Amelanchier nantucketensis

Nantucket Service-berry

Rosaceae

Amelanchier nantucketensis courtesy Plant Image Library, 2017

Amelanchier nantucketensis 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

Amelanchier nantucketensis (Nantucket Service-berry) is a deciduous clonal shrub in the rose family. Its rhizomatous growth can result in clumps of plants up to 10 meters wide with numerous stems that are spaced about 10–50 cm apart. The stems are usually under 2 meters in height and somewhat spindly, with purplish-brown to gray bark. The elliptic leaves are alternate or clustered near the ends of the branches and 29–41 mm long by 19–29 mm wide, with petioles that are 9–15 mm in length. Young stems often have larger leaves than older stems. The leaves are densely to moderately hairy on the undersides when first opening but later become smooth or only sparsely hairy, and the upper sides are somewhat glossy. The margins of mature leaves usually have 4–6 teeth per cm and the lateral veins become indistinct before reaching the teeth. Flowers appear before the leaves unfold, developing in clusters of 6–8. Each flower has 5 sepals that spread or recurve, five small white or ivory petals, 18–20 stamens, and 5 styles. (See Bicknell 1911, Fernald 1950, Dibble and Campbell 1995, Campbell et al. 2020, Weakley et al. 2022).

Amelanchier nantucketensis is best identified when flowering (Campbell et al. 2020). With an average petal length of 4.2 mm, the flowers are small in comparison to most other *Amelanchier* species (Dibble and Drummond 1997). Weatherby (1916) observed that many of the petals were inrolled and yellowish at the edges, and a closer examination revealed that the flowers were able to produce pollen on their petals (andropetalous). Not all of the petals bear pollen, but those that do replace typical petals and the flowers still develop normal anthers (Dibble and Drummond 1997). At least some of the flowers on any individual *A. nantucketensis* plant are likely to be andropetalous. Andropetaly has also been documented in *Amelanchier ovalis* but it is rare in that species (Dibble and Campbell 1995).

Flowers by Doug McGrady, 2022.

Fruits by Kelly Omand, 2015.

Amelanchier nantucketensis flowers early in the spring, usually between March and May, and the fruits develop during June and July (Campbell et al. 2020). New Jersey plants have been seen in full bloom near the end of April (NJNHP 2022). Bicknell (1911) observed that plants in Nantucket finished flowering near the end of May or occasionally early June and young fruits could be seen at the same time. The fruits are berry-like (pomes) and 7.5–10 mm in diameter (Campbell et al. 2020). When they begin to ripen the fruits turn red or purple but as they develop the color changes to a deep purple-blue, and in mid-July they can be seen in all stages of

maturity and color (Bicknell 1918). In fall the foliage turns bright red (Hird 2012). Much of the energy devoted to development of floral buds for the following year occurs before the leaves are shed, allowing the flowers to expand before the leaves when spring arrives (Savage 2019).

Amelanchier is a taxonomically difficult group because many species are polyploid, morphology can be variable, and hybridization is frequent (Campbell et al. 2020). *A. nantucketensis* is a tetraploid species (Robinson and Partanen 1980) and some taxonomists have viewed it as a hybrid (eg. Gleason and Cronquist 1991). It can also readily form new hybrids: Experimental crosses of *A. nantucketensis* with a number of other *Amelanchier* species resulted in successful seed set, although germination of the seeds formed by hybrid crosses was reported to be low (Robinson 1982). Field identification may be particularly complicated because *A. nantucketensis* often co-occurs with other members of the genus, sometimes growing so closely together that the branches intertwine (Dibble and Campbell 1995, Dibble et al. 1997).

Pollinator Dynamics

The primary pollinators of *Amelanchier nantucketensis* are generalist solitary bees. The flowers may also be visited by other bees, sawflies, bee flies, flower flies, moths, butterflies, and beetles but insects other than bees do not contribute significantly to pollination. Bees that have been documented on *A. nantucketensis* include 21 *Andrena* species, 8 *Dialictus* species, 2 *Halictus* species, 2 *Lasioglossum* species, *Augochlorella striata*, *Ceratina dupla*, *Evylaeus foxii*, *Osmia pumila*, a *Sphecodes* and some *Nomada* species. A subset of the pollinator group was more attracted to *A. nantucketensis* than to co-occurring *Amelanchier* species with normal petals, but andropetaly did not seem to be the draw as no bees were ever seen foraging on petal pollen. Instead, observers thought that the attractiveness of *A. nantucketensis* was due to its low stature and dense floral display with numerous stems and short distances between clusters of blooms. Nectar quantity, floral scent, and ultraviolet reflectance were not evaluated during the study (Dibble and Campbell 1995, Dibble and Drummond 1997, Dibble et. al. 1997).

Amelanchier nantucketensis is self-compatible and apomictic (able to produce offspring without fertilization). Its flowers are likely to be fertilized with closely related pollen due to the extensive clonal growth of the shrubs. Even when the flowers have received unrelated pollen the seeds may still be formed by apomixis. Pollen is required for the production of seeds but its presence can stimulate the formation of embryos and endosperm even if no fertilization has taken place. Consequently, the majority of seeds produced by *A. nantucketensis* are genetically identical to the maternal plants (Campbell and Wright 1996, Burgess et al. 2014, Campbell et al. 2020).

Seed Dispersal

Amelanchier fruits fall from the branches shortly after ripening (Stiles 1980) and some are likely to germinate close to the source plants (Dibble and Campbell 1995). Many are probably dispersed by animals. Stiles (1980) classified *Amelanchier* pomes as summer small-seeded fruits, which have a high sugar content and are attractive to both birds and mammals. Due to the

timing of fruit maturity, the birds involved are resident species and thus the seeds tend to be moved over relatively short distances. White-footed mice can also be important local dispersers of summer small-seeded fruits (Stiles 1980). Consumption by other mammals could result in greater dispersal distances, and *Amelanchier* fruits are known to be eaten by black bears, raccoons, coyotes, foxes, martens, and skunks (Willson 1993). Dibble and Campbell (1995) pointed out that *A. nantucketensis* fruits could be consumed along with those of other nearby *Amelanchier* species and then the seeds could subsequently be deposited, germinate, and grow together, adding to the confusion of botanists.

Amelanchier nantucketensis seeds that do not pass through an animal's digestive tract may require a period of stratification before they are able to germinate. Fern (2016) noted that *A. nantucketensis* can be very slow to germinate—often taking more than a year—and advised would-be propagators to leave the seeds outside during the fall and winter to encourage spring germination. Establishment of new plants from seed in natural settings does not appear to have been studied for the species. Although no reports of fungal associations were found for *A. nantucketensis*, Harley and Harley (1987) indicated that 90% of examined plants in the Rosaceae were mycorrhizal.

Habitat

Amelanchier nantucketensis was initially characterized as a coastal plain species and many early records of the shrub were from islands along the northeastern coast (Bicknell 1911, Ogden 1961, Bean et al. 1967, Coddington and Field 1978). Coastal habitats have been described as open, dry, sandy moors which include communities such as maritime grasslands, ericaceous heathlands, and pine-oak barrens (Bicknell 1911, Coddington and Field 1978, Angelo and Sorrie 1984, Lamont and Fitzgerald 2001, Young 2011, Leeson 2019). The habitat components often intermingle (Dunwiddie et al. 1996, Dunwiddie 1998). Within the communities the species may be found on low ground along the borders of swamps and ponds or up higher on sand hummocks and dunes (Bicknell 1911, Coddington and Field 1978, Leeson 2019). Not all of the coastal populations of *A. nantucketensis* occur on sandy substrates: On an island off the coast of Maine the shrubs grow on granite ledges (Greene et al. 2005, Cushman 2012).

Populations of *Amelanchier nantucketensis* have also been found beyond the coastal plain. Inland occurrences are known from western Massachusetts and also from a number of states located south of New York. Typical inland habitats include cliff ledges, rocky outcrops, and river scour terraces (Weakley et al. 2022). In New Jersey, the species was found growing in crevices on the crest of a vertical cliff (NJNHP 2022). Maryland and Virginia colonies were located along the Potomac River Gorge, where characteristic habitats include high rocky bluffs, river terraces, outcrop barrens and gravelly scour bars (Knapp et al. 2011, MDDNR 2023). Habitat for the South Carolina occurrence was described as an open expanse of granite (Frye 2012).

At the northern end of its range in Nova Scotia, *Amelanchier nantucket*ensis has been found in disturbed habitats like fields and roadsides as well as in more typical coastal plain communities (Munro et al. 2014, NSSAR 2023). Other altered sites where the species has been reported

include utility right-of-ways (Dibble and Campbell 1995, Young 2011) and ditches (Campbell et al. 2020). An open canopy is a common feature of nearly all *A. nantucketensis* habitats: The species can occasionally occur in mid-successional forests but even then it is always within about 10 meters of an opening (Dibble and Campbell 1995). Throughout its range, *A. nantucketensis* is usually found at elevations of 0–400 meters above sea level (Campbell et al. 2020) although the occurrences in New Jersey and South Carolina may be higher.

Wetland Indicator Status

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

USDA Plants Code (USDA, NRCS 2023)

AMNA2

Coefficient of Conservatism (Walz et al. 2018)

CoC = 7. 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 extent of *Amelanchier nantucketensis* is restricted to the eastern United States and southeastern Canada (POWO 2023). The map in Figure 1 shows the worldwide extent of the species. For a time, *A. nantucketensis* was thought to be endemic to Massachusetts (Field and Coddington 1980); although there had been a few reports of the species as far south as New Jersey during the early 1900s they were apparently unconfirmed. By the mid-1990s the known range of *A. nantucketensis* had expanded northward to Nova Scotia and southward to Maryland (Dibble and Campbell 1995), and only about a decade ago the southern end of its range was extended to South Carolina (Frye 2012). It is not clear whether the seeming increase in distribution is due to an actual range expansion or to improved understanding of the genus and better recognition of the species.

The USDA PLANTS Database (2023) shows records of *Amelanchier nantucketensis* in two New Jersey counties: Monmouth and Union (Figure 2). Nantucket Service-berry has also been found in Passaic County (NJNHP 2022). The data include historic observations and do not reflect the species' current distribution.

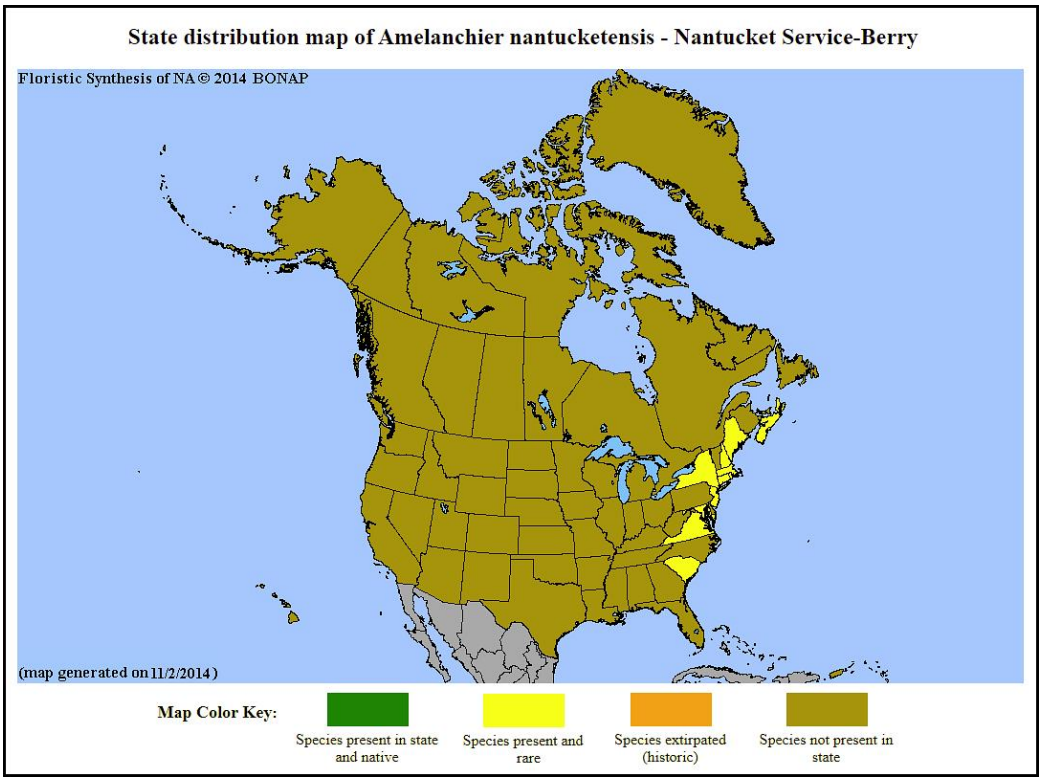

Figure 1. Distribution of A. nantucketensis in North America, adapted from BONAP (Kartesz 2015).

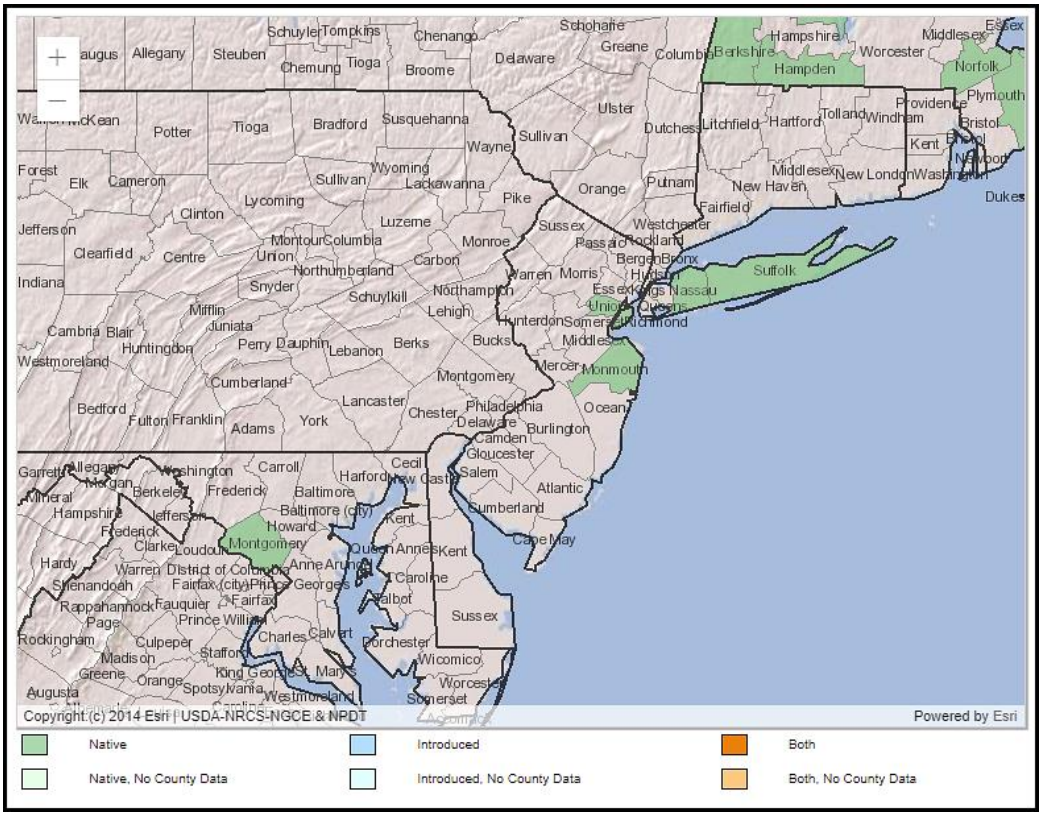

Figure 2. County records of A. nantucketensis in New Jersey and vicinity (USDA NRCS 2023).

Conservation Status

Amelanchier nantucketensis is globally vulnerable. The G3Q rank means the species has a moderate risk of extinction or collapse due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors. The Q qualifier indicates some uncertainty regarding the species' taxonomic status; in this case largely because the taxon is "suspected to be a functioning apomictic species or stabilized hybrid" (NatureServe 2023). The map below (Figure 3) illustrates the conservation status of *A. nantucketensis* throughout its range. Nantucket Service-berry is vulnerable (moderate risk of extinction) in one state, imperiled (high risk of extinction) in one state, and critically imperiled (very high risk of extinction) in four states and one province. *A. nantucketensis* is unranked in Connecticut, and no status is shown for South Carolina where the species was recently documented (Frye 2012).

In North America, *Amelanchier nantucketensis* has also been identified as a plant species of highest conservation priority for the North Atlantic region, which includes four Canadian provinces and twelve U. S. states. The species has a regional rank of R3 (vulnerable), signifying a moderate risk of extinction (Frances 2017). *Amelanchier nantucketensis* has not been listed at the federal level (USFWS 2023). At the time of the last review the status of the species was reported as stable and it was placed in Category 2, indicating that listing might be appropriate but insufficient data were available to make a determination (USFWS 1993). Catling and Porebski (1998) suggested that *A. nantucketensis* should be prioritized for protection in Canada due to its rarity and the potential economic value of its edible fruit. Although not listed at the national level the species is classified as imperiled in Nova Scotia (Munro et al. 2014), the only province in which it has been documented.

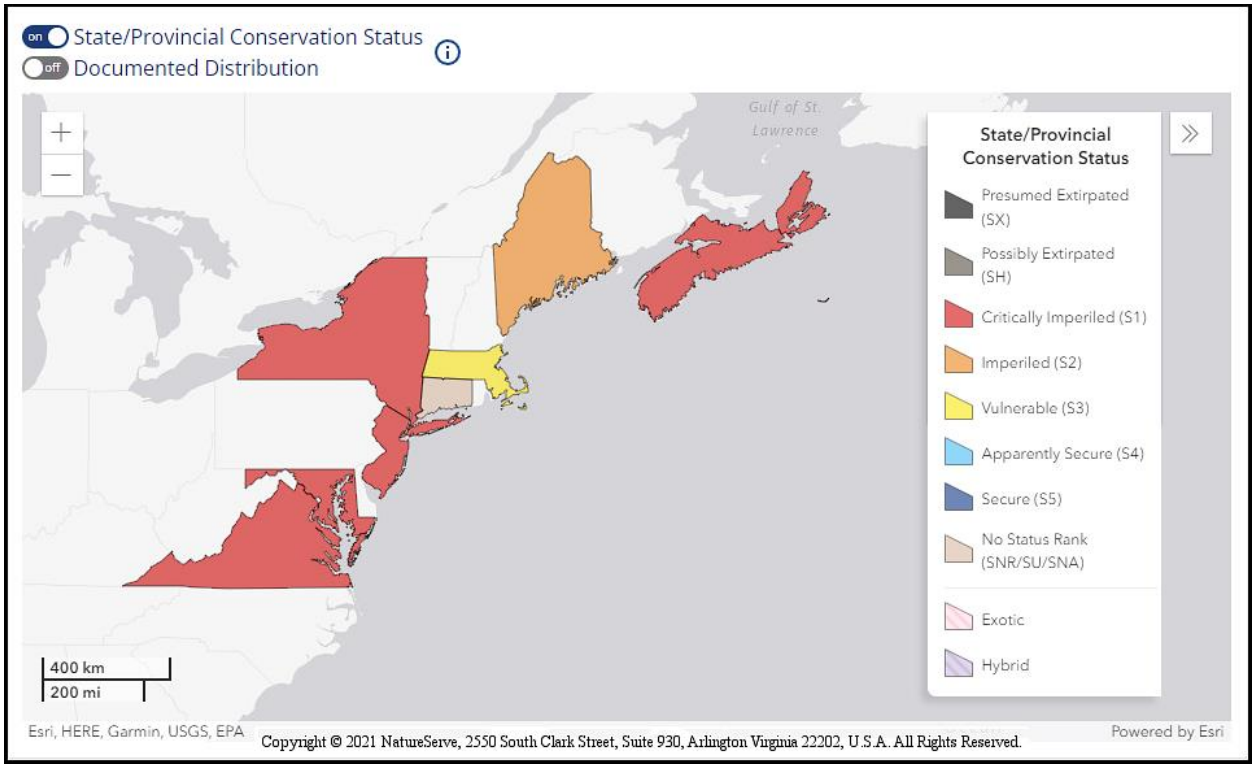

Figure 3. Conservation status of A. nantucketensis in North America (NatureServe 2023).

Amelanchier nantucketensis 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. nantucketensis* has also been assigned a regional status code of HL, signifying that the species is eligible for protection under the jurisdiction of the Highlands Preservation Area (NJNHP 2010).

It is difficult to ascertain the history of *Amelanchier nantucketensis* in New Jersey. Some early observers may have identified the species as a form of *A. canadensis*, *A. oblongifolia*, or *A. stolonifera* because the shadbushes were so frequently rearranged by taxonomists. Wiegand (1912) remarked that "*If it is difficult to determine what are species and what are not species in the genus Amelanchier, it is no less difficult to determine what names should be applied to the species recognized*." Britton and Brown (1913) indicated that *Amelanchier nantucketensis* reached the southern end of its range in New Jersey. Taylor (1915) said *A. nantucketensis* occurred "from Middlesex county southward" in New Jersey but did not name any specific locations. Hough (1983) included the species with *A. canadensis* so it is not clear which of the counties on her map represented records of *A. nantucketensis*. NYMF (2013) showed a pre-1990 record for Monmouth County and a post-1990 record near the border of Middlesex and Union counties but Mid-Atlantic Herbaria (2023) did not list any specimens of *A. nantucketensis* originating in the state. The only confirmed population of *Amelanchier nantucketensis* in New Jersey was discovered in 2015: It is located in Passaic County and consists of several colonies (NJNHP 2022).

Threats

New Jersey's population of *Amelanchier nantucketensis* is situated in protected habitat and no threats to the occurrence have been reported (NJNHP 2022). However, a number of concerns have been identified in other parts of the shrub's range. Like many plant species that grow in upland locations, Nantucket Service-berry is susceptible to development. Construction was cited as the cause of extirpation at some sites in Maine and as a threat to one New York population (Roth et al. 2009, Young 2011). Young also noted that some New York populations were located on railroad and powerline right-of-ways where the plants were occasionally damaged by maintenance activities. Many populations of *A. nantucketensis* are small or isolated and therefore highly susceptible to extinction if habitat is destroyed (Dibble and Campbell 1995).

Some *Amelanchier nantucketensis* habitats could be lost through natural processes like community succession. Crowding by other plant species may be harmful (Hird 2012), and *A. nantucketensis* can be overshaded by taller woody vegetation (Roth et al. 2009). Nantucket Service-berry produces more stems, flowers and fruits in open, sunny sites (Dibble and Campbell 1995) and the availability of pollinators is likely to decrease as succession advances (Dibble et al. 1997). Consequently, the species benefits from periodic disturbances and in some communities fire suppression could become a threat (Roth et al. 2009).

Dibble and Campbell (1995) reported damage to *Amelanchier nantucketensis* plants by insects and pathogenic fungi. They noted that ants were abundant on the flowers and fruits, consuming styles, stamens, petals, sepals, and carpels. Some weevils mated and laid eggs on the flowers and their larvae ate the developing *Amelanchier* embryos. Weevil-inflicted wounds also allowed the plants to become infected by a rust fungus (*Gymnosporangium* sp.) that disfigured the fruits, causing birds to avoid them. However, the fruits still produced viable seeds that could germinate locally in favorable microsites.

Available information suggests that *Amelanchier nantucketensis* is not especially vulnerable to climate change in New Jersey. The greatest threat is likely to result from droughts, which are becoming more frequent and prolonged in the state as global precipitation patterns shift (Hill et al. 2020). *A. nantucketensis* grows best when moisture is readily available (Dibble and Campbell 1995, Hird 2012) and extended dry periods during late summer or early fall could hamper the development of floral buds for the next season (Savage 2019). Genetic diversity in *A. nantucketensis* is limited by clonal reproduction and apomixis, which could make the species less resilient as climactic conditions continue to change. However, Nantucket Service-berry has already demonstrated a moderate ability to adapt to different habitats, which may help to compensate for limitations in genetic variability.

Management Summary and Recommendations

Amelanchier nantucketensis is known from a relatively small number of locations outside of its apparent core area in New England. Established populations should be protected in all districts where the species is vulnerable or imperiled. The development of site-specific maintenance plans is recommended for occurrences in right-of-way habitats that could be damaged by mowing or herbicides.

Although no management needs have been identified for New Jersey's Nantucket Service-berry population, ongoing monitoring is advisable in order to keep track of potential habitat loss resulting from succession. Dibble and Campbell (1995) suggested that the status of woody vegetative cover be re-evaluated at intervals of 2–5 years. Cutting, grazing, and fire have been proposed as tools for controlling succession to benefit *Amelanchier nantucketensis* (Dibble and Campbell 1995, Roth et al. 2009). In the past, fire probably maintained some of the open communities utilized by *A. nantucketensis*. Coddington and Field (1978) described the species' habitat as fire barrens, and Dibble et al. (1997) reported that *A. nantucketensis* reproduced vigorously by clonal growth following occasional small fires during the dormant season. Other sources have cited positive effects of fire on flora in coastal communities where *A. nantucketensis* occurred, although the responses of individual shrub species were not reported (Dudley and Lajtha 1993, Dunwiddie 1998). Before fire is applied as a management tool it would be helpful to have more specific information regarding the most advantageous burn frequency, intensity, and timing for *A. nantucketensis.*

There are a number of additional areas where further research could promote improved understanding and conservation planning for *Amelanchier nantucketensis*. Despite the fact that its inherent diversity is known to be constrained by the rarity of sexual reproduction, range-wide

genetic variation has not been a focus of study for the species. The question is of particular interest because it may shed light on how *A. nantucketensis* has dispersed to such widely separated locations and disparate habitats, and thus on how the species may respond to shifting climactic conditions. Little is known regarding what *A. nantucketensis* plants require in order to establish from seed, especially in natural settings. The extent of competition with native or exotic plant species for resources other than light is poorly understood, and the potential benefits of andropetaly have not been identified. Initial attempts to preserve *A. nantucketensis* seeds at the Center for Plant Conservation were discontinued after failed viability tests (Hird 2012), but the global rarity of the species warrants further investment in the conservation of its propagules.

Synonyms

The accepted botanical name of the species is *Amelanchier nantucketensis* E. P. Bicknell. Orthographic variants, synonyms, and common names are listed below (ITIS 2021, POWO 2023, USDA NRCS 2023).

Botanical Synonyms	**Common Names**
Amelanchier botryapium var. *micropetala* (B. L. Rob.) Farw.	Nantucket Service-berry
Amelanchier canadensis var. *micropetala* (B. L. Rob.) Rehder	Nantucket Shadbush
Amelanchier micropetala (B. L. Rob.) Ashe	Nantucket Juneberry
Amelanchier micropetala var. *potomacensis* Ashe	
Amelanchier oblongifolia var. *micropetala* B. L. Rob.	
Amelanchier stolonifera f. *micropetala* (B. L. Rob.) Rehder	

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