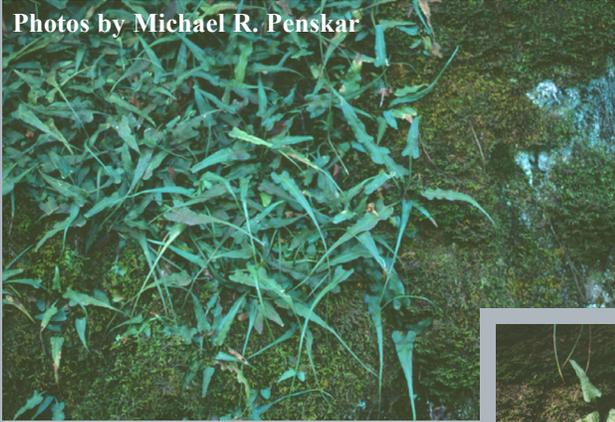
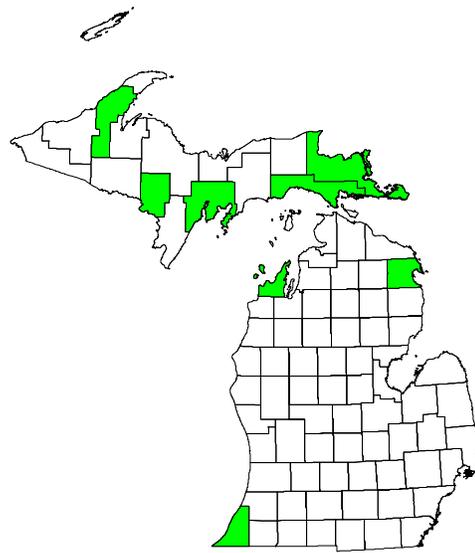


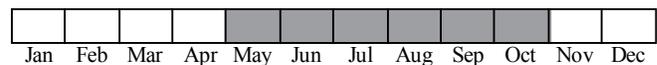
Photos by Michael R. Penskar



State Distribution



Best Survey Period



Status: State threatened

Global and state rank: G5/S2S3

Family: Aspleniaceae (spleenwort family)

Synonyms: *Camptosorus rhizophyllum* (L.) Link

Taxonomy: This very distinctive species has been segregated by several authors and placed in the genus *Camptosorus* (Morin et al. 1993), a name under which it is known in many manuals and other publications. It forms part of a complex of Appalachian spleenworts researched by Wagner (1954) in a well-known study of hybridization and backcrossing.

Total range: Walking fern occurs in eastern North America, ranging from southern Ontario and Quebec in Canada south to Georgia, Alabama, and Mississippi, occurring west to Wisconsin, Iowa, Kansas, and Oklahoma.

State distribution: Michigan represents somewhat of a disjunct region of occurrence for this fern, which is much more common in the southern portion of its range. Most of the state's 27 localities are clustered in the eastern Upper Peninsula, primarily in the eastern portion of Mackinac County, where there is a concentration of exposed limestone and dolomite boulders along the spine of the geological feature known as the

Niagara Escarpment. Elsewhere, this species occurs locally on alkaline bedrock outcrops in Dickinson, Schoolcraft, and Houghton counties, with additional local populations found in the Lower Peninsula on South Manitou Island (Leleenu County). It is also known from a sinkhole in Alpena County, and from an unusual occurrence in Berrien County where a small but vigorous colony was discovered on a limestone boulder along a stream.

Recognition: *Asplenium rhizophyllum* is an extremely distinctive fern, characterized by its tendency to form **dense colonies by reproducing via tip-rooting** on moss-covered dolomite boulders and other types of rock outcrops. Individual plants consist of clumps of fronds (leaves) arising from short, scaly rhizomes. The small, 1-3 cm wide fronds, which have net-like (reticulate) veins and may range up to ca. 30 cm in length, are stalked, and have **slender, long-tapering, lance-shaped blades with heart-shaped (cordate) to strongly lobed (auriculate) bases**. On the underside of the fronds, the spores are produced in somewhat **irregular, linear, brown masses** of sporangia scattered between the midrib and leaf margin.

As indicated by the common name, this species "walks" by proliferating through the development of long-tapering leaf tips, which elongate and arch — stolon-like — across moss mats, forming new plants



where the tips contact the surface. Large clonal colonies may develop in this manner, sometimes carpeting substantial portions of large dolomite boulders or cliff walls. Walking fern may be mistaken by the inexperienced eye for the very rare hart's-tongue fern, *Asplenium scolopendrium* L. Hart's-tongue fern is often associated with walking fern, but can be distinguished by its much larger, broader fronds that are somewhat shiny, wavy-margined (puckered), and have relatively abrupt, blunt-pointed tips. In addition, Hart's-tongue fern in Michigan occurs primarily as scattered clumps of plants growing in low ledges and concavities, and does not form dense colonies on boulders as is so characteristic of walking fern.

Best survey time/phenology: Although this species can be recognized throughout the year due to the evergreen nature of its fronds and its very specific habitat, it is best inventoried during the heart of the growing season when new foliage is produced.

Habitat: In Michigan this fern occurs primarily in association with shaded, moist boulders and outcrops of Niagaran limestone and dolomite. In the eastern Upper Peninsula, where most Michigan localities of this species are known, walking fern usually occurs on moss-covered boulders, outcrop cliff faces, and low rock ledges in second-growth mesic northern forest. Typical canopy trees include *Acer saccharum* (sugar maple), *Tilia americana* (basswood), *Abies balsamea* (balsam fir), *Fraxinus americana* (white ash), and *Betula alleghaniensis* (yellow birch). Common herbaceous species associated with walking fern include *Polystichum lonchitis* (northern holly fern), *Polypodium virginianum* (common polypody), *Geranium robertianum* (herb-Robert), *Cystopteris fragilis* (fragile fern), *Asplenium trichomanes* (maidenhair spleenwort), and occasionally such rare plants as the state threatened *Asplenium trichomanes-ramosum*



(green spleenwort) and the federal threatened and state endangered hart's-tongue fern. Moist moss mats, composed of several different moss species (e.g., *Rhodobryum roseum*, several *Mnium* and *Brachythecium* spp.) appear to be a critical element of this species' microhabitat, as well as the availability of moist crevices and other concavities that serve as colonization niches.

Elsewhere within Michigan, walking fern occurs on similar alkaline rock outcrops, such as in Dickinson County, Schoolcraft County and on the limestone face of a sinkhole in Alpena County. One of the more atypical habitats is on South Manitou Island, where this species occurs on mossy, decaying white cedar logs in an old-growth cedar forest on a sand dune, and is associated with green spleenwort.

Biology: Walking fern occurs primarily on alkaline rock substrates, and appears to require moist microhabitat and moderately to densely shaded conditions. Although this species thrives when growing in moist moss mats, it may require exposed, moist rock substrate for colonization. Once established, walking fern is able to proliferate rapidly through tip-rooting, and then as mature plants develop, this perennial is able to produce spores for dispersal to available microhabitat. Although this species occurs mostly on bedrock, it is also known throughout its range to inhabit organic substrates, as long as these are alkaline. Occasionally this species is epiphytic, occurring on trees with circumneutral bark (TNC 1993), and sometimes it can be found on sandstone and other acidic bedrock (Morin et al. 1993).

D. J. Evans (1997) found walking fern to occur under a wider range of canopy cover than the state endangered Hart's tongue fern (*A. scolopendrium* var. *americana*) which occupies similar dolomite boulders. Her study also showed a high frequency of walking fern on all aspects of the boulders in contrast to the significant preference for cool, dark, north and northeast aspects exhibited by Hart's tongue fern. This may reflect the ability of walking fern to "move" across a boulder by root-tipping. Walking fern was also found to occupy a higher vertical position on the rocks, indicating an ability to better withstand periodic intense sunlight in early spring and late fall during leaf-off periods.



Conservation/management: The conservation of this rare fern will depend, over the short term, on protection of its habitat from major disturbances. Before long-term management can be undertaken, much more needs to be learned about this fern's life history and its response to habitat changes, especially overstory removal. However, maintenance of at least a partial canopy is likely crucial to perpetuating the moist moss mats that provide the necessary microhabitat for this species (TNC 1993).

Comments: This species is frequently cultivated by horticulturalists, who also artificially hybridize walking fern with a number of other related taxa to produce unusual ornamentals and study specimens (Wagner 1989).

Research needs: Long-term monitoring to determine population trends, and the effects of such factors as light availability and disturbance, would be the most useful investigations.

Related abstracts: Mesic northern forest, Assiniboia sedge, fairy-bells, ginseng, goblin moonwort, Hart's-tongue fern, northern goshawk, red shouldered hawk, rapids clubtail, woodland vole.

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