

Riveredge Nature Center's Swamp Metalmark Butterfly Habitat Conservation Plan



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INTRODUCTION

The swamp metalmark butterfly, *Calephelis muticum*, is on the brink of extinction in Wisconsin, and despite being listed as endangered in 1989 its populations have continued to decline over the past decade. Calcareous fens, the preferred habitat for the swamp metalmark, are rare in the state (WI DNR, 2008); so it is not unexpected that a butterfly that requires this habitat type for its existence would also be rare. However, only 2 of the 5 known populations identified in *The Endangered and Threatened Invertebrates of Wisconsin* (Kirk et al., 1999) are still extant, one of which is the population discussed in this document (Borkin, pers.comm. 2011). Due to the rarity of its habitat, isolation of remaining populations, low dispersal and habitat management concerns, the swamp metalmark is unlikely to persist in WI without targeted intervention. The species has also been reported as rare or endangered throughout its global range that includes portions of Michigan, Ohio, Indiana, Kentucky, Illinois, Arkansas, and Missouri; and it is currently being evaluated for federal listing (Borkin, pers.comm. 2011).



Swamp metalmark butterfly, *Calephelis muticum*.
Photo courtesy of S.Borkin©2011

Swamp Metalmark Natural History in WI

Swamp thistle, *Cirsium muticum* is the metalmarks' only recorded host plant in WI. A native species, swamp thistle is a monocarpic, facultative biennial meaning the plants flower only once before dying and grow two or more years before flowering. The plants produce small rounded leaves that are somewhat appressed to the ground (basal rosettes) in autumn, then remain green through the winter and bloom in mid-to late summer of the second year or later.

Swamp metalmarks deposit eggs on the ventral leaf surfaces and stems of non-flowering swamp thistles. Only one generation per year is produced in WI. Most of the butterfly's life cycle is spent in the larva stage on the same plant where the egg was laid. Larvae emerge from the egg cases in July or August. They overwinter as partially grown larvae on the host plants, resuming feeding and development in spring until they are ready to pupate in June. Pupation occurs off the host plant in the litter and lasts about a month. The flight period for adults lasts several weeks in July and sometimes into August.



Swamp metalmark larva on swamp thistle (May).
Photo courtesy of S.Borkin©2004

Land Usage

Riveredge Nature Center (Riveredge or RNC), incorporated in 1968, is an approximate 380 acre privately-owned sanctuary in Newburg, WI. Parts of the site had been farmed and were subsequently planted with native prairie species. Other portions, particularly along the Milwaukee River, were selectively logged but otherwise left largely undisturbed. The land is noteworthy for its unique ecological areas and rich biodiversity including a designated State Natural Area along Riveredge Creek and the calcareous fen supporting the endangered swamp metalmark butterfly. Since early in its inception, RNC has tried to preserve these assets by providing continual maintenance and control of invasive species. Riveredge adds to the vitality of the community by providing ongoing recreational opportunities for adults, families and children. It also serves as a resource for scientific research and provides opportunities for citizen scientists to expand their horizons.

The Habitat Conservation Plan presented here reaches beyond the goal of maintaining the high-quality condition of the sanctuary, to outline a strategy that specifically addresses conserving and enhancing breeding habitat for the state-endangered swamp metalmark on the property. Program activities with volunteers and visitors are already restricted in metalmark habitats in order to protect the sensitive fen wetlands from degradation caused by trampling, but much more can be done.

Historical Background

The swamp metalmark was first reported at RNC in the mid-1970s, but by the early 1990s, it was no longer detected. Susan Borkin, from the Milwaukee Public Museum, initiated efforts to reestablish or augment the diminished population in the summer of 1994 after selective tree and brush removal was accomplished in late winter by the RNC ‘Habitat Healer’ volunteers, under the guidance of director Andy Larsen. Borkin used both translocation of larvae (ex-ova from captive females) and later adults from the two closest population sites (Aurora Road and Dundee) after first acquiring the necessary permit and approvals from the WI Department of Natural Resources (Borkin, 2005). The first attempt in 1994 was with 21 larvae on potted plants set into the fen. None of the plants and consequently no larvae survived. In 1995, 28 larvae and one female were introduced. At least some of the larvae survived the winter and six eggs were found during the flight period in 1996. Another 5 females and 2 males from the Dundee site, and later 144 captive-reared larvae were transferred in 1996. The last translocation from off-site was 12 field-collected larvae transferred in the spring of 1998. The RNC population was monitored through the annual “4th of July” (NABA) butterfly surveys and by counting larvae found on host swamp thistle plants. Distribution within the habitat was noted also. As of 2011, there is a breeding population of swamp metalmarks that has been re-established at RNC and preliminary efforts to expand the amount of habitat occupied by the metalmarks has met with mixed success.

Site Description

At the present time, the core site utilized by the swamp metalmark population consists of approximately one-half acre (0.2 hectares) of fen habitat that lies southeast of the Farm Pond,

adjacent to and west of the southern third of the No-No Pond, northwest of the mowed trail leading to the bridge that crosses Riveredge Creek, and east of the wet meadow/shrub-carr zone (and State Natural Area) along the creek. A line of deciduous trees forms the natural border at the north edge where the vegetation is somewhat more dominated by sedges. A group of birch and other deciduous trees and shrubs forms the natural border along the northeast edge linking up to the southwestern edge of the No-No pond where some of the prairie species planted to the north and east are beginning to intersperse with the fen vegetation. The site becomes progressively wetter and the fen vegetation changes to wet/sedge meadow and shrub-carr to the west. The southeast border is more heavily wooded with scattered tamarack grading into swamp forest communities. An edge of low shrubby vegetation including red-osier dogwood, willow and ninebark formed a natural barrier along both sides of the approximately 6-8 ft-wide mowed trail but efforts to remove this shrub barrier were initiated in 2011.

The diverse fen vegetation includes a high density of the swamp metalmarks' larval foodplant swamp thistle, grass-of-parnassus (*Parnassia glauca*), golden alexanders (*Zizia aurea*), sedges (*Carex spp.*) and various nectar sources including an abundance of black-eyed susans (*Rudbeckia hirta*) and mountain mint (*Pycnanthemum virginianum*) that are both used heavily by the metalmarks. A large birch and ash tree occur within the area most highly utilized by the butterflies and various invasive woody species are still present in high numbers although their size and dominance has been controlled with hand-cutting. A number of deep parallel furrows occur in portions of the site and are presumably left from heavy machinery or plowing. RNC has conducted a vegetative inventory for the property.

Approximately one-fifth of an acre (~0.1 hectare) of additional fen with potential metalmark habitat occurs southeast of the mowed trail. Recent efforts to improve the quality of the habitat and accessibility through mowing and brushing have met with some success and will continue. Two additional areas along the creek flowage have been identified as potential habitat for satellite metalmark populations but the butterflies have not been observed to disperse that far and introduction efforts attempted over a few years at one of the sites has not resulted in the establishment of a breeding population there.

HABITAT CONSERVATION PLAN

As defined by the WI Natural Heritage Inventory (WI DNR, 2008), a calcareous fen is

“An open wetland found in southern Wisconsin, often underlain by a calcareous substrate, through which carbonate-rich groundwater percolates. The flora is typically diverse, with many calciphiles. Common species are several sedges (*Carex sterilis* and *C. lanuginosa*), marsh fern (*Thelypteris palustris*), shrubby cinquefoil (*Potentilla fruticosa*), shrubby St. John's-wort (*Hypericum kalmianum*), Ohio goldenrod (*Solidago ohioensis*), grass-of-parnassus (*Parnassia glauca*), twig-rush (*Cladium mariscoides*), brook lobelia (*Lobelia kalmii*), boneset (*Eupatorium perfoliatum*), swamp thistle (*Cirsium muticum*), and asters (*Aster spp.*). Some fens have significant prairie or sedge meadow components, and intergrade with those communities.”

Fens, such as the metalmark habitat at Riveredge, are important and unique wetlands, often resulting from past glacial activity, and the community of specialized plants and animals living

there may have persisted for thousands of years (Bryan, 1993). Swamp metalmarks require a relatively dense population of swamp thistle for larval food plants and flowering species to provide nectar for the adult butterflies, as well as the suitable microclimate that the fen provides. In addition, the metalmarks seem to prefer a fairly low, open vegetative structure to their habitat since they are weak fliers.

Land management activities at RNC since the 1990s within habitat occupied by the metalmarks and adjacent areas have consisted of: selective hand-cutting of trees and shrubs during winter months, maintaining a mowed access trail that bisects the fen and adjacent habitat along the south edge, and late summer mowing of unoccupied portions of the adjacent fen habitat to the south. In addition, hand-cutting of woody vegetation and mowing has been done once or twice in two satellite areas identified as having good potential metalmark habitat farther south (see map).

Given its highly restricted distribution, limited dispersal abilities and demonstrated fire-sensitivity, the long-term survival of the swamp metalmark depends on careful **monitoring**, on-going **identification of potential threats**, and use of appropriate **management techniques** on habitats where populations occur. Best management practices currently recommended given the small size of the population and limited habitat available at RNC include:

- restriction of activities likely to result in: excessive trampling of the site, introduction of invasive species, or that may negatively impact the hydrology;
- designating the metalmark breeding areas as permanent non-fire refugia;
- implementing gradual, small scale changes rather than major, large scale changes;
- applying diverse, non-intensive management treatments to surrounding areas to create a patchwork of habitat types and corridors between potential metalmark sites. This could include using limited fire in some patches, periodic mowing, localized brush-cutting and herbicide treatment, commercial cutting if needed, and no management in portions. (Borkin, pers.comm, 2011; Swengel and Swengel, 2007).

On-going monitoring at RNC will include annual 4th of July butterfly counts, phenology records that indicate when and where adults are sighted, and documentation (photos and other records) of the condition of the fen and any changes in the vegetative components or hydrology. Potential threats include both invasive plants and insects (in particular, two species of exotic weevils: *Rhinocyllus conicus* and *Larinus planus*) that can decimate swamp thistle populations.

Land management techniques for the core metalmark population area will include 1) maintaining or increasing the amount of swamp thistle, 2) the removal of woody and invasive species, and 3) keeping the prairie plantings from encroaching into the fen.

Technique 1:

- Increasing the amount of swamp thistle within the swamp metalmark butterfly breeding habitat as required

Action: (throughout late summer, early fall)

To increase the abundance of swamp thistle in areas that metalmarks are already breeding:

- cut the seed heads of mature thistle from on-site but outside of the metalmark breeding areas and disperse the seed in breeding areas with low swamp thistle abundance.



Swamp thistle, *Cirsium muticum*. Photo courtesy of S.Borkin©2011

To increase the abundance of swamp thistle in unoccupied but potential breeding areas:

- mow the vegetation prior to natural seed dispersal. (Mowing uncovers patches of bare ground where thistle seeds are more likely to germinate, distributes the seeds randomly, and keeps the seed in a specified area.)
- grow swamp thistle in pots and transfer them into swamp metalmark preferred habitat.

Technique 2:

- Controlling invasive and woody vegetation

Some of the woody species that have been targeted for control include: red-osier dogwood (*Cornus sericea*), ninebark (*Physocarpus opulifolius*), buckthorn (*Rhamnus cathartica*), ash (*Fraxinus sp.*), and some tamarack (*Larix laricina*) and willow (*Salix sp.*). Herbaceous plants include reed canary grass (*Phalaris arundinacea*) (a dense patch occurs in the adjacent swamp forest and individual plants occur along the edges of the mowed path), non-native thistles (*Cirsium sp.*), white and yellow sweet clovers (*Melilotus alba*, *M. officinalis*) and some of the planted prairie species (see below).



Calcareous fen habitat.. Photo courtesy of Riveredge Nature Center.

Action: (throughout late summer, early fall)

Each fen area will be considered on an individual basis and specific desired outcomes (i.e. target species) identified so the appropriate method(s) and timing can be implemented. The methods will also have to be reviewed periodically to conform with best practices and for safety considerations.

If the swamp metalmark butterfly does not inhabit the area the following actions could be conducted:

- mowing (during the growing season)
- prescribed burn (during the spring or fall) to limit certain species of undesirable vegetation

- cutting or girdling woody vegetation
- spot spraying undesirable plants with herbicide (only when other options are not effective or cutting alone is likely to result in additional spread of the invasive).

Within the swamp metalmark breeding areas at RNC, control of invasive and woody vegetation will continue to be:

- cutting and dabbing of glyphosphate (at various times throughout the year)
- for any other herbicides, best management practices and guidelines for application will be used (late fall and winter when woody species are most vulnerable to herbicide).

Technique 3:

- Keeping the existing prairie plantings from encroaching into the fen

Riveredge has multiple planted prairies bordering the current and potential swamp metalmark breeding areas (see map). Some of these prairie species have shown aggressive growth in the last several years and are starting to encroach into the fen habitats that the swamp metalmarks currently inhabit. If growth of these aggressive species continues without management actions, the fen community will be compromised and may not function as suitable habitat for the metalmark. Prairie species that have already spread into the fen include big bluestem (*Andropogon gerardii*), Indian grass (*Sorghastrum nutans*) and cup plant (*Silphium perfoliatum*).



Cup plant: *Silphium perfoliatum*. Photo courtesy of Riveredge Nature Center.

Action: (throughout the growing season)

Depending on the species to be controlled, mechanical methods (i.e. cutting, digging, hand pulling, etc.) will be used rather than chemical means.

- Areas with high concentrations of aggressive prairie species will be treated multiple times a growing season.
- If prairie plants are removed during times of high seed dispersion, seed heads will be cut off, bagged, and/or composted, burned, or land filled to eliminate further dispersal.
- Buffer zones with non-invasive species may need to be established immediately adjacent to the fen and/or adjacent prairie areas mowed at appropriate times to control seed production and encroachment.

A lot of research is still needed to identify the best practices to maintain healthy fen communities. At RNC, the typical techniques, such as burning and herbiciding vegetation, may be problematic to the metalmark butterflies and other less well known invertebrate communities already living in the habitat. The conservative and thoughtful strategy outlined in this Habitat Conservation Plan is intended to help ensure that the fen community and swamp metalmark butterfly population at RNC is protected and can be sustained for future generations regardless of

the prior background knowledge of the staff serving as their custodians. Additional research on the swamp metalmark population biology, genetics, dispersal, etc. may also be key to fulfilling this goal.

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