



**Status:** Special concern

**Global and state rank:** G3/S1S2

**Synonym:** *Calephelis muticum* McAlpine

**Family:** Riodinidae (metalmarks)

**Range:** Swamp metalmark is generally restricted to the Midwestern United States, where its distribution is patchy. The species has two general centers of distribution, one centered on the Ozark Mountains of southern Missouri, extending to eastern Oklahoma and northern Arkansas; and the second centered in the southern Great Lakes region, primarily in southern Michigan and southern Wisconsin (Bess 2005). The species has also been documented from Minnesota, Iowa, Illinois, Indiana, Kentucky, Ohio, and Pennsylvania (Bess 2005). The majority of recent records occur in Michigan and Missouri with fewer (and mostly historical) records from Wisconsin and Indiana (Bess 2005).

**State distribution:** The swamp metalmark has been recorded from a total of 17 counties in the southern half of the Lower Peninsula, occurring locally within its preferred habitats (MNFI 2012). The majority of records for this species, however, are historical, with

only five occurrences documented in the past 20 years. These five records occur in Jackson, Oakland, Lenawee and Hillsdale counties. The last observations cited in the MNFI database were from Jackson and Oakland counties in July 2008 (MNFI 2012). Although no populations of this species have been documented from the northern Lower Peninsula or Upper Peninsula, swamp metalmark may occur in peatland habitats in those regions (Bess 2005).

**Recognition:** The swamp metalmark has a wingspan between 2.2 – 3.3 cm (0.9 – 1.3 in.) (Shull 1987, Bouseman and Sternburg 2001). Upper wing surfaces are red-brown with small black and metallic spots on the edge of the wing and fine black lines toward the center of the wing (Shull 1987). The fine black lines give the wings a “checkerboard” appearance. Wing undersurfaces are similar to upper surfaces but are bright orange with more black or metallic flecks. The wings are angular (especially in males,) with the hind wing more rounded (Bess 2005). The caterpillar is green with black dots and is, most notably, covered with long, white hairs. The adult form of the swamp metalmark is similar to *Calephelis borealis* (northern metalmark) and *C. virginensis* (little metalmark). However, the ranges of these species do not overlap with the range of swamp metalmark.



**Habitat:** In Michigan, the swamp metalmark occurs in prairie fens and southern wet meadows that support its main host plant, swamp thistle (*Cirsium muticum*). Soils in these fen or wet meadow habitats are generally alkaline mucks, peats, or marl (Kost et al. 2007). These open wetland habitats are dominated by sedges, rushes, and grasses, including tussock sedge (*Carex stricta*), sterile sedge (*C. sterilis*), lake sedge (*C. lacustris*), little bluestem (*Schizachyrium scoparium*), and Canadian rush (*Juncus canadensis*). Characteristic forbs include purplestem angelica (*Angelica atropurpurea*), boneset (*Eupatorium perfoliatum*), swamp thistle (*Cirsium muticum*), marsh blazing star (*Liatris spicata*), pitcher-plant (*Sarracenia purpurea*), black-eyed Susan (*Rudbeckia hirta*), and numerous orchids. Characteristic shrubs include shrubby cinquefoil (*Dasiphora fruticosa*), willows (*Salix* spp.), bog birch (*Betula pumila*), and poison sumac (*Toxicodendron vernix*). Trees, although usually sparse, include tamarack (*Larix laricina*), red-cedar (*Juniperus virginiana*), red maple (*Acer rubrum*), black ash (*Fraxinus nigra*), and aspens (*Populus grandidentata* and *P. tremuloides*).

**Biology:** The swamp metalmark has a single brood in Michigan, with flight beginning in July, and two broods in the southern portion of its range, where it flies in May and late August. Males are known to actively patrol for females (Bouseman and Sternburg 2001). Adults fly very slowly and usually travel very short distances with each flight (Bess 2005). Mature butterflies rest with their wings held out horizontally (Iftner et al. 1992). Adults are known to nectar on black-eyed Susan, shrubby cinquefoil, Virginia mountain mint (*Pycnanthemum virginianum*), and various sunflowers (*Helianthus* spp.). Adults are rarely found outside of preferred habitat and tend to occur very locally.

Host plants throughout the range are always native thistles (*Cirsium* spp.). In Michigan, swamp metalmark appears to exclusively utilize swamp thistle (*C. muticum*). Eggs are laid on the larval host plant and usually hatch in one week. Larvae feed on thistle leaves and are most active at night or on overcast days. Their eating habits leave “windows” of white transparent patches in the leaves as they move from area to area (Nielsen 1999). The swamp metalmark overwinters as a partially grown (3<sup>rd</sup> instar) larva in a silk-lined nest which is created under thistle leaves that are close to the ground. Pupation occurs the following spring in a sealed tan case attached to a flat surface with a silken

thread, usually on the host plant. Four to ten days after pupation, adult butterflies emerge.

**Best survey time:** The swamp metalmark has a single flight each year in Michigan, stretching from the first week of July to the second week of August. The best way to survey for this species is by meandering through potential habitat while checking near larval food plants and adult nectar sources or perches, such as shrubby cinquefoil. When flushed from a perch, the swamp metalmark has a “moth-like” flight and tends to land on the undersurface of plant leaves (Nielsen 1999).

**Conservation/management:** Conservation of swamp metalmark populations requires habitat preservation and land management activities that improve habitat quality. Preferred habitats, primarily prairie fens and southern wet meadows, are often small and discontinuous, separated by areas of non-preferred habitat. One of the greatest threats to these ecosystems is establishment and subsequent spread of invasive and non-native plants, particularly glossy buckthorn (*Frangula alnus*). Glossy buckthorn is especially detrimental because it forms dense monocultures and is very effective at outcompeting native fen plants. Other invasive species of importance are narrow-leaved cattail (*Typha angustifolia*), common reed (*Phragmites australis*), autumn olive (*Elaeagnus umbellata*), and multiflora rose (*Rosa multiflora*). These invasive plants not only outcompete native species that the swamp metalmark requires, but they also alter hydrology, soils and natural ecosystem processes. Disturbances to groundwater quantity and quality, including ditches, stream channelization, and nutrient additions, contribute to the establishment and spread of invasive species, so care should be taken to avoid or mitigate hydrologic disturbances. The reduction or elimination of invasive plants requires long-term commitments from land managers and agencies.

The reintroduction of a natural fire regime in the form of carefully controlled, prescribed burns can reduce encroachment of invasive species. Historically, periodic fire was an important natural process in swamp metalmark habitats. Fire helps maintain open conditions by reducing woody encroachment, and promotes seedbank expression by reducing build-up of thatch and duff (Kost et al. 2007). A thorough knowledge of the extent and habitat use of the swamp metalmark and other species of importance must be established prior to



initiating a burn management plan. Burn units should be established with special attention to micro-geographic variation in the distribution of rare species and their host plants (Opler 1981). Sites should be divided into units and burned on a rotation, assuring that a substantial proportion of the population is not exposed to fire in any single prescribed burn. Care must be taken when conducting prescribed fires in the fall or early spring, as swamp metalmark larvae overwinter near the ground in leaf litter which is highly susceptible to burning. However, succulent, fire-resistant rosettes of swamp thistle may protect larvae that hide under the leaves (Bess 2005). Growing-season fires during the flight of the swamp metalmark may be considered to avoid impacts to susceptible larvae.

Herbicides are another widely used tool to remove invasive or aggressive plants from ecosystems. While the benefits of herbicides are well documented, there are many known and likely unknown negative impacts. Herbicide persistence varies with herbicide type, but half-lives of herbicides in soil can be as short as 5 days (Sethoxydim) to as long as 150 days (Imazapic; Tu et al. 2001). Some herbicides are stable in water, and therefore can persist in ecosystems for extended periods of time (Tu et al. 2001). Stark et al. (2012) found that when the larvae of Behr's metalmark (*Apodemia mormo langei*) were exposed to herbicides, a smaller percentage of individuals reached the pupal stage. Similar impacts were demonstrated for both selective (Sethoxydim and Triclopyr) and non-selective (Imazapyr) herbicides. Each of the three herbicides tested has a different mode of action, so it is unlikely that the active ingredients cause the decrease in maturation rates. Instead, the inert ingredients may be responsible for the impacts to larvae, potentially via an indirect impact to food plant quality. Even if used in a timely manner, the benefits of herbicide use must outweigh the costs.

**Research needs:** In Michigan, many of the historic localities for swamp metalmark have not been surveyed in recent years. These historic sites should be resurveyed to determine whether historic populations are extant and, in reconfirmed sites, population size and viability. There is very little known about specific habitat requirements for the swamp metalmark, such as minimum patch size, fire effects, impacts of invasive plants and their removal, and the impact that silvicultural activities in uplands have on adjacent swamp metalmark habitat. In Michigan, swamp

metalmark has been documented from only the Southern Lower Peninsula. However, the species was recently discovered in northern Wisconsin, so the species may possibly occur in the Upper Peninsula, where it would likely be concentrated in extensive peatland habitats. Expanding surveys to such areas could reveal additional populations.

**Related abstracts:** prairie fen, southern wet meadow

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### **Abstract citation**

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