
current
research
projects

Floristic inventory of the Wade Tract at Arcadia, an old-growth longleaf pine-wiregrass forest, Thomas County, Georgia

- 2015-present
- With W. Platt, K. Robertson, W.W. Baker, building on earlier work of R.K Godfrey and others
- To date more than 550 vascular plant species have been vouchered for this ecologically significant site of about 120 acres.

TALL TIMBERS
Research Station & Land Conservancy

Floristic inventory of the Big Woods at Greenwood, an old-growth longleaf pine-wiregrass forest, Thomas County, Georgia

- Efforts at Greenwood are also underway and nearing completion.
- Work was initiated by a systematic review of vouchers collected by Ed Komarek, R.K. Godfrey, and others in the TTRS herbarium in order to update taxonomic concepts and nomenclature.
- Although we have not done a final tally, this tract promises to be even more diverse than the nearby Wade Tract at Arcadia.

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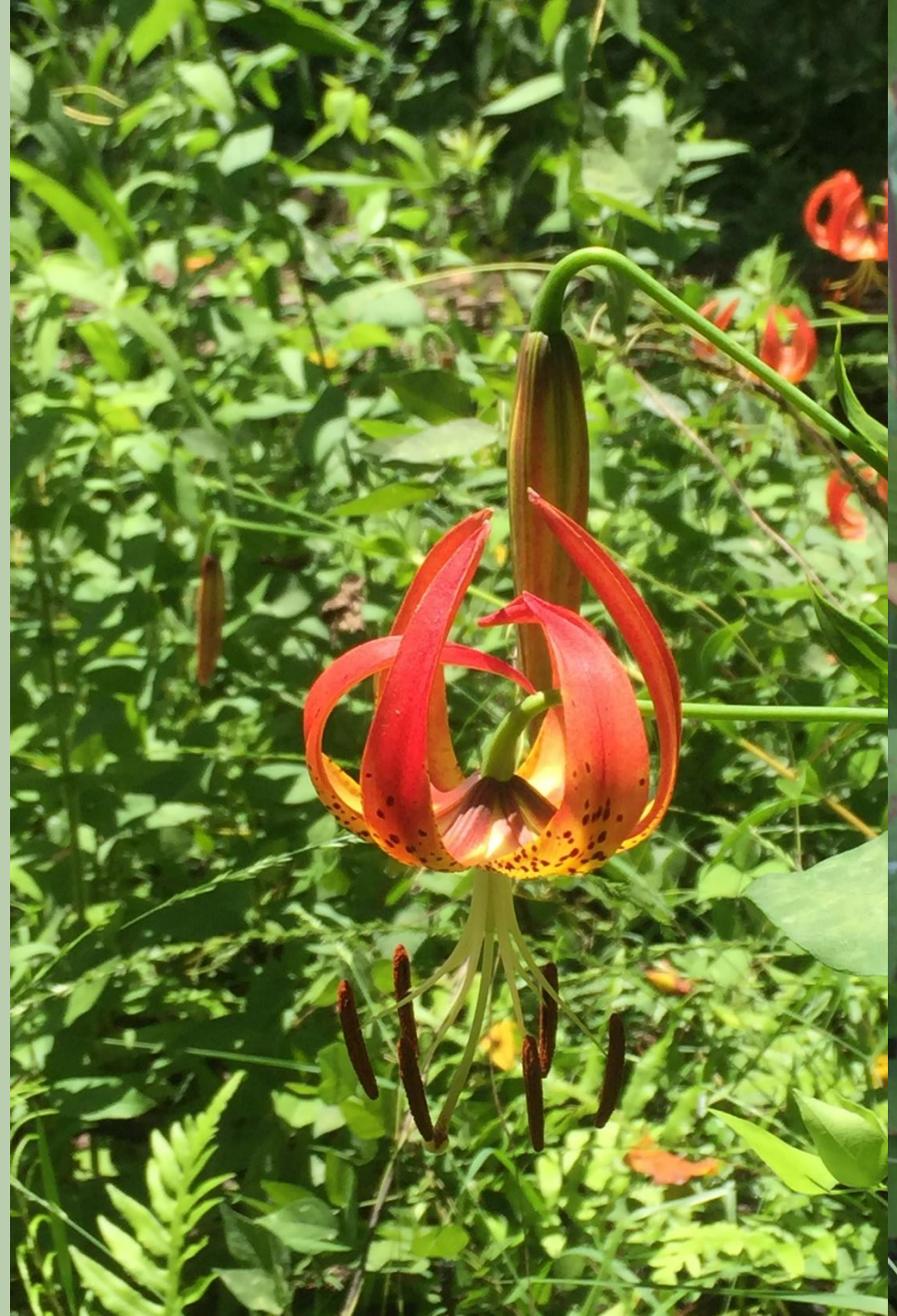
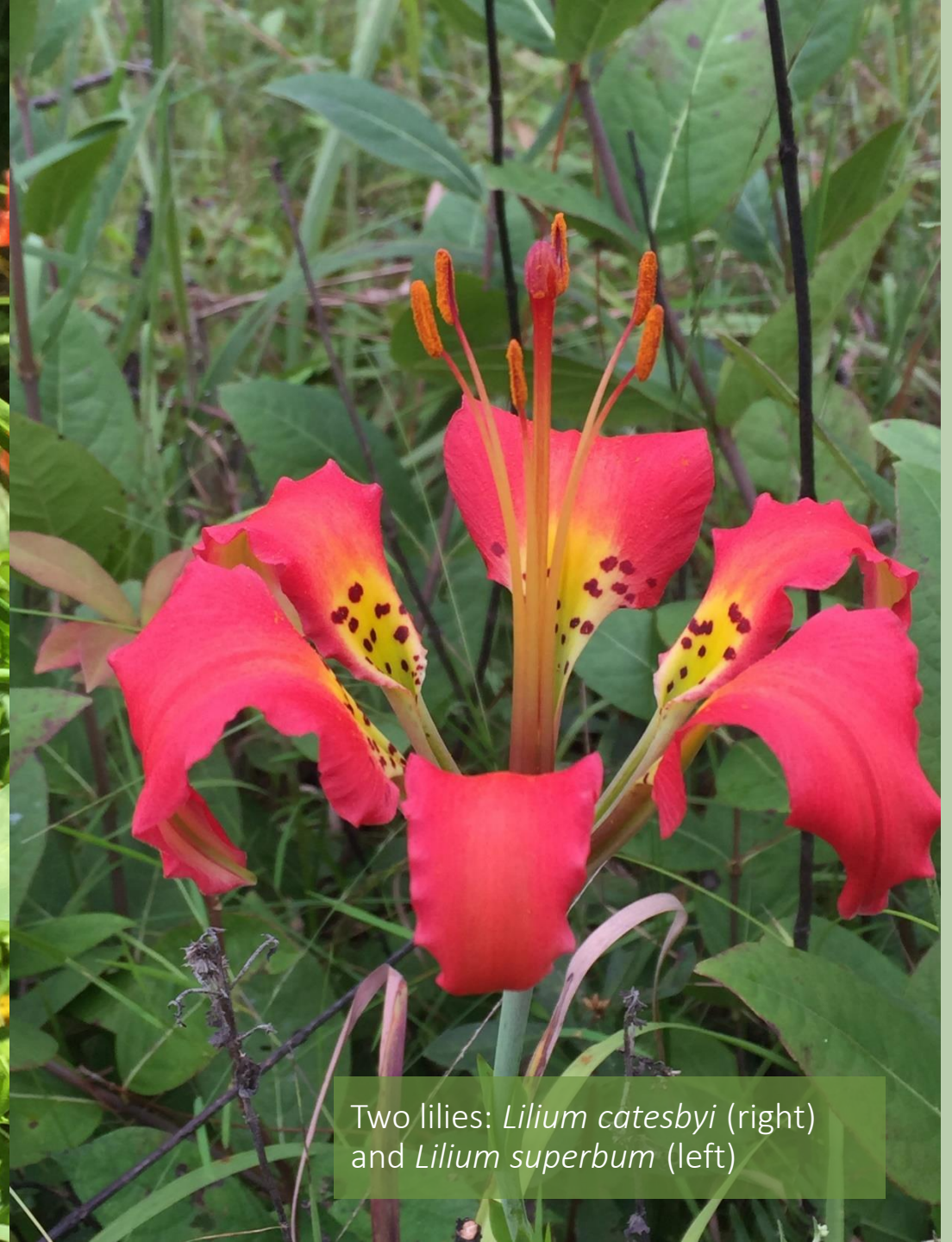
Old-growth longleaf pine-wiregrass savanna,
Big Woods, Thomas County, Georgia

Platanthera ciliaris
Yellow fringed orchid

Gentiana catesbyi
– Catesby’s bottle gentian (left)
Habenaria quinquiseta
– Michaux orchid (right)





Two lilies: *Lilium catesbyi* (right) and *Lilium superbum* (left)

Two orchids: *Platanthera conspicua* – large white-fringed orchid and *Calopogon tuberosus* – grass-pink

Pinckneya bracteata
– Georgia feverbark

Stenanthium densum
– Osceola’s plume

Sarracenia minor –
hooded pitcher plant

Oclemena reticulata – pine-barren aster (left)
Asclepias connivens – largeflower milkweed (right)

Rare plant survey and floristic inventory of Alligator Creek WMA, Wheeler County, Georgia

- With Frankie Snow
- 2016-2019
- Funded by Georgia DNR since 2018 – 2019
- Results:
  - Rare plants: *Agalinis tenella, Coleataenia tenera, Elliottia racemosa, Helanthium tenellum, Litsea aestivalis, Marshallia ramose, Muscadinia rotundifolia munsoniana, Penstemon dissectum, Rhynchospora harperi, Sarracenia minor*
  - Vouchered list of 733 vascular plant species
  - Jacob Thompson (GA-DNR) assisted with classification and mapping of plant communities

GEORGIA
DEPARTMENT OF NATURAL RESOURCES

Flora of Alligator Creek Wildlife Management Area, Wheeler County, Georgia

Richard Carter, Biology Department, Valdosta State University, Valdosta, GA
Frankie Snow, School of Science, South Georgia State College, Douglas, GA
Jacob Thompson, Georgia Department of Natural Resources, Brunswick, GA

Presented at the 82nd Annual Meeting [Virtual] of the Association of Southeastern Biologists, 24-26 March 2021

Introduction

Recently acquired by Georgia Department of Natural Resources, Alligator Creek Wildlife Management Area [ACWMA] comprises about 1,255 hectares of sand hills, flatwoods, and associated habitats located in Wheeler County at the confluence of Little Ocmulgee River and Alligator Creek in the upper coastal plain of southeastern Georgia and centered about 4.0 km N of Lumber City (Figure 1).

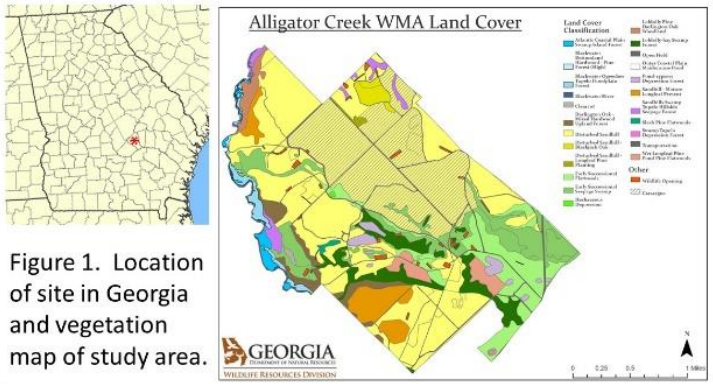


Figure 1. Location of site in Georgia and vegetation map of study area.

Methods

From 2016 through 2020, Snow and Carter spent 29 days and parts of two days in the field searching for and recording observations of rare and unusual vascular plant species, gathering data on plant communities, and generally documenting the vascular flora through the preparation of voucher specimens deposited at the Valdosta State University Herbarium (VSC). Nomenclature and family classification follow Weakley (2015).

Acknowledgments: Funding was provided by Georgia Dept. of Natural Resources (GA-DNR) with additional support from the Valdosta State University Faculty Research Fund, Biology Dept., and Foundation, and Tall Timbers Research Station. Shan Cammack served as liaison with GA-DNR.

Figure 2. Representative ACWMA habitats. A) Turkey oak-longleaf pine sandscrub, B) Little Ocmulgee River, C) *Elliottia racemosa* in ecotone along base of sandridge and gordonia swamp, D) Alligator Creek, E) disturbed sandscrub, F) edge of pocosin and gordonia swamp, G) exsiccated cypress-gum pond, H) bluff along Little Ocmulgee River, I) sphagnous seep at base of bluff along floodplain of Little Ocmulgee River, J) floodplain of Little Ocmulgee River.

TABLE 1. LARGEST FAMILIES RANKED BY NUMBER OF SPECIES.

Family	Number of species (number of additional infraspecific taxa)
Poaceae	110 (9)
Asteraceae	85 (1)
Cyperaceae	79 (1)
Fabaceae	39
Ericaceae	22
Rosaceae	16 (2)
Euphorbiaceae	15
Plantaginaceae	15
Lamiaceae	14
Hypericaceae	13
Onagraceae	13
Convolvulaceae	12
Fagaceae	12
Juncaceae	12 (1)
Rubiaceae	11

TABLE 2. LIST OF RARE PLANTS OBSERVED AND DOCUMENTED AT ACWMA; ABBREVIATIONS FROM KRAKOW (2018).

Accepted Taxon Name	Federal Status	Georgia Status	Global/State Rank
Agalinis tenella Pennell	NA	NA	G4/S2?
Coleataenia tenera (Beyrich ex Trinius) Soreng	NA	NA	G4/S1
Elliottia racemosa Muhlenberg ex Elliott	NA	T	G2G3/S2S3
Helonthium tenellum (Martius) Britton	NA	NA	G3Q/S2?
Litsea aestivalis (L.) Fernald	NA	R	G3?/S2
Marshallia ramosa Beadle & F.E. Boynton	NA	R	G2G3/S2
Muscadinia rotundifolia (Michaux) Small var. *munsoniana* (Simpson ex Planch.) Weakley & Gandhi	NA	NA	GSTA?/S2?
Penstemon dissectum Elliott	NA	R	G2/S2
Rhynchospora harperi Small	NA	NA	G4?/S1S2
Sarracenia flava L.	NA	U	G5?/S3S4
Sarracenia minor Walter	NA	U	G4T4/S4

Results

752 taxa, including 733 species and 19 infraspecific taxa, were documented with vouchers. The largest families with numbers of taxa are shown in Table 1. Eleven rare, threatened or endangered taxa with official status in Georgia (Table 2) were observed and mapped, and one species, *Ludwigia ravenii* Peng, not previously known from Georgia, was vouchered. Twenty plant communities were identified and mapped (Figures 1 and 2).

Future Research

Much of the habitat is fire-dependent and in need of intensive fire management. Additional survey work will be conducted after completion of controlled burns, particularly in flatwoods and overgrown ecotones along ponds and drains.

References

Krakow, G. A. (ed.). 2018. Georgia rare natural elements data portal. (http://gakrakow.github.io/, 11-16-2018). Georgia DNR, Wildlife Resources Division, Social Circle, Georgia.

Weakley, A.S. 2015. Flora of the southern and mid-Atlantic states. Working draft of 21 May 2015. (http://www.herbarium.unc.edu/FloraArchives/WeakleyFlora_2015-05-29.pdf, 7-8-2017). University of North Carolina, Chapel Hill.

Floristic inventory of the Livingston Place of Tall Timbers Research Station [TTRS], Jefferson County, Florida

- 9,000 acre area abutting the Georgia-Florida state line south of Quitman, owned by TTRS
- Field work commenced in June 2022.
- 806 species occurrences have been documented with voucher specimens [9/8/2023].

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Floristic inventory of Broxton Rocks Nature Preserve, Coffee County, Georgia

- I have intermittently botanized the area since 1986, and these efforts continue.
- 2014-present
- With Frankie Snow
- Searching for previously undocumented species occurrences and preparing voucher specimens to document the flora of this ecologically significant site

The Nature Conservancy

Rocky Creek Falls
Broxton Rocks Preserve
Coffee County, Georgia

Rare species documented at Broxton Rocks include:

Elliottia racemosa Muhl. ex Elliott

Marshallia ramosa Beadle & Boynt.

Nolina georgiana Michx.

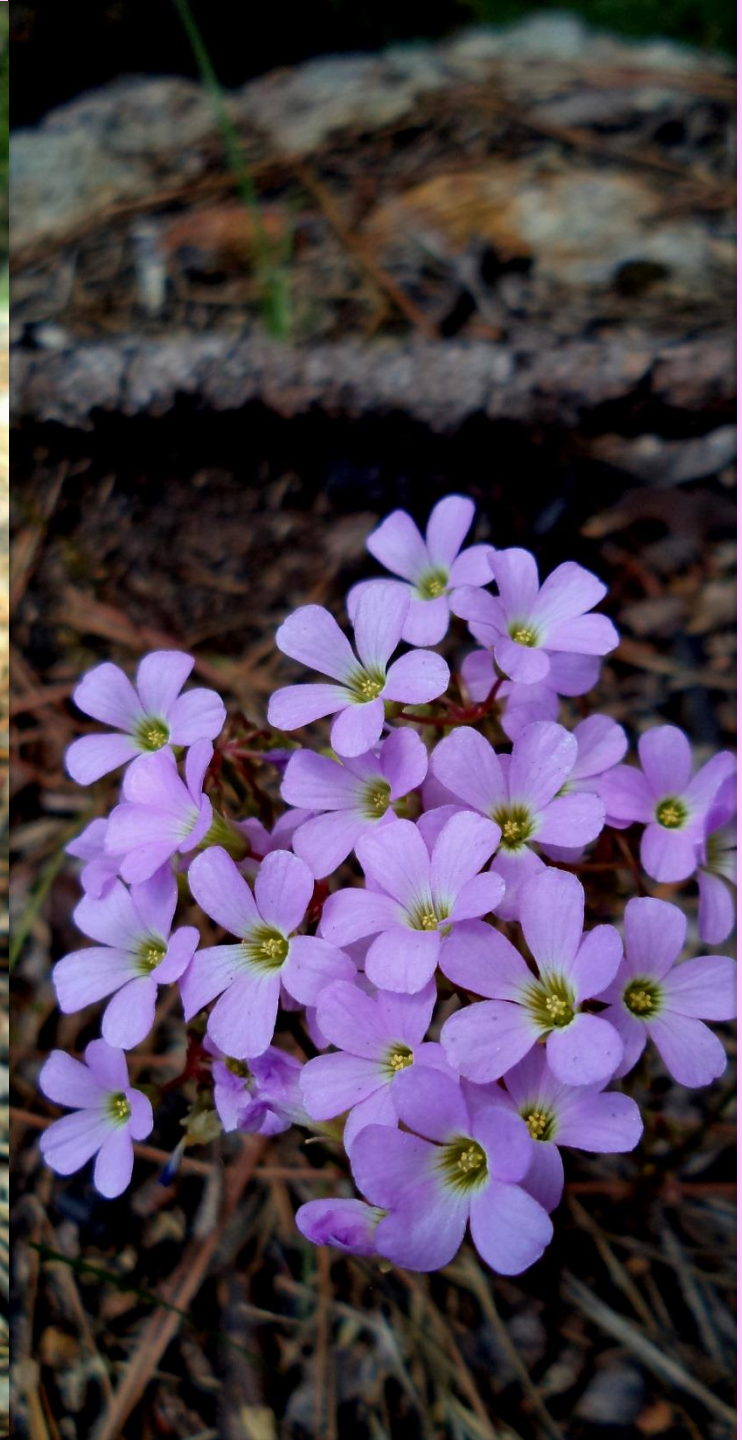
Penstemon dissectus Elliott

Portulaca biloba Urb.

Rhynchospora punctata Elliott

Oxalis "asynchrona"

An undescribed species from the Altamaha Grit of Georgia



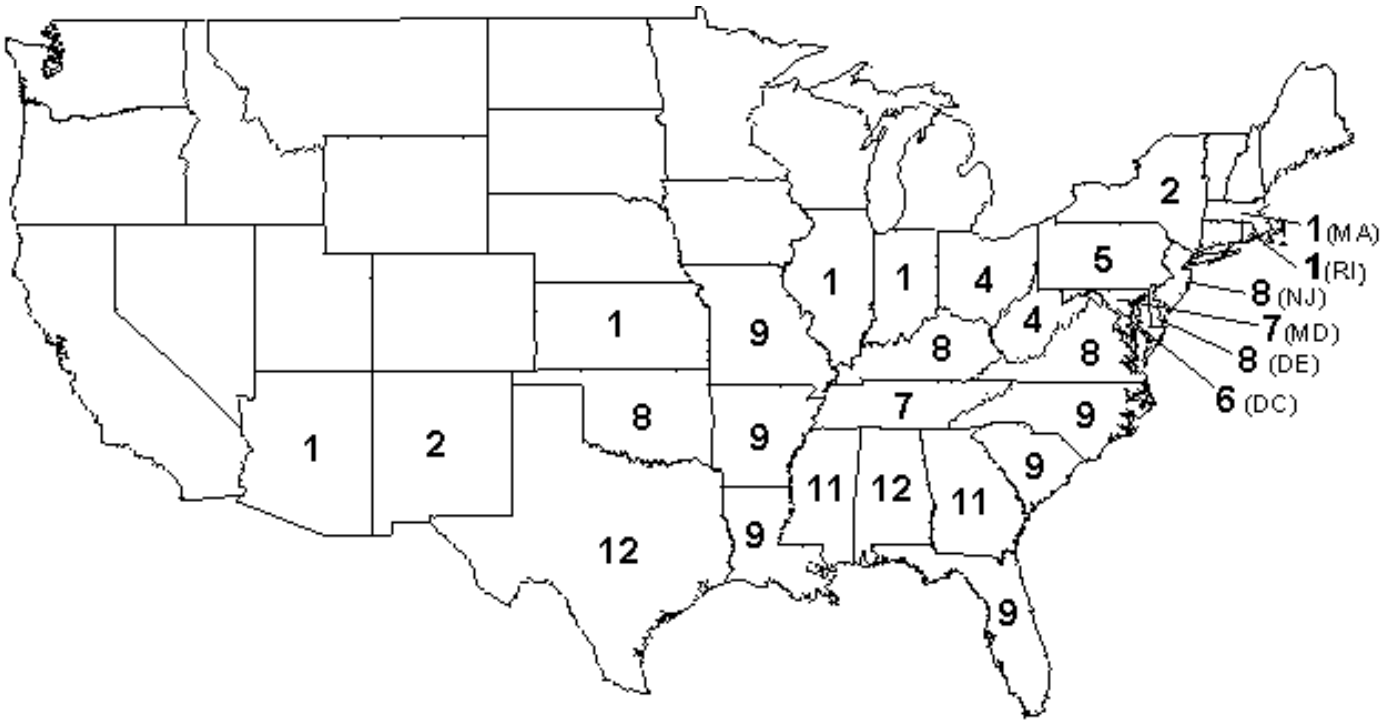
Systematics of *Cyperus* sect. *Umbellati*

Cyperus floribundus

Cyperus retrorsus

Cyperus echinatus

Number of taxa by state of *Cyperus* sect. *Umbellati* subsect. *Umbellati* in the United States



Systematic treatment

- Includes
  - Dichotomous keys to facilitate identification
  - Synonymy
  - Technical descriptions
  - Distributional & habitat data
  - Maps
  - Illustrations
- >10K herbarium specimens from >60 herbaria examined and annotated

Synonymy

Accepted name

Cyperus croceus Vahl, *Enum. Pl.* 2: 357. 1806. TYPE: "Puertorico?" or more probably vicinity of Charleston, South Carolina, U.S.A., *Bosc* (holotype: C!).

Synonyms

Cyperus baldwinii Torrey, *Ann. Lyceum Nat. Hist. New York* 3: 270. 1836. TYPE: "Middle Florida", *Chapman s.n.* (holotype: NY!; paratypes: NY!, PH!).

Cyperus globulosus sensu auct. non Aubl.: *Small, Fl. S.E. U.S.* 1321. 1903; *Man. S.E. Fl.* 152. 1933; Kükenthal, *Pflanzenr.* 4(20): 510. 1936; Horvat, *Catholic Univ. Amer., Biol. Ser.* 33: 39. 1941; Fernald, *Gray's Manual* 247. 1950; Steyermark, *Fl. Missouri,* 270. 1963; Radford *et al., Man. Vasc. Fl. Carol.* 180. 1968; Correll & Johnston, *Contrib. Tx. Res. Found.* 6: 299. 1970; Godfrey and Wooten, *Aquatic Wetl. Pl. S.E. U.S.* 1: 262. 1979; Correll and Correll, *Fl. Bah. Arch.* 218. 1982; Tucker, *Syst. Bot. Monog.* 2: 55. 1983.

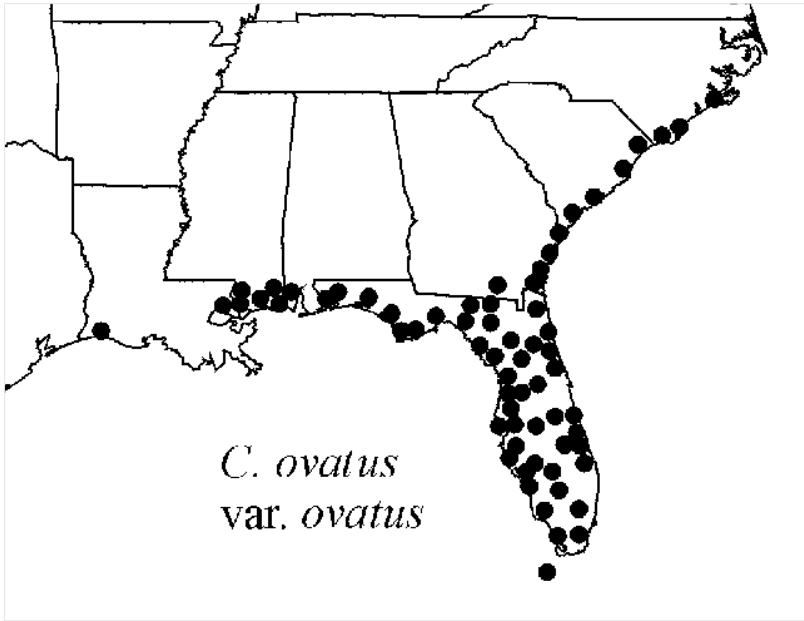
from Carter and Kral.
1990. Taxon 39:322-327.

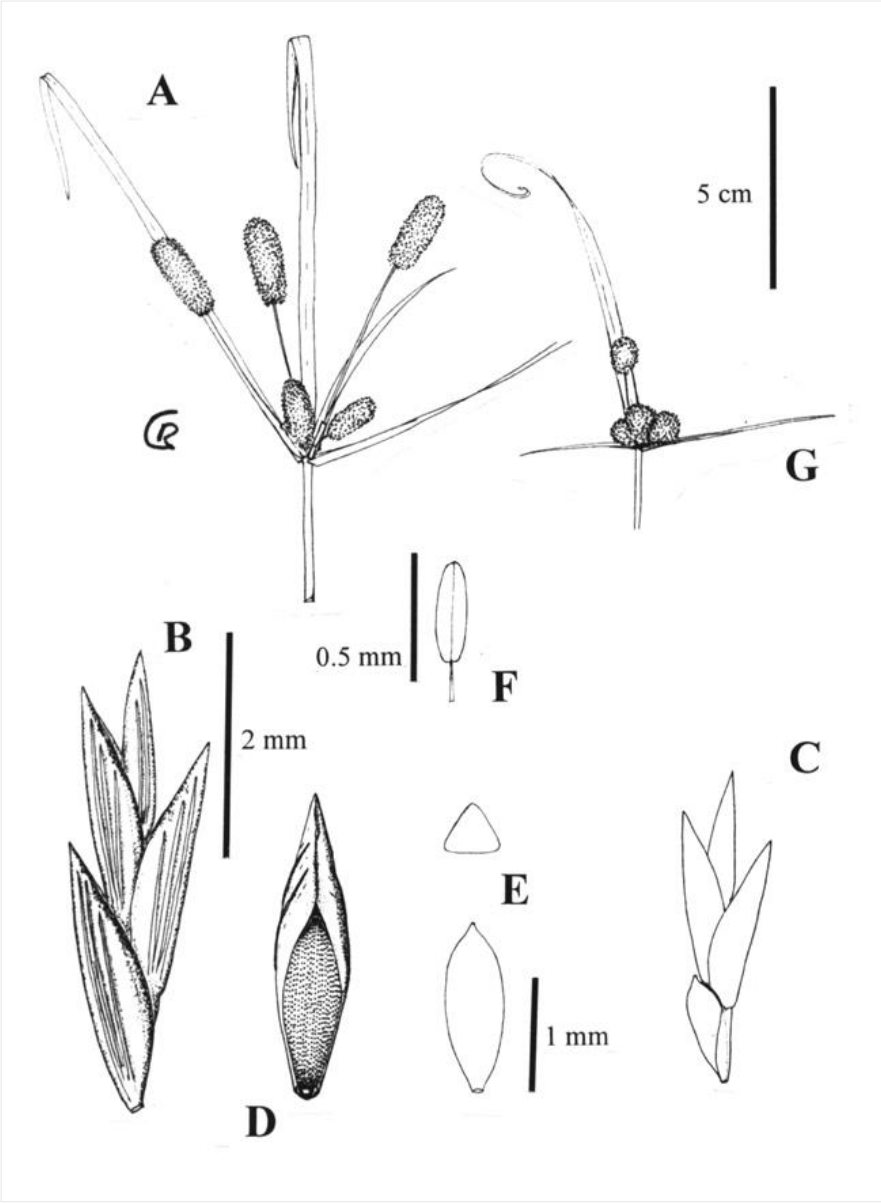
Technical descriptions of taxa

11. ***Cyperus ovatus*** Baldwin, Trans. Amer. Philos. Soc. n.s. 2: 168. 1825.--Type: U.S.A. Georgia: near St. Marys, *W. Baldwin s.n.* (Lectotype designated here: PH!). Note: Type specimen authenticated by Stuckey (1979).

Perennial herb, (8--)30--70(--100) cm high, solitary to sparingly tufted. Corms 5--7 mm wide. Stems erect to ascending, slender, (0.5--)1--3.2 mm wide, glabrous. Leaves mostly 1/2--2/3 as long as stem, yellow-green, 2--5 per stem, (1--)2--5(--7.7) mm wide, broadly V-shaped in transverse-section. Inflorescence of (2--)5--9(--12) mostly pedunculate rays, inflorescence rarely a capitate cluster of sessile spikes; peduncles slender, glabrous; longest rays to 11 cm long. Spikes elliptic to narrowly oblong or subglobose, 6--24 × (5.4--)6--13(--15) mm, simple, rarely with 1--3 rudimentary basal branches, tight, (12.7--)17.4--27.5 spikelets per mm rachis; rachis (2.7--)6--18 mm long. Primary inflorescence bracts spreading to divaricate (to ascending), leaf-like, mostly longer than longest rays. Primary prophylls truncate to oblique, often scabrid; longest (1.4--)4--11(--19) mm long. Bracteoles triangular to narrowly triangular, 0.7--1.0 mm long. Spikelet prophylls rounded, 0.8--1.2 mm long. Spikelets (38--)120--310, obovate to elliptic, (2.3--)2.8--5.6 mm long; rachilla wing narrow, less than 0.5 mm broad, hyaline, barely persistent, clasping 1/2--2/3 achene length. Floral scales (2--)3--6 [(1--)3--5 fertile], midrib greenish, sides whitish to yellow to golden brown to stramineous or brownish red, ascending to spreading, lanceolate, acute, apically conduplicate, tightly clasping achene, 1.7--2.6 mm long, becoming gradually shorter from base to apex of spikelet, 6 lateral nerves. Anthers stramineous to brown, oblong, 0.3--0.5 mm long. Achenes brown, narrowly elliptical, gradually tapering at both ends thus outline more or less fusiform, 1.2--1.5 × 0.4--0.6 mm.

Cyperus ovatus var. *ovatus*
Distribution map and original illustration





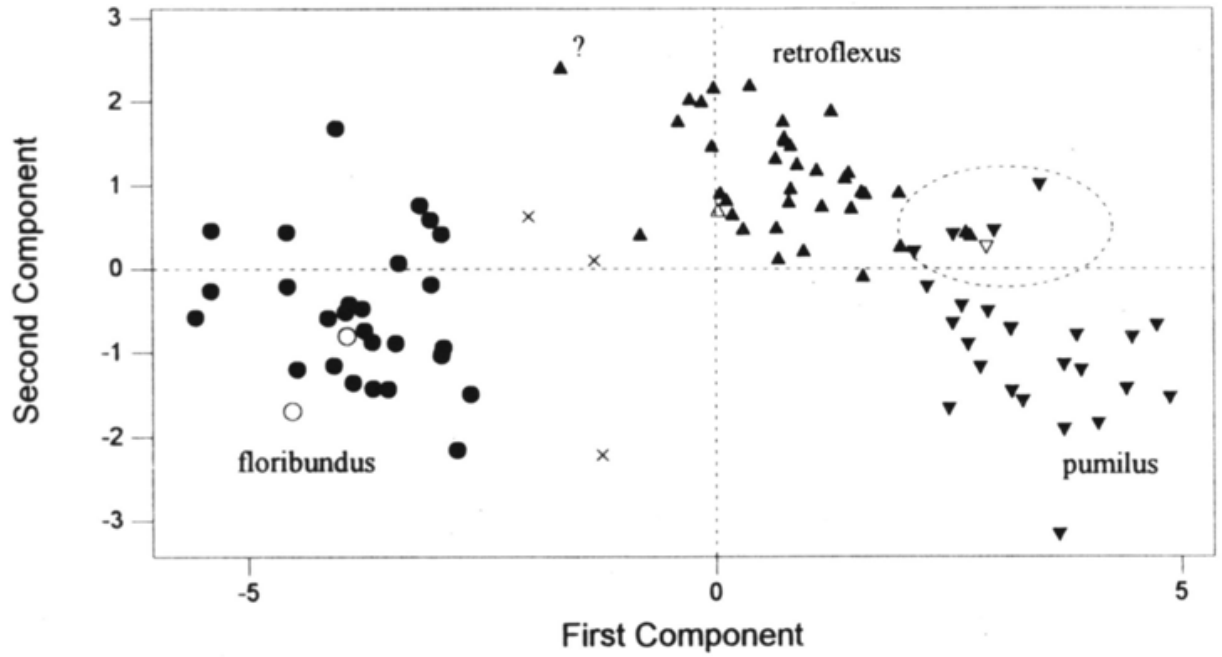
Methods

- Field observations made of all taxa
- Several hundred herbarium specimens borrowed, critically examined 15 characters selected for analysis
- Measurements taken from herbarium specimens
- Principal component analysis (PCA) used to examine variation in 95 specimens of *C. retroflexus* and *C. floribundus* with regard to these characters
- Specimens annotated

Character list for PCA

- Plant height (PLHGT)
- Length longest ray (RAYL)
- Stipe length (STIPE)
- Spikelet length (SPKLTL)
- Scales number per spikelet (SCALNO)
- Length proximal floral scale (PSCALL)
- Length longest floral scale (LSCALL)
- Difference between lengths of longest and proximal floral scale (SCALLD)
- Length terminal floral scale (TSCALL)
- Length scale mucro (MUCRL)
- Scabrousness of keel (KEEL)
- Achene length (ACHNL)
- Achene width (ACHNW)
- Ratio achene length to width (ACHNLW)
- Ratio terminal floral scale length to proximal floral scale length (SCALRAT)

Results of PCA – *Cyperus retroflexus* complex



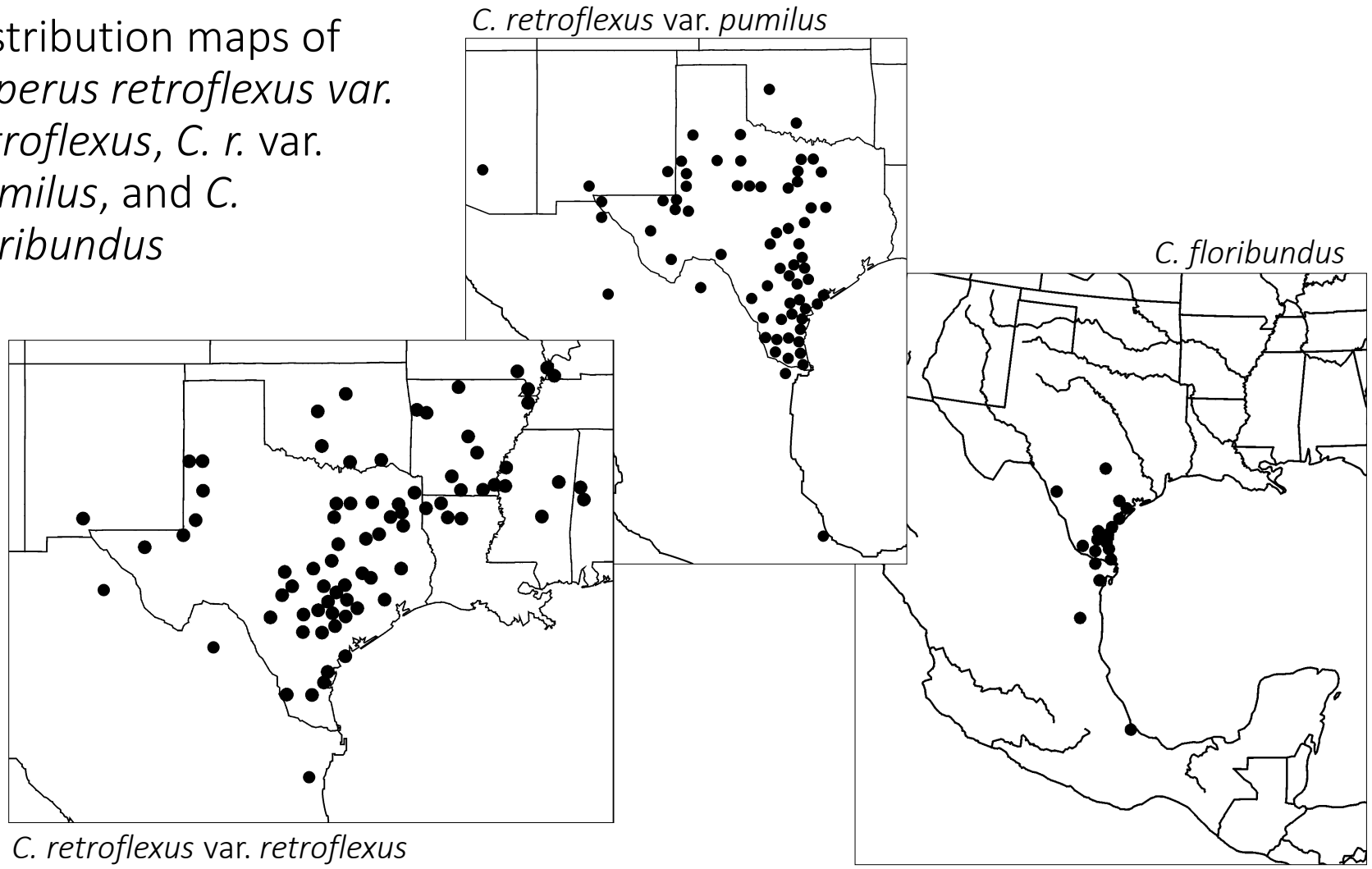
Taxonomic revision

Table 1. Comparison of taxonomic treatments of the *Cyperus retroflexus* complex.

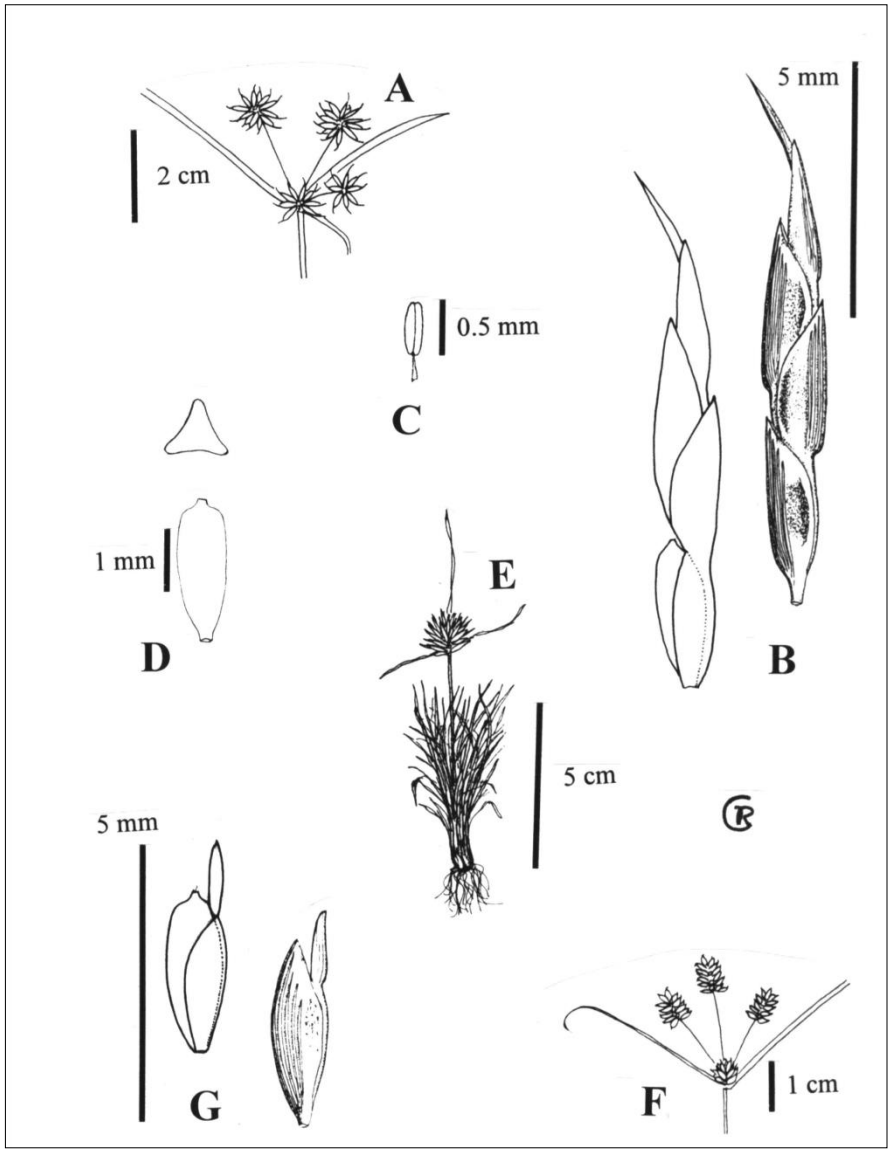
Present Treatment 4 Taxa	Kükenthal (1936) 5 Taxa	Horvat (1941) O'Neill (1942) 1 Taxon	Tucker (1994) 1 Taxon
C. floribundus	*C. uniflorus* var. *uniflorus*	*C. uniflorus*	*C. retroflexus*
	C. uniflorus var. *floribundus*		
C. pseudothyrsiflorus	*C. uniflorus* var. *pseudothyrsiflorus*		
C. retroflexus var. *retroflexus*	*C. uniflorus* var. *retroflexus*		
C. retroflexus var. *pumilus*	*C. subuniflorus*		

from Carter and Jones. 1997. Rhodora 99:319-334.

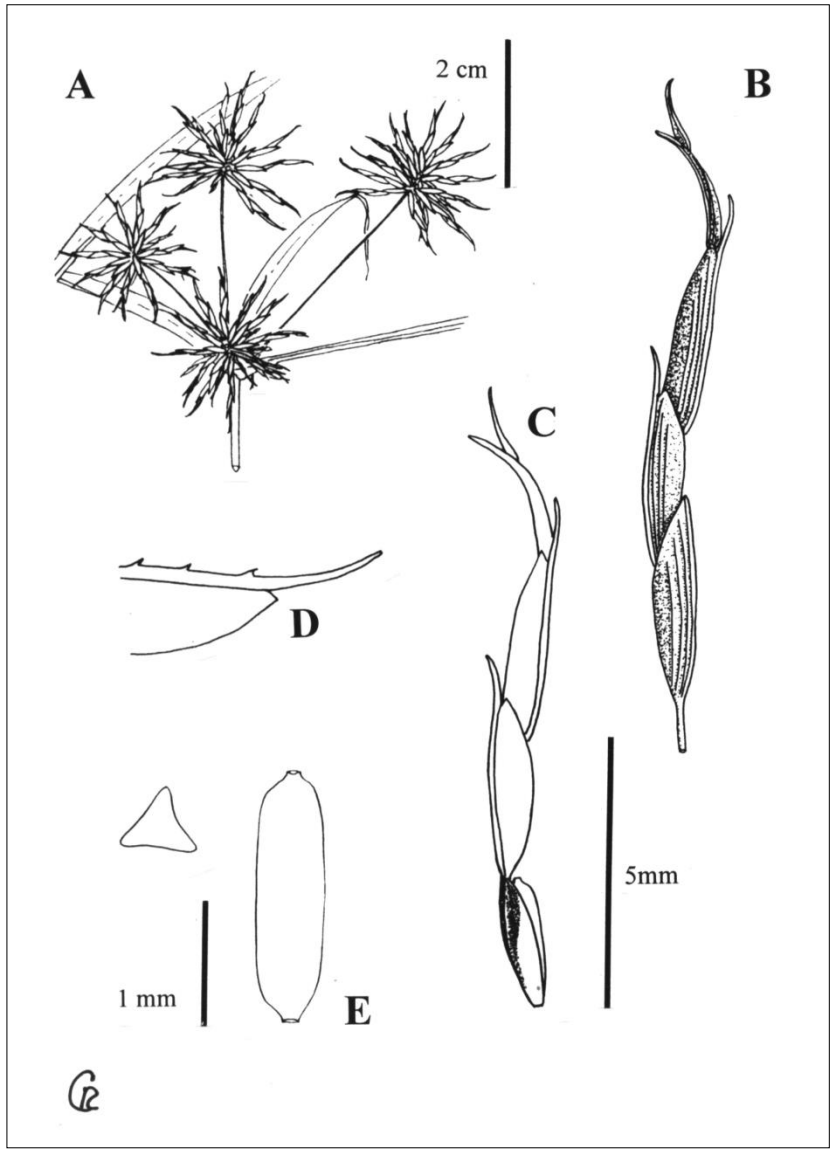
Distribution maps of *Cyperus retroflexus var. retroflexus*, *C. r.* var. *pumilus*, and *C. floribundus*



Original illustrations of *Cyperus retroflexus* var. *retroflexus*, *C. r.* var. *pumilus*, and *C. floribundus*



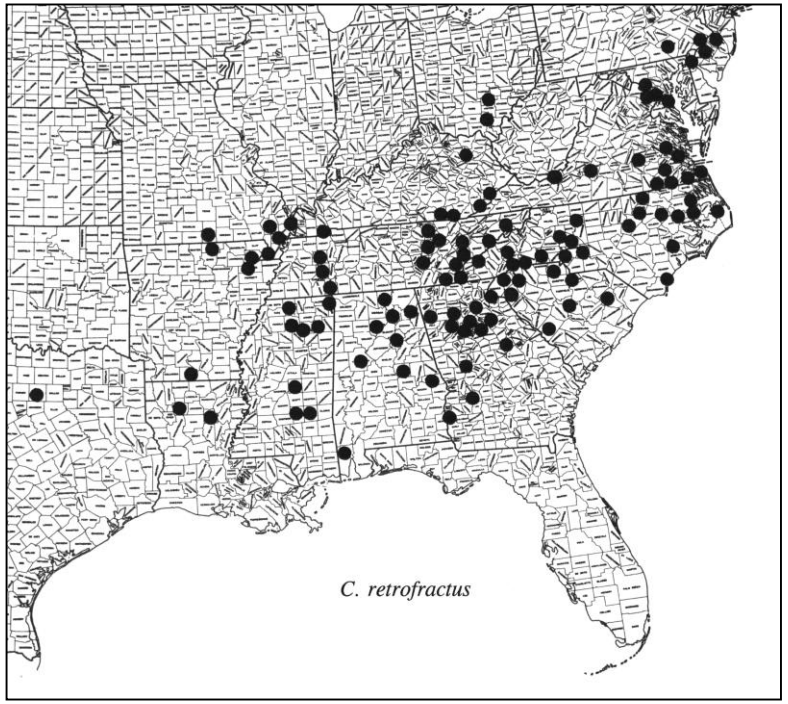
C. retroflexus var. *retroflexus* (A-D) *C. r.* var. *pumilus* (E-G)

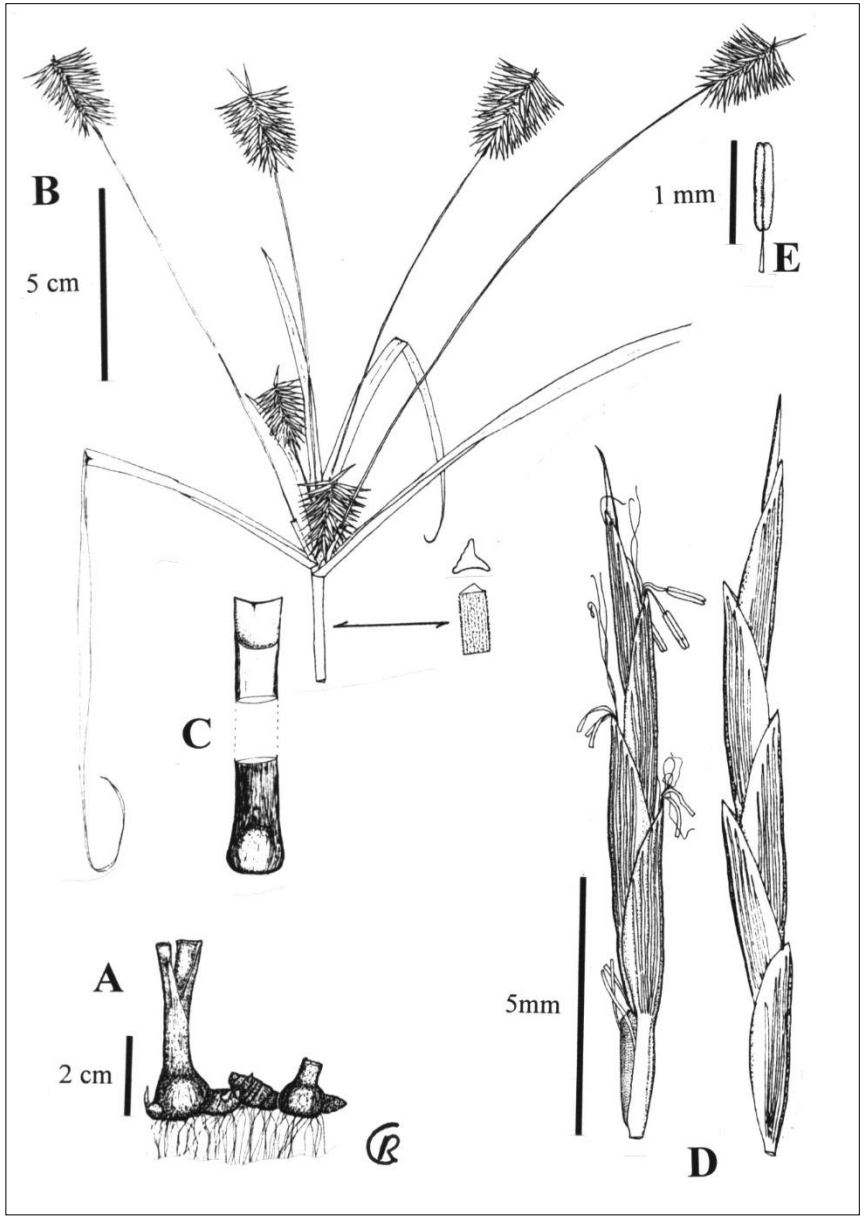


C. floribundus

Cyperus retrofractus
Distribution map and original illustration

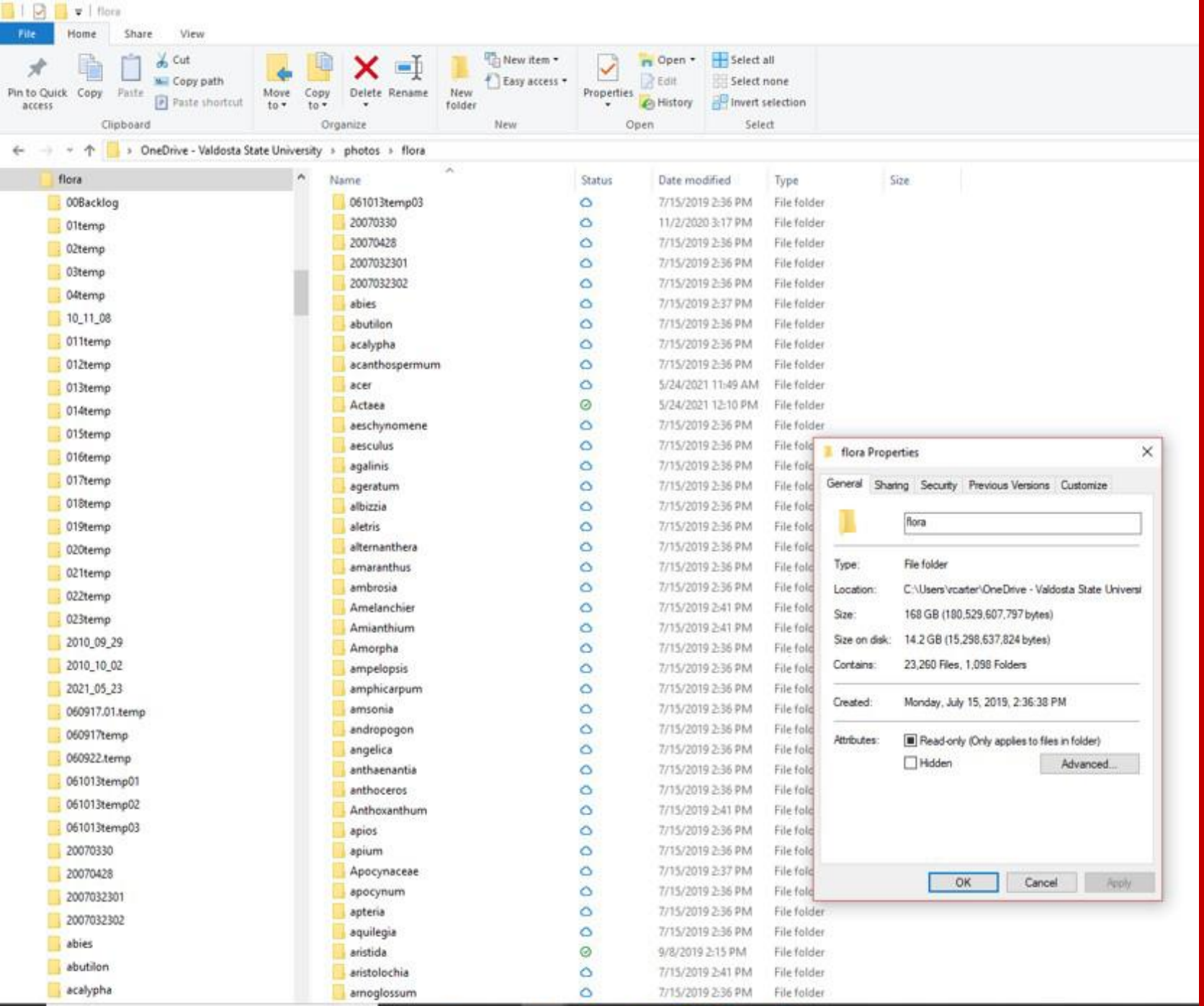
from Carter, R. In prep. Systematic revision of the North American species of *Cyperus* section *Umbellati* subsection *Umbellati* (Cyperaceae, Cypereae)





Future objectives

- Complete and submit for publication floristic efforts currently underway: Wade Tract, Greenwood, Alligator Creek WMA, Broxton Rocks, Mud Creek, Livingston Place, Lake Louise Field Station, and Grand Bay WMA–Moody AFB
- Complete various taxonomic projects currently underway: *Oxalis asynchrona* sp. nov., *Cyperus diminutus* sp. nov., and a taxonomic treatment of *Cyperus* for the southeastern United States
- Complete backlog voucher specimen processing, including digitization and updating the database
- Transition herbarium database from *Specify* to *Symbiota*, thereby promoting greater sustainability
- Complete a published flora of the Georgia Coastal Plain, which has been my long-term objective for nearly four decades



23,260 image files on One Drive – original field photographs, highlighting flora of Georgia

- Cull duplicate and substandard photos
- Organize photos by species in genus folders

06 Apr 2023