

Polygala senega L.

Seneca Snakeroot
Polygalaceae



Rob Routledge, Sault College, Bugwood.org (2013)

***Polygala senega* Rare Plant Profile**

New Jersey Department of Environmental Protection
Division of Parks and Forestry
New Jersey Forest Service
Office of Natural Lands Management
New Jersey Natural Heritage Program

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Life History

Polygala senega, also known as Seneca snakeroot, is a perennial herb in the milkwort family, Polygalaceae. Although this species is widely distributed throughout eastern and northern North America, it is of conservation concern within a large portion of its range, as its root has been collected extensively for medicinal purposes (Welborn 2011). Indigenous Seneca people used the plant to treat snakebites, hence the plant's common name, and it was later used by European settlers as an emetic, purgative, diuretic, expectorant, and tonic in treatment of pneumonia, asthma, bronchitis, and diarrhea (Burns 1986). Plant height ranges between 15cm-30cm, with a taproot and few to several simple stems from a thick, woody crown. Leaves are arranged spirally, ovate to ovate-lanceolate or elliptic-lanceolate, between 1cm-3cm long. Most leaves are pale green below and dark green above. The lowest leaves are reduced or scale-like and purplish in color (Turcotte 1997). Greenish-white flowers are arranged in a spike-like conic raceme that tapers at the apex, and each flower consists of five sepals –the outer three sepals 1mm-1.5mm long and the two lateral sepals 2mm-3mm long. The three petals are united into a tube, shorter than the lateral sepals. The fringed lower petal is broad and normally encloses eight stamens (Welborn 2011). The optimal time to survey for this species is late June to July when the plant blooms.

The variation *latifolia* has been distinguished by some authors such as Fernald (1950) and Steyermark (1963), as it allegedly has broader upper leaves and larger wings and fruits than the typical variety. Deam (1940), however, stated that he was unable to distinguish between the two varieties, and that plants of open habitat simply had narrower leaves than those of woodlands. Gleason (1952) also gave limited recognition to var. *latifolia*. Steyermark (1963) agreed that while var. *latifolia* was definitely a woodland type, in Missouri the two types seemed fairly distinct and *Polygala senega* var. *latifolia* was geographically restricted to the Ozark region (as cited in Burns 1986). In New Jersey the species most closely resembles var. *latifolia*. Populations in sunny banks are slightly narrower leaved, but highly variable and this likely reflects ecological rather than taxonomic significance.

Pollination Dynamics

Literature pertaining to the reproduction mechanisms of *Polygala senega* is scarce, however, research has been conducted on related species and genera. Autogamy, or self-pollination appears to occur in some species of *Polygala* and in two other genera of the family Polygalaceae (Verkerke 1985). In addition, both bees and ants have been observed on *P. senega* plants (Turcotte 1997), suggesting that entomophily and myrmecochory are also ways in which the species is pollinated.

Seed Dispersal

Polygala senega shoots produce a dense inflorescence, and each flower produces a capsule containing two seeds. The seeds take about 35 days to ripen, and are small, black, obliquely obovate and reticulate. The seed surface is sparsely white-pubescent with a bilobed appendage

(Turcotte 1997). The seed capsules of *P. senega* differ from other *Polygala* species by being much broader than long (Holm 1929). Seed dispersal may occur through the actions of animals, water, or wind. Seeds of *Polygala* species are initially deposited close to the parent plant and released from their capsules once they have fallen to the ground. The external structures on the seeds or fruits are collectively termed elaiosomes and are especially attractive to ants. Elaiosomes contain lipids, proteins, vitamins, sugars and starch which provide a conveniently packaged energy source for the ants that feed on them. The elaiosomes in *Polygala* are separated from the seed by a thick-walled structure, which may have evolved to ensure that only the elaiosome is consumed and the seed itself is rejected. Additionally, the seed hairs present most likely aid the ants in carrying them (Verkerke 1985).

Habitat

Habitats reported for *Polygala senega* range from rocky, thin soils to mesic woodlands, and even prairies and steppe vegetation. The plant's ecological requirements are poorly understood; however, it is often associated with calcareous gravels or bedrock. Fernald (1950) reported this species in dry, rocky, gravelly, calcareous areas. Hinds (1986) reported its habitat as calcareous woods and shores. Gleason and Cronquist (1991) stated that the species occurred in dry or moist woods and prairies, often in calcareous soil. Voss (1985) reported that while in northern Michigan it occurred on calcareous rocks in openings and at the borders of coniferous woods, in southern Michigan it occurred in a variety of areas such as woods, bogs, swamps, rocks, prairies, shores and banks. Van Bruggen (1976) reported that the species occurred on sterile soil or rocky outcrops in the Black Hills of South Dakota. Deam (1940) stated that in Indiana it usually occurred on wooded slopes along streams and lakes, but rarely in open prairie habitats. Duncan and Foote (1975) claimed that in the Southeast it occurred in dry places, thin woods and rocky, often calcareous soils (as cited in MacBryde 2000). The Black Hills and Bearlodge Mountains straddling the South Dakota and Wyoming border are the westernmost extent of the species' range in the United States (Welborn 2011). In New Jersey, the single confirmed population of *Polygala senega* is associated with rocky, wooded, slopes and openings, especially over calcareous or mafic rocks (Walz et al 2018).

Wetland Indicator Status

According to the US Army Corps of Engineers National Wetland Plant List Indicator Definitions, *Polygala senega* is facultative upland (FACU), meaning that it usually occurs in non-wetlands, but may sometimes occur in wetlands (USDA 2020).

USDA Plants Code

POSE3; USDA Plant Code for *Polygala senega*

Coefficient of Conservatism

CoC = 8; Native with a narrow range of ecological tolerances; high fidelity to particular habitat conditions, and sensitive to anthropogenic disturbance (Walz et al. 2018).

Distribution and Range

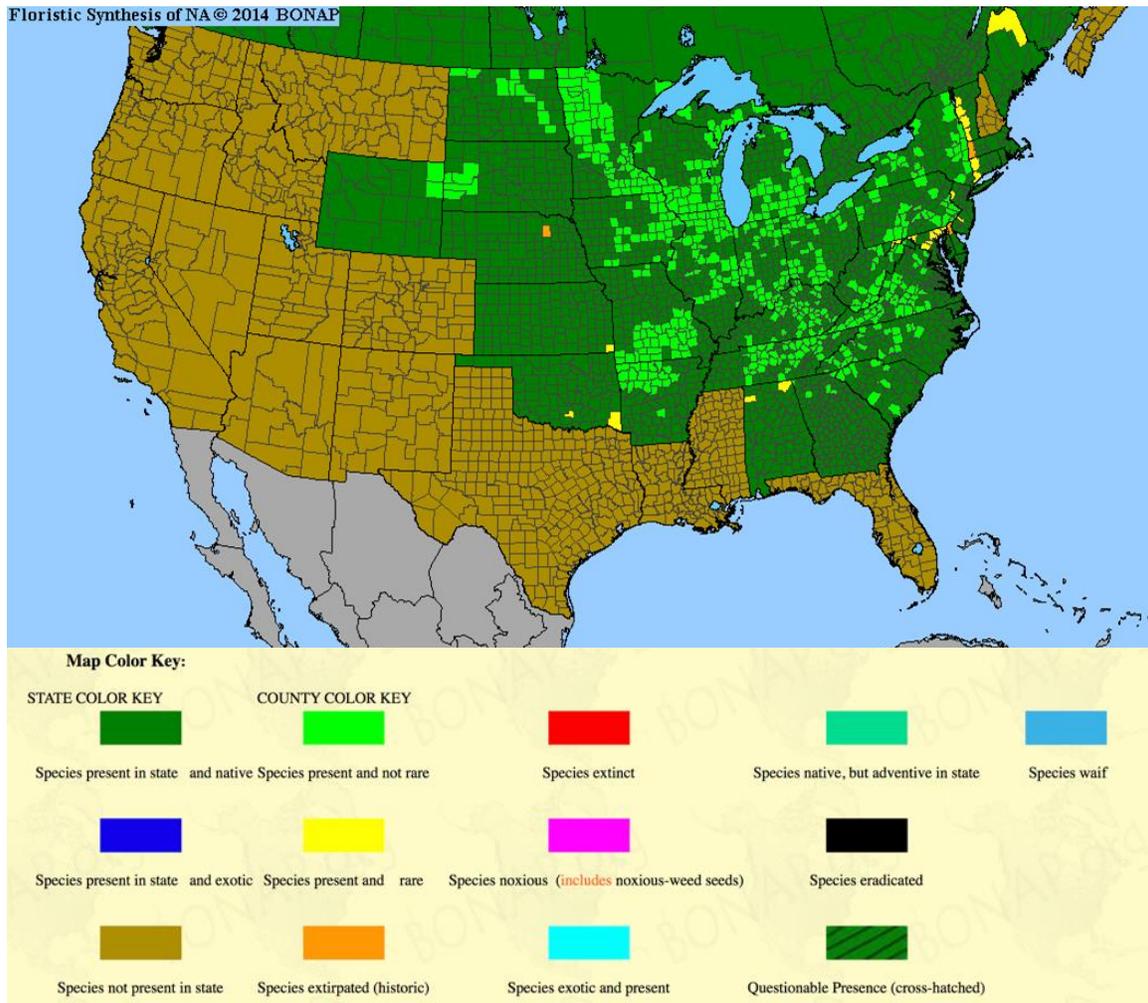


Figure 1. Distribution of *Polygala senega* in North America (Kartesz 2015).

Figure 1 above depicts the distribution of *Polygala senega* throughout North America, with dark green shaded regions indicating states and provinces where the species is native, yellow shaded regions where the species is present and rare, and orange shaded regions where the species is extirpated (Kartesz 2015). The species is found in Canada from Quebec and New Brunswick to British Columbia and continues southward into the United States. In the US, the species starts just east of the Rocky Mountains (with the exception of Montana), down to Wyoming and Oklahoma, and continues eastward (with the exception of Alabama) to Georgia, and then northward through New England (with the exception of New Hampshire) to Maine (MacBryde 2000). In New Jersey, the shaded regions in Figure 2 below suggest that the species is native to Warren, Camden, and Hudson counties (USDA 2020), however, there is no basis for the reports made in Hudson and Camden County, as their locations are based on undated 1800s literature reports and there are no specimens extant to confirm them. The distribution of *P. senega* is only confirmed in Warren county.

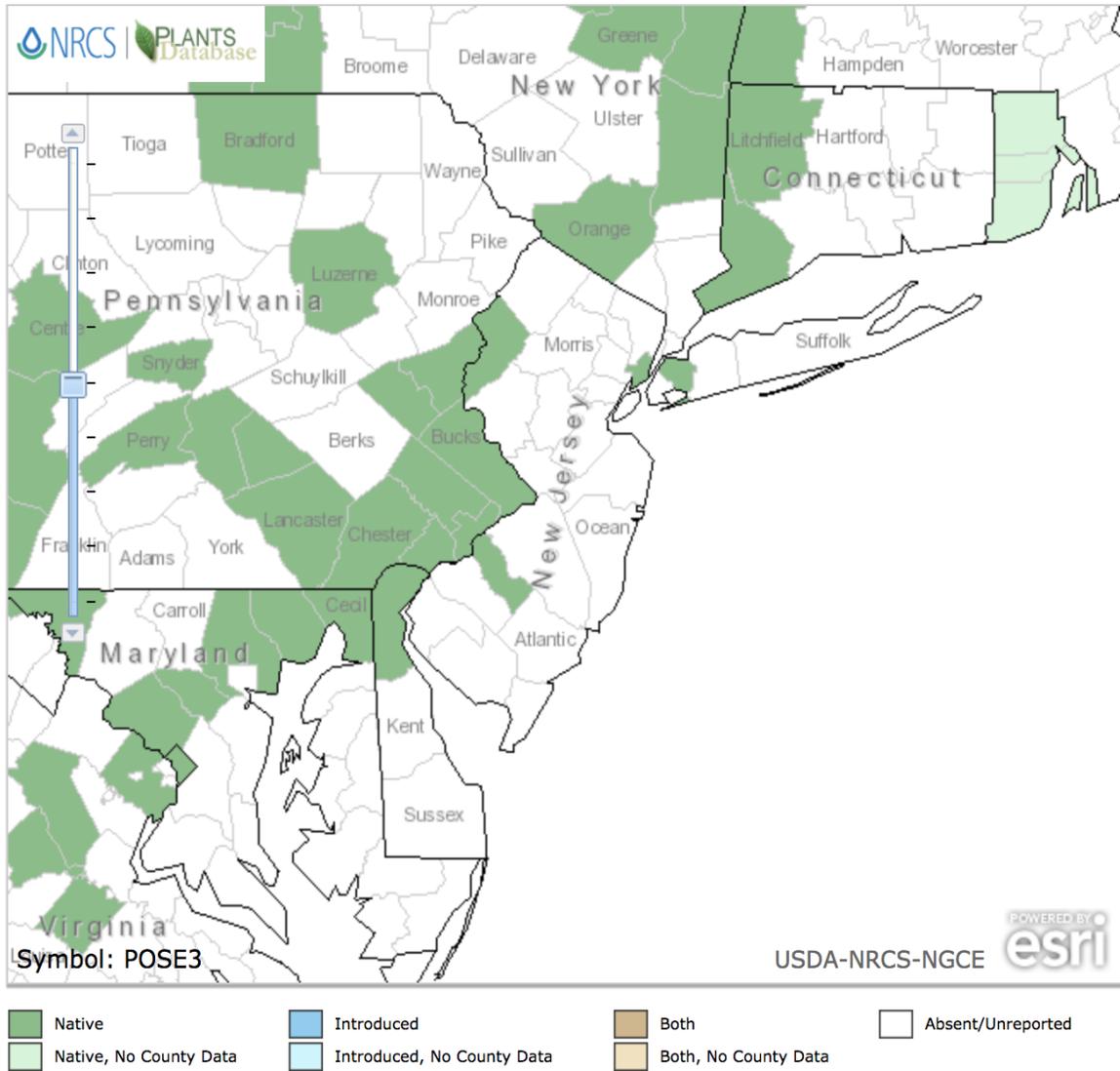


Figure 2. Distribution of *Polygala senega* in New Jersey (USDA 2020).

Conservation Status

Polygala senega is considered globally secure, although it may be rare within its range (G4G5). More data may be needed to determine whether the species' rank is G4 or G5 (New Jersey Natural Heritage Program 2016). An additional source ranks the species apparently secure (G4) as a "rounded" status, due to factors such as overharvesting and habitat loss (MacBryde 2000). *Figure 3* illustrates the combined conservation statuses of *P. senega* in multiple US states and Canadian provinces. Throughout some of its range, the species is of little conservation concern as it is listed secure (S5) or apparently secure (S4). Throughout a considerable portion of its range, however, the species is considered to be anywhere between imperiled (S2) to presumably extinct (SX). *Figure 4* depicts the species' rounded conservation status in New Jersey as being critically imperiled (S1) and at risk of extinction (MacBryde 2000). The New Jersey state rank for *P. senega* is S1.1 as there is only one known population extant in Warren County (New Jersey Natural Heritage Program 2016).

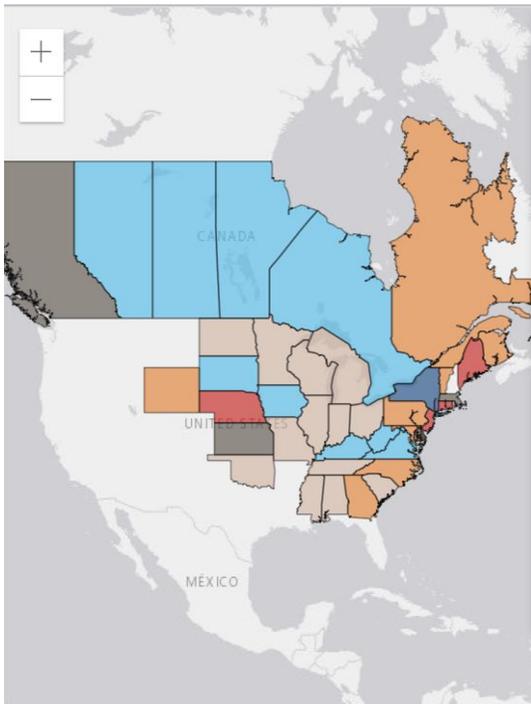


Figure 3. Conservation Status of *Polygala senega* in North America (MacBryde 2000).

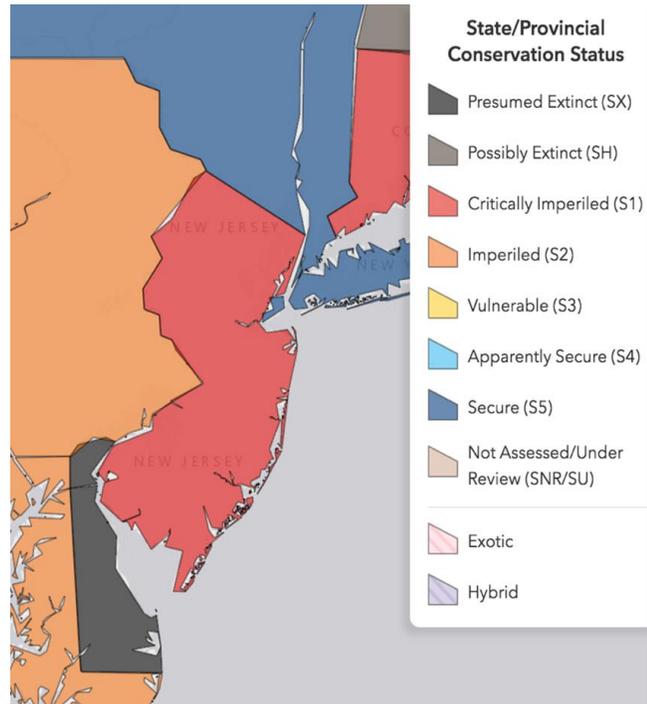


Figure 4. Conservation Status of *Polygala senega* in New Jersey (MacBryde 2000).

Threats

Globally, the largest threats to *Polygala senega* are overharvesting and habitat loss. As the roots of *P. senega* have long been used medicinally, the extent and intensity of collecting for the medicinal trade could be affecting significant numbers of populations throughout its range. There are a considerable number of US states and Canadian provinces that have recognized vulnerability or even loss of populations from within their geographical range due to general land conversion such as agriculture and urbanization (MacBryde 2000). In New Jersey, the largest threats to the remaining population in Warren County are the encroachment of invasive plant species, deer herbivory, and the use of herbicides along a nearby railroad.

Management Summary and Recommendations

A reasonable goal for this species going forward would be to protect the single remaining population in New Jersey from habitat destruction. Some management practices already in effect are annual stem counting, the implementation of deer fencing, and the removal of invasive plant species such as *Elaeagnus umbellata* (Martin Rapp, personal communication, January 5, 2021). Further research and evaluation should be done to determine whether *Polygala senega* var. *senega* and *Polygala senega* var. *latifolia* should be accepted as distinct biological entities. Additionally, further studies should be conducted on the species' pollination dynamics and seed dispersal mechanisms, as there is very little information available.

Synonyms

Botanical Name	<i>Polygala senega</i> L.
Botanical Synonym(s)	<i>Polygala senega</i> L. var. <i>latifolia</i> Torr. & A. Gray
Common Name(s)	Seneca Snakeroot Seneka Snakeroot Rattlesnake Root Mountain Flax Northern Senega Polygala Root

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