Eupatorium sessilifolium var. *brittonianum*

Britton's Upland Boneset

Asteraceae

Eupatorium sessilifolium var. *brittonianum* by Mark Kluge, 2020

***Eupatorium sessilifolium* var. *brittonianum* Rare Plant Profile**

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

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Life History

Eupatorium sessilifolium var. *brittonianum* (Britton's Upland Boneset) is a perennial herb in the Asteraceae. Whitaker (1923) observed that the roots of *Eupatorium sessilifolium* were particularly woody and surprisingly lacking in hairs. The main stem of *E. sessilifolium* is slender, smooth, and 0.5–2.0 meters in height. The bright green leaves are toothed on the margin, stalkless, rounded at the base, and mainly opposite, although they occasionally become alternate toward the top of the stem. Dense clusters of flower heads develop on paired branches that form a somewhat flat-topped inflorescence. Members of the aster family usually have composite flower heads that include both ray and disc florets, but *Eupatorium* heads are composed entirely of bisexual disc florets. The overlapping bracts (phyllaries) at the base of *E. sessilifolium* heads are blunt or rounded at the tips, and each head contains five white florets that are 3–3.5 mm long. (See Britton and Brown 1913, Fernald 1950, Montgomery and Fairbrothers 1970, Gleason and Cronquist 1991, Siripun and Schilling 2020).

Left*: Eupatorium sessilifolium* illustration from Britton and Brown 1913, courtesy USDA NRCS 2024a. Right: E. *sessilifolium* var. *brittonianum*, Warnes and Cochrane 1971.

Although var. *brittonianum* is not universally acknowledged (see Synonyms and Taxonomy section) it can be distinguished from var. *sessilifolium* by the texture and shape of the leaves. Typical *E. sessilifolium* has leaves that are thin, regularly toothed, and about five times as long as wide, while those of var. *brittonianum* are broader (about three times as long as wide), more finely toothed, and somewhat leathery. Also, some pubescence is present on the upper portion of

the stem (within the inflorescence) of var. *brittonianum* (Porter 1892, Britton and Brown 1913, Fernald 1950, Weakley et al. 2024). Both varieties may flower and fruit from July through September (Siripun and Schilling 2020, Weakley et al. 2024). Blooming dates ranging from August 2 through September 11 were reported for *E. sessilifolium* in Illinois (Robertson 1929). One New Jersey population of *E. sessilifolium* var. *brittonianum* was in bud and just beginning to flower on August 17, 2022; another was observed in a comparable state on July 12, 2023 (NJNHP 2024).

Pollinator Dynamics

Eupatorium sessilifolium and related *Eupatorium* species produce nectar and they are pollinated by insects (Sullivan 1975). Wasps—including species of *Ammophila*, *Eumenes*, *Monobia*, *Philanthus*, *Polistes*, and *Scolia*—appear to be the most abundant insects on *E. sessilifolium* although some other potential pollinators (a beetle, a butterfly and a tachinid fly) have also been observed (Robertson 1929, Hilty 2020). Wasps are frequent visitors to *Eupatorium* species with similar flowers, such as *E. perfoliatum*, but a variety of bees (*Agapostemon*, *Andrena*, *Bombus*, *Hylaeus*, and *Lasioglossum* spp.) and a few butterflies have also been seen nectaring on the blooms (Holm 2014). Stubbs et al. (1992) listed fifteen bees that are known to visit *Eupatorium*, but not all members of the genus are white-flowered so some of those insects may favor plants with pink or purple flowers.

Available information indicates that *Eupatorium sessilifolium* var. *brittonianum* is likely to be self-compatible, and the boneset may be capable of developing fruit without any fertilization at all (agamospermy). *E. sessilifolium* plants could still set seed when insects were experimentally excluded (Montgomery and Fairbrothers 1970). The taxon presently recognized as *Eupatorium sessilifolium* (see Synonyms and Taxonomy section) includes populations with varying chromosome counts, and some of those are known to be agamospermous (Grubbs et al. 2009).

Seed Dispersal and Establishment

The fruit of *Eupatorium sessilifolium* is a dry, single-seeded achene (cypsela) that is crowned with a pappus of 30–40 bristles. The cypsela is 2–3 mm long and the bristles are 3–4 mm (Siripun and Schilling 2020). The plumage aids in wind dispersal by acting as a parachute. Differences in plant height and in the morphology of both seeds and pappi generally determine how far the propagules of a particular species can be transported (Venable and Levin 1993, Greene and Johnson 1990, Anderson 1993).

No formal studies of germination or establishment were found for *Eupatorium sessilifolium* but some information gained from a decade of propagation efforts was shared by the Pleasant Valley Conservancy (2015). They reported surprisingly low germination rates (< 5%) for the species, and laboratory tests indicated that the seeds were viable but dormant. Some type of dormancy is common in perennial plants, and many require one or more periods of stratification at varying temperatures in order to germinate. A study that included another boneset (*Eupatorium altissimum*) found that the majority of its seeds germinated during the first spring after dispersal

but some did not sprout until the following spring (Baskin and Baskin 1988). Other *Eupatorium* species are known to form arbuscular mycorrhizae (Wang and Qiu 2006), so it is possible that fungal associations could play a role in the development of young *E. sessilifolium* plants. Once Upland Boneset seedlings have become established they are relatively easy to transplant (Pleasant Valley Conservancy 2015).

Habitat

Eupatorium sessilifolium can be found at elevations of 20–300 meters above sea level near the edges of dry, open woodlands (Siripun and Schilling 2020), and the habitat requirements of var. *brittonianum* appear to be similar to those of the typical plants (Fernald 1945, Edgin et al. 2010). Britton's Upland Boneset is relatively tolerant of shade but it will grow and reproduce more vigorously in open settings (Weakley et al. 2024). The larger of New Jersey's two populations is situated in a utility right-of-way that passes through a mixed oak woodland, while the smaller one is alongside an old road in a forest dominated by *Liriodendron tulipifera*, *Acer saccharum*, and *Quercus prinus* (NJNHP 2024). An occurrence in Virginia was also located in a roadside habitat (Freer 1968).

In New York, *E. sessilifolium* var. *brittonianum* reportedly favors calcareous substrates (Strong 2011) but in other parts of its range it is often associated with circumneutral soils (Gunn 1959, Eaton 1974, Weakley et al. 2024). Hoagland (2006) indicated that the boneset was likely to be found in dry prairies, barrens or savanna habitats in Wisconsin. When *E. sessilifolium* var. *brittonianum* occurs in wooded sites the canopy may include *Acer*, *Carya*, *Fagus*, *Liriodendron*, or *Quercus* species (Gunn 1959, Tans and Read 1975, Edgin et al. 2005).

Wetland Indicator Status

Eupatorium sessilifolium 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 2024b)

EUSEB

Coefficient of Conservancy (Walz et al. 2020)

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 range of *Eupatorium sessilifolium* var. *brittonianum* is restricted to the central and eastern United States (Fernald 1950, Weakley et al. 2024). The map in Figure 1 depicts the known extent of the variety.

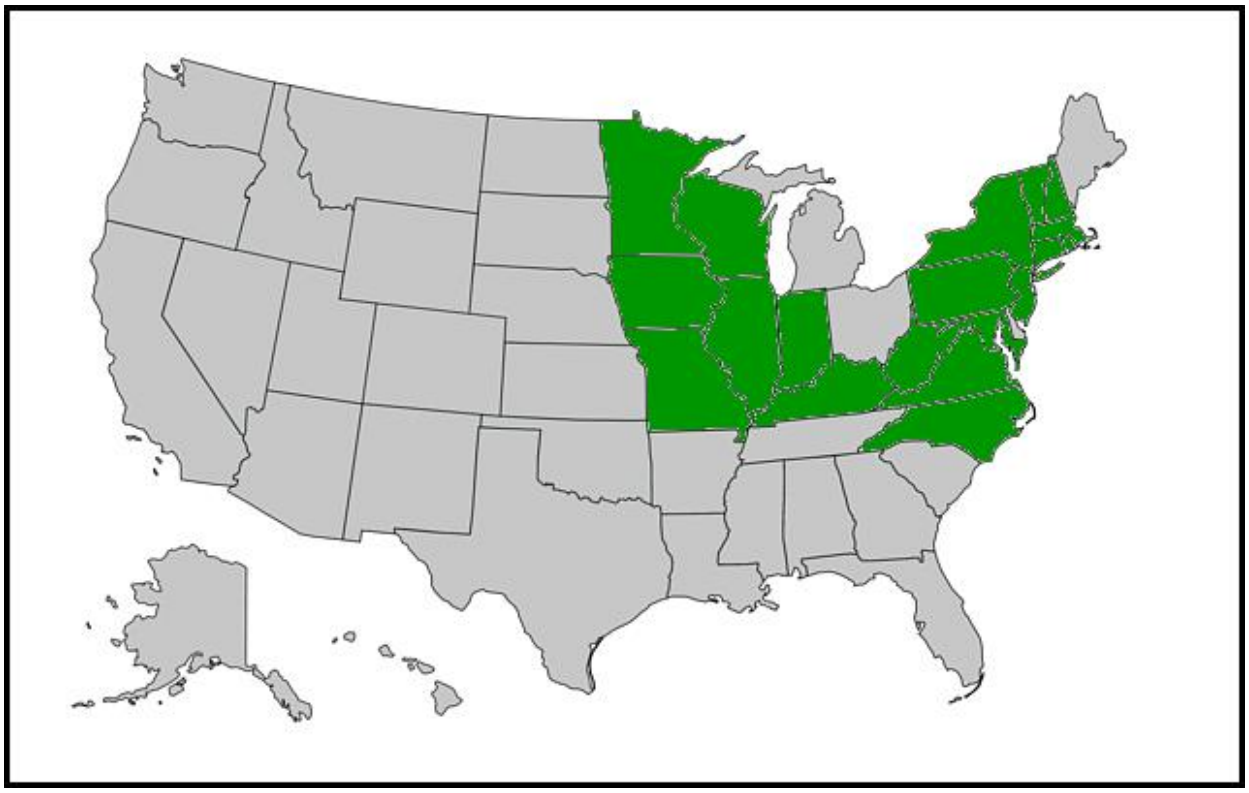

Figure 1. Distribution of E. sessilifolium var. brittonianum in the United States (source data from Fernald 1950, Weakley et al. 2024).

Eupatorium sessilifolium var. *brittonianum* has been documented in two New Jersey counties: Morris and Sussex (Figure 2 below). The data include historic observations and do not reflect the current distribution of the species.

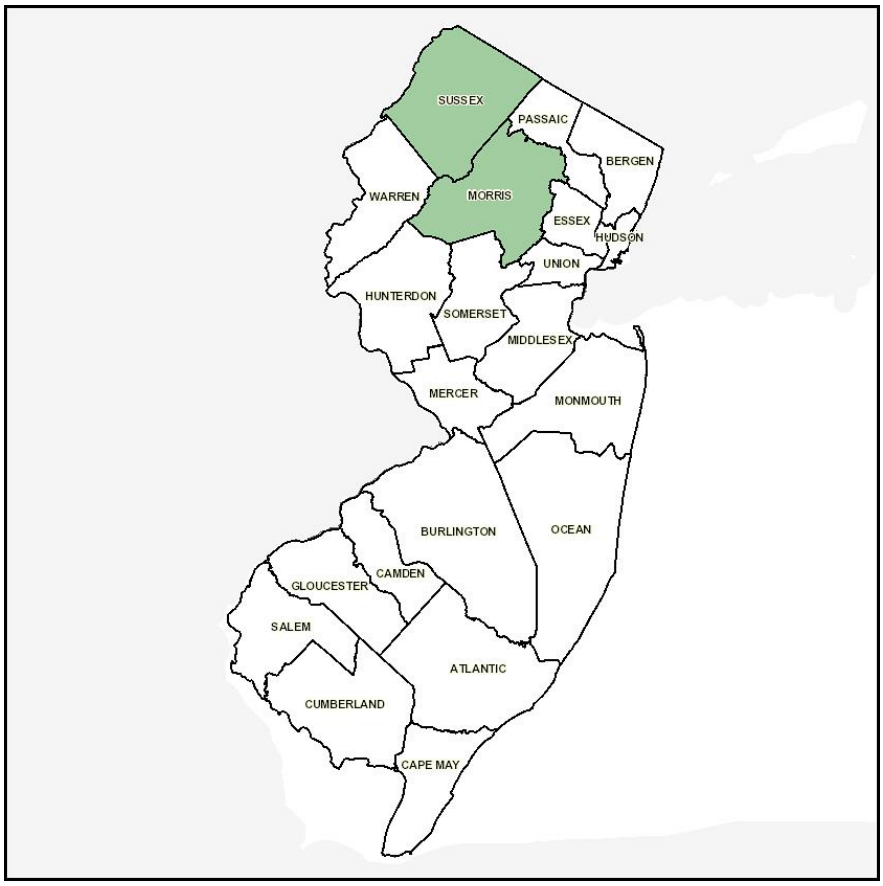

Figure 2. County records of E. sessilifolium var. brittonianum in New Jersey (source data from NJNHP 2024).

Conservation Status

Eupatorium sessilifolium var. *brittonianum* has a global rank of G5T3T4, meaning that the species as a whole is secure but there is some uncertainty as to whether the variety is vulnerable or apparently secure. T3 signifies 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. T4 indicates a fairly low risk of extinction or collapse due to an extensive range and/or many populations or occurrences, although there is some cause for concern as a result of local recent declines, threats, or other factors (NatureServe 2024).
The map below (Figure 3) illustrates the conservation status of *Eupatorium sessilifolium* var. *brittonianum* throughout its range. Britton's Upland Boneset is critically imperiled in two states and possibly extirpated in West Virginia. It is ranked as secure in Kentucky but has not been ranked in other states where it occurs. Some states may not have ranked the variety because its taxonomic status is disputed or inconsistently recognized (see Synonyms and Taxonomy section). In Pennsylvania, for example, *E. sessilifolium* var. *brittonianum* has appeared on some county lists of vascular plants (eg. Westerfield 1961, Morton and Speedy 2007) but no varieties were distinguished in the statewide flora compiled by Rhoads and Block (2007). Ventrella (2024) noted that the disparate approaches make it difficult to accurately assess the global abundance of var. *brittonianum*.

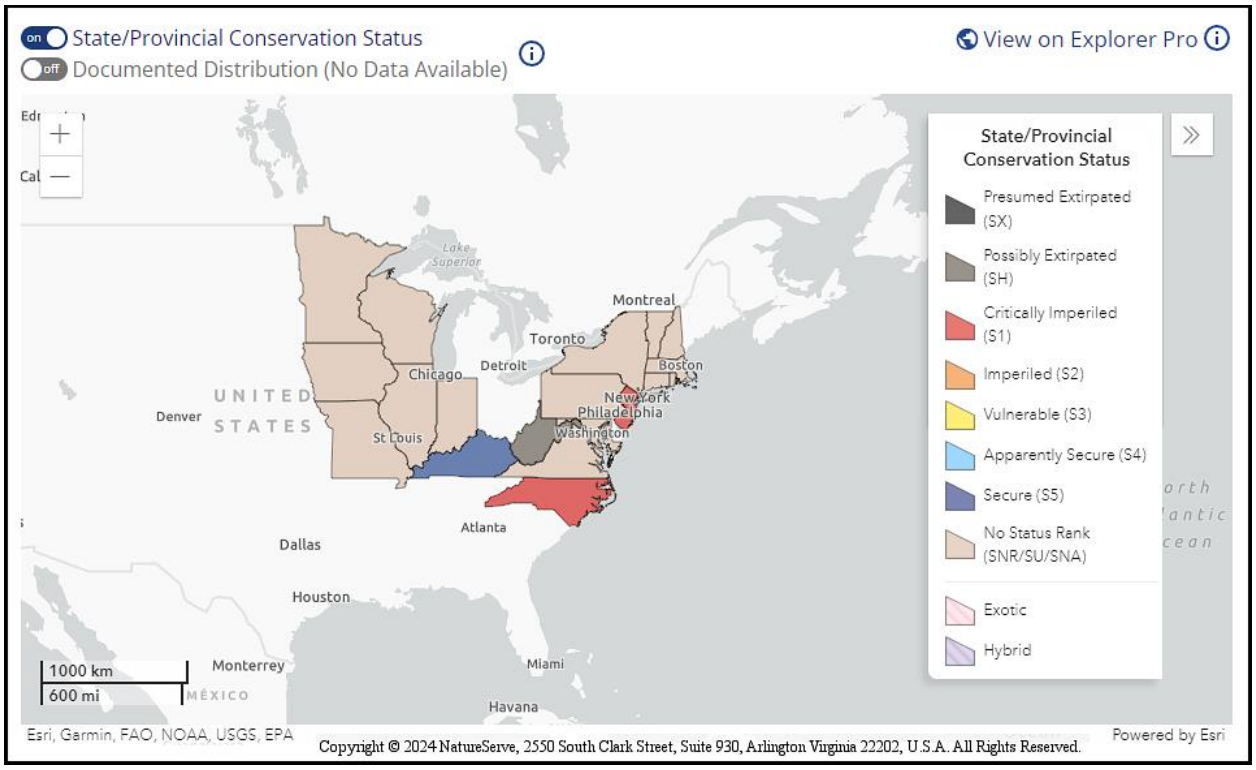

Figure 3. Conservation status of E. sessilifolium var. brittonianum in North America (NatureServe 2024).

Eupatorium sessilifolium var. *brittonianum* 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. Britton's Upland Boneset 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).

Eupatorium sessilifolium var. *brittonianum* was originally described from a specimen that was obtained in Morris County, New Jersey in 1876 (Porter 1892). Other than Porter's herbarium sheets there do not appear to be any additional records from that site, and nearly a century later when Montgomery (1964) was writing his dissertation on the *Eupatorium rotundifolium* complex he had to exclude *E. sessilifolium* var. *brittonianum* from his study because he was unable to find any extant populations in the state. Britton's Upland Boneset was rediscovered in New Jersey by David Snyder in 1996 and he documented a second occurrence in 2007. Both populations are located in Sussex County (NJNHP 2024).

Threats

No large scale threats to *Eupatorium sessilifolium* var. *brittonianum* have been documented, although factors that are frequently identified as concerns for other rare upland plants (eg. habitat loss, canopy closure, invasive species) are also likely to jeopardize some populations of the boneset (Ventrella 2024). Residential development was noted as a threat to one Wisconsin

occurrence (Tans and Read 1975). No concerns were reported during recent visits to the New Jersey populations (NJNHP 2024), although the occurrence in the utility corridor could be inadvertently damaged by right-of-way maintenance activities. Deer browse is a significant problem for many native plants, particularly in New Jersey (NJDSR 2021), but the bonesets are generally characterized as deer-resistant (eg. NCCE 2024).

Climate Change Vulnerability

Information from the references cited in this profile was used to evaluate the vulnerability of New Jersey's *Eupatorium sessilifolium* var. *brittonianum* populations to climate change. An attempt was made to assign the species 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 climactic conditions in accordance with the guidelines described by Young et al. (2016). However, there was insufficient data available for a meaningful assessment due to critical gaps in knowledge regarding the reproductive mechanisms, germination/establishment needs, competitive abilities, and climactic requirements of both the variety and the species as a whole.

Management Summary and Recommendations

Management of New Jersey's extant *Eupatorium sessilifolium* var. *brittonianum* populations should focus on protection of the sites where they occur. In the case of the larger population, it would be advisable to find out how the right-of-way is currently maintained and to engage the land managers in the development of a conservation plan for the rare plants if needed.

Observations of habitat preferences suggest that populations of Britton's Upland Boneset are likely to decline as a result of natural successional processes, so some type of periodic disturbance might be beneficial. DeSelm and Clebsch (1991) found that *E. sessilifolium* is at least mildly tolerant of fire, although information is presently lacking about the optimal frequency, intensity, or timing of burns.

Venable (2024) underscored the necessity of clarifying the taxonomy and validity of lower taxa within *Eupatorium sessilifolium*. It is unfortunate that the few researchers who have explored the variation within *E. sessilifolium* populations have not recognized var. *brittonianum* as a distinct entity, so its relationship to other members of the complex is unclear. Once the taxonomic issues have been ironed out, studies to address the gaps in information identified in the previous section can be initiated.

Synonyms and Taxonomy

The accepted botanical name of the species is *Eupatorium sessilifolium* L. var. *brittonianum* Porter. Orthographic variants, synonyms, and common names are listed below (USDA NRCS 2024b, Weakley et al. 2024). Some sources treat var. *brittonianum* as a synonym of *E.*

sessilifolium (eg. Gleason and Cronquist 1991, Kartesz 2015, Siripun and Schilling 2020, ITIS 2024, POWO 2024). *Eupatorium sessilifolium* is a complicated taxon. A few populations are diploid but the majority are polyploid and there is some debate as to whether certain polyploid populations warrant taxonomic recognition (Grubbs et al. 2009, Schilling 2011, Weakley et al. 2024). *E. sessilifolium* also hybridizes with several other species (Sullivan 1978). Some, but not all, of the plants originating as hybrids involving *E. sessilifolium* have been named, and a number of those have been alternately viewed as separate species or varieties of one of the parent taxa (Fernald 1945, Cronquist 1985, Siripun and Schilling 2006, Weakley et al. 2024).

Botanical Synonyms

Common Names

Britton's Upland Boneset
Britton's Eupatorium

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