

2020 Lake Gaston Vegetation Survey

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Survey

Lake Gaston's aquatic vegetation community is surveyed on a yearly basis using a combination of both point and sonar surveys. Both surveys cover the entire 350 mile shoreline and are conducted between September 1st and October 31st using a collaborative effort between volunteers of the Lake Gaston Association (volunteers) and staff from North Carolina State University (NCSU).

Methods

The point site survey is conducted primarily by volunteer efforts and collects data along shoreline sites. These sites are not pre-set and are chosen at random by the survey team in the field, however they are targeted to occur every 200 feet. If lily pads are detected at a site, that distance between survey points is reduced to 100 feet. At each site, the presence of emergent and floating leaf species are recorded using a visual survey of the shoreline while submersed and algal species are recorded using a rake toss method. The rake toss method utilizes a double sided metal rake, created by welding two steel garden rake heads together, attached to a rope that is thrown towards the shoreline and dragged along the bottom to collect any submersed plant material.

Sonar surveys are conducted by NCSU staff and are used to calculate the overall biovolume of submersed vegetation within the lake. By utilizing a dual sonar rig, in which a second transducer is mounted on an extended boom arm, a large breadth of the littoral zone is able to be surveyed. The hydroacoustic data collected during this survey is post-processed using BioBase™ technology and then used in combination with point survey data to calculate acreage of submersed species such as hydrilla.

Due to the life history traits of hydrilla, a federally listed noxious weed, additional survey methods are required to evaluate this population. Hydrilla deposits tubers into the substrate that can lay dormant for up to 7 years. The point and sonar surveys identify the current status of hydrilla within the lake, but a survey of the tuber bank is needed to evaluate future growth potential within the population. Tuber surveys are conducted by NCSU staff at multiple sampling sites located across 18 creeks throughout the lake. Tubers are sampled using a core sampler that collects a circular plug of sediment, which is then washed over a screen to expose any tubers that are present. Tuber densities (tuber per m²) are calculated for each site and tracked over time.

Point Site Survey Effort

Due to unforeseen challenges related to the COVID-19 global pandemic, the 2020 survey data collection was not finalized until November 7th. During this timeframe, 35 teams comprised of 67 volunteers surveyed a total of 4,487 sites. These teams put in a total effort of 395 hours for the 2020 survey and accounted for 172 hours of the active surveying time. NCSU staff surveyed a total of 881 sites and accounted for 40 hours of active surveying time. In total, 5,368 sites were surveyed by both volunteers and NCSU in a time span of 212 hours. This level of sampling effort is comparable to previous survey years (Figure 1).

Aquatic Plant Community

Overall Vegetation

Overall, 71% of the sites surveyed contained some form of aquatic vegetation (Table 1). The aquatic plant community was made up of emergent species (67%), submergent species (2%), floating leaf plants (3%), and algal species (27%) (Figure 2). Due to the high stocking rate of Grass Carp into Lake Gaston as part of the integrated management protocol for hydrilla, the low percentage of submergent and floating leaf species is to be expected. Grass Carp will target these species along with hydrilla, while emergent and algal species are not preferred. Within the aquatic plant community, water willow made up the largest percent of the overall vegetation (45%) followed by lymnbya (17%) and chara/nitella (7%) (Figure 2). These top three species were found throughout the lake (Figures 3-5). Both water willow and chara/nitella are native and considered beneficial species, however lymnbya is considered noxious and can have negative impacts to the aquatic ecosystem.

Hydrilla

Hydrilla is located throughout Lake Gaston, however sites are small and patchy (Figure 6). NCSU has been actively involved in the management of the aquatic plant community since 2012. In this time, effective hydrilla management has decreased the standing acreage of this species from 1,541 acres in 2012 to 104 acres reported in 2020 (Figure 7). Percent occurrence of hydrilla within the point survey has followed this downward trend with 64% reported in 2012 to 1% in 2020 (Figure 7). Results from the tuber bank survey conducted in December 2020 also indicate a drastic decrease from baseline samples collected in 2012 (Table 2). The tuber bank located within the eastern portion of the lake (east of Eaton Ferry's Bridge) was almost at an undetectable level in 2020. The western portion of the lake still contains a low density tuber bank, but overall has experience drastic decreases since 2012.

Lyngbya

Lyngbya is the third most prevalent species found in Lake Gaston and overall acreage has been steadily increasing since 2014 (Figure 8). In 2020, lyngbya represented 17% of the total aquatic plant community, was present at 22% of total sites surveyed, and was estimated to cover 1,194 acres of the lake (Figure 2; Figure 8). Survey sites that contain lyngbya are incrementally ranked from 1 to 4, with 1 representing trace detection and low mat density and 4 representing gear saturation due to high mat densities (Figure 9). Few areas of Lake Gaston are completely void of lyngbya and sites receiving a 4 ranking are widespread throughout the lake. NCSU research efforts continue in the development of an effective lyngbya management protocol.

Table 1. Aquatic plants were located at 71% of total sites during the 2020 vegetation survey at Lake Gaston, NC/VA. All species were identified and the total number of survey sites that contained each was calculated. The percent of total sites surveyed (5,368 sites) and the percent of only those sites containing vegetation (3,803 sites) were also calculated for each species.

LAKE GATON AQUATIC PLANT COMMUNITY - 2020			
BY SURVEY SITES			
	# of Sites Present	% of Total Sites	% of Vegetated Sites
AMERICAN LOTUS	79	1	2
ARROW PLANTS	0	0	0
ARROWHEAD	350	7	9
CATTAIL	429	8	11
CHARA/NITELLA	515	10	14
COMPSOPOGON	206	4	5
COONTAIL	21	0	1
EEL GRASS	56	1	1
EGERIA / ELODEA	2	0	0
FLOATING LEAF	0	0	0
HYDRILLA	54	1	1
LYNGBYA	1158	22	30
NAIAD	25	0	1
NONE	1565	29	41
PICKERELWEED	265	5	7
PONDWEED	29	1	1
RUSH	249	5	7
SPATTERDOCK	168	3	4
WATER WILLOW	3082	57	81
WATERMILFOIL	35	1	1
WATERSHIELD	88	2	2
WHITE WATER LILY	108	2	3

Table 2. Hydrilla tuber bank densities (tuber / m²) are calculated on a yearly basis within 18 creeks of Lake Gaston, NC/VA. Density estimates for each creek are shown for the initial survey (2012) and the last four surveys that were conducted (2017-2020).

LAKE GATON HYDRILLA TUBER BANK ESTIMATES					
	2012	2017	2018	2019	2020
East of Eaton's Ferry Bridge					
Jimmies Creek	36.41	0	0	0	0
Timberline Shores	3.08	0	0.82	0	0
Cold Springs Branch	34.95	0	1.23	0.82	0
Lakeview	124.37	0	0	0	0
Lizards Creek	N/A	0	49.34	18.91	0
Big Stone House	31.25	0	0	0	0
Pretty Creek	38.72	0	0	0	0
Poe Creek	125.4	0	0	0.82	0
Woodland Hurst	135.67	0	4.93	0	0
Sledge Creek	8.22	0	0	0	0.82
Hamlin	446.08	16.03	6.78	14.8	0
West of Eaton's Ferry Bridge					
Hubquarter	292.73	14.14	6.78	1.64	1.64
Lyons Creek	293.96	21.58	29.33	7.4	0
Poplar Creek	89.63	19.12	0	0.82	8.22
Hawtree	38.03	123.13	59.41	37	6.58
Smith Creek	8.22	0	0	0	0
Flats	119.23	7.4	2.47	0	0
Cotton Creek	217.9	76.74	67.15	115.11	42.48

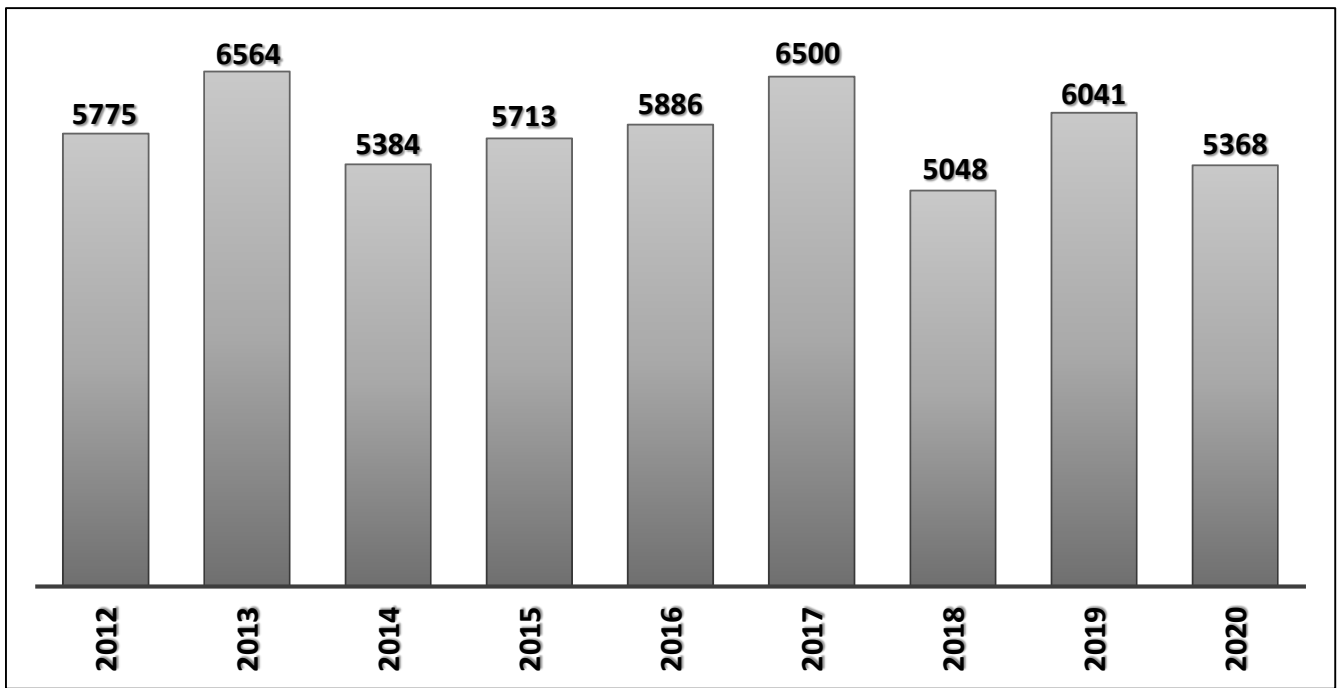


Figure 1. Bar graph representing total sites surveyed during yearly vegetation surveys conducted on Lake Gaston, NC/VA between 2012 and 2020.

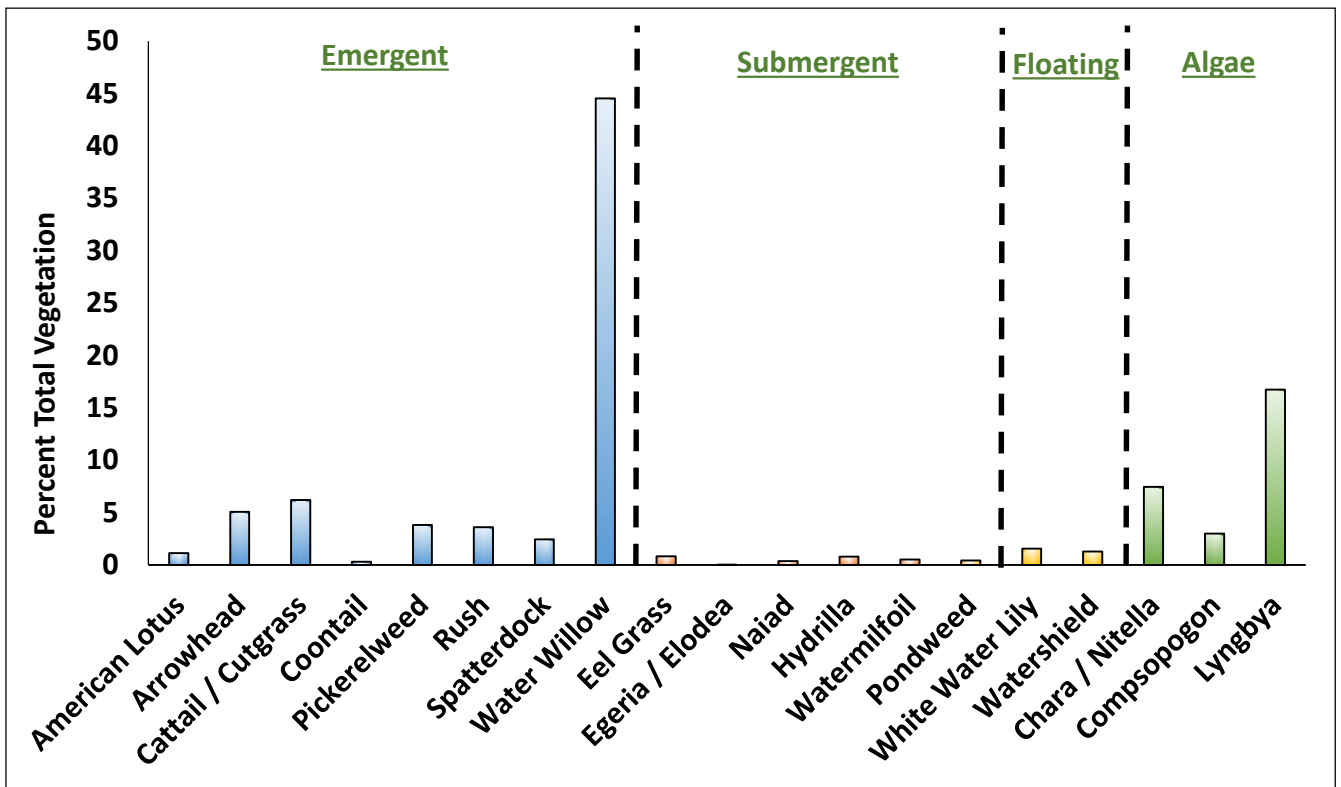


Figure 2. Bar graph representing the overall aquatic plant community of Lake Gaston, NC/VA in 2020. Overall, the community is represented by emergent (67%), submergent (2%), floating leaf (3%), and algae (27%) species.

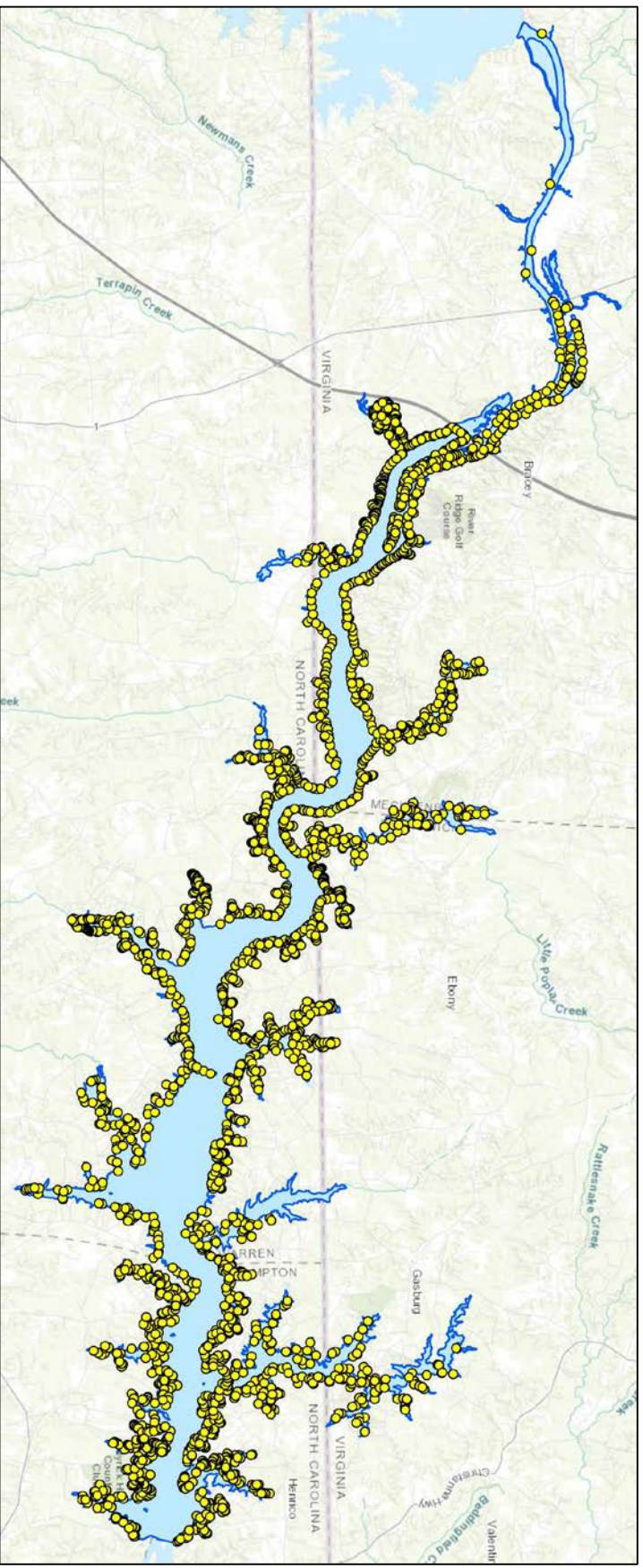


Figure 3. Map indicating sites where water willow was present during the 2020 vegetation survey Lake Gaston, NC/VA in 2020. Water willow was the most prevalent species found in 2020.

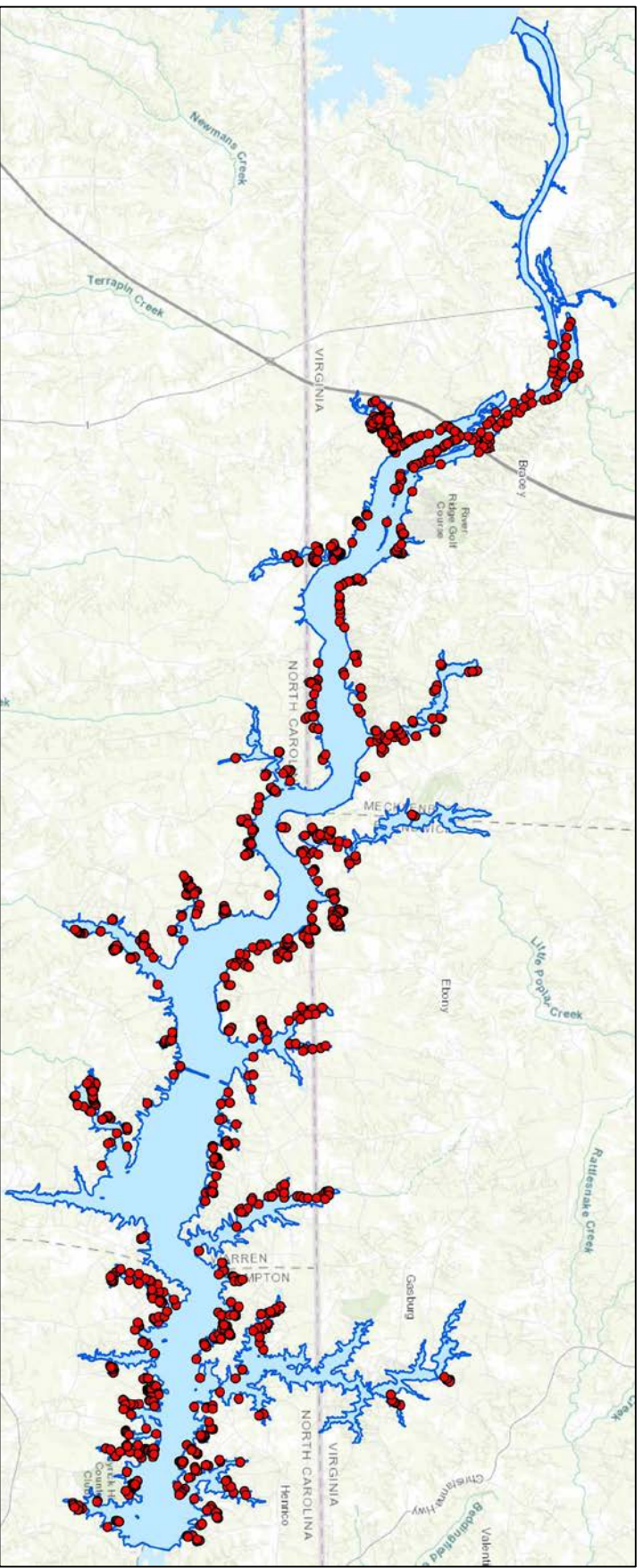


Figure 4. Map indicating sites where *Lyngbya* was present during the 2020 vegetation survey Lake Gaston, NC/VA in 2020. *Lyngbya* is a native species, but is considered to be noxious and was the second most prevalent species found in 2020.

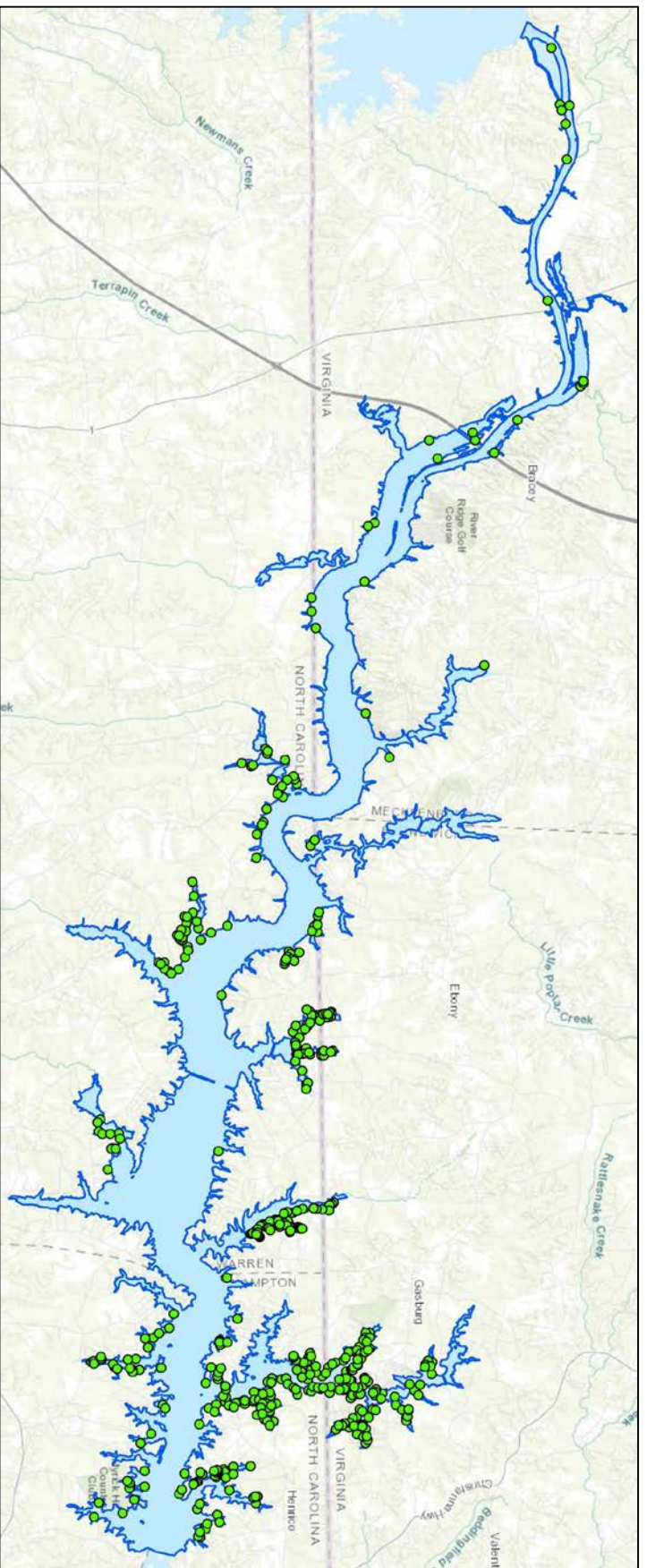


Figure 5. Map indicating sites where chara/nitella was present during the 2020 vegetation survey Lake Gaston, NC/VA in 2020. Chara/nitella was the third most prevalent species found in 2020.

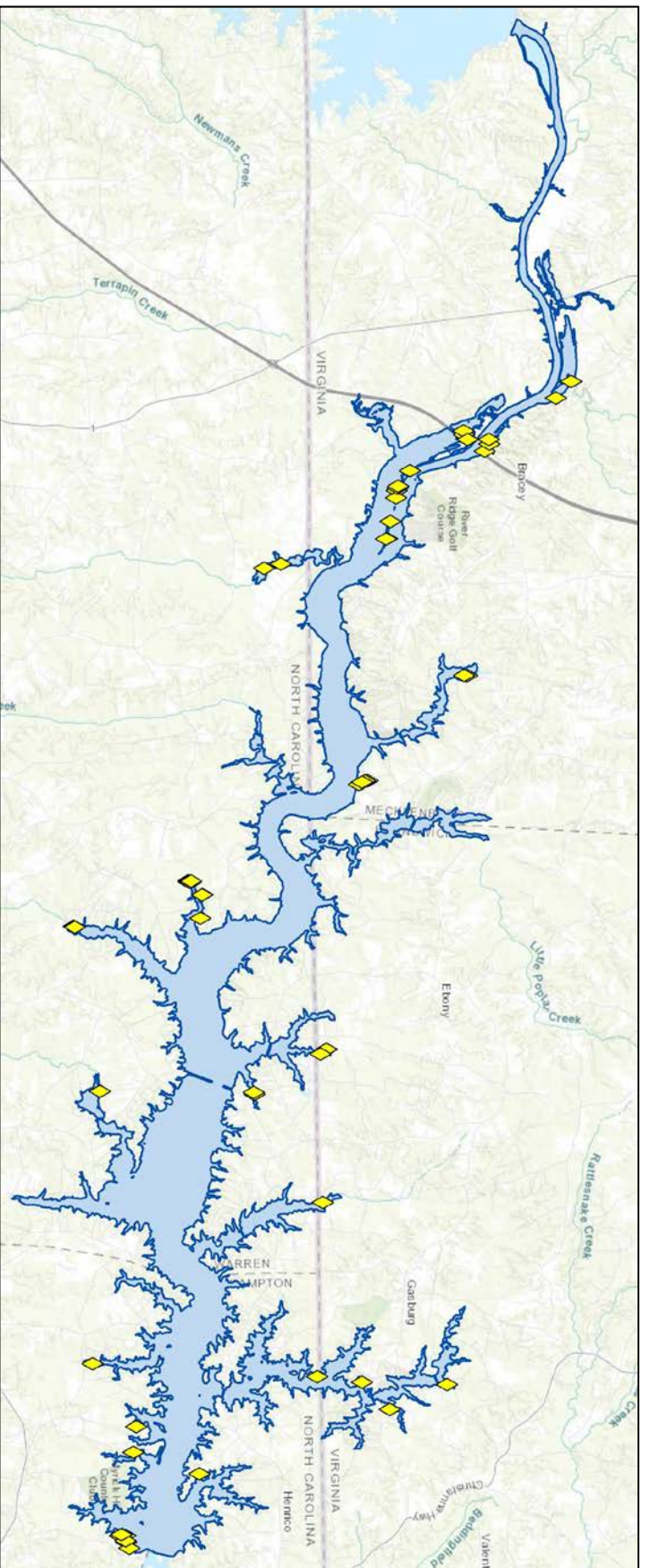


Figure 6. Map indicating sites where hydrilla was present during the 2020 vegetation survey Lake Gaston, NC/VA in 2020. Hydrilla was found at 1% of the overall sites surveyed.

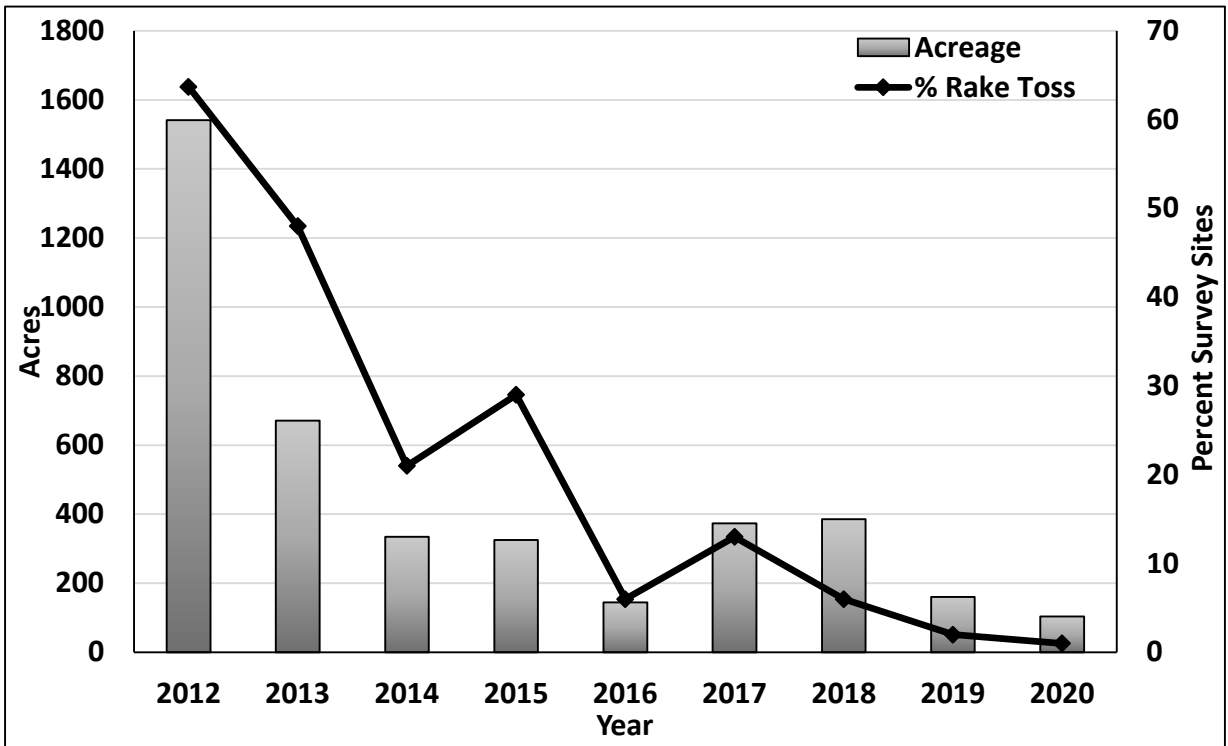


Figure 7. Estimated standing acreage (bars) and percent occurrence in the vegetation survey (line) of hydrilla in Lake Gaston, NC/VA between 2012 and 2020.

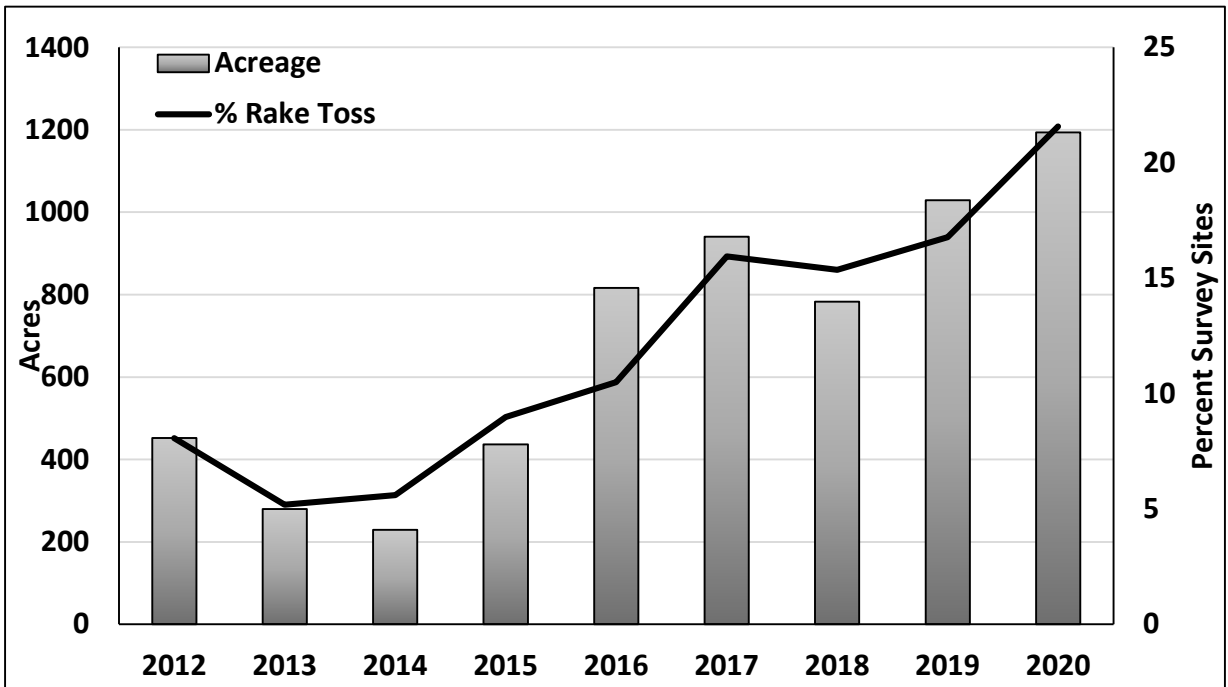


Figure 8. Estimated standing acreage (bars) and percent occurrence in the vegetation survey (line) of lyngbya in Lake Gaston, NC/VA between 2012 and 2020.

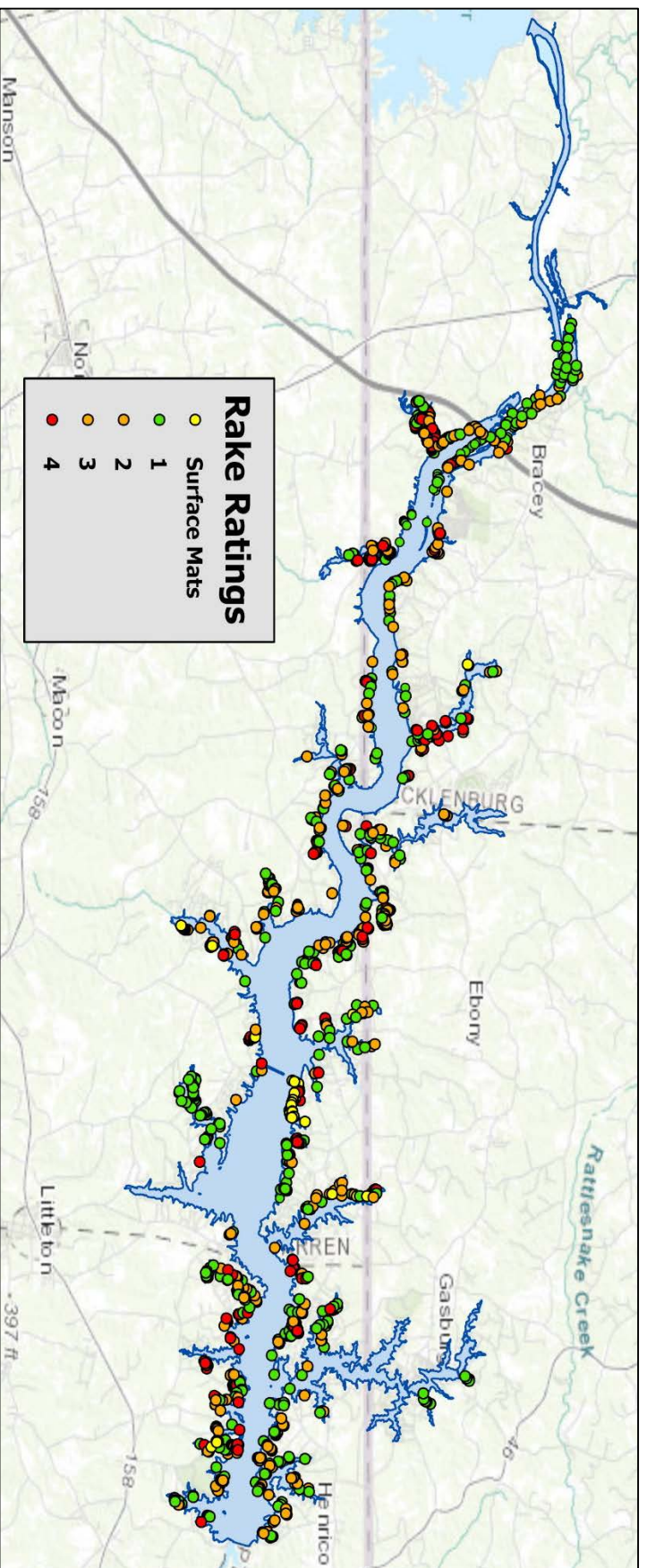


Figure 9. Map indicating the site rankings for locations that contained *Ilyngbya* during the 2020 vegetation survey of Lake Gaston, NC/VA. Survey sites are incrementally ranked with 1 (green dots) representing trace detection and low mat density, 2/3 (orange dots) representing moderate detection and mat density, and 4 (red dots) representing gear saturation due to high mat densities. Yellow dots indicate areas where surface mats were detected, however mat density was not sampled.