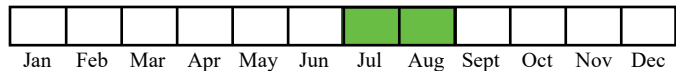


Best Survey Period



**Common name:** starry campion

**Legal status:** state threatened

**Global and state rank:** G5 (globally secure) / S2 (state imperiled)

**Other common name(s):** widowsfrill; widow's frill; whorled catchfly

**Family:** Caryophyllaceae

**Synonyms:** *Cucubalus stellatus* L.; *Evactoma stellata* var. *scabrella* Nieuwl.; *Silene scabrella* (Nieuwl.) G.N. Jones

**Taxonomy:** In the pink family (Caryophyllaceae), the genus *Silene* contains over 600 annual to perennial species that exhibit a diversity of morphological traits (glabrous to glandular-pubescent), sexual systems and arrangements (e.g., hermaphroditic, gynomonoecious, dioecious), corollas (white to pink petals with entire to fringed margins), pollination syndromes (generalist to specialized for nocturnal insects), and continental origin. Common characteristics of most *Silene* spp. are stems branching, leaf arrangement opposite or whorled, stipules absent, petioles absent or short, flower tubular to conical with at least 10 veins,

stamens 10, and fruit a grooved or winged three-to-five-times divided capsule. *Silene* is separated into several subgenera and sections to group more closely related species. *Silene stellata* is in subgenus *Behenatha*, section *Physolychnis* with over 100 species. These species are native to the Russian Far East, Arctic, North America, and high altitudes in Central Asia and South America. Most of section *Physolychnis* have upright stems and small, dissected petals, but few other common morphological traits. Genetic research of section *Physolychnis* indicates that hybridization events are common, which muddles the relationships among species (Petri and Oxelman 2011, Jafari et al. 2020).

**Total Range:** The native range of *S. stellata* is a continuous swath east of the Rockies in the United States of America: stretching from the plains in N. Dakota south to Texas east to Georgia, and north to Vermont. It is a relatively common plant throughout its range, except at certain geographic boundaries. It is ranked S2 (Imperiled) in Louisiana in the southwest, S2 in Michigan in the northcentral, and S2 and SX (Presumed Extirpated) in Connecticut and New Hampshire respectively in the northeast.



It is ranked as an exotic plant in Ontario (Kartesz 2015, NatureServe 2024), but it has not been found since its initial collection in 1941, a population considered introduced by experts, and it is not considered present in the province at the time of this report (Morton 2005).

**State Distribution:** In Michigan, natural populations of *S. stellata* have been documented in eight counties in the far southwestern and southcentral portion of the state: Berrien, Branch, Calhoun, Cass, Hillsdale, Jackson, Kalamazoo, and St. Joseph. However, its presence in four counties is based on a single vague record that overlaps the corners of Branch, Calhoun, Jackson, and Hillsdale Counties. Known extant populations are in only Berrien, Cass, Kalamazoo, and St. Joseph Counties (MNFI 2024). Michigan is part of the northern most extent of its range (Kartesz 2015).

**Recognition:** *Silene stellata* is a perennial herb with a thick taproot and multiple stems stretching 30–90 cm (12–35 in.) tall. The stems have fine hairs but may become glabrous near the base. Leaves are arranged in **whorls of four except for the uppermost and lowermost nodes** which have an opposite leaf arrangement. Leaves are sessile or have very short petioles, and leaf blades are lanceolate to ovate-lanceolate, 3–10 cm (0.8–3.9 in.) long and 4–40 mm wide (0.2–1.6 in.) with fine pubescence on both surfaces and entire margins. The inflorescence is of multiple, open panicles with straight pedicels that are 1–3 times longer than the sepals. There are typically more than 20 flowers per panicle. All flowers are perfect (containing both male and female parts). The calyx (i.e., all sepals together) have 10 obscure veins with sparse and fine pubescence. Inside the calyx are **five white petals that are divided into 4–12 lobes down half of the length** of the petal. The deeply divided petals lend a starry or stellate appearance and provide the reason for both the scientific and common name. Flower petals are 7–11 mm (0.3–0.4 in.) wide by 6–10 mm (0.2–0.4 in.) long. It has a conspicuous superior ovary, three styles, and ten stamens, all ten of which ripen simultaneously around dusk. Capsules are globose with three



triangular teeth containing dark brown seeds, about 1 mm (0.04 in.) in size. The variety that grows in Michigan (*S. stellata* var. *scabrella*) has **scabrous flower stems (i.e., pedicels) and calyx** (Morton 2005). *Silene stellata* blooms from early July through the end of August (MNFI 2024), although it may bloom into September and October in the more southern parts of its range.

*Silene stellata* could be mistaken for other white flowered species in the pink family (Caryophyllaceae), but its **whorled leaves combined with five white petals that are deeply divided into four or more lobes** distinguish it (Morton 2005).

**Best survey time/phenology:** It is easiest to distinguish *S. stellata* while it is flowering from July through August (MNFI 2024).

**Habitat:** The species is primarily documented in prairies, savannas, oak forests, forested slopes, and riverbanks, on drier or well-drained soils, and tolerating a variety of shade (Morton 2005, Haines 2011, Wilhelm and Rehrich 2017). Occasionally it is found in more disturbed areas like utility cuttings and disturbed forests. Habitat in Michigan is diverse. *Silene stellata* has been documented in various forests from floodplain to mesic southern to dry southern to dry-mesic southern forest. The



most consistent forest type is dry-mesic southern forest, often remnants that show evidence of having once been more open, barrens-like habitats with a historical frequent fire regimen. Today, *Silene stellata* can rarely be found in degraded remnants of mesic prairies, oak barrens, and oak openings. Hillside populations are documented for several Michigan populations, but it is uncertain if that is a preference of the species, or the most suitable remnant habitat after colonization, development, and/or fire suppression (MNFI 2024).

Commonly associated trees in Michigan include white oak (*Quercus alba*), bur oak (*Q. macrocarpa*), red oak (*Q. rubra*), black oak (*Q. velutina*), black cherry (*Prunus serotina*), pignut hickory (*Carya glabra*), sassafras (*Sassafras albidum*), black walnut (*Juglans nigra*), ash (*Fraxinus* spp.) and elm (*Ulmus* spp.). Associated shrubs include dogwood (*Cornus alternifolia*, *C. florida*, *C. foemina*), hazelnut (*Corylus americana*), huckleberry (*Gaylussacia baccata*), pasture rose (*Rosa carolina*), northern dewberry (*Rubus flagellaris*), leadplant (*Amorpha canescens*), and low sweet blueberry (*Vaccinium angustifolium*). Common herbaceous associates include big bluestem (*Andropogon gerardii*), Canada brome (*Bromus pubescens*), panic grass (*Dichanthelium implicatum*), Pennsylvania sedge (*Carex pensylvanica*), sedge (*Carex cephalophora*), hog-peanut (*Amphicarpaea bracteata*), thimbleweed (*Anemone virginiana*), smooth pussytoes (*Antennaria parlinii*), flowering spurge (*Euphorbia corollata*), big-leaved aster (*Eurybia macrophylla*), bedstraw (*Galium* spp.), tick-trefoil (*Hyloidesmum glutinosum*, *H. nudiflorum*), may-apple (*Podophyllum peltatum*), late figwort (*Scrophularia marilandica*), prairie-dock (*Silphium terebinthinaceum*), goldenrods (*Solidago altissima*, *S. caesia*, *S. speciosa*), heart-leaved aster (*Symphyotrichum cordifolium*), common spiderwort (*Tradescantia ohiensis*), ironweed (*Vernonia gigantea*, *V. missurica*), and culvers-root (*Veronicastrum virginicum*) (MNFI 2024).

**Biology:** *Silene stellata* is a perennial arising from a stout tap root. It flowers from July through



August, and September in the southern parts of its range. Studies of seed set reveal self-fertilization of *S. stellata* is less than 20%, and that which happens is usually pollination between different flowers on the same plant. It is pollinated primarily by nocturnal moths, but it can be pollinated by diurnal pollinators like halictid bees, syrphid flies, and bumble bees. *Silene stellata* has the following adaptations to facilitate the attraction of nocturnal moth pollinators: white petals, long floral tube, and a strong scent released at night when the ten stamens ripen (i.e., anthesis).

*Hadena* moths, specifically *H. ectypa*, the champion coronet moth, is a common pollinator, although *H. ectypa*'s range does not yet extend into Michigan. *Hadena ectypa* are most abundant when *S. stellata* is first flowering, and other copollinators become more abundant later in the season. This phenological alignment is believed to be related to the seed predation of *H. ectypa* larvae on young *S. stellata* fruits. After nectaring, female *H. ectypa* will lay one to several eggs at the base of the ovary of a young flower, preferably one that has not been pollinated. The larvae will eat young fruits, having difficulty with the harder coating on older fruits. In some cases, larvae will remain on the same plant for its entire larval stage. Although *H. ectypa* may be mostly obligate to *S. stellata*, it does not pollinate or benefit *S. stellata* more than the other nocturnal copollinators: it is considered to have a net negative to neutral relationship with *S. stellata* while other copollinators are considered mutualistic





(Reynolds et al. 2009, Kula 2012, Reynolds 2012, Callisto et al. 2013, Kula et al. 2013, Doubleday and Adler 2017, Zhou et al. 2018a, 2018b). Fruit predation by *H. ectypa* ranges from 10–50% during season (Zhou et al. 2020). Seeds disperse through passive gravity (Zhou 2017).

White-tailed deer (*Odocoileus virginianus*) have been observed eating the tops of *S. stellata*.

Many *Silene* species are affected by the anther smut fungus *Microbotyrum violaceum*, but hundreds of herbarium samples of *S. stellata* have shown no fungal infections (Hood et al. 2010).

**Conservation/management:** Records of *S. stellata* in four Michigan counties are vague and considered historical. Fifteen Michigan populations are believed to be extant. Of these, viability has been estimated for eight populations. Estimated viability ranges from poor to fair. Analysis of suspected areas and conducting surveys in suspected suitable habitat would improve statewide assessment of the species. The primary conservation strategy for this species currently is to protect its habitats including savannas, barrens, and oak forests in the southern Lower Peninsula of Michigan. Restoration of management practices in these habitats like prescribed burning are also likely to benefit the populations. Additional threats of deer over browsing and invasive species such as garlic mustard (*Alliaria petiolata*), invasive barberry (*Berberis thunbergii*, *B. vulgaris*), autumn olive (*Elaeagnus umbellata*), bush honeysuckle (*Lonicera maackii*, *L. morrowii*), and reed canary grass (*Phalaris arundinacea*) have been identified where sufficient data are available (MNFI 2024). Reduction of white-tailed deer populations and reinstitution of prescribed burns would likely reduce those threats.

Some populations persist in utility line or railroad rights-of-way and could be threatened by right-of-way maintenance activities such as herbicide application. Other right-of-way maintenance activities may benefit populations (i.e., controlling woody encroachment).



*Hadena ectypa*, photo by David George, Stephen Dunn, and Jeff Nizniz, licensed under CC BY-NC 4.0

In areas where *S. stellata* and its seed predator *H. ectypa* coexist, *H. ectypa* predaes high- and low-density areas of *S. stellata* equally, thus affecting the low-density populations greater and increasing their chances of local extirpation (Kula et al. 2014). Since all of Michigan’s remaining populations appear to be low-density, the potential expansion of *H. ectypa*’s range into Michigan from nearby states to the south could be detrimental to its continued existence in the state.

Climate change is a threat to *S. stellata* on several fronts: it could 1) change the synchrony between pollinators and flowering time, 2) improve synchrony with seed predator *H. ectypa* and increase levels of seed predation, or 3) facilitate range expansion of *H. ectypa* north into Michigan. *Hadena ectypa* is a critically imperiled species in parts of its range, but this does not seem to coincide with where *S. stellata* is threatened or of special concern.

**Comments:** *Silene stellata* is called “wewep” by the Meskwaki tribe and “wawapin” by the prairie Potawatomi tribe. Both used the roots of *S. stellata* as a poultice to dry up pus-secreting, swollen, and infected sores. There are also records of the poultice being used as treatment for aches, sprains, and open sores. Like many other plants, *S.*



*stellata* had a reputation for negating the effects of venomous snake bites, but most believe that it was more of a placebo and the lack of potency of the bite was what facilitated the belief (Adkins 2006, Runkel and Bull 2009).

**Research needs:** Further research into the possible effects of climate change on *S. stellata* and *H. ectypa* are needed to best plan for the species' continued conservation in Michigan.

Research into the lack of fungal infections of the anther smut *Microbotyrum violaceum* in *S. stellata* could prove valuable to the conservation of other *Silene* spp. This information may also prove valuable to preventing *S. stellata* from becoming affected.

**Related abstracts:** Bur oak plains, dry southern forest, dry-mesic prairie, dry-mesic southern forest, floodplain forest, hillside prairie, mesic prairie, oak barrens, oak openings, leadplant (*Amorpha canescens*)

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