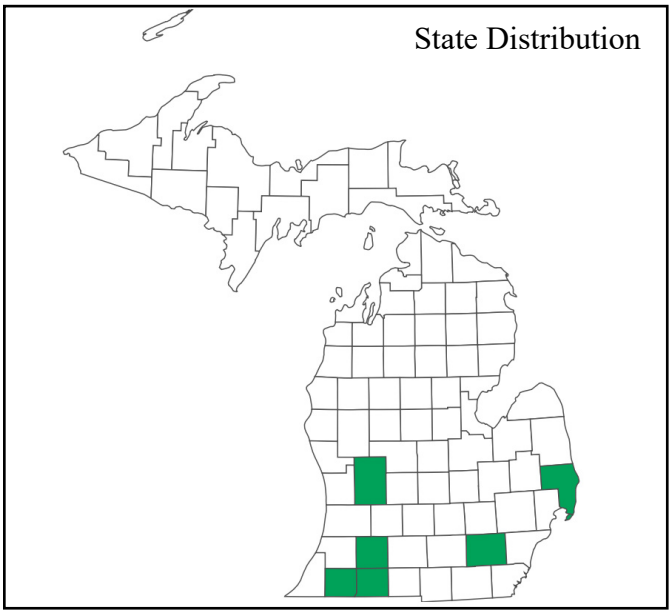
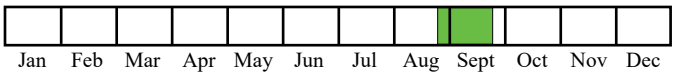
Gentiana flavida A. Gray — White gentian



Best Survey Period



Status: State Endangered

Global and state rank: G4 (Globally Apparently Secure) / S1 (State Critically Imperiled)

Other common name(s): Yellowish gentian; yellow gentian; pale gentian; cream gentian

Family: Gentianaceae (gentian family)

Synonyms: *Gentiana alba* Muhl. ex Nutt., *Dasystephana flavida* (A. Gray) Britton.

Taxonomy: The nomenclature of this species has been the subject of discussion for several decades, with Pringle (1965, 1967) recognizing *G. alba* Muhl. ex Nutt. as the earliest valid name in his detailed works on Gentianaceae. Recent authors, however, have disputed the validity of the initial description by G. H. E. Muhlenberg in 1813 along with a subsequent publication by T. Nuttall recognizing the name *G. alba* in 1818. Consensus among most modern taxonomists is that *G. flavida* Gray is the earliest validly published name (Pringle 2024), however, some sources still recognize this species as *G. alba* (Reznicek et al. 2025).

Within *Gentiana*, *G. flavida* is in section Pneumonanthe together with most other North American species and all other Michigan species. Hybridization is common in this section, and *G. flavida* is known to hybridize with *G. andrewsii* (bottle gentian) and *G. puberulenta* (prairie gentian, State Endangered), though only hybrids with *G. andrewsii* have been documented in Michigan (Pringle 2024, Reznicek et al. 2025). The epithet *flavida* refers to the yellowish color of the corolla.

Total Range: The primary distribution of *G. flavida* is centered around the central and southern Midwest with scattered, disjunct localities eastward through the foothills of the Appalachian Mountains (Kartesz 2015). Populations are most widespread and frequent in Illinois (SNR: No Status Rank), Indiana (S3: Vulnerable), Iowa (S3), Minnesota (SNR), Missouri (SNR), and Wisconsin (S4: Apparently Secure), extending westward and southward into Nebraska (S1: Critically Imperiled), Kansas (S2: Imperiled), Oklahoma (S1) and Arkansas (S1).

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Disjunct populations appear with increasing rarity eastward through Indiana (S3), Ohio (S2), Kentucky (S2), Michigan (S1), Ontario (S1), and West Virginia (S1) (NatureServe 2025). *Gentiana flavida* is ranked SH (Possibly Extirpated) in both Pennsylvania and North Carolina (NatureServe 2025). Disjunct populations were hypothesized by Pringle (1967) to be relicts from the Hypsithermal, a warm period following the Wisconsin glaciation when prairie habitat extended into the eastern deciduous forest of North America (Transeau 1935).

State Distribution: All documented observations of *G. flavida* in Michigan are limited to the southern four tiers of counties in the Lower Peninsula. Among the eighteen recorded occurrences, fifteen are considered historical, with only three of these documented more recently than the 1960s: two in Cass County in 1999, one in Washtenaw County in 1988 (MNFI 2025). Historical records are mapped from Kalamazoo, Kent, St. Clair, St. Joseph, and Washtenaw Counties. Historical records from Berrien, Genesee, and Oakland Counties have not yet been mapped due to vague location information (MNFI 2025).

Recognition: *Gentiana flavida* is a member of the true gentians (genus Gentiana, family Gentianaceae), a group easily recognized for their large, trumpet-like flowers with vividly purple, blue, or white corollas of fused petals. In several Michigan species, the corollas are often conspicuously closed in on themselves before and occasionally during their flowering periods, between late summer and fall, producing a distinct bottle-shaped appearance that hides the reproductive organs within. At anthesis, *G. flavida* will typically be partially to fully open, with younger flowers closed (Cooperrider 1995).

Plants range from 30-100 cm tall. Individual genets are composed of a deep taproot with 1-10 clustered unbranched, laxly spreading to erect stems terminating in dense cymes of up to 20 flowers, with possible smaller cymes at the uppermost 1-2 nodes. Stems are glabrous with opposite cauline leaves

usually between 2.7 and 5 cm broad and lanceolate-ovate in outline with an acuminate apex. As its scientific name suggests, the corollas of the flower are cream-colored white with inconspicuous green venation, lending a greenish-yellowish tinge to the flowers. The winged seeds are produced in a capsule. Neither the leaves nor the calyces are ciliate.

White-flowered (leucistic) variants of other species in *Gentiana* may be confused with *G. flavida*, particularly those of the more common and widespread (and typically purple-colored) bottle gentian (*Gentiana andrewsii* var. *albiflora*). *Gentiana flavida* can be distinguished from *G. andrewsii* by the complete lack of hairs on the calyx lobes, leaf blades usually greater than 2 cm broad, and plaits (folds between corolla lobes) shorter than the corolla lobes (Reznicek et al. 2025). White-flowered gentians north of the climatic tension zone will either be leucistic variants of red-stemmed gentian (*G. rubricaulis*) or the rare narrow-leaved gentian (*G. linearis*, State Threatened) (Reznicek et al. 2025). Hybrids with *G. andrewsii* [*G.* × *pallidocyanea* J. S. Pringle] have been occasionally observed in

Michigan. These will be intermediate in calyx lobe ciliation, corolla color, and width of the cauline leaves (Pringle 1967, Reznicek et al. 2025).

Best survey time/phenology: *Gentiana flavida* is best identified during its flowering period from late August through September. Ripe capsules can be observed until November.

Habitat: Gentiana flavida is a prairie and open woodland species, typically occurring in open conditions with a strong adherence to calcareous substrates (Pringle 1965, 1967). Outside of Michigan, the species occurs in rich prairies, limestone glades and escarpments, sandy oak savannas, and rich woodlands and slopes (Pringle 1967, Yatskievych 2013, Adams and Thompson 2017, Holmes et al. 2023). The few records from Michigan are mostly dated and vague. Insofar as habitat data are available, *G. flavida* has mostly been documented in sand or loamy sand within moist to dry prairies, savannas, or sparse forests, particularly within prairie remnants associated with railroads (MNFI 2025). Based on reports from Michigan and nearby states within the range of *G. flavida*, historic habitat may have included the following natural communities in southern Michigan: dry-mesic and mesic prairie (S1), mesic sand prairie (S1), hillside prairie (S1), dry-mesic and dry southern forest (S3), oak barrens and openings (S1), and bur oak plains (SX, State Extirpated) (MNFI 2025). Descriptions of soil conditions in both Michigan and the Chicago area suggest a preference for sandy and loamy textures (Pringle 1965, Wilhelm and Rericha 2017, MNFI 2025).

Documented associated species within Michigan include *Andropogon gerardii* (big bluestem), *Anemone cylindrica* (thimbleweed), *Bromus inermis* (smooth brome), *Carex pensylvanica* (sedge), *Ceanothus americanus* (New Jersey tea), *Coreopsis tripteris* (tall coreopsis), *Corylus americana* (hazelnut), *Euphorbia corollata* (flowering spurge), *Helianthus divaricatus* (woodland sunflower), *Liatris scariosa* (northern blazing star), *Monarda fistulosa* (wild-bergamot), *Pteridium aquilinum*

(bracken), *Quercus alba* (white oak), *Q. macrocarpa* (bur oak), *Q. velutina* (black oak), *Poa pratensis* (Kentucky bluegrass), *Ratibida pinnata* (yellow coneflower), *Rhus typhina* (staghorn sumac), *Salix humilis* (prairie willow), *Saponaria officinalis* (soapwort), Sassafras albidum (sassafras), *Silphium integrifolium* (rosin weed, State threatened), *Solidago canadensis* (Canada goldenrod), *S. rigida* (stiff goldenrod), *Sorghastrum nutans* (Indian-grass), *Symphyotrichum laeve* (smooth aster), *S. oolentangiense* (sky blue aster), *S. pilosum* (frost aster), *Taenidia integerrima* (yellow-pimpernel), *Tradescantia ohiensis* (common spiderwort), and *Veronicastrum virginicum* (Culver's-root) (MNFI 2025).

Gentiana flavida is apparently robust when planted in suitable habitat and has been observed withstanding invasion by non-native weeds (Gardner 2016). As suggested by its success in garden conditions (Yatskievych 2013), *G. flavida* may continue to gain popularity in prairie planting and restoration. We recommend caution regarding the plant-

ing of rare species and keeping planting records whether rare species are used or not.

Biology: *Gentiana flavida* is a perennial forb of calcareous moist prairies and oak savannas (Pringle 1967). The species is pollinated by both bumblebees (*Bombus* spp.) and ants of the genus *Dolichoderus* (Wilhelm and Rericha 2017).

Conservation/management: *Gentiana flavida* is of major conservation concern in Michigan. Since collections began in the 1810s, only 18 recorded occurrences have been documented in the state, 15 of which are known only from historical records (MNFI 2025). Of the three occurrences verified since the 1980s, one each is ranked BC (Good to Fair estimated viability), C (fair estimated viability), and CD (fair to poor estimated viability). All three of the extant populations are in isolated railroad rights-of-way (MNFI 2025).

The decline of G. flavida in Michigan is likely a direct result of three factors: (1) largescale transformation of southern Michigan prairies and oak savannas to agriculture and development, (2) suppression of fire in remnant populations, and (3) management of rights-of-way with bulldozing and herbicide overspray. Much of *G. flavida*'s historical habitat has converted to agriculture, development, or closed-canopy forest, with only a miniscule fraction of historic prairie and oak savanna remaining within the state (Cohen et al. 2015).

Management of *G. flavida* should focus on maintaining open habitats not only to maintain the appropriate light regime but also the appropriate circumneutral to alkaline soil conditions. A study in oak opening systems in Ohio where *G. flavida* persists as a relic prairie component found calcareous soil presence only in open to semi-open conditions, with acidic soils occurring in nearby complete oak overstory (Holmes et al. 2023), suggesting potential acidification following the transition of savanna to forest. In areas where controlled burns are feasible, periodic fire to reduce shrub growth and deter invasive species may benefit *G. flavida*; mowing may

be a suitable alternative where fire is inappropriate (Van Dyke et al. 2004).

Notes on other species of *Gentiana* in Ohio suggest that the flowers and capsules may be susceptible to predation by insect larvae, further imperiling recruitment within small isolated colonies (Cooperrider 1995). One record in Michigan noted the occurrence of caterpillars within the ovaries of *G. flavida* (MNFI 2025).

Comments: Yatskievych (2013) reports this species to be an excellent choice for the garden due to its hardy nature, perennial habit, and showy flowers late into the season, as does Pringle (1965), describing it as "one of the… most robust of all the gentians".

Research needs: Beyond some contemporary studies examining it as a component in prairie relicts (Kiironomos 2002, Adams and Thompson 2017; Holmes et al. 2023), little scientific research has been published on the ecology and reproduction of *G. flavida*. Species-specific studies, particularly on the ecological processes that allow for *G. flavida*'s persistence across its range, would be beneficial for its conservation. Additional research into G. *flavida*'s life history would aid in understanding the long-term survivability of the species, particularly regarding seed germination, response to fire, and pollination.

A full status survey of remaining *G. flavida* populations is required to accurately assess the current species' viability in Michigan. Although unlikely, new populations may potentially be found in remnant prairies and oak savannas, particularly along railroad rights-of-way, and possibly in road and utility right-of-ways or cemeteries where soil conditions and overstory dynamics have been maintained.

Related abstracts: bur oak plains, dry-mesic prairie, dry southern forest, dry-mesic southern forest, hillside prairie, mesic prairie, mesic sand prairie, oak openings, oak barrens, rosinweed

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