

2021 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 25th, 2021. 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. To allow for direct comparison of annual survey results, sample point locations have stayed consistent since 2017. At each sample point a 2-sided rake was thrown twice and all vegetation presence and abundance was recorded. Species abundance was ranked on a 1 – 4 scale (1 = trace, 2 = sparse, 3 = moderate, 4 = dense). In addition to the point-intercept rake samples, each of the survey boats were equipped with a high definition sonar unit that has the ability to record plant percent biovolume, or plant height, in the water column as well as overall water depth along the surveyed track.

Raw .SI2 sonar data files were uploaded to BioBase C-Map, a cloud-based processing service, to extract bathymetry estimates and SAV biovolume from the sampled tracks. The processed sonar logs and the point-intercept rake toss results were then exported as tabular data for further GIS post-processing and mapping.

Submersed aquatic vegetation (SAV) was recorded at 130 of the 202 (64%) sampled points at White Lake in 2021 (Figure 2). This is a decrease in plant occurrence when compared to the results of the 2020 survey when vegetation was found at 75% of the surveyed points. In total, 6 submersed aquatic macrophyte species and 2 algal

species were documented in the lake (Tables 1 & 2). The greatest species diversity occurred within the shallow shoreline points. The middle, deep sections of the waterbody were mostly dominated by either filamentous algae or macroalgae. Survey points in the eastern deep portion of the lake were generally void of SAV (Figure 3).

The SAV species recorded at White Lake in 2021 included Tuckerman's pondweed (*Potamogeton confervoides*), dwarf milfoil (*Myriophyllum tentellum*), bladderwort (*Utricularia purpurea*), slender spikerush (*Eleocharis baldwinii*), variable-leaved pondweed (*Potamogeton diversifolius*), and hydrilla (*Hydrilla verticillata*). The algal species that were recorded include filamentous algae (*Spirogyra spp.*) and macroalgae (*Chara/Nitella spp.*).

Hydrilla is a non-native, invasive aquatic plant species in the State of North Carolina and has been documented in White Lake in varying quantities since 2017. In 2021, hydrilla was found at 1 surveyed point on the southern side of the waterbody growing sparsely and intermixed with macroalgae, Tuckerman's pondweed, and filamentous algae. Hydrilla was not documented in White Lake in 2020 but was sparsely present during 2019 and 2018 SAV surveys (Figure 4). In 2017, hydrilla was the dominant species documented in White Lake and was found at 169 (84%) of surveyed points.

Tuckerman's pondweed (*Potamogeton confervoides*; also known as algal pondweed), was first documented in White Lake in 2020. It was found at 19 (9%) of the sampled points in 2021, and at 27 (13%) of the sampled points in 2020 (Figure 5). Its species abundance was documented to be variable but ranged from sparse to dense

where it was found. Tuckerman's pondweed was the only species that was classified as 'dense' at any surveyed point during the 2021 survey. 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.

Variable-leaved pondweed (*Potamogeton diversifolius*; also called snailseed pondweed or diverse-leaved pondweed), was documented at 1 survey point on the northwestern, shallow edge of White Lake in 2021 (Figure 6). Although this species has not been found in White Lake during previous surveys, it can be found growing in small ponds and slow-moving streams throughout North Carolina and its populations are stable (LeGrand et al. 2022).

Proliferating spikerush (*Eleocharis baldwinii*) was documented at 7 (3%) of the surveyed points. In previous years, spikerush has been a more dominant SAV species in White Lake as it was found at 90 (45%) points in 2020 and at 137 (68%) points in 2019 (Figure 7).

Purple bladderwort (*Utricularia purpurea*) has historically been found in White Lake but was not present during the past several years of survey. During the 2021 survey, purple bladderwort occurred at 8 (4%) of the surveyed sites in sparse quantities (Figure 8). Purple bladderwort is an important native species to the region and its presence a valuable aid to the biodiversity of White Lake's SAV community.

Dwarf milfoil (*Myriophyllum tenellum*) was found at 28 (14%) of points in 2021 (Figure 9). It's population has been present at 14 - 34% of surveyed points since 2017.

In 2021, the densest patches were observed on the shallow portions of the northeastern shoreline.

In comparison to the 2020 survey, both filamentous algae and macroalgae have increased in presence. Filamentous algae (*Spirogyra spp.*) was documented at 57 (28%) sample points in 2021 (Figure 10). Macroalgae (*Chara/Nitella spp.*) was found at 54 (27%) points in 2021 and was mainly distributed along the shoreline of the lake (Figure 11).

Despite the high frequency of plants observed in the lake, very few areas were found to have excessive plant height (Figure 12). The darker shades of green and orange show higher plant height in the water column. The mean biovolume of submersed vegetation where it was present in the waterbody was 9.6% during the 2021 survey. The mean depth was 6.8 feet (Figure 13). These results suggest that SAV in White Lake occupies less than 1 foot of the water column throughout the lake (on average) where it exists.

The presence of hydrilla remains a concern in White Lake, especially when considering the presence of multiple sensitive SAV species in the ecosystem. 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.

References:

LeGrand, H., B. Sorrie, and T. Howard. 2022. 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=4052

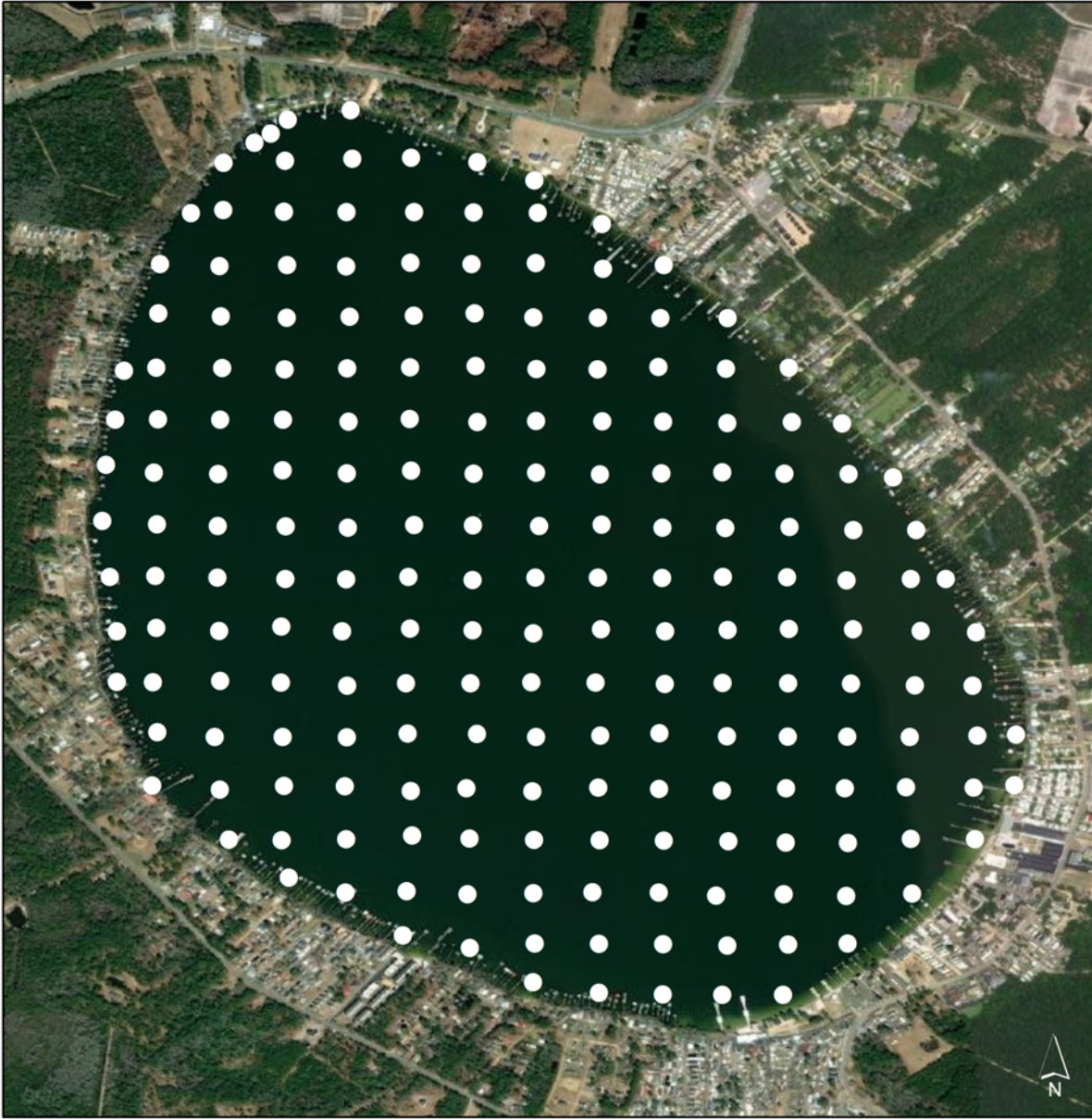


Figure 1. The 202 predetermined sample points in White Lake.

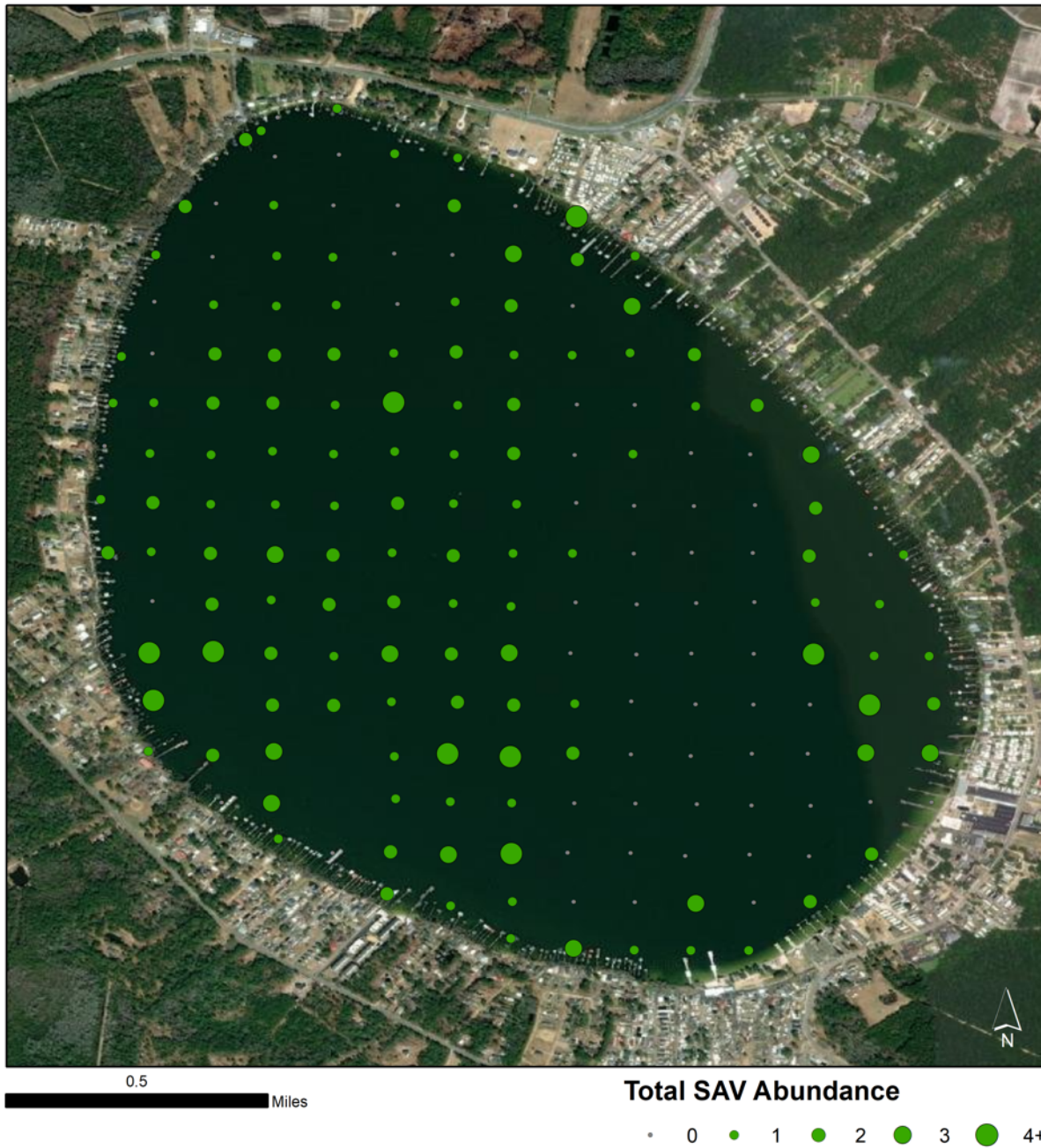


Figure 2. Total SAV abundance recorded at each sample point during 2021 survey.

Table 1: White Lake SAV % Occurrence

| Species | 2014 | 2017 | 2018 | 2019 | 2020 | 2021 |
|----------------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Hydrilla | 0% | 84% | 0.50% | 1.50% | 0% | 0.5% |
| Tuckerman's Pondweed | 0% | 0% | 0% | 0% | 13% | 9% |
| Variable Pondweed | 0% | 0% | 0% | 0% | 0% | <1% |
| Spikerush | 40% | 9% | 56% | 68% | 45% | 3% |
| Bladderwort | 14% | 0% | 0% | 0% | 0% | 4% |
| Dwarf Milfoil | 0% | 15% | 20% | 34% | 20% | 14% |
| Low Milfoil | 54% | 0% | 0.50% | 0% | 0% | 0% |
| Filamentous Algae | 0% | 0% | 0% | 0% | 24% | 28% |
| Macroalgae | 29% | 66% | 0% | 0% | 6% | 27% |
| Aquatic Moss | 43% | 63% | 32% | 6% | 8% | 0% |
| No Vegetation | 11% | 6% | 36% | 16% | 25% | 36% |
| Vegetation | 89% | 93% | 65% | 84% | 75% | 64% |

Table 2: White Lake Point Count

| Species | 2014 | 2017 | 2018 | 2019 | 2020 | 2021 |
|----------------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Hydrilla | 0 | 169 | 1 | 3 | 0 | 1 |
| Tuckerman's Pondweed | 0 | 0 | 0 | 0 | 27 | 19 |
| Variable Pondweed | 0 | 0 | 0 | 0 | 0 | 1 |
| Spikerush | 73 | 18 | 113 | 137 | 90 | 7 |
| Bladderwort | 25 | 0 | 0 | 0 | 0 | 8 |
| Dwarf Milfoil | 0 | 30 | 40 | 68 | 40 | 28 |
| Low Milfoil | 99 | 0 | 1 | 0 | 0 | 0 |
| Filamentous Algae | 0 | 0 | 0 | 0 | 49 | 57 |
| Macroalgae | 52 | 134 | 0 | 0 | 13 | 54 |
| Aquatic Moss | 79 | 127 | 65 | 12 | 16 | 0 |
| No Vegetation | 20 | 13 | 71 | 33 | 51 | 72 |
| Vegetation | 162 | 189 | 131 | 169 | 151 | 130 |

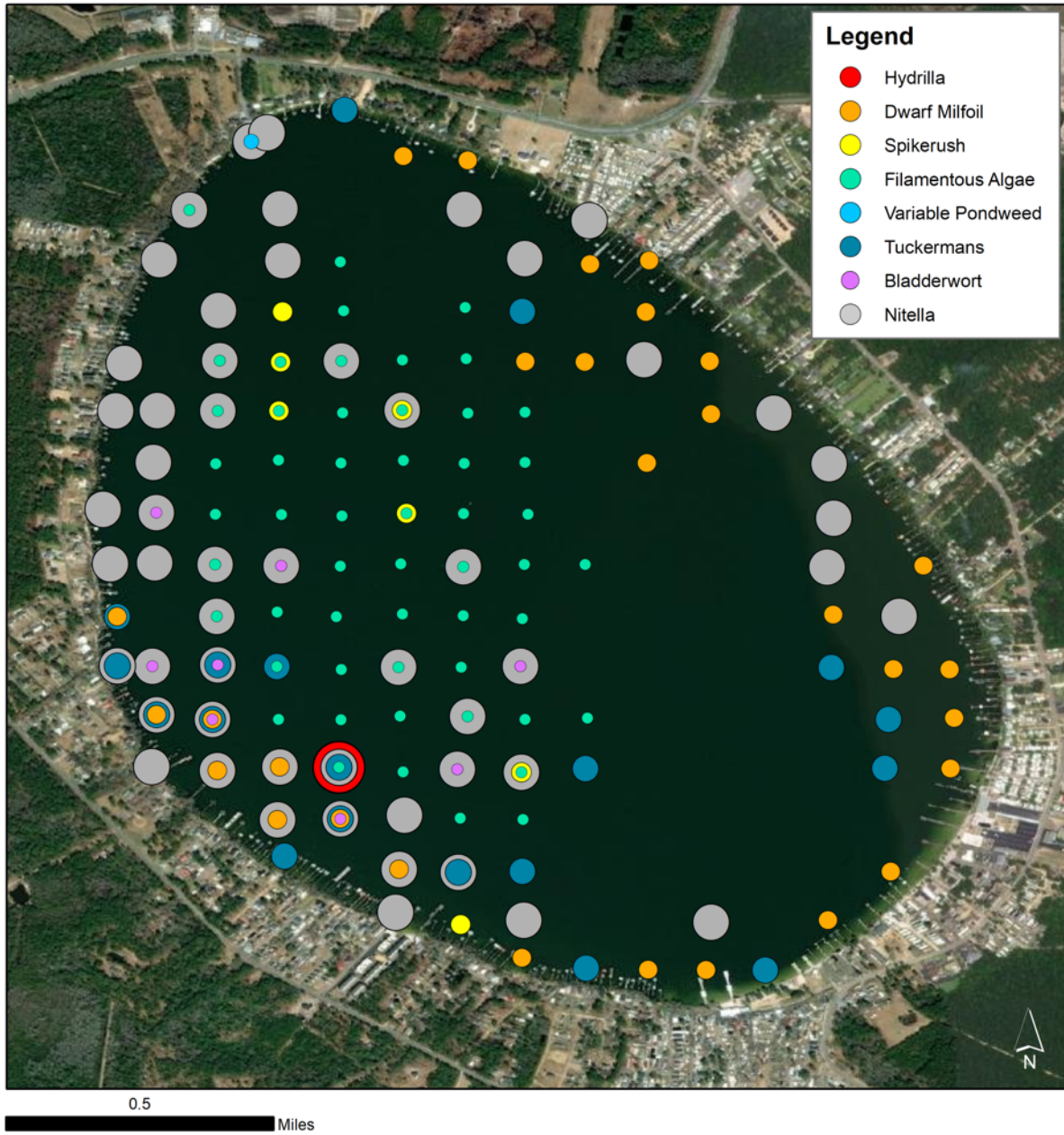


Figure 3. SAV species distribution in White Lake during 2021 survey.

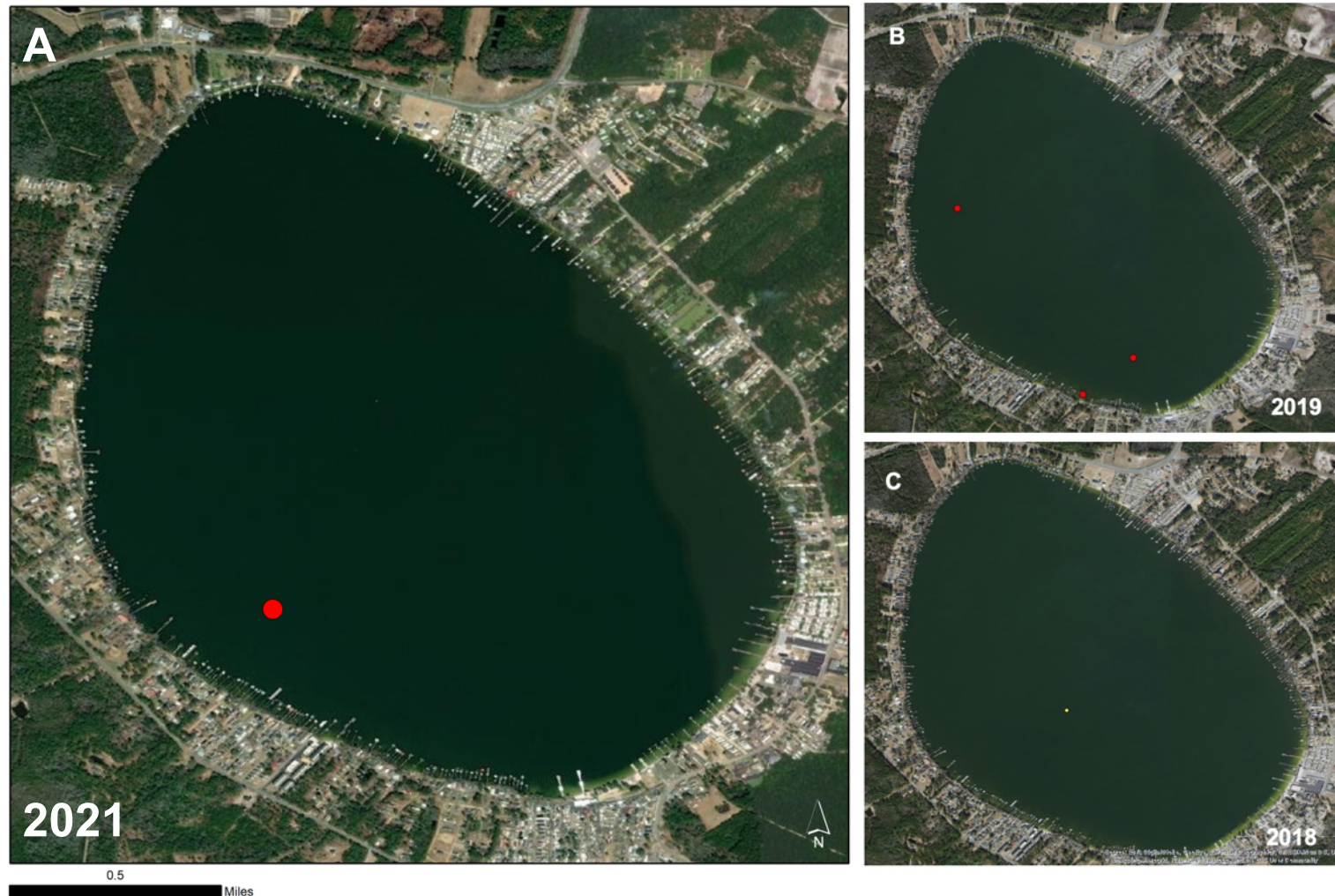


Figure 4. Hydrilla (*Hydrilla verticillata*) was found at a) 1 sample point in 2021, b) 3 sample points in 2019, and c) 1 sample point in 2018.

**Note: Hydrilla was not documented in White Lake in 2020*

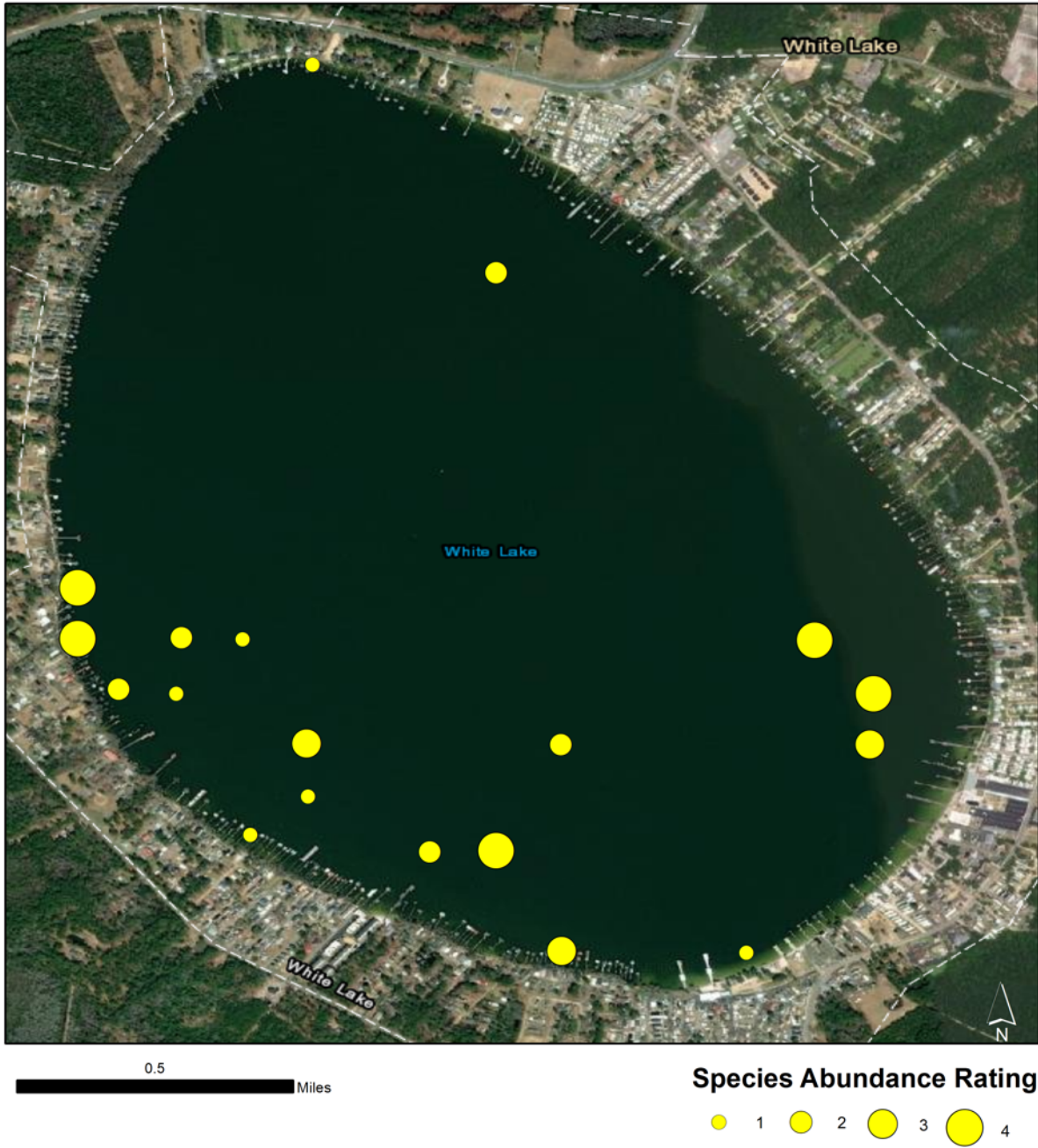
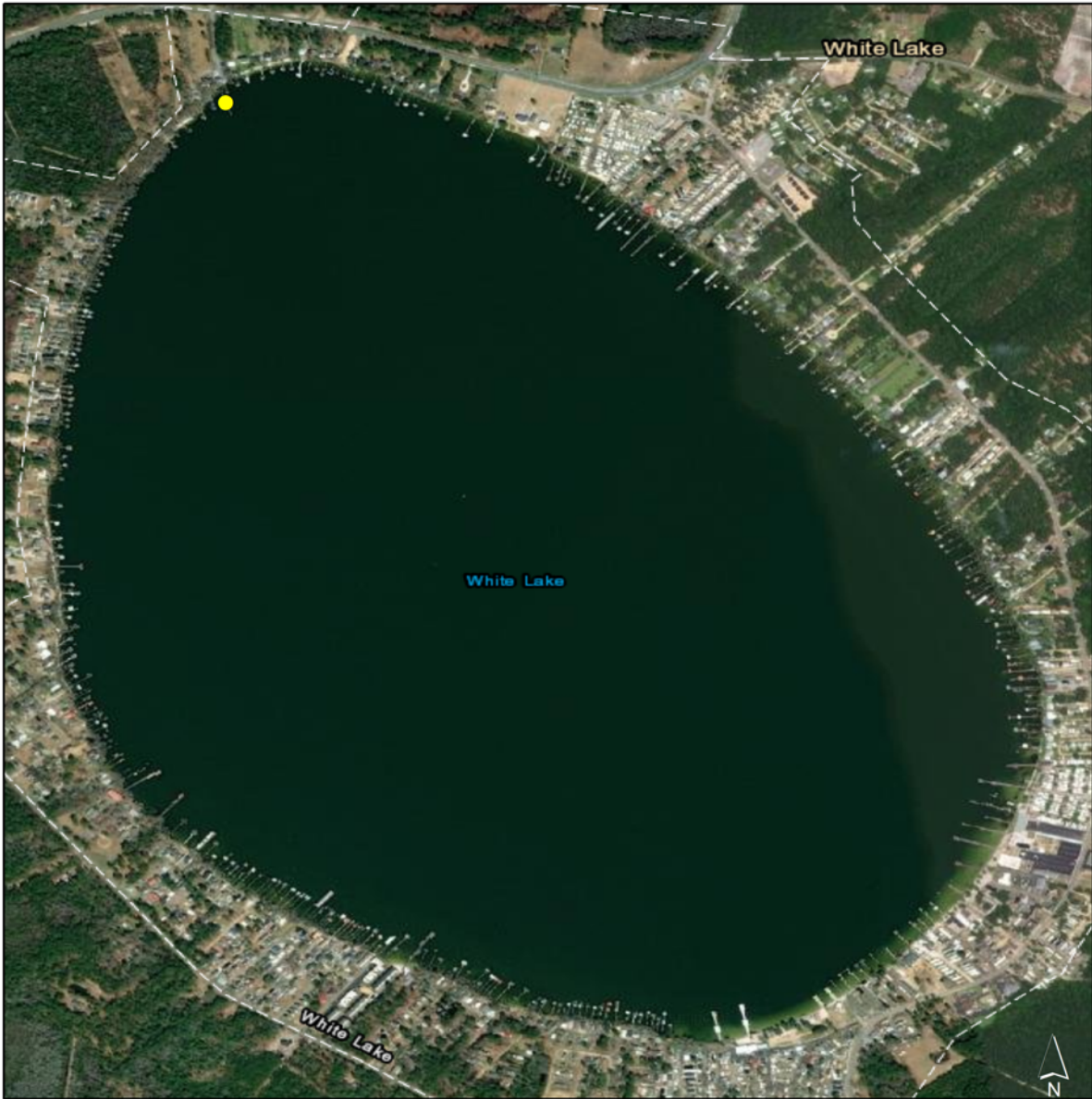


Figure 5. Tuckerman's Pondweed (*Potamogeton confervoides*) was found at 19 samples site in 2021



0.5
Miles

Species Abundance Rating



Figure 6. Variable Pondweed (*Potamogeton diversifolius*) was found at 1 sample site in 2021

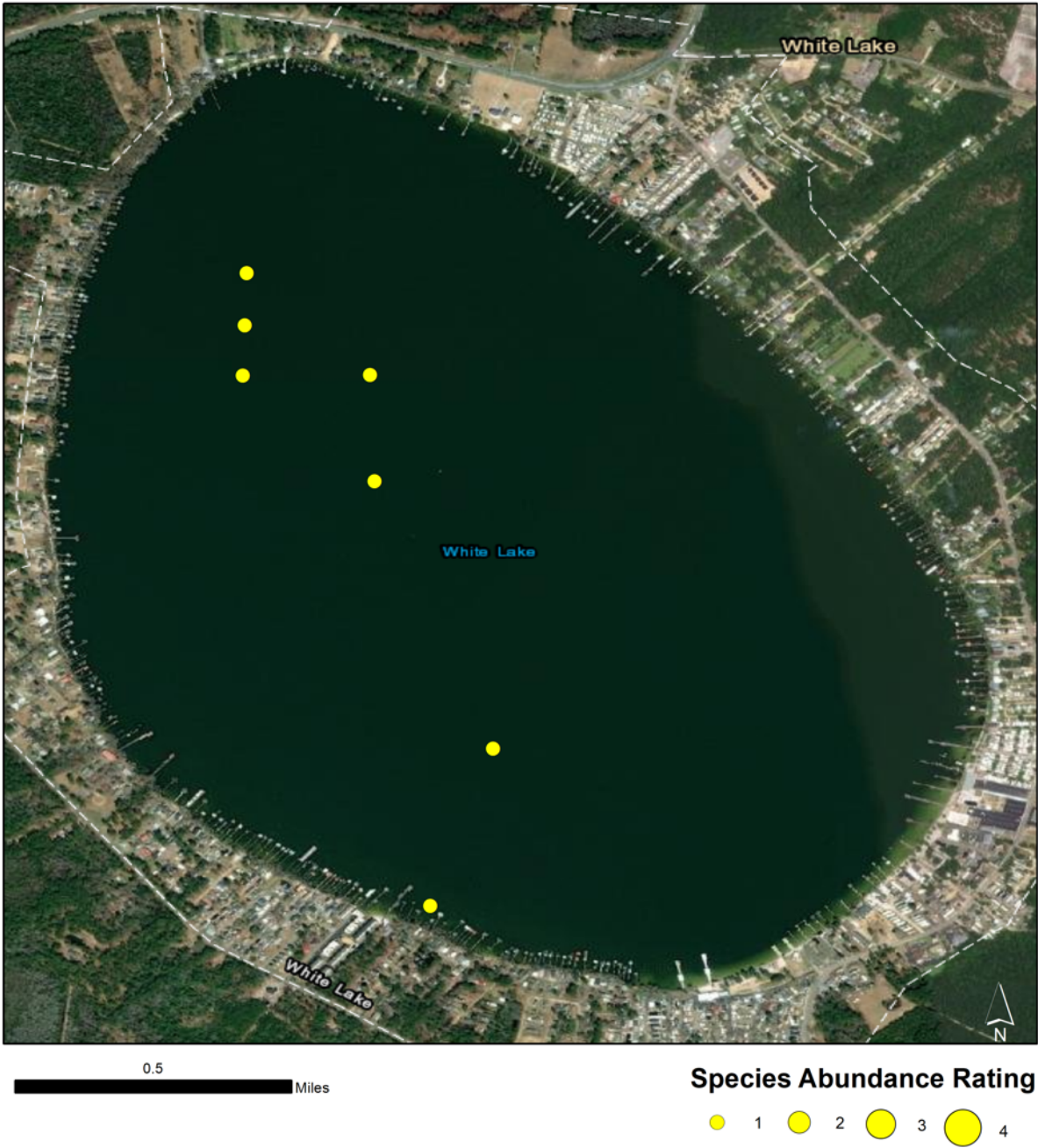


Figure 7. Proliferating Spikerush (*Eleocharis baldwinii*) was found at 7 sample sites in 2021

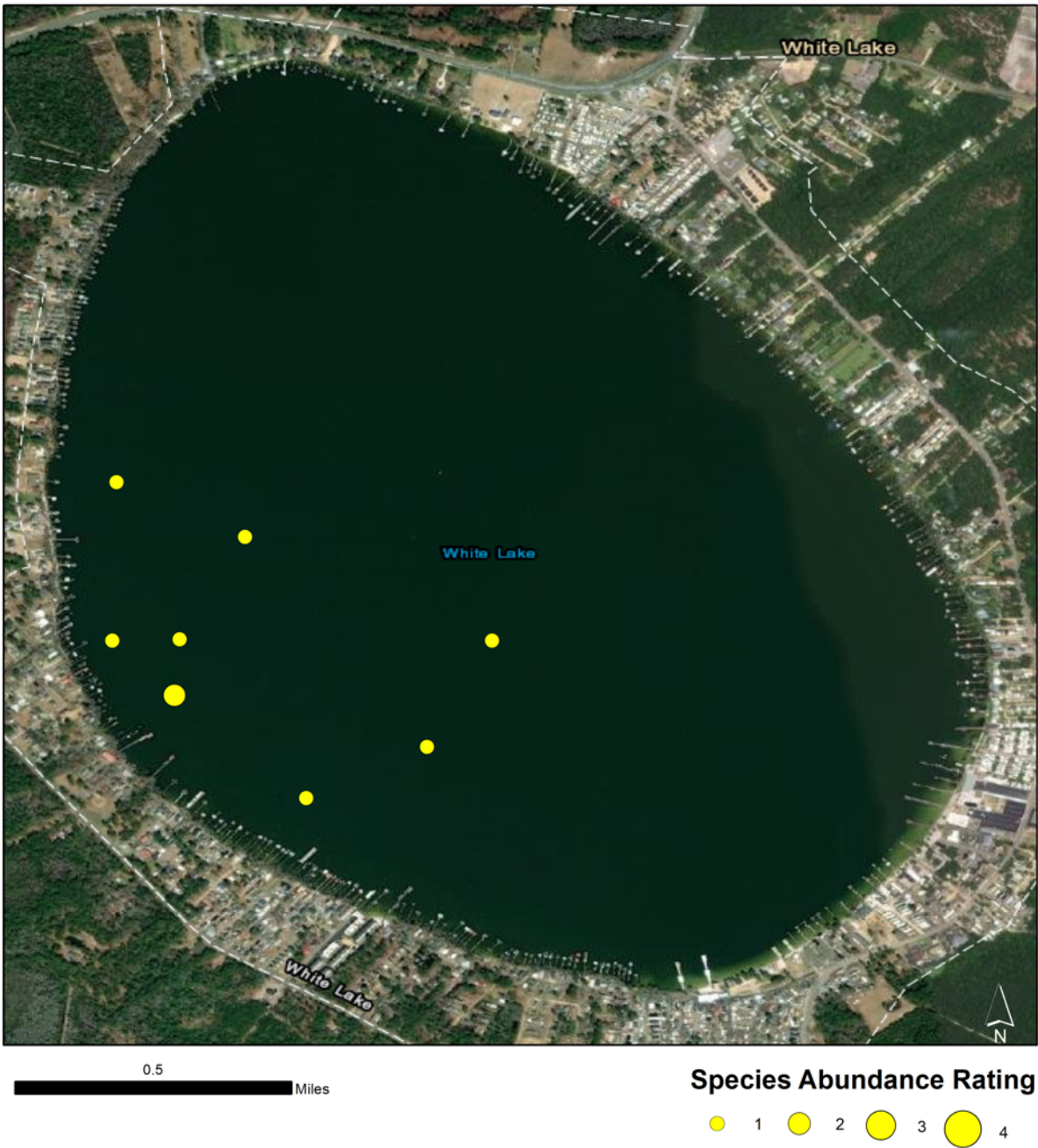


Figure 8. Purple Bladderwort (*Utricularia purpurea*) was found at 8 sample sites in 2021

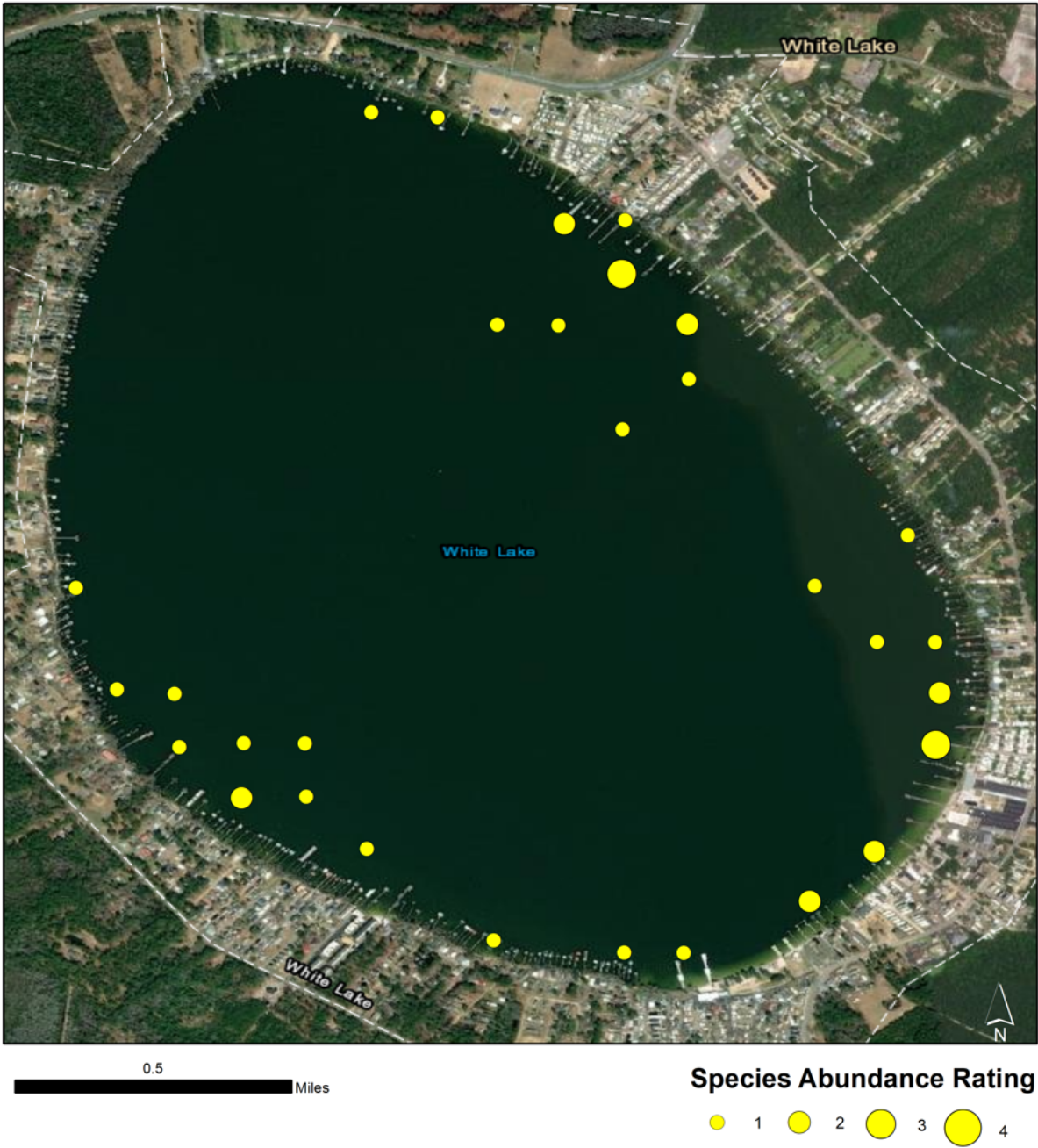


Figure 9. Dwarf milfoil (*Myriophyllum tenellum*) was found at 28 sample sites in 2021

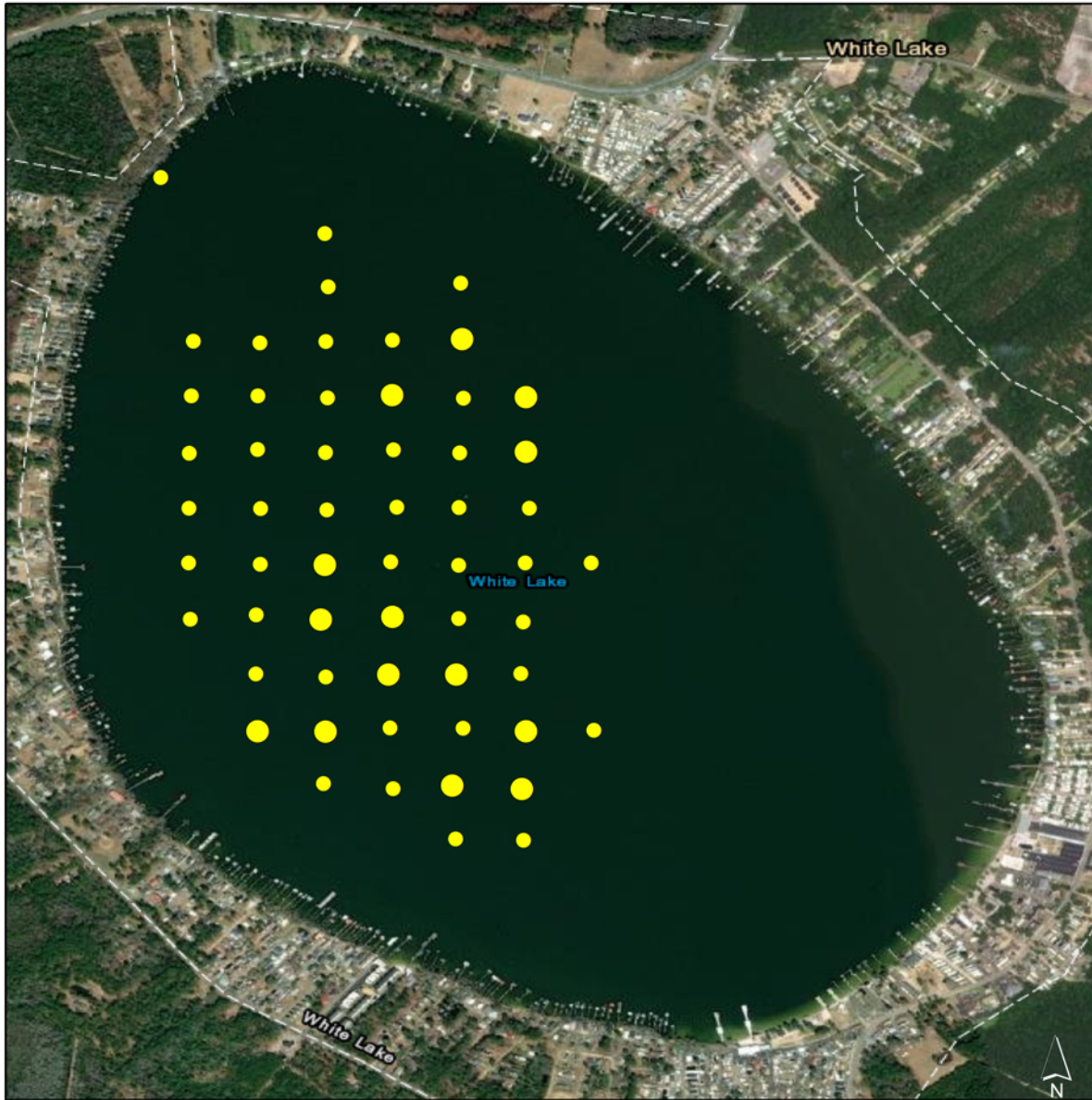


Figure 10. Filamentous algae (*Spirogyra spp.*) was found at 57 sample sites in 2021

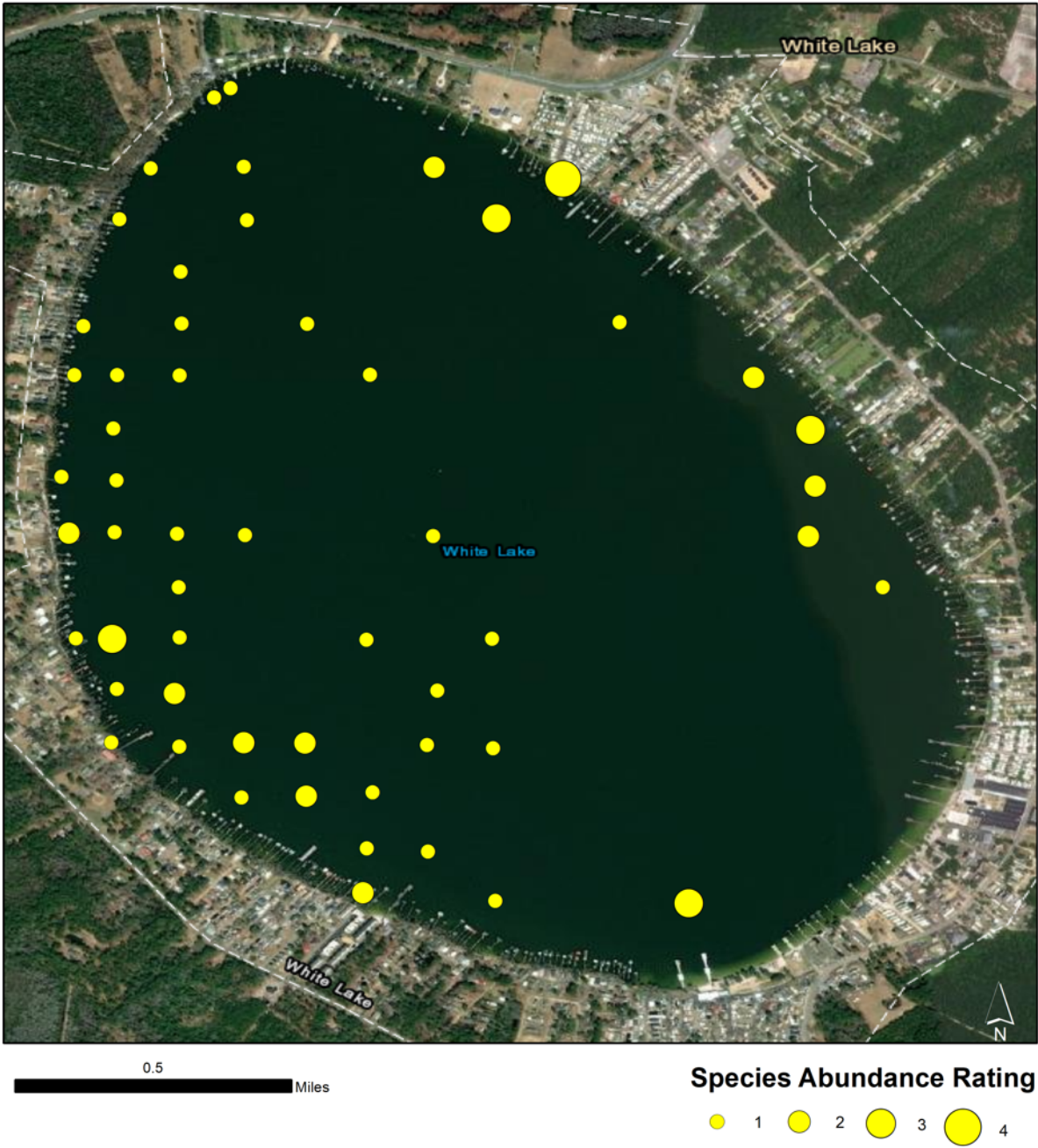


Figure 11. Macroalgae (*Nitella spp.*) was found at 54 sample sites in 2021

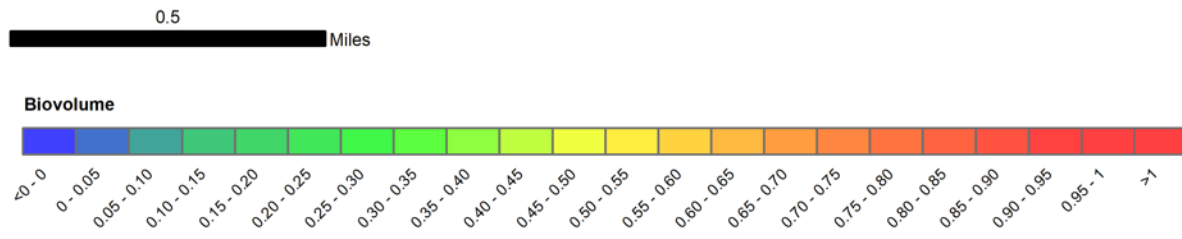
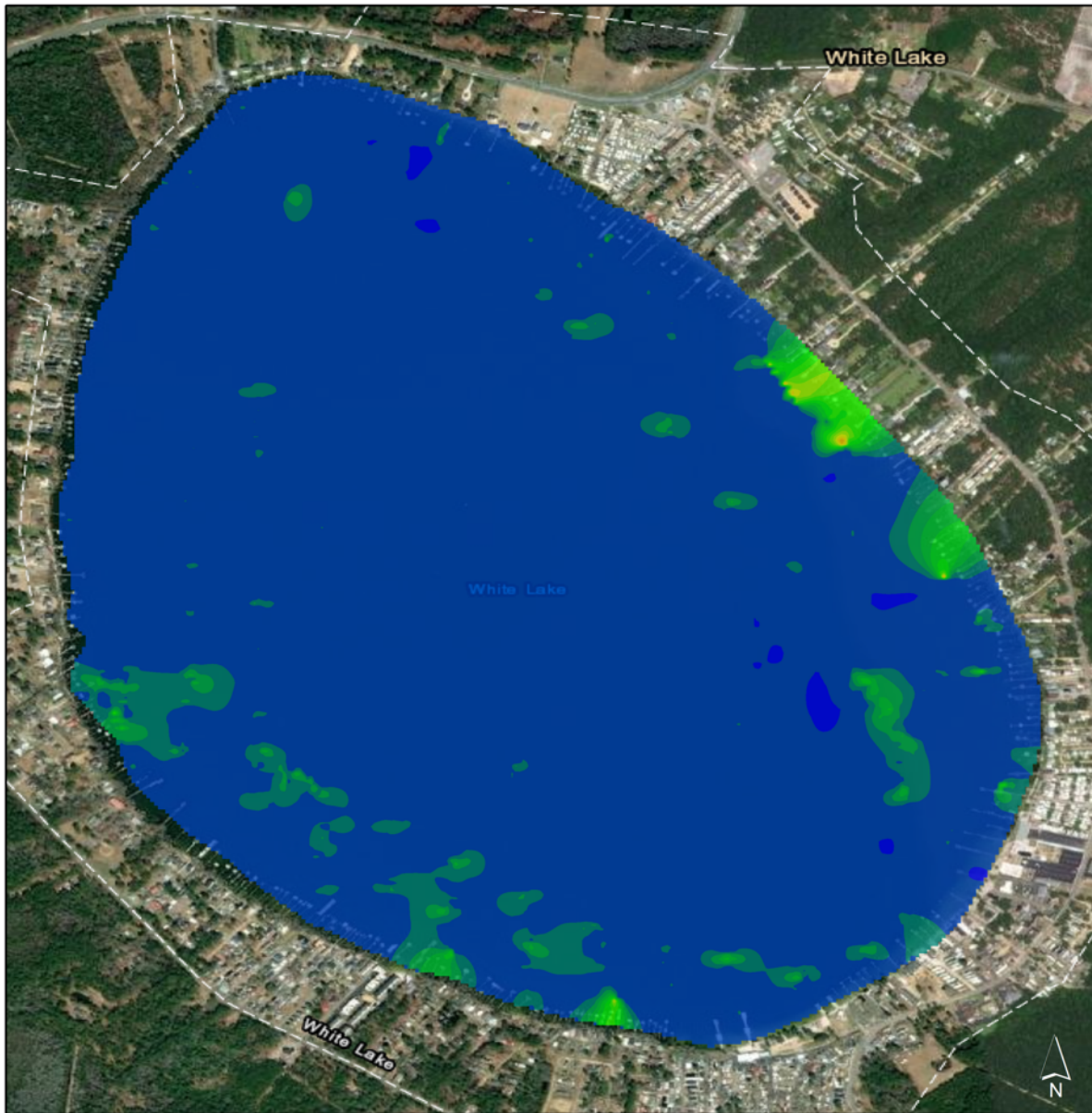


Figure 12. Interpolated biovolume data collected during the 2021 survey.

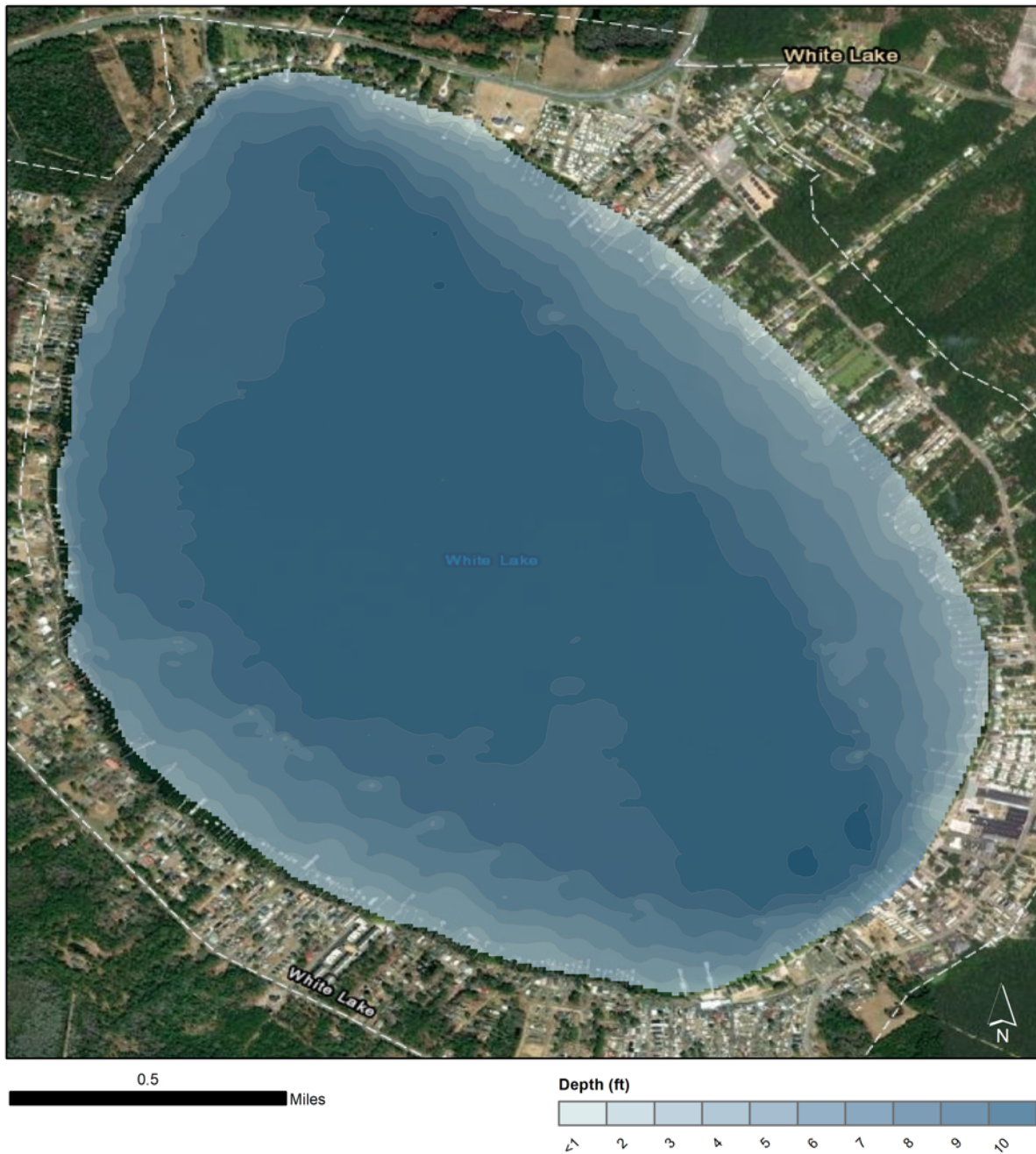


Figure 13. Interpolated depth data collected during the 2021 survey.
Contours represent 1' intervals.