

**Species Status Assessment**  
of  
**Tennessee Milkvetch**  
**(*Astragalus tennesseensis*)**



*Photo by Alan Cressler*

Illinois Department of Natural Resources  
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## **Section 1: Species Description**

### Taxonomy

*Astragalus tennesseensis* Gray ex Chapman (Family: Fabaceae) is commonly known as Tennessee milkvetch throughout its range, given its most abundant and central distribution being located in central Tennessee (Baskin et al., 1972; NatureServe Explorer, 2023). It is taxonomically isolated from other members of its genus, being the only member of section *Tennesseensis*, and most closely related to *A. sanguineus* and *A. plattensis* (Baskin and Baskin, 2005; Edwards et al., 2004).

The current classification for *Astragalus tennesseensis* is (NatureServe, 2023):

Kingdom: Plantae

Phylum: Anthophyta

Class: Dicotyledoneae

Order: Finales

Family: Fabaceae

Its NatureServe Element Code is PDFAB0F8S0, and its USDA Plant Code is ASTE7 (NatureServe, 2023; USDA, 2023).

### Physical Characteristics

*A. tennesseensis* is a short-lived, herbaceous, perennial legume with a taproot that can bend around large rocks in its soil, but never forms a large storage organ (Schwegman, 1998). Their leaves have a maximum length of 13-25 cm and are pinnately compound with 20 to 40 leaflets. At its nodes are pale, green stipules that are “large and submembranous, becoming papery with age” (Baskin et al., 1972). Its inflorescence is an axillary raceme made up of 10 to 20 flowers with a creamy white to yellow color, and an average plant has 4 to 7 inflorescences per flowering period (Baskin et al., 1972; Edwards et al., 2004). The seed produced by this plant is contained within a hard, outer seed coat, and an internal seed coat, both of which help to stunt germination until conditions are appropriate (Baskin and Quarterman, 1969). Mature plants “produce elongated decumbent semi-woody stems, which die back under drought conditions or are maintained as winter growth,” and can be used to propagate the plant (Bowles et al., 1988).

### Habitat

*A. tennesseensis* is found only in cedar glades of northern Alabama and central Tennessee, as well as on limestone outcrops of Illinois (Baskin and Baskin, 1972; Schwegman, 1998). Most of the glades it is found in in central Tennessee are on top of thin-bedded limestone, which causes shallow soil mixed with humus and rock fragments, which *A. tennesseensis* root systems are designed to curve around. The plant tends to stay in the transitional zones between the cedar forest and open glade, usually found in soil that is 7-10 cm deep (although it can be found in soil 5-15 cm deep). In this transitional zone, most measures of light and moisture

indicate that the microhabitat provides intermediate amounts of both light and moisture than what is available in the open glade or forest floor. Here, its most frequent and abundant associate is a summer annual grass, *Sporobolus vaginiflorus* (Baskin and Baskin, 1972).

Herbarium specimen collections from Illinois indicate that now-extirpated populations in the state have usually occurred in dry habits (Baskin and Baskin, 1972). There remains one native population on a gravel hill prairie in Tazewell County, Illinois, although a second population was planted from seeds from the remaining population in 1992—however, this second population is thought to be extirpated (Edwards et al., 2004; Baskin and Baskin, 2005; Illinois Natural Heritage Database, 2023). At its remaining location in Tazewell County, it is found on a series of west to north-west facing sloping terrace edges and ravine slopes, with loamy to sandy gravel soils that stay drier than those of the surrounding level upland prairie (McClain and Ebinger, 2003; Baskin and Baskin, 2005; Schwegman, 1998).

*A. tennesseensis* habitat requirements are limited, as it cannot survive in open glade due to the soil becoming too dry during the summer, but is also relatively shade intolerant, meaning that it cannot survive on the forest floor (Baskin et al., 1972). While it can survive drought conditions due to its ability to drop its leaves and produce more amino acids to handle additional storage of nitrogen and carbon, it produces the most leaves when given full sun and watered every day (Baskin and Baskin, 1974; Baskin and Baskin, 2005).

### Life History and Reproduction

*A. tennesseensis* is known to flower sometime between late April and early May, and the seeds are matured by the middle of June and the pods are shed in late July. The seeds have no known dispersal mechanisms, although they may be washed a short distance away by rainwater (Baskin et al., 1972). For germination to occur, a hard outer seed coat and an inner seed coat must both be broken, which naturally happens with the overwintering process but can be simulated with some success using mechanical scarring (Baskin and Quarterman, 1969). This germination naturally occurs in early spring, when soil moisture is high, which is critical to seedling survival, especially in the first week. By the end of that week, the plant has formed its first true leaf, and over the following weeks will rapidly develop leaves and grow its roots, whose growth slows after 8 and 10 weeks, respectively (Baskin et al., 1972).

It can take *A. tennesseensis* several years before reaching maturity, and then it requires cross-pollination by several different bees, most consistently the bumblebee, for successful reproduction. Once the seed has matured, *A. tennesseensis* spends the rest of the summer in a vegetative state, shedding leaves in early autumn and producing overwintering rosettes from vegetative buds (Baskin et al., 1972). In Illinois, the plants live for about three and a half years, living for as long as seven years, and not flowering until their second year if they flowered at all. The greatest risk to the plant in its early stages of life is drought, although as it matures it seems to be attacked by unidentified insect larvae that feed on the stems of the plant. The use of fire seems to assist in breaking the hard seed coat, and can increase germination (Schwegman, 1998).

## Conservation Status

*A. tennesseensis* is globally ranked as G3 – Vulnerable, given its restricted range, specific habitat requirements, and national declining population. It is ranked as S3 – Vulnerable in Tennessee, **S1 – Critically Imperiled** in Illinois and Alabama, and SX – Presumed Extirpated in Indiana (Figure 1) (NatureServe Explorer, 2023). It was first listed as endangered in Illinois in 1980 due to restricted habitat and low populations (Mankowski, 2012). It is not federally listed (USFWS, 2023).

## Section 2: Range and Distribution

### Range

*A. tennesseensis* range is restricted primarily to the state of Tennessee, although there is one population in Illinois and a select few in Alabama. While the plant was formerly known to be found in Indiana as well, it is now presumed to be extirpated from that state (NatureServe Explorer, 2023). See Figure 1 for more details.

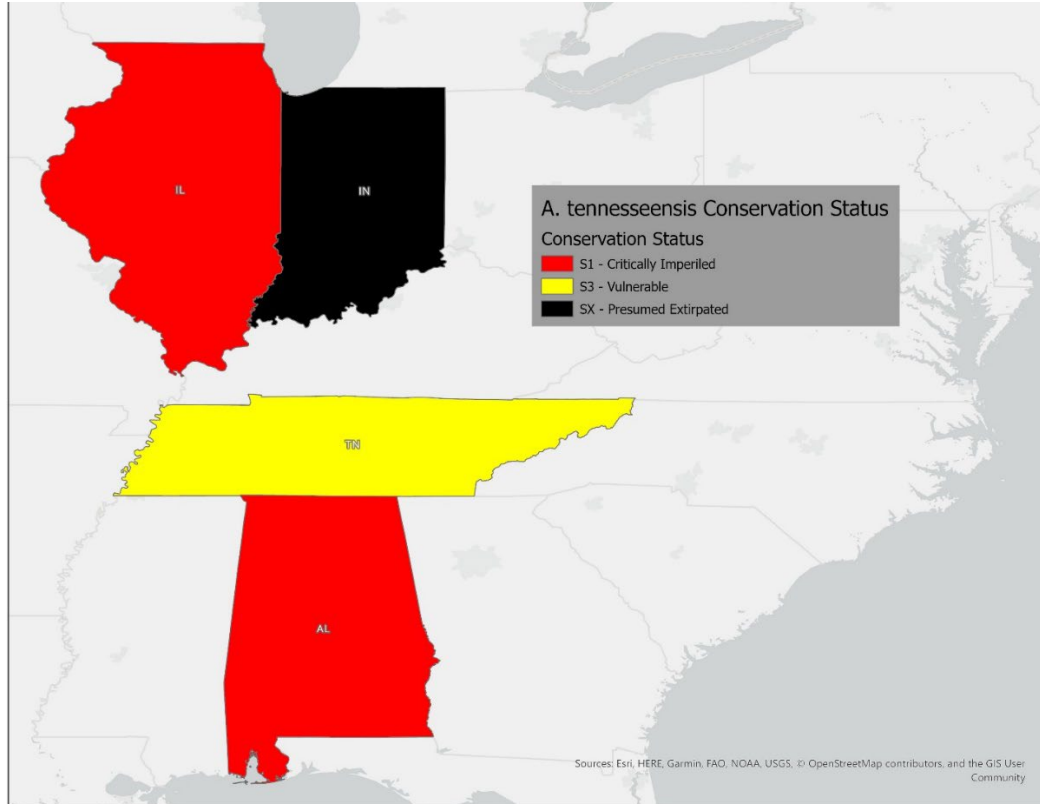


Figure 1: Nationwide Distribution and Conservation Status of *A. tennesseensis*

### Illinois Distribution

The only current, native location this species is found at in Illinois is on the terraces and hillsides of the [REDACTED]. In 1992 a population was planted at the [REDACTED], southeast of the [REDACTED], although the population has not been seen for many decades now (Figure 2) (Illinois Natural Heritage Database, 2023).

Historically, *A. tennesseensis* has been known in 11 different counties in northern Illinois (McClain and Ebinger, 2003).

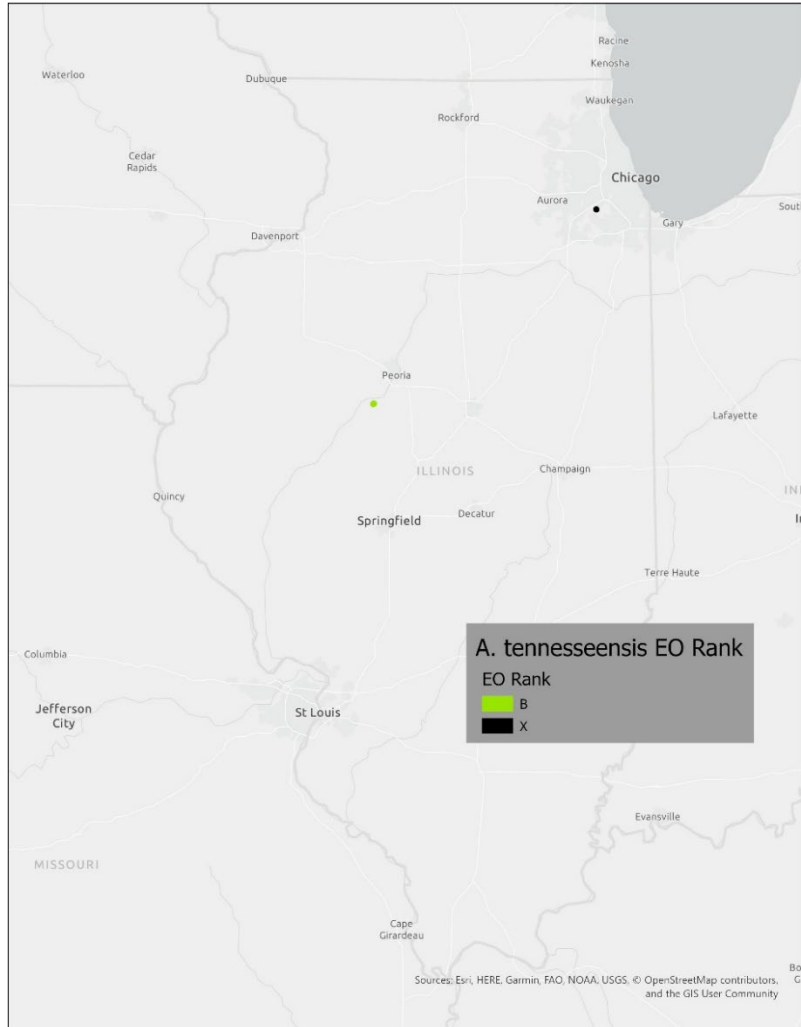


Figure 2: EO Rank of *A. tennesseensis* in Illinois

**Section 3: Abundance**

The abundance of the Illinois populations of *A. tennesseensis* is generally low, although it is noted that population fluctuations are common for the species and do not necessarily indicate a risk of extirpation (Schwegman, 1998). However, recent years consistently report low numbers of plants at their remaining locations (Table 1).

EO Number	Site Name	Last Observed Date	Plant Count at Last Observed Date	Acreage of EO
1	[REDACTED]	2020-05-27	2 flowering, 5 non-flowering, 2 seedlings	15.0
2	[REDACTED]	1996	1 flowering	3.3

Table 1: Abundance Measured by EO

#### **Section 4: Population Identification and Viability**

This assessment uses NatureServe’s EO Rank values to determine the viability of the *A. tennesseensis* populations in Illinois. Guidance for determining these Element Occurrence Records is provided by NatureServe and used by the Illinois Natural Heritage Database, using the 1-kilometer default minimum separation distance between observations of *A. tennesseensis*. This means that any observation of *A. tennesseensis* in Illinois that was greater than 1 kilometer away from an existing Element Occurrence would be recorded as a new Element Occurrence. See Table 2 and Figure 2 for more details. One EO is now found on a state-owned site (Illinois Natural Heritage Database, 2023).

<b>EO Number</b>	<b>EO ID Number</b>	<b>Site Name</b>	<b>Last Observed Date</b>	<b>EO Rank</b>	<b>Justification</b>
1	2266	[REDACTED]	2020-05-27	B	Despite current low population numbers, there is a history of regular fluctuation, and it is located on protected land
2	1179	[REDACTED]	1996	X	Despite multiple survey efforts, the population has not been seen for decades

Table 2: EO Rank and Justification

## **Section 5: References**

- Baskin, C. C. (1969). Germination Requirements of Seeds of *Astragalus tennesseensis*. *Torrey Botanical Society*, 315-321.
- Baskin, C. C. (1972). Observations on the Ecology of *Astragalus tennesseensis*. *The American Midland Naturalist*, 167-182.
- Baskin, C. C. (1974). Responses of *Astragalus tennesseensis* to Drought: Changes in Free Amino Acids and Amides during Water Stress and Possible Ecological Significance. *Oecologia*, 11-16.
- Baskin, J. M. (2005). Ecology of Two Geographically Restricted *Astragalus* Species (Fabaceae), *A. bibullatus* and *A. tennesseensis*, of the Easter United States. *Brittonia*, 345-353.
- Bowles, M. L. (1988). Propagation Techniques used in Establishing a Greenhouse Population of *Astragalus tennesseensis* Gray. *Natural Areas Journal*, 121-122.
- Edwards, A. L. (2004). Genetic Diversity in *Astragalus tennesseensis* and the Federal Endangered *Dalea foliosa* (Fabaceae). *The Journal of the Torrey Botanical Society*, 279-291.
- Illinois Natural Heritage Database. (2023, 5 7). *Astragalus tennesseensis*. Retrieved from Illinois Natural Heritage Database.
- Mankowski, A. (2012). *The Illinois Endangered Species Protection Act at Forty: A Review of the Act's Provisions and the Illinois List of Endangered and Threatened Species*. Springfield, IL: Illinois Endangered Species Protection Board.
- McClain, W. E. (2003). The Genus *Astragalus* (Fabaceae) in Illinois. *Transactions of the Illinois State Academy of Science*, 11-18.
- NatureServe. (2023, 5 7). *Astragalus tennesseensis*, *Tennessee Milkvetch*. Retrieved from NatureServe Explorer: [https://explorer.natureserve.org/Taxon/ELEMENT\\_GLOBAL.2.160713/Astragalus\\_tennesseensis](https://explorer.natureserve.org/Taxon/ELEMENT_GLOBAL.2.160713/Astragalus_tennesseensis)
- Schwegman, J. E. (1998). Some Aspects of the Life History and Population Dynamics of *Astragalus tennesseensis* A. Gray in Illinois. *Castanea*, 63-67.
- USDA. (2023, 5 7). *Astragalus tennesseensis* A. Gray ex Chapm. Retrieved from Plants Database: <https://plants.usda.gov/home/plantProfile?symbol=ASTE7>
- USFWS. (2023, June 6). *Listed Plants*. Retrieved from Environmental Conservation Online System: <https://ecos.fws.gov/ecp0/reports/ad-hoc-species-report?kingdom=P&status=E&status=T&status=EmE&status=EmT&status=EXPE&status=EXPN&status=SAE&status=SAT&mapstatus=3&fcrithab=on&fstatus=on&fspecrule=on&finvpop=on&fgroup=on&ffamily=on&header=Listed+Plants>