Ellisia nyctelea

Aunt Lucy

Hydrophyllaceae

Ellisia nyctelea by J. S. Dodds, 2022

***Ellisia nyctelea* 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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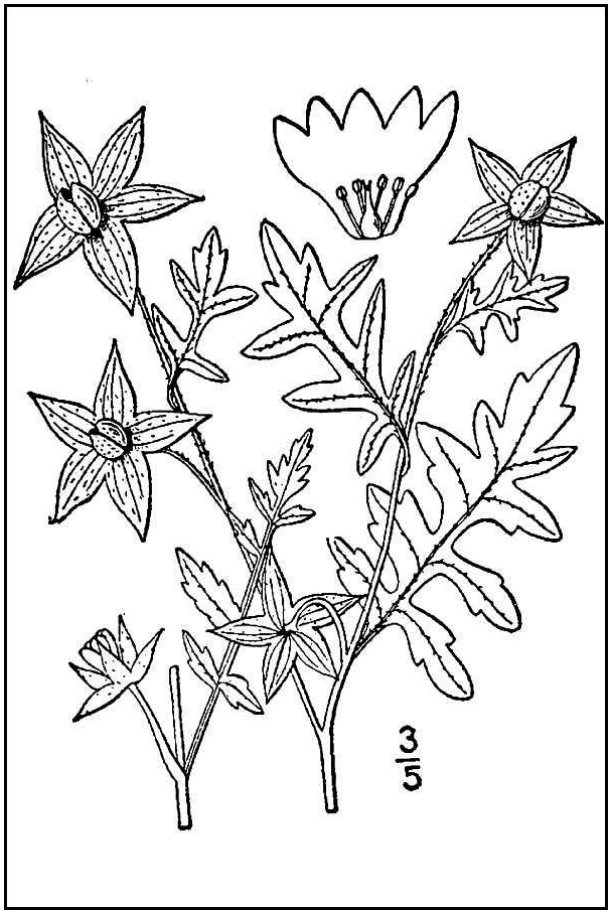
Life History

Ellisia is monotypic genus in the waterleaf family (Constance 1939, 1940). *Ellisia nyctelea* (Aunt Lucy) is a low and somewhat sprawling taprooted annual plant. The stems are usually less than 40 cm in height and are often branching and somewhat hairy. *E. nyctelea* leaves are pinnately divided into 3–6 pairs of narrow, few-toothed lobes and are opposite on the lower portion of the stem but alternate above. Flowers are borne singly at the ends of solitary peduncles that arise opposite the upper leaves or near the tip of the stem. The whitish flowers are fused at the base and end in five flaring lobes which are sometimes decorated with tiny purple spots. As a flower develops the pedicel lengthens and the five-parted calyx expands until it is nearly flat, appearing like a large, star-shaped bract beneath the flower and fruit. (See Britton and Brown 1913, Fernald 1950, Gleason and Cronquist 1991, Hilty 2020, Minnesota Wildflowers undated). Georgia (1919) said that the entire plant had a rank, disagreeable odor.



Britton and Brown 1913, courtesy USDA NRCS 2022a.

Flower with leaves, J. S. Dodds 2022

Developing fruit, J. S. Dodds 2022

In New Jersey, *Ellisia nyctelea* blossoms during May (NJNHP 2022). The flowers open during the daytime with only a few in bloom simultaneously and the corollas are quickly shed as the capsules develop (Hilty 2020). *E. nyctelea* has a short growing season—50 days was reported in Wisconsin, where the plants emerged in early May and had no aboveground vegetative organs remaining by early July (Struik 1965). The brief lifespan of the plants is focused on sexual

reproduction. Struik (1965) found that *E. nyctelea* puts very little energy into root development following the initial spring growth, and a minimal investment in cell wall support is the reason why larger plants are likely to sprawl. *E. nyctelea* plants have been observed growing in a dry railroad track where they generated miniature leaves but had full-sized flowers (Minnesota Wildflowers undated). Once Aunt Lucy plants begin flowering, seed production is continuous until senescence (Struik 1965).

Even in flower the small and inconspicuous plants of *Ellisia nyctelea* may be easily overlooked, and Hilty (2020) observed that the species is often omitted from wildflower guides. When *E. nyctelea* has been noticed, observers have responded with varying levels of appreciation. While recognizing a number of students from at the Philadelphia High School for Girls for their contributions to local botany, Long (1922) highlighted the efforts one young woman who had discovered a new occurrence of *E. nyctelea*, citing it as exceedingly rare plant in the area. At the other end of the spectrum, Georgia (1919) identified *E. nyctelea* as a troublesome agricultural pest that usurped resources needed by crops and Furrer (1968) categorized the species as a lawn weed.

Pollinator Dynamics

The flowers of *Ellisia nyctelea* are pollinated by an assortment of insects. Nectaries at the base of the ovaries attract bees and beeflies, while some other flies visit the flowers primarily to consume pollen but then also aid in its dispersal (Robertson 1893, Tooker et al. 2006, Woodcock et al. 2014, Hilty 2020). Bees reported as likely pollinators include species in the Apidae (*Bombus*, *Ceratina*, *Osmia*, *Nomada*) and Andrenidae (*Andrena*, *Augochlora*, *Halictus*) (Robertson 1893, Colla and Dumesh 2010, Hilty 2020). Robertson noted that Halictid bees were particularly abundant on *Ellisia*. Flies include members of the Bombylidae (*Bombylius*) and Tachinidae (*Siphona*) along with numerous species in the Syrphidae (*Pipiza*, *Mesogramma*, *Mesograpta*, *Rhingia*, *Toxomerous*) (Robertson 1893, Tooker et al. 2006, Woodcock et al. 2014). According to Tooker et al. (2006), *Toxomerous marginatus* is a widespread species and can be an important pollinator.

Despite reporting a broad assortment of insect visitors, Robertson (1893) inferred self-pollination in *Ellisia nyctelea* from the relative position of the anthers and stigma, suggesting that self-fertilization might help to offset the disadvantage of having inconspicuous flowers that could be overlooked by potential pollinators. Cruden (1977) reported that *E. nyctelea* is a facultative outcrosser. Plants which he placed in that category have some adaptations to favor cross-pollination but are also fully capable of self-fertilization. The dual strategy is often employed by species that occupy ephemeral habitats or utilize unreliable pollinators.

Seed Dispersal

The fruits of *Ellisia nyctelea* are dehiscent, four-seeded capsules (Vasile et al. 2021). The round, dark brown seeds measure 2–3 mm in diameter, and Chuang and Constance (1992) found that close examination of the surfaces revealed a honeycomb-like pattern of hexagonal and

pentagonal pits. Self-dispersal (e.g. gravity) is typical for many species in the Hydrophyllaceae (Gamboa-deBuen and Orozco-Segovia 2008) and Aunt Lucy seeds have no evident modifications to facilitate transport by any particular means. The seeds of plants in floodplains can sometimes be relocated by water. Haddock (2021) reported that *E. nyctelea* seeds are eaten by ground-foraging birds and small animals, which might also result in some longer-distance dispersal.

Most species in the Hydrophyllaceae exhibit physiological dormancy which is broken by environmental cues (Gamboa-deBuen and Orozco-Segovia 2008). For a summer annual plant like *E. nyctelea*, that means the seeds probably require low winter temperatures to ripen and are triggered to germinate when temperatures rise in the spring (Baskin and Baskin 1988). No information was found regarding the length of time that Aunt Lucy seeds can persist in the soil. Two closely related species that are winter annuals (*Nemophila aphylla* and *Phacelia ranunculacea*) are known to form persistent seed banks (Baskin et al. 1993).

Habitat

It is of the easiest culture, as nothing more is necessary than to strew the seeds on the ground in any tolerably moist and shady situation and the plants will need no further care. ~Louden, 1840.

Although *Ellisia nyctelea* occurs in a wide variety of habitats, Louden's assessment seems a fair summary as many of the sites where it has been found were described as being somewhat moist or shady. Natural communities reported include alluvial woodlands, mesic and bottomland forests, drainage channels, river and stream banks, grasslands, meadows, open prairie and plains, thickets, and talus (Georgia 1919, Gamboa-deBuen and Orozco-Segovia 2008, Rhoads and Block 2007, Weakley 2015, Haddock 2021, MTNHP 2022). In Iowa, *E. nyctelea* was found in forest gaps that had been colonized by vegetation similar to that of the local prairies (Shimek 1910). Aunt Lucy is often associated with disturbed sites, and the species has been reported from agricultural fields, gardens and nurseries, shaded areas along building edges, roadsides, and waste places (Georgia 1919, Constance 1940, Cavalieri et al. 2013, Hilty 2020, Haddock 2021, MTNHP 2022). Mohlenbrock (1974) observed that *E. nyctelea* was abundant and weedy in the metropolitan area around St. Louis. Even in natural settings, *Ellisia nyctelea* usually requires some type of disturbance in order to establish. The plants have been found on patches of bare soil exposed by animal activity, water scour, or windthrows (Struik and Curtis 1962, Struik 1965) and in places where other vegetation is scant due to heavy shade (Hilty 2020). Most New Jersey populations are associated with river shorelines and one is situated along the edge of a trail (NJNHP 2022).

Despite the numerous habitats in which *Ellisia nyctelea* may be seen throughout its range, some broad regional differences have been observed. Wilson (1960) observed that it was most often associated with rich woods and stream banks in the east and with prairies and plains in the west. It is also more likely to be weedy in the west and uncommon in the east. Struik (1965) suggested that the species' regional discrepancy in habitat preferences could signify either broad environmental tolerances or distinct ecotypes.

Wetland Indicator Status

The U. S. Army Corps of Engineers (2020) 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). *Ellisia nyctelea* has more than one wetland indicator status within the state. In the Eastern Mountains and Piedmont region, *E. nyctelea* is shown as a facultative upland species, meaning that it usually occurs in nonwetlands but may occur in wetlands. In other regions of the state it is listed as a facultative species, meaning that it occurs in both wetlands and nonwetlands (U. S. Army Corps of Engineers 2020).

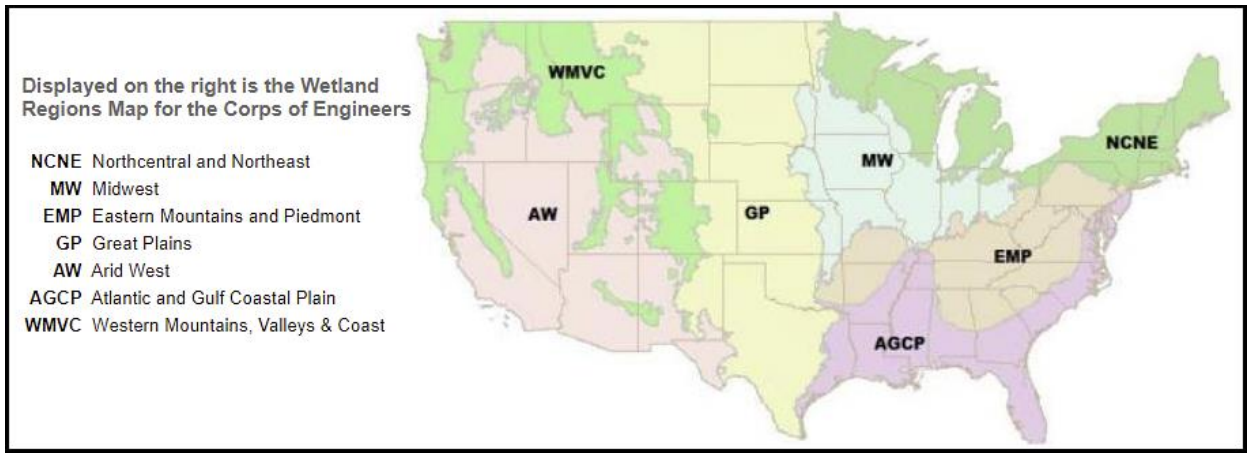


Figure 1. Mainland U. S. wetland regions, adapted from U. S. Army Corps of Engineers (2020).

USDA Plants Code (USDA, NRCS 2022b)

ELNY

Coefficient of Conservatism (Walz et al. 2018)

CoC = 5. Criteria for a value of 3 to 5: Native with an intermediate range of ecological tolerances and may typify a stable native community, but may also persist under some anthropogenic disturbance (Faber-Langendoen 2018).

Distribution and Range

The global range of *Ellisia nyctelea* is limited to North America (POWO 2022). The map in Figure 2 depicts the extent of the species in the United States and Canada.

The USDA PLANTS Database (2022b) shows records of *Ellisia nyctelea* in three New Jersey counties: Hunterdon, Mercer, and Somerset (Figure 3). The data include historic observations and do not reflect the current distribution of the species. An additional location was recently documented in Sussex County (NJNHP 2022).

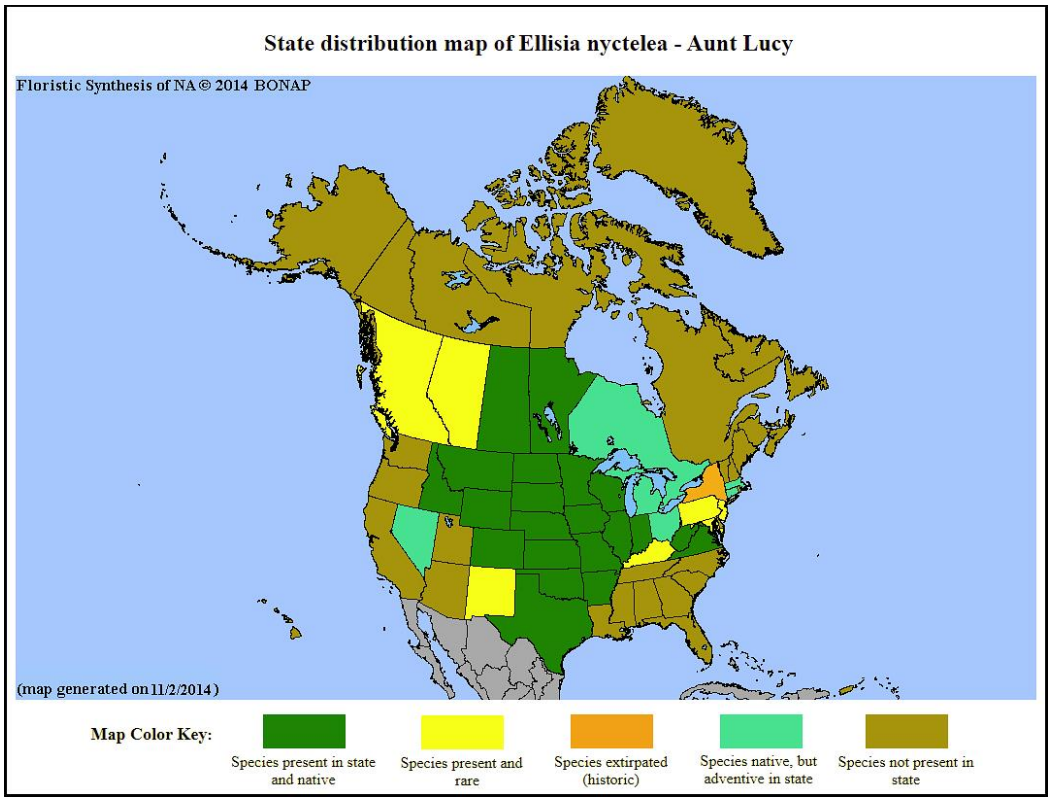


Figure 2. Distribution of E. nyctelea in North America, adapted from BONAP (Kartesz 2015).

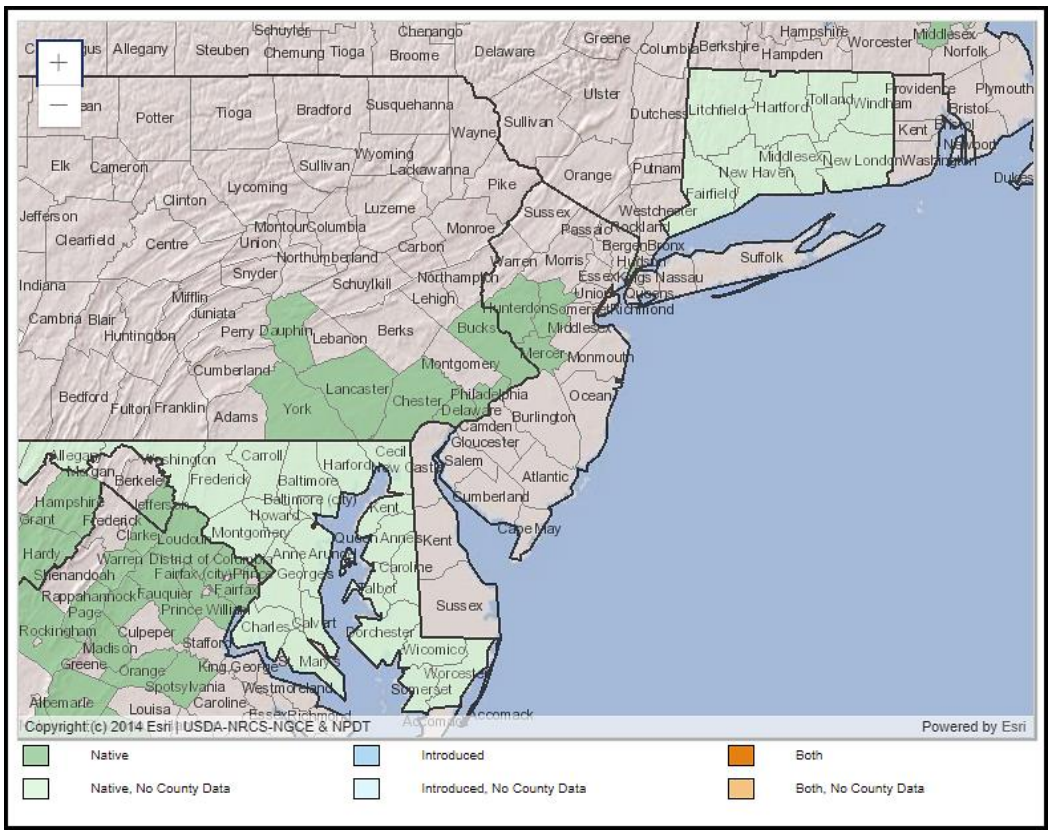


Figure 3. County records of E. nyctelea in New Jersey and vicinity (USDA NRCS 2022b).

Conservation Status

Ellisia nyctelea is listed as 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 2022). The map below (Figure 4) illustrates the conservation status of *E. nyctelea* throughout its range. Aunt Lucy is critically imperiled (very high risk of extinction) in two states, imperiled (high risk of extinction) in two states, and vulnerable (moderate risk of extinction) in one state and two provinces. *E. nyctelea* is unranked or apparently secure throughout much of the United States and the plant is considered exotic in Ontario, Michigan, and Kentucky. Although it is unranked in Massachusetts, Rich (1902) first reported the species as a pernicious western weed that had probably been introduced in impure grass seed and was unlikely to persist in the area and Sorrie (2005)—finding no additional records—classified it as a waif in that state.

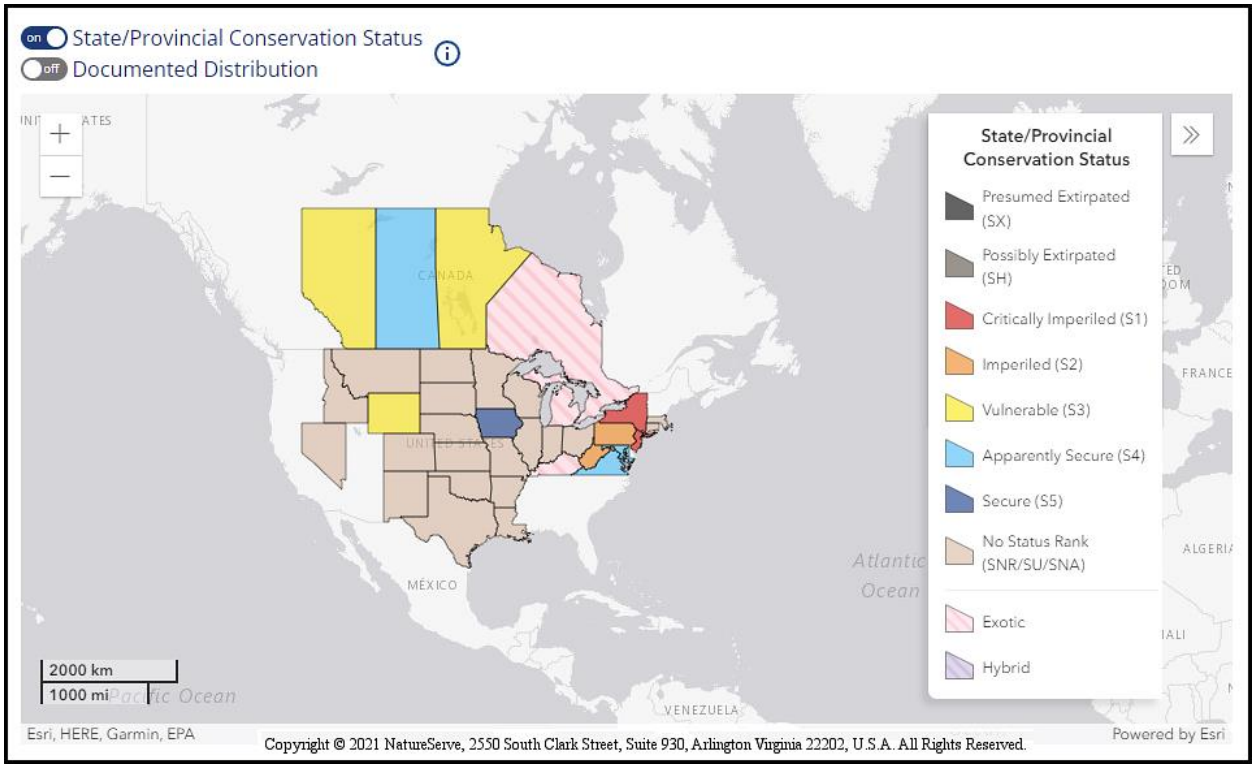


Figure 4. Conservation status of E. nyctelea in North America (NatureServe 2022).

New Jersey is one of the two states where *Ellisia nyctelea* 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. *E. nyctelea* 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 Aunt Lucy 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).

Britton (1889) cited records of *Ellisia nyctelea* from three sites in Mercer County and one in Hunterdon and Taylor (1915) noted that the species was very rare in those two counties and unknown elsewhere. At the end of the twentieth century, the plant was reported to be extant at one site in each of those counties (Breden et al. 2006). *E. nyctelea* is presently known from four locations in that two-county area, including one where records date back to 1837, and also from a site in Sussex County that was recently discovered by David Snyder (NJNHP 2022).

Threats

Invasive plants are reported as a menace to every extant occurrence of *Ellisia nyctelea* in New Jersey (NJNHP 2022). Cited threats include *Alliaria petiolata*, *Anthriscus sylvestris*, *Cardamine impatiens*, *Celastrus orbiculata*, *Glechoma hederacea*, *Lonicera japonica*, *Microstegium vimineum*, *Persicaria perfoliata*, *Polygonum cuspidatum*, *Ranunculus ficaria*, *Rosa multiflora*, and *Rubus phoenicolasius*. Species that are abundant in the herb layer during the spring when *E. nyctelea* requires open space for germination and establishment are particularly problematic. Loss of habitat to invasive plants has also been reported in Pennsylvania (PANHP 2019).

Habitat reduction resulting from dam construction, increased erosion, forest clearing, and development has also been cited as a threat to Pennsylvania occurrences, and potential damage to plants from foot traffic was reported at two New Jersey sites (PANHP 2019, NJNHP 2022). Herbivory has not been identified as a threat to *Ellisia nyctelea*. Herbivores may be deterred by the disagreeable odor (Hilty 2020), or the species' small stature and short growing season may cause it to be overlooked.

Changing climactic conditions may result in both advantages and disadvantages for *Ellisia nyctelea*, and the net outcome is difficult to predict. In addition to warmer temperatures, New Jersey is experiencing an overall increase in precipitation along with more frequent heavy rainstorms and more intense floods (USEPA 2016). A recent record of *E. nyctelea* in Manitoba's agricultural fields was attributed to an increase in wet weather (Cavalieri et al. 2013), so it is possible that moister conditions will allow the species to proliferate in new areas. Flooding can benefit *E. nyctelea* when scouring and debris removal creates gaps that the species is able to colonize, but it may also eliminate small occurrences by depositing piles of debris on sites where the plants have been growing. Intense flooding can also threaten occurrences that are situated along rivers and streams by washing away the shallowly-rooted plants or their ungerminated seeds.

Management Summary and Recommendations

In places where *Ellisia nyctelea* is imperiled, the remaining populations should be monitored on a regular basis so that action can be taken when needed to sustain the species' presence at a particular location. In New Jersey, while the eradication of numerous well-established invasive plants is unrealistic, the threat could be reduced at some sites by selectively removing the most damaging species in the immediate vicinity of small *E. nyctelea* colonies and thus maintaining gaps in which the rare plants can regenerate.

Very little research has been focused directly on *Ellisia nyctelea*, although the species has been included in studies of broader floral associations. Gamboa-deBuen and Orozco-Segovia (2008) noted that several species in the Hydrophyllaceae have unusual mechanisms for dormancy-breaking and germination and, if studied, additional members of the family could prove to be equally interesting. Knowing how long *E. nyctelea* is able to persist in the seed bank would help to predict the species' drought tolerance or the likelihood of its reappearance at a former site. It would also be particularly useful to understand why *E. nyctelea* is so rare in some parts of its range while it is considered weedy in others. A species that establishes readily and can thrive in developed areas should feel right at home in New Jersey. Perhaps the spread of *E. nyctelea* in the northeast has been curtailed by limited dispersal: That is one more subject area in need of investigation.

Synonyms

The accepted botanical name of the species is *Ellisia nyctelea* (L.) L. Orthographic variants, synonyms, and common names are listed below (ITIS 2021, USDA NRCS 2022b, POWO 2022). A quest to discover how the plant came to be known as 'Aunt Lucy' turned up only the unsatisfying explanation that it sounds like *Ellisia* if said rather carelessly (Mohlenbrock 1974).

Botanical Synonyms	**Common Names**
Ellisia nyctelea var. *coloradensis* Brand	Aunt Lucy
Ellisia ambigua Nutt.	Waterpod
Macrocalyx nyctelea (L.) Kuntze	False Babyblueeyes
Nyctelea ambigua (Nutt.) Standl.	Waterweed
Nyctelea americana Moldenke	Cut-leaved Ellisia
Nyctelea nyctelea (L.) Britton	Field Nyctelea
Polemonium nyctelea (L.) L.	

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