

***PALHINHAEA CERNUA* (NODDING CLUB-MOSS)
WEST OF THE MISSISSIPPI RIVER**

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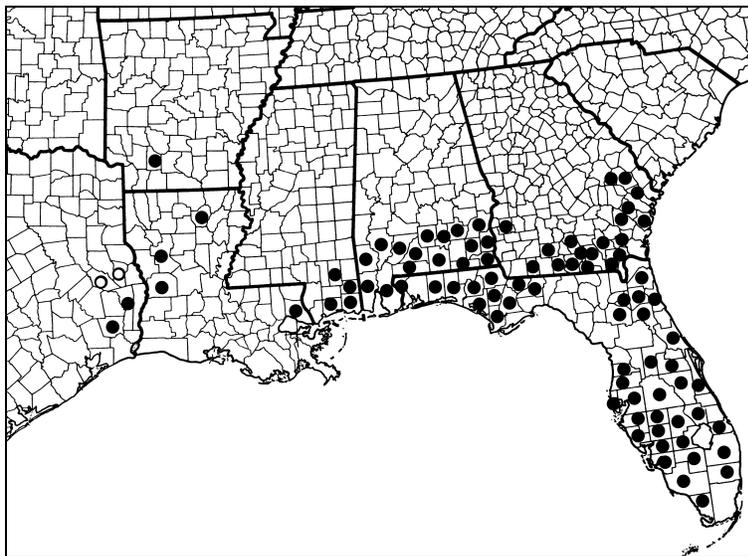
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ABSTRACT

Palhinhaea cernua has been found on the West Gulf Coastal Plain in few numbers in Texas (Hardin and Jasper cos.; undocumented records from Angelina and San Augustine cos.), Louisiana (Natchitoches, Ouachita, and Vernon parishes), and Arkansas (Nevada Co.). Plants at some of these localities, however, are known to have become extinct in the last 10-20 years, suggesting that they are essentially waifs, arriving relatively recently through long-distance dispersal and not persisting.

Palhinhaea cernua (L.) Vasc. & Franco (nodding club-moss) occurs in the southeastern USA from Florida and Georgia west to Mississippi and Plaquemines Parish, Louisiana (east of the Mississippi River). On the West Gulf Coastal Plain, it has been found at scattered sites in Louisiana and in Arkansas and Texas (Map 1). Evidence at hand suggests that the WGCP plants are essentially waifs, probably recently established through natural processes of dispersal and apparently not persisting in the region.



Map 1. Distribution of *Palhinhaea cernua* in the USA. Open circles in Texas are undocumented records.

LOUISIANA

Palhinhaea cernua was found in 1976 at Middle Branch Bog in Natchitoches Parish, southeast of Natchitoches in Kisatchie National Forest. "This area was searched extensively by Holmes and by Thomas on separate occasions in the fall of 1977 but no plants of [*Lycopodium cernuum*] could be located" (Thomas et al. 1978). It was found there again, however, in 1978 and 1980, apparently of rare occurrence. Subsequent surveys of Middle Branch Bog as well as other western Louisiana bogs did not encounter the species (MacRoberts & MacRoberts 1988, 1993, 1995a). Vouchers: Red Dirt Game Management Area, sec 27, roadside ditch near artesian well in hillside bog, rare, 15 Oct 19786, *Holmes 2902* (IBE digital image!, NATC); Red Dirt Management Area, ca 20 mi S of Natchitoches, 29 Sep 1978, *Holmes & Wells 3360* (NATC, NLU); hillside seepage area in longleaf pine woods beside Middle Branch Rd, 10 Oct 1980, *Thomas 74133* (NLU).

Thomas and Allen (1993) included a record in Ouachita Parish for *Palhinhaea cernua*, based on several collections from the same site: seepage area in sandy soil beside George Simmons Rd, 1.1 mi S of La. 557 at Cypress Turnoff W of Luna, near a branch of Gladden Branch, 29 Oct 1987, *Thomas 103145* (NLU digital image!); large clearcut area of baygall and sandy hills S of La. 557, between Luna and Cypress Turnoff S of West Monroe, 11 Oct 1989, *Thomas 113634* (NLU digital image!). clearcut baygall area S of La Hwy 557 at Cypress turnoff W of Luna at a branch of Gladden Branch, 29 Oct 1990, *Thomas 122,254* (NLU digital image!). The current status of this population is unknown.

A sterile plant of *Palhinhaea cernua* was collected in Vernon Parish: 16 mi N of Pitkin, south-central northwest portion of Sec 6 T1N R5W, drainage area just upslope from baygall, 4 Sep 1999, *Allen 18398* (NLU!). The current status of this population is unknown.

Collections from St. Tammany Parish appear to be at the western extremity of the "main" range of the species and continuous with it — they are not on the WGCP. Apparently all are from within about a 2-mile radius: Hwy 41, 1/2 mi N of jct Hwy 36, disturbed, low, sandy spot, 30 Apr 1977, *Barton 40* (LSU); very abundant in old gravel pit, 0.25 mi E on La. Hwy 36 from jct with Hwy 41, 6 Nov 1977, *Landry s.n.* with R.D. Thomas (LSU); woods between Pearl River Canal and west Pearl River E of La. Hwy 41 and Evans Creek, 13 Sep 1975, *Thomas 46276* (NLU digital image!); 3 colonies along base of W-facing bank of Pearl River Canal at Dr. Caire's camp E of Evans Creek, grocery on La. Hwy 41, S of Talisheek, 26 Sep 1975, *Thomas 47241* (NLU 28421); abandoned gravel pit E of La. Hwy 41 at La. Hwy 36 in Hickory, 4 Nov 1979, *Thomas 69513* (NLU 28423).

ARKANSAS

Palhinhaea cernua was discovered in Nevada County in October 1995 with other species of Lycopodiaceae on a red clay bluff underlain by a layer of sand (Bray 1996). It was represented by a single plant with immature strobili — reexamination of the site in November found the above-ground parts turning brown before completion of strobilus maturation. "The plant persisted for three years at this location, but with failing vigor and thriftiness until it was no longer evident by 1997. No other plants of this species were seen at that time or in subsequent visits to the location" (Peck 2011, p. 15). Voucher: Nevada Co.: *Bray 269* (HEND). Theo Witsell (Arkansas Natural Heritage Commission, pers. comm.) notes that searches for *P. cernua* at the same site in 2015 and in 2017 also were unsuccessful.

TEXAS

MacRoberts & MacRoberts (1995b) reported *Palhinhaea cernua* as new to the Texas flora, based on two sterile plants found in a hillside pitcher plant bog in the Angelina National Forest in Jasper County in August 1995. Plants were not collected but photographs were distributed as herbarium vouchers (*MacRoberts & MacRoberts 2860*, ASTC, BRCH, LSUS, VDB). The plants did



Figure 1. *Palhinhaea cernua* in Hardin Co., Texas. Photo by Eric Keith, 15 Jul 2009.

not persist at this site — the site was surveyed for three subsequent years after the discovery and no nodding club-moss was found.

In 2009 *Palhinhaea cernua* was found in Hardin Co., Texas: Village Creek State Park near Lumberton, UTM NAD 83: 386391.4 E, 3347244.1 N, sandy mound along old logging road, mesic loblolly pine-hardwood forest, five stems in two clumps, sterile, 15 Jul 2009, *Keith 973* (SHST) (Figure 1). This find was reported in an *Inaturalist* entry as *Lycopodiella cernua*. The site was examined again in September 2015 but no plants were found. By 2015, vegetation at the site had become dense and grown up.

Turner et al. (2003) mapped *Palhinhaea cernua* as occurring in San Augustine and Angelina counties. This distribution has been repeated by Kartesz (2014), USDA, NRCS (2018), and by Diggs et al. (2006), but Diggs and Lipscomb (2014) were unable to find vouchers for these two county records. We also have been unable to find evidence to confirm them.

Broader geographical range and habitat

Palhinhaea cernua in its more compact southeastern USA range occurs in some habitats where other lycopods are characteristic (e.g. baygalls, hillside seeps, bogs) but most of the collections are from disturbed or even ruderal habitats (canal banks, ditch banks and bottoms, pond and lake margins, borrow pits and gravel pits, road cuts, etc.; from label data of BRIT specimens and from online data — Wunderlin et al. 2018; Keener et al. 2018). Nodding clubmoss clearly is a colonizer of wet sites and many of these occurrences surely are ephemeral — this perhaps underlies Weakley's speculation (2015) that it may be adventive in some of its USA occurrences. Or perhaps its entire range there is continuously, even if sporadically, replenished by dispersal. If so, it seems likely that the primary range of *P. cernua* in the Southeast has been populated from the Caribbean area.

The relatively few known WGCP localities appear to mirror the habitat diversity for the species in the Southeast. WGCP occurrences, however, seem more likely to have their origin in eastern Mexico.

Palhinhaea cernua grows in South America, Central America, and Mexico (as far north as southeastern Tamaulipas), the southern half of Africa, southeast Asia, Indonesia, Australia, and New Zealand, and it is scattered in various islands in the Pacific, Atlantic, and Indian oceans (see worldwide distribution map at GBIF.org 2017). It is "a common pioneer on disturbed soil in most tropical areas, especially in the lowlands" (Matos 2013) and is probably the world's most abundant club-moss (Wagner & Beitel 1993).

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