2021 Waccamaw Aquatic Vegetation Survey
North Carolina State University

Vegetation Report

The 2021 whole-lake aquatic vegetation survey at Lake Waccamaw occurred the 28th and 29th of September. Survey methods followed the previous procedures of hydroacoustic scanning (SONAR) and point-intercept protocols for assessing submersed aquatic vegetation. A spline interpolation was utilized to develop the whole-lake spatial coverage map and estimate species acreage. Water levels were at or near full pool, allowing sampling of each predetermined point location (363 points). Water temperature averaged ~76.0 F at time of the survey.

In comparison to previous annual surveys, there was a general increase in the quantity and expanse of lakewide submersed vegetation (SAV), with vegetation discovered at 74.7% of point locations (Figure 1,2a-c and 3; Table 1). No hydrilla plants, neither rooted nor floating fragments, were discovered during the point-intercept survey; marking four consecutive years with no hydrilla found in the lake (Table 1). The macroalgae, chara, was the most abundant submersed plant at 37.7% occurrence, followed by lavender bladderwort and slender pondweed at 9.4% and 3.9% occurrence, respectively (Figure 2a and 3; Figure 3; Table 1). Spatterdock was found at many of the same locations noted during previous year's surveys, and with increased frequency compared to 2020 (Figure 2b and 3). Similarly, maidencane occurrence increased 100% from the 2020 survey, persisting at legacy locations and expanding (Figure 2c and 3; Table 1). The invasive perennial grass, phragmites, was discovered for the first time during the 2021 survey. Phragmites was present at two (2) point-intercept locations, both located in southeast corner of the waterbody (Figure 2c and 3). Interpolated macrophyte distribution maps and acreage estimates may be viewed in Table 2 and Figure 3, respectively.

The filamentous cyanobacterium, lyngbya, was present among 32 locations distributed around several shoreline areas and the eastern portion of the lake (Figure 4; Table 1). However, lyngbya was not discovered within the legacy areas near the northwest boat-launch (Figure 4). As with previous survey years, lyngbya presence and expanse in the lake is likely correlated with survey timing coinciding with lyngbya senescence (October). Previous year's surveys occurred during the time of lyngbya senescence (October-January) which may explain the increased presence of the alga during the 2021 survey (late-September). Based on rake-toss abundance ratings (*0:4 abundance scale*; 0: *none*; 1: *trace*, 2: *sparse*, 3: *moderate*, 4: *dense*) lyngbya will likely remain sparsely populated throughout the lake as amounts found on the rake were *trace* to *sparse*.

Hydrilla Tuber Report

Tuber surveys were not scheduled for the 2021 season. However, no tuber sampling locations contained hydrilla tubers during the 2020 survey efforts. The 2020 tuber survey occurred the 21st of December within the hydrilla treatment zone. This survey followed the same point sampling areas that have occurred since 2018. In total, 19 locations were sampled, with 50 sediment cores pulled among all sampling points to increase detection opportunity at each point. No sampling locations have discovered hydrilla tubers since the 2017 tuber survey. Temporal tuber dynamics and counts suggest a rapid depletion of the tuber bank over the past several years (2020-2012 tuber surveys: 2020-2018: 0 tubers; 2017 Fall: 33 tubers; 2017 Spring: 2 tubers; 2016: 49 tubers; 2015: 27 tubers; 2014: 69 tubers; 2013: 53 tubers; and 2012: 4 tubers total).

Figure 1. Spatial locations for all 204 macrophyte occurrences shown in red.

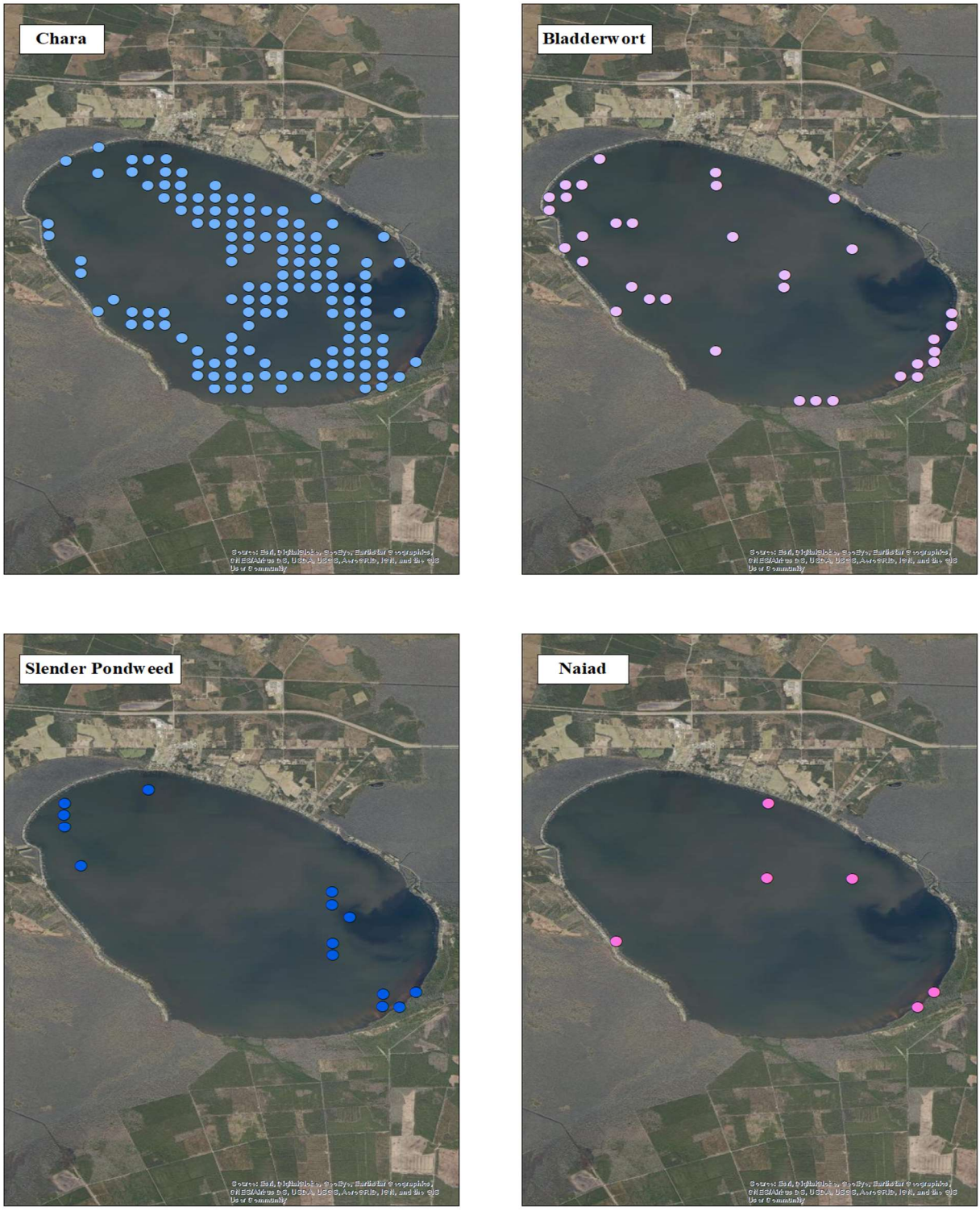

Figure 2a. Macrophyte distributions found throughout the fall 2021 survey.

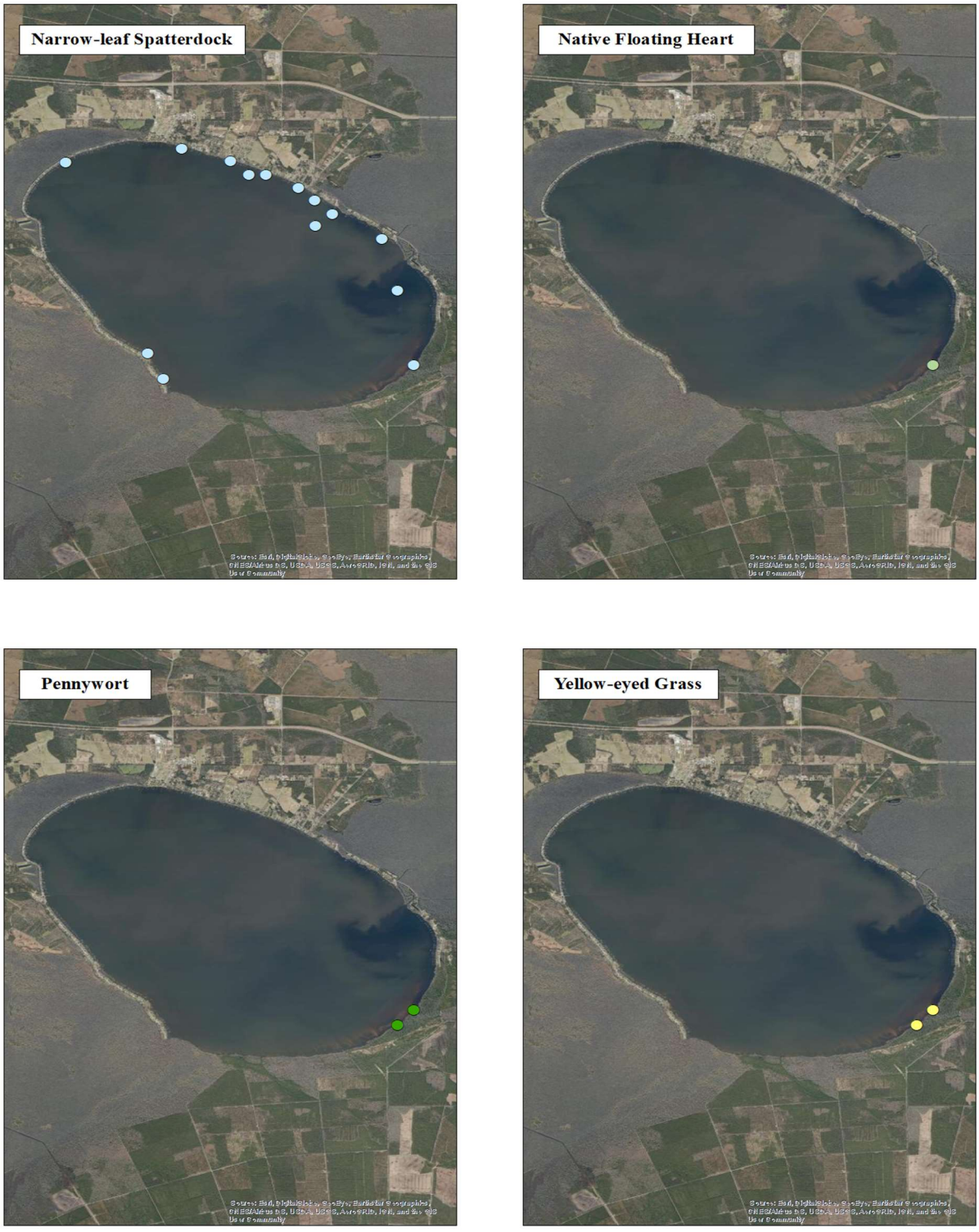

Figure 2b. Macrophyte distributions found throughout the fall 2021 survey.

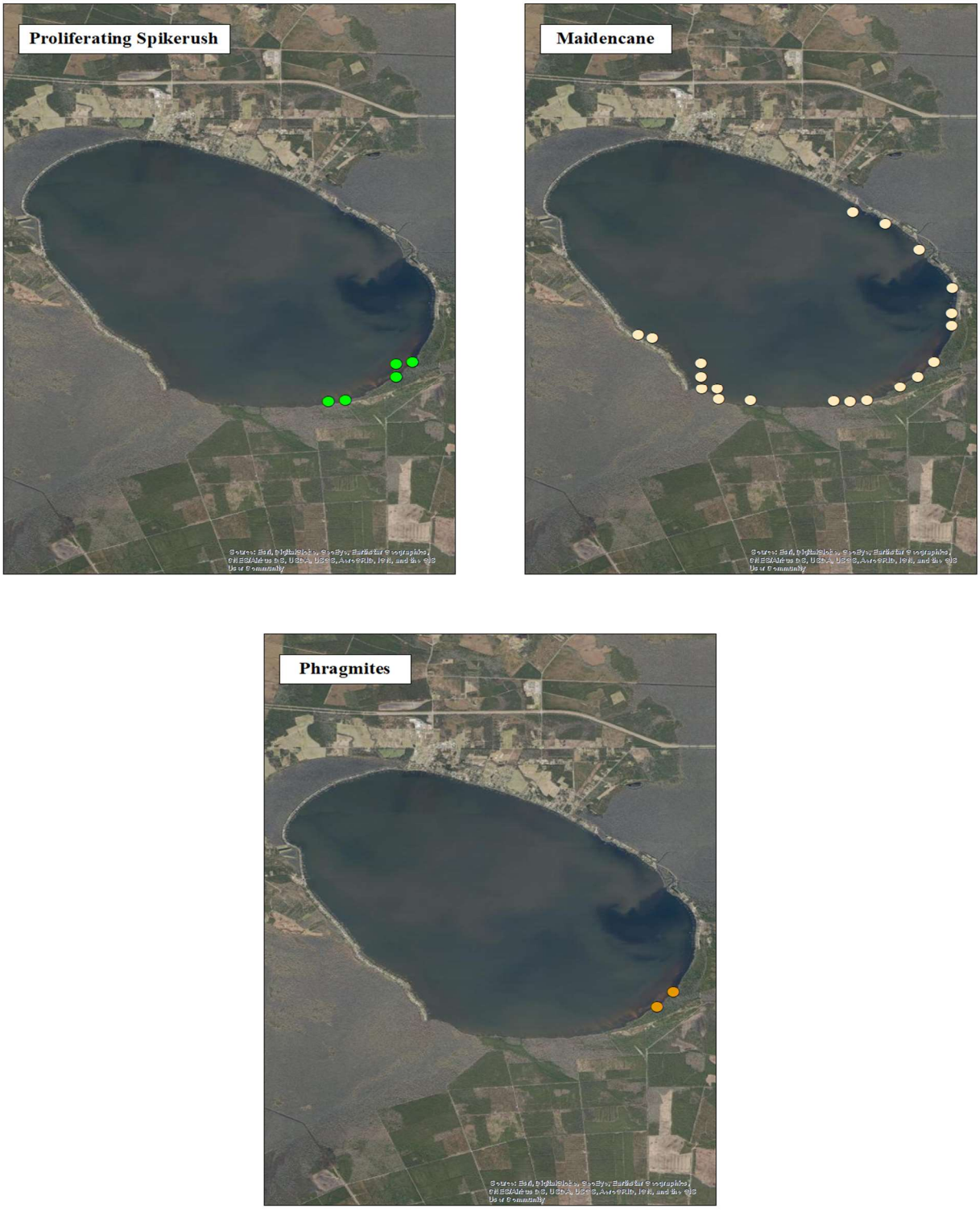

Figure 2c. Macrophyte distributions found throughout the fall 2021 survey.

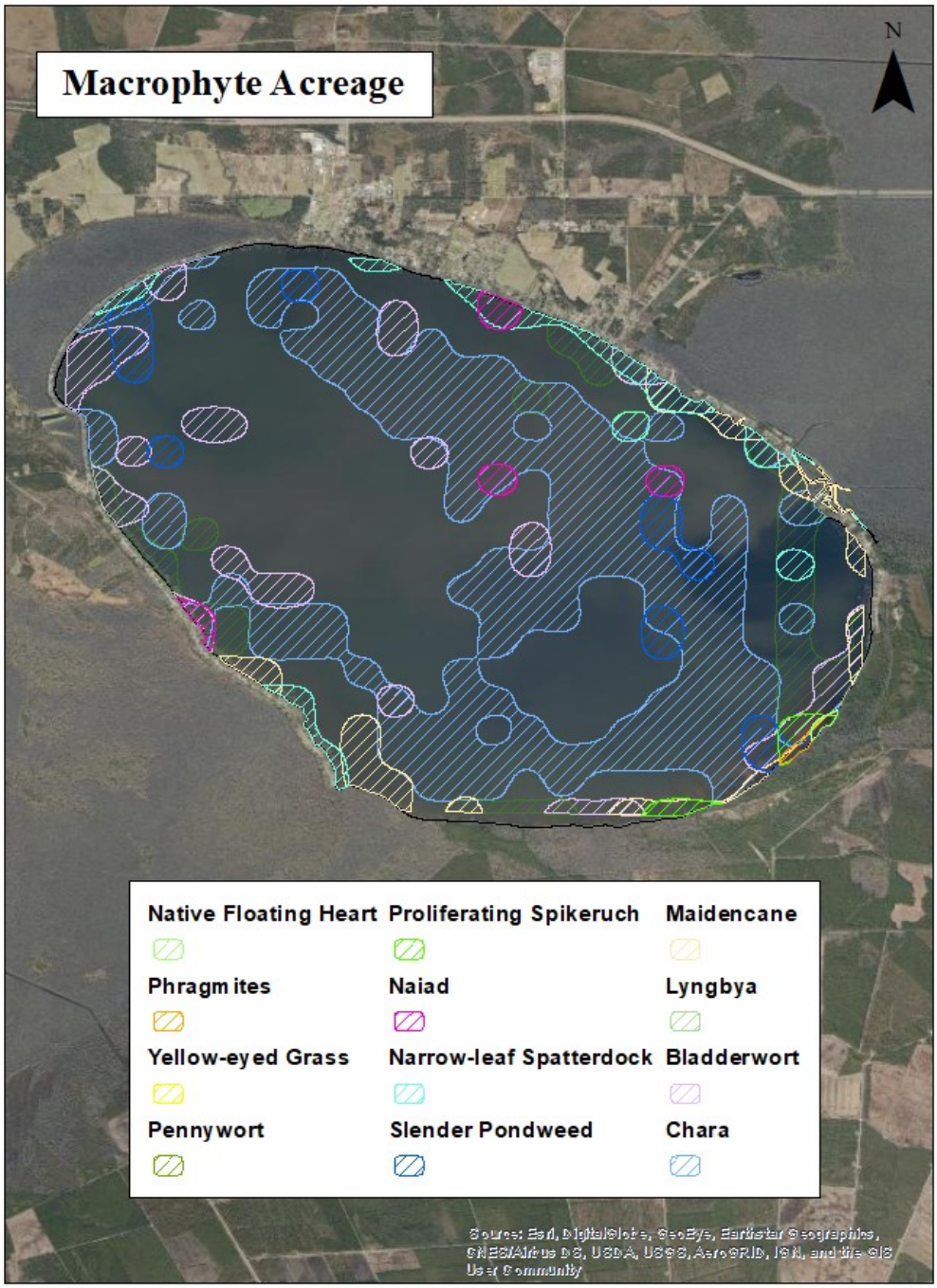

Figure 3. Macrophyte distributions interpolated from the point-intercept survey data.

Figure 4. Lyngbya infestation- 2021: point locations provided; 705.9 A, 2020-2018: None discovered, 2017: 30.8 A, 2016: 16.12 A, 2014: 21 A, and 2013: 32 A. Sampling years 2019, 2018 and 2015 not shown since no lyngbya detected. Note that 2021 and 2017 are to a different map scale.

Table 1. Sampling occurrence and percent change of all macrophytes surveyed over time.

	Occurrence [a,b]										
Species	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**Percent Change[c]**
Hydrilla	45	0	0	0	0	3	0	0	0	**0**	**0%**
Slender Pondweed	222	16	1	0	1	3	0	12	4	**14**	**250%**
Naiad	259	21	0	5	0	1	8	23	0	**6**	**-**
Proliferating Spikerush	-	-	-	-	9	11	15	-	-	**5**	**-**
Narrow-leaf Spatterdock	7	2	4	7	10	4	12	17	8	**14**	**75%**
Native Floating Heart	-	-	-	-	-	-	-	-	-	**1**	**-**
Maidencane	8	7	4	10	-	-	15	9	10	**20**	**100%**
Bladderwort	-	-	-	-	-	2	0	2	11	**34**	**209%**
Pennywort	-	-	-	-	-	-	-	-	-	**2**	**-**
Nitella	104	11	26	48	0	-	31	-	-	**-**	**-**
Chara	-	-	-	-	1	101	0	123	0	**137**	**-**
Yellow-eyed Grass	-	-	-	-	-	-	-	-	-	**2**	**-**
Phragmites	-	-	-	-	-	-	-	-	-	**2**	**-**
Lyngbya	0	2	20	0	2	7	0	0	0	**32**	**-**
Total Vegetated Points	300		46		23	119	67	155	29	**204**	**603%**

[a]Survey points = 2012: 362 points; 2013: 347 points; 2014: 352 points; 2015: 361 points; 2016: 361 points, 2017: 372 points, 2018: 386 points, 2019: 357 points, 2020: 363, 2021: 363.

[b]The (-) symbolizes species occurrence not recorded in previous survey years.

[c]Denotes percent change from 2016 - 2021 (change not shown if increasing from a 0 value).

Table 2. Estimates of macrophyte spatial coverage from the 2021 survey.

Species	**Estimated Acreage[a]**	**Percent of Waterbody**
Hydilla	0.0	0.0%
Slender Pondweed	332.1	3.8%
Naiad	120.8	1.4%
Proliferating Spikerush	68.1	0.8%
Narrow-leaf Spatterdock	287.9	3.3%
Native Floating Heart	8.3	0.1%
Maidencane	342.2	3.9%
Bladderwort	736.6	8.3%
Pennywort	17.6	0.2%
Nitella	0.0	0.0%
Chara	3378.4	38.2%
Yellow-eyed Grass	17.6	0.2%
Phragmites	17.6	0.2%
Lyngbya	705.9	8.0%
Total Plant Acreage	**4763.5**	**53.9%**

[a]Estimates represent the areas of potential spatial occupancy for species within the waterbody.