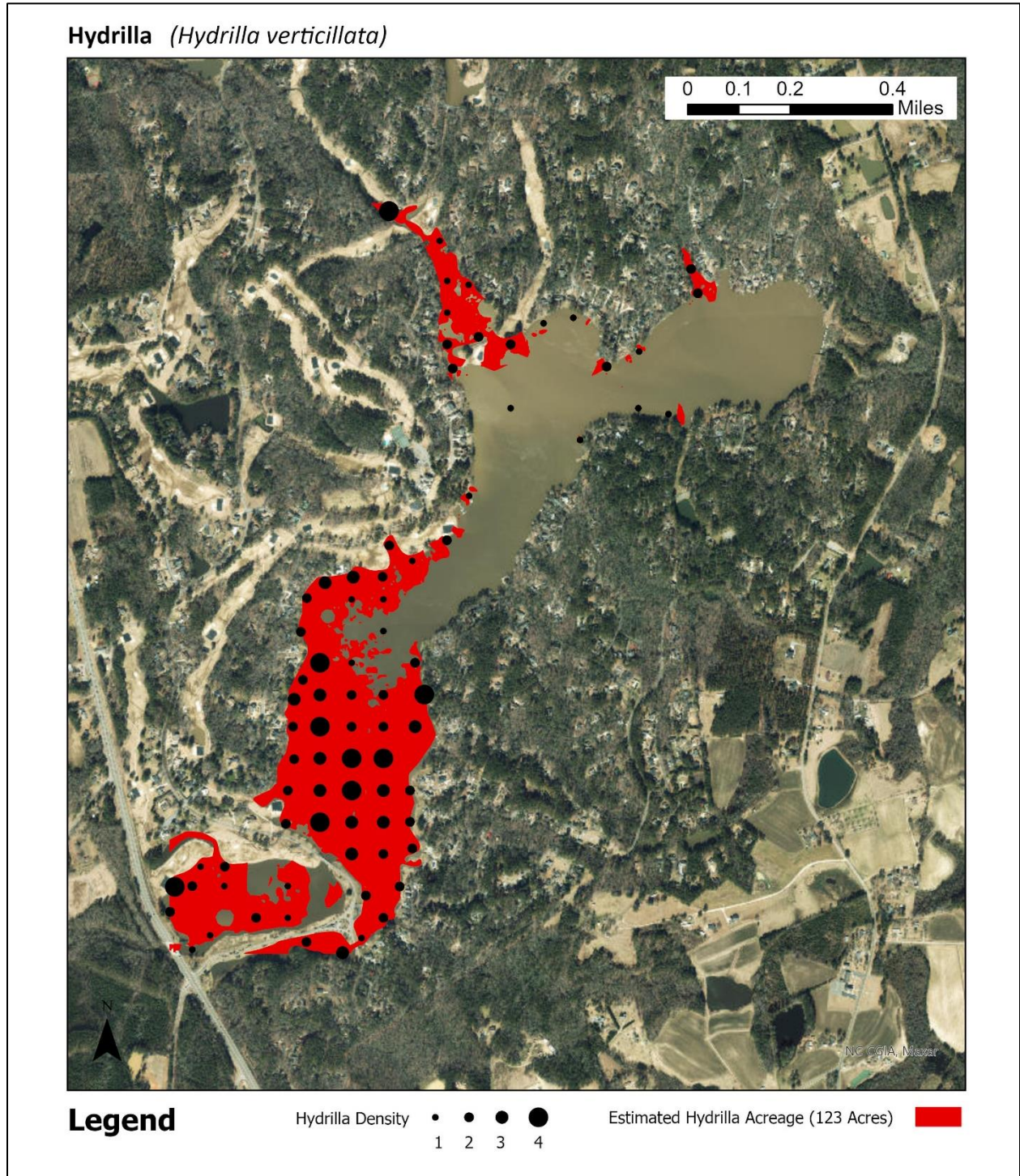


Figure 3: Hydrilla distribution and abundance determined during the 2023 survey of Lake Trace.



Figure 4: Example of hydrilla density estimation using rake toss method at Lake Trace during the 2023 survey (left: density rating of '4'; right: density rating of '1').

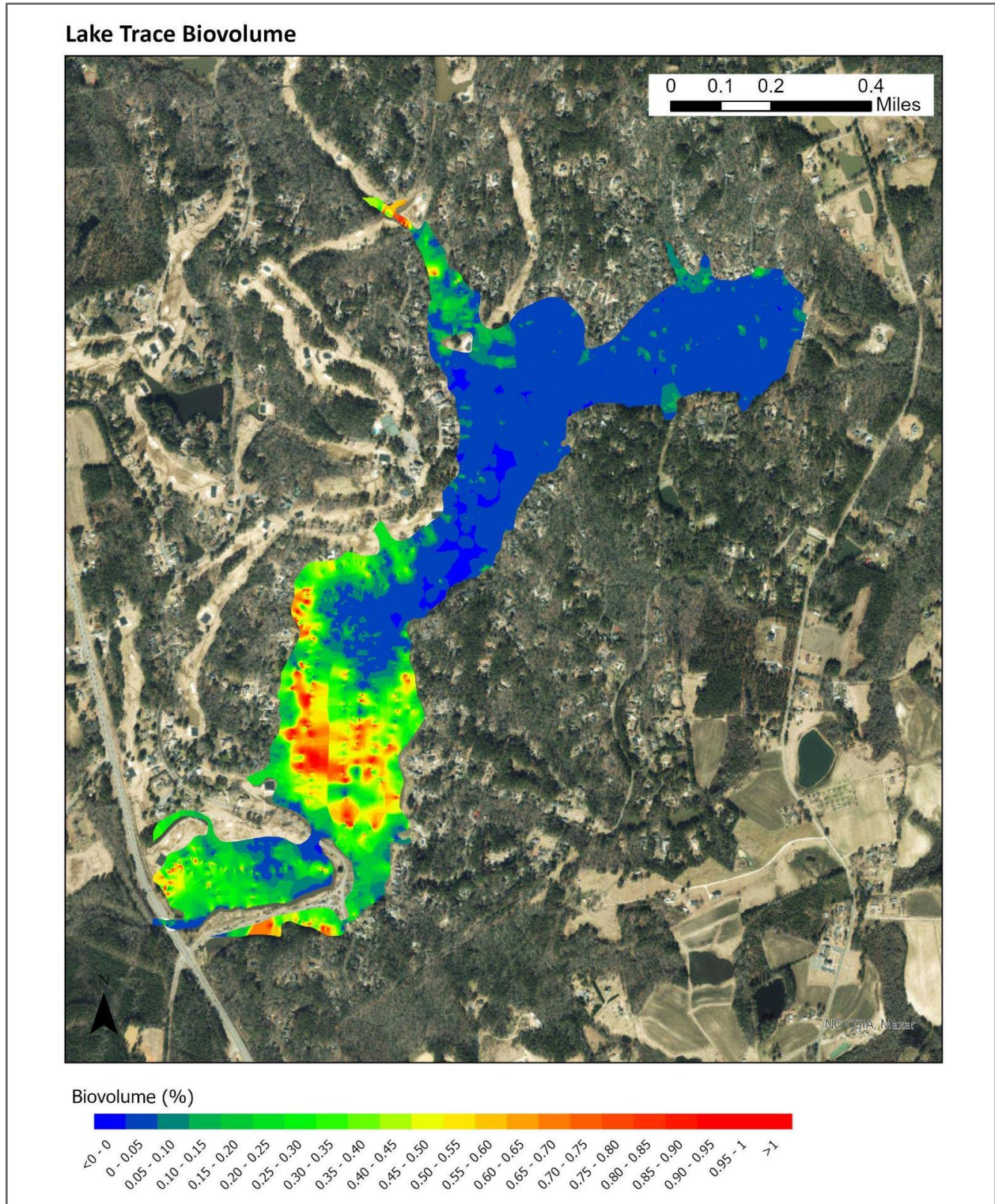


Figure 5: SAV Biovolume recorded at Lake Trace during the 2023 survey. Cool (blue) colors represent low biovolume areas and warm (red) colors represent high biovolume areas.

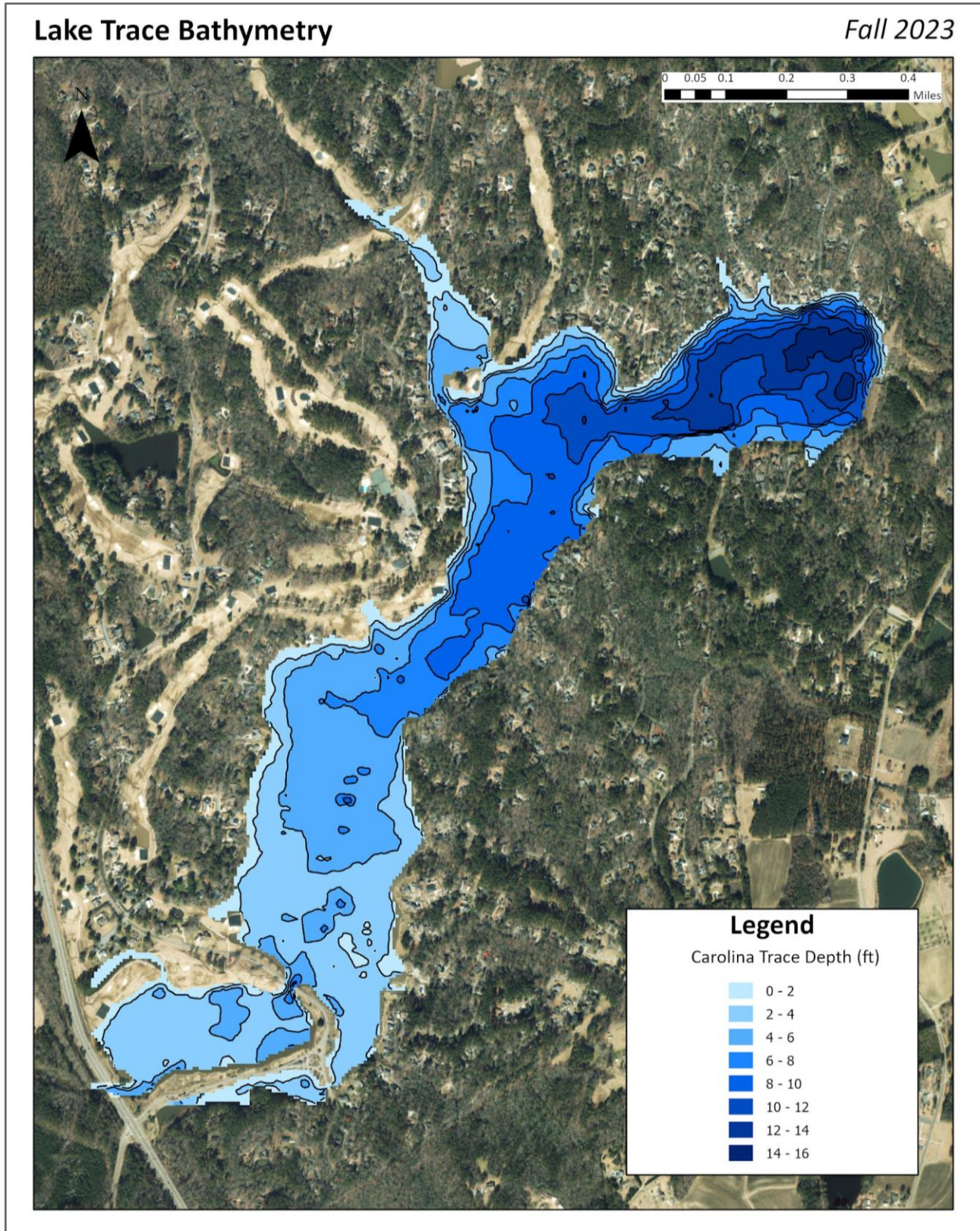


Figure 6: Echosounding measured water depths and associated bathymetry data recorded at Lake Trace during the 2023 fall survey.