Eleocharis melanocarpa

Black-fruit Spike-rush

Cyperaceae

Eleocharis melanocarpa by Sequoia Janirella Wrens, 2020

***Eleocharis melanocarpa* Rare Plant Profile**

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

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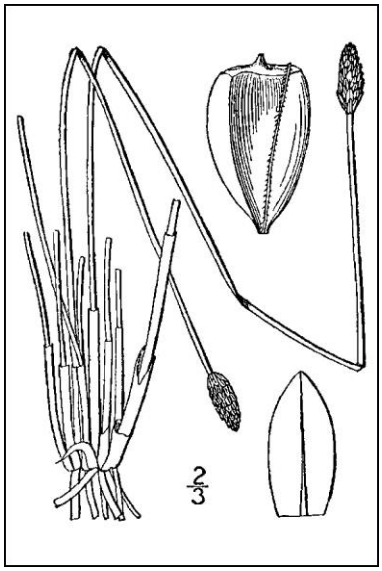
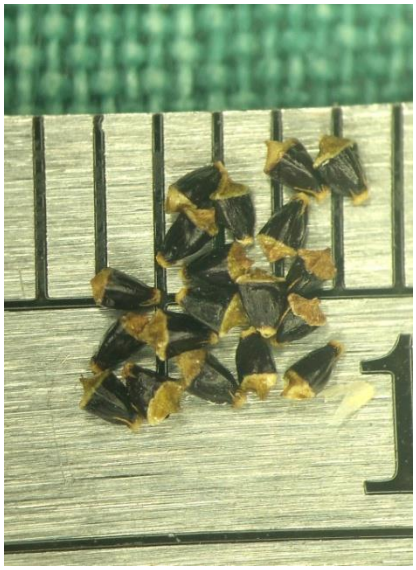
Life History

Eleocharis melanocarpa (Black-fruit Spike-rush) is a perennial sedge that often grows in dense tufts. Its rhizomes are short and stout and its roots are thick and spongy. The culms are firm and 3.5–6 dm in height. The stems are somewhat flattened so they are about half as thick as they are wide. *Eleocharis* stems are leafless, sheathed at the base, and end in a single spikelet. The tips of *E. melanocarpa* sheaths are reddish-brown in color and essentially squared-off, although they have a prominent protruding tooth up to 2 mm in length. The spikelets are 3–12 mm long and 3–4 mm wide with a clasping scale at the base. A typical spikelet contains 30–40 brown floral scales with papery margins, and the florets have three stamens and three-parted styles. The achenes are usually dark brown to black and approximately 1 mm in length: They have three smooth sides, prominent angles, and tan tubercles that cover the entire top of the achene and are pointed in the middle but flatter on the sides. (See Hill 1898, Britton and Brown 1913, Svenson 1937, Fernald 1950, Fassett 1957, Gleason and Cronquist 1991, Smith et al. 2020). *E. melanocarpa* usually flowers and fruits between late June and September, with mature fruits present during the latter part of the summer (Hough 1983, Gordon 2006, NJNHP 2024, Weakley et al. 2024).



Left: Britton and Brown 1913, courtesy USDA NRCS 2025a. Center: Rob Routledge, 2019. Right: Scott Ward, 2022.

Eleocharis melanocarpa can also reproduce via proliferous spikelets, which are culms that develop a small plantlet at the tip in place of an inflorescence. The offspring are produced asexually so they are clones of the parent plants. Young plants form roots and shoots while still attached, and the subsequent arching of the stems brings them in contact with the ground where they can take root (Hill 1898, Elmqvist and Cox 1996, Carter 2005, Leck and Schütz 2005). Detailed illustrations of the process were provided by Hill (1898). Different populations of *E. melanocarpa* may be primarily sexual, predominantly vegetative, or mixed (Weakley et al. 2024), and multiple reproductive strategies have been observed in New Jersey occurrences (Long 1909, Stone 1911). Vegetative reproduction in the sedge might be triggered by stressful

conditions (Leck and Schütz 2005). In colonies with a predominance of proliferous culms the arching and rooting can result in a dense tangle of stems (Sorrie and Leonard 1999).

Pollinator Dynamics

Eleocharis melanocarpa is probably pollinated by wind. Wind is the primary fertilization mechanism for the majority of species in the Cyperaceae although there are a few notable exceptions in scattered genera, including *Eleocharis* (Goetghebeur 1998). Adaptations to wind pollination in the family include large anthers, long filaments, and prominent stigmas (Zomlefer 1994). The sedges that are fertilized by insects generally have other modifications to attract pollinators: For example, *Eleocharis elegans* has showy, scented floral spikes (Magalhães et al. 2005). Goetghebeur (1998) indicated that sedges with insect visitors were usually also pollinated by wind. Syrphid flies have been known to obtain pollen from some *Eleocharis* species without aiding in fertilization (Saunders 2018).

Cross-pollination is presumed for the majority of sedges, and most species improve the odds of cross-fertilization by developing female flowers in advance of male flowers and/or by achieving floral maturity in a bottom-to-top sequence (Goetghebeur 1998). The strategy might be less effective in clonal species like *E. melanocarpa*. Observations of another clonal spike-rush (*Eleocharis mutata*) showed that the culms continued to elongate as they matured so that pollen from the later-developing staminate flowers was likely to fall on the stigmas of younger pistillate flowers in the same clump (Hill 1891). In some *Eleocharis* species, the transfer of pollen within clonal clusters has been identified as a possible cause of reduced seed viability (Demeda et al. 2018, Gudžinskas and Taura 2021).

Seed Dispersal and Establishment

Eleocharis achenes can be dispersed by multiple means including gravity, animals, and water (Leck and Schütz 2005). The seeds of various *Eleocharis* species are consumed by ducks, geese, gulls, grouse, and shorebirds, often in large quantities (McAtee 1918, Martin and Uhler 1939, Fassett 1957). The dispersal of viable seeds following ingestion by waterfowl is well-documented, although results vary widely depending on both plant species and seed retention time (Soons et al. 2008, Wongsriphuek et al. 2008, Farmer et al. 2017). *Eleocharis* seeds may also be transported by birds that utilize plant stalks for nesting material or by adherence to feathers and feet (Morton and Hogg 1989, Leck and Schütz 2005). In water, most *Eleocharis* achenes have a relatively short flotation time but even seeds that do not remain afloat can be transported by water movement or by attachment to floating vegetative matter. The reclining of proliferous culms can provide a degree of spatial separation between parent plants and their clonal offspring (Leck and Schütz 2005).

Although seed banking has been documented in many *Eleocharis* species (Leck and Schütz 2005), *E. melanocarpa* is sometimes absent from the seed bank even when it is present in the local flora (e.g. Kirkman and Sharitz 1994, Mulhouse 2004). Pierce (1974) noted that no seedlings were observed during a two year study of 50 sites although the species was abundant at

some locations. However, *E. melanocarpa* did colonize a Carolina Bay during a restoration project that relied on seed banks and natural dispersal for recruitment (Barton et al. 2007). No information was found regarding germination and development in *Eleocharis melanocarpa*. Mycorrhizal associations appear to be facultative in *Eleocharis*, and fungal colonization rates may vary seasonally (Bohrer et al. 2004, Wang and Qiu 2006). The relative importance of sexual vs. clonal reproduction in maintaining populations of Black-fruit Spike-rush is unclear.

Habitat

Eleocharis melanocarpa grows at elevations of 10–300 meters above sea level (Smith et al. 2020). The soils are usually sandy or peaty but the species has occasionally been found growing in muck or wet clay. Typical natural habitats are seasonal ponds, lake shores, or other intermittent wetlands (Blankinship 1903, Sinnot 1912 , Fernald 1938, Fox et al. 1950 & 1952, Voss 1957, Kral 1955 & 1973, Coddington and Field 1978, Hirst 1983, Sieren and Warr 1992, Tucker and Dill 1993, McAvoy and Bowman 2002, McKenna 2004, Mulhouse 2004, Reid and Faulkner 2010, NJNHP 2024, Weakley et al. 2024). Wilhelm (1990) characterized its general community type on Indiana dunes as mesophytic prairie. The sedge has sometimes been found in disturbed locations such as roadside ditches (Ward and Leigh 1975, Drew et al. 1998, Carter et al. 2009). The substrate at the sites where *E. melanocarpa* occurs is often acidic (Naczi 1984, Smith et al. 2020). Wooten and Leonard (1984) reported a typical pH range of 5.8–6.6.

Wetlands where *Eleocharis melanocarpa* grows often display significant variation in water levels. Some sites experience irregular cycles of inundation and drying. *E. melanocarpa* can be present during either condition: The sedge has been found on exposed pond bottoms and in permanently flooded zones (Zaremba and Lamont 1993, Drew et al. 1998, Sorrie and Leonard 1999, McKenna 2004, Mulhouse 2004, Carter et al. 2009, Reid and Faulkner 2010, Slaughter and Klain 2019). Distinct zonation can frequently be identified in shoreline plant communities and *E. melanocarpa* is usually most abundant in the mid-level or moderately dry zones (Henry 1930, Parker 1945, Pierce 1974, McKenna 2004).

Eleocharis melanocarpa can occasionally be found in somewhat shady conditions, particularly in dappled sunlight or partial shade (Hough 1983, Townsend and Karaman-Castro 2006, Reid and Faulkner 2010). However, the sedge grows more vigorously in full sun and it may also produce fewer fruits when light is limited (Kral 1955, Knox 1977, Reid and Faulkner 2010, Weakley et al. 2024). In some sites, fire has historically maintained the open conditions preferred by *E. melanocarpa* (Barton et al. 2007, Carter et al. 2009, Reid and Faulkner 2010).

When circumstances are favorable, Black-fruit Spike-rush can be a dominant member of the community (Reznicek 2018). Typical associates in open habitats may include *Lobelia canbyi*, *Rhexia* spp., *Bidens* spp., and a wide array of sedges, grasses, and rushes (Henry 1930, Naczi 1984, Breden et al. 2001, Mulhouse 2004). At one Delaware site it was noted to co-occur with a number of globally rare species (Clancy 1992). In the sinkhole depressions of western Virginia the primary *E. melanocarpa* habitat was identified as a *Cephalanthus occidentalis*/*Proserpinaca palustris* - *Polygonum hydropiperoides* community with a patchy mosaic of shrubland and herb-dominated vegetation (Fleming and Van Alstine 1999).

Wetland Indicator Status

Eleocharis melanocarpa is a facultative wetland species, meaning that it usually occurs in wetlands but may occur in nonwetlands (U. S. Army Corps of Engineers 2022).

USDA Plants Code (USDA, NRCS 2025b)

ELME

Coefficient of Conservancy (Walz et al. 2020)

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

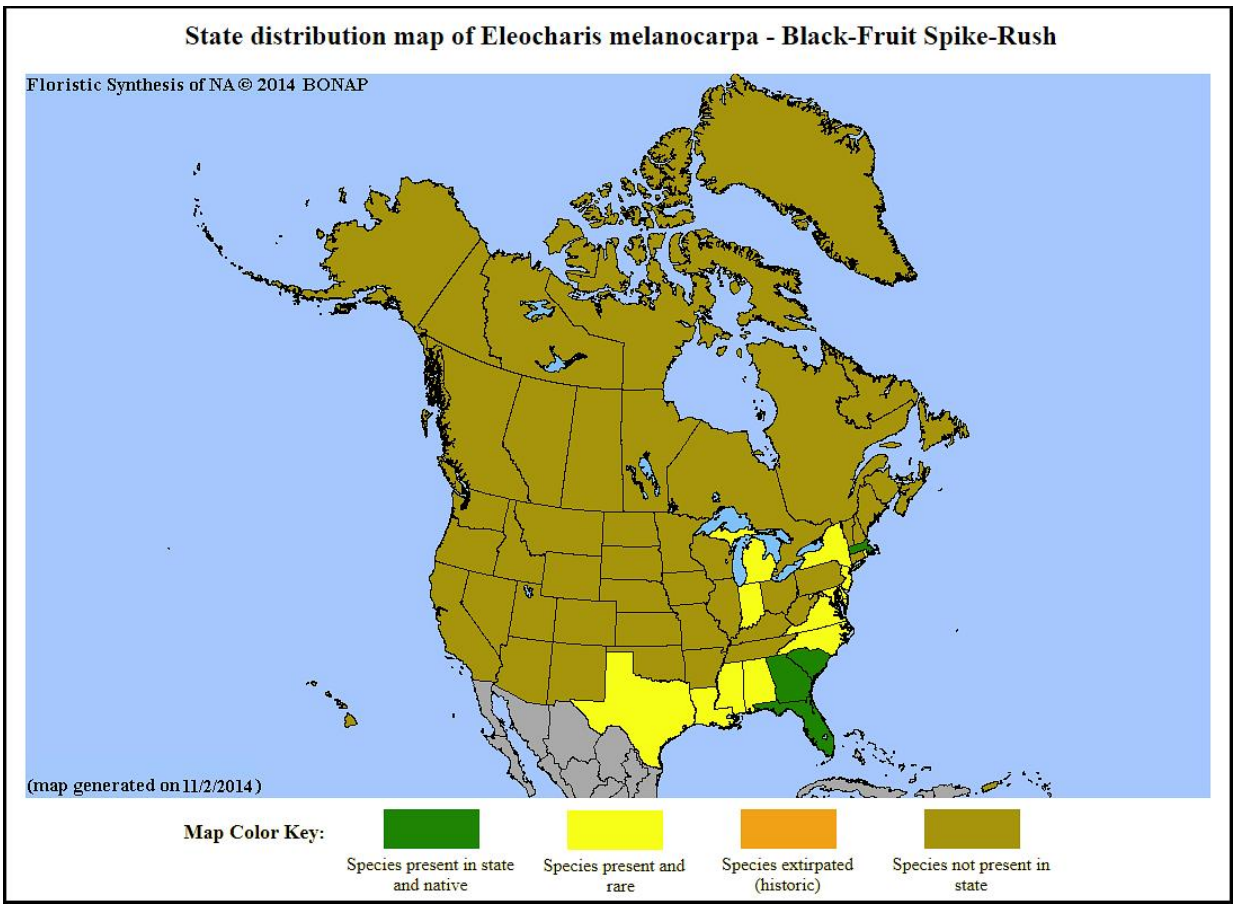


Figure 1. Distribution of E. melanocarpa in North America, adapted from BONAP (Kartesz 2015).

The global range of *Eleocharis melanocarpa* is restricted to the United States (POWO 2025). The map in Figure 1 (above) depicts the extent of the species in North America. *E. melanocarpa* is usually restricted to the Atlantic and Gulf coastal plain but there are disjunct occurrences around the Great Lakes and in northwestern Virginia (Hill 1896, Harper 1905, Peattie 1922, Fleming and Alstine 1999, Sorrie and Weakley 2001). Fernald (1942) identified the sedge as one of the few "true" coastal plain species that is also found in the Great Lakes.

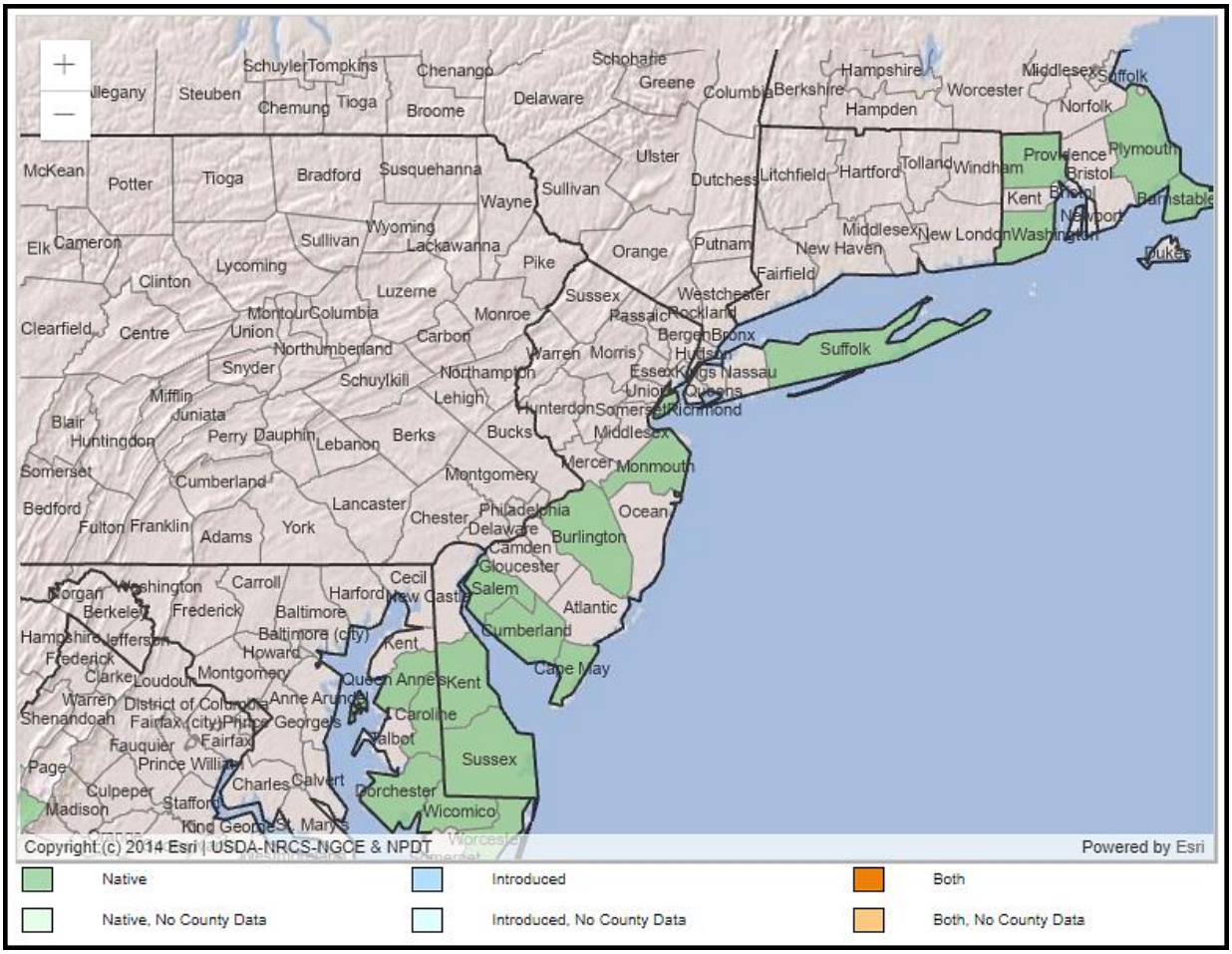


Figure 2. County records of E. melanocarpa in New Jersey and vicinity (USDA NRCS 2025b).

The USDA PLANTS Database (2025b) shows records of *Eleocharis melanocarpa* in five New Jersey counties: Burlington, Cape May, Cumberland, Monmouth, and Salem (Figure 2). There also appears to be a single record from Ocean County (Mid-Atlantic Herbaria 2025). The data include historic observations and do not reflect the current distribution of the species.

Conservation Status

Eleocharis melanocarpa is apparently secure at a global scale. The G4 rank means the species is at fairly low risk of extinction or collapse due to an extensive range and/or many populations or occurrences, although there is some cause for concern as a result of recent local declines, threats, or other factors (NatureServe 2025). The map below (Figure 3) illustrates the conservation

status of *E. melanocarpa* throughout its range. South Carolina is the only state where Black-fruit Spike-rush is not ranked as rare. The sedge is vulnerable (moderate risk of extinction) in five states, imperiled (high risk of extinction) in four states, and critically imperiled (very high risk of extinction) in seven states.

Eleocharis melanocarpa has also been identified as a plant species of highest conservation priority for the North Atlantic region, which includes four Canadian provinces and twelve U. S. states. The species has a rank of R3 (vulnerable), signifying a moderate risk of regional extinction (Frances 2017).

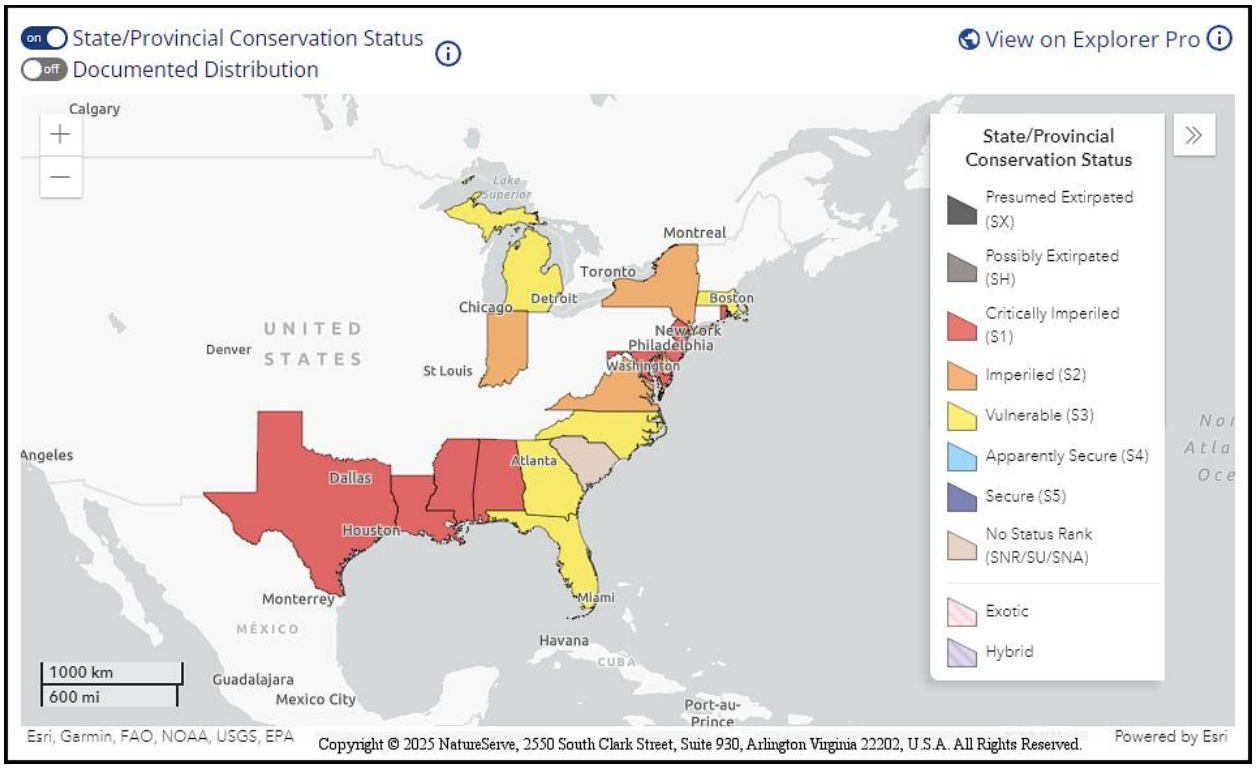


Figure 3. Conservation status of E. melanocarpa in North America (NatureServe 2025).

Eleocharis melanocarpa is critically imperiled (S1) in New Jersey (NJNHP 2024). The 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. *E. melanocarpa* is also listed as an endangered species (E) in New Jersey, meaning that without intervention it has a high likelihood of extinction in the state. Although the presence of endangered flora may restrict development in certain communities such as wetlands or coastal habitats, being listed does not currently provide broad statewide protection for the plants. Additional regional status codes assigned to the sedge signify that the species is eligible for protection under the jurisdictions of the Highlands Preservation Area (HL) and the New Jersey Pinelands (LP) (NJNHP 2010).

Early New Jersey floras cited reports of *Eleocharis melanocarpa* in Monmouth County and in the Pine Barrens (Willis 1877, Britton 1889) but Stone (1907, 1911) indicated that the species did not occur in the Pine Barrens and noted that the records should be "regarded with suspicion"

due to a lack of substantiating specimens. (However, it is worth noting that *E. melanocarpa* was identified as a characteristic plant of the pine barrens in Suffolk County, New York by Harshberger in 1904). Black-fruit Spike-rush was documented in Burlington, Cumberland, and Cape May counties between 1907 and 1910 (Long 1909, Stone 1911). Hough (1983) showed Cape May, Cumberland, and Salem as the only three counties with records that were less than a half century old. In 1987 *E. melanocarpa* was only confirmed present at a single location in the state (Snyder 1989) and it was included on the state's first official list of endangered plants (NJONLM 1990). Snyder relocated a second population in 1992 which remained viable for a number of years but it seems to have since disappeared (Breden et al. 2006, Gordon 2009, NJNHP 2024). Most of the known occurrences in New Jersey are now ranked as historical or extirpated. One population in Cape May County is still listed as extant and potentially viable but a search of the site during 2023 did not turn up any plants (NJNHP 2024).

Threats

Habitat loss and degradation are the primary threat to *Eleocharis melanocarpa* throughout its range (Coddington and Field 1978, Sorrie 1987, McKenna 2004, Soteropoulos 2024). The site of New Jersey's first documented population was rendered unsuitable by the development of a local industrial complex, and the recent disappearance of another population in the state appears to be due to a combination of heavy impacts from agricultural activities on adjacent land, alteration of the natural hydrological cycle, and modification of the area surrounding the pond for recreational purposes (Gordon 2009, NJNHP 2024).

In addition to changes in hydrologic conditions and water quality, the coastal plain ponds utilized by *Eleocharis melanocarpa* in New Jersey can be expected to face an assortment of challenges from off-road vehicle traffic, excessive browsing by deer, and altered fire regimes (Johnson and Walz 2013). Fire suppression is also a threat in other parts of the species' range since the sedge declines in vigor and abundance when shaded by woody plants (Barton et al. 2007, Reid and Falkner 2010). The proliferation of invasive plant species may also jeopardize some populations (Soteropoulos 2024).

Climate Change Vulnerability

Information from the references cited in this profile was used to evaluate the vulnerability of New Jersey's potentially extant *Eleocharis melanocarpa* populations to climate change. The species was assigned a rank from NatureServe's Climate Change Vulnerability Index using the associated tool (Version 3.02) to estimate its exposure, sensitivity, and adaptive capacity to changing climactic conditions in accordance with the guidelines described by Young et al. (2016) and the state climactic computations by Ring et al. (2013). Based on available data *E. melanocarpa* was assessed as Moderately Vulnerable, meaning that it is likely to show some decrease in abundance or range extent in New Jersey by 2050.

As a result of global warming, New Jersey is experiencing higher temperatures and shifting precipitation patterns that are resulting in more extreme episodes of both heavy rainfall and

drought. One of the two sites where *Eleocharis melanocarpa* has been seen during recent decades is located in close proximity to the coast, making it particularly vulnerable to rising sea levels as the climate continues to warm. The habitat is likely to become increasingly saline and experience more frequent flooding (Hill et al. 2020, NJ Adapt 2025). Coastal Plain Intermittent Ponds that are situated farther inland are expected to remain relatively stable as the climate changes, although they are likely to experience more dramatic or prolonged hydrologic fluctuations (Johnson and Walz 2013). *E. melanocarpa* may be able to cope in those locations because it appears to have a broad tolerance for varying water levels. Pierce (1974) noted no change in population size between a wet year and a dry one, and the sedge's capacity for switching between sexual and vegetative reproduction can help it to persist during atypical hydrologic conditions. Elevated temperatures in the state are not likely to be an issue for the primarily southern species.

Management Summary and Recommendations

It is not clear whether *Eleocharis melanocarpa* is still present in New Jersey so an updated statewide assessment of the species' status should be prioritized. Black-fruit Spike-rush has only been seen at two sites during the current century and the sedge was not observed during searches of those locations that were conducted during 2022 and 2023 (NJNHP 2024). The habitats should be re-examined because it is possible that the sedge could regenerate from rhizomes or seeds. There are seven other historical occurrences where suitable habitat may still remain and searches of those sites are also recommended.

In order to develop effective management strategies for *Eleocharis melanocarpa* it is critical to understand the relative importance of sexual and asexual reproduction in populations of the spike-rush. Research is needed to determine the species' capacity for seed banking, identify germination requirements, and describe the process of seedling development. A better understanding of the ways in which environmental conditions influence growth and reproduction in *E. melanocarpa* is required, and an examination of the freshwater species' ability to adapt to more saline conditions could help to plan for populations in close proximity to the coast.

Synonyms and Taxonomy

The accepted botanical name of the species is *Eleocharis melanocarpa* Torr. Orthographic variants, synonyms, and common names are listed below (ITIS 2025, POWO 2025, USDA NRCS 2025b). Analyses of subtaxa within the genus *Eleocharis* have often concluded that *E. melanocarpa* does not align naturally with any particular group (Svenson 1929 & 1937, Menapace 1993, González-Elizondo and Tena-Flores 2020).

Botanical Synonyms	**Common Names**
Scirpus melanocarpus (Torr.) Kuntze	Black-fruit Spike-rush

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