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REDISCOVERY OF *DICHANTHELIUM HIRSTII* (POACEAE) IN GEORGIA

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ABSTRACT

The globally rare grass *Dichanthelium hirstii* was rediscovered in Sumter Co., Georgia, after not being seen for 67 years. Prior to its rediscovery, it was collected in Georgia by Roland Harper in 1900 and Robert Thorne in 1947. Its confirmation as an extant part of the state's flora is documented here and aspects of its biology, as well as the pertinent collection history, are discussed.

In the year 1900, in Sumter Co., Georgia, Roland Harper collected a grass that he labeled simply as "*Panicum,*" from a "muddy margin of pine-barren pond" (23 Aug, *458*, NY). Harper later annotated the specimen by writing "*neuranthum* Griseb. (Det. G.V. Nash) [no date]" following "*Panicum.*" Forty-seven years after Harper's collection, Robert Thorne collected a grass in Calhoun Co., Georgia, that he labeled as "*affin.* [akin to] *Panicum neuranthum* Griseb.," from a "cypress swamp, 1 mile north of Leary" (31 May, 1947, *4313*, US.). Thorne later annotated the specimen by crossing out his initial determination and writing "*roanokense* Ashe [no date]" above "*neuranthum* Griseb." Thorne did not include *Panicum roanokense* Ashe [= D*ichanthelium dichotomum* var. *roanokense* (Ashe) LeBlond] from Calhoun Co. in his paper on the flora of southwest Georgia (Thorne 1954), nor did he recognize *Panicum neuranthum* Griseb. [= *Dichanthelium neuranthum* (Griseb.) LeBlond].

Eleven years after Thorne's collection in Georgia, in July 1958 in Atlantic Co., New Jersey, the brothers Frank (1928-2009) and Bob Hirst (1925-1963) discovered a "strange looking" (Frank Hirst, pers. comm.) grass growing in a seasonally flooded wetland depression (Walz 2012; CNOR 2014). Frank made a collection of this plant in 1959 and labeled the specimen only as "*Panicum,*" from "Leipzig Ave. Pond, Germania" (7 Jun, *47*, US). Unable to apply a species name, the brothers asked Bayard Long, curator of herbarium PH (Academy of Natural Sciences, Philadelphia) for help with identification (Frank Hirst, pers. comm.; Walz 2012). Long recognized that the plant was likely new to science (Frank Hirst, pers. comm.; Walz 2012), so he sent Frank's specimen *47* to J.R. Swallen, a Poaceae expert at herbarium US (National Museum, Smithsonian Institution, Washington, D.C. (Swallen 1961; Walz 2012). Swallen (1961) described the Hirst collection as a new species [*Panicum hirstii* Swallen = *Dichanthelium hirstii* (Swallen) Kartesz] and designated *Hirst 47* as the type. Swallen also examined Harper's specimen *458* and Thorne's specimen *4313* and determined

that these collections were also *Panicum* (*Dichanthelium*) *hirstii* (Swallen 1961). Swallen likely used the singular epithet *hirstii* because only Frank's name was on the label of the type specimen, but the common name, Hirst Brothers' Panic Grass (plural possessive), recognizes both brothers as co-discoverers.

In 1960, the Hirst brothers found a second population of *Dichanthelium hirstii* in New Jersey (Atlantic Co., "pond-bog, sw of Duerer St. and sw of Leipzig Ave., (new location), Germania," 21 Jul 1960, *Hirst 53*, PH), not far from their first collection in 1958 (Walz 2012; CNOR 2014). In 1984, Frank Hirst discovered *D. hirstii* in Sussex Co., Delaware (10 Aug, *110*, DOV), while doing rare plant surveys in seasonally flooded wetland depressions. In 1990, Richard LeBlond discovered *D. hirstii* growing in two sites while doing surveys in pond cypress savanna wetlands on the Camp Lejeune Marine Corps Base in Onslow Co., North Carolina (LeBlond & Sorrie 2001). In July 2004, Russell Juelg and Ted Gordon (Walz 2012; CNOR 2014) discovered a third population of *D. hirstii* for New Jersey in Burlington Co., approximately 29 km (18 mi) north-northwest of the Atlantic Co. site of 1958 (Walz 2012; CNOR 2014).

Dichanthelium hirstii was declared a Candidate species for listing as either Threatened or Endangered by the U.S. Fish & Wildlife Service (Federal Register 1999; CNOR 2014). This status has given incentive for a range-wide status survey of *D. hirstii*, which is ongoing and includes monitoring of existing populations and searches for undocumented populations. Due to the rarity of *D. hirstii* in Georgia, the first author, with funding from the USFWS and assistance from the co-authors, planned and conducted field surveys in Georgia for the species in 2013 and 2014. The objectives were to determine whether suitable habitat still existed for *D. hirstii* and to relocate the historic populations or find previously unknown populations.

METHODS

Surveys targeted potential habitat in southwest Georgia (Baker, Calhoun, Dougherty, Lee, and Sumter cos.) on the Dougherty Plain, a nearly flat sandy plain with limestone near the surface and characterized by karst topography, where numerous sinkholes and wetland depressions have developed (Edwards et al. 2013). Habitat for *Dichanthelium hirstii* in New Jersey, Delaware, and North Carolina are shallow, flat-bottom, wetland depressions that have fluctuating water levels and are not permanently flooded. They are typically flooded during periods of high precipitation and low rates of evapotranspiration, usually in the winter and spring, and dry during periods of low precipitation and high rates of evapotranspiration, usually during the summer months. The length of the hydroperiod is usually dependent on annual weather patterns and groundwater levels. Sites that are open and sunny often support a diverse assemblage of herbaceous plant species. They have been variously described as Coastal Plain seasonal ponds (McAvoy & Bowman 2002), Coastal Plain intermittent ponds (Walz et al. 2006), and Coastal Plain depression communities or pond cypress savannas (Schafale, 2012; Sutter et al. 2014).

In Georgia, we focused on wetland depressions known as lime-sink ponds, which are thought to have originated from dissolution of underlying limestone and subsidence of surface soils and are most prevalent on the karst topography of the Dougherty Plain (Edwards et al. 2013). They are irregular in shape and range from deep, steep sided depressions to large flat basins. Lime-sink ponds in Georgia have the seasonal water regime described above, which is common to all wetland depressions that support *Dichanthelium hirstii*. Potential survey sites were identified through review of aerial photographs, U.S. Geological Service topographic maps, and consultations with knowledgeable individuals. In addition, state rare plant species records (Georgia Dept. of Natural Resources, rare species database 2014) for *Lobelia boykinii* and *Rhexia aristosa*, taxa that are often associated with *D. hirstii* populations in New Jersey, Delaware, and North Carolina, were consulted in

order to identify potential habitat. *Rhexia aristosa* was in fact collected by Harper [specimen *466*, (Harper 1901)] the same day that he collected *D. hirstii* (specimen *458*).

Additionally, Georgia surveys were conducted in areas where Harper and Thorne made their collections in Sumter and Calhoun counties, respectively. Thorne's specimen label was fairly specific as to where he collected the plant ("cypress swamp, 1 mile north of Leary"), but the only locational data that Harper provided on his label was "Sumter Co." In order to narrow our search area within Sumter Co., we consulted Harper's paper on plants he collected in Georgia in the summer of 1900 (Harper 1901). Harper noted (p. 457) that "the afternoon of the 16th [August] found me at Leslie, a small town of about 200 inhabitants, in the pine-barrens of Sumter county, where I spent five weeks. ... From Leslie I made three trips to Americus … on August 20, 27-29. ... The rest of the time I collected within two or three miles of Leslie." On page 474 (Harper 1901), Harper cites a specimen for *Stillingia aquatica* Chapm.: "my no. 460, collected in a pine-barren pond near Leslie, Sumter county, August 23." Comparing these data to Harper's *Dichanthelium hirstii* specimen (Georgia, Sumter Co., "muddy margin of pine-barren pond," 23 Aug 1900, *458*, NY) clearly shows that Harper collected in and around the town of Leslie on 23 August 1900. Harper's specimen *458* was likely not included in his paper (Harper 1901), because it was not identified at the species level. As mentioned above, Harper labeled this specimen as "*Panicum*" but later annotated it as "*neuranthum* Griseb." based on Nash's determination, which was likely sometime after 1901.

RESULTS

Field surveys in 2013 failed to rediscover *Dichanthelium hirstii* in Georgia, although many of the sites visited contained suitable habitat for the species and many of those sites were marked for revisits in 2014. Though we were unsuccessful in finding *D. hirstii* in 2013, we are however confident that we did relocate Thorne's specimen *4313* collection site (Georgia, Calhoun Co., "cypress swamp, 1 mile north of Leary," 31 May, 1947, US). Unfortunately, the canopy at this site is closing in with pond cypress (*Taxodium ascendens*). Though sunny gaps exist, they are likely not large enough to support *D. hirstii*. We did find a few species that were collected by Thorne in 1947 ("1 mile north of Leary," 31 May 1947) and that were cited in his doctoral thesis (Thorne 1949), such as *Rhynchospora filifolia* (*5667*), *Xyris smalliana* (*5665*), and *Stillingia aquatica* (*s.n.*). In addition, we also found *Pieris phillyreifolia* at this site. Thorne did not specifically cite in his thesis that he collected this species "1 mile north of Leary," but he did cite a collection of it (*s.n.*) as being "in shallow water of cypress ponds near Leary" (Patrick 2014).

The last day of planned surveys in 2014, found us exploring the environs near the town of Leslie, in Sumter Co., Georgia, the area where Harper collected *Dichanthelium hirstii* 114 years ago (23 Aug 1900, *458*, NY). We visited several lime-sink ponds that day, all of which appeared to have unsuitable habitat for *D. hirstii*. The August day was quite warm and our energy levels were low, but we were encouraged by the potential of our next pond to visit. Upon entering the open, sunny depression we could tell that this site could be favorable for *D. hirstii*. It did not take long before we found what was clearly a sterile plant of a *Dichanthelium* that had branched stems with stiff, erect-spreading, narrow leaves. We soon found several plants with autumnal flowering, which had the characteristic narrow panicle, appressed erect-ascending pedicels, and glabrous spikelets of *D. hirstii*. With the identification verified, we proceeded to search the pond for additional plants, make habitat notes, and record associated plant species (Appendix). We estimated the population to be about 500 plants, which is exceptional considering that prior to this rediscovery, only 21 plants had been seen in 2014 from all the known populations: 20 in New Jersey (Kathleen Strakosch Walz, pers. comm., 2014) and one in North Carolina (based on field surveys by McAvoy, LeBlond, and others in 2014).

Voucher: **Georgia. Sumter Co.:** Leslie, about 500 plants scattered throughout a seasonally flooded wetland depression, or lime-sink pond, pond dry but saturated to surface, open and sunny, dominated by *Hypericum fasciculatum* and *Rhynchospora careyana*, *D. hirstii* in early autumnal flowering, with 100s of culms, many vernal culms lacking spikelets still persisting, 7 Aug 2014, *W.A. McAvoy 7442* with Tom Patrick (GA).

Associated plants of note at the rediscovery site are *Lobelia boykinii*, *Stillingia aquatica*, *Rhynchospora harperi*, and *Hypericum harperi* (Appendix). *Lobelia boykinii*, which is abundant and widespread throughout the site, is known from all but one population where *Dichanthelium hirstii* is known to occur throughout its range (McAvoy & Wilson 2013). *Stillingia aquatica* was regularly observed at the rediscovery site and was cited by Harper (1901). He collected this species the same day he collected *D. hirstii* (23 Aug, *458*): "Having noticed the extreme lightness of the wood of this species [*Stillingia aquatica*], I made a determination of its specific gravity. The specimen experimented with was a part of my no. 460, collected in a pine-barren pond near Leslie, Sumter County, August 23" (Harper 1901). *Rhynchospora harperi* was found to be frequent and scattered through the rediscovery site, and Harper collected this species (as *R. filifolia* Gray) on 23 Aug 1900 from "wet pine barrens, Sumter Co." (*467*, US). This specimen was annotated as *R. harperi* by Gale in 1941 and cited in her work on *Rhynchospora* sect. *Eurhynchospora* (1944). The type specimen was collected in 1902 (Pulaski Co., Georgia, "wet pine barrens about 3 miles east of Hawkinsville," 26 Jun 1902, *Harper 1377*, US), so the first collection of the species was actually in 1900. *Hypericum harperi* was infrequent and scattered at the rediscovery site. Harper collected *H. harperi* (labeled only as "*Hypericum*") on 9 Oct 1902 from a "pine barren pond near Leslie, Sumter Co." (*1731*, US, NY). On the specimen label, in Harper's hand below "Hypericum," he wrote "(same as 457)." Harper's *458* was of course *D. hirstii*, so Harper's specimen *457* was most likely collected on 23 Aug 1900. Harper's specimen *1731* was annotated as *H. harperi* by John K. Boggan (6/2012) and designated as a syntype.

Also of note, but not found at the rediscovery site is *Linum harperi* Small [*L. sulcatum* var. *harperi* (Small) Rogers], which was also collected by Harper on 23 Aug 1900, just three collections prior to collecting *Dichanthelium hirstii* (*458*). The specimen is labeled as "*Linum*" from a "rather dry pine-barren, (flowers 12 mm wide)," (*455* NY). *Linum harperi* was described as a new species by Small (1903) with Harper's specimen designated as the type. Like *D. hirstii*, *L. harperi* is also a critically imperiled species (NatureServe 2015). *Linum harperi* is known only from Georgia, Alabama, and Florida (Weakley 2012).

CONCLUSIONS

According to Harper's specimen record, he collected three taxa new to science on the same day and year, 23 Aug 1900 — *Linum harperi* (*455*), *Dichanthelium hirstii* (*458*), and *Rhynchospora harperi* (*467*), possibly including a fourth, *Hypericum harperi* (*457*) — a notable achievement, even for Harper's time. Furthermore, it is highly probable that *D. hirstii* (*458*) and *R. harperi* (*467*), and possibly *H. harperi* (*457*), were collected from the same site. The fact that *R. harperi* and *H. harperi* are associates of *D. hirstii* at the site of rediscovery adds weight to this possibility. This observation then begs the question: could the site of rediscovery be the actual site where Harper collected *D. hirstii* 114 years ago? We have clearly ascertained that Harper's area of exploration on 23 Aug 1900 must be near the rediscovery site and that a few of the associated plant species from the rediscovery site were also collected by Harper on that date. Thus, we cannot rule out the possibility that the rediscovery site is Harper's original site, but it can likely never be proven. It would be interesting to track down Harper's specimens *456*, *459*, *461–465*, and *468* (these collection numbers are not listed in Harper 1901) and compare their determinations with other associated plant taxa (Appendix) from the rediscovery site.

The significance of the Georgia rediscovery of *Dichanthelium hirstii* cannot be overstated and additional surveys in the state are strongly merited. The species is ranked by NatureServe as Critically Imperiled Globally [G1, five or fewer extant populations worldwide (NatureServe 2015)] and is known from four states in the USA: New Jersey, Delaware, North Carolina, and Georgia (NatureServe 2015), and all these states rank the species as S1 [critically imperiled statewide (NatureServe 2015)]. In 2014, *D. hirstii* was observed at only three sites: one in New Jersey, one in North Carolina, and now, one in Georgia (the species was last seen in Delaware in 2013, when 11 individuals were counted). With a population of about 500 plants, this rediscovery has elevated the status of *D. hirstii* in Georgia from an uncertain presence to a significant component of the species distribution.

TAXONOMIC NOTES

Some taxonomic treatments of *Dichanthelium* do not recognize *D. hirstii* at all (Kral 1983; Gleason & Cronquist 1991), even in synonymy (Gould & Clark 1978; Godfrey & Wooten 1979; Freckmann & Lelong 2003). Dr. Alfred E. Schuyler, however, with funding from the USFWS concluded that *D. hirstii* is taxonomically distinct (Schuyler 1996). In addition, Weakley's (2012) treatment of the genus *Dichanthelium*, written by Richard LeBlond, recognizes *D. hirstii* as valid.

Hitchcock and Chase (1910) apparently thought, with uncertainties however, that Harper's specimen *458* should be assigned to *Panicum roanokense* Ashe [= *Dichanthelium dichotomum* (L.) Gould var. *roanokense* (Ashe) LeBlond]. In the description of *P. roanokense* (1910, p. 197), they cited Harper's specimen: "Harper's number 458, from Sumter Co., Georgia, is doubtfully referred to this species [*Panicum roanokense*]. The first glume is very short, the panicle narrow with few, appressed branches, and the blades are long and narrow." Schuyler (1996) pointed out that both *D. hirstii* and *D. dichotomum* var. *roanokense* have glabrous spikelets approaching the same dimensions — equally prominent nerves in the leaves, second glumes, and sterile lemmas — and both have similar hyaline, sterile paleas. However, *D. dichotomum* var. *roanokense* is clearly distinguished from *D. hirstii* by having more branched and reduced axillary shoots, a more open and spreading panicle, with pedicels often twice or more as long as the spikelets, a longer first glume (0.6–1.1 mm vs. 0.3-0.4 mm), and more variation in the number of nerves (7–9) in the second glumes and sterile lemmas. In addition, *D. dichotomum* var. *roanokense* inhabits swales, meadows, swamps and low woods (Schuyler 1996), while *D. hirstii* is found in seasonally flooded wetland depressions.

Dichanthelium hirstii does resemble *D. neuranthum*, explaining why Harper's specimen *458* was determined by Nash as such and why Thorne initially labeled his specimen *4313* as "*affin. Panicum neuranthum* Griseb." The similarities between the two taxa are based primarily on the firm, erect, long, narrow leaf blades and the tightly constricted panicle that both taxa possess (Richard LeBlond, pers. comm.). The most distinguishing characters to separate the two include spikelets of *D. hirstii* glabrous (vs. papillose-pubescent for *D. neuranthum*) and first glume length of *D. hirstii* 0.3-0.4 mm (vs. 0.8-1.0 mm for *D. neuranthum*) (Richard LeBlond, pers. comm.). In addition, habitat preferences are different between the two — *D. hirstii* prefers pond cypress savannas, lime-sink ponds, and seasonally flooded wetland depressions, while *D. neuranthum* prefers moist sandy open ground, maritime grasslands or swales, and wet savannas (Richard LeBlond, pers. comm.).

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LITERATURE CITED

CNOR (Candidate Notice of Review). 2014. U.S.F.W.S. Species assessment and listing priority assignment form, *Dichanthelium hirstii*, Hadley, Massachussetts.

Edwards, L., J. Ambrose, and L.K. Kirkman. 2013. The Natural Communities of Georgia. Univ. of Georgia Press, Athens.

Federal Register. 1999. Proposed Rules: Endangered and Threatened Wildlife and Plants; Review of Plant and Animal Taxa That Are Candidates or Proposed for Listing as Endangered or Threatened. Vol. 64, No. 205, 25 October. Dept. of the Interior, Fish & Wildlife Service, Washington, D.C.

Freckmann, R.W. and M.G. Lelong. 2003. *Dichanthelium*. Pp. 406–450, in Flora of North America North of Mexico, Vol. 25, Magnoliophyta: Commelinidae (in part): Poaceae, part 2. Oxford Univ. Press, New York. http://herbarium.usu.edu/webmanual.

Gale, S. 1944. *Rhynchospora* section *Eurhynchospora*, in Canada, the United States and the West Indies. Rhodora 46: 89–134, 159–197, 207–249, 255–278.

Gleason, H.A. and A. Cronquist. 1992. Manual of Vascular Plants of Mortheastern United States and Adjacent Canada (ed. 2). The New York Botanical Garden, Bronx, New York.

Godfrey, R.K. and J.W. Wooten. 1979. Aquatic and Wetland Plants of the Southeastern United States: Monocotyledons. Univ. of Georgia Press, Athens.

Gould, F.W. and C.A. Clark. 1978. *Dichanthelium* (Poaceae) in the United States and Canada. Ann. Missouri Bot. Gard. 65: 1088–1132.

Harper, R.M. 1901. On a collection of plants made in Georgia in the summer of 1900. Bull. Torrey Bot. Club 28: 454–484.

Hitchcock, A.S. and A. Chase. 1910. The North American species of *Panicum*. Contr. U.S. Natl. Herb. Vol. 15.

Kral, R. 1983. A report on some rare, threatened or endangered forest-related vacular plants of the South. U.S.D.A. Forest Service Technical Publication R8-TP2, Atlanta, Georgia.

LeBlond, R.J. and B.A. Sorrie. 2001. Additions to and noteworthy records for the flora of the coastal plain of North Carolina. Castanea 66: 288–302.

McAvoy, W.A., and P. Bowman. 2002. The flora of Coastal Plain seasonal pond herbaceous communities on the Delmarva Peninsula. Bartonia 61: 81–91.

McAvoy, W.A. and R.M. Wilson. 2014. Rediscovery of *Lobelia boykinii* (Campanulaceae) in Delaware. Phytoneuron 23: 1–4.

NatureServe. 2015. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. <http://www.natureserve.org/explorer> Accessed January 2015.

Patrick, T. 2014. Thorne's plant collections and sites visited in Calhoun Co., Georgia. Unpublished report, Georgia Dept. of Natural Resources, Nongame Conservation Section.

Shafale, M. 2012. Guide to the Natural Communities of North Carolina Fourth Approximation. North Carolina Natural Heritage Program, Department of Environment and Natural Resources. <http://cvs.bio.unc.edu/pubs/4thApproximationGuideFinalMarch2012.pdf>

Schuyler, A.E. 1996. Taxonomic status of *Panicum hirstii* Swallen. Bartonia 59: 95–96.

Small, J.K. 1903. Flora of the Southeastern United States. Published by the author, New York.

Sutter, R.D., K.S. Walz, and W.A. McAvoy. 2014. Range-wide Monitoring Protocol for Hirst Brothers' Panic Grass (*Dichanthelium hirstii*). USFWS Region 5 Section 6 Federal Aid Grant Agreement E-3-R-7.

Swallen, J.R. 1961. A new species of *Panicum* from New Jersey. Rhodora 63: 235–236.

Thorne, R.F. 1949. The flora of southwestern Georgia. Ph.D. dissertation, Cornell University, Ithaca, New York.

Thorne, R.F. 1954. The vascular plants of southwestern Georgia. Amer. Midl. Naturalist 52: 257–327.

Walz, K.S., S. Stanford, N.L. Adamson, L. Kelly, K. Anderson, K. Laidig, and J. Bonnell. 2006. Coastal Plain Intermittent Pond Shore Communities of New Jersey. New Jersey Department of Environmental Protection, Division of Parks and Forestry, Office of Natural Lands Management, Natural Heritage Program, Trenton.

Walz, K.S. 2012. The Legacy of Hirst Brothers' Panic Grass. U.S. Fish and Wildlife Service, Endangered Species Bulletin, Nov. – Dec. <www.fws.gov/endangered/news/bulletin.html> <https://www.fws.gov/ENDANGERED/news/episodes/bu-11-2012/story4.pdf>

Weakley, A.S. 2012. Flora of the Southern and Mid-Atlantic States. Working draft of Nov 2012. Univ. of North Carolina Herbarium (NCU), Chapel Hill. <http://herbarium.unc.edu/flora.htm>.

APPENDIX

Vascular plant taxa associated with *Dichanthelium hirstii* that were recorded in a seasonally flooded wetland depression (lime-sink pond) in Sumter Co., Georgia, 7 Aug 2014. For the most part, nomenclature follows Weakley (2012). Frequency of Occurrence criteria: Rare (known from only 1 or 2 small populations), Infrequent (occasionally encountered), Frequent (generally encountered), Common (dominant, abundant, widespread), Locally Common (common, but localized in a particular area of the site, specifically, the lowest point of the pond).

Scientific Name	**Frequency of Occurrence**
Acer rubrum L.	Infrequent
Andropogon perangustatus Nash	Infrequent
Aristida palustris (Chapm.) Vasey	Frequent
Aronia arbutifolia (L.) Pers.	Frequent (pond perimeter)
Carex glaucescens Ell.	Rare
Coelorachis rugosa (Nutt.) Nash	Frequent
Coleataenia longifolia (Torr.) Soreng subsp. *longifolia*	Infrequent
Cyperus erythrorhizos Muhl.	Locally Common
Cyrilla racemiflora L.	Frequent (pond perimeter)
Dichanthelium acuminatum (Sw.) Gould & Clark var. *lindheimeri* (Nash) Gould & Clark	Infrequent
Dichanthelium erectifolium (Nash) Gould & Clark	Rare
Dichanthelium hirstii (Swallen) Kartesz	Common
Dichanthelium longiligulatum (Nash) Freckmann	Rare
Diospyros virginiana L.	Rare
Eragrostis hypnoides (Lam.) B.S.P.	Locally Common
Erianthus giganteus (Walt.) P. Beauv.	Frequent
Eriocaulon compressum Lam.	Common
Fimbristylis autumnalis (L.) Roemer & Schult.	Locally Common
Gratiola ramosa Walt.	Infrequent
Helenium pinnatifidum (Nutt.) Rydb.	Rare
Hypericum fasciculatum Lam.	Common
Hypericum harperi R. Keller	Infrequent
Ilex glabra (L.) Gray	Frequent (pond perimeter)
Ilex myrtifolia Walt.	Frequent
Juncus repens Michx.	Locally Common

Justicia ovata (Walt.) Lindau var. *lanceolata* (Chapm.) R.W. Long	Infrequent
Lachnanthes caroliniana (Lam.) Dandy	Infrequent
Lobelia boykinii Torr. & Gray ex DC.	Frequent
Ludwigia lanceolata Ell.	Frequent
Ludwigia linearis Walt. var. *linearis*	Infrequent
Ludwigia pilosa Walt.	Frequent
Ludwigia sphaerocarpa Ell.	Frequent
Lyonia lucida (Lam.) K. Koch	Frequent (pond perimeter)
Morella cerifera (L.) Small	Frequent (pond perimeter)
Nyssa biflora Walt.	Frequent
Panicum hemitomon Schult.	Infrequent
Paspalum dissectum (L.) L.	Locally Common
Paspalum repens P.J. Bergius	Locally Common
Pinus elliottii Engelm. var. *elliottii*	Infrequent
Pluchea baccharis (P. Miller) Pruski	Infrequent
Proserpinaca pectinata Lam.	Infrequent
Rhynchospora careyana Fern.	Common
Rhynchospora cephalantha Gray var. *cephalantha*	Rare
Rhynchospora filifolia Gray	Infrequent
Rhynchospora harperi Small	Frequent
Rhynchospora tracyi Britt.	Frequent
Sabatia bartramii Wilbur	Rare
Sagittaria graminea Michx.	Infrequent
Sclerolepis uniflora (Walt.) B.S.P.	Infrequent
Smilax walteri Pursh	Frequent (pond perimeter)
Stillingia aquatica Chapm.	Frequent
Vaccinium corymbosum L.	Frequent (pond perimeter)
Woodwardia virginica (L.) Sm.	Rare
Xyris fimbriata Ell.	Frequent