Anemone cylindrica

Long-head Anemone

Ranunculaceae

Anemone cylindrica courtesy Sally and Andy Wasowski, Lady Bird Johnson Wildflower Center

***Anemone cylindrica* 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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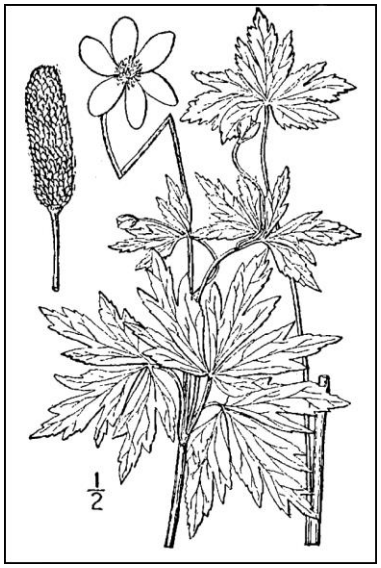
Life History

Anemone cylindrica (Long-head Anemone) is a rhizomatous perennial herb in the Buttercup family. A single stem (occasionally two) arises from a woody caudex, reaching a height of 3–7 dm. Each plant has a cluster of long-petioled basal leaves that are palmately divided into three deeply cut leaflets with narrowly wedge-shaped bases. The leaves are covered with straight, appressed hairs, particularly on the undersides. A whorl of 3–9 similarly-structured leaves (bracts) is present at the base of the inflorescence. An *A. cylindrica* inflorescence usually consists of 2–8 flowers, each held on a hairy stalk. The flowers lack petals but have 4–5 greenish-white sepals that are 5–12 mm long, smooth on the upper sides, and silky below. About 50–75 stamens surround the central head—a dense cluster of woolly pistils with crimson styles. (See Gray 1836, Britton and Brown 1913, Fernald 1950, Gleason and Cronquist 1991, Dutton et al. 2020).




Left: Britton and Brown 1913, courtesy USDA NRCS 2023a. Center: Courtesy James L. Reveal, Lady Bird Johnson Wildflower Center. Right: Vanessa Voelker, 2018.

Anemone cylindrica typically flowers during June and July (Gray 1836, Hyatt 1875, Redmond et al. 1993) although it can begin as early as May and continue into August (Rhoads and Block 2007, Weakley et al. 2022). However the plants are more noticeable in fruit than in flower (Dudley 1930). As the fruits develop the floral pedicels elongate, eventually reaching a length of 1–3 dm. The fruiting heads are cylindrical, 2–4.5 cm long, and no more than 1 cm thick, and the achenes are covered with long, cottony hairs (Gleason and Cronquist 1991, Dutton et al. 2020). Hough (1983) indicated that fruiting continues into September. However *A. cylindrica* stems are firm and the seeds are dispersed slowly so standing stalks can often be found well into the winter months (Dudley 1930, Heimburger and Kamitakahara 1963). Winter identification of *Anemone* species can be aided by the woolly cylindrical receptacles and bulges at the stem nodes (Levine 1995).

In New Jersey, *Anemone cylindrica* is most likely to be confused with *A. virginiana*. In comparison to *A. cylindrica*, *A. virginiana* is usually taller with fewer leaflike bracts at the base

of the inflorescence and its achene heads are more rounded (Henry and Buker 1958, Dutton et al. 2020). There are three accepted varieties of *A. virginiana* but only two have been found in New Jersey (Kartesz 2015, Dutton et al. 2020). The third, *A. virginiana* var. *cylindroidea*, is morphologically most similar to *A. cylindrica* but it does not occur in the state (Fernald 1899, Keener et al. 1996).

Individual plants of *Anemone cylindrica* can be long-lived (Heimburger and Kamitakahara 1963). Dietz and Schweingruber (2002) reported that patterns of growth rings in the secondary root xylem could be a viable means of determining the age of established *A. cylindrica* plants. Various parts of Long-head Anemone have been used medicinally to relieve nasal congestion and to treat an assortment of conditions including wounds, burns, headaches, sore eyes, and tuberculosis symptoms (Anderson 1889, Dutton et al. 2020, PFAF 2023). Because it is long-lived and attractive, *A. cylindrica* has also been used as a design element in landscaping (Pereboichuk 2017).

Pollinator Dynamics

An individual *Anemone cylindrica* flower usually blooms for less than a week, after which the sepals are discarded. For the first few days the sepals open partially then close in the evening, but they usually stay fully expanded by the third day (Molano-Flores and Hendrix 1998). During inclement weather the flowers may remain closed (Heimburger and Kamitakahara 1963).

Anemone cylindrica flowers do not produce nectar and they are seldom visited by insects. The anthers begin to shed pollen as the stigmas mature, facilitating self-fertilization. Heimburger and Kamitakahara (1963) found that the majority of *A. cylindrica* flowers were self-pollinated, although they noted that cross-fertilization might occasionally come about via wind or insect activity, and later studies by Molano-Flores and Hendrix (1998) confirmed low rates of outcrossing in the species. A few insects have occasionally been observed on *A. cylindrica* flowers including solitary bees (Molano-Flores and Hendrix 1998, Hilty 2020) and butterflies (Villabos et al. 2019).

Seed Dispersal and Establishment

The single-seeded achenes of *Anemone cylindrica* are 2–3 mm long, 1.5–2 mm wide, and densely woolly (Gleason and Cronquist 1991, Dutton et al. 2020). A single flowering stem may produce as many as ten fruiting heads, although four is typical, and each head can contain up to 240 achenes. The achenes are dispersed slowly during the autumn and winter months: Some are transported to new locations by wind but those that remain attached often land close to the parent plants when the stems eventually break (Heimburger and Kamitakahara 1963).

No stratification is required for germination. *A. cylindrica* seeds can sprout rapidly, usually within 1–3 weeks of sowing, and seeds that are maintained in cool, moist conditions have been found to germinate slightly faster but not at higher percentages (Sorenson and Holden 1974, Nuzzo 1978). Germination rates reported for the species vary widely. Christiansen and Landers

(1966) reported 24% germination in a greenhouse and lower rates in the field: 6–8% in weeded plots and virtually none when weeds were allowed to proliferate. Sorenson and Holden (1974) obtained germination rates of 96–98% for *A. cylindrica* in laboratory conditions, demonstrating high viability, but the experiment did not examine survival of the seedlings beyond the point of radicle emergence. Seeds planted directly outdoors during a study by Williams et al. (2007) germinated over a two-year period. Newly established *Anemone cylindrica* plants usually take about two years to flower (Christiansen and Landers 1969, Nuzzo 1978). Greenhouse-grown seedlings can be successfully transplanted (Christiansen and Landers 1969), but Nuzzo noted that one-year-old transplants had a higher survival rate than field-germinated or transplanted seedlings. *Anemone cylindrica* is expected to be mycorrhizal based on other members of the family and genus (Vogelsang et al. 2006, Wang and Qiu 2006) but no documentation of fungal associations was found for the species.

Habitat

Anemone cylindrica grows at elevations ranging from 300–3000 meters above sea level (Dutton et al. 2020). Frequently cited natural habitats include prairies, savannas, sand barrens, and open woodlands (Bush 1895, Dudley 1930, Ladd et al. 1991, Catling and Catling 1993, Weakley et al. 2022). *A. cylindrica* has also been found growing along roadsides and in pastures or abandoned fields (Day 1899, Heimburger and Kamitakahara 1963, Ladd et al. 1991, Patton and Nyren 2014).

In New Jersey the species is usually associated with limestone substrate its and habitats include rock outcrops, ledges, barrens, and glades (Britton 1889, Taylor 1915, Hough 1983, NJNHP 2022). A characteristic community in New Jersey was described as Limestone Woodland (*Juniperus virginiana*/*Bouteloua curtipendula—Carex eburnea* Wooded Herbaceous Vegetation Association). *Anemone cylindrica* was most likely to be found in gaps on hillsides or rocky summits, co-occurring with scattered, often stunted, *Juniperus virginiana* trees and a selection of other herbaceous species that are also rare in the state (Snyder 1986, Breden et al. 2001).

Anemone cylindrica has also been reported from calcareous sites in Vermont and Pennsylvania (Day 1899, Henry and Buker 1958, Rhoads and Block 2007), although in British Columbia it was found in moderately acidic soils (Klinkenberg 2020, B. C. Ministry of Forests 1998). *A. cylindrica* typically occurs in places with a dry substrate and an open canopy (Day 1899, Dudley 1930, Hough 1983, Rhoads and Block 2007). Klinkenberg (2020) recorded the soil moisture regime as very xeric to subxeric. In an Ontario study, *A. cylindrica* had the greatest frequency of occurrence (17%) at dry sites, but decreased in abundance at dry-mesic (7%) and wet-mesic (3%) sites (Reznicek and Maycock 1983).

Wetland Indicator Status

Anemone cylindrica is not included on the National Wetlands Plant List (NWPL). Any species not on the NWPL is considered to be Upland (UPL) in all regions where it occurs. The UPL

designation means that it almost never occurs in wetlands (U. S. Army Corps of Engineers 2020).

USDA Plants Code (USDA, NRCS 2023b)

ANCY

Coefficient of Conservancy (Walz et al. 2020)

CoC = 9. 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 *Anemone cylindrica* is restricted to the United States and Canada (POWO 2023). The map in Figure 1 depicts the extent of the species in North America.

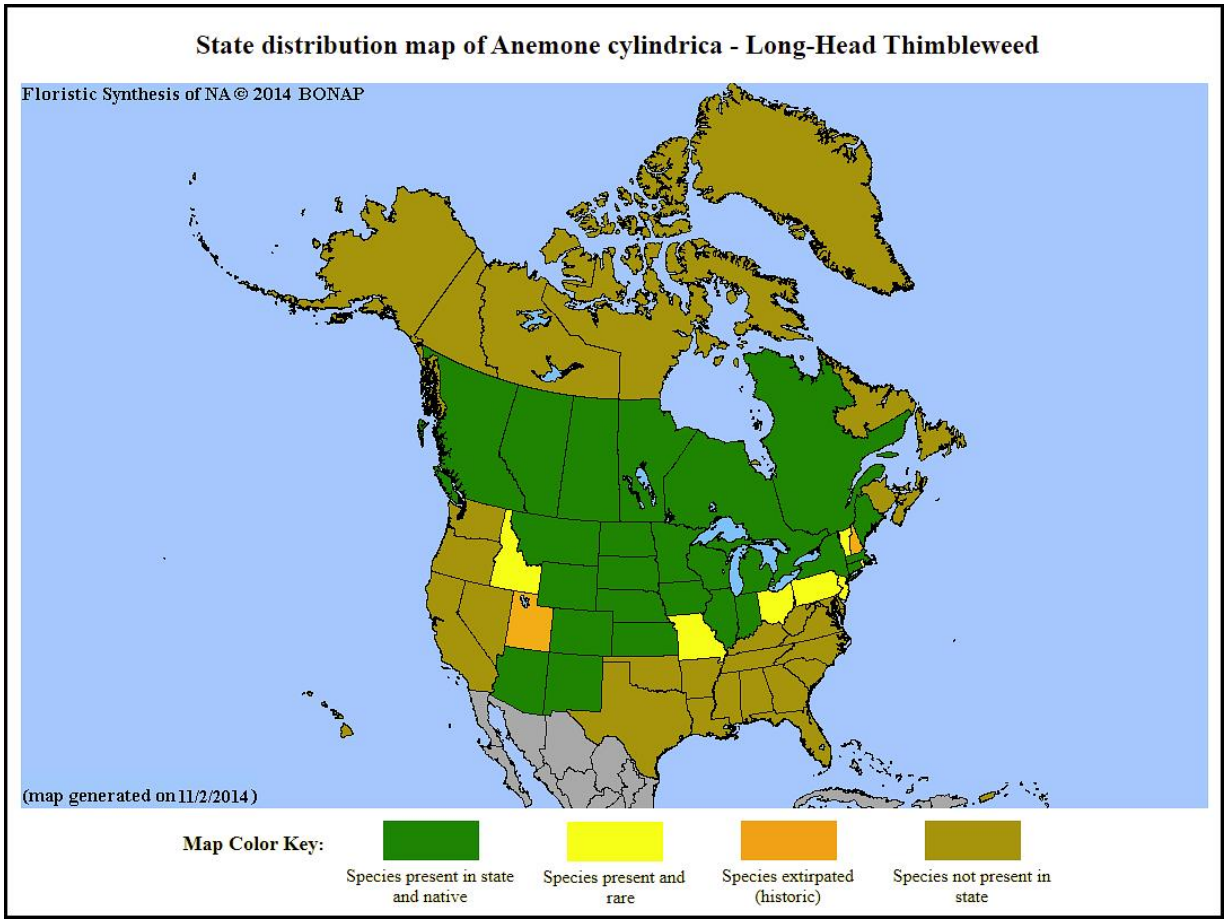


Figure 1. Distribution of A. cylindrica in North America, adapted from BONAP (Kartesz 2015).

The USDA PLANTS Database (2023b) shows records of *Anemone cylindrica* in two New Jersey counties: Hunterdon and Sussex (Figure 2). The data include historic observations and do not reflect the current distribution of the species.

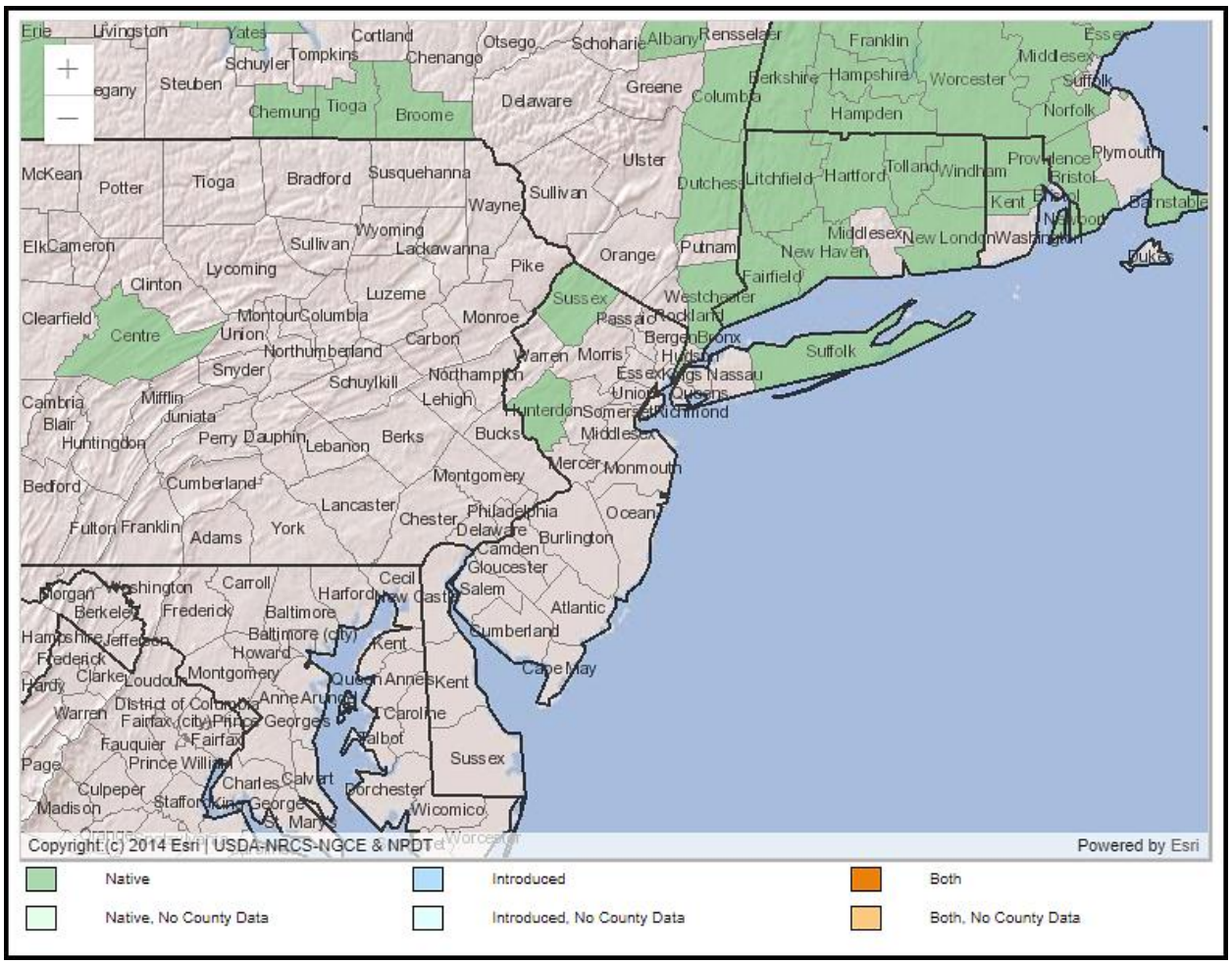


Figure 2. County records of A. cylindrica in New Jersey and vicinity (USDA NRCS 2023b).

Conservation Status

Anemone cylindrica is considered globally secure. The G5 rank means the 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 3) illustrates the conservation status of *A. cylindrica* throughout its range. Long-head Anemone is possibly extirpated in New Hampshire, critically imperiled (very high risk of extinction) in five states, imperiled (high risk of extinction) in two states, and vulnerable (moderate risk of extinction) in two states and Quebec. The species is secure or apparently so in other parts of Canada where it occurs and is unranked throughout much of the United States.

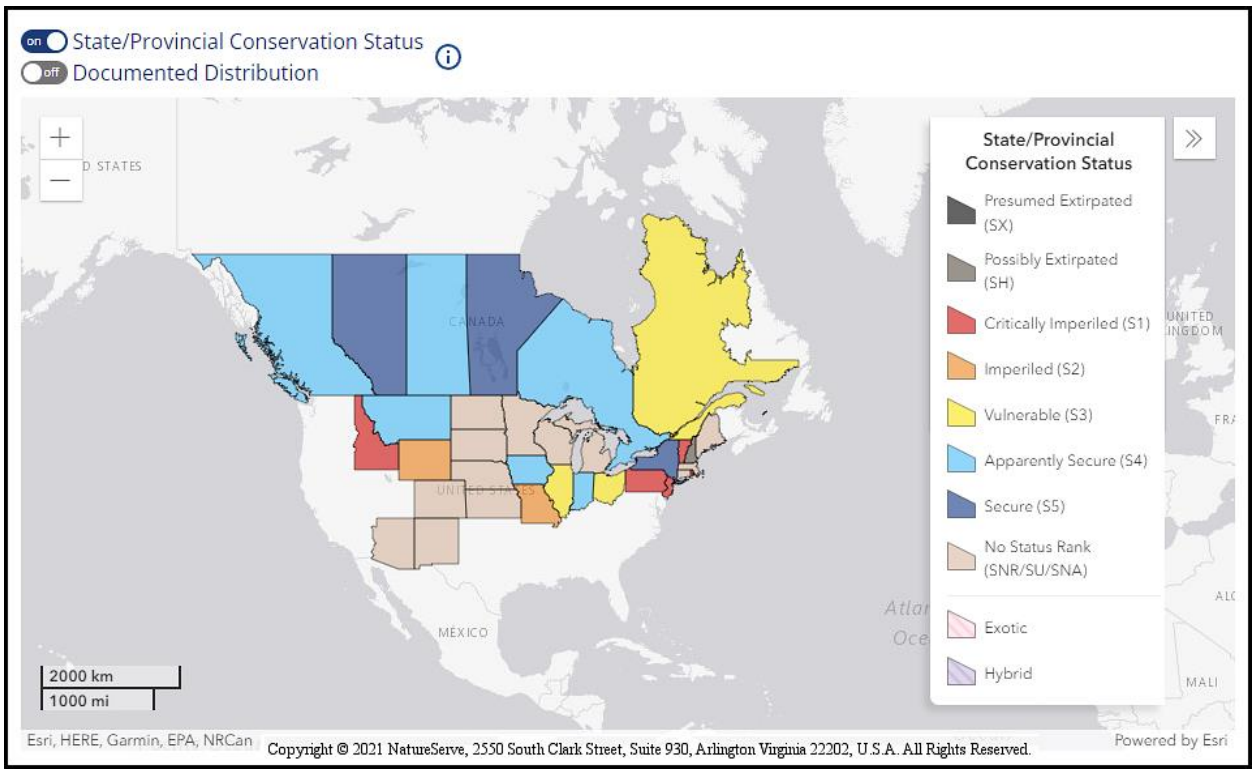


Figure 3. Conservation status of A. cylindrica in North America (NatureServe 2023).

Anemone cylindrica 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. *A. cylindrica* 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, being listed does not currently provide broad statewide protection for the plants. Additional regional status codes assigned to *A. cylindrica* signify that the anemone is eligible for protection under the jurisdictions of the Highlands Preservation Area (HL) and the New Jersey Pinelands (LP) (NJNHP 2010).

The earliest reports of *Anemone cylindrica* in New Jersey were limited to Sussex County (Britton 1889, Taylor 1915). When Vincent Abraitys relocated a population in 1973 it was the only occurrence known to be extant in the state at that time (Snyder 1984). Hough (1983) reported extant populations of *A. cylindrica* in Sussex and Hunterdon counties, indicating the presence of current verified specimens. No further information seems to be available regarding the Hunterdon occurrence but additional populations were discovered in Sussex. Around the turn of the century Breden et al. (2006) reported that two of the Sussex County populations were extirpated, and since that time a third population has likely been extirpated. Five *A. cylindrica* occurrences are currently thought to remain extant in the state (NJNHP 2022).

Threats

Anemone cylindrica typically favors open places, and competition with woody species appears to jeopardize the survival of some populations. The proliferation of both native and non-native shrubs was noted as a threat to three New Jersey occurrences, including one that may now be extirpated. Exotic species identified as problematic at one of the sites included *Ailanthus altissima*, *Berberis thunbergii*, *Celastrus orbiculata*, *Elaeagnus umbellata*, and *Lonicera morrowii*. Another former New Jersey colony which was situated in a utility right-of-way appears to have been destroyed by herbicides that were used for maintenance of the corridor (NJNHP 2022). Roadside management techniques, including herbicides, probably also caused the demise of a population in Ontario (Heimburger and Kamitakahara 1963).

Patton and Nyren (2014) noted that *Anemone cylindrica* populations occurring in pastures were favored by moderate levels of grazing, developing greater biomass than those in sites that were heavily grazed or ungrazed. Moderate levels of browsing may benefit *A. cylindrica* by reducing competition and maintaining open spaces for seedling establishment. Comparable results might be obtained by periodic burning, although there is some conflicting information regarding the impacts of fire on Long-head Anemone. A Missouri population discovered by Ladd et al. (1991) was largely restricted to an area that had recently been burned. In addition to maintaining open habitat, burning can provide a short-term break for plants that are susceptible to pathogens, interrupting the cycle of disease and permitting the hosts to renew their vigor (Shearer and Tiffany 1989). However, an Iowa population of *A. cylindrica* significantly declined after site management practices shifted from mid-summer haying to spring burns (Dornbush 2004).

Anemone cylindrica is susceptible to some rust fungi in the genus *Puccinia*. Although Arthur (1916) tried to culture a number of *Puccinia* species on *A. cylindrica* without success, a number of naturally occurring infections have been reported including *Puccinia clematidis*, *P. anemones-virginianae* and *P. recondita* (Fraser 1925, Tiffany and Knafus 1984). *Puccinia* infections can reduce growth, decrease flowering, hasten mortality, or increase a host plant's vulnerability to other stresses (Paul and Ayres 1986 and1987, RHS 2023).

A seed predation study by Blaney and Kotanen (2001) indicated that a portion of *Anemone cylindrica* seeds are likely to be consumed by vertebrates such as birds or small mammals, although insects do not appear to eat the seeds. However, it is not clear whether seed consumption reduces the opportunities for establishment or aids in dispersal. Burt-Smith et al. (2003) studied the effects of cricket herbivory on the leaves of *A. cylindrica* seedlings but found the impact to be negligible. Herbivory by White-tailed Deer (*Odocoileus virginianus*) poses a significant threat to many native herbs in New Jersey but Englund and Meyer (1986) found that the deer selectively browsed on other plant species and ignored *A. cylindrica* plants.

Anemone cylindrica is at the southern end of its range in New Jersey so populations in the state are likely to be particularly vulnerable to climate change. Taylor (1915) observed that *A. cylindrica* occurred in places where the growing season lasted for 117–159 days. However, New Jersey's growing season has steadily become longer since 1915 with the greatest acceleration occurring during the past half century. The extended growing season has coincided with rising temperatures and more frequent droughts, which can lead to water stress in many plant species

(Hill et al. 2020). *Anemone cylindrica* is sensitive to drought, particularly at the seedling stage, and Nuzzo (1978) reported that the plants showed a poor recovery from desiccation.

Because *A. cylindrica* relies heavily on self-fertilization the species is likely to have low genetic diversity, making it likely to be less resilient to change. Nevertheless, Long-head Anemone may have some capacity for modification. Heimburger and Kamitakahara (1963) discovered a small population of *Anemone cylindrica* in Ontario that had a distinctive set of chromosomes and was reproductively isolated from typical plants. Their observation suggests a potential mechanism for rapid evolution that might allow *A. cylindrica* to adapt to shifting climactic conditions.

Management Summary and Recommendations

Plant populations that are situated along range edges often contain unique genotypes which are particularly well-adapted to local conditions (Rehm et al. 2015), and there is some evidence that plants in the genus *Anemone* have retained chromosomal elements that favor rapid evolution (Mlinarec et al. 2016). Therefore the conservation of *Anemone cylindrica* populations along the southern edge of the species' range—such as those in New Jersey—may be especially important as the climate continues to change.

Although five populations of *Anemone cylindrica* are considered extant in New Jersey two of the occurrences have not been monitored since the early 1990s, one could not be found during 2021, and the remaining two were very small when last observed more than a decade ago (NJNHP 2022). Some proactive management may be required to maintain the species' presence in the state. An updated population status assessment and evaluation of habitat conditions is recommended at all sites. Location-specific plans are likely to be needed for the management of succession and/or control of invasive flora. Fire could prove to be a suitable tool for preserving *A. cylindrica* habitat, but further studies are needed to determine the burn characteristics (eg. timing, frequency, intensity) that are most favorable for the species.

Synonyms

The accepted botanical name of the species is *Anemone cylindrica* A. Gray. Orthographic variants, synonyms, and common names are listed below (ITIS 2021, POWO 2023, USDA NRCS 2023b).

Botanical Synonyms	Common Names
Anemone cylindrica f. *albida* Farw.	Long-head Anemone Long-head Thimbleweed Candle Anemone Cottonweed

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