2020 White Lake

Aquatic Vegetation Survey

Survey Conducted by:

North Carolina State University

Whole Lake Survey Results

A whole lake aquatic vegetation survey of White Lake, Bladen Co. NC was completed October 13th, 2020. A total of 202 predetermined points based on a 5 ¾ acre grid pattern were sampled (Figure 1). Sample locations (182) were based on a whole lake survey conducted by NCSU in 2014. An additional 20 points were added in 2017 to capture information in shallow water areas primarily on the north and west sides of the lake. At each sample point a 2-sided iron rake was thrown twice and all vegetation presence and abundance was recorded. In addition to the rake samples each of the boats used were equipped with a high definition SONAR unit that has the ability to record bathymetry and plant biovolume, or plant height, in the water column.

Submersed aquatic vegetation (SAV) was recorded at 151 of the 202 sampled points at White Lake in 2020. This is a slight decrease (9%) in plant occurrence when compared to the results of the 2019 survey. SAV abundance was most dense along the shallow shoreline areas of the lake, however plants were recorded throughout the entire waterbody (Figure 2). In total, 3 submersed aquatic plant species, 1 aquatic moss species, and 2 algal species were documented in the lake (Tables 1 & 2).

The SAV species recorded at White Lake in 2020 included Tuckerman's pondweed (*Potamogeton confervoides*), slender spikerush (*Eleocharis baldwinii*) , and dwarf milfoil (*Myriophyllum tentellum*). Hydrilla (*Hydrilla verticillata*), a non-native, invasive aquatic plant species was not recorded at any sample point during the 2020 survey despite having sparse distribution in the lake during 2019 and 2018 surveys

(Figure 3). In 2017, hydrilla was the dominant species documented in White Lake and was found at 169 (84%) of surveyed points.

Tuckerman's pondweed, also known as algal pondweed, has not been documented in White Lake in previous survey years. It was found at 27 (13%) of the sampled points in 2020 (Figure 4). This species is typically found in Northern regions of the US, and is classified as Significantly Rare (Rank S2) in North Carolina according to the North Carolina National Heritage Program standards. Tuckerman's pondweed has been previously documented in 8 counties in North Carolina, mainly in the Sandhills region, in waterbodies that are acidic, slow moving, and have sandy substrate (LeGrand et al. 2021). Its growth habit can be easily confused with that of filamentous algae and proliferating spikerush, both of which were also present in White Lake during the 2020 survey (Figure 5). Distinguishing features of Tuckerman's pondweed include its thin, delicate leaves that are highly branched along its stems. Like other pondweed species, this species forms flowers and fruits, which were visible during the 2020 survey and aided in its identification.

Another SAV species recorded during the 2020 survey included proliferating spikerush, which was observed at 90 (45%) points and was present in decreased abundance compared to previous years (Figure 6). Despite this decrease, spikerush remains fairly widespread within the lake. Dwarf milfoil was also found at 40 (20%) of the surveyed points in 2020 (Figure 7). This is a decrease in presence when compared to the 2019 survey, but a fairly similar presence when compared to the 2017 and 2018 surveys. Dwarf milfoil distribution remains high along the central and eastern shorelines of White Lake. Lastly, it is important to note that low watermilfoil (*Myriophyllum humile*),

the most common plant detected in 2014, was not observed during the 2020, 2019, or 2017 surveys. It was detected at 1 sample location in 2018.

The aquatic moss *Fontinalis antipyretica* was found at 16 (8%) of surveyed points in 2020 (Figure 8). The distribution of aquatic moss in White Lake has fluctuated between survey years, but remains fairly stable along the western shoreline.

Filamentous algae (*Spirogyra spp*.) has not been documented at White Lake in previous surveys but was documented at 24 (49%) sample points in 2020 (Figure 9). It was present in moderate densities in the middle, deeper portions of the lake. Macroalgae (*Chara spp.*) was found at 13 (6%) points along the northern shoreline of the lake in 2020 after not being recorded in the lake for 2 years (Figure 10). It should be noted that macroalgae was documented at 134 points in 2017.

Despite the high frequency of plants observed in the lake, very few areas were found to have excessive plant height (Figure 11). The darker shades of green and orange show higher plant height in the water column. As can be seen these are primarily found along the edges of the lake in shallow water, so it is likely 6" - 1' of plants growing in 3 – 4' of water. The sonar estimates of plant density also may over estimate plant material in very shallow water.

The potential presence of hydrilla remains a concern in White Lake, especially when considering the presence of multiple sensitive SAV species. Continued monitoring and management of hydrilla should be remain a priority. Monitoring of plant populations to evaluate hydrilla management efforts will need to continue for several years to assist in returning the lake back to a more natural condition.

Mid-Year Survey Results

Prior to the whole-lake survey, additional monitoring of the SAV community at White Lake occurred in June and August 2020. During these timepoints, a subset of the 202 pre-established survey points were visited, a 2-sided iron rake was thrown twice, and all vegetation presence and abundance was recorded. A total of 108 points were surveyed in June and 100 points in August. Results of the surveys show that the SAV community was more widespread in June when compared to August as 80% of points surveyed in June contained vegetation and only 34% of points surveyed in August contained vegetation (Table 3; Figures 13 & 14). Despite this, similar plant species were identified between the two surveys and Chara, spikerush, and dwarf milfoil were the dominant SAV during both months. Hydrilla was not documented at any survey point during either monitoring event. Bladderwort, a species that had been observed in 2014, was found at one sampling location during the June survey. Tuckerman's pondweed was not found in the lake in June but was present during the August survey which may be evidence of a seasonal growth pattern that this species follows.

Results of these surveys demonstrate the seasonal fluctuation in SAV presence in White Lake. Repeated monitoring efforts throughout the growing season can also be an important tool for early detection of problematic SAV species.

References:

LeGrand, H., B. Sorrie, and T. Howard. 2021. Vascular Plants of North Carolina [Internet]. Raleigh (NC): North Carolina Biodiversity Project and North Carolina State Parks. Available from https://auth1.dpr.ncparks.gov/flora/species_account.php?id=4050.

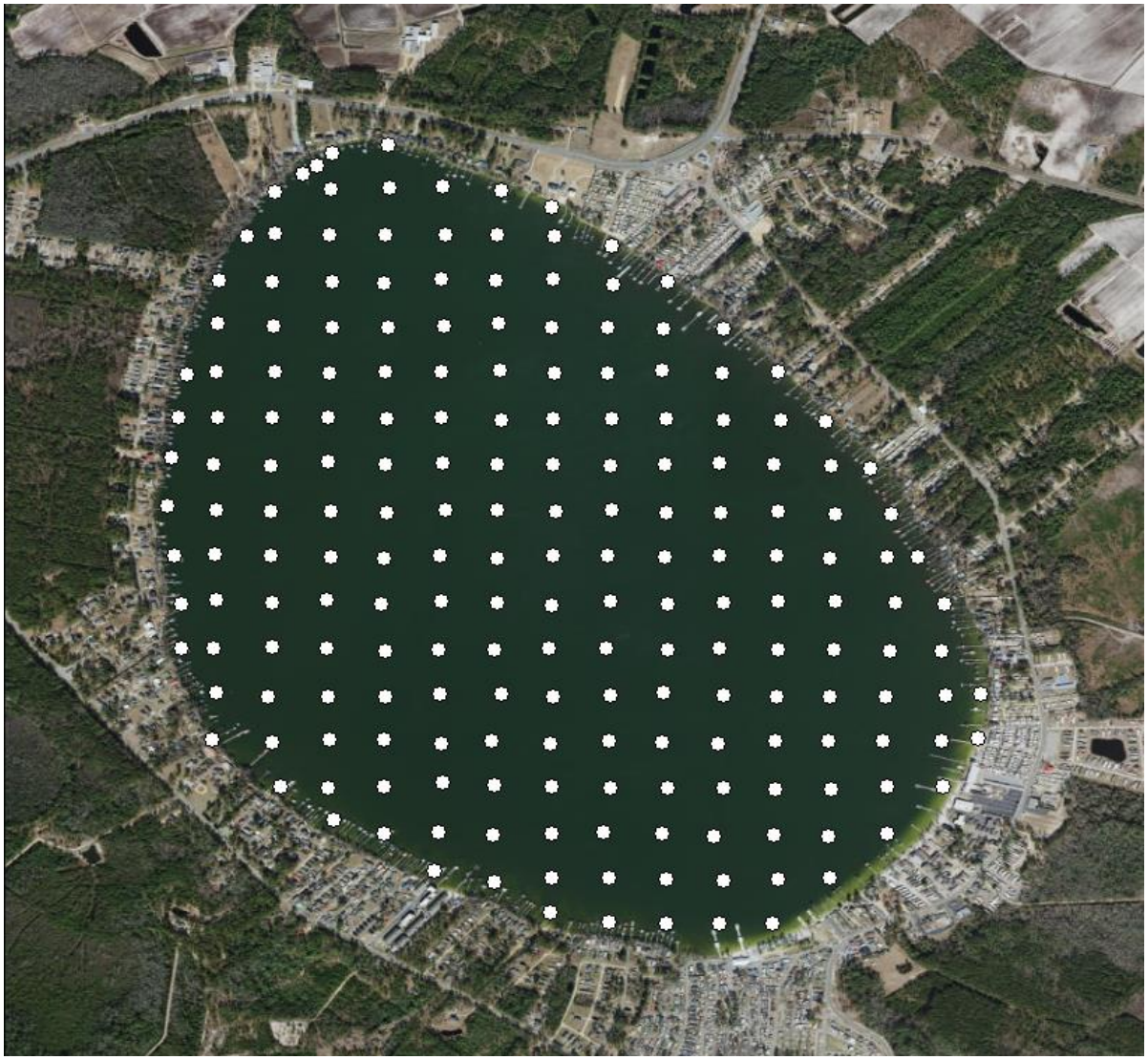


Figure 1. The 202 predetermined sample points in White Lake.

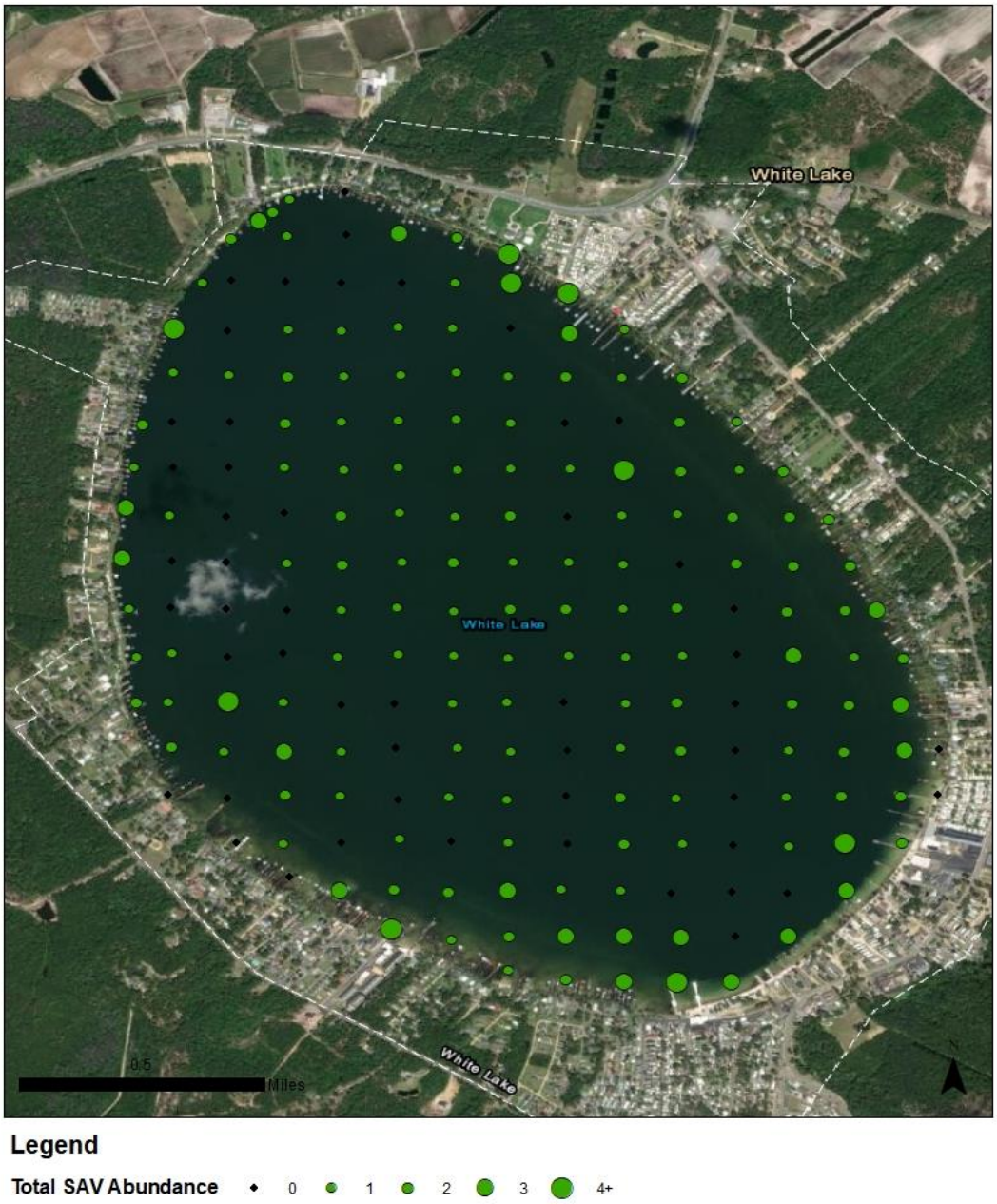


Figure 2. Total SAV abundance recorded at each sample point during 2020 survey.

Table 1: White Lake SAV % Occurrence

Species	2014	2017	2018	2019	2020
Hydrilla	0%	84%	0.50%	1.50%	0%
Tuckerman's Pondweed	0%	0%	0%	0%	13%
Spikerush	40%	9%	56%	68%	45%
Bladderwort	14%	0%	0%	0%	0%
Dwarf Milfoil	0%	15%	20%	34%	20%
Low Milfoil	54%	0%	0.50%	0%	0%
Filamentous Algae	0%	0%	0%	0%	49%
Chara	29%	66%	0%	0%	6%
Aquatic Moss	43%	63%	32%	6%	8%
No Vegetation	11%	6%	36%	16%	25%
Vegetation	89%	93%	65%	84%	75%

Table 2: White Lake Point Count

Species	2014	2017	2018	2019	2020
Hydrilla	0	169	1	3	0
Tuckerman's Pondweed	0	0	0	0	27
Spikerush	73	18	113	137	90
Bladderwort	25	0	0	0	0
Dwarf Milfoil	0	30	40	68	40
Low Milfoil	99	0	1	0	0
Filamentous Algae	0	0	0	0	24
Chara	52	134	0	0	13
Aquatic Moss	79	127	65	12	16
No Vegetation	20	13	71	33	51
Vegetation	162	189	131	169	151

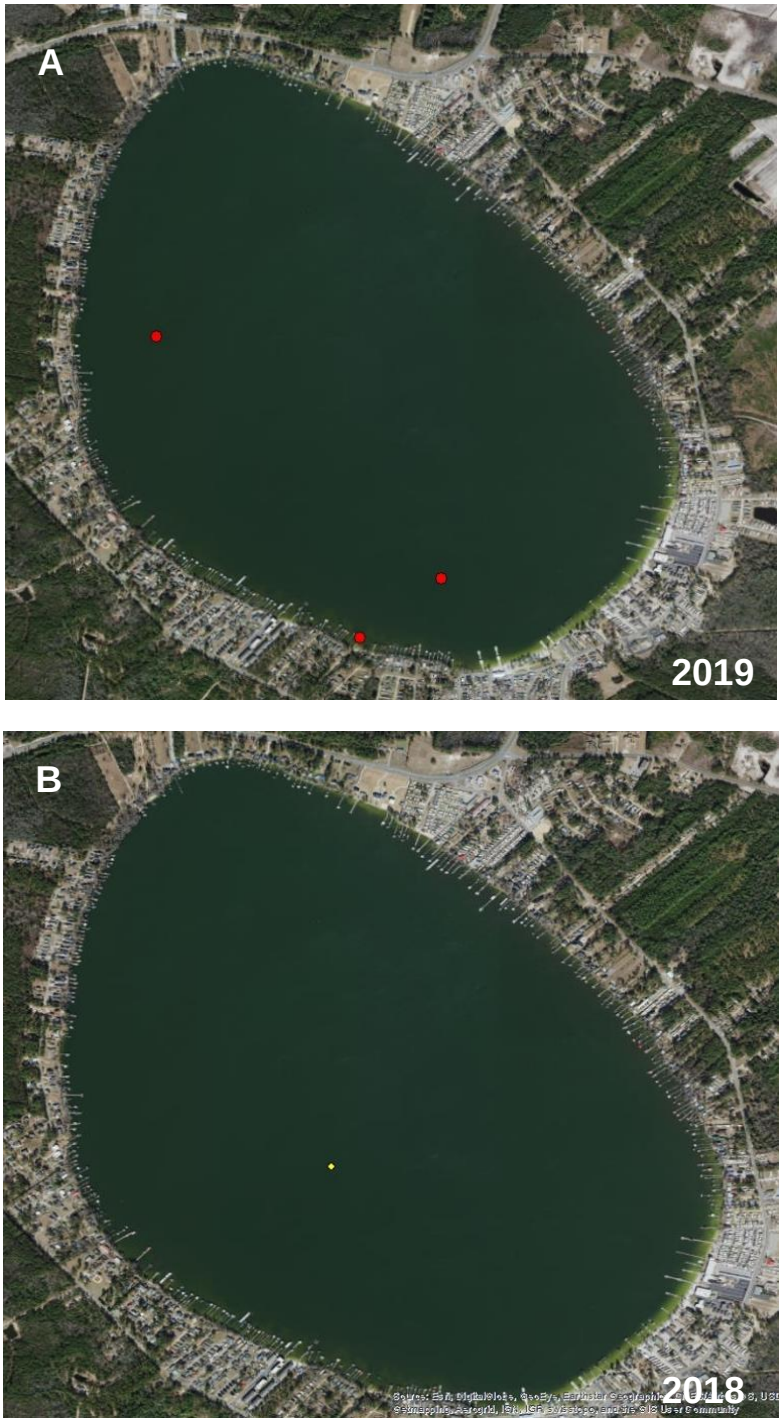


Figure 3. Hydrilla (*Hydrilla verticillata*) was found at a) 3 sample points in 2019, and b) 1 sample point in 2018.

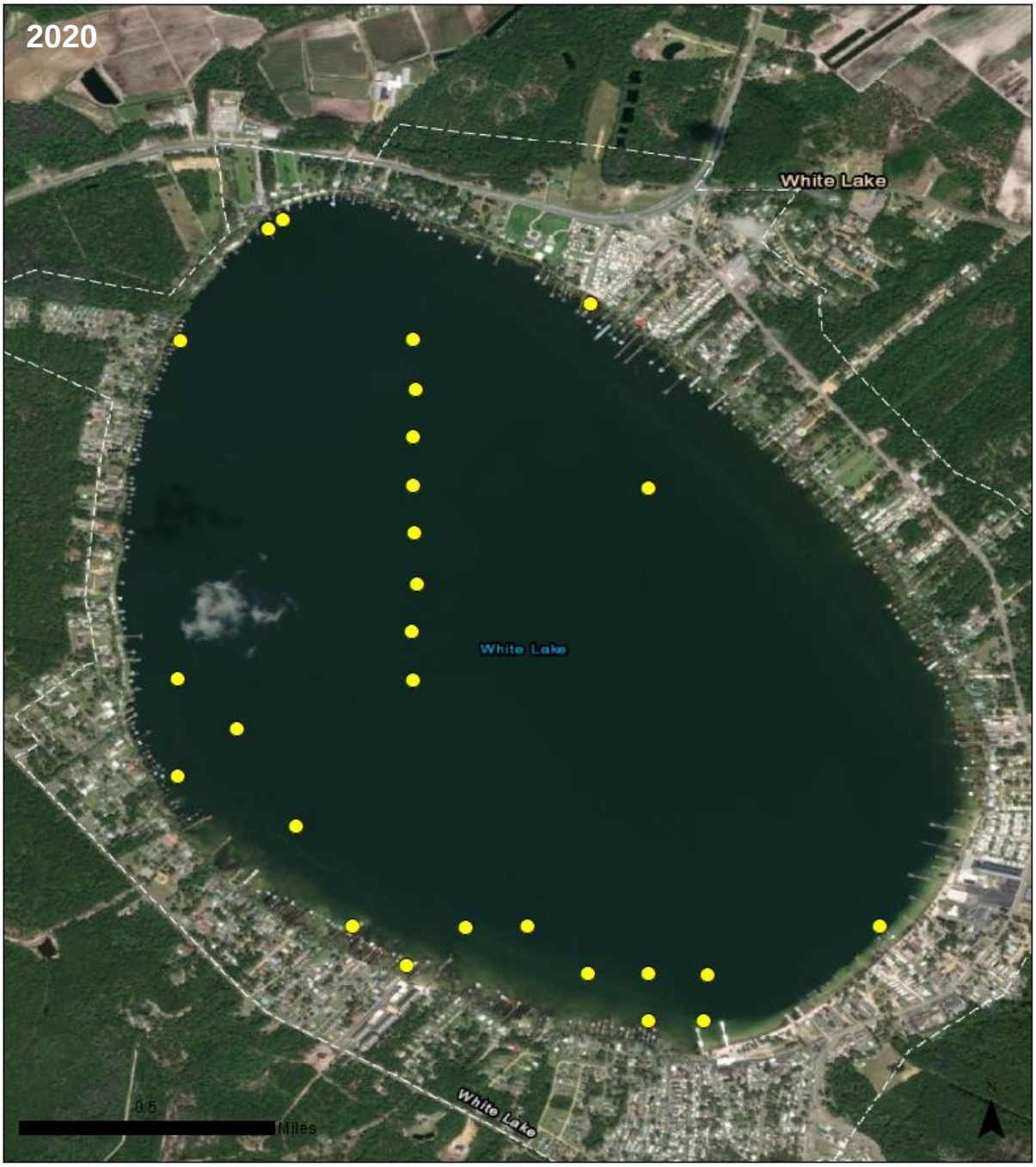


Figure 4. Tuckerman's Pondweed (*Potamogeton confervoides*) was found at 27 sample sites in 2020.

Figure 5. Tuckerman's Pondweed (*Potamogeton confervoides*) look-alikes in White Lake: a) filamentous algae, b) slender spikerush, c) Tuckerman's pondweed

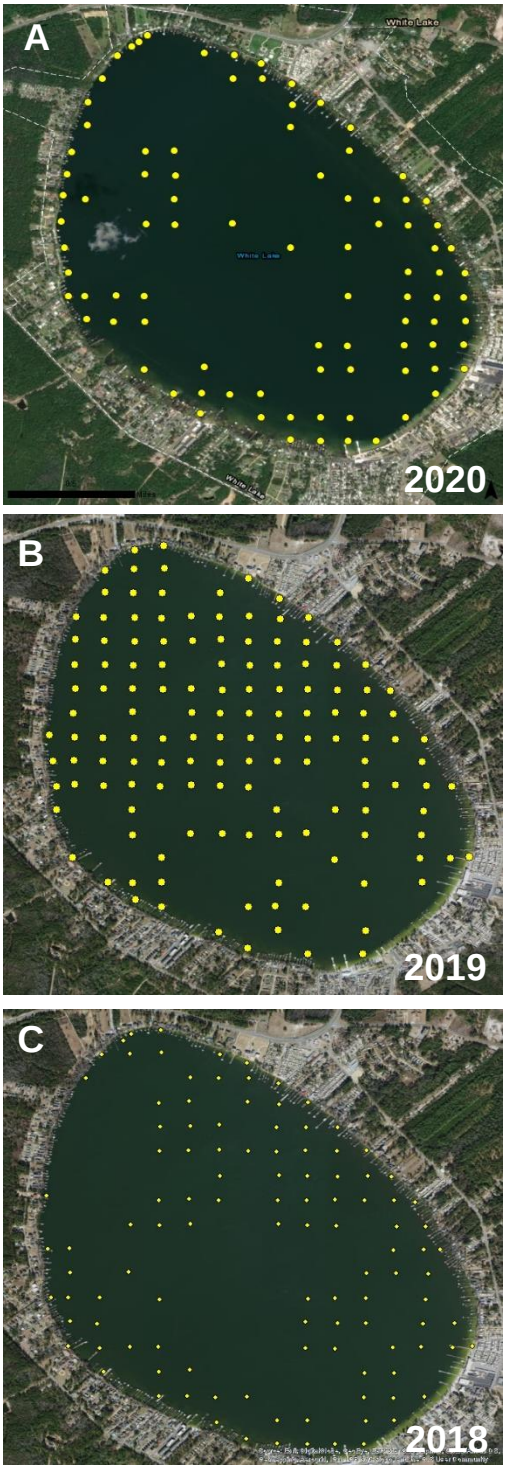


Figure 6. Spikerush (*Eleocharis baldwinii*) was recorded at a) 90 points in 2020, b) 137 sample points in 2019, and c) 113 points in 2018.

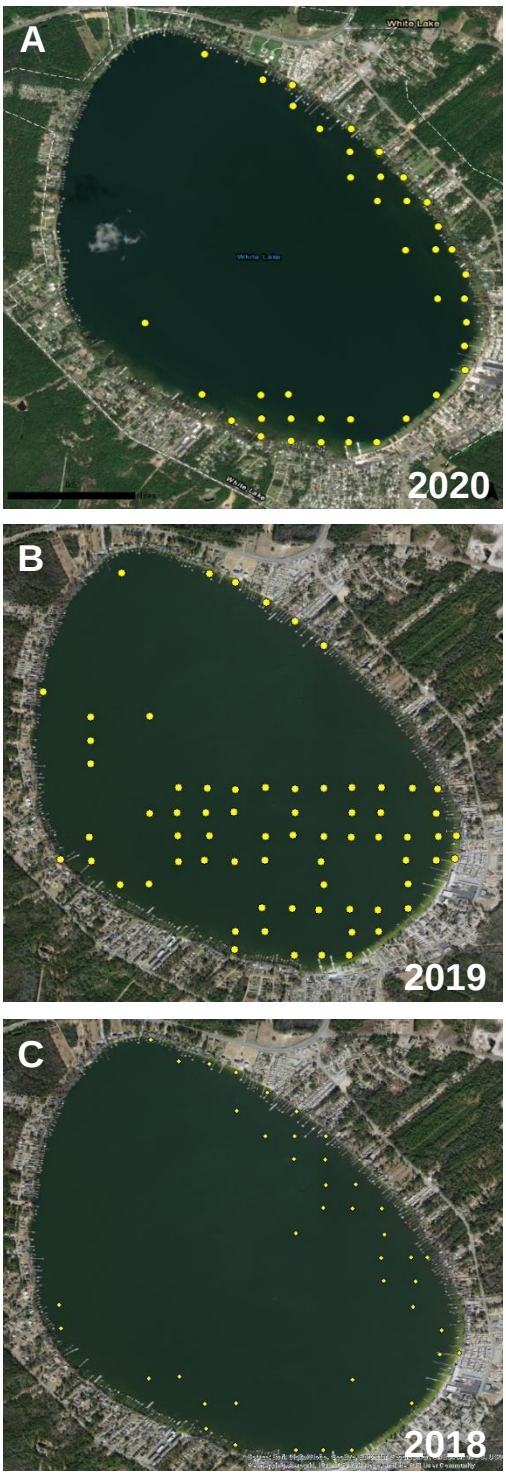


Figure 7. Dwarf milfoil (*Myriophyllum tenellum*) was found at a) 40 sample points in 2020, b) 68 sample points in 2019, and c) 30 sample points in 2018.

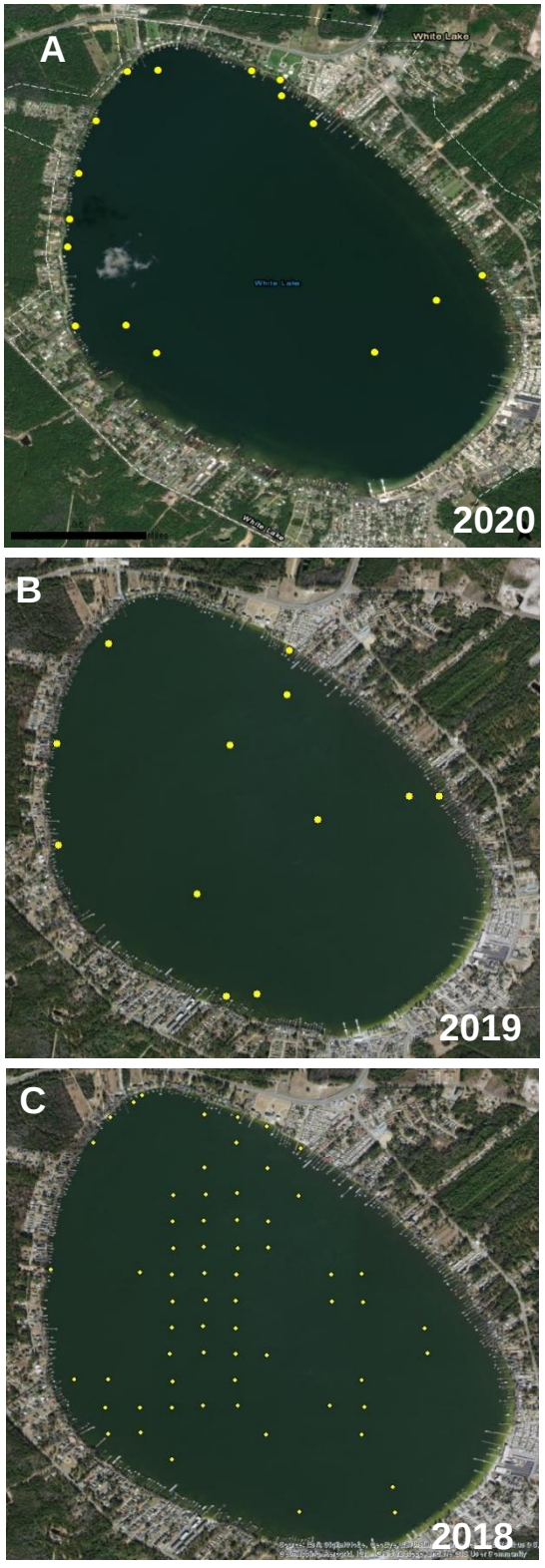


Figure 8. Aquatic moss (*Fontinalis spp.*) was detected at a) 16 points in 2020, b) 12 sample points in 2019, and c) 65 points in 2018.

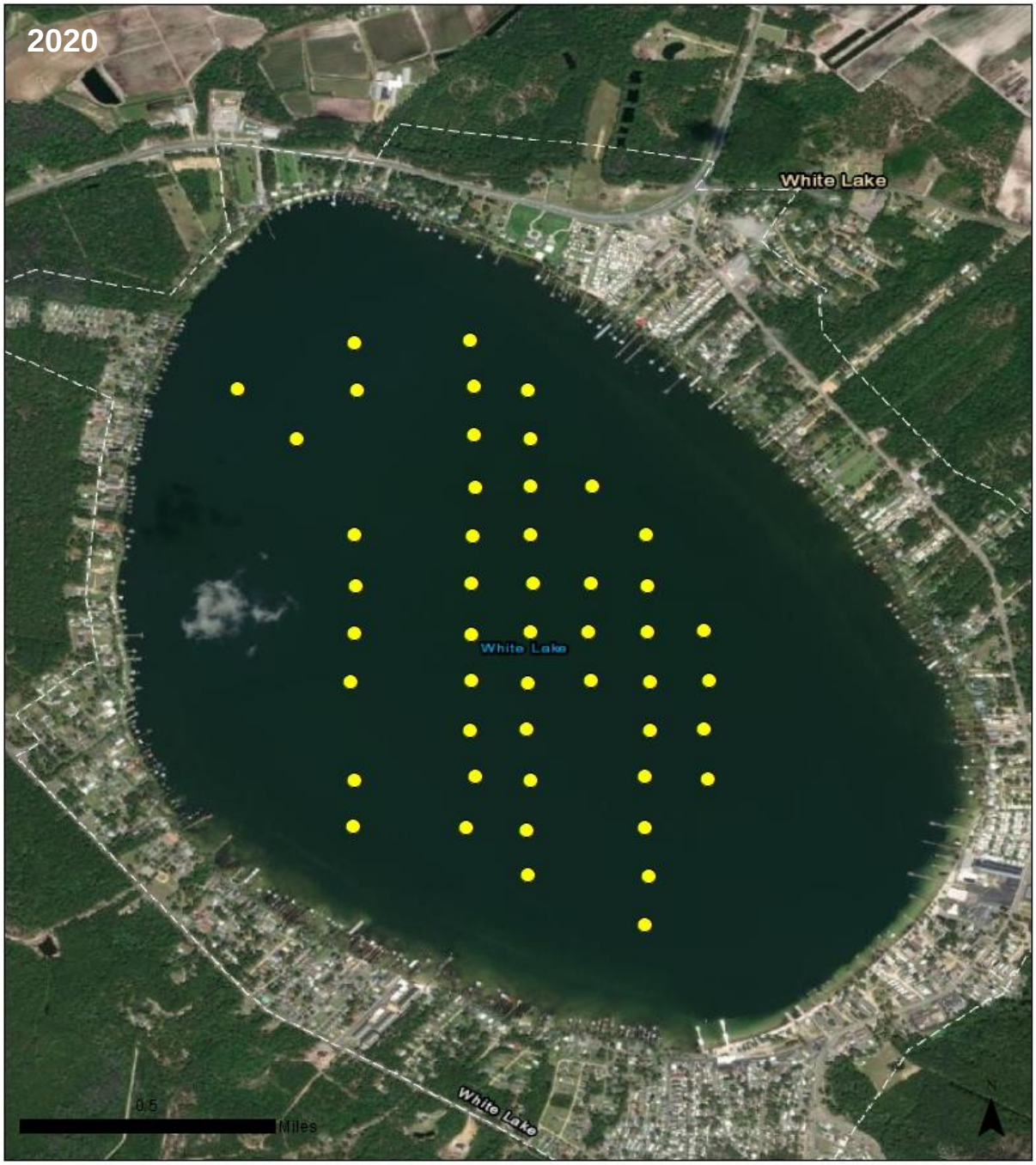


Figure 9. Filamentous algae (*Spirogyra spp.*) was found at 49 sample sites in 2020.

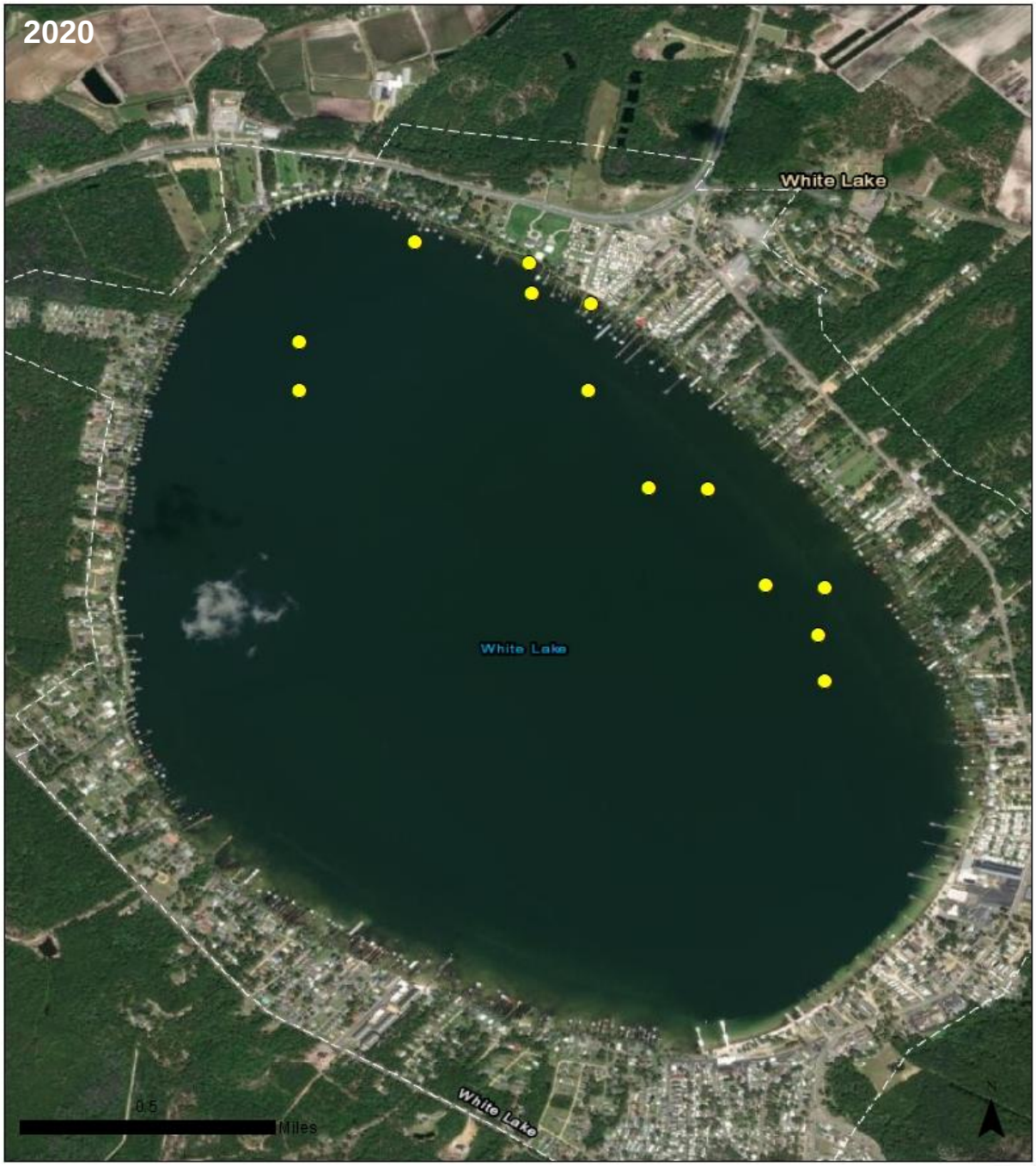


Figure 10. Macroalgae (*Chara/Nitella*) was found at 13 sample sites in 2020.

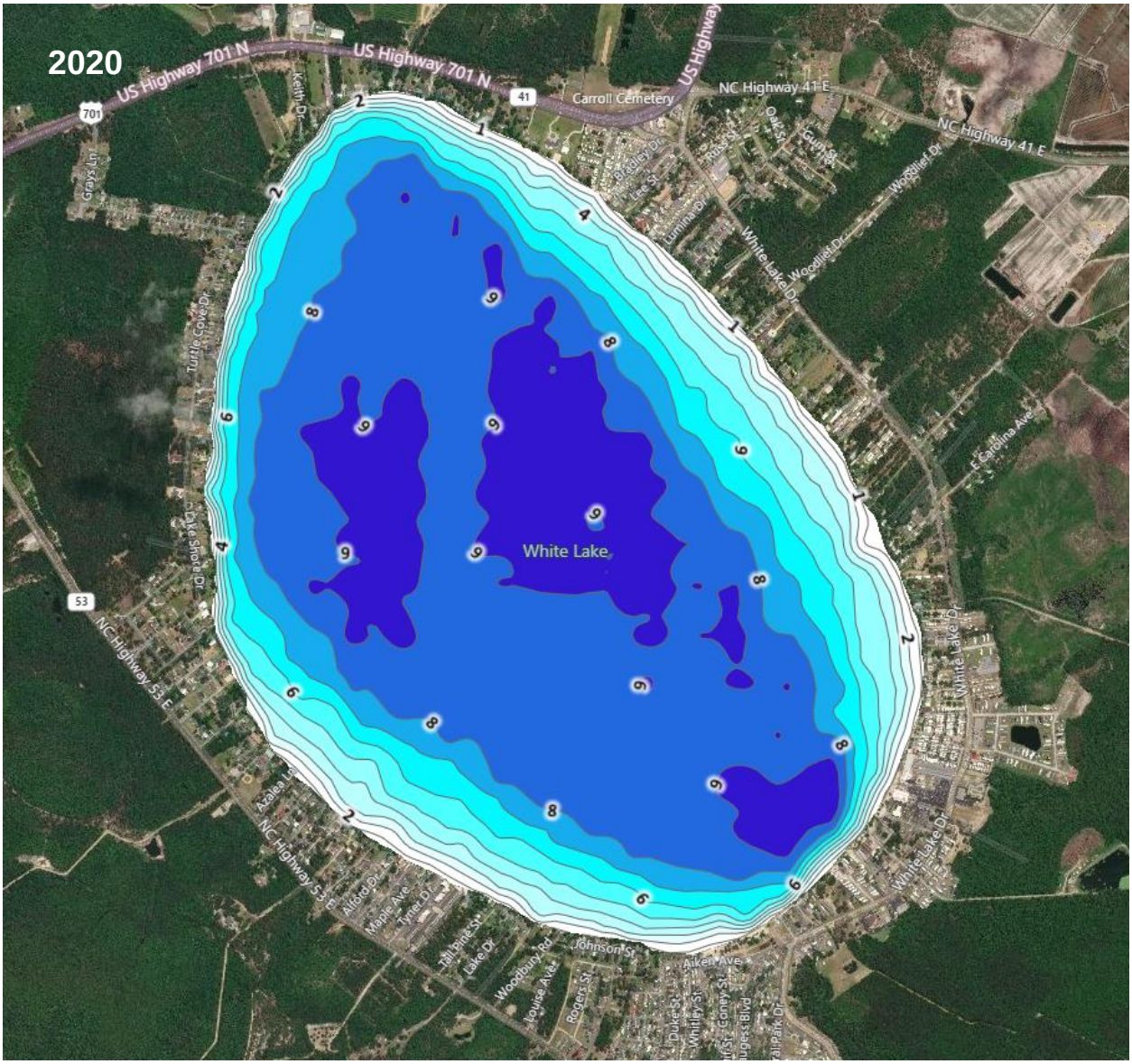


Figure 11: Bathymetry data collected during the 2020 fall survey. Data was processed using BioBase software. Average depth 7.43ft.

Table 3: White Lake SAV % Occurrence at Mid-year Monitoring Events

Species	June	August
Tuckerman's Pondweed	0%	6%
Spikerush	44%	15%
Bladderwort	1%	0%
Dwarf Milfoil	20%	8%
Chara	67%	16%
Aquatic Moss	8%	3%
No Vegetation	20%	66%
Vegetation	80%	34%

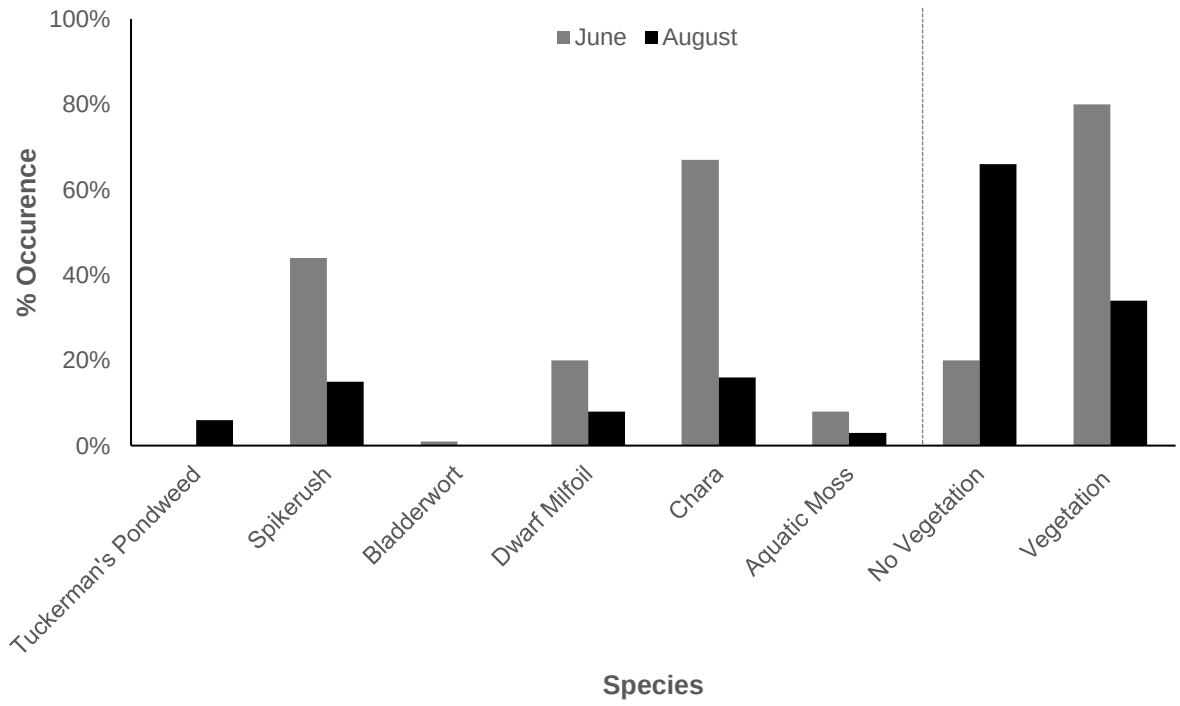
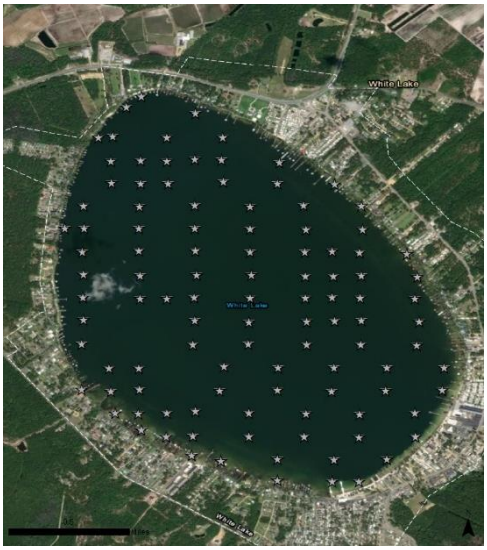
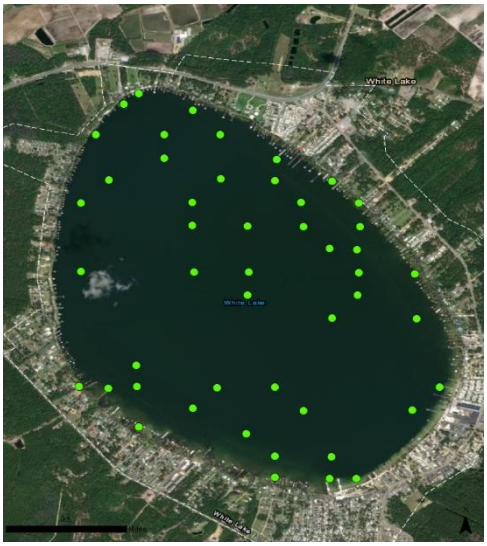


Figure 12. White Lake SAV % occurrence at mid-year monitoring events.

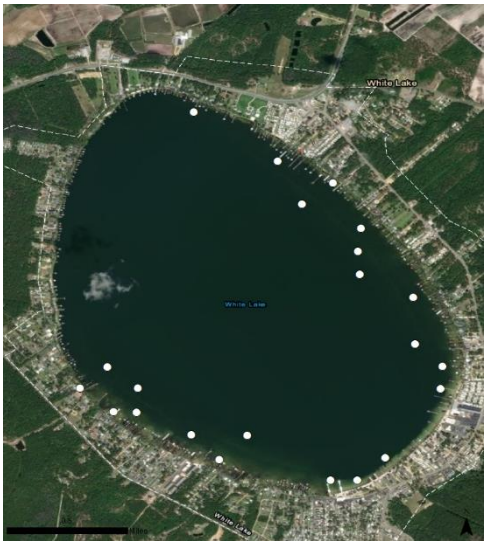
All Points:



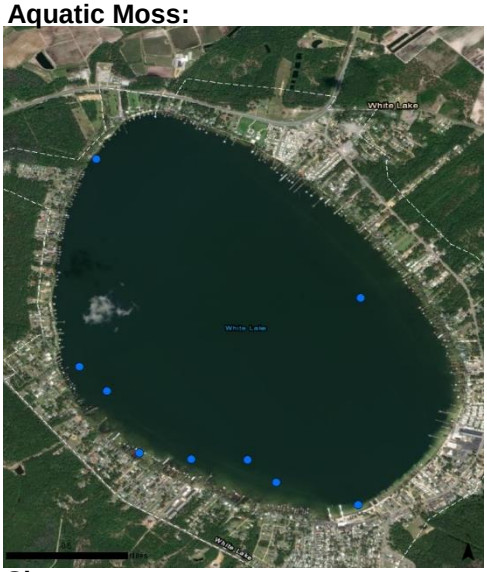
Spikerush:



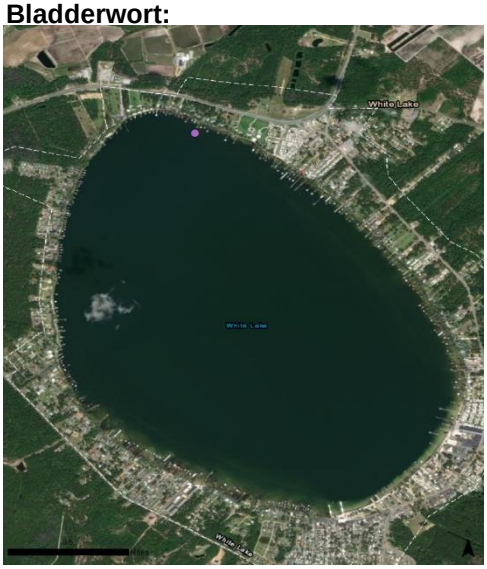
Dwarf Milfoil:



Aquatic Moss:



Bladderwort:



Chara:

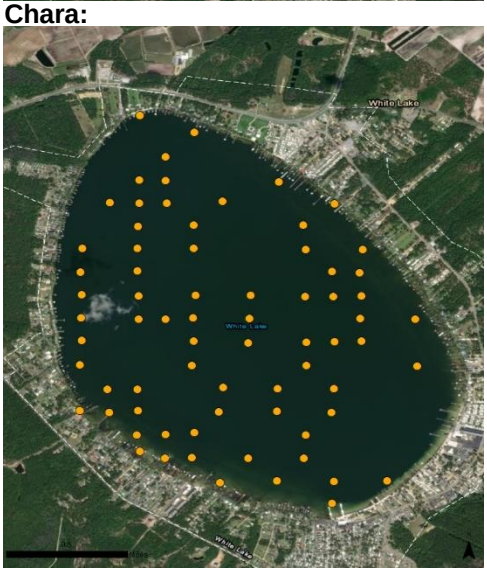
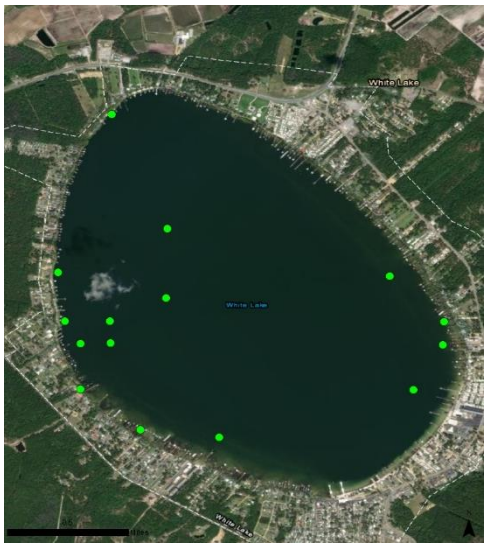


Figure 13. Results of June 2020 SAV survey at White Lake

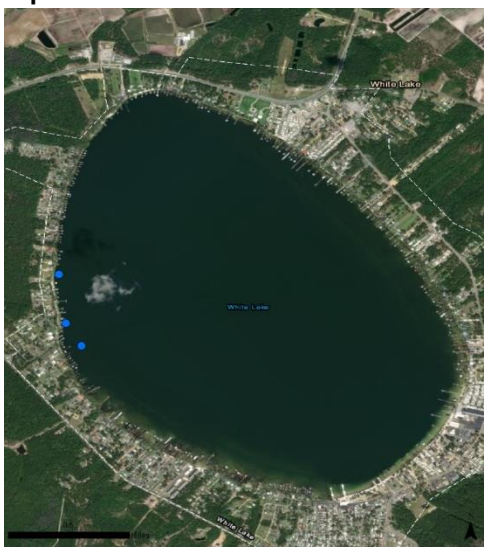
All Points:

Spikerush:

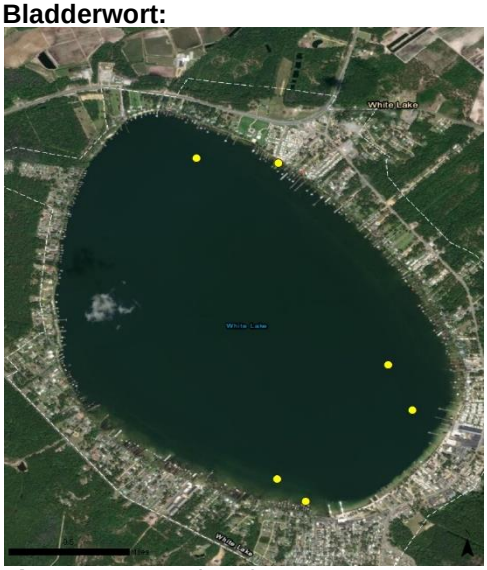


Dwarf Milfoil:

Aquatic Moss:



Bladderwort:



Chara:

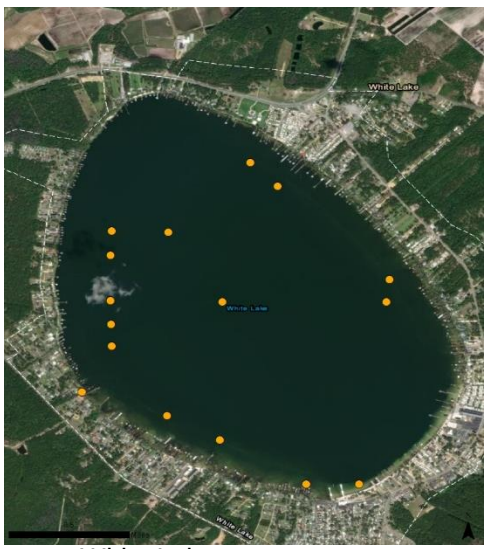


Figure 14. Results of August 2020 SAV survey at White Lake

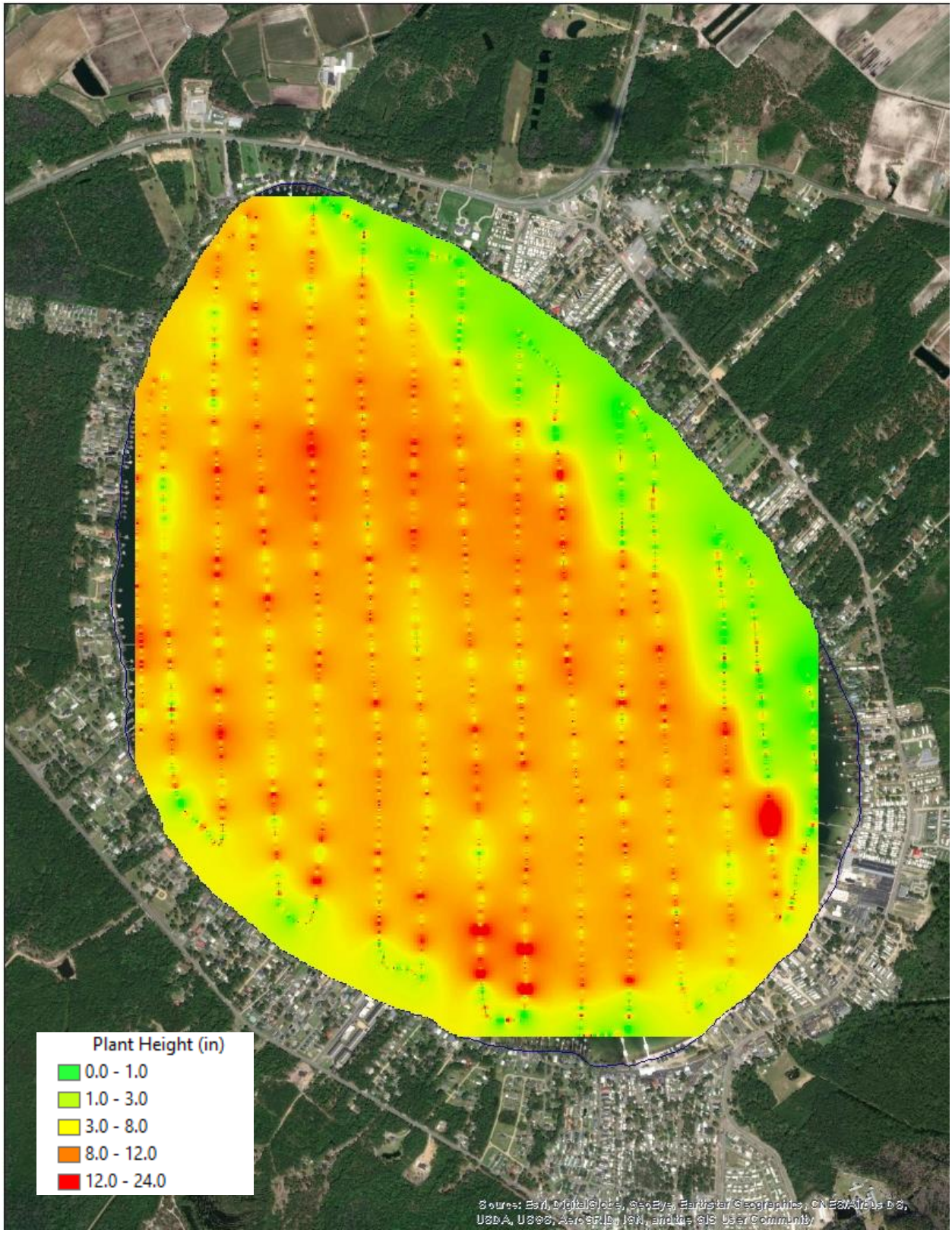


Figure 15: Plant height data collected during the August survey. Data was collected and processed using BioSonics epuipment and software.

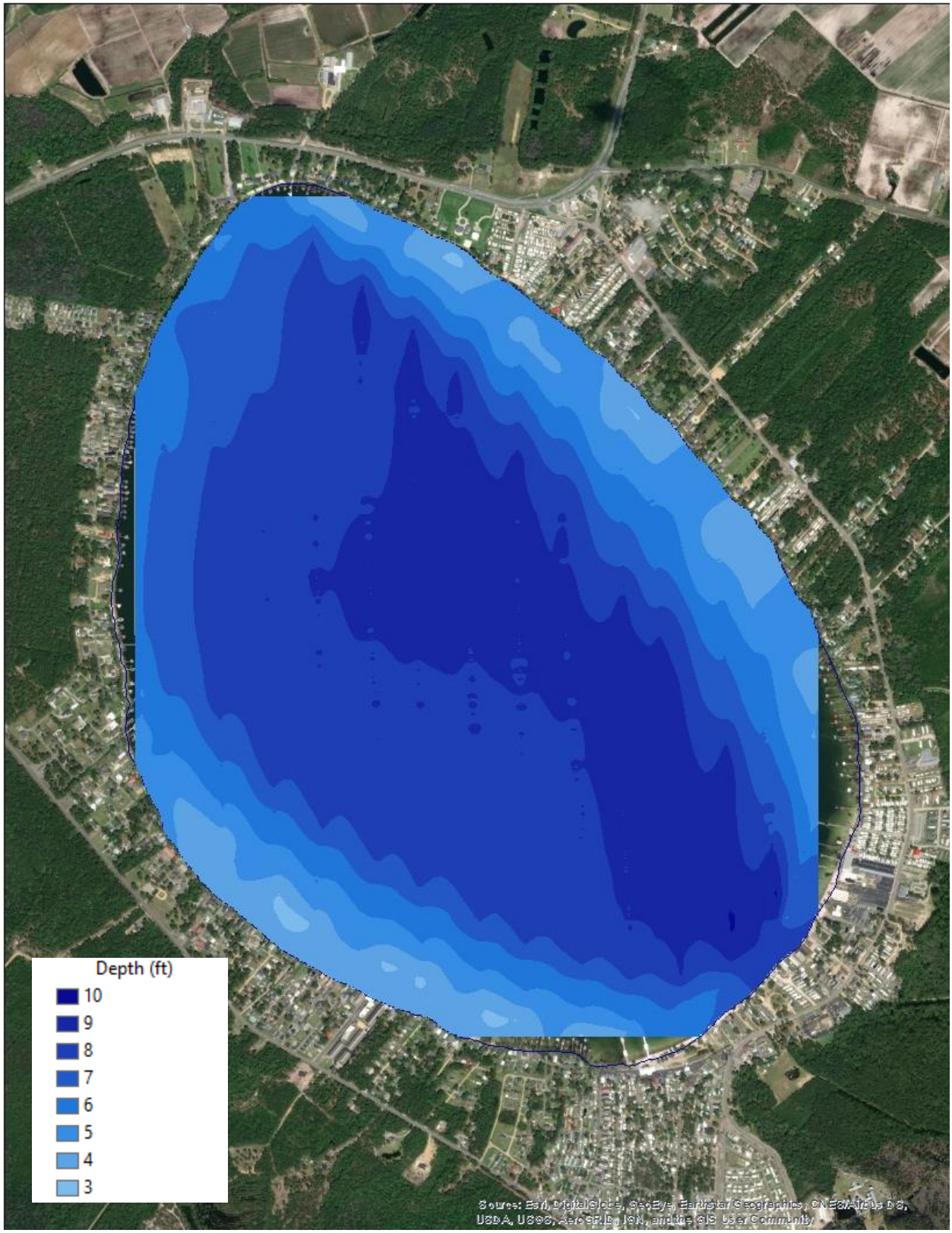


Figure 16: Bathymetry data collected during the August survey. Data was collected and processed using BioSonics epuipment and software. Average depth 7.67ft.