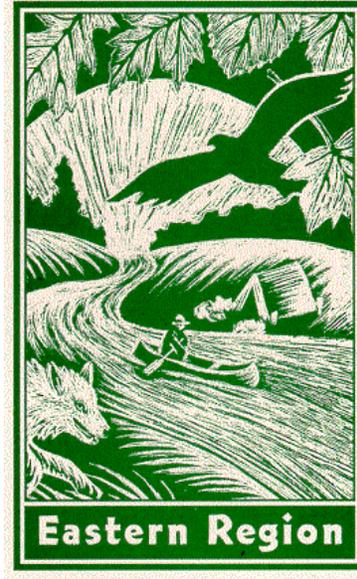


*Community Conservation Assessment
for
Earleaf Foxglove (*Agalinis Auriculata*)*



USDA Forest Service, Eastern Region

Date

Name
Location



This document is undergoing peer review, comments welcome

This Conservation Assessment was prepared to compile the published and unpublished information and serves as a Conservation Assessment for the Eastern Region of the Forest Service. It does not represent a management decision by the U.S. Forest Service. Though the best scientific information available was used and subject experts were consulted in preparation of this document, it is expected that new information will arise. In the spirit of continuous learning and adaptive management, if you have information that will assist in conserving the subject community, please contact the Eastern Region of the Forest Service - Threatened and Endangered Species Program at 310 Wisconsin Avenue, Suite 580 Milwaukee, Wisconsin 53203.

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EXECUTIVE SUMMARY

ACKNOWLEDGEMENTS

COMMUNITY CLASSIFICATION SYSTEM AND SYNONYMS

Scientific Name: *Agalinis auriculata* (Michx.) Blake

The nomenclature in question both *Agalinis auriculata* and *Tomanthera auriculata* are commonly used.

Common Name(s): Earleaf Foxglove, Eared False Foxglove, Auriculate False Foxglove

Family: Scrophulariaceae

Synonyms: *Gerardia auriculata* Michx., *Seymeria auriculata* (Michx.) Spreng., *Tomanthera lanceolata* Raf., *Tomanthera auriculata* (Michx.) Raf., *Otophyllya michauxii* Benth., *Otophyllya auriculata* (Michx.) Small, and *Aureolaria auriculata* (Michx.) Farwell.

USFS Region 9 Status: Sensitive

USFWS Status: No Status

Illinois Status: Threatened

Global And State Rank: The Illinois Natural Heritage Program ranks this species as G3/S2 (Illinois Natural Heritage Database 1999). This means that *Agalinis auriculata* is considered rare or uncommon globally and imperiled within Illinois. The Nature Conservancy (1999) lists it as having a widespread distribution but rare and local throughout its range.

RANGE

Primarily eastern North America, but with some populations west of the Mississippi River. Currently known from Iowa, Illinois, Indiana, Kansas, Maryland, Minnesota, Missouri, Mississippi, Ohio, Oklahoma, Pennsylvania, South Carolina, and Tennessee. Historically known from Alabama, Michigan, Texas, Wisconsin, and West Virginia (The Nature Conservancy 1999), see Figure 1. In Illinois, this species can be found in Adams, Bond, Bureau, Champaign, Cook, DuPage, Fayette, Grundy, Hancock, Henry, Jackson, Kane, Kendall, Lake, Lee, Logan, Macoupin, Mason, Montgomery, Ogle, and Will counties (Illinois Natural Heritage Database 1999) see Figure 2. Approximately 36 populations are known overall. This species may be introduced at some sites (Steve Hill pers. com.).

PHYSIOGRAPHIC DISTRIBUTION

In Illinois *Agalinis auriculata* is found in the Keys et. al. (1995) ecological units: Central Till Plains, Oak-Hickory and Southwestern Great Lakes Morainal Sections of the Eastern Broadleaf Forest Province and the Central Dissected Till Plains and Central Till Plains Sections of the Prairie Parkland Province. *Agalinis auriculata* is known from the following Natural Divisions of Illinois (Schwegman et. al.1973): Rock River Hill Country, Northeastern Morainal, Grand Prairie, Illinois River and Mississippi River Sand Areas, Western Forest-Prairie, Middle Mississippi Border and Southern Till Plain (Illinois Natural Heritage Database 1999).

HABITAT:

Agalinis auriculata is found in a number of habitats: mesic to wet prairie, disturbed prairies, shrubby prairies, old fields and red cedar-oak barrens (The Nature Conservancy 1999). In Illinois the primary habitat seems to be prairie, including black soil prairie, sand prairie and dolomite prairie. It has also been reported in savannas (Herkert 1991).

Swink and Wilhelm (1994) report the habitat to be moist prairie with the following associates: *Andropogon gerardii*, *Asclepias sullivantii*, *Aster ericoides*, *Aster laevis*, *Comandra umbellata*, *Elymus canadensis*, *Euphorbia corollata*, *Helianthus grosseserratus*, *Helianthus rigidus*, *Liatris spicata*, *Lysimachia quadriflora*, *Oxypolis rigidior*, *Parthenium integrifolium*, *Phlox pilosa*, *Physostegia virginiana*, *Polygala verticillata*, *Ratibida pinnata*, *Silphium laciniatum*, *Silphium terebinthinaceum*, *Solidago nemoralis*, *Solidago rigida*, *Veronicastrum virginicum*, and *Zizia aurea*.

Native associates at Midewin National Tallgrass Prairie include: *Agrostis alba*, *Andropogon gerardii*, *Apocynum sibiricum*, *Aster ericoides*, *Aster novae-angliae*, *Aster pilosus*, *Eleocharis compressa*, *Elymus canadensis*, *Equisetum laevigatum*, *Fragaria virginiana*, *Helianthus grosseserratus*, *Hypericum sphaerocarpum*, *Lactuca canadensis*, *Liatris spicata*, *Panicum virgatum*, *Phlox pilosa*, *Prunella vulgaris*, *Physostegia virginiana*, *Rudbeckia hirta*, *Silphium integrifolium*, *Silphium laciniatum*, *Silphium terebinthinaceum*, *Solidago canadensis*, *Solidago graminifolia*, *Solidago rigida*, *Sporobolus asper*, and *Sporobolus heterolepis*.

SPECIES DESCRIPTION

The Nature Conservancy element abstract for *Tomanthera auriculata* (1989) described the plant as follows. Harshly scabrous, hemi-parasitic, annual herb with retorse-hirsute 4-angled stiff stem up to 8 dm. high. Leaves sessile, lanceolate or lance-ovate, 2.5-5.5 cm long and 0.8-2 cm broad, the uppermost with divergent basal auricles. Flowers sessile in leafy-bracted spikes; calyx campanulate, with unequal ovate-lanceolate lobes 0.9-1.2 cm long; corolla about 2 cm long, tubular campanulate with spreading lobes, pink with dark purple spots in the throat; upper filaments 5-6 mm lower about 10 mm long; style pubescent. Capsule broadly ovoid 10-14 mm long; seeds ovoid 1.2-1.6 mm long.

There are other species of *Agalinis*, for example *A. purpurea* and *A. tenuifolia* that might be found growing with *Agalinis auriculata*. Both of these are different enough to not cause problems in identification with *Agalinis auriculata*.

LIFE HISTORY

Agalinis auriculata is a hemi-parasitic plant. The Nature Conservancy element abstract for *Tomanthera auriculata* (1989) notes that it has been found parasitizing *Helianthus occidentalis* and *Rudbecki fulgida* and possibly the exotic grass *Poa compressa*.

The Nature Conservancy element abstract for *Tomanthera auriculata* (1989) reviews the reproduction and biology, the following is from this publication unless otherwise noted.

The flower structure would seem to indicate that it is insect pollinated. “Long tongued bees” and “Halacid bees” have been noted visiting the flowers. It appears the flowers have the ability to self-pollinate. The plant blooms during late August to early September with the seeds ripening in early November and dispersal occurring in the fall. Swink and Wilhelm (1994) note blooming dates from August 9 to September 13 in the Chicago area.

Seeds require light for germination which occurs in mid-March to April. Disturbances may provide the openness needed to provide the required light. At Romeoville Prairie in Will County, Illinois, *Agalinis auriculata* was found in ORV tracks from the previous year. At Goodenow Grove also in Will County, *Agalinis auriculata* shows up in mowed firebreaks. The seedlings remain small for a period of time then show a growth spurt. The growth spurt may be when the plant becomes associated with or starts to derive nutrition from the host plant. It is thought that *Agalinis auriculata* seeds can remain viable in the seed bank for a number of years but this hasn’t been proven yet.

Agalinis auriculata has frequently been associated with disturbed habitats. It has been found in formerly grazed habitats. Population size can fluctuate from year to year. The vigor of *Agalinis auriculata* is also quite variable; height and number of flowers produced can vary greatly. *Agalinis auriculata* has the habitat of “moving around” with plants found in one area one year and another the next. Population numbers also can vary from year to year. This variability may be the result of weather and/or disturbance patterns.

Agalinis auriculata is preyed upon by Buckeye butterfly (*Precis coenia*) larvae. The larvae show preference for floral parts, seed pods and apical tissue. Buckeye butterfly larvae have been seen feeding on *Agalinis auriculata* in the Prairie Parklands Assessment Area. There are also some suggestions that white-tailed deer (*Odocoileus virginianus*) browse on *Agalinis auriculata*

NATURAL AND HUMAN LAND USE THREATS

The Nature Conservancy element abstract for *Tomanthera auriculata* (1999) listed the following threats: development, conversion to cropland and succession to woody vegetation. Repeated mowing was also cited as a threat. Repeated mowing during the summer months kills or removes the flowering plants, reducing reproduction and has the potential to eliminate populations.

Exotic species also may be a threat to the populations. At Midewin National Tallgrass Prairie exotic woody vegetation such as black locust (*Robina pseudoacacia*), Autumn olive (*Elaeagnus umbellata*), multiflora rose (*Rosa multiflora*) and bush honeysuckles (*Lonicera* spp.) threaten the populations. Herbaceous exotics such as cut-leaf teasel (*Dipsacus laciniatus*), common teasel

(*Dipsacus sylvestris*) and Canada thistle (*Cirsium arvense*) may also threaten populations. At Des Plaines Conservation Area, cut-leaf teasel is known to threaten a population.

The lack of suitable disturbance levels (such as fire) may also pose a threat to this species. *Agalinis auriculata* has persisted with frequent burns at Paintbrush Prairie in Cook County, Illinois (Ron Panzer, pers. com.)

VIABILITY

To maintain minimum viable populations of *Agalinis auriculata* throughout its range, protection management and restoration of habitat should be provided. A viable population can be defined as “a population that has the estimated numbers and distribution of reproductive individuals to ensure the continued existence of the species throughout its existing range within the planning area. This will be accomplished by providing special management as necessary to allow the continued existence of this species. Menges (1992) suggested that minimum viable populations are the smallest size that can persist over a period of years (usually 100 is used) with a low extinction probability (less than 5%) and with enough genetic diversity to adapt to changing conditions in the environment. Good population data isn’t available, so a minimum population size is impossible to determine. In the mean time the following specific goals would increase the likelihood of maintaining a viable population.

1. Maintain and increase the existing populations of *Agalinis auriculata* by improving the current habitat. Protection and enhancement of these natural areas through appropriate management is necessary. Introduction of a disturbance regime to current habitat may also be necessary.

2. Reintroduction of *Agalinis auriculata* should be initiated in appropriate existing habitat once that habitat is restored to more natural and appropriate conditions for its survival.

Reintroduction of *Agalinis auriculata* should be initiated in appropriate reconstructed prairie habitat once reconstructions are in a stage where *Agalinis auriculata* is likely to survive. Host plants should be well established.

MANAGEMENT

To maintain and increase the existing populations of *Agalinis auriculata* throughout its habitat range, specific management practices will be needed.

1. Maintain and increase the existing population of *Agalinis auriculata* by improving the current habitat through the following management practices:

a. Prescribed fire or other disturbance regimes should be introduced into the existing prairie remnants with *Agalinis auriculata* to help control woody vegetation encroachment and exotic species and to provide the disturbance that may be necessary for seed germination. Dormant season prescribed burning should be preferred to prevent potential harm to the actively growing *Agalinis auriculata* plants. Mowing may also provide the necessary disturbance regime, but further studies are necessary to confirm this.

b. Hydrology restoration and woody encroachment control should be initiated through the removal of large woody vegetation (trees) and shrubs. Woody vegetation can remove water from the area and transpire it to the atmosphere, changing the microclimate of an area. This process causes the habitat to become drier than it should be and possibly less suitable for *Agalinis auriculata*. Woody vegetation can shade the habitat making it less desirable for *Agalinis auriculata* and other native vegetation. Woody vegetation should be removed in such a fashion as to not disturb the soil. Either the large woody vegetation can be girdled and left to slowly decompose, or they can be cut and dropped during the winter and the woody material removed. A stump or cut surface treatment of herbicide should be used to prevent resprouting.

c. Exotic species should be controlled within existing populations using an integrated pest management technique (including herbicides if appropriate) as outlined by Carroll and White (1997).

d. Restoration and reconstruction of areas with known populations should be initiated.

Adjacent restoration and reconstruction is necessary to control woody vegetation, exotic species and hydrologic problems with the adjacent areas to make them suitable for *Agalinis auriculata*. Areas that were originally prairie are suitable for restoration to provide potential *Agalinis auriculata* habitat.

2. Reintroduction of *Agalinis auriculata* into suitable habitat.

Following habitat restoration, *Agalinis auriculata* should be reintroduced into suitable habitat. Seeds should be used for reintroductions, since it appears difficult if not impossible to get plants established horticulturally. The seed source should be locally obtained. Scattering collected seed over appropriate habitat is the preferred method to introduce this species. Several sites have been known to have this species introduced accidentally with grass seed and hay (Steve Hill pers. com.). This species needs established host plants.

3. Other Management Considerations.

a. Recreational activities that cause trampling by humans or animals should be avoided during establishment and reintroduction. Once established the population may benefit from some disturbance. Recreational activities that promote the introduction of exotic species will be avoided.

b. Any development within existing areas of *Agalinis auriculata* should be minimized to prevent any harm to the population.

c. Mowing that may be harmful to *Agalinis auriculata* during the growing season. Mowing during the dormant season may be a beneficial disturbance to provide light necessary for germination.

d. Collecting of *Agalinis auriculata* plants will only be allowed for scientific reasons and only by permit.

MONITORING

Populations should be monitored on a yearly basis to determine the health of the population. At a minimum the number of flowering plants in each population should be counted. Once the populations get large, in the hundred's to thousands, representative samples of the population should be monitored. For at least one subpopulation, demographic data should be taken on a yearly basis until adequate demographic data is collected on *Agalinis auriculata*. Data taken should measure reproductive success. The demographic data collection could replace the population monitoring once the populations are large.

RESEARCH NEEDS

Information on the genetic diversity of possible seed sources would be useful to help determine the appropriate seed sources. Research on the genetic diversity of *Agalinis auriculata* overall would be useful in determining other possible seed sources and whether it would be desirable to introduce seed from several different populations.

Determination of the best methods for reintroduction and propagation would be useful. Horticultural production does not seem to be a viable option. *Agalinis auriculata* is a hemi-parasitic plant and it may be difficult to propagate or get *Agalinis auriculata* established.

Determination of host plants would be useful in reintroduction efforts.

Need to determine just how much, how often and what kind of disturbance is needed. Anecdotal evidence suggests this plant does well with burning. The impacts of grazing need to be examined, anecdotal evidence suggests grazing can be harmful and beneficial.

Any information on life cycle would be helpful.

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FIGURES

- 1) Figure 1. North American distribution of *Agalinis auriculata*
- 2) Figure 2. Illinois distribution of *Agalinis auriculata* by county