

**Environment and Natural Resources Trust Fund
2015 Request for Proposals (RFP)**

Project Title:

ENRTF ID: 018-A

Goblin Fern: Habitat Mitigation for Species Conservation

Category: A. Foundational Natural Resource Data and Information

Total Project Budget: \$ 61,040

Proposed Project Time Period for the Funding Requested: 3-February 2015 - February 2018

Summary:

Examining Goblin fern populations in response to habitat degradation resulting from invasive earthworms; for development of long term habitat mitigation and species conservation strategies.

Name: Bobby Henderson

Sponsoring Organization: Leech Lake Band of Ojibwe

Address: 115 Sixth St NW
Cass Lake MN 56633

Telephone Number: (218) 784-8620

Email bobby.henderson@llojibwe.org

Web Address _____

Location

Region: Central

County Name: Beltrami, Cass, Itasca

City / Township: Leech Lake Reservation/Chippewa National Forest

Alternate Text for Visual:

Goblin fern, invasive earthworm, historic distribution map for goblin fern and project area.

| | | | |
|--------------------------|-------------------------|-----------------------------|----------------------|
| _____ Funding Priorities | _____ Multiple Benefits | _____ Outcomes | _____ Knowledge Base |
| _____ Extent of Impact | _____ Innovation | _____ Scientific/Tech Basis | _____ Urgency |
| _____ Capacity Readiness | _____ Leverage | _____ TOTAL | |



**Environment and Natural Resources Trust Fund (ENRTF)
2015 Main Proposal**

Project Title: Goblin fern: habitat mitigation for species conservation

PROJECT TITLE: Goblin fern: habitat mitigation for species conservation

I. PROJECT STATEMENT

Goblin fern (*Botrychium mormo*) is a small discreet fern endemic to the Great lakes region. With the 2013 update to the Minnesota DNR Endangered and Threatened Species list, Goblin fern was elevated to a status of Threatened in Minnesota. Currently the species is listed as threatened in Michigan (13 records), endangered in Wisconsin (89 records), and receives a Global rank of G3 (vulnerable). Within this restricted range Goblin fern is dependent on specific forest communities dominated by Sugar maple/Basswood with specific soil types. The scourge of Minnesota’s Goblin fern and Maple/Basswood forests has been the introduction of earthworms. All earthworms in the Great Lakes region are non-native and the spread of earthworms has been expedited through human activities such as the dumping of unused fishing bait, forest management activities, recreation, and development. As a result of the adverse effects caused by earthworms, Goblin fern faces the potential to become extirpated from Minnesota, and regrettably the species could become extinct. Goblin fern is a species of significant concern for Leech Lake Band of Ojibwe, as we take a strong stance to protect and conserve all native species and forest communities for future generations.

Overall goals:

- Quantify decline in Goblin fern abundance and extirpations related to earthworm activity.
- Collect earthworm data for a much larger earthworm study being conducted by Great Lakes Worm Watch and UMD NRRI.

Direct outcomes:

- Predict the long term viability of goblin fern as earthworms expand across the landscape.
- Development of new mitigation measures for Maple/Basswood forest communities and conservation strategies for Goblin fern.

II. PROJECT ACTIVITIES AND OUTCOMES

Activity 1: Assessment of historic Goblin fern locations

Budget: \$37,430

This is not a complicated project, but will require intensive field work and extensive data collection to document Goblin fern extirpations and declines resulting from earthworms and/or other influences. The CNF will provide records, input into survey design, data collection, and provide GIS support for the project. We shall re-visit and survey historic Goblin fern locations to collect relevant data (*goblin fern presence, canopy closure, soil moisture, associated species, soil organic layer, etc...*). We shall monitor the 80 subunits for two consecutive years following the initial surveys to compensate for environmental and climatic variability which can affect Goblin fern emergence.

| Outcome | Completion Date |
|--|------------------------|
| 1. Identify a subsample of 80 Goblin fern record locations. | February 2015 |
| 2. Establish base data for subsample units. | August 2015 |
| 3. Update records based on present data; identify extirpations or presence and persistence, data to support larger earthworm projects. | September 2017 |

Activity 2: Analysis of survey data to predict adverse effects of earthworms on Goblin fern survival and persistence

Budget: \$23,610

I shall examine Goblin fern extirpations, presence and persistence, habitat conditions, and source of habitat degradation. With the use of IERAT, we will establish earthworm activity level which coincides with Goblin fern presence and persistence. From this we shall develop a predictive model to illustrate the adverse effects earthworms cause to Goblin fern and Maple/Basswood forests across Minnesota. Results of this project will determine land management practices that are compatible with Goblin fern survival at the local scale.



Environment and Natural Resources Trust Fund (ENRTF)

2015 Main Proposal

Project Title: Goblin fern: habitat mitigation for species conservation

| Outcome | Completion Date |
|--|------------------------|
| 1. Update records based on present data; identify extirpations or presence and persistence, data to support larger earthworm projects. | September 2017 |
| 2. Predict rate of population extirpation based on level of earthworms present at each location. | December 2017 |
| 3. Develop mitigation strategies to help ensure conservation of this species. | February 2018 |

III. PROJECT STRATEGY

A. Project Team/Partners

Funded:

- Bobby Henderson, (Botanist for the Leech Lake Band of Ojibwe), sole recipient of funds.

Non-funded/in-kind partners:

- Kirk Larson (Chippewa National Forest, Botanist/rare plants specialist, assist in survey and data collection).
- Dr. Don Farrar professor emeritus (Iowa State University, leading moonwort expert).
- Dr. Cindy Johnson-Groh (Gustavus Adolphus College, Professor of Biology and Environmental Studies, moonwort expert).

B. Project Significance and Long-Term Strategy

- Provide data to support the degree of imperilment Goblin fern is currently facing in Minnesota.
- Facilitate the development of long term mitigation strategies to protect remaining Goblin fern habitat and populations.
- Invoke more conscious decisions for updating and implementing BMPs in northern hardwood forests.
- Provide updated records for future status decisions.
- Provide Earthworm data to a much larger earthworm study being conducted by Great Lakes Worm Watch and UMD NRRI.
- Neighboring state agencies show interest in the findings since Goblin fern already faces extinction within their states.

C. Timeline Requirements

It is imperative to survey and monitor a large subsample of locations for three consecutive years to account for annual variability in environmental and habitat conditions which affect the life cycle of Goblin fern (*soil moisture, annual precipitation from the previous year/years, canopy closure, phenology, soil temps, duff layer, cyclic emergence, and earthworm activity*). This will also help confirm extirpations and the viability of remnant populations.

2015 Detailed Project Budget

Project Title: Predicting population viability of Goblin fern in response to invasive earthworms.

IV. TOTAL ENRTF REQUEST BUDGET: 3 years

| <u>BUDGET ITEM</u> | <u>AMOUNT</u> |
|---|------------------|
| Personnel: | |
| Bobby Henderson, project manager, botanist, data analysis (80% salary, 20% benefits) 25% FTE for 3 years | \$ 52,200 |
| Equipment/Tools/Supplies: | |
| High precision GPS | \$ 2,100 |
| Travel: | |
| Mileage (~12,000 miles), to, between, and from survey and data collection sites. | \$ 6,740 |
| TOTAL ENVIRONMENT AND NATURAL RESOURCES TRUST FUND \$ REQUEST = | \$ 61,040 |

V. OTHER FUNDS

| <u>SOURCE OF FUNDS</u> | <u>AMOUNT</u> | <u>Status</u> |
|---|---------------|-------------------|
| Other Non-State \$ To Be Applied To Project During Project Period: | \$ - | |
| Other State \$ To Be Applied To Project During Project Period: | \$ - | |
| In-kind Services To Be Applied To Project During Project Period: | | |
| USDA Forest Service: Botanist Kirk Larson, survey and data collection support. | \$11,100 | <i>Secured</i> |
| Leech Lake Division of Resource Management: IDC, Administrative support, office space, computers, GIS programs, vehicles and maintenance. | \$40,000 | <i>Secured</i> |
| Funding History: | | |
| Restoring Minnesotas Fish and Wildlife Corridors #CH01, ML2001, Subd. 04e | \$76,910 | |
| Restoring Minnesotas Fish and Wildlife Corridors - Phase II - 02e, ML2003, Subd. 05a | \$34,700 | |
| Restoring Minnesotas Fish and Wildlife Corridors - Phase III - 2e2, ML2005, Subd. 05a | \$28,000 | |
| Minnesota Habitat Corridors Partnership - Phase IV, ML2008, Subd. 03c | \$30,000 | |
| Remaining \$ From Current ENRTF Appropriation: Wild Rice/Waterfowl Habitat 2e, ML2011, Subd. 04j2e | \$50,000 | \$18,972 FY 14 |



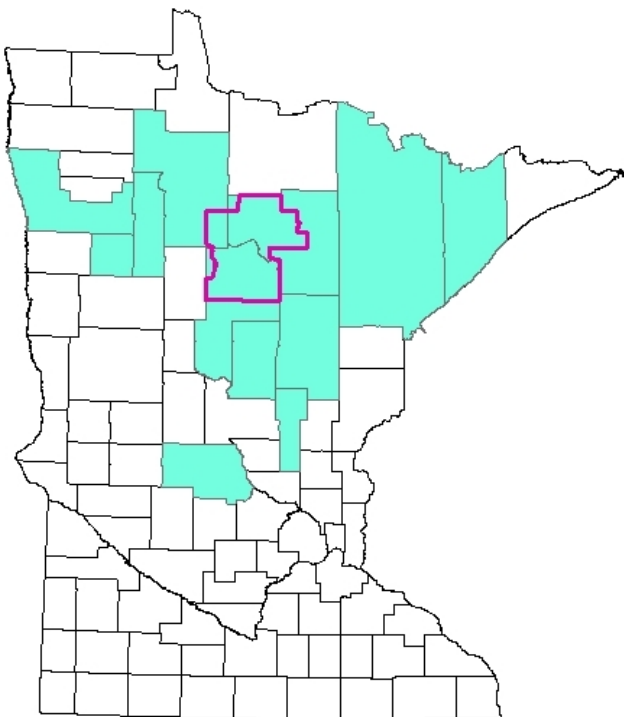
Environment and Natural Resources Trust Fund (ENRTF)
2015 Main Proposal
Project Title: Goblin fern: habitat mitigation for species conservation



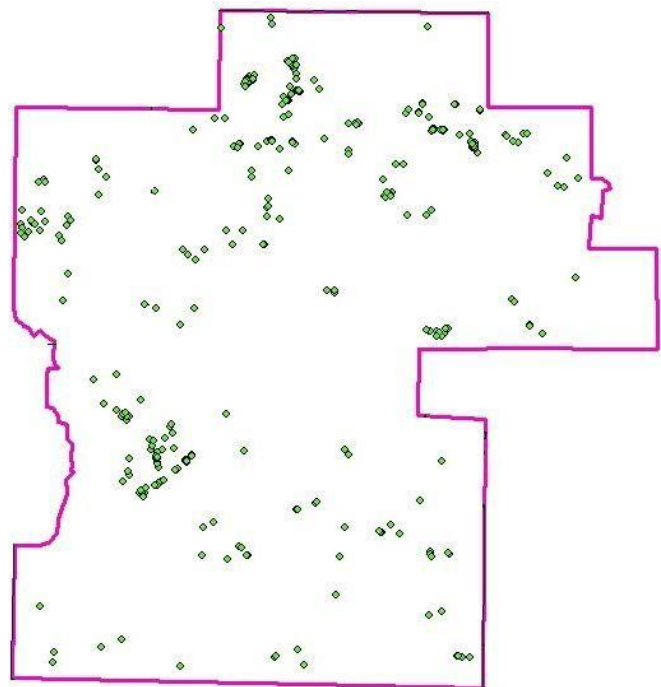
Goblin fern (*Botrychium mormo*)



Invasive earthworm



Goblin fern Distribution and project area: Leech Lake Reservation/Chippewa NF.



Goblin fern record locations within the project area.



Environment and Natural Resources Trust Fund (ENRTF)

2015 Main Proposal

Project Title: Predicting population viability of Goblin fern in response to invasive earthworms.

Predicting population viability of Goblin fern in response to invasive earthworms

Project Manager Qualifications

Bobby W. Henderson

I. QUALIFICATIONS

Professional

University of Minnesota Natural Resource Management B.S., 2008

Expertise Related to the Proposed Project

Project manager has an education emphasis in Botany, Soil & Water Quality, with a respectable background in field botany and ecology. He has extensive experience in rare plant surveys on the Leech Lake Reservation/Chippewa NF with a distinguished background in rare Moonworts. As a result of his expertise in the field he serves as consultant to CNF, trains staff in rare plant identification, habitat recognition, survey methods, and data collection.

II. RESPONSIBILITIES

Project manager will coordinate and manage the overall project, project design and protocol, conduct field surveys, collect and analyze data, consult with the CNF botanist for survey assistance, data collection, records, GIS support. His project will focus on collecting data to support updates to BMPs and development of future mitigation measures for the conservation of Goblin fern

III. ORGANIZATION DESCRIPTION

Department of Fish, Wildlife, and Plant Resources is part of Leech Lake Band of Ojibwe, Division of Resource Management. Our mission is the protection, conservation, and enhancement of all resources for the future generations of Leech Lake Reservation.