Environment and Natural Resources Trust Fund
2016 Request for Proposals (RFP)

Project Title: **ENRTF ID: 031-A**

Habitat Use of Minnesotas Rarest Rodent

Category: A. Foundational Natural Resource Data and Information

Total Project Budget: $ 90,062

Proposed Project Time Period for the Funding Requested: 3 years, May 2017 to March 2019

Summary:

Project will assess northern bog lemming habitat use and connectivity in order to mitigate the deleterious effects of climate change on lemming populations

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Location

Region: Central

County Name: Beltrami, Cass, Hubbard, Itasca

City / Township: Cass Lake

Alternate Text for Visual:

Northern bog lemming occurrence records in Minnesota

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

PROJECT TITLE: Distribution and habitat use of Minnesota's rarest rodent – the northern bog lemming

I. PROJECT STATEMENT

The northern bog lemming (*Synaptomys borealis*) is one of the least known mice in the world, and perhaps the rarest rodent in Minnesota, with fewer than 10 recorded occurrences distributed across 4 counties (Figure 1). This rarity, in combination with the absence of the species from putatively suitable habitats, is the justification for its listing by the Minnesota Department of Natural Resources as a species of special concern – indicating that the species should be monitored carefully – and by the Chippewa National Forest as a Regional Forester's Sensitive Species. It has also been petitioned for listing under the Endangered Species Act. Hypotheses purported to explain the northern bog lemming's rarity and patchy distribution include: 1) The habitat (e.g. vegetation and hydrology) required by the species is correspondingly rare and patchy, 2) The species is competitively excluded from suitable habitat by other small mammals, or 3) Northern bog lemmings are more abundant than we think but difficult to capture (e.g. detect). In reality there is probably some truth in all three hypotheses.

Although hard data on northern bog lemming ecology and threats is lacking, there is a general consensus that because the bog habitats associated with the species are threatened by climate change, the lemming is as well. More specifically, because climate change is reducing the distribution and connectivity of bog habitats, northern bog lemming populations are at risk of isolation and ultimately extinction, and this risk is exacerbated at the southern edge of their distribution in Minnesota. Consequently, it is vital to the conservation of the species in Minnesota that we develop a clearer understanding of its distribution and habitat associations if we are to ensure it remains a member of our state's ecological community.

This project will document the distribution and habitat associations of northern bog lemmings. Specifically, **we propose to undertake surveys for northern bog lemmings and associated vegetation on the Chippewa National Forest and use the results of those surveys to estimate lemming distribution and habitat use.** This information will be crucial if we are to assure population connectivity and persistence for this species in light of climate change.

II. PROJECT ACTIVITIES AND OUTCOMES

Activity 1: Surveys of northern bog lemming **Budget: $70,326**

We shall conduct surveys to document northern bog lemming habitat use and predict lemming distribution. We shall use a geographic information system to identify connected patches of habitat > 5 acres in size and with qualitatively similar vegetation to that where northern bog lemmings have been recorded previously. We shall visit each patch to ensure that its vegetative composition matches that in the GIS and that the patch is accessible. During these initial site visits we shall also scan for northern bog lemming droppings, which are supposed to be a distinctive green color. Area, accessibility, vegetative characteristics, and the presence of lemming droppings will determine whether we return to a site to trap a site. Ultimately, our goal will be to select 40 patches of habitat during these preliminary visits. On identifying 40 patches, we shall establish 5 x 20 trapping grids consisting of alternating snap and pitfall traps, marked with fluorescent driveway markers, in 5 patches per week. We shall operate each grid in a patch for four consecutive nights, which will result in 400 trap nights (1 trap night = 1 trap

set over night) per habitat patch. This level of trapping intensity should ensure we are able to trap a sufficient number of northern bog lemmings to accurately assess northern bog lemming presence/absence. We shall visit trapping grids mornings following trap nights and collect all species trapped and reset sprung traps. We shall send all specimens to the Bell Museum for positive identification. We note that although our protocol is likely to result in some mortality for northern bog lemmings, it should not be sufficient to lead to their local extirpation. To assess whether plant species composition at sites is responsible for northern bog lemming occupancy we shall survey plants along the trapping grids. On getting verification from the Bell Museum that we captured a northern bog lemming we shall share this information with the government landowner.

Outcome	Completion Date
1. Preliminary site visits	May 2017
2. Establish trapping grids and conduct vegetation surveys	June 2017 and 2018
3. Trapping	June – August 2017 and 2018

Activity 2: Model northern bog lemming habitat use and distribution and develop management guidelines **Budget: $19,736**

We will analyze survey data to determine what environmental factors (e.g. plant species composition, wetland type, composition of other rodent species trapped during survey) are most influential in determining northern bog lemming habitat use and distribution in the study area. We will develop empirical models of habitat use and distribution by comparing locations where northern bog lemmings were and were not captured. We shall use a combination of data collected during the trapping survey (plant species along trapping grids, other species of rodents caught in traps) and remotely sensed data (patch size and connectivity to similar habitat) available online (e.g. https://gisdata.mn.gov/) to discriminate between used and unused sites. This information will be used to make informed decisions about habitat needs for northern bog lemmings.

Outcome	Completion Date
1. Analyze northern bog lemming habitat use and distribution on the Chippewa National Forest.	Jan. 2019
2. Provide this information to other land manages in the area so they can make informed decision on providing habitat for northern bog lemmings.	Mar. 2019

III. PROJECT STRATEGY

A. Project Team/Partners

2016 Detailed Project Budget

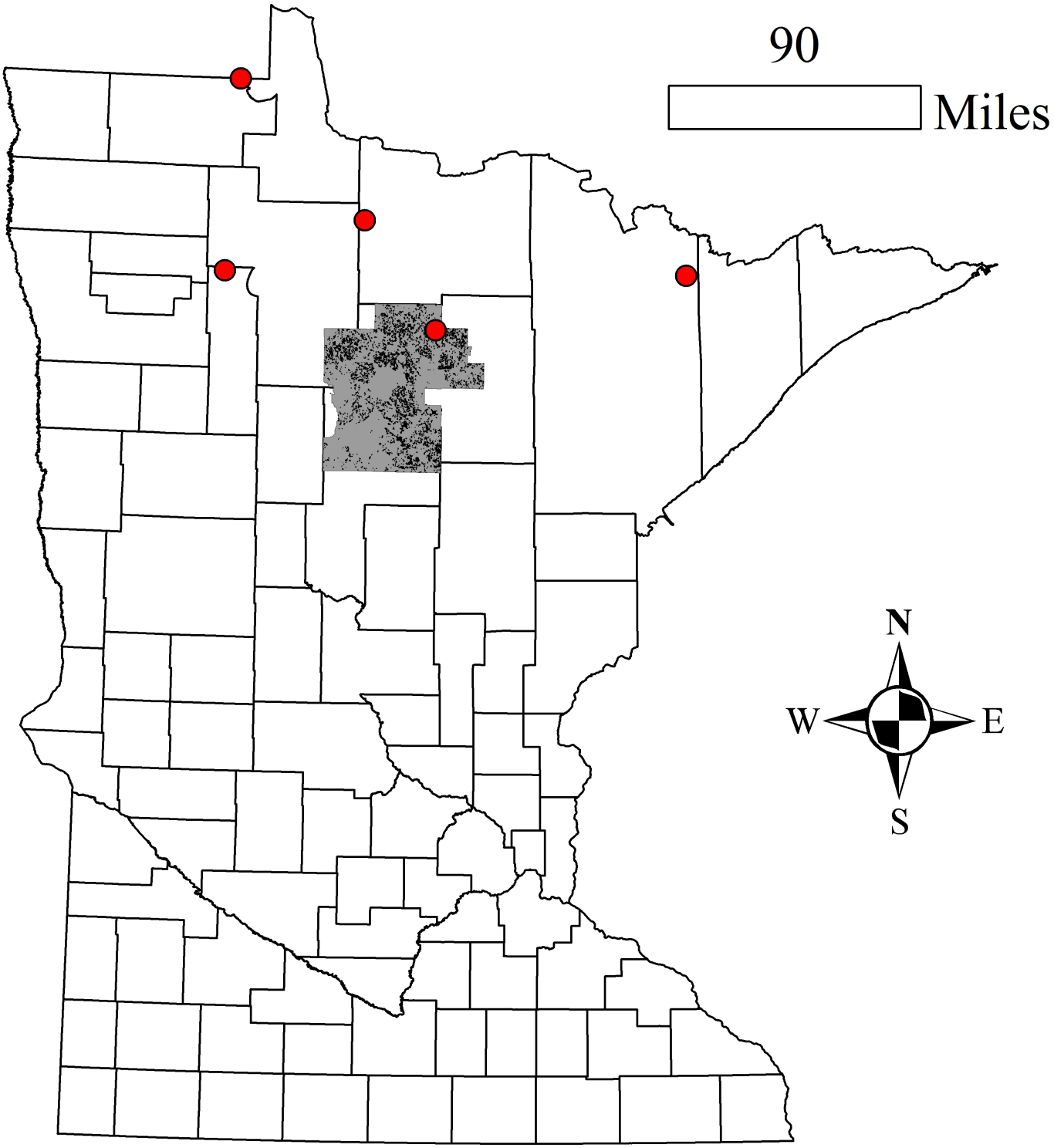
Project Title: Distribution and habitat use of Minnesota's rarest rodent - the northern bog lemming

IV. TOTAL ENRTF REQUEST BUDGET 2 years

BUDGET ITEM	AMOUNT
Personnel: note all personnel at LLBO are soft-funded and hence funding will not supplant exisiting funding	
Project Manager - 25% FTE ($28,080) plus fringe ($8,424): Will coordinate and participate in all aspects of project including field work, reporting, analyses, outreach, training and hiring, etc. Soft money funded position.	$ 36,504
Field Manager/Wetland specialist - 33% FTE ($27,734) plus fringe ($8,320): Coordinate field technicians and conduct field work (trapping, wetland and vegetation surveys), data entry, outreach. Soft money funded position.	$ 32,123
Field technician - 1 tech/year, 40h/wk, 12 wks for each of 2 yr, $14/hr: will aid field manager with field work and data entry.	$ 13,440
Equipment/Tools/Supplies:	
Trapping supplies for 2 seasons (50 snap traps ($2/trap) & 50 pitfall traps ($3/trap)/site * 5 sites/occasion) + gloves (400 pair ($50)) + bait (rolled oats and peanut butter ($100) + replacement traps (50 snap traps & 50 pitfall traps/site * 5 sites/occasion) + 500 flourescent driveway (trap) markers ($575).	$ 3,195
Handheld GPS unit	$ 400
Travel:	
Fuel for travel to trapping sites for preliminary visits and trapping across 2 seasons (60 preliminary site visits * $20/site + $50/survey day * 4 survey days/week * 8 weeks/season * 2 seasons)	$ 4,400
TOTAL ENVIRONMENT AND NATURAL RESOURCES TRUST FUND $ REQUEST =	$ 90,062

V. OTHER FUNDS *(This entire section must be filled out. Do not delete rows. Indicate "N/A" if row is not applicable.)*

SOURCE OF FUNDS	AMOUNT	Status
Leech Lake Division of Resource Management/U.S. Bureau of Indian Affairs: *Matching funds.*	$ 10,000	*Secured*
In-kind Services During Project Period:		
U.S. Forest Service: GIS data and planning, trapping assistance and equipment, management plan development and distribution.	$ 10,000	*Secured*
Leech Lake Division of Resource Management: Administrative support, office space, computers, GIS equipment and programs, vehicles and maintenance, misc. other equipment (tape measures, flagging, etc).	$ 20,000	*Secured*
Funding History:	N/A	
Remaining $ From Current ENRTF Appropriation:	N/A	



Lemming Occurrence Records

Chippewa National Forest

Potential Northern Bog Lemming Habitat

Project Manager Qualifications

The Project Manager for the Distribution and habitat use of Minnesota's rarest rodent – the northern bog lemming project proposed by the Leech Lake Band of Ojibwe is Steve A Mortensen. Steve received his BS in Biology from Bemidji State University in 1982. He was employed by the MN DNR for several years before accepting a position with the Leech Lake Reservation Division of Resources Management in 1984. He worked as a biologist for the Band until 2009, at which time; he was promoted to the Fish, Wildlife, and Plant Resources Program Director/Biologist. This program provides comprehensive fish, wildlife, and plant resources management aimed at species and habitats of importance to members of the Leech Lake Band. As such he has been involved in the development of programs for the reservation that protect, enhance, and manage human utilization of plant and animal resources on the reservation. He has also been involved in the oversight and implementation of numerous grants that work with wildlife and plants. Steve oversees a staff of 8 full time employees with an annual budget exceeding $700,000.