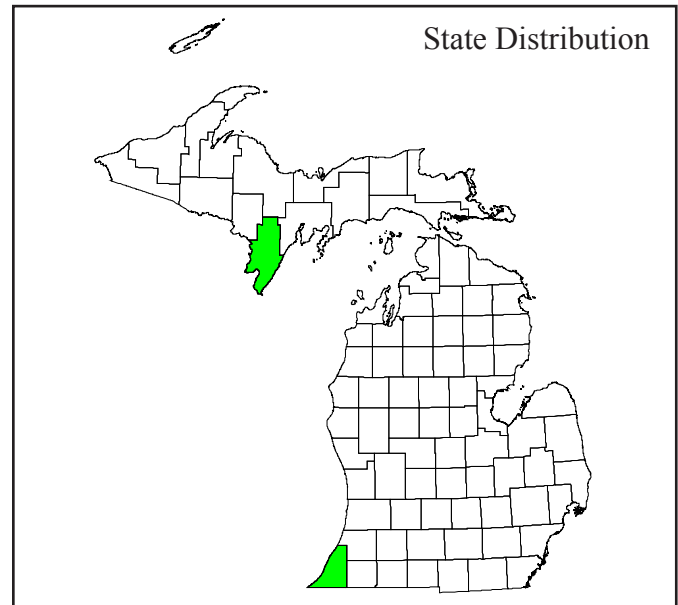
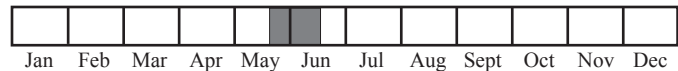




Photo by Susan R. Crispin



Best Survey Period



Status: State threatened

Global and state rank: G5/S1

Other common names: Pride of Ohio, prairie shooting star, shootingstar

Family: Primulaceae (primrose family)

Synonym: *Primula meadia* (L.)A.R.Mast & Reveal

Taxonomy: In addition to the typical variety, *Dodecatheon meadia* includes var. *brachycarpum* (Small) Fassett, found primarily in the Ozarks, and var. *frenchii* Vasey, a plant of shaded cliffs in southern Illinois and western Kentucky (Gleason and Cronquist 1991). A molecular analysis of the Primulaceae based on DNA sequencing is provided by Martins et al. 2003).

Total range: A plant of the eastern tallgrass prairie region, shooting star is concentrated in Missouri and Illinois, but ranges as far west as Texas, Oklahoma and eastern Nebraska, Manitoba, north Minnesota, Wisconsin, and Iowa, and in the east occurs in the mountains from Georgia to Pennsylvania. It is considered rare in Florida, Georgia, Louisiana, Maryland, Minnesota, Mississippi, and Pennsylvania, classified as extirpated from New York, and is known

only from historical records in the District of Columbia (NatureServe 2007).

State distribution: Shooting star has been documented from five localities in Michigan, only two of which are known to remain extant or have been observed within the last two decades. Of the three occurrences recorded in Berrien County, one moderately large population persists in a prairie fen preserve actively managed by The Nature Conservancy (TNC), whereas in a second managed fen it has not been observed since 1988 nor in a third historical site since 1932. The aforementioned site managed by TNC harbors a population where several hundred plants have been observed. A fourth station, in Menominee County, supports a highly localized colony of less than 100 plants in a right-of-way prairie remnant. A Belle Isle (Wayne County) occurrence, documented by an 1896 Farwell collection with little data, has certainly been extirpated and is of dubious origin (Voss 1996).

Recognition: Shooting star is a striking prairie forb characterized by its large rosettes of smooth leaves and smooth stems with umbels of dangling, white to pinkish flowers. The basal rosettes, which have **blunt-tipped, lance-shaped leaves that average about 20 cm in length** (and may range up to 30 cm), **produce from 2-6 flowering stems, which may reach**



60 cm in height. The flowering stems are terminated by **umbels of several nodding pink flowers that have strongly reflexed petals and a cone of yellow, forward-projecting stamens, beyond which is the tip of the projecting style** (see photos). The fruiting capsule is a dark reddish-brown. This forb is a highly distinctive species which, when in flower, is not readily confused with any other member of our native flora. As noted by Voss (1996), the flowers of cranberry are very similar, but differ in a number of significant respects, not the least of which is their fewer petals (4 versus 5 in shooting star), much smaller size, and trailing habit.



Jeff McMillian @ USDA-NRCS PLANTS Database

Best survey time/phenology: Shooting star is best sought during its blooming period, which is approximately from the latter part of May through early to mid-June.

FQI Coefficient and Wetland Category: 10, FACU

Habitat: The Berrien County population of shooting star inhabits a remnant wet prairie on a railroad right-of-way. This community lies on sandy loam in the floodplain of a creek. It is dominated by *Spartina*

pectinata (prairie cordgrass) and *Carex stricta*, with *Carex bebbii*, *Calamagrostis canadensis* (bluejoint grass), *Thaspium trifoliatum* (meadow parsnip), *Thalictrum dasycarpum* (meadow-rue), *Allium cernuum* (nodding wild onion), *Coreopsis tripteris* (tall coreopsis), *Thelypteris palustris* (marsh fern), *Onoclea sensibilis* (sensitive fern), *Equisetum arvense* (horsetail), and *Zizia aurea* (golden Alexanders), with rare species such as *Polemonium reptans* (Jacob's ladder), *Cypripedium candidum* (small white lady's slipper), *Silphium integrifolium* (rosin weed), and *Eryngium yuccifolium* (rattlesnake-master) also present. At the Menominee County locality, shooting star occurs in a sandy, mesic prairie remnant along a railroad ROW where it is associated with such species as *S. terebinthinaceum* (prairie dock), *Hierochloa odorata* (sweet grass), *Silphium laciniatum* (compass plant), *Ratibida pinnata* (yellow coneflower), *Sisyrinchium* spp. (blue-eyed-grass), and several other prairie forbs.

In Wisconsin (Fassett 1976) and the Chicago region (Swink and Wilhelm 1994), shooting star occurs primarily in wet-mesic prairie remnants and occasionally in mesic, open woodlands with oak present. Similarly, in Indiana, the species prefers prairies, high wooded stream banks and bluffs, and sometimes occurs on wooded slopes (Deam 1940). Throughout its range, shooting star favors wet-mesic soils with a circumneutral pH of 6.0 to 7.5 (Loeschke 1986).

Biology: Shooting star is a perennial prairie forb. In Michigan it flowers during late May and produces fruits by late June. The flowers are bee-pollinated and do not produce seed without pollination (Loeschke 1986; Macior 1970, 1968, 1964). Harder and Barclay (1994) provided evidence that pollen removal in *Dodecatheon* is regulated by the buzz frequency of pollen-collecting bumble-bees, encouraging transport by more pollinators and thus enhancing pollen dispersal. Seeds remain in the ripe capsules through late summer (Zimmerman 1972), requiring stratification to germinate in significant number (Loeschke 1986), with longer stratification periods increasing germination rates and lowering light and temperature thresholds. Seedlings produce no new leaves their first season, and spend the summer and following winter at or near the soil surface, where they are vulnerable to drought and frost heave (Sorenson 1984, Zimmerman 1972). Its habit of going dormant by mid-summer may enable shooting star, once established,



to survive droughts (Loeschke 1986). Summer dormancy also results in slow growth, and plants require several years to mature (usually four to nine for flowering) (Loeschke 1986). Most plants flower at least once every three years. Stalk borers and larvae of the moth families Tortricidae and Geometridae were found to feed on shooting star in Iowa, causing significant reduction in seed production (Loeschke 1986).

Conservation/management: The Berrien County population of shooting star lies on a railroad right-of-way leased as a nature preserve by The Nature Conservancy. The Menominee County right-of-way habitat is protected in part within a ROW managed by the Michigan Department of Transportation (MDOT). This species is known to respond well to prescribed burning, which reduces competition and litter accumulation, as well as destroying eggs and larvae of herbivores (Loeschke 1986). The Berrien County population has been shown to have a positive response to such management. Early spring burns, ideally timed before the shoots appear above ground, are most effective in increasing flowering rates and plant biomass (Loeschke 1986). Late spring burns, which damage young shoots, tend to delay flowering and result in lower average biomass. A former station for this species in Berrien County, now also a Nature Conservancy preserve property, offers a good opportunity for re-establishment of a population should fire management fail to elicit emergence of the colony previously observed.

Comments: Var. *frenchii* Vasey, which has abruptly contracted or even cordate leaf bases (as opposed to those of the more common variety, which taper gradually) is endemic to shaded cliffs almost exclusively in the lower Ohio River valley.

Research needs: Monitoring of the two extant populations of this state endangered species is a high priority need to determine the annual status of these occurrences, the presence of imminent and potential threats, and to better understand responses to management activities.

Related Abstracts: Mesic prairie, blazing star borer, Culver's root borer, Henslow's sparrow, leadplant flower moth, northern harrier, red-legged spittlebug, short-eared owl, Silphium borer, compass plant, lead-plant,

Leiberg's panic grass, pink milkwort, prairie coreopsis, prairie dropseed.

Selected references:

- Deam, C. C. 1940. Flora of Indiana. Dep. Conservation, Indianapolis. 1236 pp
- Fassett, N. C. 1944. *Dodecatheon* in eastern North America. Amer. Midl. Nat. 31:455-486.
- Gleason, H. A., and A. Cronquist. 1991. Manual of Vascular Plants of Northeastern United States and Adjacent Canada. Second edition. The New York Botanical Garden. Bronx, New York. lxxv + 910 pp.
- Harder, L.D. and R.M.R. Barclay. 1994. The functional significance of poricidal anthers and buzz pollination: controlled pollen removal from *Dodecatheon*. Functional Ecol. 8: 509-517.
- Loeschke, M. J. 1986. Fire and the life history of shooting star, *Dodecatheon meadia*, in Iowa tallgrass prairie. Master's thesis, Iowa State University. Ames, Iowa.
- Macior, L.M. 1970. Pollination ecology of *Dodecatheon amethystinum* (Primulaceae). Bull. Torr. Bot. Club 97: 150-153.
- Macior, L.M. 1968. Pollination adaptation in *Pedicularis canadensis*. Am. J. Bot. 55: 1031-1035.
- Macior, L.M. 1964. An experimental study of the floral ecology of *Dodecatheon meadia*. Amer. J. Bot. 51: 96-108.
- Martins, L., C. Oberprieler, and F.H. Hellwig. 2003. A phylogenetic analysis of Primulaceae s.l. based on internal transcribed spacer (ITS) DNA sequence data. Plant Syst. Evol. 237: 75-85.
- NatureServe. 2007. NatureServe Explorer: an online encyclopedia of life [web application]. Version 6.1. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: September 11, 2007).



- Parker, I.M., S.K. Mertens, and D.W. Schemske. 1993. Distribution of seven native and two exotic plants in a tallgrass prairie in southeastern Wisconsin: The important of human disturbance. *Am. Midl. Nat.* 130: 43-55.
- Sorenson, P. D. 1984. How does *Dodecatheon* grow? *Bull. Bot. Club Wisc.* 16:10-16.
- Thompson, H. J. 1953. The biosystematics of *Dodecatheon*. *Contr. Dudley Herb.* 4: 73-154.
- Turner, B.H. and E. Quarterman. 1968. Ecology of *Dodecatheon meadia* L. (Primulaceae) in Tennessee glades and woodland. *Ecology* 49: 909-915.
- Voss, E.G. 1996. Michigan Flora. Part III. Dicots (Pyrolaceae-Compositae). *Bull. Cranbrook Inst. Sci.* 61 and *Univ. of Michigan Herbarium.* xix + 622 pp.

Abstract citation:

- M.R. Penskar and S.R. Crispin. 2007. Special Plant Abstract for *Dodecatheon meadia* (shooting star). Michigan Natural Features Inventory. Lansing, MI. 4 pp.

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Funding for abstract provided by Michigan Department of Transportation.

