Environment and Natural Resources Trust Fund
2014 Request for Proposals (RFP)

Project Title: **ENRTF ID:** **017-A**

Prairie Butterfly Conservation, Research and Breeding Program

Category: A. Foundational Natural Resource Data and Information

Total Project Budget: $ 638,439

Proposed Project Time Period for the Funding Requested: 3 Years, July 2014 - June 2017

Summary:

The Zoo and DNR will work to prevent the extirpation and possible extinction of imperiled native Minnesota butterfly species through breeding, genetics and mortality research, inventory, monitoring and public education.

Name: Erik Runquist

Sponsoring Organization: Minnesota Zoological Garden

Address: 13000 Zoo Blvd
Apple Valley MN 55124

Telephone Number: (952) 431-9200

Email erik.runquist@state.mn.us

Web Address www.mnzoo.org

Location

Region: Central, Northwest, Southwest

County Name: Becker, Big Stone, Chippewa, Clay, Cottonwood, Dodge, Douglas, Grant, Jackson, Kandiyohi, Kittson, Lac qui Parle, Lincoln, Lyon, Marshall, McLeod, Murray, Nobles, Norman, Pipestone, Polk, Rock, Roseau, Sibley, Stearns, Swift, Traverse, Yellow Medicine

City / Township:

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

PROJECT TITLE: Prairie Butterfly Conservation, Research and Breeding Program

I. PROJECT STATEMENT

Prairies and their native wildlife are an important part of Minnesota's natural and cultural heritage. But with only 1% of that native prairie remaining, many prairie plant and animal species—including several species of once prevalent native butterflies—have dramatically declined. With a particular focus on imperiled butterfly species, the Minnesota Zoo in partnership with the Minnesota Department of Natural Resources is providing international leadership in understanding and conserving this important component of Minnesota's prairie ecosystems. The Zoo and DNR propose to expand those efforts by breeding specific butterfly species most under threat of extirpation, monitoring the status of a larger group of targeted species on the land, researching butterfly genetics and causes of mortality, and providing educational information on these species and efforts.

Prairies are complex ecosystems under extreme threat. Butterflies are important components of these systems as pollinators for various prairie plants and as food sources for other prairie wildlife, including birds. Importantly, due to their complex life cycles, butterflies also serve as "canary in the coalmine" indicators of prairie ecosystem health. Of the butterfly species native to Minnesota prairies, 10 are of statewide conservation concern and two (the Poweshiek skipperling and the Dakota skipper—non-migratory species with historic ranges concentrated in Minnesota and among the most common butterflies in our prairies but that have now largely disappeared) may soon be listed as federally endangered. The program to study and prevent the extirpation of prairie butterflies will focus on these two most imperiled species as well as all others of conservation concern. The Zoo will focus on breeding, research and educational outreach while DNR will inventory and monitor the status of butterflies on the ground.

II. DESCRIPTION OF PROJECT ACTIVITIES

Activity 1: Zoo Conservation breeding program for imperiled prairie butterflies **Budget: $304,439**

To prevent the global extinction of the most imperiled species, the Zoo will expand its newly established program to breed imperiled Minnesota native prairie butterfly species at the Zoo—the only such program in the world—using an indoor rearing chamber determined to be most favorable for this effort.

Outcome	Completion Date
1. Indoor rearing chamber for butterflies established.	May 2015
2. Rearing/breeding protocols with Poweshiek skipperling will be finalized.	September 2015
3. Rearing/breeding protocols with Dakota skippers will be finalized.	September 2016

Activity 2: Zoo conservation genetics research on imperiled prairie butterflies **Budget: $24,000**

Understanding the genetic relationships among the remaining populations of butterflies and the genetic diversity remaining within each of these isolated populations is critical before considering reintroduction of any Zoo-bred butterflies in the wild. Research will be conducted on site at the Zoo.

Outcome	Completion Date
1. Genetic information collected and reintroduction recommendations completed	June 2017

Activity 3: DNR Butterfly Status Monitoring **Budget: $250,000**

DNR will develop an intensive monitoring protocol to be used at up to 13 selected sites in western and southern Minnesota to track the abundance of adults of 10 target species and to evaluate impacts of various management activities on species populations. Sites will include those where targeted species have historically been documented and those representing a range of management activities. DNR will monitor an additional set of sites only for presence of target species. Sites will be selected to detect changes at the site level and on a

broader scale by revealing spatial patterns in changes across the range in Minnesota. A database for storing and managing the monitoring data will be created and data analyzed quickly address problems discovered.

Outcome	Completion Date
1. Data collected and entered for field testing of protocols for monitoring	September 2014
2. Protocols revised based on analysis of test results	May 2015
3. Monitoring data collected for intensive sites and 1st panel of other sites	December 2015
4. Monitoring data collected for additional sites	June 2016

Activity 4: Butterfly Mortality Research **Budget: $30,000**

Beyond habitat loss, there is little understanding of the threats to prairie butterflies that may have to their declines and local extinction. One unstudied hypothesis is that pesticide drift onto native prairies could lead to mortality and local extinction of these butterflies in remaining prairie fragments. The Zoo will conduct captive research and support other scientific research on surrogate species (non-threatened related butterflies of similar life history) to evaluate levels of pesticides found on their food and the effects of those pesticides on butterfly mortality across life stages.

Outcomes	Completion Date
1. Prairie butterfly risks of pesticide-associated mortality are better understood	June 2017

Activity 5: Outreach and Environmental Education at the Zoo **Budget: $30,000**

The Zoo will produce at least two publications (both traditional and web-based) and graphics about Minnesota's imperiled butterflies and their prairie habitat for public education. Guides will be free to Zoo guests at its seasonal Butterfly Garden exhibit, at other on-site displays, and at other educational outreach opportunities.

Outcome	Completion Date
1. Production of a Prairie Butterflies Identification and Information Guide	May 2015
2. Production of a Prairie Biology Guide	May 2016

III. PROJECT STRATEGY

A. Project Team/Partners

Minnesota Zoo will be responsible for completing activities related to butterfly breeding, research and educational outreach—activities 1, 2, 4 and 5 above—with the project lead by Dr. Erik Runquist, Butterfly Conservation Biologist. Through its Minnesota Biological Survey, DNR will focus on monitoring butterfly populations on the ground—activity 3 with that component of the project lead by Robert Dana, Entomologist/Prairie Ecologist.

B. Timeline Requirements

The Zoo's butterfly breeding efforts will span all three years as will genetics and mortality research. Educational materials should be completed in two years. During the first year of the grant, DNR will create and test the monitoring protocols. Actual monitoring will be conducted in the summer of 2015 and initially completed by September of 2015, with additional monitoring completed in the Spring 2016. Initial data collected will be entered and some analysis completed by Spring 2016. Monitoring will be ongoing throughout the second year.

C. Long-Term Strategy and Future Funding Needs

This project is part of the Zoo's efforts to conserve Minnesota-native wildlife species and their habitats and to engage the public in learning about their local environments. We hope to continue this project indefinitely as funding is available. Similarly, this type of inventory, monitoring and analysis is typical of projects undertaken by DNR's Minnesota Biological Survey in its efforts to understand and preserve Minnesota's ecological integrity.

Project Title: Prairie Butterfly Conservation, Research and Breeding Program

IV. MINNESTOA ZOO TOTAL ENRTF REQUEST BUDGET: 3 years

BUDGET ITEM	AMOUNT
Personnel:	
Zoo Butterfly Conservation Biologist (Program Administrator Sr. @ 100% time, salary & benefits for 3 years) currently on short term grant funding.	$ 196,149
Zoo Seasonal Student worker (1 unclassified @ 100% time for 3 years)	$ 32,440
Contracts:	
Zoo Pesticides-related mortality research contracts. This is an estimate. Contractor and actual amount subject to RFP.	$ 30,000
Zoo Conservation genetics DNA sequencing professional services. This is an estimate. Contractor and acutal amount subjec to RFP.	$ 24,000
Equipment/Tools/Supplies:	
Zoo Butterfly breeding chamber (purchase, placement, associated equipment, maintainence)	$ 52,000
Zoo project equipment (tables, rearing cages, butterfly nets, collecting supplies) and butterfly plants	$ 5,100
Zoo printing and production costs associated with prairie butterfly education guides	$ 30,000
Travel:	
Zoo field work in-state travel and associated expenses	$ 9,000
Zoo field work out-state travel and associated expenses to obtain butterflies for core breeding program operations for butterflies are not available in Minnesota.	$ 6,000
Zoo travel to present this research at scientific conferences and associated expenses.	$ 3,750
MINNESOTA ZOO TOTAL ENRTF $ REQUEST =	$ 388,439

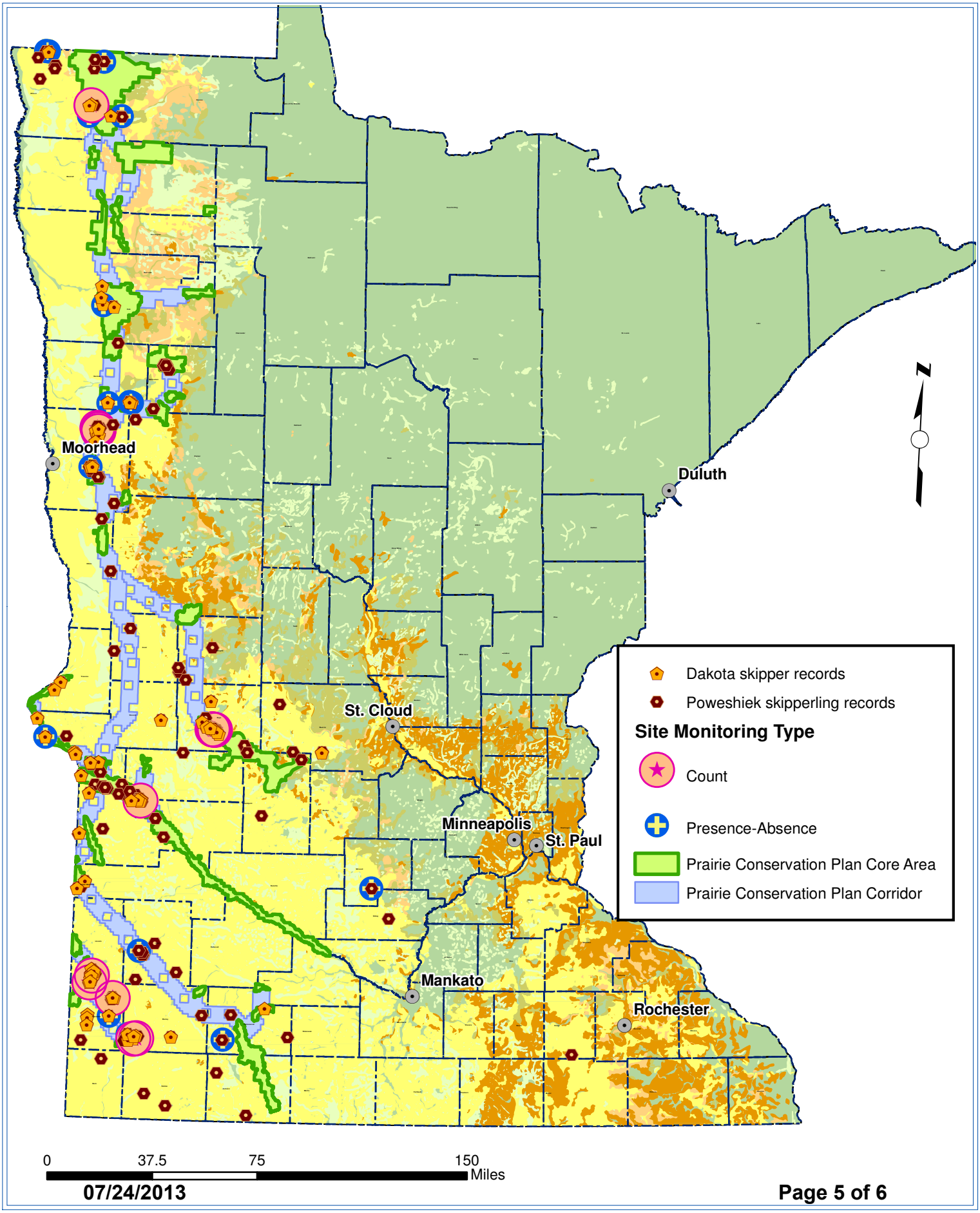
IV. MN DNR TOTAL ENRTF REQUEST BUDGET : 2 years

BUDGET ITEM	AMOUNT
Personnel:	
DNR Entomologist/Insect ecologist (1 unclassified @ 100% time, salary & benefits)	$ 130,000
DNR Entomology assistant (1 unclassified @ 50% time, salary & benefits)	$ 30,000
Contracts:	
DNR insect survey & monitoring contracts	$ 30,000
DNR Service-level agreements for development of information system products	$ 18,500
DNR direct and necessary business services required to support this proposal	$ 21,000
Equipment/Tools/Supplies:	
DNR field measuring devices etc. (GPS) and entomological collecting and specimen curation tools	$ 2,500
Travel:	
DNR field work in-state travel and associated expenses	$ 18,000
MINNESOTA DNR TOTAL ENRTF $ REQUEST =	$ 250,000
ZOO + DNR TOTAL ENRTF $ REQUEST =	$ 638,439

V. OTHER FUNDS

SOURCE OF FUNDS	AMOUNT	Status
Other Non-State $ Being Applied to Project During Project Period:	$ -	
Other State $ Being Applied to Project During Project Period:	$ -	
In-kind Services During Project Period:	$ -	
Remaining $ from Current ENRTF Appropriation (if applicable):	$ -	
Funding History: The Zoo's initial butterfly conservation program has been supported in large part by short-term funding from the Clean Water, Land and Legacy Fund along with other sources of Zoo funds.	$ 236,500	

2014 LCCMR Proposal: Prairie Butterfly Conservation, Research, and Breeding Program--DNR Monitoring Sites



07/24/2013

ORGANIZATION DESCRIPTION: Minnesota Zoological Garden

The Minnesota Zoo, a state agency established more than 35 years ago to provide Minnesota residents and guests with a unique experience available nowhere else to experience exotic animals from around the world in natural habitats and a garden-like setting, is today one of the State's premier cultural and educational institutions.

The Zoo's mission is ***to connect people, animals and the natural world.*** Its recently completed Master Plan sets out a vision and goal for the Zoo of becoming a world leading zoo. By creating memorable guest experiences, being a trusted resource for environmental learning, and conducting critical conservation programs, the Zoo will:

- Increase environmental literacy statewide.
- Strengthen animal conservation efforts.
- Create a major tourist destination and cultural icon for Minnesota.

With well over 1.3 million guests a year, state-wide outreach programs and a website visited by millions, the Zoo is in a unique position to strengthen Minnesotans' awareness and understanding of our State's cultural commitment to wildlife, science and conservation. It is, in fact, the State's largest environmental center.

The Minnesota Zoo has also become a worldwide leader in conservation. True to its original core values, the Zoo participates in more than 60 Species Survival Plans (coordinated by the American Zoo and Aquarium Association), an ongoing effort to manage and breed zoo animals that may face extinction in the wild. The Zoo also has a long history and strong partnership with two internationally known conservation programs—the International Species Information System, a program that provides animal records keeping software and database services to zoos around the world, and the Conservation Breeding Specialist Group, a branch of the International Union for the Conservation of Nature. The Zoo has recently enhanced its efforts to focus on Minnesota wildlife and habitats, including efforts to conserve Minnesota's moose 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. Currently less that 25% of its annual operating budget of almost $24 is covered by annual state general fund appropriations.

PROJECT MANAGER: Erik Runquist

Erik Runquist is the Butterfly Conservation Biologist at the Minnesota Zoo. In partnership with multiple agencies and organizations, he will be leading conservation efforts for imperiled, threatened and endangered prairie butterfly species native to Minnesota. He has worked on conservation breeding, re-introduction, and monitoring efforts with several rare butterflies, including the critically endangered Schaus Swallowtail in the Florida Keys, and also conducted foundational butterfly ecology surveys in Oregon's Cascade-Siskiyou National Monument. His butterfly conservation and field research has taken him around the world. Erik recently completed a PhD in Ecology with an emphasis in Conservation Biology from the University of California, Davis. He also received a Bachelors in Wildlife Ecology and Conservation with Honors and a Minor in Zoology from the University of Florida.