DEVELOPMENT OF A MULTI-STATE MITCHELL'S SATYR HABITAT CONSERVATION PLAN

COOPERATIVE ENDANGERED SPECIES CONSERVATION FUND SECTION 6 OF THE ENDANGERED SPECIES ACT

GRANT PROPOSAL
FOR THE PERIOD: OCTOBER 1, 2005 – SEPTEMBER 30, 2009

MICHIGAN DEPARTMENT OF NATURAL RESOURCES
INDIANA DEPARTMENT OF NATURAL RESOURCES

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PROJECT STATEMENT: Development of a Habitat Conservation Plan (HCP) for the Mitchell's satyr butterfly in Michigan and Indiana.

SUMMARY:

The Mitchell's satyr (*Neonympha mitchellii mitchellii*) is among the most endangered of butterflies in North America (Service 1997). Its demise is believed to be habitat-related. It is currently confined to a few discrete sites, most of which are in southern Michigan (18 sites) and northern Indiana (2 sites). Historically, this species was known predominantly from southern Michigan, but also from northern Indiana, northern Ohio, and northern New Jersey with an unconfirmed record from central Maryland (Lee 2000). The concentration of historic sites suggests Michigan was the former core of the Mitchell's satyr range (Szymanski 1999).

Mitchell's satyr numbers have declined dramatically in the last decade, a period when the most population data is available. Satyrs have been extirpated in over 10% of the occupied sites during this period. Additionally, occupied site habitat condition has declined to a point where only a fraction of many occupied sites support habitat to maintain healthy populations (Lee 2000). Seventeen of the 20 extant sites occur on private land where protection of Mitchell's satyr and their habitat is more challenging. These declines have continued even though additional regulatory protection was afforded to this species as a result of federal listing as endangered (Service 1997).

Habitat appears to be restricted to calcareous wetlands that range along a continuum from open fen, wet prairie, prairie fen, and sedge meadow to shrub-carr and tamarack savanna (relict conifer swamp) (Shuey 1997, Szymanski 1999). A primary host plant appears to be tussock sedge (*Carex stricta*) (McAlpine et al. 1960). Habitat heterogeneity appears important with common attributes including peat soil, an herbaceous community, scattered deciduous shrubs or coniferous trees, and groundwater seeps (Szymanski 1999).

Mitchell's satyr habitat was historically maintained by fire, augmented in the 1800s and 1900s by mowing and grazing. Fire suppression, coupled with ditching, draining, and land use conversion to agriculture, peat mining, and development have modified or destroyed most of this habitat and impacted associated ecological processes. In their modified state, many of these areas were rendered vulnerable to invasion by adventive species including red maple (Acer rubrum), purple loosestrife (Lythrum salicaria), and glossy buckthorn (Rhammus frangula) (Lee 2000).

The Michigan and Indiana Department of Natural Resources (MDNR and IDNR) are proposing to jointly develop a multi-state HCP to assist in recovery of Mitchell's satyr habitat. The HCP is needed to efficiently secure incidental take permits when conducting management activities for satyrs in occupied habitat. This HCP does not include activities to allow for the development of habitat. The HCP will be developed following an ecosystem management approach; prairie fens and surrounding lands necessary to support proper hydrology will be managed by restoring ecological processes. Native species dependant on fens and the surrounding uplands will be considered along with the satyrs in an adaptive framework. Restoring the ecological processes

and native plant communities within the fens will restore an important component to the parent ecosystems and benefit many rare and declining species.

NEEDS:

Mitchell's satyr butterflies are endemic to a habitat type that depends on frequent disturbance, particularly fire. Historically, fire was a major determinant of successional vegetative stages present at any given time within calcareous fens in the range of the Mitchell's satyr butterfly. Without fire, the open herbaceous areas of the fen used by this species succeed into dense shrub cover. This vegetative succession eliminates suitable habitat patches within the fens for Mitchell's satyr. Prescribed fire is a necessary management tool to maintain and enhance habitats on some of the currently occupied sites. It is not feasible to use prescribed fire at sites that area extremely small or that are close to private homes, but where appropriate it is a valuable management tool. This butterfly, however, is not fire tolerant, and, depending on the timing of burns, adults, larvae, or eggs are killed during the fire event. The biology of this species depends on burned sites being colonized by individuals from adjacent unburned patches. Therefore, to manage for this species some individuals must be taken. Consequently, a process for securing take permits under the Endangered Species Act is needed to maintain and enhance habitat for this species.

An HCP is not the only vehicle for securing necessary take permits for habitat management activities. In this case, however, an HCP offers needed efficiencies and effectiveness to ensure timely management of habitats, much of which is on private lands. Landowners wishing to have management conducted on their lands that benefits fens and Mitchell's satyr need incentives to make the regulatory process easier to navigate. The HCP will offer incidental take permits through certificates of inclusion to private landowners provided they agree to and follow all provisions of the HCP. This HCP is expressly not for allowing habitat to be developed in exchange for replacement or other assurances of no net loss. This HCP will only cover those activities designed to recover the species.

Before the HCP can be developed, however, the management activities to be included must be properly established. Because some individuals can be incidentally taken during management activities, the outcomes of those activities need to be fully understood so that local populations are not put at risk. Much of the biology and habitat requirements of Mitchell's satyrs remain uncertain. Further, most remaining populations are relegated to small isolated patches. Therefore, mistakes in applying management activities such as timing and periodicity of burns, amount of habitat to be actively managed at any given time, size and location of adjacent populations needed for recolonization, size and juxtaposition of open herbaceous patches needed, hydrologic buffer zones, control of exotic vegetation, and possibly others may negatively impact a local population. Baseline data, inventories of populations and habitats, modeling, and analyses of data are needed to determine management guidelines to include in the HCP.

This proposal will address needs that are consistent with recommendations included in the Mitchell's Satyr Recovery Plan (Service 1997) and recommendations offered by the Mitchell's Satyr Working Group. The use of an HCP stems from the Recovery Plan to provide the planning basis for this project. Implementing the HCP will provide the habitat necessary to support viable

populations sufficient to allow delisting. Under the HCP, protection and management of these habitat sites will be assured through an approach that recognizes and includes conservation of the supporting calcareous wetland communities. In summary, these needs include:

1. A greater understanding of satyr biology and ecology. Food plants, the insect's relationship to a heterogeneous habitat, and habitat development in relation to local climatic and edaphic factors all need to be better understood to develop appropriate management strategies.

2. A more thorough understanding of satyr populations and numbers. Fewer than 25 occupied habitat sites are known range-wide, and there is no estimate of the proportion of the total population these sites represent.

3. Additional effort to identify potential habitat and new occupied sites. Mitchell's satyr habitat occurs almost exclusively in prairie fens, and the MNFI Natural Heritage Database includes approximately 120 of these sites. Yet, these known sites may represent only 1/4 to 1/3 of existing sites (M. Kost, personal communication).

4. Surveys to understand the distribution and status of other rare fen-associated plants and animals.

5. An education and outreach effort to facilitate sharing with stakeholders, management partners, and the general public to heighten understanding and solicit support for a conservation strategy that is of both a local and landscape level to address satyrs and their prairie fen habitat.

6. Project administration and landowner coordination for effective habitat planning and management.

7. A better understanding of effective management for both the Mitchell's satyr and other rare fen species that includes consideration of new management directions and modifications to existing methods.

8. Combination of existing and new information to guide management activities that will be included in the HCP. This HCP will then be used to support an application for incidental take permits. The ultimate intent of using take permits is to conduct habitat management that benefits populations while ensuring that the cumulative effects of take of individuals does not jeopardize the species.

OBJECTIVES:

Ultimately, the goal of the HCP is to be an effective tool that assists in recovering this species. This goal of this grant is to support the development of the HCP. Although both MDNR and IDNR are committed to also implementing the plan, this grant will not support implementation activities. Specifically, the objectives of this grant are as follows:

Objective 1: Baseline Surveys

Baseline surveys will be conducted at known, historic, and suspected occupied sites for the presence of Mitchell's satyrs. Surveys will also be conducted on predicted suitable habitats to determine presence or absence of Mitchell's satyr. Protocols will be developed and implemented as part of these surveys to quantify population status at each occupied site.

Objective 2: Inventories and modeling

Inventories of habitat quality and quantity will be conducted at selected known sites to be used in developing predictive models of potentially suitable habitat. A predictive model of potential habitat will then be developed, combining inventory data with other GIS layers of vegetation, soils, and hydrology. Another model will be developed to predict timing of adult emergence and periods of peak activity to better target survey efforts (degree-day model).

Objective 3: Outreach

Outreach efforts will be developed to incorporate stakeholders, potentially affected publics, private landowners with occupied or suitable habitat, conservation partners, and any other interested public in all aspects of developing the HCP and Environmental Assessment. Additionally, outreach efforts will be developed to educate landowners with suitable habitat on Mitchell's satyr biology and management needs. This outreach will also encourage participation in management activities and programs.

Objective 4: Plan writing and NEPA compliance

The HCP and an Environmental Assessment of incidental take under the HCP will be developed and approved by USFWS. As part of the HCP development, individual site conservation plans for known populations will be developed or updated as needed and included in the HCP.

EXPECTED RESULTS OR BENEFITS:

The ultimate goal of the proposal is to recover the Mitchell's satyr. The HCP, once implemented, we be an efficient tool to ensure habitat management occurs that benefits populations while providing for incidental take of individuals. Because much of this management needs to occur on private lands or lands owned by conservation groups, the incentive of getting permits through a certificate of inclusion will hopefully spur more management for satyrs than would otherwise occur. Without having to secure take permits on their own, these landowners will be more willing to participate in LIP and Farm Bill programs to conduct management for Mitchell's satyrs.

The HCP will consolidate many individual management projects under a single strategic umbrella. Currently, separate management activities are occurring on state lands, on lands owned and/or managed by conservation groups, and on private lands in habitats that are suitable for Mitchell's satyr. Coordination will ensure that the best available management practices are used to maximize benefits. Additionally, better adaptive management information will be available to all when practices need to be modified. Sharing of information will also increase the body of information and understanding of satyr biology and ecology.

The HCP will also be developed to address the priorities identified in the recovery plan. With the additional incentive to manage satyrs provided through the HCP, activities to address the priorities are much more likely to occur. The HCP will be developing a network throughout the management community and will result in use of LIP and Farm Bill program incentives to conduct activities to address recovery priorities.

The activities supported under this grant and through the subsequent implementation of the HCP will have benefits beyond the Mitchell's satyr. The HCP will follow an ecosystem management approach where the native plant communities and hydrologic cycles necessary to maintain fen habitat for satyrs will be the management unit of focus. Consequently, native plants dependent on fens will also receive habitat management benefits. Other associated animal species will also benefit, notably the Eastern massasauga rattlesnake, a federal candidate species that uses crayfish burrows in these same fens as hibernacula. Fens also provide spring and fall foraging habitat for massasaugas.

Consequently, the HCP will address the habitat-based needs of the satyrs and other species of concern from a holistic, community-based perspective that recognizes both the independence and interdependence of the various endemic populations existing in largely isolated relict calcareous wetland communities. Specifically, benefits of the HCP include:

1. A better understanding of forage plants selected by Mitchell's satyrs and their adaptiveness in switching between plants based upon availability and location. This will lead to an understanding of the typical habitat and the range of variability around this typical habitat for satyrs. This understanding will help determine management activities that need to be included in the HCP.

2. A degree-day model that will help anticipate adult emergence and peak activity periods to better schedule surveys, management, and monitoring. The model will also help to assess risks of extreme weather events resulting in catastrophic population impacts.

3. Standardized protocols that will allow us to equate effort between sites and to develop measures of output per unit of effort that will be incorporated into adaptive management strategies.

4. Results of surveys which will be used to determine site occupancy rate, site occupancy persistence, and numbers of satyrs. These population parameters are necessary in developing site plans and measuring progress toward Recovery Plan objectives.

5. Development of a habitat model to help characterize essential site components and provide managers with a tool to predict areas of suitable habitat and to assess known habitats.

6. A predictive model to be used to assess potential habitat within the landscape of concern, efficiently prioritize on-ground validation surveys to document new sites and ascertain model precision, and to project habitat loss to land use conversion and succession.

7. Help in quantification, characterization, and documentation of additional habitat and additional fens. Results of surveys for other fen-associated species will be used to

determine the distribution and status of these species at each site and to contribute to a better understanding of the site's overall biological diversity and ecological health.

8. Continuous networking with stakeholders and the public—both distributing and soliciting information—via the website.

9. Advisory groups to provide balance to considerations and decisions contributing to development of a HCP.

10. Facilitation of a collaborative interactive approach for HCP/NEPA development that involves both the public and stakeholders.

APPROACH:

MDNR and IDNR are the grantees under this proposal. Activities supported by this grant will also be contracted through and/or with cooperation from the Michigan Natural Features Inventory (Michigan State University Extension), Michigan State University, Purdue University, Grand Valley State University, University of Notre Dame, Toledo Zoo, Michigan and Indiana Chapters of The Nature Conservancy, Southwest Michigan Land Conservancy, and Mitchell's Satyr Recovery Workgroup. Activities to accomplish the proposal objectives and that will be funded through this grant are as follows:

Approach 1: Baseline Surveys

Baseline surveys will be conducted to determine the presence or absence of Mitchell's satyrs and determine the extent of occupied habitat. Surveys are visual, conducted by trained personnel. Individual butterflies are not captured or handled during these surveys. For each individual identified, the sex, as well as the relative physical condition, is visually determined. This information, along with date, time of day, weather conditions, and GPS locations, is collected for each site. Data collected is used to map locations and determine/refine timing of surveys and suitable weather conditions for conducting surveys. This information will be used in developing the degree-day model discussed below.

For selected sites, quantification surveys will be conducted to ascertain satyr numbers within subpopulations. Timed-meandered surveys will be conducted and verified against a limited number of mark-release-recapture surveys. Satyrs will be captured and marked using soft nets and permanent markers. Protocols will conform to permit requirements from the Service which will include advanced training in satyr handling. For both presence/absence and quantification surveys, results of surveys will be reflected against expectations; adaptive changes will be recommended to the Service in instances where surveys fail to meet needs.

All persons conducting baseline surveys will be extensively trained on butterfly identification and survey techniques. Surveys will be conducted annually at all known occupied, historic, and potential habitat sites. Surveys will be conducted by DNR, MNFI, TNC, and SWMLC staff and volunteers.

As part of this proposal, protocols will be modified and developed to expand these baseline surveys to quantify population status at each site. These surveys will also be conducted at sites where management has occurred to determine management effectiveness.

Approach 2: Inventories and modeling

The development of a predictive habitat model will involve vegetation inventories at occurrence locations. GPS locations of individuals will be used to select a number of locations for vegetation inventories. This data will be used to assist in training a GIS application that combines soil and vegetation data that predicts potential habitat within the species range. These vegetation inventories will allow incidental identification and recording of additional occurrences of rare fen-associated plants and animals.

Climate conditions, especially temperature, will be collected for locations where field personnel have direct observations of Mitchell's satyr activity; climate information will be obtained from websites maintained by the National Oceanic and Atmospheric Administration (NOAA). These conditions will be compared to the direct field observations of Mitchell's satyr activity to develop a degree-day model similar to those that exist for economic insects. The Mitchell's satyr degree-day model will be used for predicting favorable conditions and timing for conducting future surveys, including variance amongst emergence and peaking at different locations.

Direct field observations of occurrences and individual Mitchell's satyr characteristics will be compared to past and current management techniques, or lack thereof, to determine the effectiveness of the management activities. This will allow determination of which activities will be most conducive to achieving HCP goals.

Approach 3: Outreach

An education and outreach program will be developed and implemented to ensure widespread involvement in developing the HCP and associated EA as well as targeting landowners for involvement in management activities. The core of the outreach program will be a website accessible by project personnel, landowners, and the general public. The website will include information on progress of the project, electronic versions of all handouts and brochures, meeting notices and notes, and links to partner websites. Public input and comments will also be solicited on the website. Public and informal talks, news releases, and handouts and brochures will be used to disperse information; each of these dispersal means will include the website address as a reference for further information. Partners and other outside organizations will be closely involved to ensure that the widest possible audience is reached.

Approach 4: Plan writing and NEPA compliance

The HCP and an Environmental Assessment of incidental take under the HCP will be developed and approved by USFWS. As part of the HCP development, individual site conservation plans for known populations will be developed or updated as needed and included in the HCP. The development of the HCP and NEPA compliance will be guided by scientific and management advisory groups. Use will be made of the existing recovery workgroup, but additional groups will be formed as needed. Members of these groups will consist of conservation partners and representatives of other stakeholder groups and interested publics.

LOCATION:

Grant activities will occur in the Southern Michigan Ecoregion (Albert 1995) and glaciated portions of northern Indiana.

ESTIMATED COST:

Costs will vary annually. The Grant Proposal covers salaries and wages, contractual services, expenses and equipment. Specific work activities may vary from year to year as detailed in the Grant Agreements.

Objectives	FY 2006	FY 2007	FY 2008	Totals
Baseline Surveys	$58,889	$70,000	$70,000	**$198,889**
Inventories and modeling	$133,333	$137,777	$113,333	**$384,443**
Outreach	$55,556	$55,556	$47,778	**$158,890**
Plan writing and NEPA compliance	$55,555	$70,000	$110,000	**$235,555**
Totals	**$303,334**	**$333,334**	**$341,111**	**$977,777**

Federal Share	**90%**	**$880,000**
States Share	**0%**	**$0**
In-Kind Partner Contribution[1]	**10%**	**$97,777**

[1]In-kind Partner contribution includes donated overhead for salaries and wages, volunteer labor and donated supplies. Details of in-kind contributions and their valuation will be included in the grant agreements.

COMPLIANCE:

National Environmental Policy Act (NEPA)

The activities supported by this grant of planning, surveys, inventories, modeling, and outreach will not have a significant impact on the quality of the human environment and are covered by categorical exclusions. The issuance of incidental take permits, however, constitutes a federal action. Even though this action is designed to recover a listed species, whether it is considered as having a significant impact on the quality of the human environment has been disputed. Consequently, an Environmental Assessment will be prepared as part of the development of the HCP to determine if the issuance of incidental take permits can have a Finding of No Significant Impact or whether an Environmental Impact Statement needs to be prepared.

Section 7, Endangered Species Act (ESA)

The activities supported by this grant will not have any direct or indirect impacts on listed species. The issuance of incidental take permits will be likely to adversely affect listed species.

Consultations will occur with Ecological Services personnel of USFWS. As part of developing the HCP and EA, a biological assessment will be prepared for Section 7 compliance with the incidental take permits.

National Historic Preservation Act (NHPA)

The planning, surveys, inventory, modeling, and outreach activities supported by this grant will not have any impacts on sites eligible or potentially eligible for listing in the National Register of Historic Places. Consequently, no Section 106 review is necessary.

PROJECT PERSONNEL:

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APPENDIX A: Habitat Conservation Planning Assistance Program – Fiscal Year 2005 Evaluation Form

This appendix summarizes the information used for evaluating HCP proposals.

Species Benefits

This proposal will benefit all of the known extant Mitchell's satyr sites in Michigan and Indiana and, thus, will have very high conservation value. The activities in this HCP proposal are crucial to the recovery of this species and covers at least 75% of the known range-wide habitat. Because this HCP will focus on the management needs of prairie fens, many rare plant and animal species dependent on this rare and declining habitat will also receive benefits. Recent surveys in Michigan have documented at least 12 rare animals, including the Eastern massasauga rattlesnake, a federal candidate species, and 13 rare plants at these satyr sites (See Table 1). Because this proposal will improve the fen habitat that these animal and plant species depend upon, it will have at least low to medium conservation value for these species. The benefit to these other species will be to a lesser extent than to the Mitchell's satyr; however, because fen habitat is declining, it is crucial to preserve and maintain those fens that do still exist. The impact that the HCP will have on each of the other rare plants and animals found at these satyr sites will vary for each specific species depending on its range and distribution and status.

Although the incidental take permit will only identify the Mitchell's satyr butterfly, management activities pursued under the permit will benefit the other rare species found in the fens.

Ecosystem Benefits

When considered in the context of the surrounding landscape, the HCP plan area contains some of the naturally occurring biotic and abiotic components and ecological processes necessary to maintain a fully functioning ecosystem; this includes the fen habitat needed to support the Mitchell's satyr and other rare, fen-associated plants and animals. All of the sites will need some management to address the vegetative succession that is threatening the fens, but the status of the other biotic and abiotic components and ecological processes varies by site. Some of the occupied satyr sites are in relatively good condition and have intact hydrological processes with few threats from the surrounding landscape. Other sites are more disturbed and contain more threats which need to be addressed by the HCP.

A tertiary, or impact, zone was created around each of the known satyr sites, delineating the area which has the potential to directly or indirectly impact the quality of the wetlands occupied by the Mitchell's satyr. This acreage was calculated to be greater than 50,000 acres, including surrounding landowners whose practices on their land could either harm or benefit the fens. For example, sedimentation and road salt (Na^+ and Cl^-) at road crossings, residential and agricultural water use, and nutrients from septic systems and agricultural runoff likely increase stream sedimentation and change the water chemistry and flow of groundwater and surface water into the system. This favors salt tolerant vegetation and other invasive species. These and other impacts to the soil and hydrology as well as other processes will be addressed in the HCP.

Fostering HCP Partnerships

A broad stakeholder group has already been working together towards the recovery of the Mitchell's satyr butterfly as part of the Mitchell's Satyr Working Group. Many of these stakeholders have expressed interest in playing a significant role in the development of the HCP and may participate in the HCP steering committee. In addition, other stakeholders which are not currently part of the satyr working group have been identified to assist with HCP development. We have identified 18 partners who will likely play a key role in the HCP development (See Table 2).

Delivery or Completion

The activities outlined in this proposal are instrumental in initiating planning for a new HCP for the Mitchell's Satyr butterfly. The activities for which funding is requested cannot be completed within 1 year.

Table 1: Rare Plants and Animals Associated with Prairie Fens in Michigan

ANIMALS

Common Name	**Scientific Name**	**Status**
Angular spittlebug	*Lepyronia angulifera*	State special concern
Blanding's turtle	*Emys blandingii*	State special concern
Blazing star borer moth	*Papaipema beeriana*	State special concern.
Box turtle	*Terrapene c. carolina*	State special concern
Kirtland's snake	*Clonophis kirtlandii*	State endangered
Massasauga rattlesnake	*Sisturus c. catenatus*	Federal Candidate
Poweshiek skipper	*Oarisma poweshiek*	State threatened
Silphium borer moth	*Papaipema silphii*	State threatened
Spotted turtle	*Clemmys guttata*	State threatened
Swamp metalmark	*Calephis mutica*	State special concern
Tamarack tree cricket	*Oecanthus laricis*	State special concern

PLANTS

Common Name	**Scientific Name**	**Status**
Bog bluegrass	*Poa paludingena*	State threatened
Cut-leaved water parsnip	*Berula erecta*	State threatened
Edible valerian	*Valeriana edulis* var. *ciliata*	State threatened
Fleshy stickwort	*Stellaria crassifolia*	State threatened
Horsetail spikerush	*Eleocharis equisetoides*	State special concern
Jacob's ladder	*Polemonium reptans*	State threatened
Leadplant	*Amorpha canescens*	State special concern
Narrow-leaved reedgrass	*Calamagrostis stricta*	State threatened
Prairie dropseed	*Sporobolus heterolepis*	State special concern
Prairie Indian plantain	*Cacalia plantaginea*	State special concern
Rosinweed	*Silphium integrifolium*	State threatened
White Lady Slipper	*Cypripedium candidum*	State threatened
Wild rice	*Zizania aquatica* var. *aquatica*	State threatened

Table 2: Mitchell's Satyr HCP Stakeholders:

Organization
Consumers Energy
Detroit Zoo
Eastern Michigan University
Grand Valley University
Indiana DNR Nature Preserves
John Ball Zoo
MDNR Landowner Incentive Program
MDNR Parks and Recreation
MI Department of Miliarty & Veteran Affairs
Michigan Natural Features Inventory
Michigan Nature Association
Michigan State University
Purdue University
Southwest Michigan Land Conservancy (SWMLC)
The Nature Conservancy, Indiana
The Nature Conservancy, Michigan
Toledo Zoo
USFWS