

Luzula acuminata var. *acuminata*

Hairy Wood-rush

Juncaceae



Luzula acuminata var. *acuminata* by Peter M. Dziuk, 2012

Luzula acuminata var. *acuminata* Rare Plant Profile

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

Luzula acuminata var. *acuminata* (Hairy Wood-rush) is a rhizomatous perennial herb in the Juncaceae. The plants grow in loose clumps, spreading by stolons up to 6 cm in length. The leaves are linear and usually have long hairs on the margins. *L. acuminata* has basal leaves that are up to 32 cm long and 12 mm wide, while several smaller (2–4 cm long, 2–5 mm wide) leaves are present on the stems. The culms are 1–4 dm in height. The inflorescence of *L. acuminata* var. *acuminata* is a terminal cluster of 5–22 long-stalked solitary flowers, although a small number of the pedicels may develop secondary floral branches. The pedicels are variously upright, spreading, or nodding. The flowers have six brownish tepals that are 3–4.5 mm long and sharply pointed at the tips, six stamens with large anthers, and three-parted stigmas. The fruit is a three-seeded ovoid capsule that is generally equal to or longer than the tepals at maturity. (See Fernald 1950, Ebinger 1962, Coffey 1970, Gleason and Cronquist 1991, Munro et al. 2014, Mittelhauser et al. 2019, Swab 2020).



Peter M. Dziuk, 2012 (left, right) and 2013 (center).

In the northeast, the wood-rushes usually flower and fruit from April through July (Rhoads and Block 2007). Throughout its range, *Luzula acuminata* var. *acuminata* may flower from April through June and it appears that the species' blooming period can vary depending on latitude and weather conditions (Fernald 1910, Clausen 1945, Munro et al. 2014, Mittelhauser et al. 2019). Fruit is typically present from June through August (Hough 1983, Weakley et al. 2024). The leaves of *L. acuminata* often turn red during the fall months in the South Dakota hills (Zacharkevics 2006), whereas in southern and central Ohio green basal leaves may be present throughout the winter (Beatley 1956).

When the plants are in bloom or fruiting, *Luzula acuminata* var. *acuminata* can readily be distinguished from other members of the genus that are known to occur in New Jersey (*L. bulbosa*, *L. echinata*, *L. multiflora*) because the inflorescences of those species have dense clusters of flowers (Swab 2020). The other named variety of *L. acuminata* (var. *carolinae*) has not been documented in the state although New Jersey falls within its known range (Kartesz 2015, Swab 2020, POWO 2025). *L. acuminata* var. *carolinae* closely resembles var. *acuminata*

but has more extensive branching of its floral pedicels. Although secondary branches are sometimes produced in var. *acuminata* it occurs in less than a third of the pedicels and there are usually no more than one branches per stalk. In var. *carolinae* the majority of the floral pedicels are branched and some have more than one additional branch (Ebinger 1962, 1964).

A recent genetic analysis of the Juncaceae suggested that *Juncus* is a paraphyletic genus. The *Luzula* species in the study formed a cohesive unit but were nested within *Juncus* (Roalson 2005). The basic diploid chromosome number in *Luzula* is 12 (Nordenskiöld 1951) but in *L. acuminata* it is 18 (Löve 1981). Both polyploidy and agmatoploidy (an increase in the number of chromosomes due to fragmentation) are frequent in the genus (Drábková 2013). Natural hybrids are apparently rare in *Luzula* (Ebinger 1964).

Pollinator Dynamics

As with other members of the rush family, *Luzula* spp. are mainly pollinated by wind. A few species are pollinated by both insects and wind. Unlike *L. acuminata*, the insect-pollinated wood-rushes have brightly colored (reddish or whitish) tepals and pseudo-nectaries (Cox and Grubb 1991, Zomlefer 1994, Huang et al. 2013).

Rushes, including *Luzula*, are self-compatible and at least one species of *Luzula* produces cleistogamous (self-fertilizing) flowers (East 1940). However, there is a temporal separation between the maturity of the floral parts: The stigmas of *Luzula* flowers typically become receptive several days before the anthers begin to disperse pollen (Edgar 1966) and the strategy increases the probability of outcrossing (Cruden 1988, Zomlefer 1994).

Seed Dispersal and Establishment

The seeds of *Luzula acuminata* are red-brown or purplish and 1–1.5 mm in diameter. A conspicuous protuberance is present on one end of each seed (Ebinger 1964, Swab 2020). The appendage, known as an elaiosome, is attractive to ants and thus aids in the dispersal of the seeds (Swearingen 2021). The role of ants in distributing *L. acuminata* propagules was documented by Handel (1978), who observed that the insects rapidly removed all available seeds. Seeds that have elaiosomes are usually collected shortly after they fall from the fruits. Ants carry them back to their nests, where they consume the appendages without harming the seeds. The majority of ant-dispersed seeds wind up within a few meters of the parent plants. The seeds that are relocated by ants are protected from predation, and the nests are generally favorable sites for germination (Thompson 1981, Handel and Beattie 1990, Ness et al. 2004).

A study in Pennsylvania found that *Luzula acuminata* was absent from the seed bank despite having a moderate presence in vegetation (Hanlon et al. 1998), and seeds of several other *Luzula* species did not persist for long when they were maintained in dry storage (Deno 1996). No information was found regarding germination and seedling development in *L. acuminata*. Variable stratification requirements have been reported for other *Luzula* species (Bell and Amen 1970). Preliminary work by Deno (1996) suggested that light may be important for the

germination of wood-rush seeds. Some members of the genus are mycorrhizal but others are not (Wang and Qiu 2006). Leopold (2005) noted that *L. acuminata* can be propagated by seeds or via division.

Habitat

Luzula acuminata var. *acuminata* can utilize a wide variety of habitats. The species is a generalist in terms of light availability and it is highly shade tolerant (Lammers 1983, Leopold 2005, Zacharkevics 2006, Szakacs et al. 2022, Weakley et al. 2024). Although it is most often found in partial shade, a study by Good (1963) found that the plants reached their highest density in sites with moderately high light levels. *L. acuminata* var. *acuminata* usually grows within 500 meters of sea level (Swab 2020) but in South Dakota it was documented at elevations of 1,353–1,829 meters (Zacharkevics 2006). The sites utilized by Hairy Wood-rush are often moist or mesic and well-drained (Pusateri et al. 1993, Handel and Martin 1996, Leopold 2005, Zacharkevics 2006, Weakley et al. 2024) but the species may also occur in swampy woods and floodplains (Rhoads and Block 2007), seasonally inundated alvars (White 2016), or dry woodlands and prairies (Harms et al. 1980, Faber-Langendoen and Maycock 1987).

Typical habitat for *Luzula acuminata* var. *acuminata* in New Jersey is wooded slopes or ravines (NJNHP 2024). While it is most frequently located in comparable habitats throughout its range, the wood-rush has also been found in thickets, meadows, prairies, stream corridors, and shoreline fens (Fernald 1951, Thorne 1953, Hartley 1960, Harms et al. 1980, Lammers 1983, Faber-Langendoen and Maycock 1987, Pusateri et al. 1993, Handel and Martin 1996, Angelo and Boufford 2000, Munro et al. 2014, Swab 2020). The canopies in forested habitats where *L. acuminata* occurs may be deciduous or mixed. Dominant deciduous trees can include *Acer*, *Betula*, *Fagus*, *Populus*, or *Quercus* species while typical evergreens may be various types of *Picea*, *Pinus*, or *Tsuga* (Beatley 1956, Schmiel and Medve 1970, Zavitkovski 1976, Nesom and Treiber 1977, Harms et al. 1980, Carleton and Maycock 1981, Aldrich et al. 1985, Cholewa and Ownbey 1991, Brunton 1992, McKenna 2004, Anacker and Kirschbaum 2006, Zacharkevics 2006, Poindexter and Thompson 2009, Munro et al. 2014, Mittelhauser et al. 2019).

No reports were found of *L. acuminata* colonizing anthropogenic habitats, but the species does appear to have some tolerance for canopy disturbance in places where it is already established. A study of logging impacts in Ontario compared the vegetation of sites that were clear cut, lightly thinned, heavily thinned, or undisturbed. *L. acuminata* was present in nearly all of the stands and was particularly abundant in the partially cut and clear cut areas (Ramprasad 2001).

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). *Luzula acuminata* has more than one wetland indicator status within the state. In the Eastern Mountains and Piedmont region it is a facultative species, meaning that it occurs in both wetlands and nonwetlands. In the rest of the state it is a facultative upland species, meaning that

it usually occurs in nonwetlands but may occur in wetlands (U. S. Army Corps of Engineers 2022).

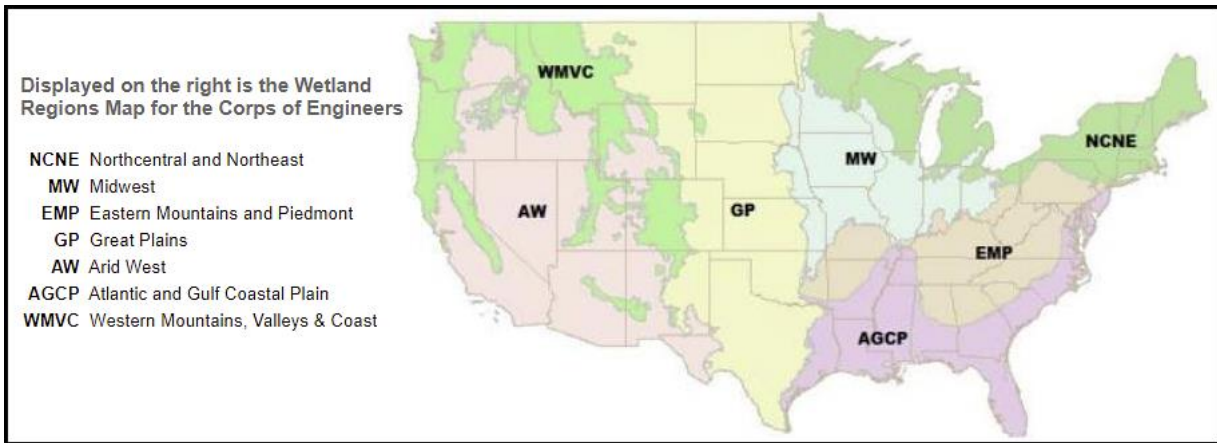


Figure 1. Mainland U. S. wetland regions, adapted from U. S. Army Corps of Engineers (2022).

USDA Plants Code (USDA, NRCS 2025)

The USDA code for *Luzula acuminata* var. *acuminata* is LUACA. The USDA NRCS identifies the plant as *Luzula acuminata* ssp. *acuminata*, for which the code is LUACA2.

Coefficient of Conservancy (Walz et al. 2020)

CoC = 8. Criteria for a value of 6 to 8: Native with a narrow range of ecological tolerances and typically associated with a stable community (Faber-Langendoen 2018).

Distribution and Range

The global range of *Luzula acuminata* var. *acuminata* is restricted to the central and eastern United States and Canada (POWO 2025). The map in Figure 2 depicts the extent of the variety in North America.

The USDA PLANTS Database (2025) shows records of *Luzula acuminata* var. *acuminata* in six New Jersey counties: Bergen, Gloucester, Hunterdon, Monmouth, Ocean, and Salem (Figure 3). The data include historic observations and do not reflect the current distribution of the species.

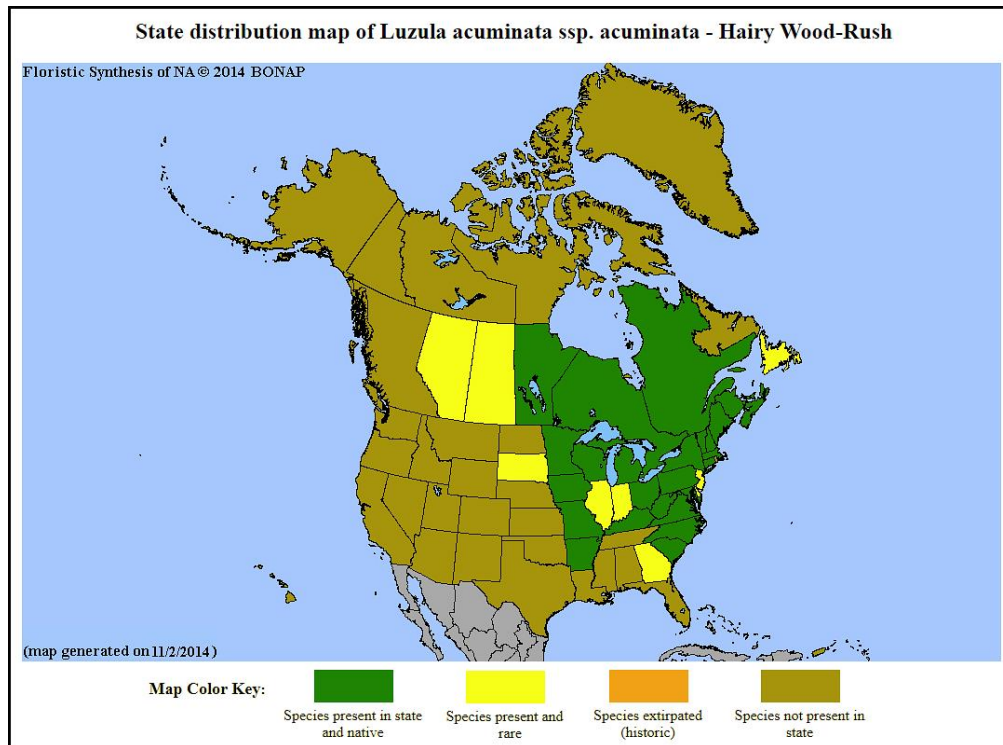


Figure 2. Distribution of *L. acuminata* var. *acuminata* in North America, adapted from BONAP (Kartesz 2015).

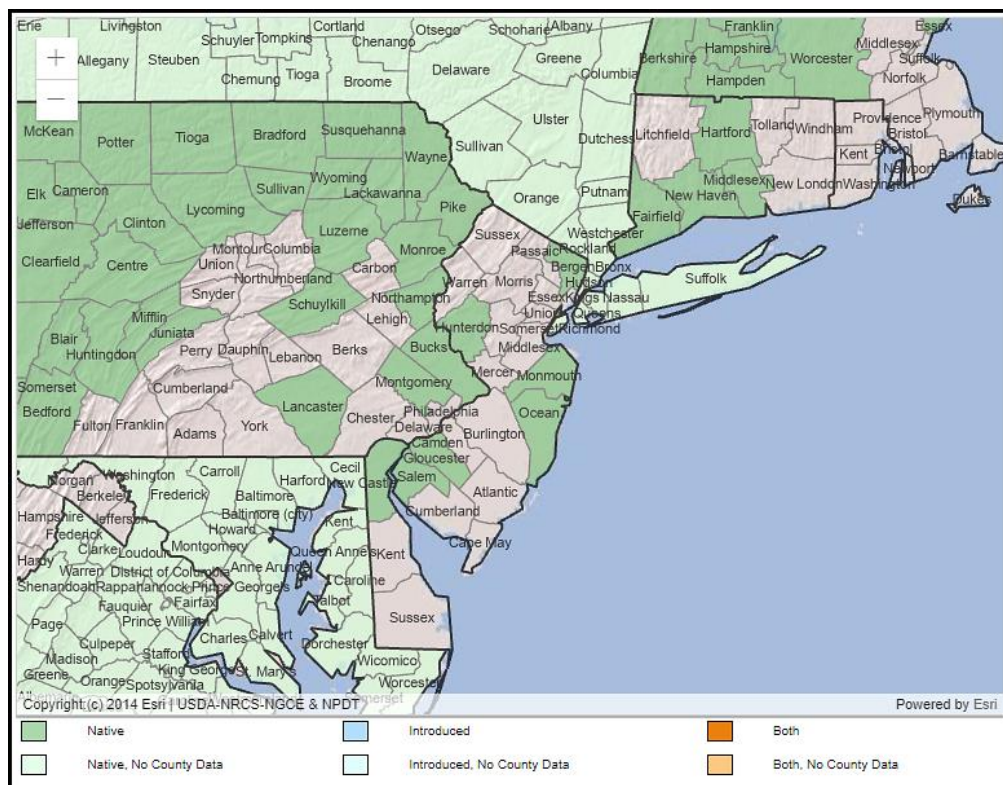


Figure 3. County records of *L. acuminata* var. *acuminata* in New Jersey and vicinity (USDA NRCS 2025).

Conservation Status

Luzula acuminata var. *acuminata* is considered globally secure. The G5T5 rank means the variety 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 2025). The map below (Figure 4) illustrates the conservation status of *L. acuminata* var. *acuminata* throughout its range. Hairy Wood-rush is vulnerable (moderate risk of extinction) in one province and critically imperiled (very high risk of extinction) in one province and three states. In most of the places where it occurs, *L. acuminata* var. *acuminata* is secure, apparently secure, or unranked. In some states where it is rare (e.g. Illinois, per Jones 1994, Molano-Flores et. al. 2019) its rank may not be displayed on the map if it was listed without specifying the variety.

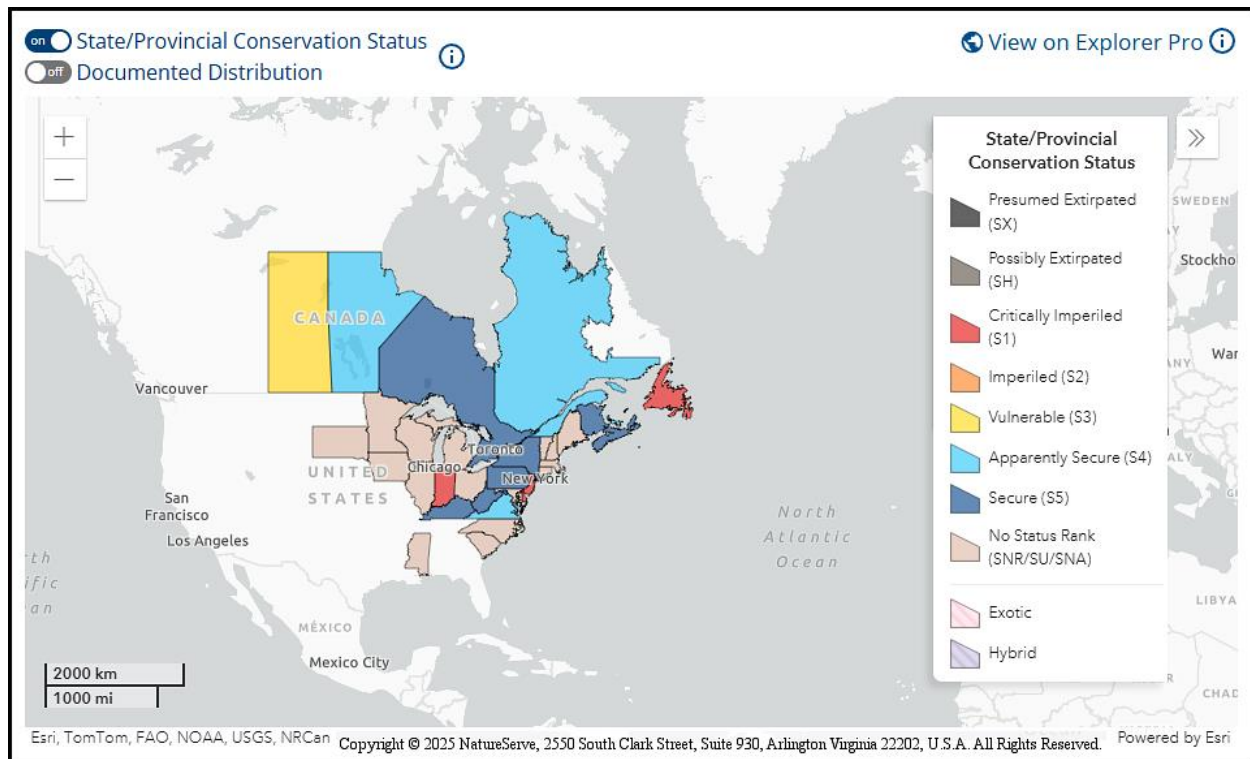


Figure 4. Conservation status of *L. acuminata* var. *acuminata* in North America (NatureServe 2025).

Luzula acuminata var. *acuminata* 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. *L. acuminata* var. *acuminata* 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 plants. Additional regional status codes assigned to *L. acuminata* var. *acuminata* signify that the wood-rush is eligible for protection under the jurisdictions of the Highlands Preservation Area (HL) and the New Jersey Pinelands (LP) (NJNHP 2010).

Luzula acuminata var. *acuminata* was documented in Bergen County during the early 1800s but by the end of the nineteenth century no other collections had been made in the state (Britton 1889, Taylor 1915). Some additional populations were discovered during the early 1900s. Hough (1983) noted that there were scattered records from around the state although they were more than 50 years old in all but three counties (Hunterdon, Monmouth, Salem). Around the end of the twentieth century, Breden et al. (2006) indicated that there were five extant occurrences in four counties. The same five populations are still listed as extant but at all of the sites the most recent observations of *L. acuminata* date back 30–40 years. Four other occurrences are ranked as historical or extirpated (NJNHP 2024).

Threats

The site of New Jersey's extirpated occurrence of *Luzula acuminata* var. *acuminata* was destroyed by development. No threat to extant populations in the state have been identified to date (NJNHP 2024). In addition to development, potential threats noted in other parts of the species' range included feral swine (*Sus scrofa*), invasive plants, or right-of-way maintenance (Rossell et al. 2016, Soteropoulos 2024).

Handel and Martin (1996) observed that *L. acuminata* was absent from forested areas that were heavily grazed by livestock and suggested grazing or soil compaction as possible explanations. An investigation by Host (1996) indicated that the species is relatively tolerant of soil compaction, although the study evaluated damage that was caused by logging equipment rather than trampling. The post-harvest surveys conducted by Ramprasad (2001) also indicated that logging activities were not a threat to *L. acuminata*; in fact, the species was more abundant at sites that had been cleared. The wood-rush may benefit from periodic exposure to higher light levels, perhaps by allocating more energy to reproductive efforts. Similar increases in *L. acuminata* abundance were documented following the experimental radiation of forested habitats that caused extensive die-off of woody plants (Zavitkovski and Salmonson 1975, Amiro and Sheppard 1994).

Research by Wang and Kembell (2006) examined the effects of fire severity on understory plants at some Manitoba sites where *Luzula acuminata* was present. They found that light burns which consumed the litter but not the underlying duff were most beneficial for graminoids in general, although the results for individual species were not reported.

Climate Change Vulnerability

Information from the references cited in this profile was used to evaluate the vulnerability of New Jersey's *Luzula acuminata* var. *acuminata* 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 climatic conditions in accordance with the guidelines described by Young et al. (2016) and the state climatic computations by Ring et al. (2013). Based on available data *L. acuminata* was assessed as Moderately Vulnerable, meaning that it is likely to show some decrease in abundance

or range extent in New Jersey by 2050. The conclusion was reached with some uncertainty due to a lack of information regarding the species' response to risk factors like disease or competition with invasive flora. A similar evaluation in Illinois concluded that the wood-rush was Highly Vulnerable in that state (Molano-Flores et al. 2019).

As the global climate changes, New Jersey is experiencing higher temperatures, more frequent floods, and longer droughts (Hill et al. 2020). The range of *Luzula acuminata* var. *acuminata* indicates that the species is capable of tolerating warmer conditions, and most of the sites where it occurs in the state have minimal exposure to inundation. The potential effects of extended droughts are unknown, although Jones (1994) suggested that a spring drought may have accounted for the absence of *L. acuminata* plants at an Illinois site where the species had previously been found.

As an ant-dispersed species, *Luzula acuminata* probably has a limited ability to colonize new sites if existing ones become unsuitable because its propagules are rarely moved over long distances. Hairy Wood-rush can apparently adjust the timing of flowering (and subsequent seed development) in response to local weather conditions (Clausen 1945) but it is not clear if its dispersers can do the same. As the climate continues to warm, synchrony between seed release and periods of high ant activity may be disrupted (Warren et al. 2017). Warmer temperatures might also facilitate the introduction of different ant species in the region, which could affect seed dispersal distances and frequency (Ness et al. 2004).

Management Summary and Recommendations

An updated statewide status assessment is recommended for *Luzula acuminata* var. *acuminata* in New Jersey. Recent searches of one site failed to turn up any plants, so monitoring of the remaining extant occurrences is needed to determine current population status and identify threats. Thorough searches were conducted for one of the historical New Jersey occurrences around 1990–1991 but the species was not found (Radis and Zappalorti 1991). However, there are two other historical locations where suitable habitat may still be present and searches of those sites could prove fruitful. *L. acuminata* var. *acuminata* is not a showy plant so there might be occurrences in the state that have been overlooked. It would also be worth searching for var. *carolinae* since it utilizes similar habitats and New Jersey falls within its range.

There are many areas where research could help to fill current gaps in our knowledge about *Luzula acuminata* var. *acuminata*. Suggestions include identification of the primary ant species involved in local seed dispersal, determination of the plant's germination and establishment requirements, and examination of mycorrhizal associations. Other potential topics for study are the impact of climatic conditions on the plant's life cycle, its responses to competition, or the pros and cons of burning as a habitat management tool.

Synonyms

The accepted botanical name of the species is *Luzula acuminata* Raf. var. *acuminata*. Orthographic variants, synonyms, and common names are listed below (ITIS 2025, POWO 2025, USDA NRCS 2025). Some debate regarding the proper name for the species arose because Rafinesque's original description of *Luzula acuminata* was somewhat vague (e.g. Fernald 1944, Jones 1951, Ebinger 1962). In order to rectify the situation a neotype was designated by Kirshner and Kaplan (2001). Kaplan (2001) proposed recognition of the other variety (*L. acuminata* var. *carolinae*) at the subspecies level, and a number of the sources used for this profile have done so. Weakley et al. (2024) retained *carolinae* as a variety but noted that it might be more appropriate to treat it as a species.

Botanical Synonyms

Common Names

Luzula acuminata Raf. ssp. *acuminata*
Luzula carolinae var. *saltuensis* (Fernald) Fernald
Luzula pilosa var. *americana* Schult. & Schult.
Luzula pilosa var. *saltuensis* (Fernald) B. Boivin
Luzula saltuensis Fernald
Juncoides pilosa var. *michiganensis* Farw.
Juncoides pilosa var. *saltuensis* (Fernald) Farw.
Juncoides saltuensis (Fernald) F. Heller

Hairy Wood-rush

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