Stellaria borealis var. *borealis*

Boreal Starwort

Caryophyllaceae

Stellaria borealis var. borealis by Bob Cunningham, 2018

***Stellaria borealis* var. *borealis* 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

501 E. State St.
PO Box 420
Trenton, NJ 08625-0420

Prepared by:
Elizabeth A. Johnson
eajohnson31@gmail.com

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For:
New Jersey Department of Environmental Protection
Office of Natural Lands Management
New Jersey Natural Heritage Program
natlands@dep.nj.gov

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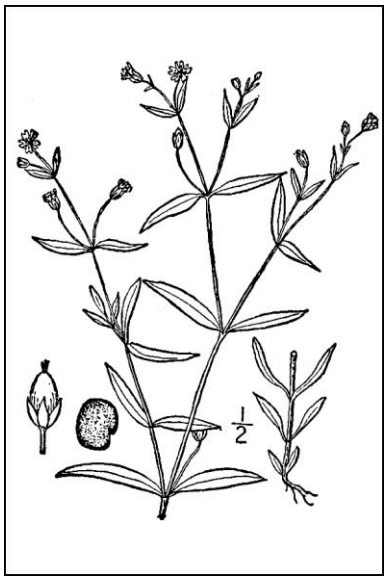
Life History

Boreal starwort (*Stellaria borealis* var. *borealis*) is a perennial rhizomatous member of the pink family (Caryophyllaceae). The stems of the plant are weak and often prostrate but can also grow erect, with many branches. The 4-angled stems grow from (5-)25 to 50 cm in height and are glabrous or slightly pubescent (Gleason and Cronquist 1963; Morton 2021; Native Plant Trust 2022; Strausbaugh and Core 1978). Leaves are opposite, simple, lance-shaped, 1–5 cm in length and 7–60 mm x 2–8 mm in size, narrowed at the base and with entire, ciliate margins (Gleason and Cronquist 1963; Morton 2021).

The flowers are small and white, usually with five petals and five sepals, although some flowers lack petals. The petals and sepals are not fused, and the petals are shorter than the sepals. Flowers are 3–5 mm long, 5–6 mm wide, with 5–50 flowers/plant (Morton 2021; Native Plant Trust 2022; Strausbaugh and Core 1978). The petals are 1–3 mm long and lobed or fringed at the tip. If infected with the anther smut fungus (*Microbotryum violaceum* [*stellariae*]), the anthers may have an enlarged, reddish appearance (Morton 2021; Native Plant Trust 2022). Although not well studied, anther smut fungus has been found to infect perennials (over annuals) in Caryophyllaceae and may affect host population growth and persistence (Hood et al. 2010 and references therein).

The blooming period extends from March through August, depending on location (LBJWC 2007); in nearby Pennsylvania plants bloom May through August (PNHP 2019) and mid-June through August in New Jersey (Hough 1983). *S. borealis* is quite variable in appearance and may hybridize with *S. longifolia* (Gleason and Cronquist 1963; Morton 2021).

The fruit is a dark brown capsule 3–4.5 mm long with no ribs or wings that splits open along the main seams (valves) when ripe later in the season (Morton 2021; Native Plant Trust 2022). The seeds within are smooth or indistinctly rugose (Morton 2021).



Left: Britton and Brown, 1913, courtesy USDA NRCS 2022a. Right: Habitat and fruit, courtesy Samuel Brinker, 2018.

Pollinator Dynamics

The related Long-Leaved Stitchwort (*Stellaria longifolia*) has many insect pollinators, including long-tongued bees (Anthophoridae spp. and Megachilidae [e.g., *Osmia conjuncta*]) and short-tongued bees (Halictidae spp., Colletidae spp., and Andrenidae spp.). Numerous fly species in the following families also visit that stitchwort: Sciaridae, Syphiridae, Bombyliidae, and Tachinidae. In addition to the above insect taxa, the related Common Chickweed (*S. media*) is visited by fly species in the families Calliphoridae, Muscidae, Anthomyiidae, Fanniidae, Sphaeroceridae, and Scathophagidae. Common Chickweed is also reported to be visited by wasps (Chalcididae spp., Ichneumonidae spp., and Sapygidae spp.) and butterflies such as American Lady (*Vanessa virginiensis*), Cabbage White (*Pieris rapae*), and *Celastrina* spp. (Hilty 2020; Robertson 1929). It is possible that similar insect species visit and pollinate Boreal Starwort. Boreal Starwort is also reported to self-pollinate (Sharples et al. 2021), at times producing flowers without petals, although it does not have cleistogamous flowers (Native Plant Trust 2022). More research is needed to better understand the pollination system of this species.

Seed Dispersal

The seed capsule of Boreal Starwort is 3–5 mm long with seams at the top that open to release the seeds when dried. There are 10–20 seeds per capsule, each one 0.7–0.9 mm in length that are smooth or obscurely roughened (Britton and Brown 1913; Native Plant Trust 2022). Seeds do not have any specialized structures such as wings or hooks to aid in dispersal.

Little to no information is available about seed dispersal and seed viability in *S. borealis* var. *borealis*; however, there is much information about the related and more widespread *S. media*. In this species, seeds fall out of the dry capsule when it is jostled by wind or animal movement (Sobey 1981). Martin et al. (1951) lists Common Chickweed as having high food value to birds, due to its numerous seeds and tender leaves (both of which are relished by gamebirds and songbirds) and to the plant species' wide distribution. *S. media* seeds are reported to be dispersed in feces of pigs, horses, cattle, deer, quail and magpies, the casts of earthworms, and moved by ants (Sobey 1981 and references therein). They may also be transported in animal hoofs, boots or in machinery. The seeds of Common Chickweed can remain dormant in soil if buried, germinating when exposed to sunlight (Mohler et al. 2021; Turkington et al. 1980). Some seeds of Boreal Starwort are also likely consumed and ultimately dispersed by birds and possibly other animals; other seeds may germinate where they fall.

Although *S. borealis* does not have bulbils or bulblets (Native Plant Trust 2022) and has not been reported to root at stem nodes as does *S. media* (Turkington et al. 1980), it likely spreads vegetatively by the growth of its rhizomes as does the closely related Long-Stalked Chickweed (*S. longipes*) (Maillette et al. 2000; MNDNR 2022).

Habitat

In New Jersey Boreal Starwort is known from seepage areas at the edges of swamps, with one population found near the base of an upland slope and another within 2.5–3.0 m (8–10 ft) of a Rhododendron (*Rhododendron maxima*)-covered upland edge. The plants grow in wet openings and in shallow mucky water among hummocks, in moist soil, or with sphagnum moss. They also grow along slow-moving stream channels in swamps. Associated canopy trees include Yellow Birch (*Betula alleghaniensis*), Black Birch (*B. lenta*), Sugar Maple (*Acer saccharum*), and Eastern Hemlock (*Tsuga canadensis*), with some Red Maple (*Acer rubrum*), White Ash (*Fraxinus americana*), Tulip Poplar (*Liriodendron tulipifera*) and White Pine (*Pinus strobus*). Typical wetland shrubs include Highbush Blueberry (*Vaccinium corymbosum*), Maleberry (*Lyonia ligustrina*) and Winterberry (*Ilex verticillata*). Associated wetland herbs include Sensitive (*Onoclea sensibilis*) and Cinnamon (*Osmundastrum cinnamomeum*) Ferns, Jewelweed (*Impatiens capensis*), Eastern Skunk Cabbage (*Symplocarpus feotidus*) and sundews (*Drosera* spp.) (NJNHP 2022).

Range wide, Boreal Starwort can be found in many types of moist and wet habitat: around seeps, springs, and streamlets in cool woods and swamps; in marshes, meadows and low fields; along the shores of rivers or lakes; among boulders on talus slopes or river and roadside gravel; and in alpine and subalpine zones (Morton 2021; Native Plant Trust 2022; PNHP 2019). In New Hampshire the species is found to 1,525 m (5,000 ft) (Britton and Brown 1913) and it has been found at 914 m (3,000 ft) in the Canaan Valley of West Virginia (Strausbaugh and Core 1978). It may range up to 3,500 m (9,842 ft) elsewhere in its range (Morton 2021).

Eighty to ninety-two percent of surveyed terrestrial flowering plant species and families are considered to have mycorrhizal associations of some kind (Wang and Qiu 2006). Of eight *Stellaria* species evaluated, four species were found to be either mycorrhizal (with arbuscular mycorrhizae) or non-mycorrhizal. These included *S. holostea*, *S. media*, *S. pallida*, and *S. nemorum*. The other species were all non-mycorrhizal and included *S. alsine*, *S. graminea*, *S. palustri*s, and *S. parviflora* (Wang and Qiu 2006). Although Boreal Starwort had not been evaluated at that time, it is possible that Boreal Starwort is mycorrhizal.

Wetland Indicator Status

Stellaria borealis is a facultative wetland species, meaning that it usually occurs in wetlands but may occur in nonwetlands (U. S. Army Corps of Engineers 2020).

USDA Plants Code (USDA, NRCS 2022b)

STBOB USDA Plants Code (*Stellaria borealis* ssp. *borealis*)
STBOB4 NJ accepted (NJNHP listed as *Stellaria borealis* var. *borealis*)

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 global range of *Stellaria borealis* extends from North America through northern Europe (POWO 2022), a circumpolar distribution. The map in Figure 1 depicts the extent of *S. borealis* var. *borealis* in the United States and Canada.

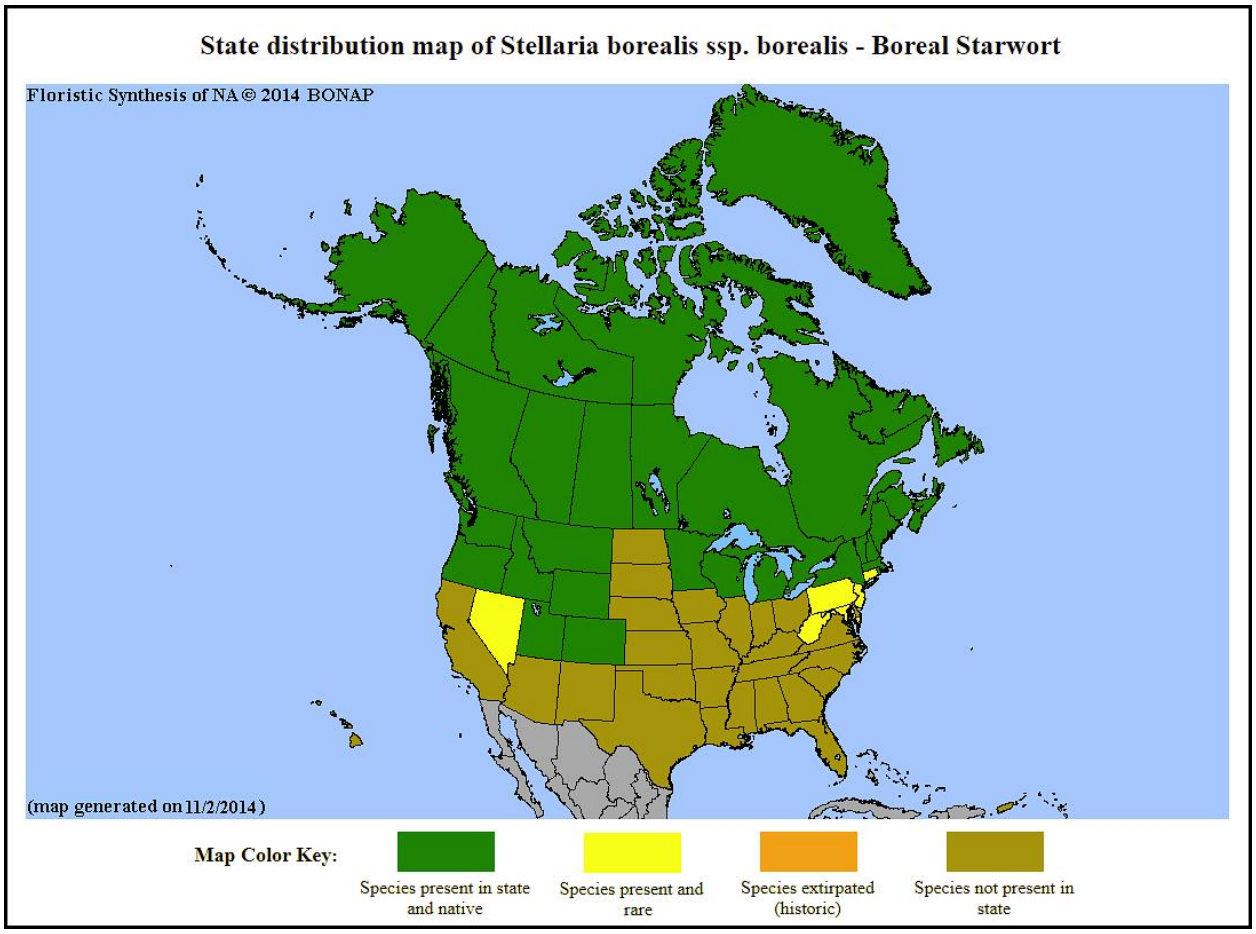


Figure 1. Distribution of S. borealis var. *borealis in North America, adapted from BONAP (Kartesz 2015).*

The USDA PLANTS Database (2022b) shows records of Boreal Starwort in four New Jersey counties: Morris, Passaic, Sussex, and Warren (Figure 2). The data include historic observations and do not reflect the current distribution of the species as there are no tracked historical or extant occurrences from Warren County, New Jersey (NJNHP 2022).

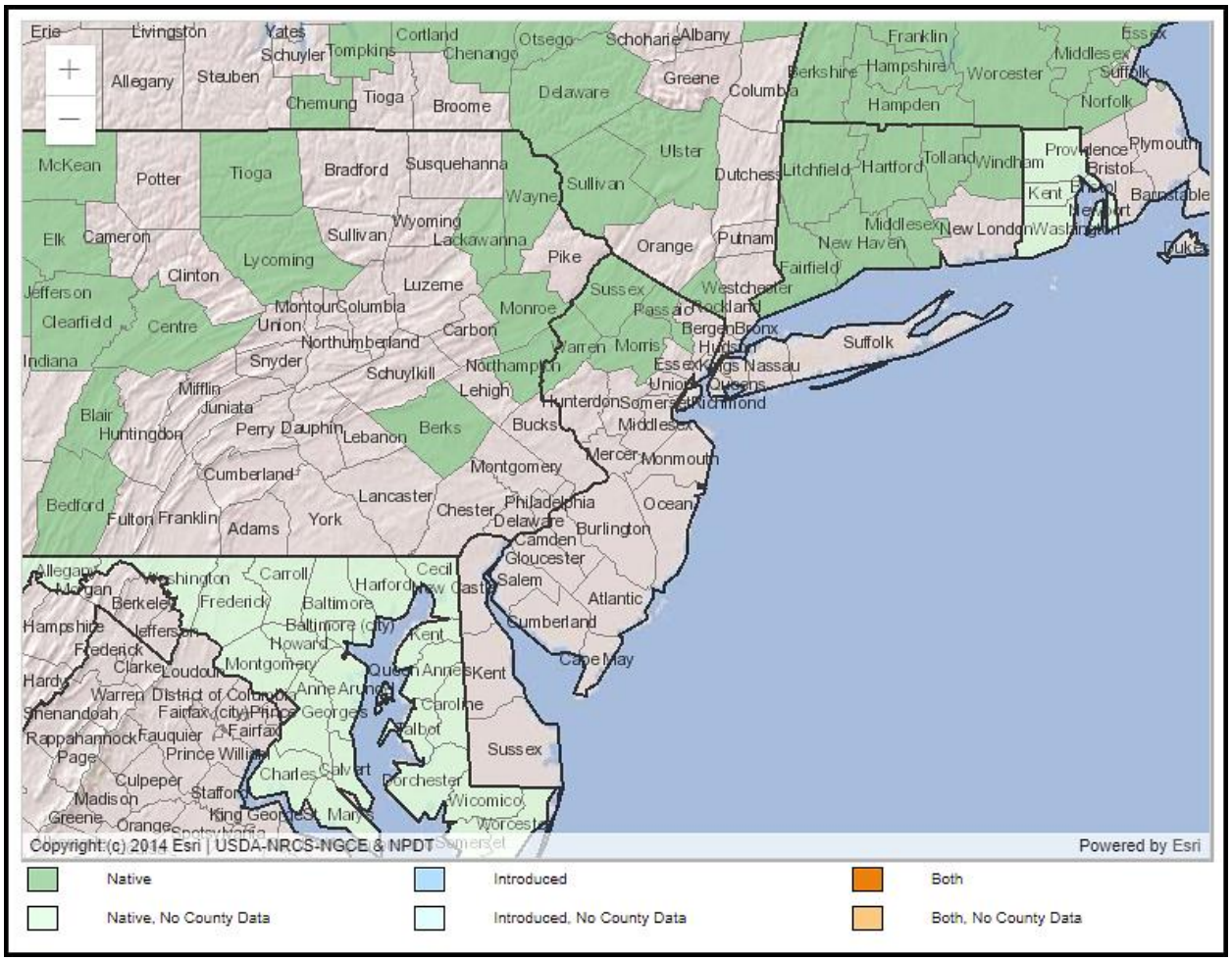


Figure 2. County records of S. borealis var. *borealis in New Jersey and vicinity (USDA NRCS 2022b).*

Conservation Status

Stellaria borealis var. *borealis* is considered globally secure. The G5T5 rank means the subspecies 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 2022). The map below (Figure 3) illustrates the conservation status of *S. borealis* var. *borealis* throughout its range. Boreal Starwort 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 one state and one province. Throughout most of its range, the species is considered secure or apparently secure or is unranked.

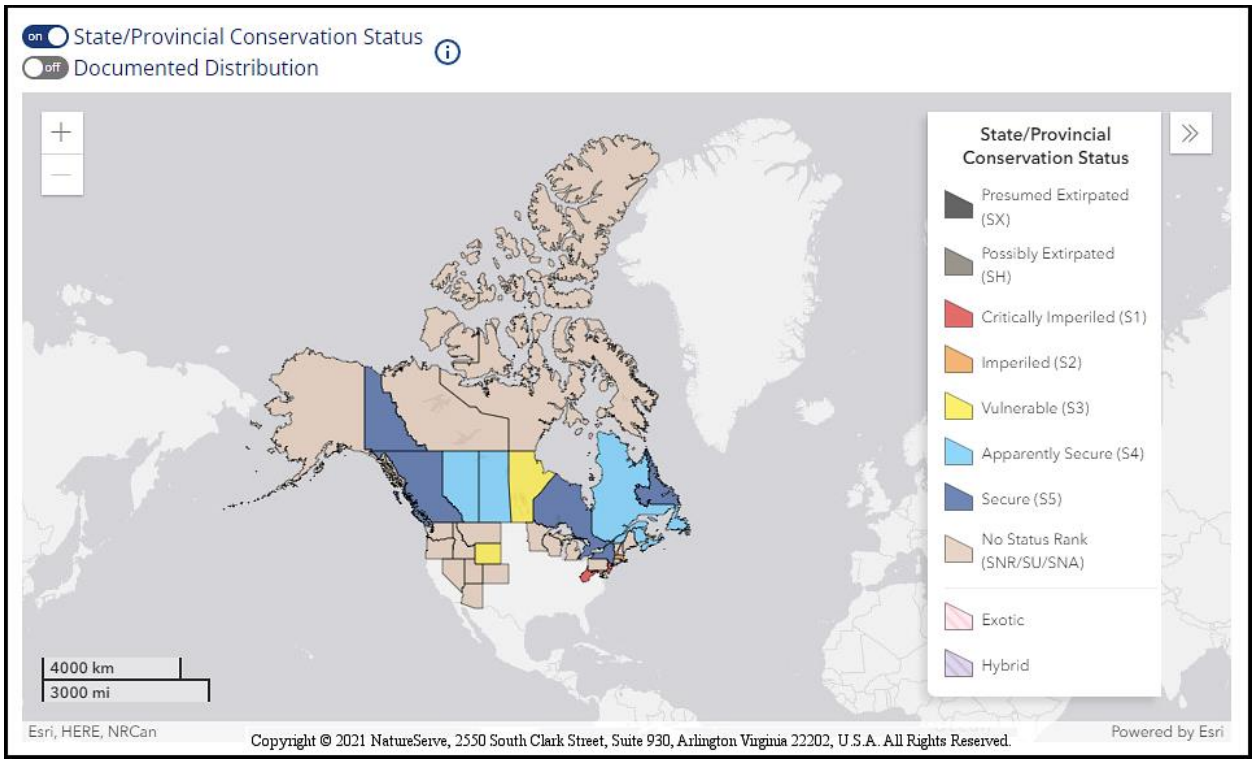


Figure 3. Conservation status of S. borealis var. *borealis in North America (NatureServe 2022).*

New Jersey is one of the two states where *Stellaria borealis* var. *borealis* is critically imperiled. In those cases, the two states (New Jersey and West Virginia) are at the southernmost extent of the species' range in the eastern United States. 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. borealis* var. *borealis* 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 plant 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).

There are eight verified element occurrences in New Jersey; five are extant and three are considered historical (dating from 1884, 1909, and 1918). All are (or were) located in the northern region of the state in Morris, Passaic, and Sussex counties (NJNHP 2022).

Threats

The only non-native invasive species reported from New Jersey occurrences was Japanese Stiltgrass (*Microstegium vimineum*), but it was not described as a threat to any populations at the time of the observation in 2016 (NJNHP 2022). Although not mentioned in the site visit records, the effects of non-native insects, such as the Emerald Ash Borer (*Agrilus planipennis*) and

Wooly Adelgid (*Adelges tsugae*) that kill ash (*Fraxinus* spp.) and Eastern Hemlock (*Tsuga canadensis*), respectively, may alter the cool microhabitat conditions required by *S. borealis* in locations where these tree species are a significant component of the overstory.

Herbivory, another potential threat to Boreal Starwort, was not noted as a threat in the literature or in New Jersey populations. Nor was there any indication that human disturbance was a problem at tracked occurrence sites in New Jersey (NJNHP 2022).

Likely the greatest challenges to New Jersey populations are their isolation from each other and the fact that they are found at the southernmost edge of range for this species. Not only does the species prefer cooler climates, in New Jersey is it restricted to cooler ravines and mountain stream corridors at the northern edge of the state. Climate projections locally include higher temperatures on average and heavier storm events, though unevenly distributed throughout the year such that summer droughts are likely be become a more common occurrence (NJDEP 2020). All these changes do not bode well for the long-term persistence of Boreal Starwort in the state.

Management Summary and Recommendations

Although non-native species were not noted as specific threats at the time of site visits, due to the rapidity at which Japanese Stiltgrass and other non-native species can encroach into habitat, continued monitoring of element occurrences is recommended. Regular monitoring will help detect the presence of invasive species and allow for earlier control and management if necessary and may help prevent the development of other threats such as herbivory or human disturbance.

As much of the life history information for this plant had to be inferred from other members of the genus, species-specific research on relevant topics would be beneficial. Research into other potential threats such as disease or habitat fragmentation and genetic isolation might be warranted, specifically as they pertain to New Jersey populations. Additionally, the inconspicuous appearance of this species makes it difficult to identify and find (PNHP 2019); it may be that new surveys would be a worthwhile consideration.

Ensuring that sufficient suitable cool, moist habitat conditions remain for the species at, and/or adjacent to extant populations in New Jersey will be critical to support the species' persistence in a changing climate.

Synonyms

The accepted botanical name utilized in New Jersey is *Stellaria borealis* var. *borealis* Bigelow. The species is also frequently identified as *Stellaria borealis* ssp. *borealis*. Orthographic variants, synonyms, and common names are listed below (Britton and Brown 1913; ITIS 2022; Kartesz 2015; POWO 2022; USDA, NRCS 2022b).

Botanical Synonyms

Stellaria borealis ssp. *borealis* Bigelow
Alsine borealis (Bigelow) Britton
Alsine borealis var. *alpestris* Britton
Arenaria lateriflora Darl.
Micropetalon lanceolatum Pers.
Spergulastrum lanceolatum Michx
Stellaria aquatica Cham. & Schltdl.
Stellaria borealis f. *apetala* Kurtz
Stellaria borealis var. *floribunda* Fernald
Stellaria borealis f. *glaucescens* Kurtz
Stellaria borealis var. *isophylla* Fernald
Stellaria borealis f. *macrantha* Kurtz
Stellaria borealis f. *subcorollina* Kurtz
Stellaria calycantha var. *floribunda* (Fernald) Fernald
Stellaria calycantha ssp. *interior* Hultén
Stellaria calycantha var. *isophylla* (Fernald) Fernald
Stellaria calycantha var. *latifolia* B. Boivin
Stellaria calycantha var. *laurentiana* Fernald
Stellaria laxa Behm
Stellaria mollis Wirzén
Stellaria uliginosa Laest.
Stellularia borealis (Bigelow) Kuntze

Common Names

Boreal Starwort
Northern Stitchwort
Bog Stitchwort
Bog Starwort
Marsh Chickweed
Mountain Starwort

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