

# *Spiranthes laciniata*

Lace-lip Ladies'-tresses

Orchidaceae



*Spiranthes laciniata* by Étienne Léveillé-Bourret, 2022

## ***Spiranthes laciniata* 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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March, 2023

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This report should be cited as follows: Dodds, Jill S. 2023. *Spiranthes laciniata* 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, Trenton, NJ. 16 pp.

## Life History

*Spiranthes laciniata* (Lace-lip Ladies'-tresses) is a perennial orchid that arises from a tight cluster of short, fleshy roots. Each plant has 3–5 firm, basal, grasslike leaves that may be up to 4 cm long. The leaves are present at blooming time. Some leaflike bracts also develop on the stem, which can range from 20–95 cm in height. The small (6–10 mm) flowers are arranged in a single loose spiral that extends for about 14 cm at the top of the stem. The flowers and upper stem are densely hairy-glandular. The narrow white sepals and petals form a slender tube; the upper sepal and petals curve downward while the lateral sepals are somewhat cupped. The lip is yellowish at the center and its outer edge is irregularly lobed, giving it a lacy appearance. (See Ames 1905, Fernald 1950, Morris 1989, Gleason and Cronquist 1991, Liggio and Liggio 1999, Fowler 2005, Pace and Cameron 2017, Sheviak and Brown 2020).



M. Hough, 2018.



Floyd Griffith, 2020.



Jake Antonio Heaton, 2019.

*Spiranthes laciniata* is most likely to be confused with two other spring-blooming ladies'-tresses: *Spiranthes praecox* and *S. vernalis*. *S. laciniata* may co-occur with either species, causing it to be overlooked (Morris 1989). Early specimens of *Spiranthes laciniata* were sometimes labeled as *S. praecox* (Hough 1983) but Small (1903) described *S. laciniata* as a distinct taxon. Ames (1905) noted the close resemblance between *S. laciniata* and *S. vernalis* but distinguished the two by their rachis pubescence: *S. vernalis* has long, tapering hairs while *S. laciniata* has short hairs that are mostly ball-tipped. Correll (1940) proposed that *S. laciniata* was a hybrid of *S. vernalis* and *S. praecox* but recent molecular studies support *Spiranthes laciniata* as a unique species and indicate that it is not very closely related to *S. praecox* (Dueck and Cameron 2007, Dueck et al. 2014). Raised green veins on the lips of *Spiranthes praecox* flowers can help to separate that species from *S. laciniata* (Sheviak and Brown 2020, Weakley et al. 2022).

The blooming time of *Spiranthes laciniata* is correlated with latitude (Pace et al. 2017, Sheviak and Brown 2020). Florida plants bloom from May to early July, North Carolina plants typically flower between June and August, August was reported as the species' flowering time in Virginia, and plants in New Jersey bloom during August and September (Massey 1953, Boyd 1991, Lamont and Stalter 2007, Pace et al. 2017). Some *Spiranthes* species reproduce vegetatively by producing buds on their root tips or side shoots, but those that do usually form dense colonies (Rasmussen 1995) and Fowler (2005) observed that *S. laciniata* does not form large clumps. Les

(2020) remarked that details on the reproductive ecology of Lace-lip Ladies'-tresses are lacking, and since different kinds of *Spiranthes* vary in their annual growth patterns (Rasmussen 1995) the seasonal cycle of *S. laciniata* cannot be inferred from the habits of related species.

### **Pollinator Dynamics**

The flowers of some *Spiranthes* are heavily perfumed (Genders 1977) and Oakes (1905) described *S. laciniata* as fragrant, although Pace and Cameron (2016) indicated that the flowers were unscented or only faintly scented. Nevertheless they attract an assortment of bees and flies (Fowler 2005). *Spiranthes laciniata* and most other northeastern *Spiranthes* species are pollinated by medium-sized bees, primarily bumblebees (*Bombus* spp.) and solitary bees in the family Megachilidae (Catling 1983, Pace 2020). When the long-tongued bees insert their heads into the flowers to obtain nectar, the sticky pad at the base of the anthers (viscidium) is perfectly shaped to adhere to their upper mouthparts (Catling 1983).

The flowers of *Spiranthes laciniata* are protandrous, meaning that the male organs mature before the female organs, and the flowers on a spike open sequentially beginning at the lower end. The strategy promotes cross-pollination because the bees forage in an upward direction. Once fertilized, the flowers of *S. laciniata* quickly become discolored and the bees typically begin by visiting the lowest "fresh" flower, where they deposit pollen from another plant (Catling 1983). Some *Spiranthes* species can reproduce without fertilization but when insects were experimentally excluded from *S. laciniata* flowers the plants did not develop seeds (Catling 1982).

### **Seed Dispersal and Establishment**

The fruits of *Spiranthes laciniata* are oval-obovoid capsules about 6–7 mm in length (Small 1903). Orchids produce numerous tiny, dustlike seeds that consist mainly of an embryo surrounded by a loose, papery coating (Dressler 1981). Some *Spiranthes* have polyembryonic seeds but those of *S. laciniata* contain a single embryo (Dueck et al. 2014, Sheviak and Brown 2020). Approximately 69% of a typical *Spiranthes* seed consists of internal air space, which allows the wind-dispersed propagules to remain afloat in the air for long periods. Many orchid seeds also have a water-resistant outer surface that—together with the internal air space—permits flotation, allowing some movement of seeds via surface water. The seeds of a number of *Spiranthes* species have been reported to float when wet. The general characteristics of orchid seeds also allow them to be transported by adherence to birds or animals (Arditti and Ghani 2000).

Because their seeds lack endosperm, orchids must form associations with appropriate fungi in order to germinate and develop (Dressler 1981). *Spiranthes* species can often germinate in the absence of fungi but without a mycorrhizal relationship development ceases and seedlings do not become established (Zettler and McInnis 1993, Zettler et al. 1995). Some members of the genus can be grown on artificial media without fungi but survival rates are poor (Zettler 1996). *Spiranthes* seeds often germinate near mature plants where suitable fungi are likely to be present

in the soil (Ames 1921). However established *Spiranthes* plants are not dependent on mycorrhizae and some species apparently develop fungal associations seasonally, particularly during the fall and winter months (Rasmussen 1995).

Germination and establishment have not been studied in *Spiranthes laciniata*. Other members of the genus have been reported to germinate quickly and develop fast. Rasmussen (1995) reported that the seeds of North American *Spiranthes* could remain viable for up to three years when refrigerated but the best results were obtained from sowing fresh seed. Studies of *Spiranthes cernua*, *S. odorata*, and *S. brevilabris* have reported similar developmental patterns: When fungal symbionts were present the seeds germinated in a few weeks, forming small protocorms that grew rapidly and soon produced small roots and leaves (Zettler and McInnis 1993, Zettler et al. 1995, Stewart et al. 2003). Ames (1921) indicated that *S. cernua* could produce slender, few-flowered racemes during the first growing season after germination and more typical inflorescences by the second year. Cultivated species of *Spiranthes* are also known to flower two years after germination (Zettler et al. 1995).

## **Habitat**

*Spiranthes laciniata* grows in open and usually wet places on the coastal plain at elevations of 0–50 meters above sea level (Sheviak and Brown 2020). Natural habitats include marshes, meadows, prairies, savannas, swamps, wet depressions and pond margins (Morris 1989, Smith 1996, Drew et al. 1998, MacRoberts et al. 2009, Godfrey and Wooten 2013, Pace et al. 2017, NAOCC 2022, Sheviak and Brown 2020, Weakley et al. 2022). *S. laciniata* has also been found growing in disturbed sites such as cemeteries, ditches, fields, lawns, and roadsides (Fowler 2005, Pace et al. 2017, NAOCC 2022, Sheviak and Brown 2020). Pine Barren savanna is the most typical environment for Lace-lip Ladies'-tresses in New Jersey, although its habitats have also been described as bogs, swamps, damp meadows, and vernal pond edges (Boyd 1991, Johnson and Walz 2013, NJNHP 2022).

It is unusual for orchids to grow in standing water but there are some that do (Dressler 1981), including *Spiranthes laciniata* (Massey 1953, Sheviak and Brown 2020). Depths of up to 20 cm have been reported (Les 2020). Many of the sites favored by *S. laciniata* are flooded seasonally. Pond Cypress (*Taxodium ascendens*) savannas, which were described by Gaddy (2018) as prime habitat for *S. laciniata*, may be inundated for six to nine months annually—McMillan and Porcher (2005) noted that the orchids were situated in the drawdown areas. The savanna and flatwood habitats in which the species grows in Florida are poorly drained, and for short periods following heavy rain several centimeters of standing or flowing water may be present (Minno et al. 2001, Roberts et al. 2006). On one of North Carolina's barrier islands *S. laciniata* was found in a freshwater marsh that typically has standing water for a portion of the year (Lamont and Stalter 2007). Shoreline occurrences have been reported from oxbow lakes and Carolina bays (MacRoberts et al. 2008, Howell et al. 2016). Ames (1905) observed that *S. laciniata* grew in places where there was standing water for most of the year and flowered during the dry season after the water receded.

## **Wetland Indicator Status**

The U. S. Army Corps of Engineers divided the country into a number of regions for use with the National Wetlands Plant List and portions of New Jersey fall into three different regions (Figure 1). *Spiranthes laciniata* has more than one wetland indicator status within the state. In the Atlantic and Gulf Coastal Plain region, *S. laciniata* is a facultative wetland species, meaning that it usually occurs in wetlands but may occur in nonwetlands. In the rest of the state it is an obligate wetland species, meaning that it almost always occurs in wetlands (U. S. Army Corps of Engineers 2020).

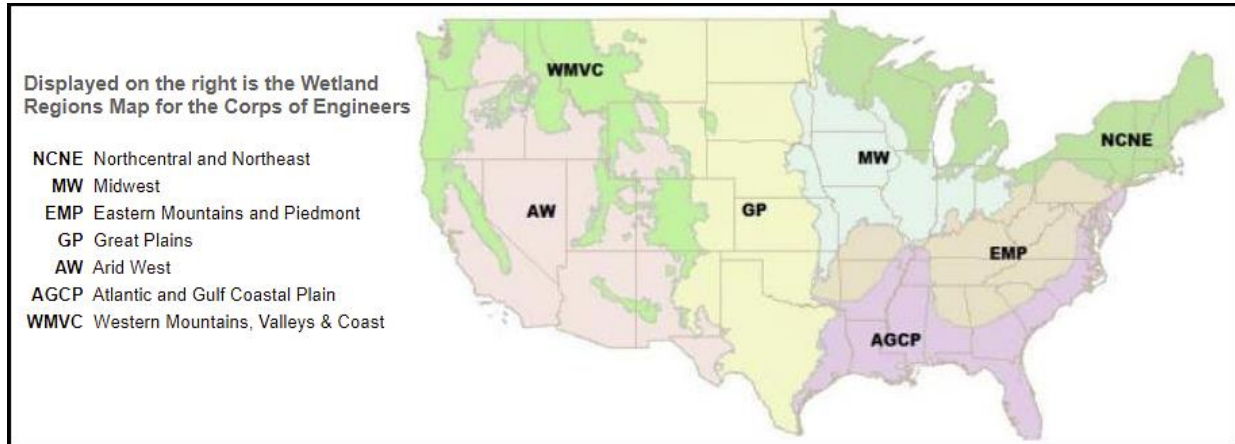


Figure 1. Mainland U. S. wetland regions, adapted from U. S. Army Corps of Engineers (2020).

## **USDA Plants Code (USDA, NRCS 2023)**

SPLA3

## **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 global range of *Spiranthes laciniata* is restricted to the southeastern coastal plain of the United States (Weakley et al. 2022, POWO 2023). The map in Figure 2 depicts the worldwide extent of the species.

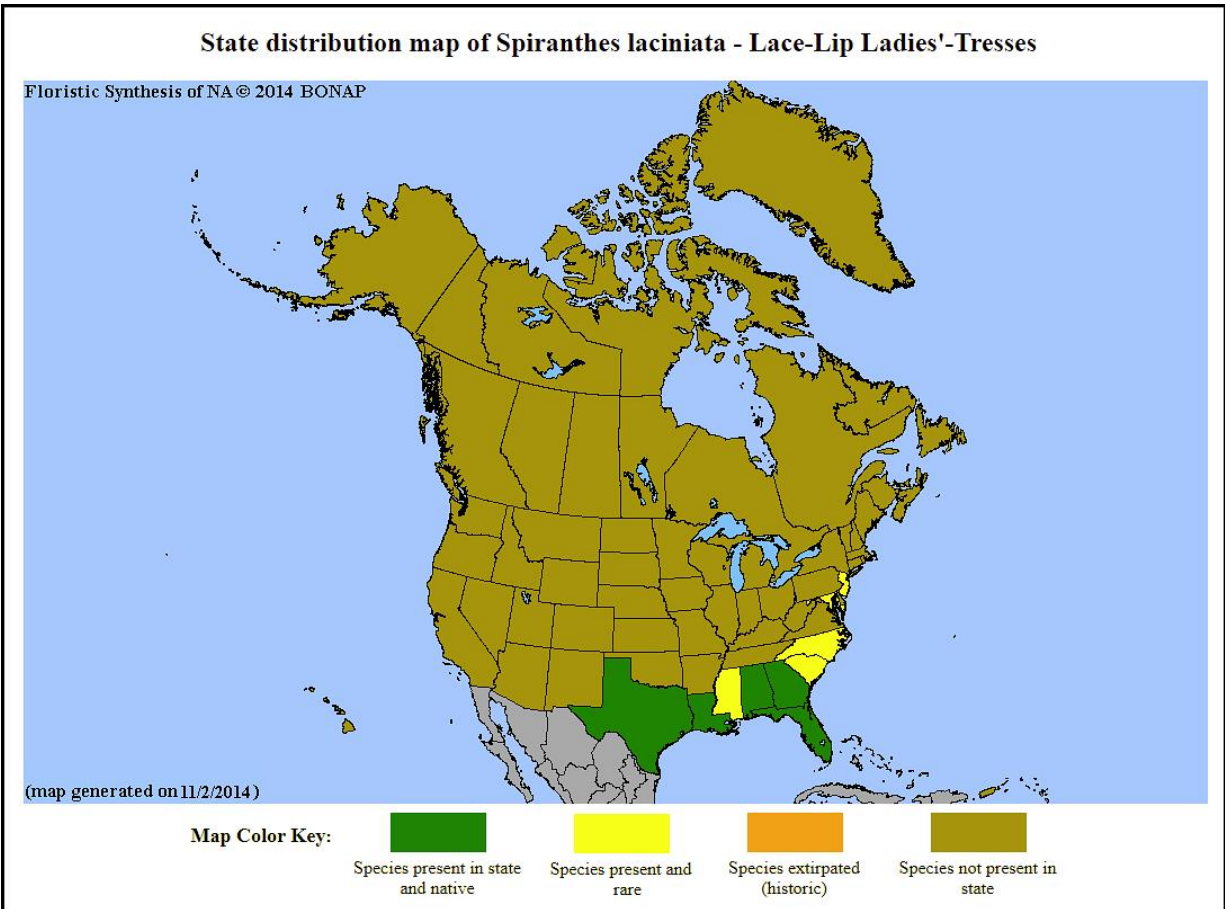


Figure 2. Distribution of *S. laciniata* in North America, adapted from BONAP (Kartesz 2015).

The USDA PLANTS Database (2023) shows records of *Spiranthes laciniata* in eleven New Jersey counties: Atlantic, Bergen, Burlington, Cape May, Essex, Gloucester, Middlesex, Morris, Ocean, Passaic, and Somerset (Figure 3 below). Observations from Mercer County have also been reported (Mid-Atlantic Herbaria 2022). The data include historic observations and do not reflect the current distribution of the species.

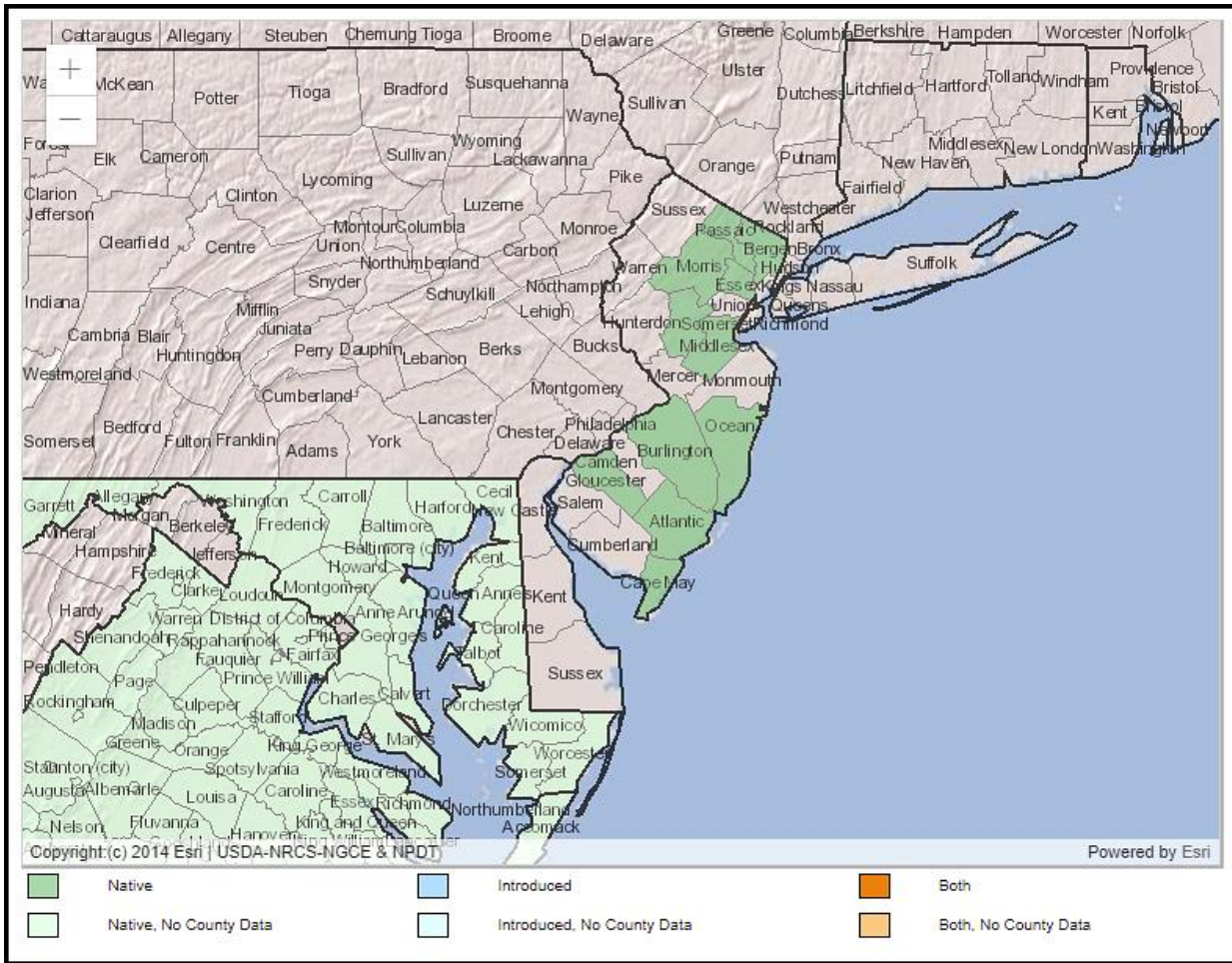


Figure 3. County records of *S. laciniata* in New Jersey and vicinity (USDA NRCS 2023).

### Conservation Status

*Spiranthes laciniata* has a global rank of G4G5, meaning there is some uncertainty as to whether it should be considered apparently secure or secure. A G4 species has a 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 local recent declines, threats, or other factors. A G5 species has a very low risk of extinction or collapse due to a very extensive range, abundant populations or occurrences, and little to no concern from declines or threats (NatureServe 2023). The map below (Figure 4) illustrates the conservation status of *S. laciniata* throughout its range. The orchid is critically imperiled (very high risk of extinction) in two states, imperiled (high risk of extinction) in one state, and vulnerable (moderate risk of extinction) in two states. It is unranked in six other states where it occurs.



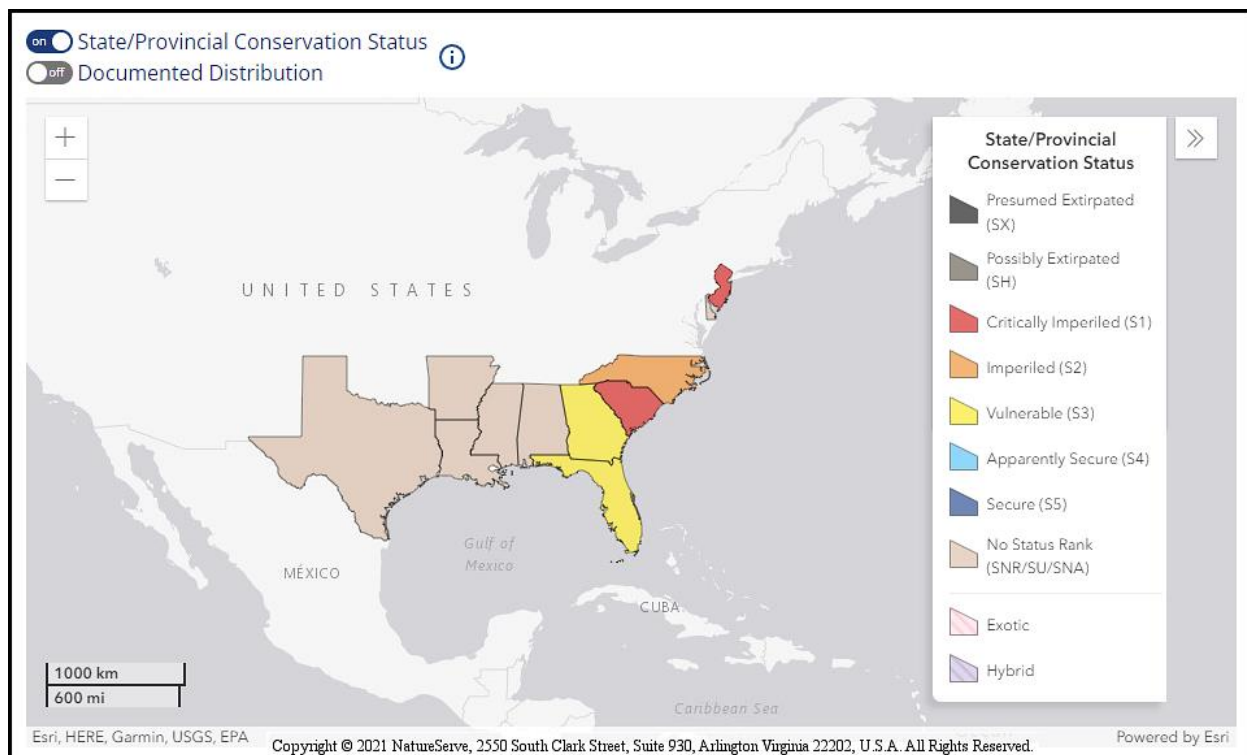


Figure 4. Conservation status of *S. laciniata* in North America (NatureServe 2023).

New Jersey is one of the states where *Spiranthes laciniata* is 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. *S. laciniata* 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 *S. laciniata* 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).

Nearly half of New Jersey's known populations of *Spiranthes laciniata* were documented by collections that were made before the species was described in 1905. Of the 16 substantiated occurrences in the state 4 are ranked as extirpated, 9 as historical, and only 3 as extant. Data is lacking for one occurrence where site access is restricted and no *S. laciniata* plants were observed during recent visits to the other two sites (NJNHP 2022).

### **Threats**

No specific threats were identified for New Jersey's extant populations of *Spiranthes laciniata*, and even as the plants disappeared from two sites no substantial changes to the habitats were observed (NJNHP 2022). Pace (2020) pointed out that most northeastern orchids are infrequent or rare and, as a group, they face acute conservation concerns due to the interaction of multiple

ecological pressures. Stresses on populations of *S. laciniata* in New Jersey might have been compounded by their position at the extreme northeastern boundary of the species' range or their somewhat disjunct location relative to most other known occurrences.

The habitats favored by *Spiranthes laciniata* are also susceptible to a number of threats. Historic losses of the wetlands have resulted from development, agriculture, and resource extraction, and in some locations the water quality continues to be degraded by the introduction of pesticides, fertilizers, or other contaminants in runoff from farm fields or storm drains. The native plant communities in such habitats are also threatened by changes to natural hydrologic or fire regimes that would normally keep succession in check (OCC 2005, Johnson and Walz 2013). For example, Pond Cypress savannas are maintained by periodic hot fires that usually occur at intervals of 5–20 years (Gaddy 2018). Threats from fire suppression increase with development in the surrounding landscape.

*Spiranthes laciniata* may also experience some losses due to herbivores. Studies of other *Spiranthes* species have found that herbivory can significantly reduce reproduction and cause a decline in plant vigor. Slugs and snails damaged leaves of *S. casei* var. *casei* and sometimes consumed entire plants, while deer preferentially browsed on the flowering stems (Reddoch and Reddoch 2008). Consumption of floral stalks by vertebrates (deer, rabbits) has also been reported for other *Spiranthes* species, primarily while the plants were still in bud (Wonkka 2010). Browsing of up to 46% of reproductive stalks was observed during another two-year study. Some losses also occurred due to insect herbivory, primarily by grasshoppers and moth larvae, but the majority of invertebrate damage was limited to foliage (Nally 2016).

The pressures on *Spiranthes laciniata* could be exacerbated by climate change. Shifting climatic conditions in New Jersey are resulting in higher temperatures, more frequent and intense precipitation events, and increasing periods of drought (Hill et al. 2020). However, the Pine Barren savanna habitats are expected to remain relatively stable (Johnson and Walz 2013), and an evaluation of selected species' vulnerability to climate change by Ring et al. (2013) ranked *S. laciniata* as "presumed stable." Although both the habitat and the species could be affected by the alteration of natural hydrologic patterns, Gaddy (2018) pointed out that the plants characteristic of savannas are adapted to endure periods of both flood and drought. There is some evidence that *Spiranthes cernua* has expanded its range northward in recent decades (Catling and Oldham 2011) and a southern species like *S. laciniata* might be expected to do the same although that does not seem to be the case.

### **Management Summary and Recommendations**

New Jersey is relatively remote from the core of *Spiranthes laciniata*'s range and yet the species was once well-established in the state, colonizing at least 16 locations. The first population of the orchid was documented in 1877 and it remained extant until 2004, but recent site visits have failed to locate any *S. laciniata* plants or identify the reason for their disappearance (NJNHP 2022). In order to effectively plan for the management of *Spiranthes laciniata* in New Jersey, a more thorough understanding of both the species and the cause of its recent decline in the state is required. Les (2020) pointed out the paucity of research for *S. laciniata*. More information is

needed in order to understand the potential for and/or extent of vegetative reproduction and dormancy in *S. laciniata*, its requirements and limiting factors during the germination and establishment phases, the extent of impacts from herbivory, and sensitivity to contaminants.

Continued efforts should be made to locate and observe *Spiranthes laciniata* in New Jersey. Some plants may still persist in sites where the species has been observed in recent decades and those could provide valuable information regarding potential management needs. Although there is little detail available regarding the location of most of the state's historical populations, targeted searches of habitat that is suitable for *S. laciniata* might still turn up a few colonies.

### **Synonyms**

The accepted botanical name of the species is *Spiranthes laciniata* (Small) Ames. Orthographic variants, synonyms, and common names are listed below (ITIS 2021, POWO 2023, USDA NRCS 2023).

#### **Botanical Synonyms**

*Gyrostachys laciniata* Small  
*Ibidium laciniatum* (Small) House  
*Triorchis lacinatus* (Small) House

#### **Common Names**

Lace-lip Ladies'-tresses  
Lacelip Lady's Tresses  
Lace-lipped Spiral Orchid  
Jagged Ladies'-tresses

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