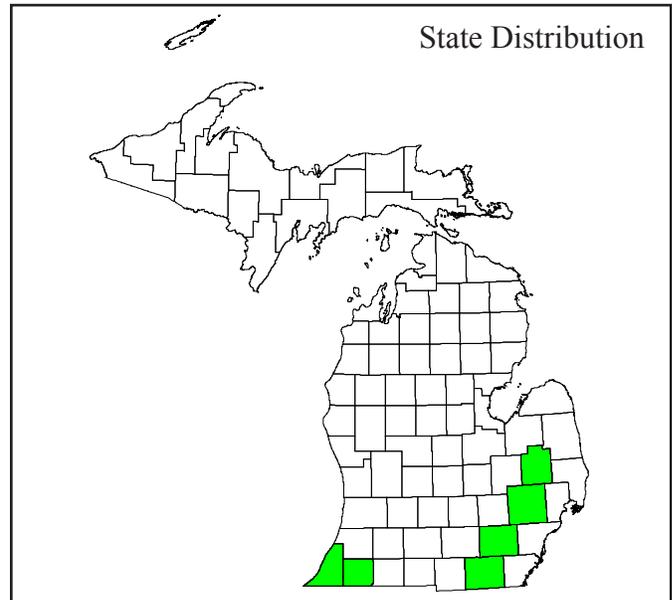
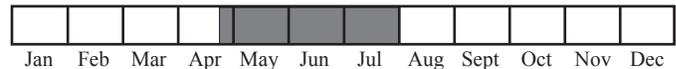




Photo by Susan R. Crispin



Best Survey Period



**Status:** State threatened

**Global and state rank:** G5/S2

**Other common names:** Greek valerian

**Family:** Polemoniaceae (phlox family)

**Synonym:** *Polemonium reptans* L. var. *villosum* E.L. Braun

**Taxonomy:** In addition to the typical variety, which characterizes Michigan plants, glandular-hairy plants in portions southern Ohio and adjacent Kentucky have been referred to var. *villosum* E. Braun (Gleason and Cronquist 1991). Molecular analyses of the Polemoniaceae to resolve both the relationships within the family, and the family's position within its taxonomic sub-class, are provided by Steele and Vilgalys (1994) and Downie and Palmer (1992), respectively.

**Range:** Jacob's ladder is a plant of eastern North America, ranging from New England west to Minnesota and South Dakota, and occurring in the south from Georgia to Oklahoma. It is considered rare in Delaware, Georgia, Kansas, Mississippi, Nebraska, New Jersey, and North Carolina, but classified as an adventive (exotic) in Ontario and Quebec (NatureServe 2007).

**State distribution:** This species is concentrated in extreme southwestern Michigan, with 19 of its 32 known state localities in Berrien and western Cass Counties. Single stations exist in Lapeer, Lenawee, Oakland, and Washtenaw counties. More than 20 populations have been confirmed extant since 1980, whereas four are unconfirmed since the 1930's.

**Recognition:** The slender stems of *Polemonium reptans*, which are clumped or solitary, range to 2-4 dm in height, are often branched, and bear **pinnately-compound leaves with narrowly elliptic to lance-shaped leaflets 2-4 cm in length**. Stalks of the lowest leaves are long, while those of the upper stem are nearly absent. **Blue, bell-shaped flowers** are borne in loose clusters terminating the stems. Each of the five corolla lobes is posed opposite a shorter stamen. This is a distinctive species, and the **combination of bell-shaped blue flowers and pinnately-compound leaves make it unlikely to be confused with any other native species**. *Polemonium caeruleum* is a cultivated species with similar leaves and blue flowers, rarely found outside gardens, but can be distinguished by its much narrower, fewer leaflets and stalkless fruits (the latter being short-stalked in *P. reptans*).

**Best survey time/phenology:** Occurrence records show that flowering and fruiting has been observed from about the last week of April through July, the



optimum and recommended period for survey, although experienced botanists may be able to identify sterile plants.

**FQI Coefficient and Wetland Category:** 10, FAC

**Habitat:** Jacob's ladder most frequently inhabits fens and wet prairies in Michigan, where the associates may include such species as *Cacalia plantaginea* (prairie Indian plantain), *Carex stricta* (sedge), *Zizia aurea* (golden alexanders), *Thelypteris palustris* (marsh fern), *Geranium maculatum* (wild geranium), *Vernonia missurica* (ironweed), *Silphium terebinthinaceum* (prairie dock), *S. integrifolium* (rosin weed), *Eupatorium maculatum* (spotted Joe-pye-weed), and *Phlox maculata* (spotted phlox). It has also been found in moist forested or forest edge habitats, especially in southern Michigan floodplain forests, where it is known to occur under *Acer saccharinum* (silver maple), *Ulmus americana* (American elm), *Celtis occidentalis* (hackberry), *Populus deltoides* (eastern cottonwood), *Acer negundo* (box-elder), *Platanus occidentalis* (eastern sycamore), and *Carya cordiformis* (bitternut hickory). Frequent herbaceous woodland associates include *Hydrophyllum virginianum* (Virginia waterleaf), *Asarum canadense* (wild ginger), *Urtica dioica* (stinging nettle), *Laportea canadensis* (wood nettle), and *Collinsia verna* (blue-eyed Mary). Over a large portion of its range, this species occurs primarily in moist forests.

**Biology:** According to the extensive germination experiments conducted by Baskin and Baskin (1988) *P. reptans* is able to germinate in both the autumn and the spring, and requires high summer temperatures for after-ripening. This enables seedling establishment to be initiated as early as possible, i.e. at the beginning of the growing season, and thus conveys a competitive advantage to this species and associated herbaceous taxa in forest communities.

**Conservation/management:** Since Jacob's ladder occurs in both open and shaded situations, it is probably less vulnerable to shading by woody species than many other fen and prairie plants. It is undoubtedly sensitive to hydrologic alterations, however. Ruhren and Handel (2003) studied the restoration feasibility for *P. reptans* and eight other herbaceous forest species in New Jersey in an area of known high herbivory due to the presence white-tailed deer. As expected, plantings outside enclosure areas were heavily impacted by deer herbivory,

but even where plants survived outside enclosures, none flowered (in contrast to individuals within enclosures, where pollinators and fruiting were observed), and thus it was concluded that restoration was unfeasible without protection from deer. This species is protected in at least one Nature Conservancy preserve and within preserves of the Michigan Nature Association, as well as within local preserves.

**Research needs:** There are few population data for several occurrences, and thus status surveys are highly desirable. Apparently little is known about the life history of this species in Michigan.

**Related abstracts:** Floodplain forest, prairie fen, wet prairie, eastern massasauga, American bittern, Blanchard's cricket frog, Blanding's turtle, blazing star borer, eastern box turtle, Indiana bat, Mitchell's satyr butterfly, northern harrier, red-shouldered hawk, short-eared owl, spotted turtle, beak grass, English sundew, prairie dropseed, Queen-of-the-prairie, red mulberry, Richardson's sedge, shooting star, Virginia snakeroot, whiskered sunflower, white lady's-slipper, and numerous additional species (see MNFI Rare Species Explorer for a comprehensive list of taxa in these natural community types).

**Selected references:**

Baskin, C.C. and J.M. Baskin. 1988. Germination ecophysiology of herbaceous plant species in a temperate region. *Am. J. Bot.* 75: 286-305.

Bray, J. R. 1957. Climax forest herbs in prairies. *Amer. Midl. Nat.* 58: 434-440.

Davidson, J. F. 1950. The genus *Polemonium* (Tournefort) L. *Univ. Calif. Publ.* 23: 209-282.

Downie, S.R. and J.D. Palmer. 1992. Restriction site mapping of the chloroplast DNA inverted repeat: a molecular phylogeny of the Asteridae. *Ann. Miss. Bot. Gdn.* 79: 266-283.

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.



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).

Steele, K.P. and R. Vilgalys. 1994. Phylogenetic analyses of Polemoniaceae using nucleotide sequences of the plastid gene matK. *Syst. Bot.* 19: 126-142.

**Abstract citation:**

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