Agalinis paupercula var. *paupercula*

Small-flower False Foxglove

Orobanchaceae

Agalinis paupercula var. *paupercula* by J. S. Dodds, 2021

***Agalinis paupercula* var. *paupercula* 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

Agalinis paupercula var. *paupercula* (Small-flower False Foxglove) is an annual hemiparasitic herb in the broom-rape family. *Agalinis* has traditionally been included in the Scrophulariaceae but after genetic analyses resulted in fragmentation of the figwort family all of the parasitic genera were transferred to the Orobanchaceae (Olmstead et al. 2001, APGII 2003). A hemiparasitic plant can both fix its own carbon by means of photosynthesis and also obtain some nourishment from other species. Swollen, rounded structures (haustoria) on the roots of the parasite attach to a host and establish pathways for the transfer of nutrients (Estabrook and Yoder 1998).

The stems of *Agalinis paupercula* var. *paupercula* are 7–80 cm in height, and some ascending branches are occasionally present. The plants have opposite branching and leaves. The leaves are linear, smooth-margined, 7.5–50 mm long, and 0.5–4 mm wide. The flowers, which are tubular with five flaring lobes, occur singly or in pairs at the nodes. They are 9–20 mm long and bright pink, with two yellow lines and a sprinkling of red spots on the inside of the throat. The style and the four stamens are usually shorter than the corolla tube. The fruit is a rounded capsule 4–6 mm in diameter. (See Britton and Brown 1913, Pennell 1919 & 1929, Fernald 1950, Gleason and Cronquist 1991, Canne-Hilliker and Hays 2020). *A. paupercula* var. *paupercula* usually flowers during August or September but blooming may begin late in July or continue into October. The corollas of individual flowers last for less than a day: They are typically discarded in the afternoon. The fruits develop from September through November (Pennell 1919, Hough 1983, Rhoads and Block 2007, Canne-Hilliker and Hays 2020). After the plants senesce their stems and foliage darken (Pennell 1929).

Left: Britton and Brown 1913, courtesy USDA NRCS 2025a. Right: J. S. Dodds, 2021.

The other variety of *Agalinis paupercula* (var. *borealis*) does not occur in New Jersey but *A. paupercula* is closely related to two species that do occur in the state: *A. purpurea* and *A. fasciculata* (Neel and Cummings 2004, Pettengill and Neel 2008). All three belong to *Agalinis*

Section *Purpureae*, Subsection *Purpureae* and the taxonomic status of several members of that group—including *A. paupercula*—remains unsettled (see Synonyms and Taxonomy section). Northern populations of *Agalinis fasciculata*, including those in New Jersey, are sometimes identified as *A. virgata* (Weakley et al. 2024).

Agalinis purpurea is morphologically similar to *A. paupercula* but the former species is generally more robust and its longer styles often extend beyond the corolla tubes. *A. purpurea* stems may be up to120 cm in height and the corollas are 18–36 mm long. Plants that fall in the mid-range (under 80 cm in height, corollas 18–22 mm) can easily be misidentified. Pennell (1919, 1929) noted that the calyx lobes of *A. paupercula* were longer and narrower than those of *A. purpurea* but according to Canne-Hilliker and Hays (2020) that feature is not a useful means of distinguishing between the two taxa. *A. fasciculata*, which is also rare in New Jersey (S3), is structurally comparable to *A. purpurea* but it has more densely-flowered stems that are rough to the touch. There are some minor differences in the seed coats of the three species but examination with a scanning electron microscope is needed in order to detect them (Canne 1979).

Pollinator Dynamics

Agalinis flowers are structurally well-suited to bee pollination, with large corolla tubes that permit entry and copious hairs that help the insects maintain their foothold in an inverted position (Pennell 1935). Potential pollinators are likely to be attracted by the brightly colored petals, and the interior markings may aid in orientation. A review by Dieringer and Rodriguez 2024 concluded that *Agalinis* flowers can be fertilized by a wide variety of bees, and recorded visitors have include species of *Augochlorella, Bombus, Ceratina, Dialictus,* and *Hylaeus* (Stubbs et al. 1992). While only a few pollinator records were found that specifically applied to *Agalinis paupercula* they were consistent with general reports for the genus. Both short-tongued and long-tongued bees (*Augochlora p. pura*, *Ceratina d. dupla*, *C. strenua*) have been recorded on *A. paupercula* flowers (Hilty 2020), and pollen collected from bumblebees (*Bombus impatiens, B. vagans*) was identified as that of *A. paupercula* through DNA analysis (Carter 2024). The blooms of *A. paupercula* are also visited by butterflies (Gordon 2024), although they may be able to access nectar without coming into contact with the reproductive organs.

The floral development of several closely related taxa was investigated by Stewart and Canne-Hilliker (1998), but unfortunately *Agalinis paupercula* var. *paupercula* was not included in the study. Based on their observations, the authors inferred that the larger *A. purpurea* was probably mainly outcrossing while plants with smaller flowers such as *A. paupercula* var. *borealis* and *A. neoscotica* were more likely be capable of self-fertilization and to utilize mixed mating systems.

Seed Dispersal and Establishment

Agalinis fruits may contain 60–600 seeds, depending on the species (Canne-Hilliker and Hays 2020), but it is not clear how many propagules are typically produced by *A. paupercula*. Once *Agalinis* capsules have dehisced wind could play a role in distributing the seeds (Roy et al.

2020). The dispersal mechanisms utilized by *A. paupercula* probably also include both water and attachment to bird feathers or feet (Morton and Hogg 1989). Tests by Morton and Hogg showed that *A. paupercula* seeds may remain afloat for a week or more. Although *A. paupercula* capsules generally sink in less than 24 hours, those that remain attached to larger inflorescence fragments might continue to float for several days.

Agalinis paupercula has an annual life cycle, which means that once the seeds germinate the plants are likely to develop rapidly, reproduce, and die. It is not clear whether *A. paupercula* forms a persistent seed bank. At one Ontario site the species was frequent in the vegetation but did not germinate from soil samples that were collected three years later (Keddy and Reznicek 1982). Noting that *A. paupercula* was a hemiparasite, the authors suggested that its failure to sprout in the greenhouse may have been due to the absence of a suitable host. However, *Agalinis* species are facultatively parasitic so they do not absolutely require a host plant in order to establish or reach maturity. The production of haustoria is apparently triggered by the proximity of a potential host. Members of the genus are capable of parasitizing an assortment of woody and herbaceous plants so in most cases they do become associated with host plants sooner or later (Riopel and Musselman 1979, Estabrook and Yoder 1998).

Habitat

Agalinis paupercula var. *paupercula* occupies open habitats at elevations within 300 meters of sea level (Canne-Hilliker and Hays 2020). Weakley et al. (2024) assigned the variety a heliophily ranking of 9, indicating that it is essentially a "sun obligate." *A. paupercula* var. *paupercula* is usually associated with lakeshores, fens, and glacial bogs (Cribbs 1917, Pennell 1919 & 1929, Jones 1941, Friesner and Potzger 1946, Thorne 1956, Holte and Thorne 1962, Wolden 1956, Nekola 1994, Faber-Langendoen 2001, Featherstone 2005, NJNHP 2024, Weakley et al. 2024). It has also been recorded in other damp or wet habitats including streambanks, pond margins, seepage areas, wet meadows, and marshes (Brown 1905, Bicknell 1915, Metcalf and Griscom 1917, McAtee 1920, Knowlton 1933, Moldenke 1945, Bentz and Cooperrider 1978, Dalton et al 1983, Rhoads and Block 2007, Varga 2008). *A. paupercula* can sometimes be found in brackish habitats along tidal rivers or the edges of salt marshes (Wherry 1920, Tiner 2009). Typical substrates include sand, peat, gravel, or clay (Blake 1914, Fernald and Wiegand 1923, Reznicek and Catling 1989, Canne-Hilliker and Hays 2020). A study of vegetation distribution along the shore of a receding lake found that *A. paupercula* was most prevalent in sections that had been exposed for several years and it was absent at the waterline (Keddy and Reznicek 1982). Small-flower False Foxglove tends to favor habitats that are notably undisturbed (Hogg and Morton 1983, Featherstone 2005) but it has occasionally been found in ditches or along roadsides (Lyon 1927, Canne-Hilliker and Hays 2020).

Ponomarenko (2005) indicated that *Agalinis paupercula* var. *paupercula* was a common component of dry alkaline meadows dominated by *Danthonia spicata* and *Comandra umbellata* on the Bruce Peninsula in Lake Huron. In its more typical habitats *A. paupercula* can co-occur with grasses, sedges, rushes, carnivorous plants, and a wide variety of herbaceous species (Brown 1905, Metcalf and Griscom 1917, Fernald and Wiegand 1923, Lloyd 1956, Hogg and Morton 1983, Reznicek and Catling 1989, Faber-Langendoen 2001, Featherstone 2005).

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). *Agalinis paupercula* has more than one wetland indicator status within the state. In the Northcentral and Northeast region it is an obligate wetland species, meaning that it almost always occurs in wetlands. In other regions of the state *A. paupercula* is a facultative wetland species, meaning that it usually occurs in wetlands but may occur in nonwetlands (U. S. Army Corps of Engineers 2022).

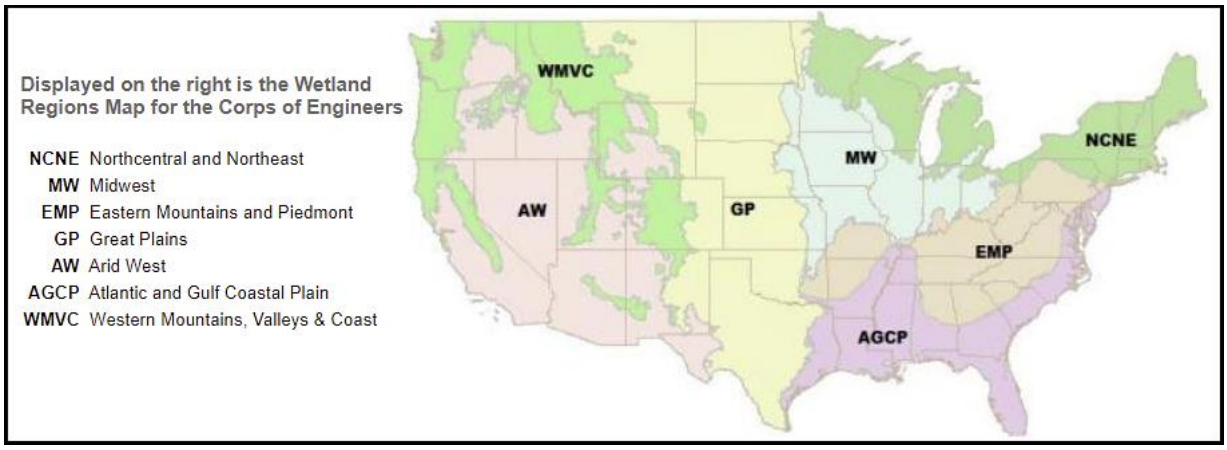

Figure 1. Mainland U. S. wetland regions, adapted from U. S. Army Corps of Engineers (2022).

USDA Plants Code (USDA, NRCS 2025b)

AGPAP3

Coefficient of Conservancy (Walz et al. 2020)

CoC = 10. Criteria for a value of 9 to 10: Native with a narrow range of ecological tolerances, high fidelity to particular habitat conditions, and sensitive to anthropogenic disturbance (Faber-Langendoen 2018).

Distribution and Range

The global range of *Agalinis paupercula* var. *paupercula* is restricted to North America (POWO 2025). The map in Figure 2 shows the extent of the species in the United States and Canada.

Agalinis paupercula var. *paupercula* has been reported in many New Jersey counties but there is conflicting information about its local distribution due to the difficulty of species identification, mislabeled specimens, and the inconsistent application of nomenclature. Figure 3 shows some possible historic locations for *A. paupercula* in the state (Kartesz 2015, Mid-Atlantic Herbaria 2025). No records outside of Sussex County are currently accepted (NJNHP 2024).

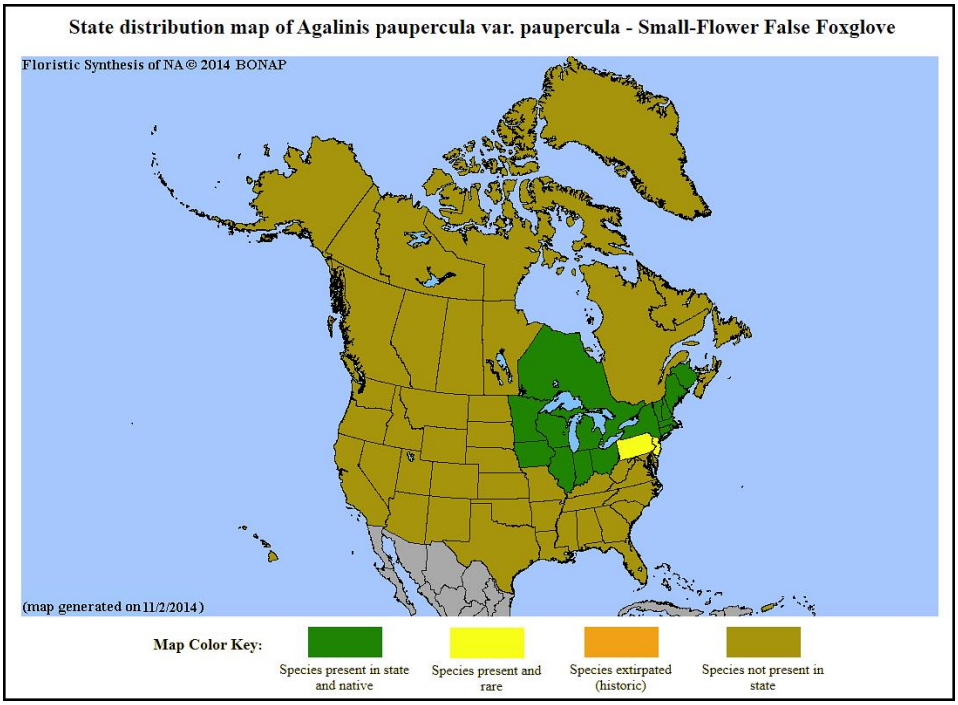

Figure 2. Distribution of A. paupercula var. paupercula in North America, adapted from BONAP (Kartesz 2015).

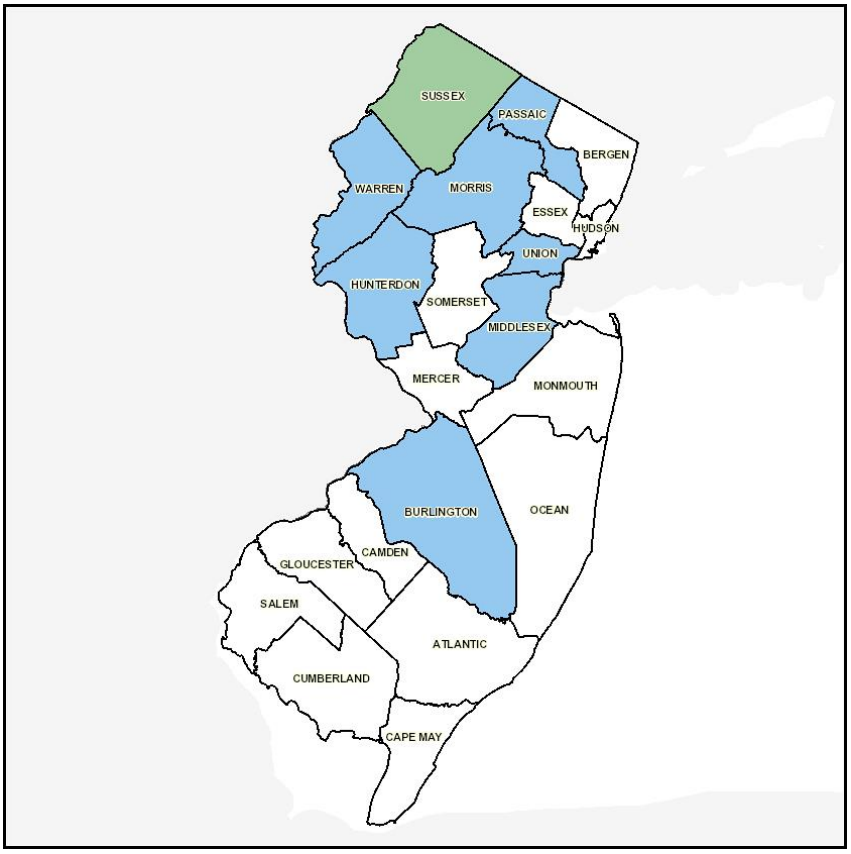

Figure 3. County reports of A. paupercula var. paupercula in New Jersey. The green color signifies accepted records, blue indicates uncertainty.

Conservation Status

NatureServe follows Canne-Hilliker and Hays (2010) in identifying both varieties of *Agalinis paupercula* as *Agalinis purpurea* var. *parviflora*, which 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 *A. purpurea* var. *parviflora* throughout its range. The variety is shown as vulnerable (moderate risk of extinction) in two states and two provinces, imperiled (high risk of extinction) in one state and one province, and critically imperiled (very high risk of extinction) in three states and one province. It is ranked as apparently secure in one state and one province, and it has not been ranked in a number of other states.

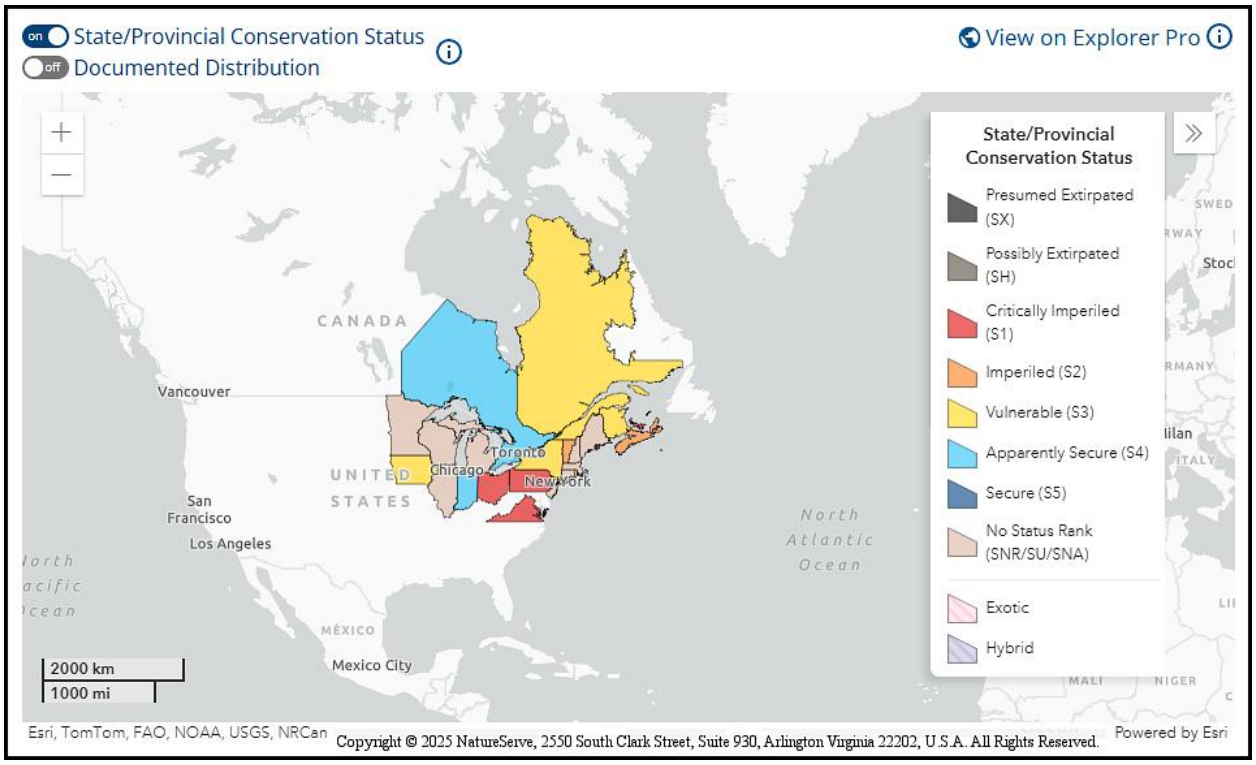

Figure 4. Conservation status of A. paupercula in North America (NatureServe 2025).

Agalinis paupercula var. *paupercula* is critically imperiled (S1) in New Jersey (NJNHP 2024), although that status is not depicted on the map above because it is listed under a different name. 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. paupercula* var. *paupercula* has also been assigned a regional status code of HL, signifying that the variety is eligible for protection under the jurisdiction of the Highlands Preservation Area (NJNHP 2010).

It is difficult to assess the status of *Agalinis paupercula* var. *paupercula* in New Jersey because the plant has so often been misidentified. In the course of developing this profile, conflicting names for herbarium specimens were encountered and the species was found listed in floras from

states that are well outside of its known range. *A. paupercula* was reported in Hunterdon, Sussex, and Warren counties over a century ago (Britton 1889, Taylor 1915). Hough (1983) noted it under *A. purpurea*, remarking that that the variety was rare and confined to the northern part of the state. *A. paupercula* var. *paupercula* was not included on the earliest special plant lists for New Jersey, but during the current century its rank has slowly been downgraded from S3 to S2 to S1 (NJNHP 2001, 2016, 2024). Although it seems likely that Small-flower False Foxglove once occurred at multiple locations in the state, no historical populations are tracked by the Natural Heritage Program. The photographs in this profile were taken at the site of the only New Jersey occurrence that is presently accepted.

Threats

A threat to New Jersey's *Agalinis paupercula* var. *paupercula* occurrence from the spread of *Phragmites australis* ssp. *australis* and the proliferation of woody plants was first reported following a monitoring visit in 2007 (NJNHP 2024). The *Agalinis* population is restricted to a small portion of a lake shore and a band of the invasive *Phragmites* is encroaching on its habitat from the water's edge. During a site visit in 2021 it was noted that *Lythrum salicaria* had also become established in the vicinity, while numerous native and nonnative woody species and vines (e.g. *Ailanthus altissima*, *Populus grandidentata*, *Salix* spp., *Alnus incana* ssp. *rugosa*, *Cornus amomum*, *Rosa palustris*, *Celastrus orbiculatus, Mikania scandens*, *Parthenocissus inserta*, *Toxicodendron radicans*,) were spreading into the community and shading the habitat utilized by the false foxglove plants (Walz 2021).

Invasive plants have also been identified as a potential threat to *Agalinis paupercula* in other locations, along with habitat destruction resulting from the indiscriminate use of off-road vehicles (Tomaino 2023). The loss of some historic populations in Iowa and Ontario was attributed to habitat conversion for agriculture or development (Thorne 1956, Varga 2008). Greene (1949) encountered a leaf spot fungus on *Agalinis paupercula* in Wisconsin and described it as a new variety of *Septoria scrophulariae*. Some species of *Septoria* can cause significant damage to their host plants (Das et al. 2020). However, *S. scrophulariae* is usually restricted to *Scrophularia* species (Beach 1918, Uppal 1925, Preston 1947) and no additional records of infections on *Agalinis* species were found.

Climate Change Vulnerability

Information from the references cited in this profile was used to evaluate the vulnerability of New Jersey's *Agalinis paupercula* var. *paupercula* population 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 climactic conditions in accordance with the guidelines described by Young et al. (2016) and the state climactic computations by Ring et al. (2013). Based on available data *A. paupercula* 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

low confidence because the impacts of some risk factors were estimated based on observations rather than data.

As a result of climate change, plant communities in New Jersey are being exposed to higher temperatures, more frequent and intense precipitation events, and increasing periods of drought (Hill et al. 2020). Although no information was found regarding the ways in which weather conditions might affect the life cycle of *Agalinis paupercula*, New Jersey is near the southern end of the species' range so the false foxglove may have difficulty adapting to warmer conditions—at least in its current form. Pennell (1929) believed that a group of taxa in *Agalinis* Section *Purpureae* (*A. purpurea*, both varieties of *A. paupercula*, and *A. neoscotica*) could exemplify a series of evolutionary adaptations to environmental conditions encountered in the course of a northward range expansion, and he further suggested that the plants which have come to be identified as *A. paupercula* var. *paupercula* might have originated on two different occasions in the east and the midwest.

As it now stands, there are at least two factors in addition to increasing temperatures that are likely to have a detrimental impact on *A. paupercula* in New Jersey as the climate continues to warm. Lengthy droughts could both directly affect the moisture-loving plants and facilitate the colonization of their wetland habitats by more competitive species. Even in the absence of drought, introduced plants in general—and *Phragmites* in particular—are expected to become an even greater threat to native communities in the northeast as a result of climate change (Bellard et al. 2013, Eller et al. 2017, Salva and Bradley 2023).

Management Summary and Recommendations

Active management will be required in order to preserve New Jersey's only known extant occurrence of *Agalinis paupercula* var. *paupercula*. Efforts should focus on limiting the spread of *Phragmites* at the site and removing woody plants that are shading the false foxgloves, particularly the invasive ones like *Ailanthus altissima* and *Celastrus orbiculatus*. All three species have been identified as highly threatening to native plant communities in New Jersey (FoHVOS 2025).

As discussed in the section that follows, clarification is needed regarding the relationships and defining characteristics of *Agalinis* species in the *Purpureae* group. Once that has been resolved, a review of the herbarium specimens for all *Agalinis* species that were collected in New Jersey is recommended in order to verify identifications and update nomenclature. A better understanding of the species' original distributions throughout the state will aid in planning for the conservation of *A. paupercula* and other rare taxa in the genus, and the process might also identify some historic locations where careful searches could reveal more extant populations.

Synonyms and Taxonomy

The accepted botanical name of the species is *Agalinis paupercula* (A. Gray) Britton var. *paupercula*. Some orthographic variants, synonyms, and common names are listed below. The

name utilized in New Jersey is recognized by some current sources (eg. Kartesz 2015, Weakley et al. 2024, USDA NRCS 2025) but others identify the taxon as *Agalinis purpurea* var. *parviflora* (eg. Canne-Hilliker and Hays 2020, ITIS 2025, NatureServe 2025, POWO 2025). Both varieties of *Agalinis paupercula* are included in *Agalinis purpurea* var. *parviflora.*

Questions regarding the relationship between *Agalinis paupercula* and *A. purpurea* have been raised repeatedly over the years (e.g. Lyon 1927, Nekola 1994, Neel and Cummings 2004). On the basis of morphology, Pennell (1929, 1935) hypothesized that *A. paupercula* var. *paupercula* had been derived from *A. purpurea* and had in turn yielded *A. paupercula* var. *borealis* and *A. neoscotica*. In addition to their overlap in morphological features, a molecular phylogenic analysis indicated that there was no clear separation between *A. paupercula* and *A. purpurea* (Pettengill and Neel 2008). However, the investigators noted that the initial study was limited in scope and that a broader sample conducted at higher resolution might yield different results.

Botanical Synonyms	**Common Names**
Agalinis purpurea var. *parviflora* (Benth.) Boivin	Small-flower False Foxglove
Agalinis purpurea ssp. *parviflora* (Benth.) Á. Löve & D. Löve	Small Flowered Purple Gerardia
Gerardia paupercula (A. Gray) Britton	Little Pink Gerardia
Gerardia paupercula (A. Gray) Britton var. *typica* Pennell	
Gerardia purpurea var. *parviflora* Benth.	
Gerardia purpurea L. var. *paupercula* A. Gray	

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