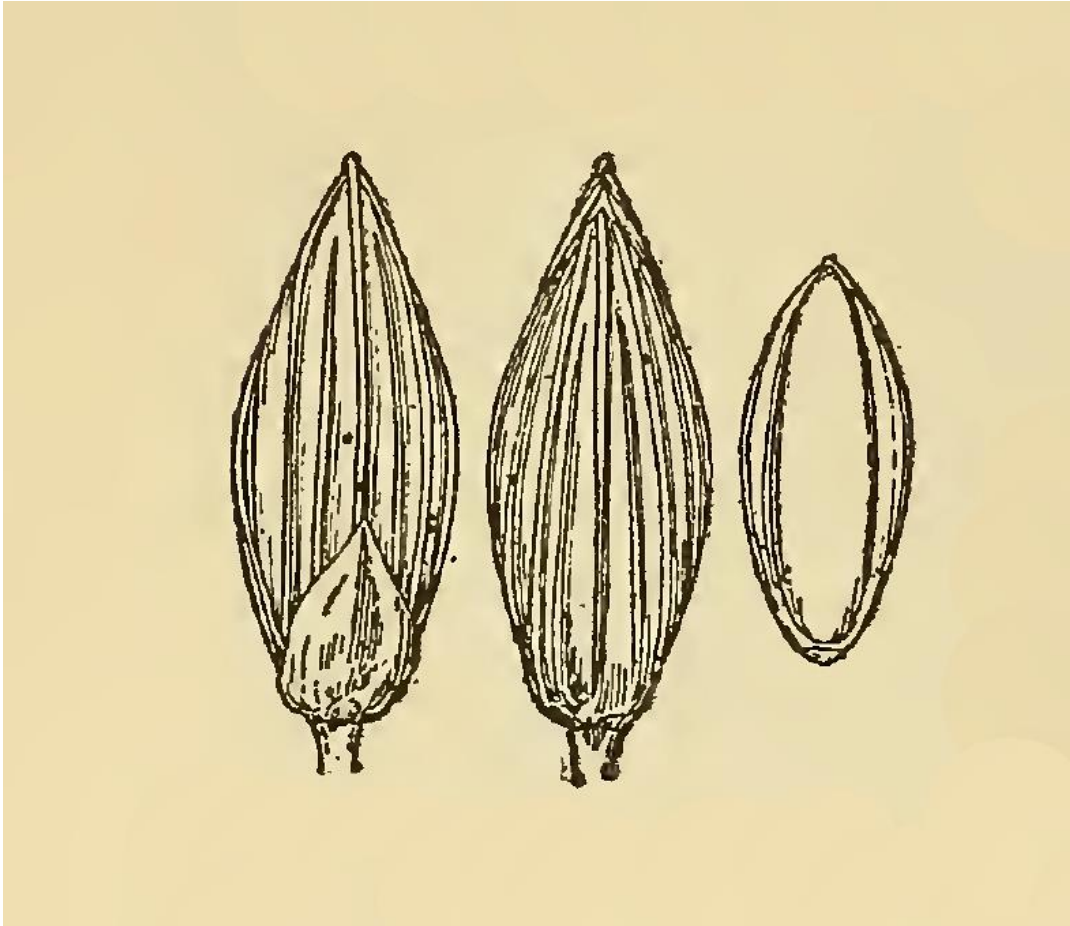


# *Dichanthelium cryptanthum*

Hidden-flowered Panic Grass

Poaceae



*Dichanthelium cryptanthum* by Hitchcock and Chase, 1910

## *Dichanthelium cryptanthum* Rare Plant Profile

New Jersey Department of Environmental Protection  
State Parks, Forests & Historic Sites  
State Forest Fire Service & Forestry  
Office of Natural Lands Management  
New Jersey Natural Heritage Program

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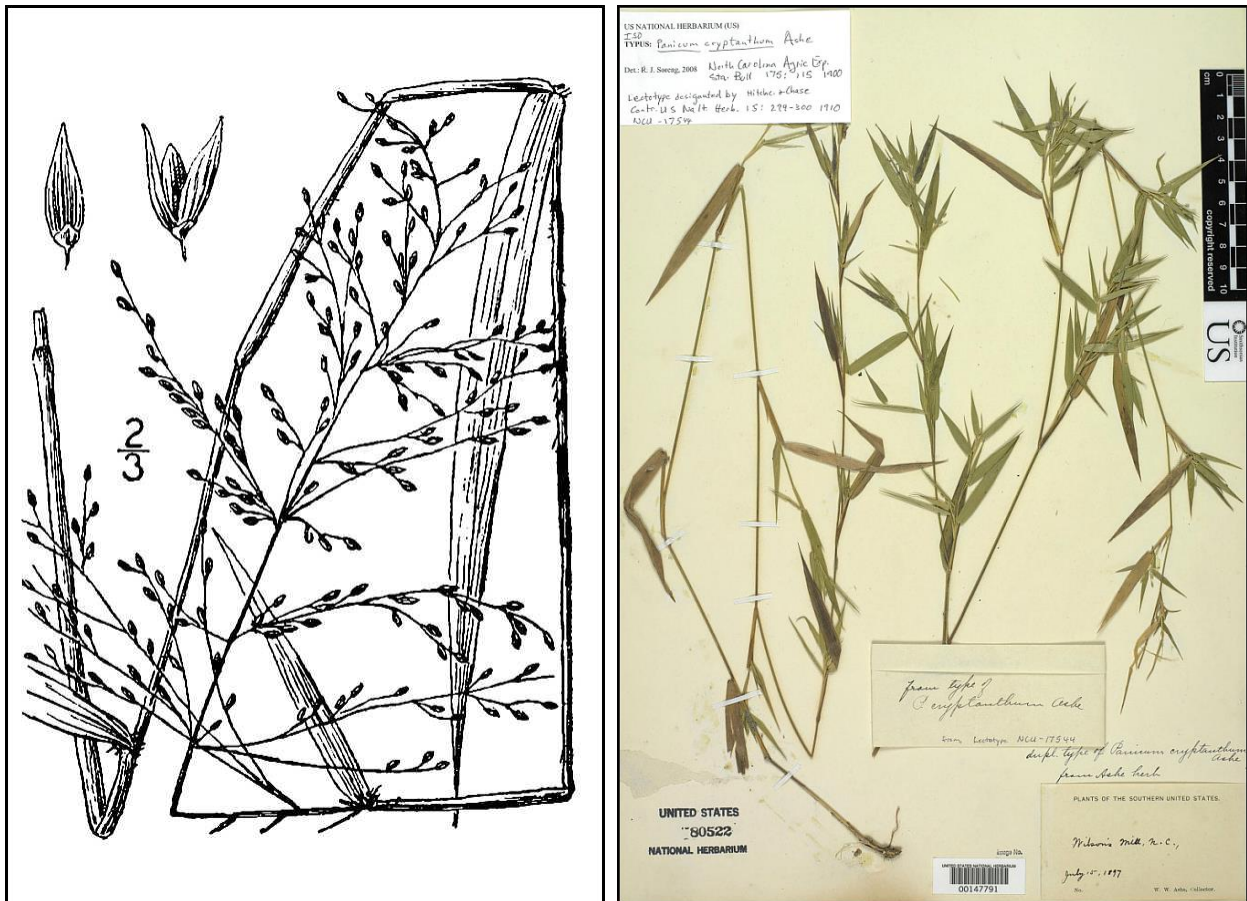
January, 2023

For:  
New Jersey Department of Environmental Protection  
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## Life History

*Dichanthelium cryptanthum* (Hidden-flowered Panic Grass) is a perennial member of the grass family. Species in the genus *Dichanthelium* are sometimes referred to as rosette grasses because they form basal rosettes of winter leaves that are relatively short and wide. The seasonal growth habits of *Dichanthelium* species also set them apart from other grasses in our region because they have two distinct flowering periods each year. In the spring (vernal phase) the plants produce simple culms with narrow leaves and many-flowered panicles. Later in the season (autumnal phase) the stems typically develop numerous short branches with reduced leaves and smaller lateral panicles that are often sheathed (Hitchcock and Chase 1910, Gould and Clark 1978). Although C<sub>4</sub> photosynthesis is common in the grass family, all species of *Dichanthelium* use the C<sub>3</sub> photosynthetic pathway (Brown and Smith 1975). Shinnars (1944) observed that it is best to use vernal phase plants for identification of *Dichanthelium* species.



Left: Britton and Brown, courtesy USDA NRCS 2022a. Britton and Brown (1913) used this illustration for both *P. scabriusculum* and *P. cryptanthum* with a brief note describing how the two species differ. Right: Autumnal phase specimen collected by William W. Ashe in 1897.

The vernal culms of *Dichanthelium cryptanthum* are 70–100 cm high and have stiff hairs at the nodes and smooth internodes. The sheaths are usually smooth, although the lowest ones may be hairy, and the stiff leaf blades are 10–15 cm long and 7–9 mm wide. The ligules are membranous and 0.3–0.6 mm long. The panicle is 5–10 cm long, egg-shaped in outline, and has

sticky spots on the axis and branches. The pointed spikelets are 2.2–2.4 mm long and 1 mm wide. The autumnal plants are upright and develop only a few stiffly ascending branches. The stem nodes are smooth and the leaves are shorter, averaging 2–5 cm in length and 3–5 mm in width. The panicles are narrow and partially concealed within the sheaths. (See Hitchcock and Chase 1910, Nash and Hitchcock 1915, Blomquist 1948, Fernald 1950, Hitchcock 1950, Weakley et al. 2019).

The availability of specific information regarding *Dichantherium cryptanthum* is limited because the species has been treated as a synonym of *D. scabriusculum* by many authors (see Synonyms and Taxonomy section). *D. scabriusculum* (Sheathed Panic Grass) is also rare in New Jersey (NJNHP 2022). On the whole *D. scabriusculum* tends to be larger, with leaves 10–25 cm long and 8–15 mm wide, ligules 0.5–1.3 mm long, panicles 10–20 cm long, and spikelets up to 2.8 mm in length. The lowest stem internode of *D. cryptanthum* is usually less than 2 mm wide but in *D. scabriusculum* it is usually wider than 2 mm, and the latter species rarely has bearded stem nodes. Additional details regarding characteristics that are useful in differentiating between the two species can be found in Weakley et al. (2011, 2019).

### **Pollinator Dynamics**

When first describing *Dichantherium* as a subgenus of *Panicum*, Hitchcock and Chase (1910) observed that grasses in the group produced two kinds of flowers. They indicated that the flowers of the vernal inflorescences produced numerous spikelets but few viable seeds, while those of the autumnal inflorescences were cleistogamous (remaining closed and self-pollinating) and highly fertile. LeLong (1965) studied reproduction in the *Dichantherium* group and reported that while the plants produced two types of flowers, they were not strictly associated with the vernal and autumnal blooming periods. Instead, chasmogamous (open and cross-pollinating) flowers developed in large inflorescences which were typically positioned at the ends of culms while the cleistogamous inflorescences were more likely to be few-flowered and located on axillary shoots. LeLong noted that the chasmogamous *Dichantherium* flowers had longer anthers, produced copious amounts of pollen, and were pollinated by wind like typical grasses. Studies of multiple *Dichantherium* species have shown that, on the average, the anthers of cleistogamous flowers are smaller (0.4 mm) than those of chasmogamous flowers (1.0 mm) (Campbell et al. 1983). However, LeLong (1965) also found that *Dichantherium* species varied in their degree of cleistogamy, and that many produced lateral branches with small-anthered flowers which were not completely cleistogamous but still likely to be self-pollinated. He concluded that self-fertilization was prevalent in *Dichantherium* and cross-pollination was of secondary importance in the group.

Additional research has confirmed the predominance of self-fertilization in *Dichantherium*. Species studied by Spellenberg (1975) were highly self-compatible and self-pollination was likely to occur even when conditions were favorable for outcrossing. Cleistogamous flowers of *Dichantherium clandestinum* produced ten times as many seeds as the chasmogamous flowers (Bell and Quinn 1985), and even when that ratio was shifted by environmental conditions the plants allocated more resources to cleistogamous reproduction (Bell and Quinn 1987). Although seeds produced by both flower types were equally viable, those resulting from cleistogamy

germinated faster while those from chasmogamous flowers had greater dormancy—suggesting that the latter type may play a key role in the long-term maintenance of populations (Bell and Quinn 1985).

### **Seed Dispersal**

*Dichanthelium* seeds are rounded and smooth with no notable adaptations for distribution. Gravity has been cited as the primary means of dispersal for some species (Kirkman et al. 2004), and Bell and Quinn (1985) observed that the seeds of *D. clandestinum* were not dispersed over great distances. *Dichanthelium cryptanthum* often grows in large, dense patches (NJNHP 2022), suggesting that many of the seeds remain close to the source plants. In some *Dichanthelium* species, breakage of stems can result in seed movement as fragments of the stalks are blown around the wind (Campbell et al. 1983).

It is likely that animals play a role in both local and longer-distance dispersal. Grass seeds are an important food source for numerous birds (Fassett 1975) and *Dichanthelium* seeds are favored by wintering sparrows (DiMiceli et al. 2007, Korosy 2013) and an assortment of small mammals (Smith 2020). Larger herbivores that consume the grasses can also excrete viable seeds, and germination of *Dichanthelium* seeds from deer pellets has been reported by Pile et al. (2015) and Flaherty et al. (2017).

No information was found regarding the germination or establishment requirements of Hidden-flowered Panic Grass. Although some other species of *Dichanthelium* and *Panicum* are known to be mycorrhizal (Wang and Qiu 2006) it is not clear whether *D. cryptanthum* forms or requires fungal associations during any phase of its life.

### **Habitat**

*Dichanthelium cryptanthum* grows in low, wet, open places. Hitchcock and Chase (1910) described the habitat as low, swampy ground, noting that the type specimen originated from a small swamp adjacent to a railroad. Other habitats that have been cited include floodplains, seepage areas, spring heads, wet meadows, swales, and ditches (Fernald 1940, Blomquist 1948, Longbottom et al. 2016, Weakley et al. 2011, Weakley et al. 2022). The canopy is usually open, and community succession may be limited by fires or other repeated disturbances (Weakley et al. 2011). *D. cryptanthum* is often rare or local where it occurs (Sorrie et al. 2006, Longbottom et al. 2016), although Rogers (1977) indicated that it was common in parts of Mississippi where suitable habitat was present.

The habitat for one North Carolina occurrence was characterized as a Sandhill/Streamhead Pocosin Ecotone in a Longleaf Pine-Wiregrass (*Pinus palustris*–*Aristida stricta*) community, and the authors classified the seepage-driven system as an acid fen (Sorrie et al. 2006). In New Jersey, *Dichanthelium cryptanthum* has been found in the Pine Barrens where it grows in savanna-like habitat associated with rivers or streams and adjacent to Atlantic White Cedar (*Chamaecyparis thyoides*) swamps. The substrate is typically mucky and the communities are

dominated by a mix of graminoids and shrubs. At one site, it was noted that *D. cryptanthum* was subjected to periods of both light and shade during the course of a day (NJNHP 2022).

### **Wetland Indicator Status**

*Dichanthelium cryptanthum* is not recognized as a distinct species on the National Wetlands Plant List. *Dichanthelium scabriusculum* is an obligate wetland species, meaning that it almost always occurs in wetlands (U. S. Army Corps of Engineers 2020).

### **USDA Plants Code (USDA, NRCS 2022b)**

PACR6

### **Coefficient of Conservatism (Walz et al. 2018)**

CoC = 10. Criteria for a value of 9 to 10: Native with a narrow range of ecological tolerances, high fidelity to particular habitat conditions, and sensitive to anthropogenic disturbance (Faber-Langendoen 2018).

### **Distribution and Range**

The native range of *Dichanthelium cryptanthum* is restricted to the United States, where it occurs in coastal states from New Jersey to Texas (POWO 2022). The map in Figure 1 depicts the known extent of *D. cryptanthum*. Weakley et al. (2022) noted that the distribution of the grass may not be fully understood due to a previous lack of clarity regarding the status of the species (see Synonyms and Taxonomy section).

*Dichanthelium cryptanthum* has been reported from four New Jersey counties: Atlantic, Burlington, Cape May, and Cumberland (Figure 2). The data include historic observations and do not reflect the current distribution of the species.

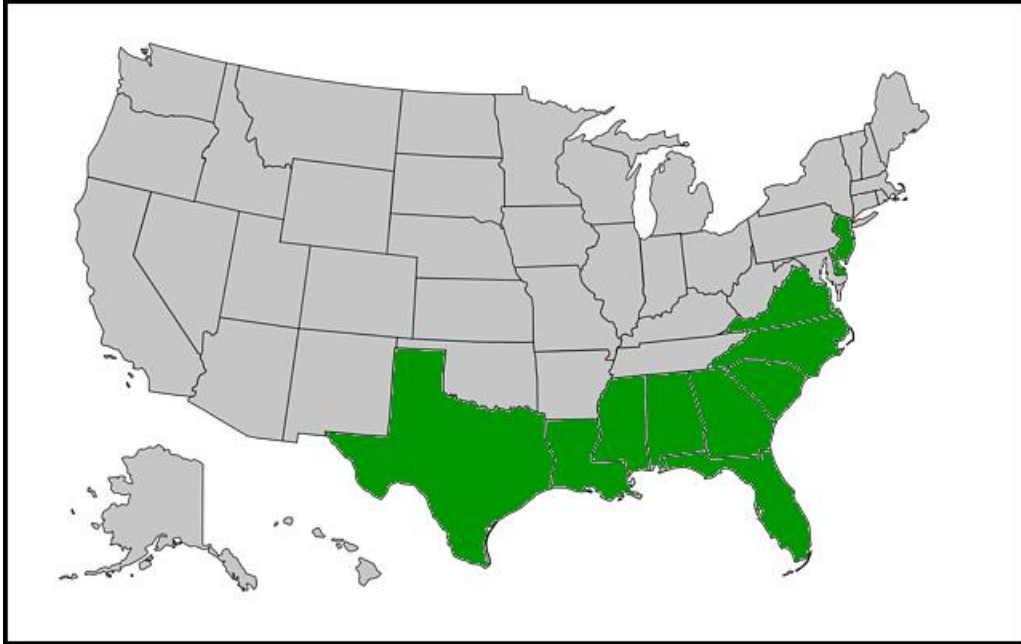


Figure 1. Distribution of *D. cryptanthum* in the United States (source data from POWO 2022, Longbottom et al. 2016).

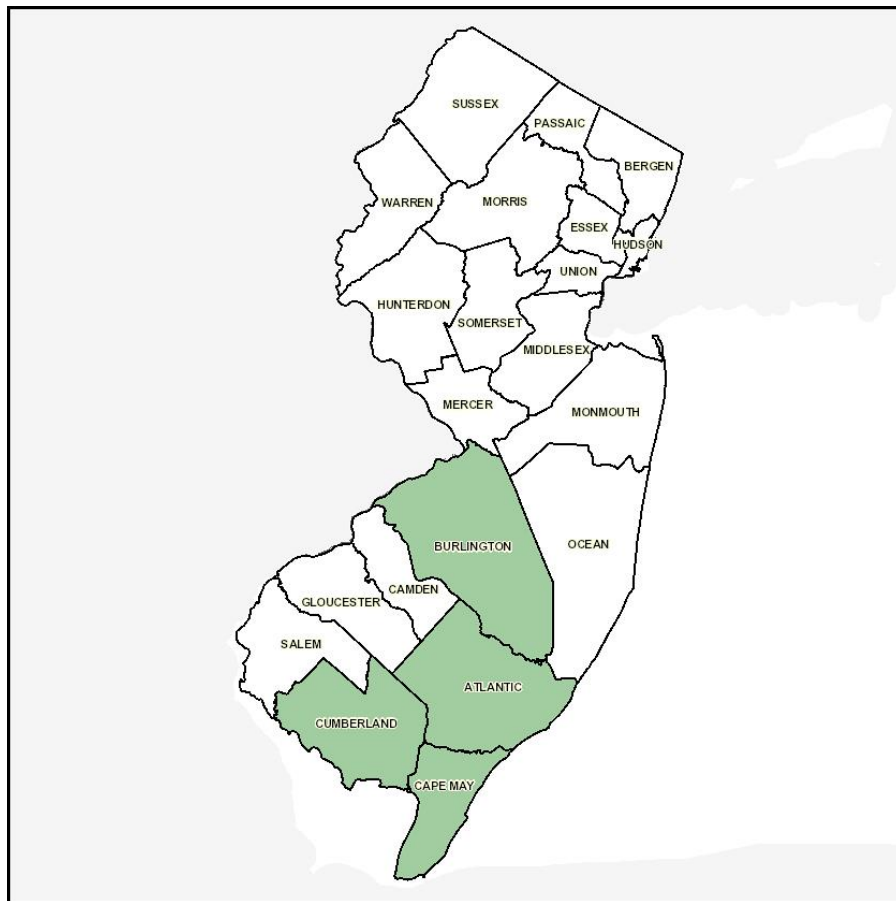


Figure 2. County records of *D. cryptanthum* in New Jersey (source data from Stone 1911, Moore et al. 2016, Mid-Atlantic Herbaria 2022, NJNHP 2022).

## Conservation Status

As of August 2022, the global rank of *Dichantheium cryptanthum* is GUQ. The U means that the species is currently unrankable due to a lack of information or substantially conflicting information regarding its status and trends, and the Q indicates an informal recognition of taxonomic status. Final determination of the species' classification is pending (NatureServe 2022). Fernald (1938) cited *D. cryptanthum* as an example of an extremely localized species, and Weakley et al. (2011) noted that the grass is uncommon to rare throughout its range. The map below (Figure 3) illustrates the conservation status of *D. cryptanthum* in North America, although Treher (2015) indicated that the actual number of occurrences is not known because the range of the species is unclear. Hidden-flowered Panic Grass is presently ranked as critically imperiled (very high risk of extinction) in two states and imperiled (high risk of extinction) in one state. The grass is unranked in four other states where it has been documented.

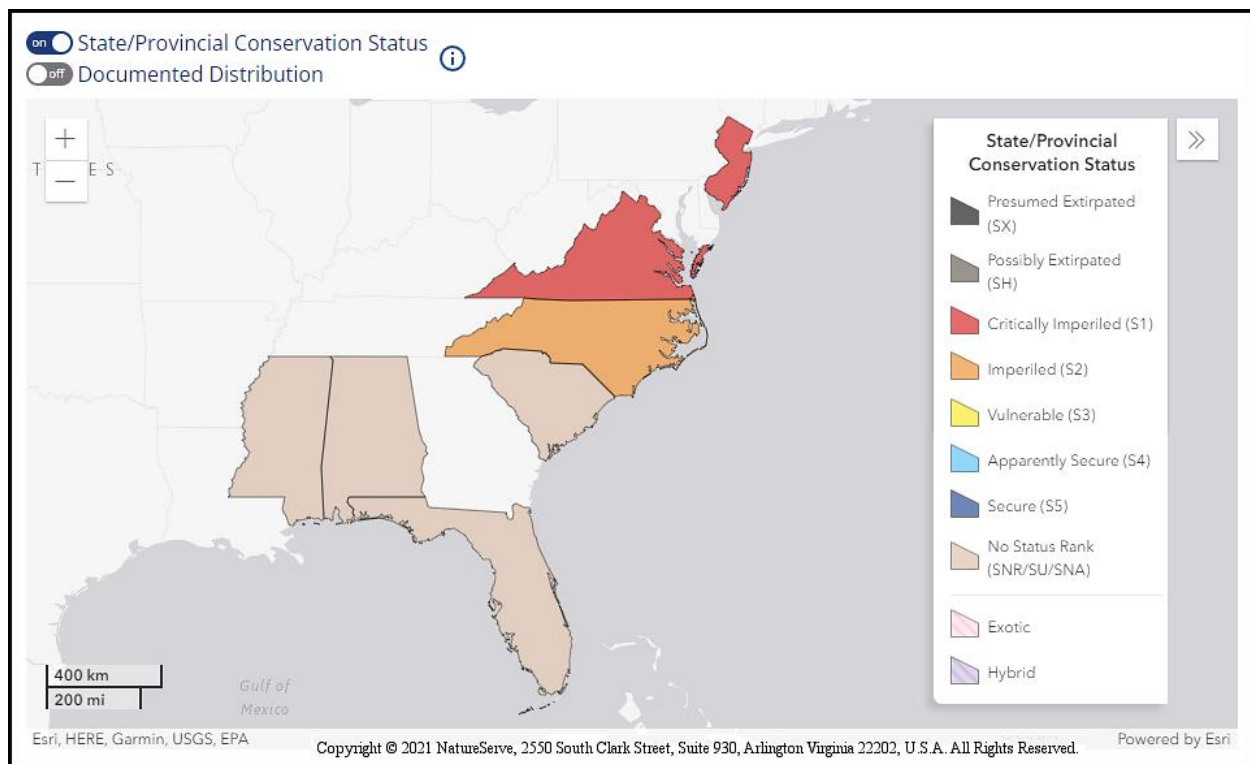


Figure 3. Conservation status of *D. cryptanthum* in North America (NatureServe 2022).

New Jersey is one of the states where *Dichantheium cryptanthum* has been ranked as critically imperiled (NJNHP 2022). The S1 rank signifies five or fewer occurrences in the state. A species with an S1 rank is typically either restricted to specialized habitats, geographically limited to a small area of the state, or significantly reduced in number from its previous status. *D. cryptanthum* has also been assigned a regional status code of HL, signifying that the grass is eligible for protection under the jurisdiction of the Highlands Preservation Area (NJNHP 2010).

The earliest reports of *Dichantheium cryptanthum* in New Jersey originated from one or two sites in Atlantic County (Stone 1911, Taylor 1915, Fables 1957). Until recently, the species was not ranked in the state or tracked by the Natural Heritage program due to the uncertainty



surrounding its taxonomic status (NJNHP 2016, Moore et al. 2016). During the past decade, Richard LeBlond determined that pressed specimens originating from Cape May County in 1921 and Burlington County in 1982 were actually *D. cryptanthum* (Mid-Atlantic Herbaria 2022), and a historical record of *D. scabriusculum* from Cumberland County was also determined to be *D. cryptanthum* (Moore et al. 2016). Four extant populations have recently been documented in the state. All of the occurrences are situated in protected habitat and appear to be vigorous, as recent surveyors have observed hundreds or thousands of plants at each site (NJNHP 2022).

### **Threats**

Natural successional processes have been noted as a potential threat to one New Jersey population of *Dichantheium cryptanthum* (NJNHP 2022). As discussed in the habitat section, the species is usually found in open sites and Weakley et al. (2011) noted the importance of regular disturbance for maintaining suitable habitat. Several occurrences in other states are located in utility right-of-ways where *D. cryptanthum* may benefit from some maintenance activities that keep succession in check, although mowing before the grasses have set seed or the application of herbicides could be detrimental to those populations (Treher 2015).

Rising temperatures and shifting precipitation patterns are bringing about more frequent and intense droughts in New Jersey (Hill et al. 2020). *Dichantheium* species are susceptible to water stress, and may abort spikelets or even entire panicles in response to drying depending on the timing of the event (Spellenberg 1975). Experimental work with *D. clandestinum* demonstrated that a decrease in soil moisture reduced both cleistogamous reproduction and total biomass of the plants (Bell and Quinn 1987). As the climate continues to warm, water stress is likely to threaten *Dichantheium cryptanthum* populations in drought-impacted regions.

### **Management Summary and Recommendations**

Resolution of the taxonomic status of *Dichantheium cryptanthum* is needed (see next section). Conflicting approaches to classification of the grass have resulted in some confusion regarding the full extent of the species and a paucity of information regarding its life history and ecological relationships.

Based on observations of the species' habitat preferences, one New Jersey occurrence of *Dichantheium cryptanthum* may eventually require management to slow natural succession and maintain an open canopy at the site. In other states, the presence of *D. cryptanthum* populations could be taken into consideration during the development of maintenance plans for utility right-of-ways.

Most *Dichantheium* species rely heavily on cleistogamous flowers for seed production. If that holds true for *D. cryptanthum*, distinct occurrences are likely to be made up of genetically similar individuals. Consequently, multiple populations of Hidden-flowered Panic Grass need to be conserved in order to maintain genetic diversity for the species as a whole (Parkhurst et al.

2011). Treher (2015) has recommended long-term protection for high quality occurrences of *D. cryptanthum*.

### **Synonyms and Taxonomy**

The accepted botanical name of the species is *Dichantherium cryptanthum* (Ashe) LeBlond. Orthographic variants, synonyms, and common names are listed below (ITIS 2022, POWO 2022). *Dichantherium cryptanthum* was first described in 1900 as *Panicum cryptanthum* but Gleason (1952) reclassified it as a variety of *Panicum scabriusculum*. The rosette-forming *Panicum* species were initially distinguished as a subgenus, but in 1974 Gould established *Dichantherium* as a separate genus (Gould and Clark 1978). Gould and Clark, along with numerous other authors, treated *Dichantherium cryptanthum* as a synonym of *D. scabriusculum* (e.g. Godfrey and Wooten 1981, Hansen and Wunderlin 1988, Gleason & Cronquist 1991, Roane 1991, Kartesz 2015, Barkworth 2021, USDA NRCS 2022b). A number of sources continue to recognize *D. cryptanthum* as a distinct species (e.g. Sorrie et al. 2006, ITIS 2022, POWO 2022, Weakley et al. 2019 and 2022).

#### **Botanical Synonyms**

*Panicum cryptanthum* Ashe  
*Panicum scabriusculum* var. *cryptanthum* (Ashe) Gleason

#### **Common Names**

Hidden-flowered Panic Grass  
Hidden-flower Witchgrass  
Hidden-flower Rosette Grass

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