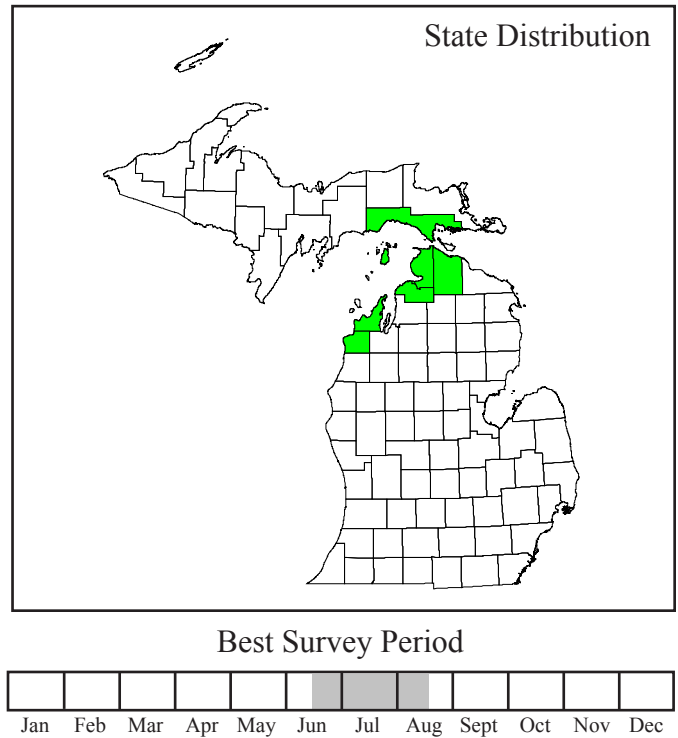


# *Mimulus michiganensis* (Pennell) Posto & Prather Michigan monkey-flower



**Status:** Federal and state endangered

**Global and state rank:** G5T1/S1

**Family Name:** Scrophulariaceae (figwort family)

**Other common names:** Yellow monkey-flower, monkey-flower.

**Taxonomy:** *Mimulus glabratus* occurs from southern Canada to Mexico and southern Chile, and is comprised of at least seven named varieties. These varieties are strongly correlated with well documented geographical, morphological, and other differences, such as allozyme and cytogenetic characteristics (Vickery 1990). There has been considerable research on the origin and taxonomy of Michigan monkey-flower; one hypothesis is that it is a genetic variant of var. *jamesii*, whereas others have hypothesized that it was derived as a result of hybridization between *M. guttatus* and *M. glabratus* var. *jamesii*, based on the intermediacy of its morphological characteristics and the relative infertility. More recent genetic research involving molecular analyses, including DNA sequencing, has been conducted at Michigan State University, resulting in the elevation of this taxon to full species status based on the research of Posto and Prather (2003).

**Total range:** The global range of Michigan monkey-flower is restricted entirely to Michigan, where it occurs in the Grand Traverse and Straits of Mackinac regions (Voss 1996).

**State distribution:** Seventeen occurrences of this taxon have been documented within the state, ranging from Benzie and Leelanau counties in northwestern Lower Michigan to Mackinac County in the eastern Upper Peninsula. Two of these occurrences are known only from historical records, including a record for the west shore of Burt Lake and the west shore of Mullett Lake. Searches of the latter two localities have not been successful, although the colonies persist elsewhere along these lakes. Occurrences of Michigan monkey-flower are often very localized, sometimes consisting of small but dense patches restricted to small seeps, springs, and depressions, whereas others are comprised of numerous patches of plants widely dispersed along small streams and spring-fed seeps within northern white cedar swamps. Large to moderately-sized populations of this plant include occurrences on Glen Lake, Burt Lake, and portions of the Mackinac County shoreline within the Manitou Payment Highbanks formation in the Brevort to Epoufette region.

**Recognition:** *Mimulus michiganensis* is an aquatic to semi-aquatic perennial plant characterized by its



mat-forming, clonal growth habit. The stems, which range to about 40 cm or more in length, are lax and reclining at their base, rooting freely at the lower leaf nodes to produce numerous additional shoots via stolons (aboveground stems). Propagation in this manner often results in the production of clones of up to several hundred stems or more. The **broadly ovate to roundish, opposite leaves are inconspicuously to coarsely sharp-toothed** and have leafstalks that are usually shorter than the blades. Upward the leaves become somewhat reduced and shorter-stalked. **Bright yellow, snapdragon-like, tubular flowers** are produced from the upper leaf axils, borne on slender pedicels that may be longer than the leaves. The **two-lipped flowers range from 16-27 mm in length and have an irregularly red-spotted lower lip and tube**. The three-lobed, heavily bearded lower lip forms a wide landing platform for insect pollinators; the upper lip bears two upright lobes. The fruit, which is seldom produced, consists of an oblong, pointed capsule ca. 8-10 mm long, containing numerous oval seeds with longitudinal striations (USFWS 1997).



Michigan monkey-flower is most likely to be confused with the more common, wide-ranging James' monkey flower (*M. glabratus* var. *jamesii*), a closely related taxon (and also commonly known in older manuals as *M. glabratus* var. *fremontii*) that can be distinguished by its usually smaller flowers that range from 8-18 mm in length. Despite some overlap in flower size between these varieties, the consistently different style and pistil lengths (2.8-4.6 mm and 6.3-9.3 mm, respectively, in var. *jamesii* versus 8.1-9.1 mm and 15.4-17.8 mm, in *M. michiganensis*) can be used to most reliably separate them, as noted by Bliss (1986, 1983). Spots on the corolla of var. *jamesii* are usually only on the tube. Vegetative characters of the two varieties have considerable overlap and cannot be used to dependably distinguish them. The leaves of var. *jamesii* are usually smaller, have shorter stalks, and are less conspicuously toothed. *Mimulus guttatus* (common monkey-flower), a predominantly western species known from a single Michigan locality in the western Upper Peninsula, also has some size overlap with Michigan monkey-flower. *M. guttatus*, however, is a more erect, robust plant with much larger flowers that may range from 16-45 mm in length (Minc 1989). Additional distinguishing floral

characters include larger, better developed calyx lobes, a wider corolla, and a more strongly spotted throat and floral tube.

**Best survey time/phenology:** Flowers are needed in order to reliably identify this plant, especially to distinguish it from the closely related James' monkey-flower, with which it sometimes grows. Michigan monkey-flower begins to bloom by about mid-June, reaching its peak in late June and July, and commonly continuing into the first half of August.

**Habitat:** Michigan monkey-flower is restricted to alkaline habitats, occurring in marly springs and seepages, cold groundwater-fed streams in cedar swamps, and also inhabiting alkaline shorelines at the mouth of small drainages. It frequently occurs in northern white cedar (*Thuja occidentalis*) swamps formed in drainages at the base of relatively steep, moraine slopes and bluffs. This taxon flourishes best within canopy openings, along forest edges, or along streams adjacent to open, meadow-like areas. It flowers most abundantly when growing in full sunlight, although it will persist in sterile condition under heavy canopy cover. In addition to northern white cedar, common and indicator associates include *Nasturtium officinale* (watercress), *Caltha palustris* (marsh-marigold), and *Impatiens capensis* (jewelweed). *Myosotis scorpioides* (forget-me-not), though a non-native garden escape, is often present. Beadle (1990), in an extensive rangewide survey of Michigan monkey-flower habitat, summarized the specific abiotic requirements of this taxon. Beadle found that colonies nearly always occurred in silty-sand in cold, flowing water that ranged from 8.7 ° to 16.6°C. Beadle also found that Michigan monkey-flower occurs in an exceptionally narrow pH range of 7.66 to 8.21.

**Biology:** Flowering occurs from June to August, with some blooms produced occasionally in October. Otherwise, the life history of this taxon is poorly known, due in part to the lack of long-term monitoring data as well as the many difficulties involved in studying this rare plant. Bliss (1986), however, established that Michigan monkey-flower produces little viable pollen, and only one site was found to produce an appreciable amount of seed. Bliss concluded that this plant is thus nearly totally dependent on vegetative propagation. The lack of seed production and yet the persistence of colonies indicates that this monkey-



flower is able to overwinter as a dormant aquatic plant. Dispersal for many colonies undoubtedly takes place via the fragmentation of clonal colonies, from which stems can be readily detached and dispersed downstream for the establishment of new colonies. The semi-prostrate, clonal growth habit often produces luxuriant mats, as the semi-reclining stems readily root from their leaf nodes.

**Conservation/management:** The primary conservation need for this globally critically imperiled taxon is the protection of habitat for all sites. Beyond the direct protection of colonies, the major need is the prevention of habitat degradation, especially with regard to alterations in local hydrology that influence any aspect of flow regime and water quality.

**Comments:** Recent molecular investigations indicate that Michigan monkey-flower may be an old hybrid between common monkey-flower and James' monkey-flower, which corroborates the strong intermediacy of Michigan monkey-flower's morphological characters, and may also explain the relative infertility of plants.

**Research needs:** Genetic research is highly desirable in order to ascertain the origin and more appropriate taxonomic standing for this rarity. Population monitoring and studies of population demography, including genetic analyses of population structure, are urgently needed in order to information that will provide the best guidance in the management of populations and their habitat.

**Related abstracts:** Wooded dune and swale, limestone oak fern.

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#### Abstract citation:

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