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

Project Title: **ENRTF ID: 009-A**

Prairie Butterfly Conservation, Research and Breeding - Phase 2

Category: A. Foundational Natural Resource Data and Information

Total Project Budget: $ 990,042

Proposed Project Time Period for the Funding Requested: 3 years, July 2016 to June 2019

Summary:

Minnesota Zoo and DNR, in collaboration with USFWS and others, are working to prevent the extinction of imperiled Minnesota prairie butterflies through breeding, research, field surveys, and potentially reintroduction.

Name: Erik Runquist

Sponsoring Organization: Minnesota Zoo

Address: 13000 Zoo Blvd.

Apple Valley MN 55124

Telephone Number: (952) 431-9562

Email erik.runquist@state.mn.us

Web Address http://mnzoo.org/conservation/minnesota/saving-minnesotas-prairie-butterfly-heritage/

Location

Region: NW, SW

County Name: Becker, Big Stone, Blue Earth, Brown, Chippewa, Clay, Cottonwood, Dodge, Douglas, Faribault, Freeborn, Grant, Jackson, Kandiyohi, Kittson, Lac qui Parle, Lincoln, Lyon, Mahnomen, Marshall, Martin, McLeod, Meeker, Mower, Murray, Nicollet, Nobles, Norman, Otter Tail, Pennington, Pipestone, Polk, Pope, Red Lake, Redwood, Renville, Rock, Roseau, Sibley, Stearns, Steele, Stevens, Swift, Traverse, Waseca, Watonman, Wilkin, Yellow Medicine

City / Township:

Alternate Text for Visual:

Ten Minnesota-native prairie butterfly species are listed federally or in Minnesota as Endangered, Threatened, or Special Concern. The two federally-listed species, Poweshiek skipperling and Dakota skipper, were commonly detected in Minnesota as recently as 2001 but have largely vanished from the state (graph included). The Minnesota Zoo successfully reared and bred Dakota skippers in 2014 (species pictured) and is proposing to expand these efforts. The DNR has been monitoring prairies for species of concern, and the enclosed map shows the proposed 2016 monitoring sites.

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

PROJECT TITLE: Prairie Butterfly Conservation, Research and Breeding - Phase 2

I. PROJECT STATEMENT

PROBLEM: Minnesota's prairie butterflies are disappearing, and some are in danger of global extinction. The collapse of these pollinators indicates that our vital prairie ecosystems are in trouble. We know little about the status of these pollinators or why they are declining.

GOALS:

1) Expand capacity of the Minnesota Zoo's imperiled butterfly breeding program for potential reintroduction.
2) Understand the current status of these pollinators and the threats they face in the wild.

OUTCOMES:

1) Expand rearing capacities to produce up to **2000 individuals** per year for potential reintroduction of federally-listed butterflies in accordance with pending federal recovery plans.
2) Characterize threats to prairie butterflies and identify low-threat sites for reintroduction.
3) Assess whether common agricultural pesticides pose risks to prairie butterflies.
4) Document changes in the populations of butterfly species at **14 Minnesota prairies** and potentially locate undiscovered populations of protected species.
5) Develop and implement a training program to alleviate a severe shortage in surveyors for protected species.

BACKGROUND:

Prairies are complex ecosystems under extreme threat. Butterflies are important components of these systems as pollinators for various plants and food sources for wildlife. The Minnesota Zoo and the Minnesota DNR have collaboratively initiated programs to better understand and protect Minnesota-native prairie butterfly species. This proposal seeks to expand these existing breeding and research programs - including the world's first breeding program for Dakota skippers - to aid the recovery of highly imperiled prairie butterflies and better understand the health of our prairie ecosystems. The importance of this work increased following the 2014 listing of two Minnesota prairie butterflies, Dakota skipper (threatened) and Poweshiek skipperling (endangered), under the Federal Endangered Species Act. Current funding is not sufficient to cover the costs of needed program expansion, including the extended surveys for federally listed and other declining populations.

II. PROJECT ACTIVITIES AND OUTCOMES

Activity 1: Breeding and potential reintroduction of endangered butterflies **Budget: $451,050**

To breed enough butterflies for successful population supplementation and/or reintroduction under pending federal recovery plans, the Zoo will increase its current maximum rearing capacity of Dakota skippers from ~600 to 2000 pupae per year and may also add Poweshiek skipperlings (pending USFWS decision). This requires two new outdoor hoop houses for breeding, butterfly food plants, and one new temporary summer staff member.

Outcome	Completion Date
1. Two metal screened outdoor hoop houses (~15'x30') placed and outfitted	June 2017
2. Populations of listed butterflies are large enough to sustain releases	June 2019

Activity 2: Characterization of threats to prairie butterflies **Budget: $65,000**

Minnesota Zoo will work with partners on a GIS analysis to identify factors that predict population trends for imperiled prairie butterflies. Results will be used to assess threats to prairie butterflies and identify low-threat sites for potential reintroductions. To prepare for the analysis, we will expand an existing database for Dakota skippers to include data on landscape features that may influence population trends, such as habitat management (ex: prescribed fire), prairie size, adjacent lands, climate, and plant diversity/composition. Data for other prairie butterfly species will be added as feasible. The Zoo will provide temporary support for this activity.

Outcome	Completion Date
1. Expand GIS database	December 2017
2. Characterize threats to prairie butterflies and identify low-threat sites for reintroduction	June 2018

Activity 3: Pesticides research – Phase 2 **Budget: $35,000**

Building on our currently funded research, the Zoo will study the risks posed to prairie butterflies by commonly applied soybean aphid pesticides. We have documented drift of these pesticides onto Minnesota prairie remnants and will conduct additional field research to understand the prevalence of these pesticides on prairie lands. We will pair this with controlled experiments to understand the effects of these pesticides on caterpillars of common prairie butterflies that are closely related to the protected species. Funding will be used to test ~90 field samples from 4-5 Minnesota prairies for pesticide residues and to conduct the controlled experiments.

Outcome	Completion Date
1. Initiate controlled chamber pesticides exposure experiments	August 2016
2. Complete field sampling of prairie remnants for pesticides	September 2018
3. Complete pesticides exposure experiments	June 2019

Activity 4: DNR butterfly survey and status monitoring **Budget: $426,992**

DNR will continue critical survey efforts to locate wild populations of prairie butterflies, implemented under the ENRTF in 2014, especially those that are federally- and state-listed. Surveys at 14 sites will comprise a total of ~7000 acres in seven western Minnesota counties, from Pipestone to Kittson. DNR will also initiate abundance monitoring of the two federally-listed species at between one and five of these sites (depending on results of the survey), with a focus on the response of the butterflies to prairie management, and will monitor any sites where Minnesota Zoo-reared insects are released.

Outcome	Completion Date
1. Extensive survey of prairie sites completed, and current status of MN's prairie-dependent butterflies, especially the federally listed ones, determined	Sept 15, 2016
2. Two to three years of quantitative data collected in at least two sites on response of the federally and state listed species to prairie management	June 30, 2019
3. Abundance monitoring initiated for any reintroduction effort	June 30, 2019

Activity 5: Threatened and endangered butterfly identification and survey training **Budget: $12,000**

DNR will conduct training workshops in identification and survey techniques to resolve a severe shortage of qualified surveyors that can identify these butterflies, a critical need for a sustained long-term conservation effort. The target will be wildlife biologists and other natural resource professionals.

Outcome	Completion Date
1. Two to three training workshops in prairie butterfly identification and survey completed, with at least 6 individuals able to contribute to survey work	August 2018

III. PROJECT STRATEGY

A. Project Team/Partners

The Zoo will conduct Activities 1, 2, and 3. DNR will conduct Activities 4 and 5. The University of Minnesota will be involved in Activities 2 and 3 and The Nature Conservancy in Activity 4. USFWS will provide advice for all Activities, especially those involving federally-listed species.

B. Project Impact and Long-Term Strategy

The combined efforts of the Zoo and DNR will advance the recovery of federally-listed butterflies from the edge of global extinction. We will provide insight into prairie health and identify sites for potential reintroductions of endangered species. Our work will broadly benefit Minnesota's prairie pollinators by better understanding the conditions, management needs, and threats that may exist. We anticipate that endangered species recovery efforts will be the next phase of the program, and that we would likely submit a proposal for this work.

C. Timeline Requirements

All Activities will be completed within three years, as outlined above.

Project Title: Prairie Butterfly Conservation, Research and Breeding Program

IV. MINNESOTA ZOO TOTAL ENRTF REQUEST BUDGET: 3 years

BUDGET ITEM	AMOUNT
Personnel:	
Butterfly Conservation Biologist Erik Runquist (State Program Administrator Principal at 100%, salary & benefits for FY18 & FY19 years).	$ 177,000
Butterfly Conservation Specialist (Project Specialist at 100% salary & benefits for FY18 and FY19 + $56,580 FY17).	$ 188,150
Database expansion and population trends analysis for threats characterization (support for a temporary research position, at MNZoo or subcontracted, FY17 & 18)	$ 65,000
Seasonal Temporary Student Worker (1 unclassified @ 100% time for 6 months total during FY18 and FY19)	$ 15,900
Contracts:	
Pesticides residue analysis contract. Contractor and actual amount subject to RFP, but the USDA National Sciences Lab was selected in current ENRTF and is likely to be used again. Current rates are $166-$332/sample depending on analysis. This would test about 90 samples for pesticide residues across 4-5 prairie remnants.	$ 30,000
Equipment/Tools/Supplies:	
2 Zoo hoop houses (metal-frames, screened, ~15x30'). One is needed for butterfly breeding and rearing, one additional for growing butterfly food plants that are rotated through butterfly breeding/rearing operations. Quoted $17,000 each by Zoo Operations staff. Majority of cost is site preparation and concrete pad placement.	$ 34,000
Breeding program supplies: tables, rearing cages, collecting supplies, butterfly plants	$ 24,000
Pesticides research supplies (plants, chemicals, and space rental at the University of Minnesota (pricing TBD pending new equipment installation, summer 2015)	$ 5,000
Travel:	
Zoo in-state and out-of-state travel costs (lodging, meals, mileage) to obtain butterfly eggs for core breeding program operations. This includes populations that are not available in Minnesota (esp., South Dakota, Michigan, Wisconsin)	$ 12,000
MINNESOTA ZOO TOTAL ENRTF $ REQUEST =	$ 551,050

IV. MN DNR TOTAL ENRTF REQUEST BUDGET : 3 years

BUDGET ITEM	AMOUNT
Personnel:	$ 250,360
1 Project coordinator/Lead entomologist. $162,525 (70% salary, 30% benefits); .6 FTE for 3 yrs	$ 162,525
1 Entomologist $68,000 (70% salary, 30% benefits); 0.5 FTE for 3 yrs	$ 68,000
1 Data management specialist $11,335 (70% salary, 30% benefits); 0.1 FTE for 2 yrs	$ 11,335
1 Graphics/Web design Specialist $8,500 (50% salary, 50% benefits) 0.1 FTE for 1 year	$ 8,500
Contracts:	
TBD (competitive RFP); site surveys to detect presence of target butterfly species and quantitative monitoring in selected sites; Planned one contractor in three years. Bid for 2015 surveys is $42,500. Estimate is higher due to strong competiton for qualified surveys which multiplied by 3 is $127,500.	$ 138,000
Equipment/Tools/Supplies:	
DNR field measuring devices etc. (GPS), close-focusing binoculars, cameras, and entomological collecting and specimen curation tools	$ 3,000
Travel:	
DNR field work in-state travel and associated expenses (62.7% mileage, 25.1% lodging, 12.2% meals, for lead entomologist and 2 seasonal entomologists, all DNR)	$ 23,000
Other:	
DNR direct and necessary expenses* HR support (~$5,238), Safety support (~$1,235), Financial support (~$5,801), Communication support (~$1,236), IT support (~$10,058), Planning support (~$829), and Procurement support (~$235) necessary to accomplishing funded programs/projects.	$ 24,632
MINNESOTA DNR TOTAL ENRTF $ REQUEST =	$ 438,992
ZOO + DNR TOTAL ENRTF $ REQUEST =	$ 990,042

V. OTHER FUNDS

SOURCE OF FUNDS	AMOUNT	Status
Other Non-State $ Being Applied to Project During Project Period: MNZoo has applied for funding from the Association of Zoos and Aquariums' Conservation Grant Fund to partially support ~$22,000 of the non-personnel costs above (including one of the proposed hoop houses), but application status will not be known until September 2015.	$ 23,641	Pending
Other State $ Being Applied to Project During Project Period:	$ -	
In-kind Services During Project Period:	$ -	
Remaining $ from Current ENRTF Appropriation (if applicable): The Zoo has $289,418 remaining from its current ENTRF appropriation and the DNR has $193,524 remaining. The DNR's appropriation expires at the end of FY16 and the Zoo's appropriation expires at the end of FY17. In FY17, the Zoo's Butterfly Conservation Biologist is 100% funded and the Butterfly Conservation Specialist is 5% funded under the Zoo's current ENRTF appropriation.	$ 482,942	
Funding History: The Zoo's initial butterfly conservation program was supported FY12-FY14 in large part by short-term funding from the Clean Water, Land and Legacy Fund. Since FY15, it has been primarily supported by the ENRTF, with additional support from the Clean Water, Land and Legacy Fund and from private donations. The current ENRTF-supported pesticides research also recieved a $20,000 matching grant from the U.S. Fish and Wildlife Service Endangered Species - Candidate Conservation Action Fund. These federal funds expire at the end of FY17. The current DNR work has been supported by ENRTF for FY15 and FY16 (ENRTF M.L. 2014, Chp. 226, Sec. 2, Subd. 05j-2).	ENRTF (Zoo+DNR): $625,000 Federal Grant (Zoo): $20,000 Legacy (Zoo): $310,000	

Minnesota's imperiled prairie butterflies

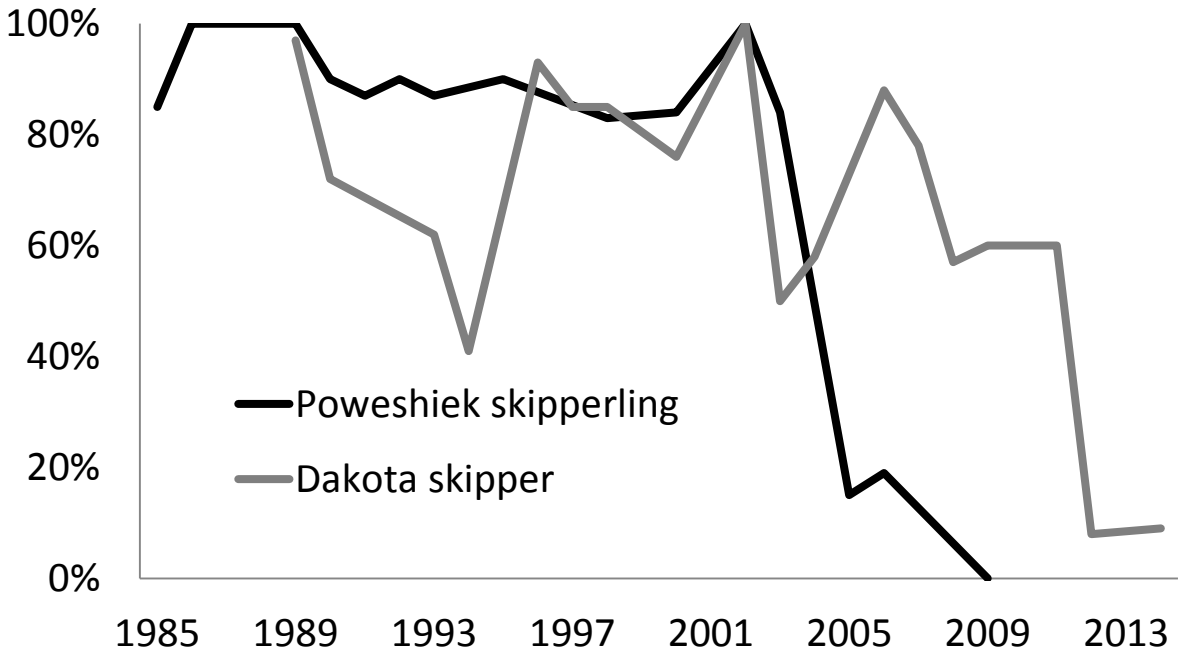
Poweshiek skipperling
Dakota skipper
Ottoë skipper
Uncas skipper
Assiniboia skipper
Garita skipperling
Uhler's arctic
Arogos skipper
Leonard's skipper
Regal fritillary

US Threatened or Endangered

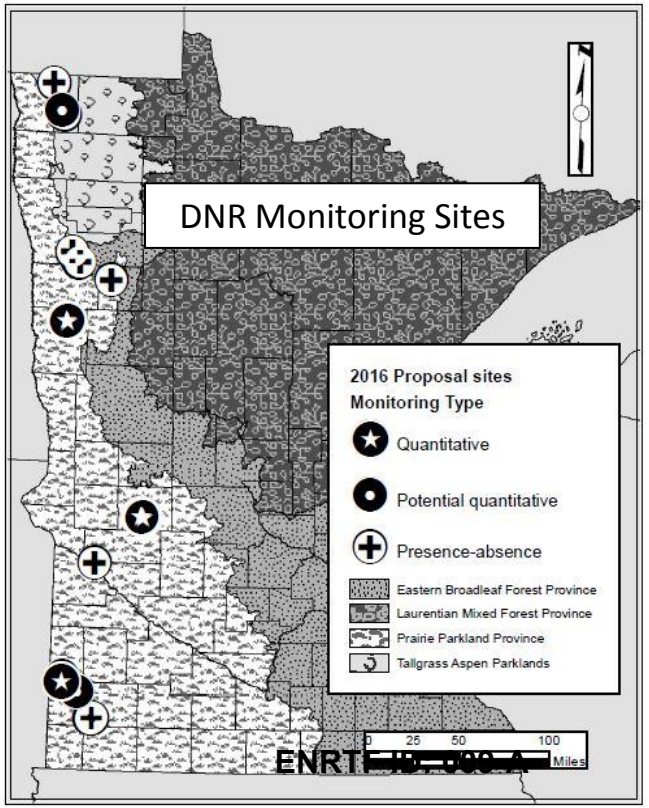
MN Threatened or Endangered

MN Special Concern

Male Dakota skipper reared from egg to adult at MNZoo. The Zoo successfully bred this species in 2014.



The percentage of surveyed sites in Minnesota where protected species were found has dropped precipitously.



ORGANIZATION DESCRIPTION: Minnesota Zoological Garden

The Minnesota Zoo, a state agency established in 1978 to provide Minnesota residents and guests with a unique opportunity to experience animals from the exotic to the familiar, is today one of the State's premier cultural, educational, and conservation institutions.

The Zoo's mission is ***to connect people, animals and the natural world to save wildlife.*** With over 1.2 million guests a year and state-wide outreach programs, the Zoo is in a unique position to strengthen Minnesotans' awareness and understanding of our State's cultural commitment to wildlife, science and conservation. The Zoo is, in fact, the State's largest environmental educator.

The Minnesota Zoo has also become a worldwide leader in conservation – conducting breeding programs and field efforts at the Zoo, in Minnesota, and across the globe. The Zoo has recently enhanced its efforts to focus on Minnesota wildlife and habitats, including efforts to conserve Minnesota's moose, bison, and prairie butterfly populations. It is also addressing habitat issues on its own 485 site, looking to restore undeveloped areas to native conditions and exploring ways to provide educational opportunities to interpret those efforts.

The Zoo has a proven record of using its resources efficiently and effectively, ***matching*** the State's investment with private funds and earned income.

ZOO PROJECT MANAGER: Erik Runquist, PhD

Erik Runquist is the Butterfly Conservation Biologist at the Minnesota Zoo where he has managed the Prairie Butterfly Conservation Program since its inception in 2012. Erik holds a PhD in Ecology with an emphasis in Conservation Biology from the University of California, Davis and studied butterflies for his doctoral degree.

ORGANIZATION DESCRIPTION: Minnesota Department of Natural Resources

The Minnesota Department of Natural Resources works to integrate and sustain the interdependent values of a healthy environment, a sustainable economy, and livable communities. DNR's integrated resource management strategy shares stewardship responsibility with citizens and partners to manage for multiple interests. DNR protects the state's natural heritage by conserving the diversity of natural lands, waters, and fish and wildlife that provide the foundation for Minnesota's recreational and natural resource-based economy (M.S. 84, M.S. 97A). DNR manages natural lands such as forests, wetlands, and native prairies; maintains healthy populations of fish and wildlife; and protects rare plant and animal communities throughout the state. DNR manages the state's water resources, sustaining healthy waterways and ground water resources. DNR provides access to enrich public outdoor recreational opportunities, such as hunting, fishing, wildlife-watching, camping, skiing, hiking, biking, motorized recreation, and conservation education through a state outdoor recreation system that includes parks, trails, wildlife management areas, scientific and natural areas, water trails, and other facilities (M.S. 86A). DNR supports natural resource-based economies, managing state forest lands for multiple forest values (M.S. 89), ensuring the maximum long-term economic return from school trust lands (M.S. 127A), and providing other economic opportunities in a manner consistent with sound natural resource conservation and management principles. The mission of the Minnesota Department of Natural Resources is to work with citizens to conserve and manage the state's natural resources, to provide outdoor recreation opportunities, and to provide for commercial uses of natural resources in a way that creates a sustainable quality of life.

DNR PROJECT MANAGER: Robert Dana, PhD

Robert Dana is a prairie ecologist/conservation entomologist with the Minnesota DNR. He has conducted numerous surveys in Minnesota for butterflies and moths of conservation concern, emphasizing species that depend upon native prairie habitat in Minnesota. He has also contributed to the development of guidelines for prairie management that take into account the critical impacts to insects and other invertebrates to prairie ecosystems. He has a Ph.D. in Entomology from the University of Minnesota (1989) where he investigated the biologies of two species of prairie-dependent skipper.