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RHYNCHOSPORA MEGAPLUMOSA (CYPERACEAE), A NEW SPECIES FROM CENTRAL FLORIDA, WITH SUPPLEMENTAL NOTES AND A KEY TO *RHYNCHOSPORA* SERIES *PLUMOSAE*

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Abstract: *Rhynchospora megaplumosa* is described as a new species of *Rhynchospora,* endemic to central Florida, in the section *Rhynchospora* series *Plumosae.* It is restricted to sandy openings in scrubby flatwoods in two localized areas of central Florida, in Polk and Manatee counties, where it flowers profusely in areas following burning. *Rhynchospora megaplumosa* is most closely related to *R. pineticola* and *R. plumosa,* but is distinguished by several characters, most conspicuously by its longer (5–7 mm) perianth bristles and golden-brown, narrowly lanceolate, longer spikelets. A key is provided to distinguish it from other species in the series. The habitat and associated species of *R. megaplumosa,* are also discussed.

Keywords: *Rhynchospora,* Cyperaceae, Florida, scrubby flatwoods.

In October of 1990, we collected an unusual species of *Rhynchospora* in Lake Arbuckle State Forest (now known as Lake Wales Ridge State Forest, Arbuckle Tract) on the eastern edge of the Lake Wales Ridge in Polk County, Florida. This plant clearly belonged to *Rhynchospora* series *Plumosae* (C. B. Clarke) Small, a group characterized by plumose floral bristles and consisting of about five species (Channell 1956) centered in the southeastern United States and the Antilles, with a few species extending to Central and South America. Vegetatively, the plant seemed close to *Rhynchospora pineticola* C. B. Clarke (at that date known by the misapplied name, *R. intermedia* (Chapm.) Britton as explained in the notes on *Rhynchospora* series *Plumosae,* below). However, upon closer examination it was found to differ markedly from *R. pineticola,* and all other species of series *Plumosae* in several characters. Subsequent revisits to the collecting locality in 1991 and 1992 failed to relocate any individuals with these characteristics, although *R. pineticola* was abundant at the site. We were ready to dismiss our collection as an unusual, perhaps teratological, fluke until May of 1993, when at an area of similar habitat a few miles from the original collection a large uniform population of this same entity was discovered. Detailed field notes were made on this population, and a search was made for other species of *Rhynchospora* and for possible intermediate or intergrading specimens at the site. The results of the field and laboratory examinations indicated a narrow range of character states in this entity, consistent with the previous collection, clearly separated from other members of series *Plumosae,* and worthy of species' level recognition.

In early 1995 we were made aware by Dr. Richard Wunderlin of a Manatee County collection of an unusual *Rhynchospora* while annotating Cyperaceae at the USF herbarium. This specimen (*S. Cole LM0105*) was immediately recognizable as an exact match of our Polk County material of the undescribed species. Subsequent searches for this *Rhynchospora* in Manatee County by the authors resulted in the discovery of several additional sites, but still restricted to a relatively small area in each of the two known counties. Its exceptionally consistent morphology in two disjunct regions provides further evidence that it represents a distinct, undescribed species.

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TAXONOMY

Rhynchospora megaplumosa E. Bridges and Orzell, sp. nov., TYPE: UNITED STATES. **Florida.** Polk County: Scrubby flatwoods ecotone between scrub and mesic flatwoods, along road #4, 0.2 mi W of main road through Lake Wales Ridge State Forest, Arbuckle Tract, at a point 4.1 mi S of entrance gate at jct Rucks Dairy Rd and 5.0 mi S of jct Lake Arbuckle Rd, ca. 0.8 mi NW of FL 64, ca. 7 air mi NE of Avon Park and 8.5 air mi SE of Frostproof, SWQ, SEQ, Sec. 27, T32S, R29E; Lake Arbuckle 7.5′ Quad., 27°39′45″N, 81°24′13″W, Elev. 79 ft, 15 May 1993, *S. L. Orzell and E. L. Bridges 21827* (HOLOTYPE: USF; ISOTYPES: BRCH, BRIT, GA, GH, FLAS, FSU, LSU, MICH, MO, NY, TEX) (Figure 1).

Rhynchosporae pineticola similis sed differt spiculis laete brunneis anguste lanceolatis 8–10 mm longis, setis perianthii quam acheniis multo longioribus 5–7 mm longis excavis ex spicula exsertis ad maturitatem, et acheniis brevioribus 1.5–1.8 mm longis.

PERENNIAL HERB, forming small dense clumps from short, stout, knotty, scaly rhizomes. Culms stiff and wiry, 1.5–2.0 mm thick at base, 3–6(–8.5) dm tall. LEAVES stiff and wiry, deeply channeled below, becoming involute above, 1–3 mm wide, mostly basal, 1–2(–3) dm long, culm leaves becoming remote and strongly reduced in size upwards. INFLORESCENCE almost always consisting of a single, dense, branched terminal fascicle, at maturity ca. 1.5 cm high and 2.0–2.5 cm wide, very rarely with a smaller lateral fascicle from the same node; bract subtending the inflorescence subulate, 2.0–4.5 cm long, surpassing the inflorescence, with inflorescence branches subtended by progressively reduced subulate bractlets. SPIKELETS narrowly lanceolate-subulate, light golden-brown, 8–10 mm long, ca. 2 mm wide, mostly 2-fruited; old spikelets persistent in inflorescence for several months and becoming gray with age; outermost spikelet scales empty (sterile), lance-ovate, 2–4 mm long, inner (fertile) spikelet scales narrowly lanceolate, 7–8 mm long, 1-nerved, pale brown to tan with a broad hyaline margin. PERIANTH bristles 6, 5–7 mm long, plumose on the lower half, the plumose hairs dense and spreading in the lowest 1 mm of the bristle, becoming more ascending and appressed for the next 2–3 mm of the bristle length, and merging into small antrorsely appressed barbs in the upper half of the bristle, the perianth bristles arching outwards from the achene body at maturity, and exserted from the spikelets, giving the spikelets a distinctly bristly appearance. ACHENE obovoid, nearly spherical above and tapered to the base, scarcely if at all flattened in cross-section and not evidently biconvex, 1.5–1.8 mm long, 1.1–1.2 mm wide; tubercle conical, the base only half of the width of the achene apex, articulated with the achene at the base, 0.5–0.7 mm long.

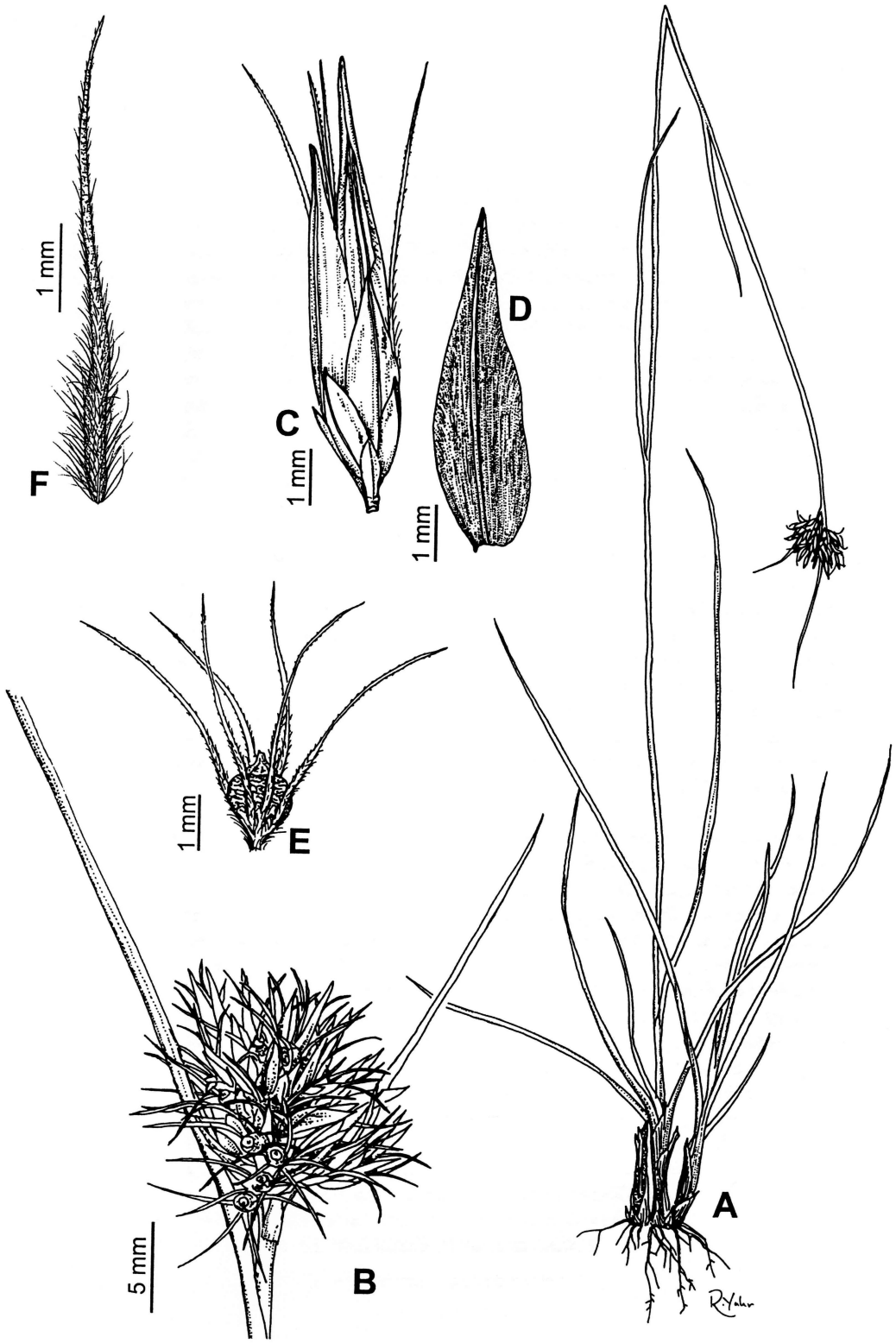
DISTRIBUTION AND HABITAT: Very localized in frequently burned sandy openings in scrubby flatwoods in two disjunct regions of Polk and Manatee counties, endemic to central Florida. Flowering from as early as March to as late as November, with mature achenes from April until November or later.

ADDITIONAL SPECIMENS EXAMINED: UNITED STATES. **Florida. Manatee**

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FIG. 1. *Rhynchospora megaplumosa* (from *Orzell & Bridges 21827* (type) and live material from the type population). A. Habit (a scale bar equal to the others in size would be 25 mm long. Scale is 0.5×). B. Inflorescence at achene maturity. C. Spikelet at anthesis. D. Medial spikelet scale. E. Mature achene with perianth bristles. F. Single perianth bristle.

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County: Lake Manatee State Recreation Area, NWQ, SEQ, SWQ, Sec. 31, T34S, R20E, Burn Zone 1bS, W of Park Office, 30 July 1993, *Sam Cole LM0105* (USF); same locality (additional locality data: W of Poley Branch, NE of guard/check station, N of FL 64, ca 2.5 mi W of jct FL 675, ca 14 mi E of Bradenton, Verna 7.5′ Quad., 27°28′44″N, 82°20′45″W, Elev. 66 ft, Soils—Pomello Soils (Arenic Haplaquods)); 4 June 1995, *Orzell & Bridges 23685* (USF), N side of FL 64, from 1.0–1.5 mi E of Manatee River bridge, 5.2 mi E of jct Verna-Bethany Rd at Verna Baptist Church, 6.8 mi E of jct FL 675, 18.3 mi E of jct I-75 E of Bradenton, Myakka City 7.5′ Quad., 27°28′00″N, 82°11′24″W, Elev. 90–100 ft, 4 June 1995, *Orzell & Bridges 23686* (USF); ca 0.3 mi E of North Fork Manatee River, ca. 2.8 air mi S of Keentown, ca. 4.5 mi SW of jct FL 62 and FL 37, Keentown 7.5′ Quad, 27°31′54″N, 82°08′58″W, Elev. 100 ft, 30 May 1996, *Orzell & Bridges 24472* (USF). **Polk County:** same as type locality, 6 Nov 1993, *Orzell & Bridges 22545* (USF); 16 Oct 1994, *Orzell & Bridges 23309* (USF): 10 Nov 1995, *Orzell & Bridges 24112* (USF); SE of Co Rd 64 at jct with School Bus Rd, 1 mi NE of Highlands Co line on FL 64, ca 7.6 mi NE of Avon Park, Lake Arbuckle 7.5′ Quad., 27°39′20″N, 81°23′36″W, Elev. 83–90 ft, 10 Nov 1990, *Orzell & Bridges 15823* (FLAS, USF).

Rhynchospora megaplumosa can be easily distinguished from *R. pineticola* by its much longer, light golden-brown spikelets (castaneous dark brown in *R. pineticola*), much longer perianth bristles, and smaller achenes. In addition, the leaves of *R. megaplumosa* are mostly shorter than those of *R. pineticola,* usually less than half the length of the flowering culm. Examination of hundreds of individuals in mixed populations of *R. megaplumosa, R. pineticola,* and *R. plumosa* Ell. revealed no intermediate forms or any evidence of introgresssion. The following key (revised from Godfrey and Wooten 1979, Gale 1944, and Kukenthal 1949), serves to distinguish all species of this series:

Key to *Rhynchospora* Series *Plumosae*

1. Style base bicornute, narrowest at its base and broadened towards the tip; achene obtriangular . . . . . R. *diodon* (Nees) Griseb.
1. Style base triangular to deltoid, broadest at the base; achene ovoid, elliptic, to suborbicular in outline 2
   2. Spikelets 1 to 5 per culm, remote on 1 to 2 slender branches, the lowermost inflorescence branch strongly divergent 3
   2. Spikelets numerous on each culm, congested in corymbose to spiciform fascicles 4
3. Achene body broadly elliptic or ovoid with a constricted neck at the junction of achene and tubercle; tubercle about 0.6 mm high; bristles as long as the achene or longer . . *R. oligantha* A. Gray
3. Achene body obovoid with only a groove at junction of achene and conic tubercle; tubercle about 0.4 mm high; bristles less than half the length of the achene . . . . . *R. breviseta* (Gale) Channell
   4. Inflorescence of a single terminal corymbiform fascicle; spikelets more than 4 mm long; leaves 1–3 mm wide 5
   4. Inflorescence an elongate spikelike raceme or a small terminal glomerule; spikelets less than 3 mm long; leaves generally filiform, less than 1 mm wide . . . . . *R. plumosa* Ell.
5. Achene body 1.5–1.8 mm long; bristles at maturity arching outward from the achene and exserted from the spikelet scales, 5–7 mm long; spikelets narrowly lanceolate-subulate, 8–10 mm long . . . . . *R. megaplumosa* E. Bridges and Orzell
5. Achene body 2.0–2.2 mm long; bristles appressed to the achene body and enclosed within the spikelet scales, 2–3 mm long; spikelets lance-ovoid, ca. 4–6 mm long . . . . . *R. pineticola* C. B. Clarke

Notes on *Rhynchospora* Series *Plumosae*

The first species described in *Rhynchospora* series *Plumosae* (C. B. Clarke) Small was *R. plumosa* (Elliott 1816). Gray (1835) described two additional species in this series, *R. oligantha* and *R. semiplumosa* A. Gray, the latter differing only slightly from *R. plumosa* and now considered a part of the complex of forms of that species (Gale

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1944; Godfrey and Wooten 1979). Chapman (1860) described *R. plumosa* var. *intermedia* Chapm., with a description which seems to fit the characters of the robust, spike-like inflorescence form of *R. plumosa,* in contrast to his description of var. *plumosa* with the characteristics of the lax, wiry form of *R. plumosa* with only small glomerules of spikelets. Britton (1892) elevated Chapman's var. *intermedia* to species level, and Small (1933) seems to have recognized *R. intermedia* with the same concept and description as that of Chapman (1860) and Britton (1892). Gale (1944) recognized three species in this series (*R. plumosa, R. intermedia,* and *R. oligantha*), and added var. *breviseta* Gale as a variety of *R. oligantha.* Gale's concept of *R. intermedia,* however, is quite different from that of previous authors. *Rhynchospora intermedia* is described by Gale as having a single terminal corymb and larger achenes than *R. plumosa.* This concept has subsequently been applied to the Florida scrub and scrubby flatwoods endemic species fitting Gale's concept. The only subsequent published change in the taxonomy of this series was the elevation of *R. oligantha* var. *breviseta* to species level (Channell 1956).

In the process of taxonomic and floristic work for the Flora of Florida project in 1991, the senior author was made aware of a problem with the application of the name *R. intermedia* to the species fitting Gale's concept (Robert K. Godfrey, pers. comm.). According to verbal communication from Godfrey, the type material of *R. plumosa* var. *intermedia* at NY belongs to the taxon with the spike-like inflorescence and small achenes represented by the type of *R. plumosa.* Although we have not seen this type, if this is true (as Chapman's (1860) descriptions would imply) it would relegate *R. intermedia* to synonymy under *R. plumosa.* Godfrey (pers. comm.) indicated that a valid name does exist for the Florida endemic with the corymbose inflorescence, *R. pineticola* C. B. Clarke. With the assistance of Richard Wunderlin and Bruce Hansen of USF, we researched this situation and came to the same conclusion. There apparently has been no published documentation of this nomenclatural problem, although the name *R. pineticola* has begun to be used as the valid name for this species in some works (Kartesz and Meacham 1999). In the following text, we briefly describe our reasoning for accepting *R. pineticola* rather than *R. intermedia.* Clarke (1908) described *R. pineticola* based on the his interpretation of *R. intermedia* (Chapm.) Britton as a later homonym of *R. intermedia* Beyr. ex Kunth (Kunth 1837). Rather than simply providing a replacement name, Clarke (1908) provided a new Latin description and several syntypes, thereby clearly establishing *R. pineticola* as a valid name. However, Kunth listed *R. intermedia* only based on the annotation of a specimen as this name in Beyrich's herbarium, without a description, and therefore it should not be considered as validly published. Although *R. intermedia* is therefore not to be rejected as a later homonym, as Clarke (1908) proposed, based on the presumed identity of the type specimen it should be relegated to synonymy under *R. plumosa,* leaving *R. pineticola* as the earliest published valid name for the Florida corymbose entity. Other workers apparently have arrived at the same conclusion, although there is no indication if any have seen the critical Chapman type specimen.

The present paper does not address the still unresolved taxonomy of the *R. plumosa* complex. There are several forms of this species, varying in the length of the plumose portions of the perianth bristles, culm height and stiffness, and inflorescence shape (spike-like vs. small terminal glomerules). Further study may indicate that some of these forms, which may have accounted for the historical confusion of the application of names described above, are deserving of taxonomic recognition. However, *R. pineticola* and *R. megaplumosa* are both clearly distinguishable from the *R. plumosa* complex by numerous consistent characters, as

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noted in the foregoing key, and can be recognized without regard to the resolution of the taxonomy of the *R. plumosa* complex.

Phenology, Habitat, and Associated Species

Flowering and fruiting of *Rhynchospora megaplumosa* is strongly stimulated by fire or other natural or artificial disturbance to the ground cover layer, without which few individuals produce flowers. In addition, the flowering and fruiting phenology of *R. megaplumosa* seems to be influenced by a combination of growing season temperatures and the timing of rainfall, with rainfall seeming to have the greater effect of the two factors. With ample rainfall following a mild, winter dry season in south-central Florida, initial flowering has been observed as early as late March. Unless there are prolonged rain-free periods March thru May, by mid-May the majority of plants in a population have mature achenes, and plants continue to produce new flowering culms. Production of flowering culms seems to be rather continuous throughout the growing season, until rainfall declines or frost occurs. In years with adequate fall and winter rainfall and no killing frost, *R. megaplumosa* may flower and fruit all year. However, in the El Niño year of 1998, most plants were in full fruit by mid-May and were becoming senescent, due to the combination of earlier than normal heavy rainfall followed by late spring drought conditions.

The scrubby flatwoods habitat of *Rhynchospora megaplumosa* is a distinctly Floridian natural community type. It is a well-defined community, that represents the broad transition between the more xeric, upland scrub and the typical poorly drained flatwoods communities of lower topographic positions (Abrahamson and Hartnett 1990; Menges 1999). Scrubby flatwoods are fire-maintained communities with acidic, low-nutrient soils (Ostertag and Menges 1994) and occur where a relatively deep sandy surface soil overlies an impervious spodic layer, resulting in alternating conditions of subsurface saturation and drought, with periodic extreme winter droughts. Soil series of the known *Rhynchospora megaplumosa* sites include Pomello (Arenic Haplohumods) and Satellite (Aquic Quartzipsamments). Both of these can be thought of as intermediate in depth to water table between the more xeric sandy soils of the upslope scrub and the more poorly drained flatwoods soils downslope.

The habitat of *Rhynchospora megaplumosa* can be characterized as an open canopy savanna with widely scattered *Pinus palustris* Mill., *P. elliottii* Engelm., or *P. clausa* (Chapm. ex Engelm.) Vasey ex Sarg. There is an open to moderately dense shrub layer of evergreen scrub oaks (*Quercus geminata* Small, *Q. minima* (Sarg.) Small, and *Q. myrtifolia* Willd.) and ericaceous shrubs (*Befaria racemosa* Vent., *Lyonia lucida* (Lam.) K. Koch, *L. fruticosa* (Michx.) Torr., and *Vaccinium myrsinites* Lam.). The shrub layer differs from that of other pine savanna-flatwoods types in having a higher frequency of evergreen scrub oaks and a sparser herb layer (Abrahamson and Hartnett 1990). There is a moderately dense herbaceous groundcover layer, dominated by *Aristida beyrichiana* Trin. & Rupr., with some patches of open bare sand.

Including all vegetative strata, at least 110 species of vascular plants occur in close association with *Rhynchospora megaplumosa* at one or more sites (Bridges and Orzell unpublished data). Ninety-five of these 110 species occur with *R. megaplumosa* at the type locality, for which we have much more comprehensive floristic surveys than for the remaining sites. Among the herbaceous associates of *R. megaplumosa* are many species which are endemic or nearly endemic to Florida, including *Asimina reticulata* Shuttlw. ex Chapm., *Chapmannia floridana* Torr. & A. Gray, *Euphorbia polyphylla* Englem. ex Chapm., *Gymnopogon chapmanianus* A. Hitchc., *Helianthemum nashii* Britton, *Hieracium megacephalon* Nash, *Lachnocaulon beyrichianum* Sporl. ex Korn., *Lia-*

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tris tenuifolia Nutt. var. *quadriflora* Chapm., *Palafoxia integrifolia* (Nutt.) Torr. & A. Gray, *Phoebanthus grandiflorus* (Torr. & A. Gray) Blake, *Piloblephis rigida* (Bartr. ex Benth.) Raf., *Polygala rugelii* Shuttlew. ex Chapm., and *Rhynchospora fernaldii* Gale. The large number of endemic species in these habitats is indicative of the floristic and ecological distinctiveness of these peninsular Florida natural communities.

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