

**MICHIGAN & INDIANA**  
**PRAIRIE FEN CONSERVATION PLAN**

**and**

**MITCHELL'S SATYR HABITAT CONSERVATION PLAN**

1. **PURPOSE** (*e.g., to provide strategic and operational guidance for the conservation of prairie fens in MI & IN. Also, this section explains the separation of the fen conservation plan and the HCP: the latter addresses only situations where take of Mitchell's satyr could occur; the former address all prairie fens. This distinction is important to circumscribe the Federal action in relation to this project*)
  
2. **OVERVIEW OF PRAIRIE FENS IN MICHIGAN & INDIANA**
  - 2.1 **Landscape Context**
  - 2.2 **Physical Features**
    - 2.2.1 Geology, topography and soils
    - 2.2.2 Regional climate
    - 2.2.3 Microclimate
    - 2.2.4 Hydrology (*or is this a process?*)
    - 2.2.5 Water quality
  - 2.3 **Ecological Processes**
    - 2.4.1 Wildfire
    - 2.4.2 Flooding (*or should hydrology go here instead?*)
    - 2.4.3 Windthrow
    - 2.4.4 Herbivore grazing
    - 2.4.5 Insect/disease outbreak
  - 2.4 **Vegetation**
    - 2.5.1 Indicator species
    - 2.5.2 Federally listed species
    - 2.5.3 State listed species
    - 2.5.4 Other species of concern
  - 2.5 **Wildlife**
    - 2.6.1 Indicator species
    - 2.6.2 Federally listed species
    - 2.6.3 State listed species
    - 2.6.4 Other species of greatest conservation need
  
3. **THREATS TO PRAIRIE FENS IN MICHIGAN & INDIANA**
  - 3.1 **Modification of Ecological Processes**
  - 3.2 **Habitat Conversion**
  - 3.3 **Invasive Species**
  - 3.4 **Climate Change**

### 3.5 Recreation

4. **GOAL AND OBJECTIVES** (*example goal: Restore and maintain a matrix of interconnected prairie fens and associated upland habitats that experience a natural range of ecological processes and sustain diverse native species communities. Example language for the following objectives is yet to be developed; the focus of each objective is listed*)
  - 4.1 **Objective 1: Prairie Fen Occurrence** (*potential quantifiable measures: number, area, distribution, % of historic occurrences; any figures associated with these measures might be seen as arbitrary, so developing an objective of this type will be difficult*)
  - 4.3 **Objective 2: Ecological Processes** (*potential quantifiable measures: types, intensities and frequencies of disturbance; desired successional state indicated by structure and cover*)
  - 4.4 **Objective 3: Native Species Communities** (*potential quantifiable measures: abundance of fen indicator species, abundance of undesirable species; abundance of rare species*)
  - 4.2 **Objective 4: Connectivity** (*potential quantifiable measures: corridor width, likelihood of dispersal between fens by certain species within specified time intervals*)
5. **PRAIRIE FEN CONSERVATION STRATEGIES**
  - 5.1 **Increase Public Awareness and Understanding of Prairie Fens and Associated Conservation Issues.**
    - 5.1.1 Develop and implement an education and information program focused on prairie fens.
    - 5.1.2 Support training opportunities for staff and conservation partners.
    - 5.1.3 Evaluate the effectiveness of the education and information program.
  - 5.2 **Conduct Active Research and Monitoring Programs to Support Science-based Prairie Fen Conservation.**
    - 5.2.1 Investigate factors that affect the health and function of prairie fens.
    - 5.2.2 Investigate and test techniques to reduce threats or improve fen conditions.
    - 5.2.3 Monitor the distribution and relative abundance of prairie fen species.
    - 5.2.4 Investigate and test techniques for the re/introduction of missing prairie fen components.
  - 5.3 **Protect Prairie Fens and Associated Upland Habitats and Landscape Connections.**
    - 5.3.1 Prioritize prairie fens and adjacent lands for protection.
    - 5.3.2 Work with landowners to identify protection options.
    - 5.3.3 Identify and secure funding.
    - 5.3.4 Acquire or purchase easements for high-priority parcels.
  - 5.4 **Restore/Simulate Ecological Processes.** (*detailed description of management techniques in this section; introductory note: “To avoid or minimize take, land managers working in habitat occupied by Mitchell’s satyr should refer to the Mitchell’s satyr HCP for management guidelines.”*)
    - 5.4.1 Restore/simulate natural wildfire regimes.

- 5.4.2 Restore/simulate natural flooding regimes.
- 5.4.3 Restore/simulate the effects of windthrow.
- 5.4.4 Restore/simulate the effects of herbivore grazing.
- 5.4.5 Simulate the effects of insect/disease outbreak.

**5.5 Restore and Protect Natural Hydrology.**

- 5.5.1 Support enforcement of wetland regulations.
- 5.5.2 Identify and minimize water inputs and withdrawals that adversely affect prairie fens.

**5.6 Control Invasive Species.**

- 5.6.1 Recommend modifications in law, policy or enforcement that could more-effectively prevent the spread of invasive species.
- 5.6.2 Refine and implement field protocols to prevent spread of invasive species.
- 5.6.3 Provide the public with information on invasive species.
- 5.6.4 Reduce distribution and abundance of invasive species (*detailed description of management techniques here; introductory note: "To avoid or minimize take, land managers working in habitat occupied by Mitchell's satyr should refer to the Mitchell's satyr HCP for management guidelines."*)

**5.7 Minimize Adverse Changes to Water Quality.**

- 5.7.1 Support enforcement of aquatic contamination regulations.
- 5.7.2 Identify and minimize artificial nutrient inputs.

**5.8 Minimize Adverse Impacts of Recreational Activities.**

- 5.8.1 Minimize and guide trail development.
- 5.8.2 Restrict access by off-road vehicles.

**5.9 Re/Introduce Missing Prairie Fen Components.**

- 5.9.1 Identify missing prairie fen components.
- 5.9.2 Assess the need and feasibility of a species re/introduction program.
- 5.9.2 Prioritize components and areas for species re/introduction.
- 5.9.3 If necessary and feasible, develop, test and implement a species re/introduction program.

**6. MONITORING, EVALUATION & ADAPTIVE MANAGEMENT**

**6.1 Data Collection**

- 6.1.2 Prairie Fen Occurrence
- 6.1.3 Connectivity
- 6.1.4 Ecological Processes
- 6.1.5 Native Species Communities

**6.2 Data Analysis & Evaluation**

**6.3 Adaptive Management**

**7. IMPLEMENTATION**

**7.1 Partner Participation**

**7.2 Public Involvement**

**7.3 Implementation Timeline**

**7.4 Anticipated Costs**

## **8. LITERATURE CITED**

### **APPENDIX: MITCHELL'S SATYR HABITAT CONSERVATION PLAN**

#### **A1. INTRODUCTION**

- A1.1 Purpose**
- A1.2 Background**
- A1.3 Permit Duration**
- A1.4 Regulatory/Legal Framework**
- A1.5 Area To Be Covered by Permit**
- A1.6 Species To Be Covered by Permit**

#### **A2. MITCHELL'S SATYR BIOLOGY AND STATUS**

- A2.1 Physical Description**
- A2.2 Habitat**
- A2.3 Food Habits**
- A2.4 Life Cycle**
- A2.5 Dispersal**
- A2.6 Distribution and Abundance**
- A2.7 Factors Affecting the Species**

#### **A3. GOAL AND OBJECTIVES** *(example goal: Support maintenance of prairie fens in a condition and configuration necessary to sustain existing populations of Mitchell's satyr)*

- A3.1 Objective 1:** *(example objective: Restore/simulate ecological processes required to provide abiotic and biotic features required by Mitchell's satyr.)*
- A3.2 Objective 2:** *(example objective: Maintain connectivity among occupied Mitchell's satyr habitats to support dispersal among existing populations.)*

#### **A4. PROJECT DESCRIPTION/ACTIVITIES COVERED BY PERMIT**

- A4.1 Project Description**
- A4.2 Activities Covered by Permit**
  - A4.2.1 Prescribed Burning
  - A4.2.2 Flooding
  - A4.2.3 Mowing/Hydroaxing
  - A4.2.4 Manual Vegetation Removal
  - A4.2.5 Chemical Vegetation Removal
  - A4.2.6 Soil Scarification
  - A4.2.7 Livestock Grazing
  - A4.2.8 Seeding and Planting
  - A4.2.9 Treatment Combinations

#### **A5. MEASURES TO MINIMIZE ADVERSE IMPACTS**

- A5.2.1 General**
- A5.2.2 Prescribed Burning**
- A5.2.3 Flooding**

- A5.2.4 Mowing/Hydroaxing**
- A5.2.5 Manual Vegetation Removal**
- A5.2.6 Chemical Vegetation Removal**
- A5.2.7 Soil Scarification**
- A5.2.8 Livestock Grazing**
- A5.2.9 Seeding and Planting**
- A5.2.9 Treatment Combinations**

**A6. POTENTIAL BIOLOGICAL IMPACTS/TAKE ASSESSMENT**

- A6.1 Direct Impacts**
- A6.2 Indirect Impacts**
- A6.3 Anticipated Take: Wildlife Species**
  - A6.3.1 Mitchell's Satyr
  - A6.3.2 Other Federally Listed and Candidate Wildlife
  - A6.3.3 Michigan State-listed Wildlife
- A6.4 Anticipated Impacts: Plants**
  - A6.4.1 Federally Listed Plants
  - A6.4.1 Michigan State-listed Plants
- A6.5 Cumulative Impacts**
  - A6.5.1 Historic Cumulative Impacts
  - A6.5.2 Contemporary Cumulative Impacts

**A7. MONITORING AND REPORTING**

**A8. FUNDING**

- A8.1 Funding for HCP Administration**
- A8.2 Funding for HCP Implementation**

**A9. ALTERNATIVES**

- A9.1 Alternative 1: No Action**
- A9.2 Alternative 2: Public-lands HCP**
- A9.3 Alternative 3: Provision of Refuges**

**A10. HCP IMPLEMENTATION, CHANGED AND UNFORSEEN CIRCUMSTANCES**

- A10.1 HCP Implementation**
- A10.2 Changed Circumstances**
- A10.3 Unforeseen Circumstances**
- A10.4 Other Measures as Required by the Director**

**A11. LITERATURE CITED**