

2019 Survey of Aquatic Plant Species in Mississippi Waterbodies



A report submitted to the Mississippi Aquatic Invasive Species Council

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Executive Summary

Conclusions

- Only one waterbody (Lake Elvis Presley) in this survey had a plant assemblage entirely composed of native aquatic plant species.
- Of the 60 plant species observed, 5 were not found in the 2017 statewide survey.
- Hydrilla (*Hydrilla verticillata*: 9 waterbodies), torpedograss (*Panicum repens*: 8 waterbodies), alligatorweed (*Alternanthera philoxeroides*: 7 waterbodies), and parrotfeather (*Myriophyllum aquaticum*: 6 waterbodies) were the most widespread non-native species found in the survey.
- Water hyacinth (*Eichhornia crassipes*: 5 waterbodies), Cuban bulrush (*Oxycaryum cubense*: 3 waterbodies), and torpedograss (*Panicum repens*: 4 waterbodies) are of concern as they have the ability to rapidly colonize any waterbody in which they are introduced.

Recommendations

- Continue monitoring waterbodies within Mississippi for the presence of non-native aquatic plant species.
- Implement early detection, rapid response (EDRR) management options on populations of those non-native aquatic plant species known to be in Mississippi, specifically small isolated populations before they spread to other sites.
- Determine suitable goals for management of large populations of non-native aquatic plant species.
- Implement management strategies on those populations of native species that have grown to nuisance levels in Mississippi waterbodies.

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Introduction

The state of Mississippi (MS) has significant water resources that, many times, are impaired by invasive aquatic and wetland plant species. These waterbodies can then act as source populations to introduce non-native vegetation to other waterbodies in the region. The likelihood of being a source population increases if the waterbody in question has a high frequency of boat traffic. Many times, small waterbodies that have significant amounts of boat traffic are overlooked due to the size of the waterbody. Approximately 192,050 acres of MS are covered by small waterbodies (<100 acres; Willis and Neal 2012) which is greater than the five largest reservoirs (117,840 acres; Ross Barnett, Sardis, Grenada, Enid, and Arkabutla reservoirs) in the state combined (USACE 2017). The state has more small waterbodies (> 160,000) and a greater density (1 per 0.51 mi²) of small waterbodies than any other state in the MidSouth (MS, AL, AR, TN, LA, and GA) region of the United States (Willis and Neal 2012).

Many waterbodies in the state that receive the highest amount of traffic are those owned and managed by the state of MS (via the Mississippi Department of Wildlife, Fisheries, and Parks - MDWFP). Other lakes that receive a significant amount of traffic are federal lakes operated by the US Fish and Wildlife Service (USFWS), the US Forest Service (USFS), or the US Army Corps of Engineers (USACE). Aside from state and federally operated waterbodies, there are also waterbodies that are operated by private entities (e.g. Pat Harrison Waterway District) or homeowners associations within the state. Many of these waterbodies are known to have problematic vegetation while others have never been surveyed.

Two federally listed noxious weeds have been found within the state: *Hydrilla verticillata* (Hydrilla or Waterthyme) and *Salvinia molesta* (giant salvinia). Additionally, there are other non-native species that are known to cause localized problems in the waterbodies they infest (i.e. *Panicum repens* – torpedo grass).

To date, only one statewide survey of small and medium sized (100 – 7,500 acres) waterbodies in MS has been conducted within a single growing season (Turnage and Shoemaker 2018). However, that survey did not visit all the public waterbodies in the state in this size class. The purpose of this work was to survey small and medium sized waterbodies for the presence of invasive or problematic aquatic vegetation that were not visited in 2017 or that warranted a revisit.

Methodology

Water bodies were selected based on a combination of size, frequency of boat traffic, location within the state, and previous survey status. All waterbodies surveyed were lentic or slow-moving systems within the geographic boundaries of the state of Mississippi. A total of 15 waterbodies were surveyed from June through August 2019. Surveyed waterbodies were in the northern portions of the state with the main focus being the Tennessee-Tombigbee Waterway (Tenn-Tom or TTW). Aside from the Tenn-Tom, there were five state managed (MDWFP) or private lakes that were surveyed (Figure 1).

Most waterbodies were surveyed using a random walk (semi-quantitative) survey methodology. Survey points were taken by boat at intervals ranging from 150-2,000 m, depending on overall lake shoreline length (Figure 2). In general, increased length of shoreline resulted in increased distances between sampling points. Survey points were taken in the littoral zone of each waterbody, which was determined through Secchi readings (3 times the average secchi depth). At each survey point the GPS location and water depth were recorded. Plant assemblages at each point were documented via species presence for all aquatic plants (submersed rooted, floating leaved, emergent, and free-floating submersed growth forms; Sculthorpe 1967) along with certain macrophytic algae (i.e., *Nitella* spp., *Chara* spp.). All visible plants within 3.05 m (10 ft) of any part of the boat were recorded. At each survey point, a plant rake was deployed to determine the presence and identity of submersed plants. Plants that were observed but not within a sampling point were noted. Plant identification followed Godfrey and Wooten (1981a, b) and naming is consistent with the USDA-PLANTS database (plants.usda.gov).

If *Hydrilla verticillata* (hydrilla) was found in a waterbody, additional survey efforts were initiated to document and map the extent of the infestation. Upon finding hydrilla, additional survey points were taken at 50 m intervals along a grid pattern until a hydrilla-free point was reached (Figure 3). Additionally, at each point where hydrilla was present, the extent of its littoral zone infestation was quantified via periodic rake throws along a line perpendicular to the shore until water depth exceeded that of the littoral zone.

Species lists for each waterbody were compiled, including total points surveyed, percent of littoral zone vegetated, points present, and percent frequency per species and the native/non-native status of each species.

Results and Discussion

Tennessee Tombigbee Waterway (137 river miles)

AL state line to Lake Columbus (USACE):

This section of the TTW (33.345504, -88.401817) was surveyed on June 5-10, 2019. Littoral zone depth was measured at 3.6' (1.09 m; Table 1). In total, 1,062 hectares (2,630 acres) of water was surveyed within 165 kilometers (103 miles) of shoreline. Overall, 116 points were surveyed; which represented one point per 9.1 hectares (22.6 acres) and one point per 1.4 kilometers (0.9 miles) of shoreline. Out of the 116 points surveyed, 110 (94.8%) were vegetated. The three (3) most common species by presence were 1) *Justicia americana* (present at 59.5% of points) 2) *Alternanthera philoxeroides* (present at 56.9% of points) and 3) *Ludwigia peploides* (present at 33.6% of points). Non-native species (7 species) accounted for 18.9% of the 37 species observed. Of the species observed, the only federal noxious species found in this section of the TTW was *Hydrilla verticillata*. This section of the TTW ranked 3rd in diversity (Shannon-Weaver H Index) and 13th in evenness (plants were not evenly distributed) out of the 15 waterbodies surveyed.

Columbus Lake (USACE):

Columbus Lake (33.52474N, -88.47202W) was surveyed from June 13-24, 2019. Littoral zone depth was measured at 4.8' (Table 2). In total, 2,062 hectares (5,103 acres) of water was surveyed within 237 kilometers (148 miles) of shoreline. Overall, 269 points were surveyed, of which 250, or 92.9%, were vegetated. Survey point density represented one point per 7.6 hectares (18.9 acres) and one point per 0.9 kilometers (0.5 miles) of shoreline. The three (3) most common species by presence were 1) *Alternanthera philoxeroides* (present at 41.6% of points), 2) *Taxodium distichum* (present at 36.4% of points), and 3) *Justicia americana* (present at 35.7% of points). Non-native species (12 species) accounted for 26.6% of the 45 species observed. *Hydrilla verticillata*, a federal noxious weed, was not observed in Columbus Lake during this survey; however, it was observed in the lake by G. Turnage during the 2019 growing season as part of another project. *Hydrilla* was found at 12.8% of survey points in a 2017 survey of Columbus Lake (Turnage and Shoemaker 2018). *Salvinia molesta* (giant salvinia), another federal noxious weed, was observed in Columbus Lake during this survey, but not at any survey points; giant salvinia was not observed during the 2017 survey but was known to be in the lake at this time. *Panicum repens* (torpedograss), a state listed noxious weed, was observed at 6 (2.2%) survey points on Columbus Lake; torpedograss was not found during the 2017 survey. Of the 15 waterbodies surveyed, the Columbus Lake plant assemblage was the most diverse (45 species; Shannon-Weaver H Index) and ranked 9th in evenness out of the 15 waterbodies surveyed.

Aberdeen Lake (USACE):

Aberdeen Lake (33.840659, -88.508368) was surveyed from June 25 – July 3, 2019. Littoral zone depth was measured at 5.0' (Table 3). In total, 1,191 hectares (2,947 acres) of water was surveyed within 157 kilometers (98 miles) of shoreline. Overall, 117 points were surveyed, of which 107, or 91.49%, were vegetated. Survey point density represented one point per 10.1 hectares (25.2 acres) and one point per 1.3 kilometers (0.8 miles) of shoreline. The three (3) most common species by presence were 1) *Alternanthera philoxeroides* (present at 61.5% of points), 2) *Justicia americana* (present at 46.2% of points), and 3) *Ludwigia peploides* (present at 33.3% of points). Non-native species (12 species) accounted for 29.2% of the 41 species observed. *Hydrilla verticillata* and *Salvinia molesta*, both federal noxious weeds, were observed in Aberdeen Lake during this survey at 10 (8.5%) and 1 (0.9%) survey points, respectively. *Panicum repens*, a state listed noxious weed, was observed at 2 (1.7%) survey points on Aberdeen Lake. Of the 15 waterbodies surveyed, the Aberdeen Lake plant assemblage was the 2nd most diverse (41 species) and ranked 8th in evenness out of the 15 waterbodies surveyed.

Amory Lake (USACE):

Amory Lake (34.009167, -88.477142) was surveyed on July 9th and 10th, 2019. Littoral zone depth was measured at 4.1' (Table 4). In total, 296 hectares (732 acres) of water was surveyed within 24 kilometers (15 miles) of shoreline. Overall, 19 points were surveyed, of which 19, or 100%, were vegetated. Survey point density represented one point per 15.5 hectares (38.5 acres) and one point per 1.3 kilometers (0.8 miles) of shoreline. The three (3) most common species by

presence were 1) *Justicia americana* (present at 79.0% of points), 2) *Alnus* spp. (Alder, a shoreline species present at 47.4% of points), 3) *Juncus effuses* and *Taxodium distichum* (both present at 21.1% of points). Non-native species (3 species) accounted for 21.4% of the 14 species observed. No federally listed or state listed noxious weeds were observed in Amory Lake. Amory Lake ranked 9th in diversity (Shannon-Weaver H Index) and 5th in evenness out of the 15 waterbodies surveyed.

Smithville Lake (USACE):

Smithville Lake (34.063760, -88.423697) was surveyed on July 11, 2019. Littoral zone depth was measured at 4.9' (Table 5). In total, 929 hectares (2,300 acres) of water was surveyed within 62 kilometers (39 miles) of shoreline. Overall, 44 points were surveyed, of which 43, or 97.7%, were vegetated. Survey point density represented one point per 21.1 hectares (52.2 acres) and one point per 1.4 kilometers (0.9 miles) of shoreline. The three (3) most common species by presence were 1) *Justicia americana* (present at 77.3% of points), 2) *Alnus* spp. (Alder, a shoreline species present at 59.1% of points), 3) and *Potamogeton nodosus* (present at 31.8% of points). Non-native species (3 species) accounted for 12.0% of the 25 species observed. *Hydrilla verticillata*, a federally listed noxious weed, was found at 2 (4.6%) points in Smithville Lake. The Smithville Lake plant assemblage had 25 species. Smithville Lake ranked 6th in diversity (Shannon-Weaver H Index) and 11th in evenness out of the 15 waterbodies surveyed.

Fulton Lake (USACE):

Fulton Lake (34.297907, -88.419179) was surveyed on July 11th and 12th, 2019. Littoral zone depth was measured at 7.5' (Table 6). In total, 440 hectares (1,089 acres) of water was surveyed within 38 kilometers (24 miles) of shoreline. Overall, 25 points were surveyed, of which 25, or 100%, were vegetated. Survey point density represented one point per 17.6 hectares (43.6 acres) and one point per 1.5 kilometers (0.9 miles) of shoreline. The three (3) most common species by presence were 1) *Justicia americana* (present at 80.0% of points), 2) *Potamogeton nodosus* (present at 64.0% of points), and 3) *Alnus* spp. (present at 48.0% of points). Non-native species (3 species) accounted for 15.0% of the 20 species observed. *Hydrilla verticillata*, a federally listed noxious weed, was observed at 8 points (32.0%) in the Fulton Lake survey. Fulton Lake ranked 7th in diversity (Shannon-Weaver H Index) and 6th in evenness out of the 15 waterbodies surveyed.

TTW Pool D (USACE):

Pool D (34.381538, -88.396910) on the TTW was surveyed on July 15, 2019. Littoral zone depth was measured at 7.0' (Table 7). In total, 727 hectares (1,800 acres) of water was surveyed within 69 kilometers (43 miles) of shoreline. Overall, 31 points were surveyed, of which 31, or 100%, were vegetated. Survey point density represented one point per 23.5 hectares (58.0 acres) and one point per 1.2 kilometers (0.8 miles) of shoreline. The three (3) most common species by presence were 1) *Justicia americana* (present at 77.4% of points), 2) *Potamogeton nodosus*

(present at 61.3% of points), and 3) *Alnus* spp. (present at 51.6% of points). Non-native species (2 species) accounted for 8.3% of the 24 species observed. *Hydrilla verticillata*, a federally listed noxious weed, was observed at 9 points (29.0%) in Pool D survey. This section of the TTW ranked 5th in diversity (Shannon-Weaver H Index) and 7th in evenness out of the 15 waterbodies surveyed.

TTW Pool E (USACE):

Pool E (34.463695, -88.354729) on the TTW was surveyed on July 16, 2019. Littoral zone depth was measured at 8.0' (Table 8). In total, 304 hectares (752 acres) of water was surveyed within 24 kilometers (15 miles) of shoreline. Overall, 17 points were surveyed, of which 15, or 88.2%, were vegetated. Survey point density represented one point per 17.9 hectares (44.2 acres) and one point per 1.4 kilometers (0.9 miles) of shoreline. The three (3) most common species by presence were 1) *Potamogeton nodosus* (present at 64.7% of points), 2) *Vallisneria americana* (present at 52.9% of points), and 3) *Hydrilla verticillata* (present at 47.1% of points). Non-native species (3 species) accounted for 15.0% of the 20 species observed. This section of the TTW ranked 4th in diversity (Shannon-Weaver H Index) and 3rd in evenness out of the 15 waterbodies surveyed.

TTW Canal Section (USACE):

The Canal Section (34.828828, -88.302408) was surveyed from June 17-19, 2019. Littoral zone depth was measured at 19.7' (Table 9). In total, 427 hectares (1,057 acres) of water was surveyed within 78 kilometers (49 miles) of shoreline. Overall, 23 points were surveyed, of which 1, or 4.3%, were vegetated. Survey point density represented one point per 18.6 hectares (45.9 acres) and one point per 3.4 kilometers (2.1 miles) of shoreline. The only species present were 1) *Justicia americana* (present 4.3% of points), 2) *Sagittaria latifolia* (present at 4.3% of points), and 3) *Hydrilla verticillata* (present at 4.3% of points). *Hydrilla verticillata* accounted for 33.3% of the 3 species observed. This section of the TTW ranked 14th in diversity (Shannon-Weaver H Index) and 1st in evenness (plants were evenly distributed) out of the 15 waterbodies surveyed.

Pickwick Lake (USACE/TVA):

Pickwick Lake (34.992965, -88.215437) was surveyed from July 17-19, 2019. Littoral zone depth was measured at 14.2' (Table 10). In total, 1,362 hectares (3,371 acres) of water was surveyed within 69 kilometers (43 miles) of shoreline. Overall, 61 points were surveyed, of which 42, or 68.8%, were vegetated. Survey point density represented one point per 22.3 hectares (55.3 acres) and one point per 1.1 kilometers (0.7 miles) of shoreline. The three (3) most common species by presence were 1) *Justicia americana* (present at 39.3% of points), 2) *Hydrilla verticillata* (present at 26.2% of points), 3) *Alnus* spp. and *Alternanthera philoxeroides* (both present at 14.8% of points). Non-native species (4 species) accounted for 20.0% of the 20

species observed. Pickwick Lake ranked 8th in diversity (Shannon-Weaver H Index) and 12th in evenness out of the 15 waterbodies surveyed.

Hill Lakes

Lamar Bruce Lake (MDWFP):

Lamar Bruce Lake (34.389884, -88.669482) was surveyed on July 24, 2019. Littoral zone depth was measured at 4.5' (Table 11). In total, 119 hectares (294 acres) of water was surveyed within 19 kilometers (12 miles) of shoreline. Overall, 24 points were surveyed, of which 15, or 62.5%, were vegetated. Survey point density represented one point per 4.9 hectares (12.3 acres) and one point per 0.8 kilometers (0.5 miles) of shoreline. The three (3) most common species by presence were 1) *Juncus effusus* (present at 33.3% of points), 2) *Justicia americana* (present at 25.0% of points), 3) *Alnus* spp. and *Sarurus cernuus* (both present at 12.5% of points). Non-native species (1 species) accounted for 11.1% of the 9 species observed. No federally listed or state listed noxious weeds were observed during the Lamar Bruce Lake survey. Lake Lamar Bruce ranked 12th in diversity (Shannon-Weaver H Index) and 4th in evenness out of the 15 waterbodies surveyed.

Elvis Presley Lake (MDWFP):

Elvis Presley Lake (34.302519, -88.650341) was surveyed on July 25, 2019. Littoral zone depth was measured at 6.0' (Table 12). In total, 127 hectares (315 acres) of water was surveyed within 16 kilometers (10 miles) of shoreline. Overall, 21 points were surveyed, of which 19, or 90.5%, were vegetated. Survey point density represented one point per 6.1 hectares (15.0 acres) and one point per 0.8 kilometers (0.5 miles) of shoreline. The three (3) most common species by presence were 1) *Juncus effusus* (present at 85.7% of points), 2) *Chara* spp. (present at 42.9% of points), and 3) *Ceratophyllum demersum* (present at 42.9% of points). Non-native species were not observed during the Elvis Presley Lake survey; however, giant arrowhead (*Sagittaria montevidensis*) was observed in the lake during the 2017 survey. Lake Elvis Presley ranked 10th in diversity (Shannon-Weaver H Index) and 10th in evenness out of the 15 waterbodies surveyed.

Spring Lake (MDWFP):

Spring Lake (34.664318, -89.466505) at Wall Doxey State Park was surveyed on July 26, 2019. Littoral zone depth was measured at 18.2' (Table 13). In total, 13 hectares (33 acres) of water was surveyed within 3 kilometers (2 miles) of shoreline. Overall, 7 points were surveyed, of which 7, or 100%, were vegetated. Survey point density represented one point per 1.9 hectares (4.7 acres) and one point per 0.5 kilometers (0.3 miles) of shoreline. The three (3) most common species by presence were 1) *Myriophyllum spicatum* (present at 100% of points), 2) *Scirpus cyperinus* (present at 57.1% of points), 3) *Hydrilla verticillata*, *Hydrocotyle ranunculoides*, *Peltandra virginica*, and *Taxodium distichum* (all present at 42.9% of points). Non-native species

(3 species) accounted for 30.0% of the 10 species observed. Spring Lake was ranked 11th in diversity (Shannon-Weaver H Index) and 2nd in evenness out of the 15 waterbodies surveyed.

Delta Lakes

Lake Washington (Private):

Lake Washington (33.076675, -91.042330) was surveyed on July 29-30, 2019. Littoral zone depth was measured at 4.2' (Table 14). In total, 1,178 hectares (2,916 acres) of water was surveyed within 32 kilometers (20 miles) of shoreline. Overall, 16 points were surveyed, of which 16, or 100%, were vegetated. Survey point density represented one point per 73.6 hectares (182.3 acres) and one point per 2.0 kilometers (1.3 miles) of shoreline. The three (3) most common species by presence were 1) *Taxodium distichum* (present at 93.8% of points), 2) *Zizaniopsis miliaceae* (present at 37.5% of points), and 3) *Colocasia esculenta* (wild taro; present at 25.0% of points). Non-native species (2 species) accounted for 20.0% of the 10 species observed. The 2017 survey did not find *Alternanthera philoxeroides* (alligatorweed; present at 6.3% of points in this survey). Wild taro had increased significantly from 7.3% to 25.0% of points from 2017 to 2019 ($p=0.048$; Chi-square analysis). No federally or state listed noxious weeds were observed during the Lake Washington survey. Lake Washington was ranked 13th in diversity (Shannon-Weaver H Index) and 14th in evenness out of the 15 waterbodies surveyed.

Moon Lake (Private):

Moon Lake (34.423809, -90.503889) was surveyed from July 31 – Aug 2, 2019. Littoral zone depth was measured at 6.0' (Table 15). In total, 957 hectares (2,370 acres) of water was surveyed along 32 kilometers (20 miles) of shoreline. Overall, 52 points were surveyed, of which 51, or 98.1%, were vegetated. Survey point density represented one point per 18.4 hectares (45.6 acres) and one point per 0.6 kilometers (0.4 miles) of shoreline. The three (3) most common species by presence were 1) *Taxodium distichum* (present at 98.1% of points), 2) *Platanus occidentalis* (present in 3.9% of points), and 3) *Cephalanthus occidentalis* (present in 3.9% of points). Non-native species (2 species) accounted for 33.3% of the 6 species observed. No federally listed noxious weeds were observed during the Moon Lake survey; however, a state listed noxious weed (*Panicum repens*) was observed at 1 (1.9%) point during the survey; torpedograss was not observed in the lake during the 2017 survey. Moon Lake ranked 15th in diversity (Shannon-Weaver H Index) and 15th in evenness (plants were not evenly distributed) out of the 15 waterbodies surveyed.

Total Survey:

In total, 60 distinct species were encountered (Table 16) in the 15 waterbodies surveyed (Table 17); however, this is not a comprehensive list of plant species known to occur at aquatic locations in MS. Some species were only identified to the taxonomic level of Genus. A total of

13 non-native species were observed (Table 16). Of the non-native species observed, mimosa (*Albizia julibrissin*) was the most widespread (8 waterbodies; 53% of waterbodies), followed by hydrilla (*Hydrilla verticillata*; 7 waterbodies; 47% of waterbodies), and parrotfeather (*Myriophyllum aquaticum*; 6 waterbodies; 40% of waterbodies). Of the 15 waterbodies surveyed, only one had a plant assemblage composed entirely of native aquatic plant species: Elvis Presley Lake. In some waterbodies, native species also caused nuisance problems (i.e. *Ceratophyllum demersum* in Elvis Presley Lake). In total, 842 points were surveyed across 11,194 hectares (27,709 acres) of surface water encompassed in 995 kilometers (662 miles) of shoreline.

Conclusions

- Only one waterbody (Lake Elvis Presley) in this survey had a plant assemblage entirely composed of native aquatic plant species.
- Of the 60 plant species observed, 5 were not found in the 2017 statewide survey.
- Hydrilla (*Hydrilla verticillata*: 9 waterbodies), torpedograss (*Panicum repens*: 8 waterbodies), alligatorweed (*Alternanthera philoxeroides*: 7 waterbodies), and parrotfeather (*Myriophyllum aquaticum*: 6 waterbodies) were the most widespread non-native species found in the survey.
- Water hyacinth (*Eichhornia crassipes*: 5 waterbodies), Cuban bulrush (*Oxycaryum cubense*: 3 waterbodies), and torpedograss (*Panicum repens*: 4 waterbodies) are of concern as they have the ability to rapidly colonize any waterbody in which they are introduced.

Recommendations

- Continue monitoring waterbodies within Mississippi for the presence of non-native aquatic plant species.
- Implement early detection, rapid response (EDRR) management actions on populations of those non-native aquatic plant species known to be in Mississippi, specifically small isolated populations before they spread to other sites.
- Determine suitable goals for management of large populations of non-native aquatic plant species.
- Implement management strategies on those populations of native species that have grown to nuisance levels in Mississippi waterbodies.

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Tables and Figures

Table 1. Plant species present in the TTW (AL state line to Lake Columbus). An ‘*’ denotes an observed species in the waterbody not present at any survey points. Species in **red font** are non-native; species in **Bold** type are listed on the State and/or Federal Noxious Weed List.

Littoral Depth	43.5” (3.6’)	Date Surveyed	June 5-12, 2019
Species Richness	37	Total Pts. Sur	116
Native Species Richness	29	Total Pts. Veg	110
		%-Littoral Veg	94.8
Scientific Name	Common Name	# Pts. Present	%-Frequency
<i>Acer rubrum</i>	Red maple	7	6.0
<i>Albizia julibrissin</i>	Mimosa	1	0.8
<i>Alternanthera philoxeroides</i>	Alligatorweed	66	56.9
<i>Arundinaria gigantea</i>	River cane	28	24.1
<i>Baccharis halmifolia</i>	Eastern baccharis	1	0.8
<i>Boehmeria cylindrica</i>	Smallspike false nettle	7	6.0
<i>Carex spp.</i>	Sedge	2	1.7
<i>Cephalanthus occidentalis</i>	Common buttonbush	12	10.3
<i>Ceratophyllum demersum</i>	Coontail	3	2.6
<i>Colocasia esculenta</i>	Wild taro	1	0.86
<i>Crotalaria spp.</i>	Rattlebox	1	0.86
<i>Eichhornia crassipes</i>	Water hyacinth	19	16.4
<i>Eleocharis obtusa</i>	Blunt spikerush	1	0.86
<i>Eleocharis quadrangulata</i>	Squarestem spikerush	1	0.86
<i>Equisetum spp.</i>	Horsetail	9	7.76
<i>Hydrilla verticillata</i>	Hydrilla	1	0.86
<i>Hydrocotyle umbellata</i>	Manyflower marshpennywort	3	2.6
<i>Juncus effusus</i>	Common rush	3	2.6
<i>Justicia americana</i>	American water willow	69	59.5
<i>Landoltia punctata</i>	Spotted duckweed	7	6.0
<i>Lemna minor</i>	Common duckweed	10	8.6
<i>Ludwigia peploides</i>	Floating primrose-willow	39	33.6
<i>Myriophyllum aquaticum</i>	Parrotfeather	1	0.86
<i>Najas minor</i>	Brittle naiad	4	3.5
<i>Nelumbo lutea</i>	American lotus	3	2.6
<i>Nymphaea odorata</i>	White waterlily	1	0.86
<i>Panicum repens</i>	Torpedo grass	24	20.7
<i>Peltandra virginica</i>	Green arrow arum	10	8.6
<i>Platanus occidentalis</i>	American sycamore	12	10.3
<i>Sacciolepis striata</i>	American cupscale	1	0.86
<i>Sagittaria lancifolia</i>	Bulltongue arrowhead	1	0.86
<i>Sagittaria latifolia</i>	Broadleaf arrowhead	5	4.3
<i>Salix nigra</i>	Black willow	7	6.0
<i>Sarurus cernuus</i>	Lizard’s tail	21	18.1
<i>Taxodium distichum</i>	Bald cypress	38	32.8
<i>Triadica sebifera</i>	Chinese tallow	4	3.5
<i>Zizaniopsis miliacea</i>	Giant cutgrass	34	29.3

Table 2. Plant species present in Lake Columbus. An ‘*’ denotes an observed species in the waterbody not present at any survey points. Species in **red font** are non-native; species in **Bold** type are listed on the State and/or Federal Noxious Weed List.

Littoral Depth	57.6” (4.8’)	Date Surveyed	June 13-24, 2019
Species Richness	45	Total Pts. Sur	269
Native Species Richness	33	Total Pts. Veg	250
		%-Littoral Veg	92.9
Scientific Name	Common Name	# Pts. Present	%-Frequency
<i>Acer rubrum</i>	Red maple	7	2.6
<i>Albizia julibrissin</i>	Mimosa	9	3.3
<i>Alnus spp.</i>	Alder	45	16.7
<i>Alternanthera philoxeroides</i>	Alligatorweed	112	41.6
<i>Arundinaria gigantea</i>	River cane	35	13
<i>Baccharis halmifolia</i>	Eastern baccharis	18	6.7
<i>Carex spp.</i>	Sedge	2	0.7
<i>Cephalanthus occidentalis</i>	Common buttonbush	13	4.8
<i>Ceratophyllum demersum</i>	Coontail	6	2.2
<i>Colocasia esculenta</i>	Wild taro	8	3.0
<i>Eichhornia crassipes</i>	Water hyacinth	66	24.5
<i>Eleocharis obtusa</i>	Blunt spikerush	4	1.5
<i>Eleocharis quadrangulata</i>	Squarestem spikerush	1	0.4
<i>Equisetum spp.</i>	Horsetail	11	4.1
<i>Hydrocotyle ranunculoides</i>	Floating marshpennywort	12	4.5
<i>Hydrocotyle umbellata</i>	Manyflower marshpennywort	12	4.5
<i>Juncus effusus</i>	Common rush	23	8.6
<i>Justicia americana</i>	American water willow	96	35.7
<i>Landoltia punctata</i>	Spotted duckweed	32	11.9
<i>Lemna minor</i>	Common duckweed	35	13.0
<i>Limnobium spongia</i>	American frogbit	10	3.7
<i>Ludwigia peploides</i>	Floating primrose-willow	47	17.5
<i>Myriophyllum aquaticum</i>	Parrotfeather	5	1.9
<i>Myriophyllum spicatum</i>	Eurasian watermilfoil	1	0.4
<i>Najas minor</i>	Brittle naiad	1	0.4
<i>Nelumbo lutea</i>	American lotus	37	13.8
<i>Nymphaea odorata</i>	White waterlily	1	0.4
<i>Oxycaryum cubense</i>	Cuban bulrush	13	4.8
<i>Panicum repens</i>	Torpedo grass	6	2.2
<i>Peltandra virginica</i>	Green arrow arum	5	1.9
<i>Platanus occidentalis</i>	American sycamore	15	5.6
<i>Polygonum pennsylvanicum</i>	Pennsylvania smartweed	4	1.5
<i>Potamogeton nodosus</i>	Longleaf pondweed	27	10.0
<i>Quercus nigra</i>	Water oak	8	3.0
<i>Sagittaria graminea</i>	Grassy arrowhead	4	1.5
<i>Sagittaria latifolia</i>	Broadleaf arrowhead	1	0.4
<i>Salix nigra</i>	Black willow	16	5.6
<i>Salvinia minima</i>	Common salvinia	1	0.4
<i>Salvinia molesta</i>	Giant salvinia	*	-

<i>Sarurus cernuus</i>	Lizard's tail	56	20.8
<i>Sesbania herbacea</i>	Bigpod sesbania	4	1.5
<i>Taxodium distichum</i>	Bald cypress	98	36.4
<i>Triadica sebifera</i>	Chinese tallow	1	0.4
<i>Typha latifolia</i>	Broadleaf cattail	13	4.8
<i>Zizaniopsis miliacea</i>	Giant cutgrass	31	11.5

Table 3. Plant species present in Lake Aberdeen. An “*” denotes an observed species in the waterbody not present at any survey points. Species in **red font** are non-native; species in **Bold** type are listed on the State and/or Federal Noxious Weed List.

Littoral Depth	60” (5.0’)	Date Surveyed	June 25-July 3, 2019
Species Richness	41	Total Pts. Sur	117
Native Species Richness	29	Total Pts. Veg	107
		%-Littoral Veg	91.4
Scientific Name	Common Name	# Pts. Present	%-Frequency
<i>Acer rubrum</i>	Red maple	2	1.7
<i>Albizia julibrissin</i>	Mimosa	6	5.1
<i>Alnus spp.</i>	Alder	24	20.5
<i>Alternanthera philoxeroides</i>	Alligatorweed	72	61.5
<i>Arundinaria gigantea</i>	River cane	13	11.1
<i>Baccharis halmifolia</i>	Eastern Bbccharis	12	10.3
<i>Bacopa caroliniana</i>	Blue waterhyssop	3	2.6
<i>Cephalanthus occidentalis</i>	Common buttonbush	2	1.7
<i>Ceratophyllum demersum</i>	Coontail	2	1.7
<i>Colocasia esculenta</i>	Wild taro	13	11.1
<i>Eichhornia crassipes</i>	Water hyacinth	35	29.9
<i>Equisetum spp.</i>	Horsetail	6	5.1
<i>Hydrilla verticillata</i>	Hydrilla	10	8.5
<i>Hydrocotyle ranunculoides</i>	Floating marshpennywort	9	7.7
<i>Hydrocotyle umbellata</i>	Manyflower marshpennywort	5	4.3
<i>Hydrolea quadrivalvis</i>	Waterpod	6	5.1
<i>Juncus effusus</i>	Common rush	9	7.7
<i>Justicia americana</i>	American water willow	54	46.2
<i>Landoltia punctata</i>	Spotted duckweed	7	6.0
<i>Lemna minor</i>	Common duckweed	10	8.5
<i>Limnobiium spongia</i>	American frogbit	7	6.0
<i>Ludwigia leptocarpa</i>	Anglestem primrose-willow	27	23.1
<i>Ludwigia peploides</i>	Floating primrose-willow	39	33.3
<i>Myriophyllum aquaticum</i>	Parrotfeather	1	0.9
<i>Myriophyllum spicatum</i>	Eurasian watermilfoil	1	0.9
<i>Nelumbo lutea</i>	American lotus	1	0.9
<i>Oxycaryum cubense</i>	Cuban bulrush	9	7.7
<i>Panicum repens</i>	Torpedo grass	2	1.7
<i>Peltandra virginica</i>	Green arrow arum	1	0.9
<i>Potamogeton nodosus</i>	Longleaf pondweed	29	24.8
<i>Sagittaria lancifolia</i>	Bulltongue arrowhead	2	1.7
<i>Sagittaria latifolia</i>	Broadleaf arrowhead	24	20.5
<i>Salix nigra</i>	Black willow	9	7.7
<i>Salvinia minima</i>	Common salvinia	2	1.7
<i>Salvinia molesta</i>	Giant salvinia	1	0.9
<i>Sarurus cernuus</i>	Lizard’s tail	6	5.1
<i>Sesbania herbacea</i>	Bigpod sesbania	23	19.7
<i>Taxodium distichum</i>	Bald cypress	13	11.1

<i>Triadica sebifera</i>	Chinese tallow	1	0.9
<i>Typha latifolia</i>	Broadleaf cattail	18	15.4
<i>Zizaniopsis miliacea</i>	Giant cutgrass	1	0.9

Table 4. Plant species present in Amory Lake. An “*” denotes an observed species in the waterbody not present at any survey points. Species in **red font** are non-native; species in **Bold** type are listed on the State and/or Federal Noxious Weed List.

Littoral Depth	49.5” (4.1’)	Date Surveyed	July 9-10, 2019
Species Richness	14	Total Pts. Sur	19
Native Species Richness	11	Total Pts. Veg	19
		%-Littoral Veg	100
Scientific Name	Common Name	# Pts. Present	%-Frequency
<i>Albizia julibrissin</i>	Mimosa	1	5.3
<i>Alnus spp.</i>	Alder	9	47.4
<i>Alternanthera philoxeroides</i>	Alligatorweed	3	15.8
<i>Baccharis halmifolia</i>	Eastern baccharis	1	5.3
<i>Hydrocotyle umbellata</i>	Manyflower marshpennywort	1	5.3
<i>Juncus effusus</i>	Common rush	4	21.1
<i>Justicia americana</i>	American water willow	15	79.0
<i>Ludwigia leptocarpa</i>	Anglestem primrose-willow	3	15.8
<i>Ludwigia peploides</i>	Floating primrose-willow	3	15.8
<i>Oxycaryum cubense</i>	Cuban bulrush	1	5.3
<i>Potamogeton nodosus</i>	Longleaf pondweed	2	10.5
<i>Sarurus cernuus</i>	Lizard’s tail	1	5.3
<i>Taxodium distichum</i>	Bald cypress	4	21.1
<i>Typha latifolia</i>	Broadleaf cattail	2	10.5

Table 5. Plant species present in Smithville Lake. An ‘*’ denotes an observed species in the waterbody not present at any survey points. Species in **red font** are non-native; species in **Bold** type are listed on the State and/or Federal Noxious Weed List.

Littoral Depth	58.5” (4.9’)	Date Surveyed	July 11, 2019
Species Richness	25	Total Pts. Sur	44
Native Species Richness	22	Total Pts. Veg	43
		%-Littoral Veg	97.7
Scientific Name	Common Name	# Pts. Present	%-Frequency
<i>Albizia julibrissin</i>	Mimosa	2	4.6
<i>Alnus spp.</i>	Alder	26	59.1
<i>Alternanthera philoxeroides</i>	Alligatorweed	4	9.1
<i>Baccharis halmifolia</i>	Eastern baccharis	2	4.6
<i>Brasenia schreberi</i>	Watershield	2	4.6
<i>Cephalanthus occidentalis</i>	Common buttonbush	1	2.3
<i>Ceratophyllum demersum</i>	Coontail	2	4.6
<i>Eleocharis quadrangulata</i>	Squarestem spikerush	3	6.8
<i>Hydrilla verticillata</i>	Hydrilla	2	4.6
<i>Hydrolea quadrivalvis</i>	Waterpod	1	2.3
<i>Juncus effusus</i>	Common rush	8	18.2
<i>Justicia americana</i>	American water willow	34	77.3
<i>Limnobium spongia</i>	American frogbit	5	11.4
<i>Ludwigia leptocarpa</i>	Anglestem primrose-willow	5	11.4
<i>Ludwigia peploides</i>	Floating primrose-willow	5	11.4
<i>Nelumbo lutea</i>	American lotus	4	9.1
<i>Nymphaea odorata</i>	White waterlily	2	4.6
<i>Peltandra virginica</i>	Green arrow arum	5	11.4
<i>Potamogeton nodosus</i>	Longleaf pondweed	14	31.8
<i>Quercus nigra</i>	Water oak	4	9.1
<i>Sagittaria latifolia</i>	Broadleaf arrowhead	1	2.3
<i>Sesbania herbacea</i>	Bigpod sesbania	4	9.1
<i>Taxodium distichum</i>	Bald cypress	3	6.8
<i>Typha latifolia</i>	Broadleaf cattail	3	6.8
<i>Zizaniopsis miliacea</i>	Giant cutgrass	1	2.3

Table 6. Plant species present in Fulton Lake. An ‘*’ denotes an observed species in the waterbody not present at any survey points. Species in red font are non-native; species in **Bold** type are listed on the State and/or Federal Noxious Weed List.

Littoral Depth	90.0” (7.5’)	Date Surveyed	July 11-12, 2019
Species Richness	20	Total Pts. Sur	25
Native Species Richness	17	Total Pts. Veg	25
		%-Littoral Veg	100
Scientific Name	Common Name	# Pts. Present	%-Frequency
<i>Albizia julibrissin</i>	Mimosa	1	4.0
<i>Alnus spp.</i>	Alder	12	48.0
<i>Chara spp.</i>	Muskgrass	1	4.0
<i>Colocasia esculenta</i>	Wild taro	10	40.0
<i>Hydrilla verticillata</i>	Hydrilla	8	32.0
<i>Juncus effusus</i>	Common rush	4	16.0
<i>Justicia americana</i>	American water willow	20	80.0
<i>Limnobiium spongia</i>	American frogbit	1	4.0
<i>Ludwigia leptocarpa</i>	Anglestem primrose-willow	7	28.0
<i>Ludwigia peploides</i>	Floating primrose-willow	4	16.0
<i>Nelumbo lutea</i>	American lotus	1	4.0
<i>Peltandra virginica</i>	Green arrow arum	1	4.0
<i>Potamogeton nodosus</i>	Longleaf pondweed	16	64.0
<i>Sagittaria lancifolia</i>	Bulltongue arrowhead	1	4.0
<i>Sarurus cernuus</i>	Lizard’s tail	3	12.0
<i>Scirpus cyperinus</i>	Woolgrass	1	4.0
<i>Sesbania herbacea</i>	Bigpod sesbania	6	24.0
<i>Taxodium distichum</i>	Bald cypress	1	4.0
<i>Typha latifolia</i>	Broadleaf cattail	4	16.0
<i>Zizaniopsis miliacea</i>	Giant cutgrass	1	4.0

Table 7. Plant species present in the TTW Pool D. An ‘*’ denotes an observed species in the waterbody not present at any survey points. Species in **red font** are non-native; species in **Bold** type are listed on the State and/or Federal Noxious Weed List.

Littoral Depth	84” (7.0’)	Date Surveyed	July 15, 2019
Species Richness	24	Total Pts. Sur	31
Native Species Richness	22	Total Pts. Veg	31
		%-Littoral Veg	100
Scientific Name	Common Name	# Pts. Present	%-Frequency
<i>Alnus spp.</i>	Alder	16	51.6
<i>Brasenia schreberi</i>	Watershield	1	3.2
<i>Ceratophyllum demersum</i>	Coontail	4	12.9
<i>Chara spp.</i>	Muskgrass	5	16.1
<i>Hydrilla verticillata</i>	Hydrilla	9	29.0
<i>Hydrocotyle umbellata</i>	Manyflower marshpennywort	1	3.2
<i>Juncus effusus</i>	Common rush	4	12.9
<i>Justicia americana</i>	American water willow	24	77.4
<i>Ludwigia leptocarpa</i>	Anglestem primrose-willow	5	16.1
<i>Ludwigia peploides</i>	Floating primrose-willow	9	29.0
<i>Myriophyllum aquaticum</i>	Parrotfeather	2	6.5
<i>Nelumbo lutea</i>	American lotus	1	3.2
<i>Peltandra virginica</i>	Green arrow arum	1	3.2
<i>Potamogeton nodosus</i>	Longleaf pondweed	19	61.3
<i>Sagittaria lancifolia</i>	Bulltongue arrowhead	3	9.7
<i>Sagittaria latifolia</i>	Broadleaf arrowhead	1	3.2
<i>Scirpus cyperinus</i>	Woolgrass	1	3.2
<i>Sarurus cernuus</i>	Lizard’s tail	1	3.2
<i>Sesbania herbacea</i>	Bigpod sesbania	3	9.7
<i>Sparganium americanum</i>	American bur-reed	2	6.5
<i>Typha latifolia</i>	Broadleaf cattail	4	12.9
<i>Utricularia vulgaris</i>	Common bladderwort	4	12.9
<i>Vallisneria americana</i>	American eelgrass	13	41.9

Table 8. Plant species present in the TTW Pool E. An “*” denotes an observed species in the waterbody not present at any survey points. Species in **red font** are non-native; species in **Bold** type are listed on the State and/or Federal Noxious Weed List.

Littoral Depth	96” (8.0’)	Date Surveyed	July 16, 2019
Species Richness	20	Total Pts. Sur	17
Native Species Richness	17	Total Pts. Veg	15
		%-Littoral Veg	88.2
Scientific Name	Common Name	# Pts. Present	%-Frequency
<i>Alnus spp.</i>	Alder	6	35.3
<i>Ceratophyllum demersum</i>	Coontail	3	17.7
<i>Chara spp.</i>	Muskgrass	3	17.7
<i>Hydrilla verticillata</i>	Hydrilla	8	47.1
<i>Juncus effusus</i>	Common rush	6	35.3
<i>Justicia americana</i>	American water willow	4	23.5
<i>Ludwigia leptocarpa</i>	Anglestem primrose-willow	1	5.9
<i>Ludwigia peploides</i>	Floating primrose-willow	1	5.9
<i>Myriophyllum aquaticum</i>	Parrotfeather	1	5.9
<i>Myriophyllum spicatum</i>	Eurasian watermilfoil	6	35.3
<i>Potamogeton nodosus</i>	Longleaf pondweed	11	64.7
<i>Sagittaria graminea</i>	Grassy arrowhead	3	17.7
<i>Sagittaria lancifolia</i>	Bulltongue arrowhead	2	11.8
<i>Sagittaria latifolia</i>	Broadleaf arrowhead	1	5.9
<i>Scirpus cyperinus</i>	Woolgrass	1	5.9
<i>Sesbania herbacea</i>	Bigpod sesbania	2	11.8
<i>Taxodium distichum</i>	Bald cypress	1	5.9
<i>Typha latifolia</i>	Broadleaf cattail	4	23.5
<i>Vallisneria americana</i>	American eelgrass	9	52.9
<i>Zizaniopsis miliacea</i>	Giant cutgrass	2	11.8

Table 9. Plant species present in the TTW Canal section between Bay Springs Lake and Pickwick Lake. An ‘*’ denotes an observed species in the waterbody not present at any survey points. Species in **red font** are non-native; species in **Bold** type are listed on the State and/or Federal Noxious Weed List.

Littoral Depth	236.2" (19.7')	Date Surveyed	July 17-19, 2019
Species Richness	3	Total Pts. Sur	23
Native Species Richness	2	Total Pts. Veg	1
		%-Littoral Veg	4.3
Scientific Name	Common Name	# Pts. Present	%-Frequency
<i>Hydrilla verticillata</i>	Hydrilla	1	4.3
<i>Justicia americana</i>	American water willow	1	4.3
<i>Sagittaria latifolia</i>	Broadleaf arrowhead	1	4.3

Table 10. Plant species present in Pickwick Lake. An ‘*’ denotes an observed species in the waterbody not present at any survey points. Species in **red font** are non-native; species in **Bold** type are listed on the State and/or Federal Noxious Weed List.

Littoral Depth	171.3” (14.2’)	Date Surveyed	July 22-23, 2019
Species Richness	20	Total Pts. Sur	61
Native Species Richness	16	Total Pts. Veg	42
		%-Littoral Veg	68.8
Scientific Name	Common Name	# Pts. Present	%-Frequency
<i>Albizia julibrissin</i>	Mimosa	7	11.5
<i>Alnus spp.</i>	Alder	9	14.8
<i>Alternanthera philoxeroides</i>	Alligatorweed	9	14.8
<i>Cephalanthus occidentalis</i>	Common buttonbush	1	1.6
<i>Ceratophyllum demersum</i>	Coontail	1	1.6
<i>Chara spp.</i>	Muskgrass	1	1.6
<i>Eichhornia crassipes</i>	Water hyacinth	1	1.6
<i>Eleocharis vivipara</i>	Viviparous spikerush	2	3.3
<i>Hydrilla verticillata</i>	Hydrilla	16	26.2
<i>Hydrocotyle ranunculoides</i>	Floating marshpennywort	1	1.6
<i>Hydrocotyle umbellata</i>	Manyflower marshpennywort	1	1.6
<i>Juncus effusus</i>	Common rush	5	8.2
<i>Justicia americana</i>	American water willow	24	39.3
<i>Potamogeton nodosus</i>	Longleaf pondweed	1	1.6
<i>Sagittaria graminea</i>	Grassy arrowhead	1	1.6
<i>Sagittaria latifolia</i>	Broadleaf arrowhead	5	8.2
<i>Sarurus cernuus</i>	Lizard’s tail	3	4.9
<i>Scirpus cyperinus</i>	Woolgrass	1	1.6
<i>Taxodium distichum</i>	Bald cypress	7	11.5
<i>Zizaniopsis miliacea</i>	Giant cutgrass	1	1.6

Table 11. Plant species present in Lake Lamar Bruce. An ‘*’ denotes an observed species in the waterbody not present at any survey points. Species in **red font** are non-native; species in **Bold** type are listed on the State and/or Federal Noxious Weed List.

Littoral Depth	54.0” (4.5’)	Date Surveyed	July 24, 2019
Species Richness	9	Total Pts. Sur	24
Native Species Richness	8	Total Pts. Veg	15
		%-Littoral Veg	62.5
Scientific Name	Common Name	# Pts. Present	%-Frequency
<i>Albizia julibrissin</i>	Mimosa	1	4.2
<i>Alnus spp.</i>	Alder	3	12.5
<i>Eleocharis quadrangulata</i>	Squarestem spikerush	2	8.3
<i>Juncus effusus</i>	Common rush	8	33.3
<i>Justicia americana</i>	American water willow	6	25.0
<i>Sarurus cernuus</i>	Lizard’s tail	3	12.5
<i>Scirpus cyperinus</i>	Woolgrass	1	4.2
<i>Taxodium distichum</i>	Bald cypress	1	4.2
<i>Typha latifolia</i>	Broadleaf cattail	1	4.2

Table 12. Plant species present in Elvis Presley Lake. An ‘*’ denotes an observed species in the waterbody not present at any survey points. Species in **red font** are non-native; species in **Bold** type are listed on the State and/or Federal Noxious Weed List.

Littoral Depth	72.0" (6.0')	Date Surveyed	July 25, 2019
Species Richness	14	Total Pts. Sur	21
Native Species Richness	14	Total Pts. Veg	19
		%-Littoral Veg	90.5
Scientific Name	Common Name	# Pts. Present	%-Frequency
<i>Brasenia schreberi</i>	Watershield	1	4.8
<i>Cephalanthus occidentalis</i>	Common buttonbush	2	9.5
<i>Ceratophyllum demersum</i>	Coontail	9	42.9
<i>Chara spp.</i>	Muskgrass	9	42.9
<i>Eleocharis quadrangulata</i>	Squarestem spikerush	1	4.8
<i>Eleocharis vivipara</i>	Viviparous spikerush	2	9.5
<i>Hydrocotyle ranunculoides</i>	Floating marshpennywort	1	4.8
<i>Hydrocotyle umbellata</i>	Manyflower marshpennywort	2	9.5
<i>Juncus effusus</i>	Common rush	18	85.7
<i>Peltandra virginica</i>	Green arrow arum	3	14.3
<i>Potamogeton nodosus</i>	Longleaf pondweed	6	28.6
<i>Sagittaria latifolia</i>	Broadleaf arrowhead	3	14.3
<i>Scirpus cyperinus</i>	Woolgrass	2	9.5
<i>Utricularia vulgaris</i>	Common bladderwort	1	4.8

Table 13. Plant species present in Spring Lake at Wall Doxey State Park. An ‘*’ denotes an observed species in the waterbody not present at any survey points. Species in **red font** are non-native; species in **Bold** type are listed on the State and/or Federal Noxious Weed List.

Littoral Depth	218.5” (18.2’)	Date Surveyed	July 26, 2019
Species Richness	10	Total Pts. Sur	7
Native Species Richness	7	Total Pts. Veg	7
		%-Littoral Veg	100
Scientific Name	Common Name	# Pts. Present	%-Frequency
<i>Eleocharis quadrangulata</i>	Squarestem spikerush	2	28.6
<i>Hydrilla verticillata</i>	Hydrilla	3	42.9
<i>Hydrocotyle ranunculoides</i>	Floating marshpennywort	3	42.9
<i>Juncus effusus</i>	Common rush	2	28.6
<i>Myriophyllum aquaticum</i>	Parrotfeather	1	14.3
<i>Myriophyllum spicatum</i>	Eurasian watermilfoil	7	100.0
<i>Peltandra virginica</i>	Green arrow arum	3	42.9
<i>Sagittaria latifolia</i>	Broadleaf arrowhead	1	14.3
<i>Scirpus cyperinus</i>	Woolgrass	4	57.1
<i>Taxodium distichum</i>	Bald cypress	3	42.9

Table 14. Plant species present in Lake Washington. An “*” denotes an observed species in the waterbody not present at any survey points. Species in **red font** are non-native; species in **Bold** type are listed on the State and/or Federal Noxious Weed List.

Littoral Depth	50.8” (4.2’)	Date Surveyed	July 29-30, 2019
Species Richness	10	Total Pts. Sur	16
Native Species Richness	8	Total Pts. Veg	16
		%-Littoral Veg	100
Scientific Name	Common Name	# Pts. Present	%-Frequency
<i>Alternanthera philoxeroides</i>	Alligatorweed	1	6.3
<i>Cephalanthus occidentalis</i>	Common buttonbush	1	6.3
<i>Colocasia esculenta</i>	Wild taro	4	25.0
<i>Equisetum spp.</i>	Horsetail	1	6.3
<i>Landoltia punctata</i>	Spotted duckweed	3	18.8
<i>Lemna minor</i>	Common duckweed	2	12.5
<i>Sarurus cernuus</i>	Lizard’s tail	1	6.3
<i>Sesbania herbacea</i>	Bigpod sesbania	1	6.3
<i>Taxodium distichum</i>	Bald cypress	15	93.8
<i>Zizaniopsis miliacea</i>	Giant cutgrass	6	37.5

Table 15. Plant species present in Moon Lake. An “*” denotes an observed species in the waterbody not present at any survey points. Species in **red font** are non-native; species in **Bold** type are listed on the State and/or Federal Noxious Weed List.

Littoral Depth	72.0” (6.0’)	Date Surveyed	July 31-Aug 2, 2019
Species Richness	6	Total Pts. Sur	52
Native Species Richness	4	Total Pts. Veg	51
		%-Littoral Veg	98.1
Scientific Name	Common Name	# Pts. Present	%-Frequency
<i>Cephalanthus occidentalis</i>	Common buttonbush	2	3.9
<i>Eichhornia crassipes</i>	Water hyacinth	1	1.9
<i>Equisetum spp.</i>	Horsetail	1	1.9
<i>Panicum repens</i>	Torpedo grass	1	1.9
<i>Platanus occidentalis</i>	American sycamore	2	3.9
<i>Taxodium distichum</i>	Bald cypress	51	98.1

Table 16. List of all species encountered during this survey. In the native status column, a ‘-’ indicates that the native status is not known.

Scientific Name	Common Native	Status	2017 Lakes	2019 Lakes
<i>Acer rubrum</i>	Red maple	Nat	1	3
<i>Albizia julibrissin</i>	Mimosa	Non-nat	-	8
<i>Algae spp.</i>	Algae	-	7	-
<i>Alnus spp.</i>	Alder	Nat	-	9
<i>Alternanthera philoxeroides</i>	Alligatorweed	Non-nat	30	7
<i>Arundinaria gigantea</i>	Giant cane	Nat	2	3
<i>Azolla caroliniana</i>	Carolina mosquitofern	Nat	1	-
<i>Baccharis halimifolia</i>	Eastern baccharis	Nat	5	5
<i>Bacopa caroliniana</i>	Blue waterhyssop	Nat	4	1
<i>Bacopa spp.</i>	Waterhyssop	-	2	-
<i>Boehmeria cylindrica</i>	Smallspike false nettle	Nat	2	1
<i>Brasenia schreberi</i>	Watershield	Nat	16	3
<i>Callicarpa americana</i>	American beautyberry	Nat	1	-
<i>Carex spp.</i>	Sedge	-	1	2
<i>Carya aquatica</i>	Water hickory	Nat	2	-
<i>Cephalanthus occidentalis</i>	Common buttonbush	Nat	21	8
<i>Ceratophyllum demersum</i>	Coontail	Nat	10	8
<i>Chara spp.</i>	Muskgrass	Nat	11	5
<i>Colocasia esculenta</i>	Wild taro	Non-nat	8	5
<i>Crataegus spp.</i>	Hawthorn	Nat	1	-
<i>Crotalaria spp.</i>	Rattlebox	-	-	1
<i>Cyperus esculentus</i>	Yellow nutsedge	Non-nat	4	-
<i>Cyperus odoratus</i>	Fragrant flatsedge	Nat	4	-
<i>Cyperus spp.</i>	Flatsedge	-	1	-
<i>Digitaria spp.</i>	Crabgrass	-	2	-
<i>Drepanocladus spp.</i>	Watermoss	-	1	-
<i>Dulichium arundinaceum</i>	Three-way sedge	Nat	1	-
<i>Echinodorus cordifolius</i>	Creeping burhead	Nat	5	-
<i>Eichhornia crassipes</i>	Water hyacinth	Non-nat	8	5
<i>Eleocharis obtusa</i>	Blunt spikerush	Nat	4	2
<i>Eleocharis quadrangulata</i>	Squarestem spikerush	Nat	2	6
<i>Eleocharis spp.</i>	Spikerush	-	1	-
<i>Eleocharis vivipara</i>	Viviparous spikerush	Nat	14	2
<i>Equisetum spp.</i>	Horsetail	-	2	5
<i>Eupatorium serotinum</i>	Lateflowering thoroughwort	Nat	3	-
<i>Fraxinus pennsylvanica</i>	Green ash	Nat	3	-
<i>Hibiscus laevis</i>	Halberdleaf rosemallow	Nat	2	-

<i>Hibiscus moscheutos</i>	Crimsoneyed rosemallow	Nat	1	-
<i>Hydrilla verticillata</i>	Hydrilla	Non-nat	5	9
<i>Hydrocotyle ranunculoides</i>	Floating marshpennywort	Nat	2	5
<i>Hydrocotyle spp.</i>	Pennywort	-	4	-
<i>Hydrocotyle umbellata</i>	Manyflower marshpennywort	Nat	12	7
<i>Hydrolea quadrivalvis</i>	Waterpod	Nat	6	2
<i>Juncus effusus</i>	Common rush	Nat	15	12
<i>Juncus repens</i>	Lesser creeping rush	Nat	3	-
<i>Juncus spp.</i>	Rush	-	3	-
<i>Justicia americana</i>	American water-willow	Nat	6	11
<i>Landoltia punctata</i>	Spotted duckweed	Nat	-	4
<i>Leersia oryzoides</i>	Rice cutgrass	Nat	2	-
<i>Lemna minor</i>	Common duckweed	Nat	3	4
<i>Lemna spp.</i>	Duckweed	-	3	-
<i>Limnobium spongia</i>	American frogbit	Nat	3	4
<i>Lindera benzoin</i>	Northern spicebush	Nat	4	-
<i>Liquidambar styraciflua</i>	Sweetgum	Nat	4	-
<i>Ludwigia arcuata</i>	Piedmont primrose-willow	Nat	2	-
<i>Ludwigia leptocarpa</i>	Anglestem primrose-willow	Nat	-	6
<i>Ludwigia palustris</i>	Marsh seedbox	Nat	3	-
<i>Ludwigia peploides</i>	Floating primrose-willow	Nat	18	8
<i>Ludwigia spp.</i>	Primrose	Nat	2	-
<i>Mayaca fluviatilis</i>	Stream bogmoss	Nat	1	-
<i>Myriophyllum aquaticum</i>	Parrotfeather	Non-nat	6	6
<i>Myriophyllum heterophyllum</i>	Variableleaf watermilfoil	Nat	1	-
<i>Myriophyllum spicatum</i>	Eurasian watermilfoil	Non-nat	3	4
<i>Najas guadalupensis</i>	Southern naiad	Nat	10	-
<i>Najas minor</i>	Brittle naiad	Non-nat	12	2
<i>Nelumbo lutea</i>	American lotus	Nat	11	6
<i>Nitella spp.</i>	Stonewort	-	7	-
<i>Nuphar lutea</i>	Spatterdock	Nat	4	-
<i>Nymphaea odorata</i>	American white waterlily	Nat	20	3
<i>Nyssa aquatica</i>	Water tupelo	Nat	4	-
<i>Oxycaryum cubense</i>	Cuban bulrush	Non-nat	7	3
<i>Panicum hemitomon</i>	Maidencane	Nat	1	-
<i>Panicum repens</i>	Torpedo grass	Non-nat	15	4
<i>Panicum rigidulum</i>	Redtop panicgrass	Nat	1	-
<i>Panicum spp.</i>	Panicgrass	-	4	-
<i>Peltandra virginica</i>	Green arrow arum	Nat	2	8
<i>Phragmites australis</i>	Common reed	Non-nat	1	-
<i>Platanus occidentalis</i>	American sycamore	Nat	7	3

<i>Pluchea camphorata</i>	Camphorweed	Nat	2	-
<i>Polygonum amphibium</i>	Water knotweed	Nat	3	-
<i>Polygonum hydropiperoides</i>	Swamp smartweed	Nat	7	-
<i>Polygonum pennsylvanicum</i>	Pennsylvania smartweed	Nat	1	1
<i>Polygonum spp.</i>	Knotweed	-	10	-
<i>Potamogeton crispus</i>	Curlyleaf pondweed	Non-Nat	1	-
<i>Potamogeton diversifolius</i>	Waterthread pondweed	Nat	8	-
<i>Potamogeton foliosus</i>	Leafy pondweed	Nat	10	-
<i>Potamogeton illinoensis</i>	Illinois pondweed	Nat	2	-
<i>Potamogeton nodosus</i>	Longleaf pondweed	Nat	6	9
<i>Quercus nigra</i>	Water oak	Nat	1	2
<i>Rhynchospora corniculata</i>	Shortbristle horned beaksedge	Nat	5	-
<i>Saccharum giganteum</i>	Sugarcane plumegrass	Nat	6	-
<i>Sacciolepis striata</i>	American cupscale	Nat	5	1
<i>Sagittaria graminea</i>	Grassy arrowhead	Nat	3	3
<i>Sagittaria lancifolia</i>	Bulltongue arrowhead	Nat	11	5
<i>Sagittaria latifolia</i>	Broadleaf arrowhead	Nat	9	10
<i>Sagittaria montevidensis</i>	Giant arrowhead	Non-nat	2	-
<i>Salix nigra</i>	Black willow	Nat	12	3
<i>Salvinia minima</i>	Common salvinia	Non-nat	3	2
<i>Salvinia molesta</i>	Giant salvinia	Non-nat	-	2
<i>Saururus cernuus</i>	Lizard's tail	Nat	17	9
<i>Scirpus cyperinus</i>	Woolgrass	Nat	9	7
<i>Sesbania herbacea</i>	Bigpod sesbania	Nat	1	7
<i>Sparganium americanum</i>	American bur-reed	Nat	7	1
<i>Stuckenia pectinata</i>	Sago pondweed	Nat	4	-
<i>Taxodium distichum</i>	Bald cypress	Nat	19	12
<i>Tillandsia usneoides</i>	Spanish moss	Nat	1	-
<i>Triadenum walteri</i>	Greater marsh St. Johnswort	Nat	2	-
<i>Triadica sebifera</i>	Chinese tallow	Non-nat	1	3
<i>Typha latifolia</i>	Broadleaf cattail	Nat	-	8
<i>Typha spp.</i>	Cattail	-	23	-
<i>Utricularia spp.</i>	Bladderwort	-	16	-
<i>Utricularia vulgaris</i>	Common bladderwort	Nat	-	2
<i>Vallisneria americana</i>	American eelgrass	Nat	-	2
<i>Zizaniopsis miliacea</i>	Giant cutgrass	Nat	7	8

Table 17. Waterbodies surveyed in 2017 and 2019; an ‘X’ denotes a survey was conducted in that year; waterbodies in **red font** had non-native species present while those in **bold font** had federally or state listed noxious weeds present.

Lakes	2017	2019	Management Entity*
Aberdeen (TTW)		X	USACE
Amory (TTW)		X	USACE
Anchor	X		Private
Archusa Creek	X		PHW
Bay Springs (TTW)	X		USACE
Bee	X		Private
Bill Waller	X		MDWFP
Bogue Homa	X		MDWFP
Bluff	X		USFWS
Calling Panther	X		MDWFP
Caroline	X		Private
Clarkco Lake	X		MDWFP
Claude Bennett	X		MDWFP
Columbia	X		MDWFP
Columbus (TTW)	X		USACE
Dry Creek	X		PHW
Elvis Presley	X	X	MDWFP
English	X		MDWFP
Flint Creek	X		PHW
Fulton (TTW)		X	USACE
Geiger	X		MDWFP
Hideaway	X		Private
Kemper	X		MDWFP
Lamar Bruce	X	X	MDWFP
Lincoln	X		MDWFP
Loakfoma	X		USFWS
Lowndes	X		MDWFP
Mary	X		Private
Mary Crawford	X		MDWFP
Maynor Creek	X		PHW
Mike Connor	X		MDWFP
Moon	X	X	Private
Natchez	X		Private
Okhissa	X		USFS
Perry	X		MDWFP
Pickwick (TTW/TVA)		X	USACE/TVA
Pool D (TTW)		X	USACE

Pool E (TTW)		X	USACE
Prentiss Walker	X		MDWFP
Roosevelt	X		MDWFP
Simpson-Legion	X		MDWFP
Smithville (TTW)		X	USACE
Spring		X	MDWFP
Tangipahoa	X		MDWFP
Tippah	X		MDWFP
Tombigbee	X		MDWFP
TTW AL-Col		X	USACE
TTW Canal		X	USACE
Turkey Creek	X		PHW
Turkey Fork	X		PHW
Walthall	X		MDWFP
Washington	X	X	Private

*In the Management Entity column: USACE is U.S. Army Corps of Engineers; PHW is Pat Harrison Waterway District; MDWFP is MS Department of Wildlife, Fisheries, and Parks; USFWS is U.S. Fish and Wildlife Service; USFS is the U.S. Forest Service; and TVA is the Tennessee Valley Authority.

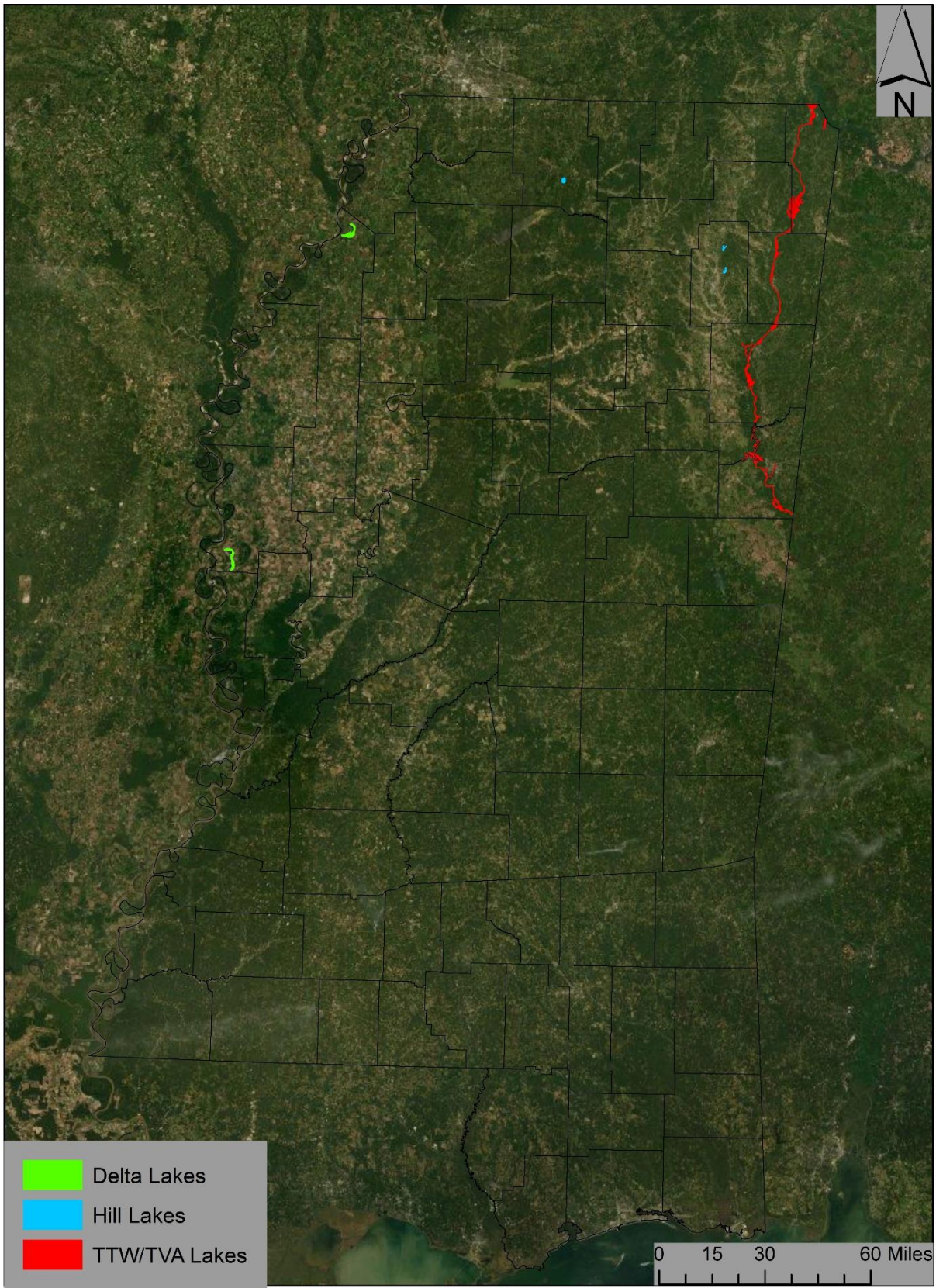


Figure 1. Location of Mississippi waterbodies surveyed in 2019.