

# *Scirpus pedicellatus*

Stalked Woolgrass

Cyperaceae



*Scirpus pedicellatus* by Katy Chayka, 2014

## ***Scirpus pedicellatus* 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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## Life History

*Scirpus pedicellatus* (Stalked Woolgrass) is a rhizomatous perennial sedge. The rhizomes are short, dense, and branching so large tussocks can form as the result of vegetative reproduction. The rhizomes eventually decay at their older ends so a tussock with a large number of short rhizomes may be a single clone. The stout stems can be up to 2 meters tall, averaging 8 leaves per stem. The leaves are 42–77 cm long and 5–9 mm wide. Fertile culms have a branching inflorescence at the top which is subtended by a whorl of smooth bracts that are brown near their bases. The branches are typically drooping or ascending. The pale brown spikelets are 3–9 mm long, ovoid, and mostly solitary at the ends of long pedicels. Six slender, contorted bristles surround each of the achenes and they project well beyond the scales, giving the mature spikelets a woolly appearance. (See Fernald 1900, Fernald 1950, Fassett 1957, Schuyler 1961 and 1963, Gleason and Cronquist 1991, Arsenault et al. 2013, Whittemore and Schuyler 2020). Stalked Woolgrass usually flowers during July and achenes may be present from July through August (Thornton 1934, Whittemore and Schuyler 2020, Weakley et al. 2022).



Katy Chayka, 2015 (left) and 2017 (center and right).

Recent genetic studies have confirmed a close relationship between *Scirpus pedicellatus*, *S. atrocinctus*, and *S. cyperinus* (Léveillé-Bourret et al. 2014). All three species occur in New Jersey but the first two are rare in the state while the latter one is widespread (Kartesz 2015). *S. atrocinctus* is most similar to *S. pedicellatus* but can be distinguished by its more slender culms and the blackish coloration of its spikelet scales and bracteal bases. *S. cyperinus* typically has more densely clustered spikelets with reddish-brown scales and matures later than the other two species (Schuyler 1961, 1967). However, in places where any of those species co-occur confusion may arise as a result of hybridization. Although the chromosome number of *Scirpus cyperinus* ( $1n=33$ ) differs from that of the other two ( $1n=34$ ), *Scirpus pedicellatus* can hybridize with either species (Schuyler 1967, 1976). Unlike the sterile offspring that develop from crosses between many other *Scirpus* species, a small but significant number of fertile hybrids are usually produced by crosses between members of this group. Subsequent interbreeding between hybrid offspring and backcrosses with parent species can result in hybrid swarms, populations with variable morphology and genetic composition that blur the boundaries between taxa (Schuyler 1963 and 1967, Whittemore and Schuyler 2020).

## **Pollinator Dynamics**

The majority of species in the Cyperaceae are pollinated by wind, and while there are a few notable exceptions in scattered genera no alternative pollination mechanisms have been reported for *Scirpus*. In nearly all sedges the female flowers develop before the male flowers, which is thought to be a way of enhancing the opportunity for cross-fertilization (Goetghebeur 1998). However that may not be the case for *Scirpus pedicellatus*. Schuyler (1961) reported that the flowers on *S. pedicellatus* spikelets mature sequentially from the bases to the tips but while the basal florets usually have one or two stamens those near the spikelet tips often lack stamens. Although no specific studies of self-compatibility in *S. pedicellatus* were found, the species' ready ability to hybridize with close relatives suggests that possibility.

## **Seed Dispersal**

A vigorous *Scirpus pedicellatus* plant may produce up to 60,000 seeds (Schuyler 1963). The three-sided achenes are small, averaging 0.75 x 0.5 mm, and they have six long, smooth bristles that persist on the mature propagules (Thornton 1934, Beetle 1943). The cottony bristles enhance transportation by wind (Goetghebeur 1998) and can also facilitate attachment to floating vegetation or animals, creating multiple pathways for seed dispersal. Gravity, water movement, and consumption by waterfowl have also been reported as dispersal mechanisms for *Scirpus* achenes (Leck and Schütz 2005). Fassett (1957) indicated that the achenes of various *Scirpus* species are often important food sources for waterfowl and they are also eaten by wading birds and songbirds.

No specific information about propagule persistence or establishment was found for *Scirpus pedicellatus*. Establishment from achenes at sites located more than 100 meters from source plants has been reported for the closely related *Scirpus cyperinus* (Mad et al. 2016), and that species is also known to form a seed bank (Leck and Schütz 2005). *S. cyperinus* and many other plants in the genus *Scirpus* form mycorrhizae (Wang and Qiu 2006) although it is not clear whether the fungal associations are required for establishment.

## **Habitat**

The sole occurrence of *Scirpus pedicellatus* in New Jersey is located on a riverbank that is subjected to periodic inundation (NJNHP 2022), and the sedge has been found in alluvial habitats in many other locations throughout its range (Fernald 1900, Thornton 1934, Schuyler 1963, Papoulias et al. 2006, Angelo and Boufford 2007, Rhoads and Block 2007, PANHP 2007 and 2009). However, Stalked Woolgrass is not known to occur in tidal marshes (Tiner 2009).

*Scirpus pedicellatus* generally grows at elevations less than 500 meters above sea level (Whittemore and Schuyler 2020). The communities where it occurs are frequently described as marshes (Weatherby and Adams 1945, Schuyler 1963, Swanson and Sohmer 1978, PANHP 2007) but it has also been reported in bogs, wet herbaceous or shrubby meadows, thickets, wet woods, and swamps (Burnham and Latham 1914, Thornton 1934, Butters and Abbe 1953,

Papoulias et al. 2006). Some occurrences have been situated in ponds (Papoulias et al. 2006) or on lakeshores (Blake 1913, Knowlton 1933, Hartley 1957). One *S. pedicellatus* population at an Indiana site was associated with limestone substrate (Price and Welch 1929), and the species has also been recorded in Maine peatlands (Anderson et al. 1996).

### **Wetland Indicator Status**

*Scirpus pedicellatus* 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 2023)**

SCPE3

### **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**

The global range of *Scirpus pedicellatus* is restricted to the central and eastern United States and Canada (POWO 2023). The map in Figure 1 depicts the extent of the species in North America.

The USDA PLANTS Database (2023) shows records of *Scirpus pedicellatus* in one New Jersey county: Sussex County (Figure 2). Some botanical specimens from Monmouth and Ocean counties were labeled as *S. pedicellatus* (Mid-Atlantic Herbaria 2023), but Hough (1983) noted that the sedge was confined to the northern part of the state and only a single collection from Sussex County had been verified. There is now a more recent record from Warren County (NJNHP 2022).



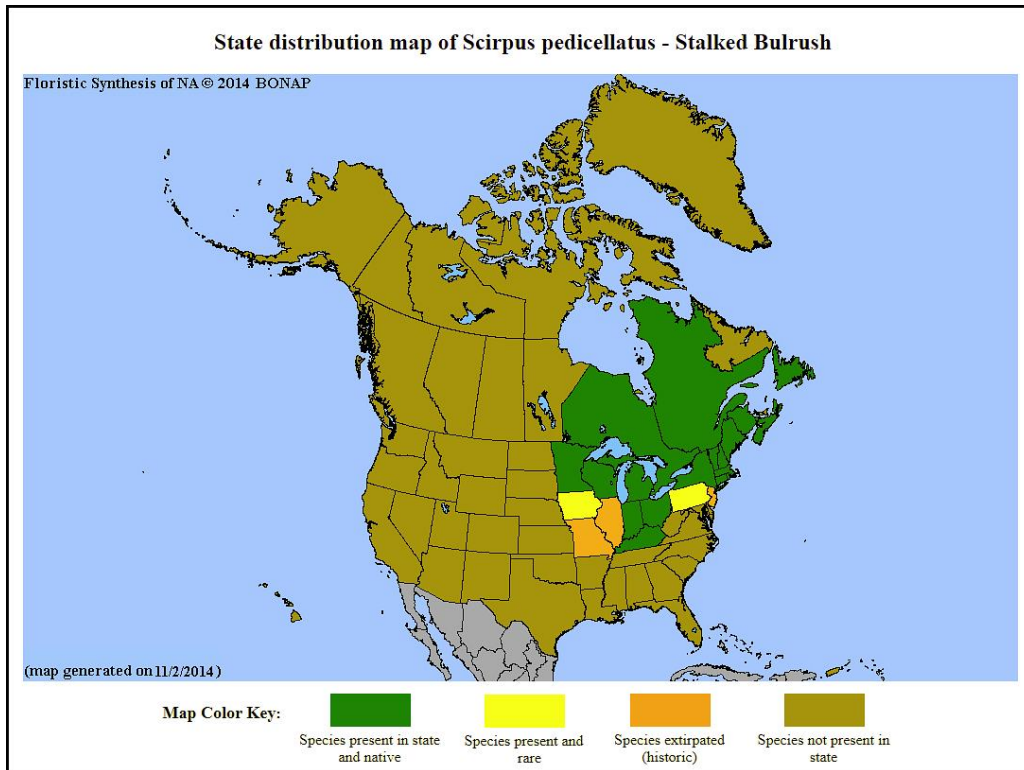


Figure 1. Distribution of *S. pedicellatus* in North America, adapted from BONAP (Kartesz 2015).

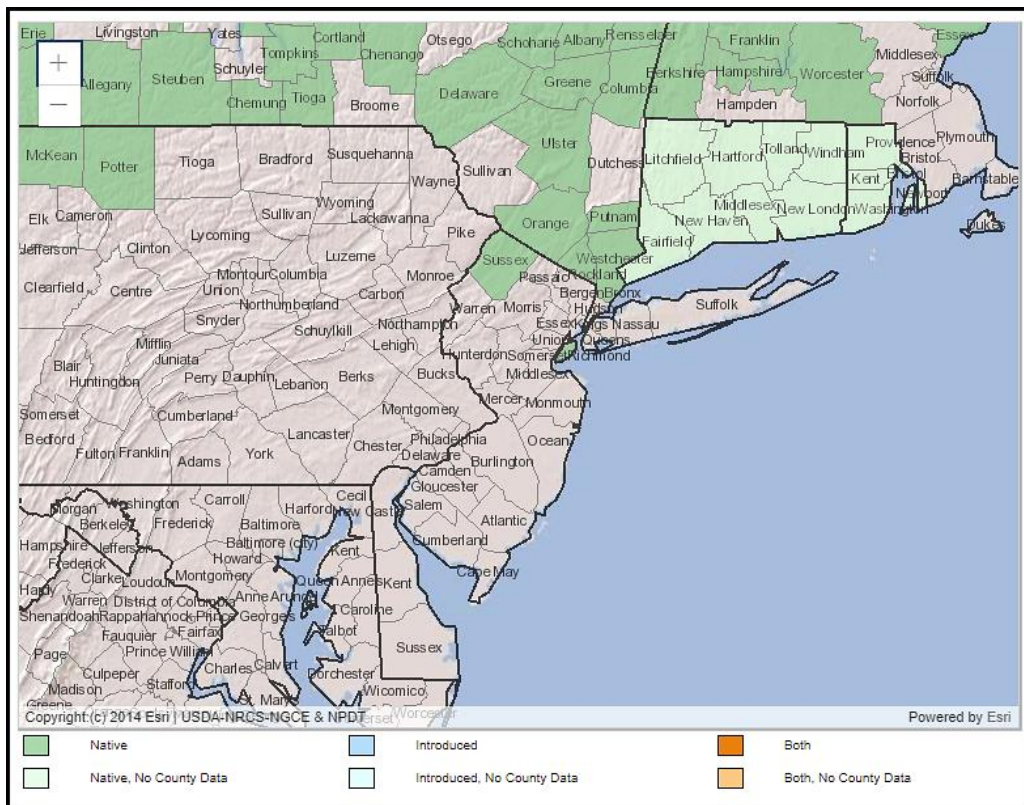


Figure 2. County records of *S. pedicellatus* in New Jersey and vicinity (USDA NRCS 2023).

## Conservation Status

*Scirpus pedicellatus* 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. However, it was noted that the global status of the species was last determined in 1988 so it is due for an updated review (NatureServe 2023). A more recent worldwide evaluation of the species by Maiz-Tome (2016) concluded that there was insufficient evidence to rank *S. pedicellatus* as vulnerable but that additional information was needed regarding the status of extant populations.

The map below (Figure 3) illustrates the conservation status of *S. pedicellatus* throughout its range. Stalked Woolgrass is vulnerable (moderate risk of extinction) in one province, imperiled (high risk of extinction) in one province and one state, and critically imperiled (very high risk of extinction) in two provinces and four states. *S. pedicellatus* is presumed to be extirpated in Illinois (Bowles et al. 1991). The species is secure or apparently so in New York and New Brunswick and unranked throughout New England and the Great Lakes region. Stalked Woolgrass was formerly reported as a threatened species in Ohio (Stuckey and Roberts 1977) but it is currently unranked in that state.

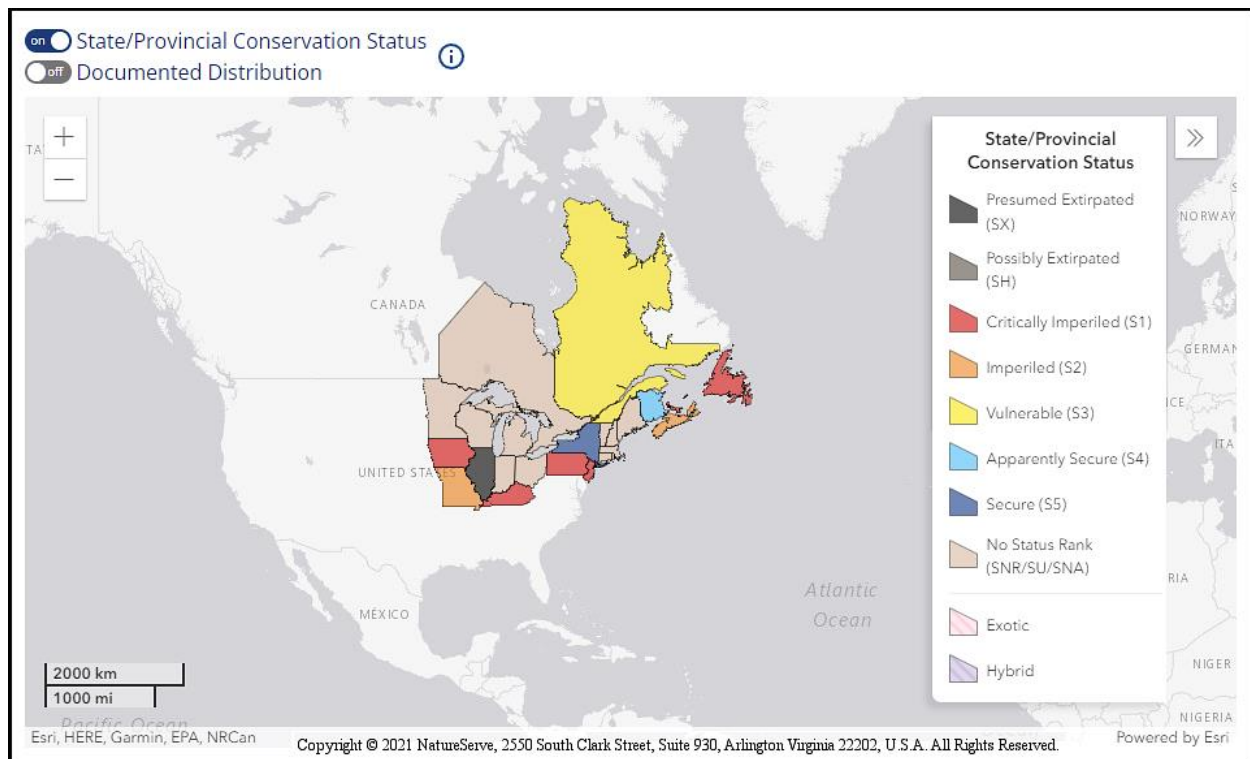


Figure 3. Conservation status of *S. pedicellatus* in North America (NatureServe 2023).

*Scirpus pedicellatus* is critically imperiled (S1) in New Jersey (NJNHP 2022). 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. *S. pedicellatus* 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 it is eligible for protection under the jurisdictions of the Highlands Preservation Area (HL) and the New Jersey Pinelands (LP) (NJNHP 2010).

New Jersey's confirmed Sussex County record of *Scirpus pedicellatus* was documented in 1918 but that population has not been seen since, although the site has been searched multiple times in recent decades. A small population in Warren County discovered by David Snyder a century later is the sole extant occurrence known in the state (Fallon 2018, NJNHP 2022).

### **Threats**

New Jersey's only extant population of *Scirpus pedicellatus* is fairly small and it is situated along the edge of the Delaware River in a location with some notable challenges. Although *S. pedicellatus* is adapted to floodplain habitats with variable water levels, on some occasions in recent years the New Jersey plants have been completely submerged. The riverbank at the site of the population also has an extensive cover of highly invasive species such as *Persicaria perfoliata* and *Artemisia vulgaris* (NJNHP 2022). Significant flood events early in the season could interfere with the completion of the sedge's reproductive cycle or wash away achenes and prevent them from reaching suitable germination sites. Establishment of seeds that are locally dispersed may be inhibited by the dense cover of exotic plants. Competition from non-native species might also limit vegetative reproduction. Although the effects of competition on *S. pedicellatus* has not been studied, Beavan and Oosting (1939) observed that the species was most abundant in areas that had burned.

Some reported threats to individual *Scirpus pedicellatus* populations in other locations were associated with habitat destruction or degradation. For example, Burk (1977) listed *S. pedicellatus* as a species that was reduced in abundance following an oil spill in a Massachusetts marsh, and Dugal (1992) noted that the habitat of an Ontario occurrence was threatened by planned development.

Various fungal infections have been documented on *Scirpus pedicellatus*. In fact, *S. pedicellatus* was the host plant for *Cercospora scirpina* when the fungus was first described by Davis (1915). Most *Cercospora* species are leaf spot fungi that cause patches of dead tissue on their host plants (Horst 2013). Some types can cause considerable tissue loss during a single season, and one was damaging enough to be utilized for the control of invasive plants (Sprague and Fellows 1934, Latch 1965, Burdon 1994). Another fungus reported on *S. pedicellatus* is *Kriegeria* (aka *Xenogloea*) *eriophori* (Greene 1953). The species is an internal leaf parasite but infections can eventually result in discoloration and patches of necrotic tissue (Kao 1956, Doubles and McLaughlin 1999). Severe fungal infections that affect leaves can result in a reduction of photosynthetic capacity and a consequent decrease in overall plant performance (Gautam et al. 2022).



As a result of global warming, New Jersey is experiencing higher temperatures and shifting precipitation patterns which are increasing the frequency and intensity of both droughts and floods in the region (Hill 2020). Due to a paucity of research on the ecological requirements of *Scirpus pedicellatus* it is not clear whether temperature regimes have been a limiting factor in the species' distribution. There is, however, a high probability that the state's population of *S. pedicellatus* will be affected by more frequent and intense floods in the future. Flood impacts have already been observed at the site of New Jersey's extant occurrence, and shifts in river flow dynamics that resulted from damming were identified as a potential threat to a Pennsylvania population (Cowell and Stoudt 2007). As the climate continues to warm, it appears likely that flooding events in the Delaware Basin will increase in both frequency and magnitude (Schopp and Firda 2008, UDS 2008).

### **Management Summary and Recommendations**

*Scirpus pedicellatus* should be a high priority for conservation in New Jersey due to its extreme rarity in the state. The top management issue for the extant population is invasive species control. Both *Persicaria perfoliata* and *Artemisia vulgaris* are considered highly threatening to native communities in New Jersey (FoHVOS 2022). Multiple years of effort may be needed as the two species are particularly difficult to eradicate—the former due to rapid spread and prolific seed production and the latter due to persistent rhizome fragments in the soil (Kaufman and Kaufman 2007). Techniques for managing *A. vulgaris* are discussed by Wallace et al. (2021) and Lower Hudson PRISM (2023), and some strategies for combating *P. perfoliata* are provided by USDA Forest Service (2005) and Okay et al. (2010). A weevil (*Rhinoncomimus latipes*) is currently available as a means of biocontrol for *Persicaria perfoliata* in New Jersey (PABIRL 2023). Although the insect does not eradicate the invasive vine it reduces vigor and decreases seed production so it could serve as part of a comprehensive management strategy.

Additional information about *Scirpus pedicellatus* is needed in order to facilitate effective long-term conservation planning for the species. An understanding of the factors that limit the distribution of the species in places where it is rare, particularly along the southern edge of its range, may be particularly important in light of changing climactic conditions. Other areas where research on *S. pedicellatus* could fill critical gaps in knowledge include germination and establishment requirements, fungal associations, competitive interactions, and fire effects.

### **Synonyms**

The accepted botanical name of the species is *Scirpus pedicellatus* Fernald. Orthographic variants, synonyms, and common names are listed below (ITIS 2021, POWO 2023, USDA NRCS 2023). Britton and Brown (1913) treated *S. pedicellatus* as a synonym of *S. cyperinus* and Gleason and Cronquist (1991) viewed both *S. pedicellatus* and *S. atrocinctus* as 'phases' of *S. cyperinus* due to the intergrading discussed in the first section.

## Botanical Synonyms

*Scirpus cyperinus* var. *pedicellatus* (Fernald) Schuyler  
*Scirpus pedicellatus* var. *pullus* Fernald  
*Scirpus pedicellatus* f. *viviparus* F. G. Bernard  
*Eriophorum cyperinum* var. *pedicellatum* (Fernald) Farw.

## Common Names

Stalked Woolgrass  
Stalked Bulrush

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