

FIRST DOCUMENTATION OF *DICHANTHELIUM CAERULESCENS* (POACEAE) FOR THE VASCULAR FLORA OF LOUISIANA, U.S.A.

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ABSTRACT

Dichanthelium caerulescens is documented for the first time in Louisiana, as the result of floristic fieldwork performed in 2019 through 2021. Louisiana records extend the range of *D. caerulescens* westward by approximately 265 mi (426.5 km) into the Western Gulf Coastal Plain ecoregion. These findings also identify a new habitat, coastal prairie, utilized by *D. caerulescens*.

RESUMEN

Dichanthelium caerulescens se documenta por primera vez en Louisiana, como resultado del trabajo de campo florístico realizado en 2019 hasta 2021. Los registros de Louisiana amplían el rango de *D. caerulescens* hacia el oeste en aproximadamente 265 millas (426,5 km) en la ecorregión de la llanura costera occidental del Golfo. Estos hallazgos también identifican un nuevo hábitat, la pradera costera, utilizada por *D. caerulescens*.

KEY WORDS: *Dichanthelium caerulescens*, *Panicum caerulescens*, *Dichanthelium roanokense*, *Dichanthelium dichotomum*, grassland, coastal prairie, prairie, pine savanna, flatwoods, alkaline, flora, Louisiana

INTRODUCTION

Dichanthelium (Hitchc. & Chase) Gould is one of the largest grass genera in the Western Hemisphere (Thomas 2015), and often is a difficult genus to understand taxonomically (Freckmann 1967; Hansen & Wunderlin 1988; LeBlond 2001; Thomas 2015). This difficulty is due to the frequent clinal and sympatric disposition of these taxa and is further exacerbated by the large number of species in this genus (Freckmann 1967; LeBlond 2001; Thomas 2015). A taxonomic understanding of this genus is especially important for floristic treatments, monitoring projects, restoration efforts, and other taxonomic interests (Thomas 2015). The complex nature of *Dichanthelium* has resulted in mislabeled herbarium specimens; subsumption of many species, often with little to no justification (Thomas 2015; LeBlond 2020); and unrealized range extent.

One taxon that is frequently misidentified and has been subject to subsumption is *Dichanthelium caerulescens* (Hack. ex Hitchc.) Correll. Hitchcock (1909) first described *Dichanthelium caerulescens*, which was maintained at the species rank through 1951 (Hitchcock & Chase 1951; LeBlond 2001). Gleason (1952) and subsequent authors (e.g., Radford et al. 1964; Lelong 1984; Thomas & Allen 1993) synonymized *D. caerulescens* with *D. roanokense*. However, Gleason (1952) did provide characteristics differentiating the two taxa and stated that the two taxa possibly integrate.

Dichanthelium caerulescens is similar to *D. roanokense* (Ashe) LeBlond; both taxa have terminal and upper vernal leaf blades of similar size that tend to be erect or slightly ascending-spreading; glabrous spikelets; scabrous panicle branches and peduncles; and an affinity for wetland habitats. The leaves of *D. roanokense* are sometimes glaucous; however, this characteristic is more pronounced and consistent on *D. caerulescens* (hence the specific epithet) (LeBlond 2001, 2020). Despite a general similarity, there are more morphological features that distinguish these two taxa. *Dichanthelium caerulescens* has smaller spikelets (1.4–1.8 mm long) (Gleason 1952) and fertile lemmas (1.3–1.5 mm long) than *D. roanokense* (1.8–2.2 mm and 1.6–1.8 mm long, respectively) (Hitchcock 1909; LeBlond 2001, 2020). The fertile lemmas lack papillae on *D. caerulescens*, whereas papillae are present on fertile lemmas of *D. roanokense* (LeBlond 2001). The vernal panicles of *D.*

caerulescens tend to be narrower and partially exerted with ascending panicle branches, unlike the broader open panicles with spreading branches of *D. roanokense* (Hitchcock 1909; Gleason 1952; LeBlond 2001). Additionally, *D. caerulescens* has thinner culms and is generally shorter in stature than *D. roanokense* (LeBlond 2001). These distinctions, coupled with some ecological differences, merit the recognition of *D. caerulescens* at the species rank as treated in Hitchcock (1909), Hitchcock and Chase (1951), Correll (1979), and LeBlond (2001, 2020).

Distributions and habitat types of *D. roanokense* and *D. caerulescens* overlap. However, *D. caerulescens* is restricted to near coast habitats of the outer Atlantic and Eastern Gulf Coastal Plains (LeBlond 2001), whereas *D. roanokense* is found along the coast and inland to MO (Brant 2019), AR and TN (Ciafré & Estes 2022; SERNEC Data Portal 2021) (Fig. 1). *Dichantheium caerulescens* has a niche for alkaline habitats, primarily near coastal or near coastal grasslands, and wet pine savannas (LeBlond 2001). Hitchcock (1909) reported the range of *D. caerulescens* as southeastern New Jersey to Florida, west to Mississippi; also in Bahamas and Cuba, and provided specimen citations for this range. Later, Hitchcock and Chase (1951) added Louisiana to the *D. caerulescens* range, but did not cite a Louisiana collection or location.

METHODS

While conducting formal and informal natural community floristic surveys on coastal prairie remnants in Calcasieu Parish, Louisiana, the author observed several individuals of *Dichantheium* that appeared atypical for the known taxa on site. Specimens were collected, processed, identified, and deposited for preservation in the Shirley C. Tucker Herbarium (LSU) and the University of North Carolina at Chapel Hill Herbarium (NCU). Vouchered *Dichantheium* specimens collected by the author were sent to Richard LeBlond [North Carolina Natural Heritage Program (retired) and Associate of the University of North Carolina Herbarium] for annotation.

A literature and herbarium specimen search to substantiate the reported Louisiana occurrence of *D. caerulescens* by Hitchcock and Chase (1951) was conducted. Online herbarium specimen images were accessed and examined through the SERNEC Data Portal (2021). Specimen loans were requested for physical examination when a specimen location or characteristics were atypical for the known parameters of *D. caerulescens*. Specimen annotation nomenclature follows Weakley (2020). Additionally, County/Parish specimen location data from the SERNEC Data Portal (2021) and published literature were compiled to assess geographic distributions of *D. caerulescens* and *D. roanokense*.

RESULTS

A search of the SERNEC Data Portal (2021) yielded two Louisiana specimens identified as *D. caerulescens*. In addition to these two specimens, additional collections from the southeastern United States identified as *D. roanokense* or *D. caerulescens* were also examined from BRIT, LSU, LSU/NLU, NCSC, and TENN. The examined specimens were identified to species using Weakley (2020) and annotation notes are listed below. The species name listed first is the identification provided on the specimen collection label.

***Dichantheium caerulescens*, U.S.A. Louisiana. Union Co.:** 6 mi W Sterlington, frequent on moist sandy clay clearing in oak-pine woods, 20 May 1959, *Kral* 8960 (BRIT265539). Annotation: *Dichantheium tenue* (Muhl.) Freckmann & Lelong (Early, 19 Jan 2020), **Spikelets:** minutely pubescent, hairs largely restricted to margins, 1.1–1.5 mm long, 0.9–1.2 mm wide, first glume 0.4 mm long, obtuse apically; **Panicle:** 50–55 mm wide by 70–78 mm long, branches smooth; **Leaves:** 4.9–5.3 mm wide by 5.2–6.8 mm long, longitudinally grooved, white to tawny margin, widest near base, not clasping; **Ligule:** ciliate, white, 0.3–0.4 mm long; **Culm:** 1.0–1.2 mm thick at lowest internodes, nodes and internodes glabrous.

***Dichantheium caerulescens*, U.S.A. Louisiana. Lincoln Co.:** ca. 2 mi SE Ruston, on sandy clay of sunny road bank, 20 May 1963, *Kral* 17055 (BRIT265538). Annotation: *Dichantheium tenue* (Muhl.) Freckmann & Lelong (Early, 19 Jan 2022), **Spikelets:** most are nearly glabrous, some minutely pubescent, two spikelets densely pubescent, 1.3–1.5 mm long, 0.9–1.0 mm wide, first glume 0.3–0.4 mm long, obtuse apically; **Panicle:**



FIG. 1. Scanned specimen *Dichanthelium caerulescens* (Early 2116, LSU00217341) (SERNEC Data Portal 2021).

45 mm wide by 55 mm long, branches smooth; Leaves: 6.1–6.2 mm wide by 64–75 mm long, longitudinally grooved, white to tawny margin, widest near base, not claspig; Ligule: ciliate, white, 0.3 mm long; Culm: 1.0 mm thick at lowest internode, nodes and internodes glabrous.

***Dichanthelium caerulescens*, U.S.A. Florida. Polk Co.:** W of Arbuckle Lake Charlie Bombing Range, Cypress hammock, 04 Apr 1970, Underwood 44421(TENN-V-0021924). Annotation: *Dichanthelium erectifolium* (Nash) Gould & C.A. Clark (Early, 18 Feb 2022), Spikelets: densely pubescent, 1.0–1.3 mm long;

Panicle: narrow 17 mm wide and 64 mm long, branches sparsely scabrous; **Leaves:** 7 mm wide x 65 mm long sub-cordate at the base; **Ligule:** short dense ciliate hairs >0.5 mm long; **Culm:** 1.3–1.6 mm wide at lowest internode.

Dichanthelium caerulescens, U.S.A. Florida. Monroe Co.: Long Key: Everglades, 18–26 Jan 1909, *Small and Carter* 2858 (TENN-V-0021925). Annotation: *Dichanthelium caerulescens* (Early, 18 Feb 2022), **Spikelets:** glabrous 1.6–1.7 mm long, first glume 0.4 mm long; **Panicle:** branches (ascending) and peduncles densely antrorsely scabrous; **Leaves:** 3.1–5 mm wide 45–55 mm long; **Ligule:** short dense ciliate hairs >0.5 mm long; **Culms:** 1.1 mm wide at lowest internode with some hairs on sheath, fascicled autumnal form.

Dichanthelium caerulescens, U.S.A. North Carolina. Carteret Co.: in grassy thicket, moist soil, Shackleford Bank, Beaufort, 13 Jul 1941, *Blomquist* 11632 (NCSC35688). Annotation: *Dichanthelium caerulescens* (Early, 18 Feb 2022), **Spikelets:** 1.5–1.6 mm long, first glume 0.5–0.6 mm long; **Panicle:** 12–19 mm wide, branches and peduncles moderately to densely antrorsely scabrous; **Leaves:** 3.5–4.4 mm wide 42–56 mm long; **Ligule:** ciliate <0.5 mm long; **Culm:** 1.1 mm wide at lowest internode.

Dichanthelium caerulescens, U.S.A. North Carolina. Pender Co.: in savanna on E side of Alligator Lake Road, immediately S of junction with Flo Road, 3 Jun 2012, *Thornhill* 1308 (NCSC00057028). Annotation: *Dichanthelium caerulescens* (Early, 18 Feb 2022), **Spikelets:** glabrous 1.7–1.8 mm long, first glume 0.5–0.7 mm long; **Panicle:** branches ascending (< 20 mm wide) and peduncles antrorsely scabrous; **Leaves:** 2.8–6 mm wide by 50–78 mm long; **Ligule:** ciliate 0.4 mm long; **Culm:** at lowest internode 1.1 mm wide, nodes and internodes sparsely puberulent.

Dichanthelium caerulescens, U.S.A. North Carolina. Tyrrell Co.: open places in oak forest, 5 mi W of Columbia, 8 May 1938, *Godfrey* 3880 (NCSC00054261). Annotation: *Dichanthelium dichotomum* (Linnaeus) Gould var. *dichotomum* (Early, 18 Feb 2022), **Spikelets:** 1.8–2.1 mm long and glabrous, first glume 0.7–0.9 mm long; **Panicle:** branches and peduncles glabrous to slightly antrorsely scabrous; **Ligule:** ciliate 0.4 mm long; **Leaves:** 7–6 mm wide by 90–105 mm long; **Culm:** 1.1 mm wide at lowest nodes, lower nodes retrorsely bearded.

Dichanthelium caerulescens, U.S.A. South Carolina. Georgetown Co.: 7 mi E of Andrews, plowed grass-edge bog or savanna, 27 Jun 1939, *Godfrey and Tryon* 162 (TENN-V-0021927). Annotation: *Dichanthelium webberianum* (Nash) LeBlond (Early, 18 Feb 2022), **Spikelets:** 1.9–2.1 mm long, first glume 0.8–0.9 mm long; **Panicle:** branches densely antrorsely scabrous; **Leaves:** clasping at base 7.5–9 mm wide by 70–98 mm long; **Ligule:** 0.8–1 mm long; **Culm:** 1.8–2 mm wide at lowest internode, some lower nodes puberulent, lowest internode with some hairs.

Dichanthelium caerulescens, U.S.A. Tennessee. Moore Co.: sandy loam of moist areas by TN 130 oak barren W of Tullahoma by powerline intersect, near Motlow College on game refuge, 6 Jun 1989, *Kral* 76569 (TENN-V-0075280). Annotation: *Dichanthelium microcarpon* (Muhl. ex Elliott) Mohlenbr. (Early, 18 Feb 2022), **Spikelets:** 1.7–1.8 mm long by 0.9–1.1 mm wide, first glume 0.4–0.5 mm long; **Panicle:** branches and peduncles antrorsely scabrous, peduncles scabrous; **Leaves:** 3.5–4 mm wide by 60–64 mm long, culm; **Ligule:** ciliate white 0.8–1 mm long; **Culm:** 0.8–1.1 mm wide at lowest internode, lower nodes conspicuously retrorsely long bearded.

Dichanthelium roanokense, U.S.A. Louisiana. Calcasieu Parish: Sweet Lake Prairie, W of Fruge Road via private roads, 1.5 mi N of jct. w/Lionel Derouen Rd, 2.5 mi E of jct. w/LA 27, ca 2 air mi S of Holmwood, lat: 30.103056, lon: -93.054444, 21 Jun 2010, *Reid* 7466 (LSU00129158). Annotation: *Dichanthelium roanokense* (Early, 19 Jan 2022), **Spikelets:** 1.9–2.0 mm long, first glume 0.6 mm long; **Panicle:** 33–46 mm wide, branches and peduncle antrorsely scabrous; **Leaves:** 3–5 mm wide by 60–65 mm long; **Ligule:** ciliate <0.5 mm long; **Culm:** 1.2 mm wide at lowest internode.

Dichanthelium roanokense, U.S.A. Louisiana. Calcasieu Parish: W of Fruge Rd. and S of Lionel Derouen Rd., E of LA 27, ca 4 air mi SSE of Holmwood, lat: 30.068258, lon: -93.063411, Grazed coastal prairie remnant

burned on 13 Mar 2014, common in wet intermound swale dominated by *Panicum hemitomon*, 05 May 2014, Reid 8819 (LSU00180361). Annotation: *Dichanthelium roanokense* (Early, 19 Jan 2022). Spikelets: (1.8 immature) 1.9–2.2 mm long, first glume 0.7–0.9 mm long; Panicle: 60 mm wide, branches and peduncle antrorsely scabrous; Leaves: 3–5 mm wide by 60–65 mm long; Ligule: ciliate <0.5 mm long; Culm: 1.0–1.6 mm wide at lowest internode.

***Dichanthelium roanokense*, U.S.A. Louisiana. Calcasieu Parish:** prairie-strip between railroad and Metzger Road ca 8 mi SW of Iowa, 22 Apr 1989, Allen 16403 (LSU/NLU0394933). Annotation: *Dichanthelium roanokense* (Early, 18 Feb 2022), Spikelets: 1.8–2.0 mm long, first glume 0.4–0.7 mm long; Panicle: 25–33 mm wide, branches and peduncles antrorsely scabrous; Leaves: 3–5 mm wide by 60–65 mm long; Ligule: ciliate <0.5 mm long; Culm: 1.1–1.2 mm wide at lowest internodes.

***Dichanthelium roanokense*, U.S.A. Louisiana. Calcasieu Parish:** Sweet Lake North Prairie, 20 Apr 2018, Early 1258 (LSU00214483). Annotation: *Dichanthelium roanokense* (Early, 18 Feb 2022), Spikelets: glabrous 1.9–2.1 mm long, first glume 0.8 mm long; Panicle: 22–33 mm wide, branches antrorsely scabrous; Leaves: 3–5 mm wide by 60–65 mm long; Ligule: 0.3–0.4 mm long; Culm: 0.9 mm wide at lowest internode.

***Dichanthelium roanokense*, U.S.A. Louisiana. Calcasieu Parish:** Jacques Coulee coastal prairie remnant, wet to mesic intermound flats, 13 Aug 2019, Early 1717 (LSU00216066). Annotation: *Dichanthelium roanokense* (Early, 20 Apr 2022), Spikelets: glabrous 1.9–2.0 mm long, first glum 0.5–0.8 mm long; Panicle: 22 mm wide, branches antrorsely scabrous; Leaves: 3–6 mm wide by 27–82 mm long; Ligule: 0.4 mm long; Culm: 1.1–1.3 mm wide at lowest internode.

***Dichanthelium roanokense*, U.S.A. Louisiana. Calcasieu Parish:** Jacques Coulee coastal prairie remnant, hydric flats, 24 Mar 2020, Early 1840 (LSU00216078). Annotation: *Dichanthelium roanokense* (Early, 20 Apr 2022), Spikelets: glabrous 1.9–2.0 mm long, first glume 0.5 mm long; Panicle: 32–42 mm wide, branches antrorsely scabrous; Leaves: 4–6 mm wide by 80–115 mm long; Ligule: 0.3–0.4 mm long; Culm: 1.6–1.8 mm wide at lowest internode.

***Dichanthelium roanokense*, U.S.A. Louisiana. Sabine Parish:** Peason Ridge Military Reservation, 6.3 air mi NE of Hornbeck in southwestern quarter of reservation lat: 31.372217; lon: –93.306368, mucky mid-slope seepage bog in mostly sun w/ *Toxicodendron vernix*, *Rudbeckia scabrifolia*, *Sarracenia alata*, *Viburnum nudum*, and *Magnolia virginiana*, 28 Apr 2011, Reid 7971 (LSU00179564). Annotation: *Dichanthelium roanokense* (Early, 19 Jan 2022). Spikelets: 1.9–2.0 mm long, first glume 0.8–1.0; Panicle: 32–36 mm wide, branches and peduncle antrorsely scabrous; Leaves: 3–5 mm wide by 60–65 mm long; Ligule: ciliate <0.5 mm long; Culm: 0.9–1.0 mm wide at lowest internode.

***Dichanthelium roanokense*, U.S.A. Texas. Newton Co.:** Hwy 1416, ca 2.7 mi S of Bon Weir, infrequent, 20 Apr 2007, Allen 71459 (LSU00137963). Annotation: *Dichanthelium roanokense* (Early, 18 Feb 2022), Spikelets: 1.9–2.2 mm long, first glume 0.5–0.9 mm long; Panicle: 25 mm wide (all panicle branches were adhered to the mounting paper, true form and width are unknown, though most appear to be ascending) branches and peduncle antrorsely scabrous; Leaves: 3–5 mm wide by 60–65 mm long; Ligule: ciliate <0.5 mm long; Culm: 1.0–1.3 mm wide at lowest internodes.

***Dichanthelium roanokense*, U.S.A. Louisiana. Calcasieu Parish:** ca. 3 mi S of Vinton on Gray Ranch Prairie Replicate 9 treatment 4, 29 May 2019, Early 1661 (LSU00216058). Annotation: *Dichanthelium portoricense* (Desv. ex Ham.) B.F. Hansen & Wunderlin (Early, 20 Apr 2022), Spikelets: glabrous and prominently nerved, 2.4–2.7 mm long; Panicle: open, branches smooth; Leaves: larger 3.5–6.5 mm wide by 45–100 mm long; Ligule: 0.5 mm long; Culm: 1.1–1.2 mm wide at lowest internode, stem and some sheaths purple, plant largely glabrous on nodes, internodes, but with some hairs on sheath.

Collections made in 2019 and 2021 (listed below), confirm the presence of *D. caerulescens* in Louisiana. These collections extend the range of *D. caerulescens* westward by approximately 265 miles (426.5 km) from the

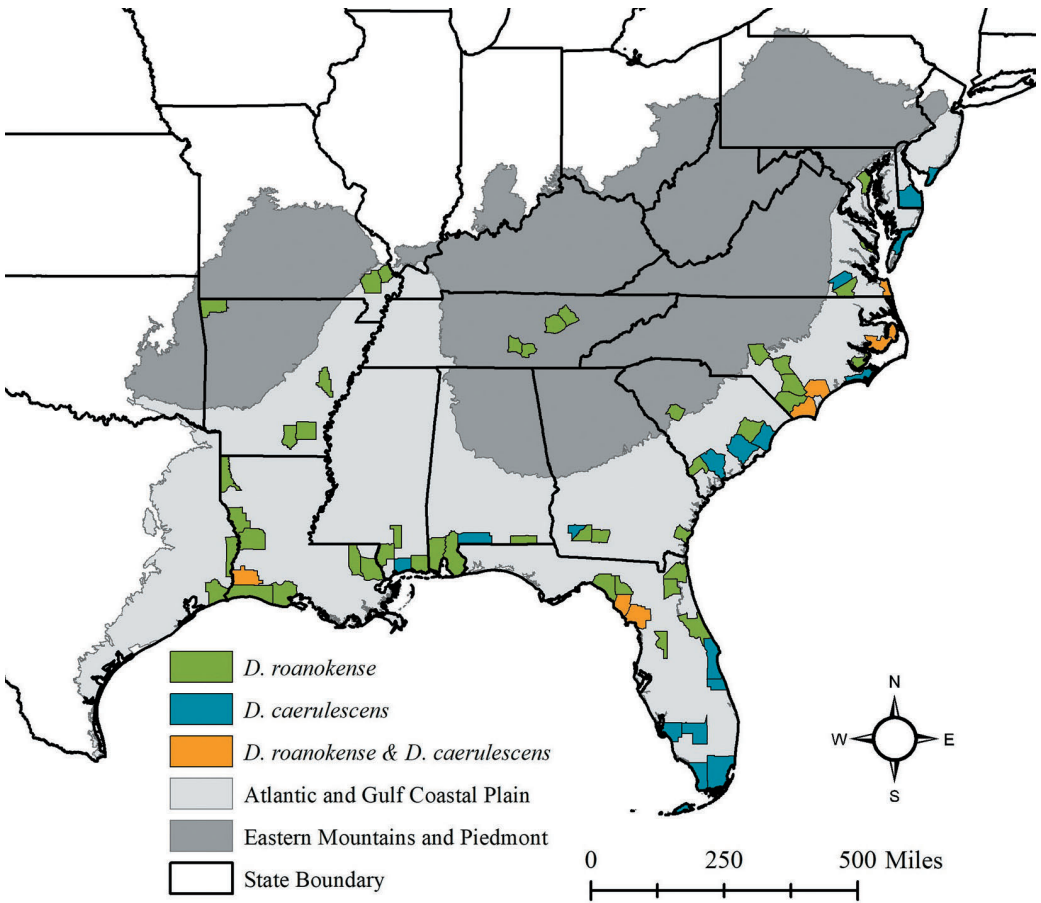


FIG. 2. U.S. Counties/Parishes with vouchered specimens identified as *D. roanokense* and/or *D. caerulescens* based on information from the SERNEC Data Portal (2021). Ecoregions boundaries were adapted from geospatial Level III and Level IV data of the continental United States (U.S. EPA 2013).

closest known collection in Harrison County, Mississippi, U.S.A. (Tracy 4600, NCU) (SERNEC Data Portal 2021). Richard LeBlond (NCU) concurrently annotated the following Louisiana *D. caerulescens* specimens. **U.S.A. Louisiana. Calcasieu Parish:** ca. 3 mi S of Vinton, (30.118635°, -93.604520°), on coastal prairie remnant-saline slick at mound base, associated with *Spartina patens*, *Andropogon capillipes*, *Sporobolus* sp., *Cynodon dactylon*, *Phyla nodiflora*, *Fimbristylis castanea*, and *Symphytotrichum dumosum* var. *subulifolium*, 18 Oct 2019, Early 1787 (NCU). **Calcasieu Parish:** ca. 3 mi S of Vinton, (30.124230°, -93.601546°), on hydric flats associated with *Andropogon capillipes*, *Rudbeckia texana*, *Rhynchospora gracilentia*, *Hyptis alata*, *Hibiscus leucophyllus*, *Polygala appendiculata*, and *Paspalum plicatum*. 06 Jun 2021, Early 2116, (LSU00217341 & NCU) (Fig. 2).

This disjunct population is located on a marsh fringing coastal prairie remnant of approximately one-thousand acres, which has long been used as rangeland for domestic cattle and is presumably unplowed. This prairie remnant contains pimple mounds as described in (Seifert et al. 2009), marais or ephemeral ponds and hydric to mesic flats (Holcomb et al. 2015). In Louisiana, coastal prairie is listed as critically imperiled by the Louisiana Department of Wildlife and Fisheries (LDWF), meaning it is at very high risk of extirpation due to very restricted range, very few occurrences, very steep declines, and/or severe threats (Holcomb et al. 2015).

Botanical surveys within the same coastal prairie remnant in 2020 and 2021 yielded more *D. caeruleum* observations from several micro-habitats including saline slicks, interstitial hydric flats among pimple mounds, and along the marsh-prairie interface. In the spring and autumn of 2020, *D. caeruleum* was observed in study plots (Replicate 5 along Transect 1, LDWF unpublished data) on hydric-mesic intermound flats with *Andropogon capillipes*, *Schizachyrium scoparium*, *Axonopus fissifolius*, *Hibiscus leucophyllus*, *Rudbeckia texana*, and *Vernonia missurica*. Anecdotally, *D. caeruleum* appears to have some fire tolerance, as it was observed in fruit in October of 2020 and June of 2021 following a prescribed fire treatment on 12 August 2020.

While botanical surveys are ongoing, *D. caeruleum* has yet to be identified at other remnants or within other habitat types in Louisiana. No other *D. caeruleum* specimens were identified from Louisiana herbarium records. LeBlond (2001) reports that *D. caeruleum* may be the most under documented *Dichanthelium* of the informal *Dichotoma* group.

These findings merit additional field explorations in Louisiana and Texas to estimate the status of *D. caeruleum* on the Western Gulf Coastal Plain. Researchers should focus future fieldwork in suitable habitats such as coastal prairies and longleaf pine flatwoods savannas, especially those that may have alkaline surface or subsurface soil strata. In addition to fieldwork, herbarium specimens need further review to identify any potential mislabeled material. Although more work is needed to assess the status of *D. caeruleum*, the preliminary assessments yielding only one small, disjunct population and the critically imperiled status of the coastal prairie habitat in which it occurs indicate that *D. caeruleum* may also be critically imperiled in Louisiana.

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