

**Environment and Natural Resources Trust Fund
2017 Request for Proposals (RFP)**

Project Title:

ENRTF ID: 032-A

Beetle Status in Old-Growth and Early Successional Habitats

Category: A. Foundational Natural Resource Data and Information

Total Project Budget: \$ 199,195

Proposed Project Time Period for the Funding Requested: 3 years, July 2017 - June 2020

Summary:

We will assess the status of beetles relevant to conservation of biodiversity, forest health, and pollination, and develop conservation and monitoring recommendations.

Name: Wayne Steffens

Sponsoring Organization: Lake Superior Research Institute

Address: 1993 Holm Rd
Two Harbors MN 55616

Telephone Number: (218) 834-3029

Email wsteffens@fastmail.fm

Web Address _____

Location

Region: Northeast

County Name: Aitkin, Carlton, Cook, Itasca, Koochiching, Lake, Pine, St. Louis

City / Township:

Alternate Text for Visual:

Map Showing Old-Growth Forest Stands in the Northeastern Minnesota study 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)
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Project Title: Beetle Status in Old-Growth and Early Successional Habitats

I. Project Statement

Beetles are the most diverse group of insects yet the beetles of northeastern Minnesota old-growth and early successional (ES) habitats (herbaceous areas), have never been systematically surveyed. Time is running out to document native species; invasive species, fragmentation and climate change are some of the potential threats to native species, and we must identify the original components of these habitats while they are intact. Some native ladybugs (actually beetles) are vanishing from ES habitats and surveys are needed before they vanish completely. Certain Midwestern Longhorned beetles have declined due to fragmentation of mature maple forests.

Pollinators such as bees are in decline, and the beetle families we will sample also include pollinators for which population trends are unknown. These families also include some of the most destructive and annoying invasive species such as the Emerald Ash Borer, and the Multi-colored Asian Ladybug, and they are at risk for introduction of new invasive species such as Asian Longhorned Beetle.

We will survey and monitor important beetle families in several types of old-growth in northeastern Minnesota, including black ash, maple (northern hardwood) and lowland conifer. We will also survey and monitor early successional habitats, gathering additional data on pollinating beetles and native ladybug status. Our goals are:

- 1) Evaluate status and distribution of selected native beetle families including pollinators, creating baseline data for future monitoring
- 2) Identify sites and habitats with high beetle diversity and/or rare species
- 3) Develop conservation and monitoring recommendations

Additional benefits include:

- Potential early detection of economically important invasive species.
- Identify native beetles in threatened old-growth ash forest, adding to the Emerald Ash Borer and Black Ash: Wildlife Impacts project (015-A) in progress.
- Evaluate beetle monitoring methods to compliment the Statewide Monitoring Network for Minnesota’s Changing Habitats project (004-A).

Our goals will be achieved by examining historical records and museum specimens for all species in several priority beetle families, creating county distribution layers. These results along with published literature and the results of our sampling will enable us to evaluate historical and current status and identify needs of numerous species for which useful data is currently lacking.

II. PROJECT ACTIVITIES AND OUTCOMES

Activity 1: Collect and identify priority

Budget: \$119, 517

beetles. We will sample 2 full seasons with limited sampling in a third season. Identification of specimens will be ongoing, but concentrated in fall-winter.

Old growth sampling sites will be static. An equal number of static ES sites will be monitored but other ES sites will be added or dropped as information is gathered.

Outcome	
1. Select 6-8 old-growth and 6-8 ES monitoring sites to be monitored for 2 full seasons. Coordinate with Statewide Monitoring Network for Minnesota’s Changing Habitats project	January 2018
2. Collect, process and identify beetles	December 2019

Beetle Status in Old-Growth and Early Successional Habitats

Activity 2: Create Distribution Layers.

Budget: \$39,839

We will examine literature records and specimens in the University of Minnesota Insect Collection. These will be combined with our sampling results to create county distribution lists and data layers for priority beetles. These will include all Minnesota longhorned beetles, buprestid beetles, and ladybugs, at a minimum.

Outcome	
1. Beetles in UM Insect Collection and literature records examined; county level localities recorded	January 2020
2. Data layers of priority beetles created	March 2020

Activity 3: Develop recommendations for conservation and monitoring. Budget: \$39,839

We will analyze the results of our distribution layers along with ecological data to develop conservation and monitoring recommendations

Outcome	
1. Review data layers, literature and other resources; assessments and recommendations developed in final report	June 2020

III. Project Strategy.

A. Project Team/Partners. Wayne Steffens, Researcher at Lake Superior Research Institute is the Project Manager. We will coordinate site selection and data products closely with MBS and DNR's Statewide Monitoring Network for Minnesota's Changing Habitats project. The Minnesota Department of Natural Resources Forest Health Program and Minnesota Department of Agriculture Plant Protection Program will both provide in-kind contribution (loan) of forest beetle traps. Students from Dr Brian Aukema's University of Minnesota Entomology classes will sort and curate samples with his oversight. We will work with The Nature Conservancy to sample old-growth forest on their Upper Manitou Forest Preserve.

B. Project Impact and Long-term Strategy

This project is part of a regional effort to document, monitor and develop conservation strategies for old-growth beetle biodiversity, beetle pollinators, and native lady beetle decline in the Upper Midwest. A smaller 2-year project managed by W. Steffens is expected to begin in Vilas County, WI in 2016.

C. Timeline Requirements

This is a 3 year project. Two full seasons (2018 and 2019) of sampling will be conducted with some limited sampling and site evaluation in the 2017 field season. After the 2019 field season, 8-9 months will be used to complete identifications, analyze the data, and develop recommendations in the final report.

2017 Detailed Project Budget

Project Title: Beetles of Old-growth and Early Successional Habitats

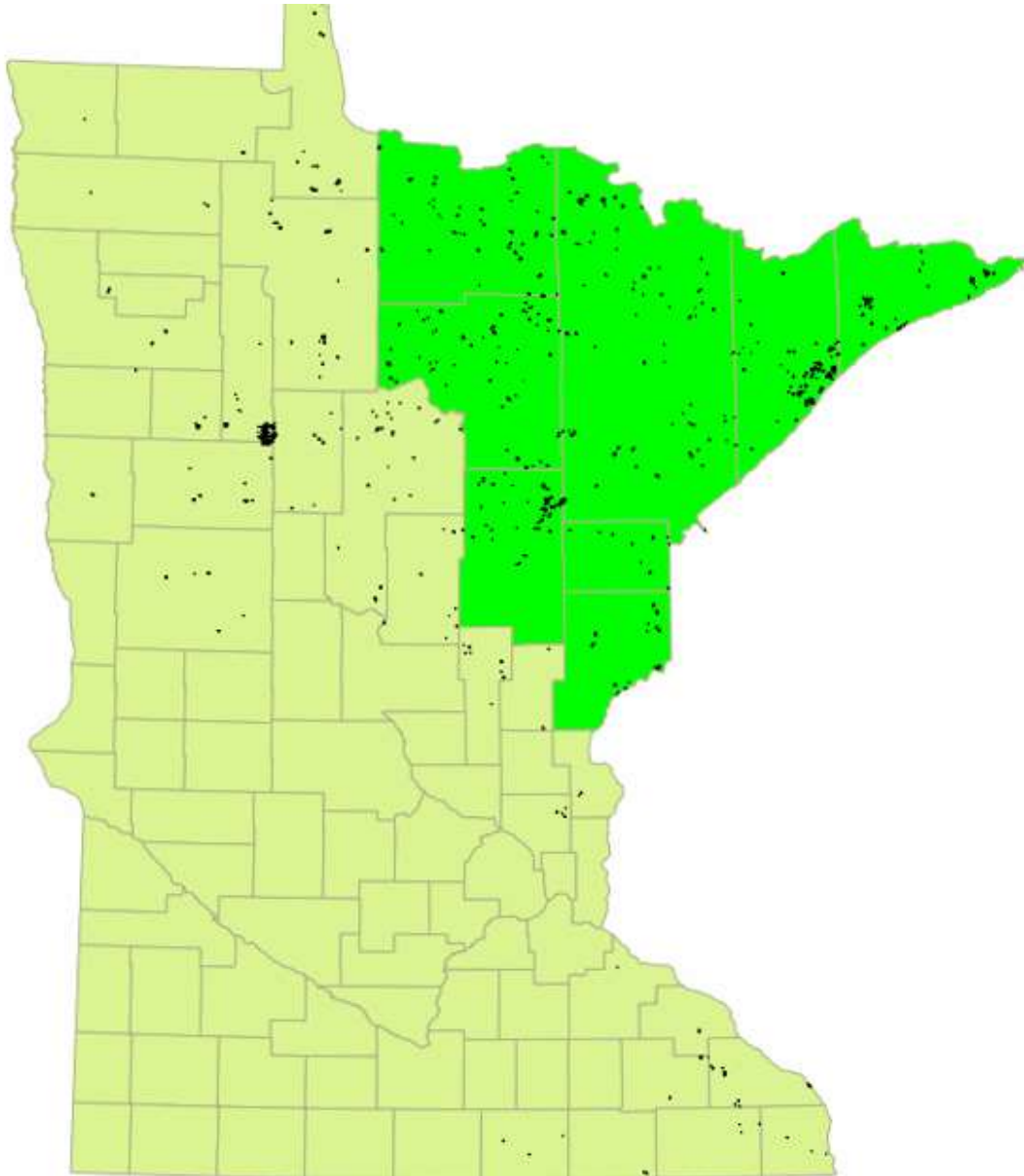
IV. TOTAL ENRTF REQUEST BUDGET 3 years

<u>BUDGET ITEM</u>	<u>AMOUNT</u>
Personnel: Wayne Steffens, Researcher @ Lake Superior Research Institute (57% salary 43% fringe), 58% Full-time for 3 years.	\$ 150,150
Professional/Technical/Service Contracts: University of Minnesota Entomology student(s) (32 total FT student-weeks) pinning beetle specimens (\$16,000) and part-time faculty oversight by Dr. Brian Aukema (\$14,000)	\$ 30,000
Equipment/Tools/Supplies:	
Handheld GPS (1)	\$ 450
50 flight intercept traps, lures hangers	\$ 3,000
Trap lures, solvents & preservative	\$3,100
disposable strainer funnels	\$125
Whirl-pak specimen bags	\$250
beetle pinning supplies	\$720
Travel: in-state travel to sample sites and UM Insect Collection. Each static monitoring site will be visited 6 times during the sampling season, with additional travel to dynamic sampling sites. (travel 97%/lodging 4%)	\$ 11,400
TOTAL ENVIRONMENT AND NATURAL RESOURCES TRUST FUND \$ REQUEST =	\$ 199,195

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:	N/A	
Other State \$ To Be Applied To Project During Project Period:	N/A	
In-kind Services To Be Applied To Project During Project Period:		
up to 40 Lindgren funnel traps loaned by MN DNR Forest Health @\$75	\$ 3,000	Secured
15 Lindgren funnel traps loaned by Minnesota Department of Agriculture @\$75	\$ 1,125	Secured
University of Minnesota entomology student help sorting samples (100 hours)	\$ 1,000	Secured
Funding History:	N/A	
Remaining \$ From Current ENRTF Appropriation:	N/A	

Beetle Status in Old-Growth and Early Successional Habitats



Old-Growth Forest Stands in Northeastern Minnesota

2017 LCCMR Project Manager Qualifications and Organization Description

Wayne Steffens. Researcher, Lake Superior Research Institute. Wayne Steffens has been leading rare insect surveys, habitat assessments and inventories since 1996. Wayne has consulted on numerous insect projects by the Minnesota DNR, University of Minnesota, US Forest Service, US Fish and Wildlife Service and others. He has lived in Two Harbors, Minnesota since 1998.

Specialist Groups

- Terrestrial Invertebrate Specialist Team for revision of Wisconsin's Species of Greatest Conservation Need (SGCN). 2014-2015
- Insect Specialist Panel for Midwest National Forest Plan revisions, 1999-2000

Publications

Steffens, W. P. and R. P. Lumen. 2015 Decline in Relative Abundance of *Hippodamia convergens* (Coleoptera: Coccinellidae) in Fall Shoreline Aggregations on Western Lake Superior. *Great Lakes Entomol.* 48(3-4):159-162.

Steffens, W.P., and W. A Smith. 2006. The Larva of *Somatochlora incurvata* Walker. (Odonata: Corduliidae). *ODONATOLOGICA* 35(4) 405-409.

Steffens, W.P., and W. A Smith. 2000. New distribution records for Minnesota Odonata. *Great Lakes. Entomol.* 32:3. 219-223.

Steffens, W. P. 1998. New Distribution Records of *Somatochlora hineana* (Odonata: Corduliidae). *Great Lakes Entomol.* 38 (1): 25-26.

Recent Technical Reports

Steffens, W. P. 2015. Rare Tiger Beetle and Lady Beetle Surveys in Minnesota's Lake Superior Coastal Zone. Report to Minnesota's Lake Superior Coastal Program. Project No. 13-306-05C. 25 p.

Steffens, W. P. 2013. 2012 Piping plover, Hairy-necked Tiger Beetle, and Lake Huron Locust Surveys on Western Lake Superior. Report to Wisconsin Bureau of Endangered Resources. 27 p.

Steffens, W. P. 2011. Hine's Emerald Dragonfly (*Somatochlora hineana* Williamson) Status Surveys in Southeast Minnesota. Report to U. S. Fish and Wildlife Service and Minnesota Department of Natural Resources. 48 p.

Professional Memberships

The Coleopterists Society

Education

Graduate work in Insect Ecology, Montana State University 2015

Invasive Species Module, University of Minnesota 2013

Bachelor's Degree in Biology, Western Washington University 1989