



Environment and Natural Resources Trust Fund (ENRTF) M.L. 2014 Work Plan

Date of Report: February 7, 2014
Date of Next Status Update Report: November 30, 2014
Date of Work Plan Approval:
Project Completion Date: June 30, 2017
Does this submission include an amendment request? No

PROJECT TITLE: Imperiled Prairie Butterfly Conservation, Research, and Breeding Program

Part 2 (Activity 3) of the project is described in a separate work plan with an appropriation of \$245,000 to the Minnesota DNR

Project Manager: Dr. Erik Runquist
Organization: Minnesota Zoo
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Location:

Dakota, Cottonwood, Murray, Pipestone, Lincoln, Chippewa, Big Stone, Pope, Clay, Norman, Polk, Kittson, Roseau, and potentially other counties in western and southern Minnesota with prairies.

Total ENRTF Project Budget:	ENRTF Appropriation:	\$380,000
	Amount Spent:	\$0
	Balance:	\$380,000

Legal Citation: M.L. 2014, Chp. 226, Sec. 2, Subd. 05j-1

Appropriation Language:

\$380,000 the second year is from the Trust Fund to the Minnesota Zoological Garden and \$245,000 the second year is from the trust fund to the Commissioner of Natural Resources to prevent the extirpation and possible extinction of imperiled native Minnesota butterfly species through breeding, genetics and mortality research, inventory, monitoring, and public education. This appropriation is available until June 30, 2017, by which time the project must be completed and final products delivered.

I. PROJECT TITLE: Imperiled Prairie Butterfly Conservation, Research, and Breeding Program

II. 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 many species of once prevalent native butterflies—have dramatically declined. Of the butterfly species native to Minnesota prairies, 10 are of statewide conservation concern and two, the Poweshiek skipperling and the Dakota skipper, have now largely disappeared from the state and are proposed for listing under the U.S. Endangered Species Act despite being historically among the most common prairie butterflies and having their historic ranges concentrated in Minnesota. The ENTRF (Project 017-A) will allow the Minnesota Zoo will expand its conservation breeding program for butterfly species most under threat of extinction like the Poweshiek skipperling and Dakota skipper, to conduct critically needed conservation genetics studies, research potential causes of mortality associated with pesticides, and provide focused educational information on these species and efforts.

The Minnesota Zoo is collaborating with the Minnesota Department of Natural Resources (DNR) for this joint ENTRF. Classified as "Activity 3" in the joint proposal and the peer-reviewed Research Addendum, but described in a separate Work Plan, the DNR will simultaneously monitor the status of these and a number of additional targeted species on native prairie remnants across Minnesota. This joint work will provide needed information of status of not only Minnesota's native prairie butterflies, but also the greater prairie ecosystem, and steps that may be needed to further their conservation. Beyond serving as pollinators for various prairie plants and as food sources for other prairie wildlife, butterflies are sensitive "canary in the coalmine" indicators of prairie ecosystem health. The loss of prairie has significant consequences for Minnesota's water quality and wildlife interests.

III. PROJECT STATUS UPDATES:

Project Status as of November 30, 2014:

Project Status as of May 31, 2015:

Project Status as of November 30, 2015:

Project Status as of May 31, 2016:

Project Status as of November 30, 2016:

Project Status as of May 31, 2017:

Overall Project Outcomes and Results:

IV. PROJECT ACTIVITIES AND OUTCOMES:

ACTIVITY 1: Minnesota Zoo breeding conservation program for imperiled prairie butterflies

Description: The Minnesota Zoo's Prairie Butterfly Conservation Program was launched in 2012 following consultations with the U.S. Fish and Wildlife Service (USFWS) and Minnesota Department of Natural Resources (DNR) on the need to establish conservation breeding populations for endangered, threatened, and imperiled Minnesota-native prairie butterflies whose wild populations have experienced catastrophic recent declines and face the risk of global extinction. Two of these species, the Poweshiek skipperling (*Oarisma poweshiek*) and Dakota skipper (*Hesperia dacotae*) are currently listed in Minnesota as Endangered and were proposed for federal listing as Endangered and Threatened (respectively) in October 2013. Both have disappeared from the majority of their historic ranges (90+% for Poweshiek, 50+% for Dakota) in recent decades. Dakota skippers may

only remain in one Minnesota location. Poweshiek, sometimes referred to as the “Most Minnesotan Butterfly” because half of its historic range was the state, was once one of the most abundant butterflies on Minnesota’s prairies, but has not been confirmed in Minnesota since 2008. It has also disappeared in North Dakota, South Dakota and Iowa between 2001 and 2008. Intensive 2013 surveys across the remaining isolated known populations in Michigan, Wisconsin, and Manitoba indicate that fewer than 500 Poweshiek skipperlings likely remained globally in 2013, making them at least three times rarer than wild giant pandas and one of the most endangered animals on earth.

The primary goal of the Minnesota Zoo’s Prairie Butterfly Conservation Program is to utilize the recognized organizational capacity and experience of the Minnesota Zoo for the managed breeding of endangered species to establish large, genetically robust populations at the Zoo that can serve as an “insurance policy” against the risk of regional and global extinction of endangered species like the Poweshiek skipperling and Dakota skipper. These Zoo populations may also serve as reservoirs from which potential supplementations to wild populations and reintroductions to historic or potentially suitable sites may be drawn. These potential needs and the role of the Minnesota Zoo to achieve these goals are highlighted in the recent federal Endangered and Threatened species listing proposals for Poweshiek skipperlings and Dakota skippers (USFWS 2013). Our efforts are international, involving over a dozen partner U.S., Canadian, and tribal agencies and organizations. In consultations with our partners, we have established safeguards to ensure that our efforts protect wild population integrity.

The Minnesota Zoo constructed an outdoor butterfly breeding facility for this program in 2012 with built-in multi-level containment capabilities, but so far have lacked stable indoor space in which we can control temperature and lighting for other operations. Funding from ENTRF will allow for much needed expansion of our operations and allow us to test a variety of methodological approaches to optimize breeding success and minimize mortality. Among the remaining questions we are interested in addressing include the effects of different larval hostplants on growth rates and survivorship, temperature tolerances for winter hibernation survival, and, the optimizing the conditions that provide the greatest success for mating. Our ability to perform some of these tests with the endangered species is contingent on having large, stable breeding populations, and adaptive rearing techniques may take priority over experimental arrays in the short-term to maximize survivorship. Note that the entire personnel (wage and benefits) budget for the entire program is grouped under this Activity for simplicity. In reality, both personnel supported by this ENTRF will be working on all four Minnesota Zoo Activities, but these percentages will vary proportionately within and across years.

Summary Budget Information for Activity 1:

ENTRF Budget: \$ 336,400
Amount Spent: \$ 0
Balance: \$ 336,400

Activity Completion Date:

Outcome	Completion Date	Budget
1. Purchase and outfitting of the indoor breeding chamber	May 2015	\$ 52,000
2. Rearing and breeding protocols for Dakota skippers and Poweshiek skipperlings finalized	April 2017	\$ 284,400

Activity Status as of November 30, 2014:

Activity Status as of May 31, 2015:

Activity Status as of November 30, 2015:

Activity Status as of May 31, 2016:

Activity Status as of November 30, 2016:

Activity Status as of May 31, 2017:

Final Report Summary:

ACTIVITY 2: Conservation genetics research on imperiled prairie butterflies

Description: Successful conservation management of both wild and Minnesota Zoo-based populations of endangered species requires knowledge of both existing genetic variation within populations and the degree of differentiation between populations and regions of those species. To advance these needs with endangered prairie butterflies, the Minnesota Zoo has established a conservation genetics laboratory under the supervision of Program Manager Dr. Erik Runquist and formed a collaborative relationship with Dr. Emily Saarinen (Assistant Professor, University of Michigan-Dearborn/New College of Florida. Using non-ENTRF funding, Dr. Saarinen’s lab extract DNA extractions for small tissue samples from the imperiled species collected under permit and then conduct “next-generation” sequencing, isolation, and identification of micro-satellite genetic markers for estimates of population-level genetic diversity. Dr. Saarinen will provide these DNA extractions to Dr. Runquist who will use ENRTF funds to 1) screen populations for the presence of *Wolbachia*, an intracellular bacterial endosymbiont that has the potential to sterilize or kill infected male butterflies when populations become infected with incompatible strains, and 2) sequence several additional known genetic markers for which evolutionary rates are better understood to estimate evolutionary divergence.

Summary Budget Information for Activity 2:

ENRTF Budget: \$ 8,000
Amount Spent: \$ 0
Balance: \$ 8,000

Activity Completion Date:

Outcome	Completion Date	Budget
1. Sequencing of known markers to test for population-level divergence for Poweshiek skipperlings. Screening for and strain identification of <i>Wolbachia</i> strains in Poweshiek skipperlings. Assessment of genetic diversity of any Zoo-bred Poweshiek skipperlings and/or Dakota skippers for ex situ breeding prescriptions.	March 2015	\$ 3,500
2. Sequencing of known markers to test for population-level divergence for Dakota skippers. Screening for and strain identification of <i>Wolbachia</i> strains in Dakota skippers. Assessment of genetic diversity of any Zoo-bred Poweshiek skipperlings and/or Dakota skippers for ex situ breeding prescriptions.	March 2016	\$ 3,500
3. Final sequencing and analyses for remaining individuals and species. Assessment of genetic diversity of any Zoo-bred Poweshiek skipperlings and/or Dakota skippers for ex situ breeding prescriptions. Preparation of results and submission to peer-reviewed scientific journals for publication.	June 2017	\$ 1,000

Activity Status as of November 30, 2014:

Activity Status as of May 31, 2015:

Activity Status as of November 30, 2015:

Activity Status as of May 31, 2016:

Activity Status as of November 30, 2016:

Activity Status as of May 31, 2017:

Final Report Summary:

ACTIVITY 3: ACTIVITY 3: DNR Butterfly Status Monitoring

Description: The Minnesota DNR will implement a monitoring program of prairie butterflies across Minnesota. This is described in a separate work plan with a separate appropriation to the MN DNR (\$245,000).

ACTIVITY 4: Pesticides-related mortality research on surrogate prairie butterflies

Description: The historically vast tallgrass prairies of the Upper Midwest have been dramatically reduced and fragmented, with the vast majority of the historic acreage now converted to intensive row crop agriculture. The close proximity of agricultural lands to prairie remnants that formerly or may still retain populations of threatened and endangered prairie butterflies presents the possibility that drift from agricultural pesticide applications near prairie fragments may have indirect effects on these imperiled and other prairie species (Longey and Sotherton 1997). Neonicotinoids have become one of the most important groups of agricultural and horticultural insecticides since their development in the 1990s. Their use has increased as an alternative to previously widespread applications of pyrethroid, carbamate, and organophosphate insecticides due to their lower binding potential to mammalian neural receptors and correspondingly lower human health risks. Neonicotinoids can be applied as a foliar spray, a soil treatment, and as a seed coat powder. These systemic pesticides become incorporated into plant tissues, nectar, and pollen and can persist and accumulate in soil and water for months or even years. Numerous studies have documented the negative influence of neonicotinoids on non-target invertebrates, including beneficial insects like honey bees (Pettis *et al.* 2013), aquatic macroinvertebrates (Van Dijk *et al.* 2013), and large butterflies (Krischik, in review 2014). Seed coat applications of neonicotinoids can also become airborne as dust during planting operations that can coat adjacent non-crop plants with powder that can have lethal and sub-lethal effects (Marzaro *et al.* 2011; Krupke *et al.* 2012; Tapparo *et al.* 2012).

The U.S. Environmental Protection Agency specifies the need for further data on the effects of neonicotinoids on non-target invertebrates and on endangered species. A similar need for more data was also highlighted in the recent USFWS proposal to list Poweshiek skipperlings and Dakota skippers under the U.S. Endangered Species Act (USFWS 2013), as well as at the Northern Tallgrass Prairie Lepidoptera Conservation Conference (Minnesota Zoo 2013). To begin addressing this research need, we will test for the presence of neonicotinoid residues that may be present on non-target native prairie remnants adjacent to agricultural fields. We will test insecticide residue concentrations present in grass samples and soil samples from several Minnesota prairie remnants.

This work will then inform experimental tests on the effects of varying concentrations of neonicotinoid applications on growth rates and survivorship of grass skipper butterfly caterpillars, pupae and adults. The experimental treatments will likely be three concentrations of a neonicotinoid and one control treatment with no insecticide application. The concentration of one of the three insecticide treatments will correspond with the levels of one of these neonicotinoids detected in prairie remnants. Previous studies in other U.S. states and several Canadian provinces have detected the presence of thiamethoxam, clothianidin, and (to a lesser extent) imidacloprid in prairie remnants. For these experiments, we will most likely test the effects of thiamethoxam, one of the primary neonicotinoids applied to soybean and corn production in Minnesota. Grass skippers spend the majority of their lives as caterpillars, and potential pesticide effects are expected to be greatest on caterpillars. Comparable experiments to our proposed work with Monarchs (*Danaus plexippus*) and Painted Ladies (*Vanessa cardui*) demonstrate strong effects of the neonicotinoid imidacloprid on larval survivorship but non-significant effects on the nectar feeding adults (Krischik, in review, 2014). We will perform the experimental

tests using non-endangered surrogate species of related grass skippers that are similar in terms of their natural history and ecological associations to mitigate the cost of conducting these experiments with endangered species. No experiments on the effects of these pesticides on small butterflies like these skippers have been conducted to date. We plan to conduct a small-scale pilot study in 2014 to assess logistics and treatment details.

Summary Budget Information for Activity 4:

ENRTF Budget: \$ 27,600
Amount Spent: \$ 0
Balance: \$ 27,600

Activity Completion Date:

Outcome	Completion Date	Budget
1. Begin establishment of breeding populations of surrogate species for research.	November 2014	\$ 400
2. Collect plant samples from prairie remnants and submit samples for pesticide residue testing.	April 2015	\$ 10,200
3. Conduct a small scale pilot study to refine protocols for controlled pesticides experiments with surrogate species.	April 2015	\$ 800
4. Perform first year of controlled experiments: treat experimental plants with pesticide, track the effects on survivorship and growth on surrogate butterflies. Collect plant tissue samples from the experiments for pesticide residue analysis.	November 2015	\$ 3,000
5. Collect additional plant samples from prairie remnants and perform pesticide residue testing.	April 2016	\$ 10,200
6. Repeat #4 to provide replication. Analyze data and submit results for publication.	June 2017	\$ 3,000

Activity Status as of November 30, 2014:

Activity Status as of May 31, 2015:

Activity Status as of November 30, 2015:

Activity Status as of May 31, 2016:

Activity Status as of November 30, 2016:

Activity Status as of May 31, 2017:

Final Report Summary:

ACTIVITY 5: Prairie Outreach and Environmental Education at the Zoo

Description: With 1.3 million visitors annually, the Minnesota Zoo will utilize its role as Minnesota’s largest environmental education center to provide educational materials about prairie butterflies, their imperiled native habitats, and actions the public can take. The Minnesota 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. These glossy, fold-out guides will be free to Minnesota Zoo guests at its seasonal Butterfly Garden exhibit, at other on-site displays, and at other educational outreach opportunities. These guides will also be made available online for download and incorporated into Zoo social media and other digital outreach opportunities.

Summary Budget Information for Activity 5:

ENRTF Budget: \$ 8,000

Amount Spent: \$ 0
Balance: \$ 8,000

Activity Completion Date:

Outcome	Completion Date	Budget
1. Production and printing of a Prairie Butterflies Identification and Pollinator Information Guide	May 2015	\$ 4,000
2. Production and printing of a Prairie Biology Guide	May 2016	\$ 4,000

Activity Status as of November 30, 2014:

Activity Status as of May 31, 2015:

Activity Status as of November 30, 2015:

Activity Status as of May 31, 2016:

Activity Status as of November 30, 2016:

Activity Status as of May 31, 2017:

Final Report Summary:

V. DISSEMINATION:

Description:

The activities and results of the Minnesota Zoo's breeding and research operations will be shared all named partners through annual reports. The outcomes of the conservation genetics and the pesticides research will be submitted for publication in independent peer-reviewed scientific journals. Findings will also be communicated through the Minnesota Zoo's marketing and education departments as much as possible, including on the Zoo's webpage (www.mnzoo.com), as well as presentations by the Project Manager to the public and other interested parties. Zoo staff, interns, and volunteers will also be trained to talk about the program, prairie butterflies, and the importance of prairies to the public. The produced guides described in Activity 5 will also serve as a major source of outreach and in addition to being made available free to Zoo guests, will be posted on the Zoo's webpage for download, and integrated into other outreach digital and hardcopy publications.

Activity Status as of November 30, 2014:

Activity Status as of May 31, 2015:

Activity Status as of November 30, 2015:

Activity Status as of May 31, 2016:

Activity Status as of November 30, 2016:

Activity Status as of May 31, 2017:

Final Report Summary:

VI. PROJECT BUDGET SUMMARY:

A. ENRTF Budget Overview:

Budget Category	\$ Amount	Explanation
Personnel:	\$ 273,500	1 State Program Administrator Principal at 100% FTE for 3 years; 1 Project Analyst at 25% FTE for 3 years;
Professional/Technical/Service Contracts:	\$ 32,000	1 contract (RFP) pesticide residue testing; 1 contract (RFP) for DNA sequencing
Equipment/Tools/Supplies:	\$ 5,600	Supplies needed to support Zoo conservation breeding operations as well as conservation genetics and pesticides research, including tables, rearing cages, butterfly nets, collecting supplies, plants, and laboratory reagents
Capital Expenditures over \$5,000:	\$ 52,000	Purchase and outfitting of indoor chamber for the Zoo conservation breeding program
Printing:	\$ 8,000	Production of two guides on prairies and prairie butterflies and pollinators for free distribution at the Zoo
Travel Expenses in MN:	\$ 3,800	Mileage, lodging, meals for travel to and between prairie sites for data collection and breeding operations
Other:	\$ 5,100	Travel expenses outside of MN. Mileage, lodging, meals for travel to and between prairie sites to obtain individuals for the Zoo conservation breeding program. All known viable populations of the Minnesota-native endangered butterflies are now outside of Minnesota in Wisconsin, Michigan, North Dakota, South Dakota, and Manitoba, necessitating out of state travel to obtain founder stock.
TOTAL ENRTF BUDGET:	\$ 380,000	

Explanation of Use of Classified Staff: N/A

Explanation of Capital Expenditures Greater Than \$5,000: The Minnesota Zoo’s Prairie Butterfly Conservation Program requires stable indoor space in which temperature and lighting can controlled for breeding and rearing operations, an aspect that has been lacking to date. Funding from ENRTF will allow for required expansion of our operations to allow us to test a variety of methodological approaches to optimize breeding success and minimize mortality of these endangered species. This multi-layer containment rearing chamber will be located on Zoo grounds and will conform to USFWS and USDA guidelines. Should the Prairie Butterfly Conservation Program close, the Zoo will consult with the ENRTF on alternative arrangements or reimburse the funds.

Number of Full-time Equivalentents (FTE) Directly Funded with this ENRTF Appropriation: 3.75

Number of Full-time Equivalentents (FTE) Estimated to Be Funded through Contracts with this ENRTF Appropriation: 0

B. Other Funds:

Source of Funds	\$ Amount Proposed	\$ Amount Spent	Use of Other Funds
Non-state			
Zoo admissions donations from the public	\$ 5,000	\$	To support potential overtime costs associated with field work, not accounted for in the ENRTF personnel budget. Also likely are additional pesticides residue testing and genetic screening. Donations will be solicited May 24-September 1, 2014.
Matching Gift from Aveda	\$ 5,000	\$	To generally supplement all operations, especially additional pesticides residue testing and genetic screening. Funds will be available beginning late 2014.
State			
Legacy Clean Water Arts and Cultural Heritage Fund, grant to MN Zoo for FY15	\$ 40,000	\$	To support the remaining 75% of the MN Zoo's assistant worker salary and benefits. This amount has been secured for FY15. Renewal of this funding source will likely be sought for FY16 and FY17.
TOTAL OTHER FUNDS:	\$ 50,000	\$	

VII. PROJECT STRATEGY:

A. Project Partners:

Beyond the Minnesota Zoo and DNR partnership, we are also partnering with the numerous agencies and organizations. None will receive funding from this partnership:

- U.S. Fish and Wildlife Service: Permitting under the US Endangered Species Act; access to federal lands
- U.S. Department of Agriculture: Permitting to allow the movement of live insects between states and internationally
- Provincial government of Manitoba: Permitting under the Species at Risk Act
- Sisseton Wahpeton Oyate: Permitting under tribal endangered species provisions, access to tribal lands
- Michigan DNR: Permitting under the state's endangered species provisions; access to state lands, assistance in collections of individuals for breeding
- Wisconsin DNR: Permitting under the state's endangered species provisions; access to state lands
- The Nature Conservancy: Access to prairie preserves
- The Nature Conservancy of Canada: Access to prairie preserves
- University of Minnesota: Collaborative pesticides-associated mortality research
- University of Michigan-Dearborn & New College of Florida: Collaborative conservation genetics research, assistance in collections of individuals for breeding
- Milwaukee Public Museum: Assistance in collections of individuals for breeding

B. Project Impact and Long-term Strategy:

The Minnesota Zoo's Prairie Butterfly Conservation Program and the Minnesota DNR's survey and monitoring program are complimentary and integrative. Extensive survey efforts in Minnesota for Poweshiek skipperlings and Dakota skippers from 2006 to 2013 have pointed to a steep decline in both, to the point that the Poweshiek skipperling may be extirpated and the Dakota skipper may be close to meeting the same fate. Surveys in other

states in these skippers' ranges are yielding similar results. There are troubling indications of declines in other Minnesota-native prairie species as well. This project will assist the DNR in broadening the scope of survey and monitoring efforts for prairie-dependent butterflies. The immediate benefit may be the discovery of surviving colonies of one or both of the two highest priority species. This will support the Minnesota Zoo's conservation breeding program and conservation genetics and pesticides studies. Initiation of the complementary monitoring of individual populations will provide the foundation for a higher-resolution tracking of population trends and for detection of causation.

Both the conservation breeding and wild population monitoring programs are obviously long-term commitments, and this ENTRF project will constitute only the beginning for them. We intend this project to develop monitoring and breeding protocols that will be used long-term. We will be working on strategies for funding the long-term work.

C. Spending History:

Funding Source	FY12	FY13	FY14
Legacy Clean Water Arts and Cultural Heritage Fund grant to MN Zoo to support all operations and staff of the Prairie Butterfly Conservation Program since its inception in February 2012	\$ 62,000	\$ 103,000	\$ 107,000

VIII. ACQUISITION/RESTORATION LIST: N/A

X. VISUAL ELEMENT or MAP(S): See attached graphic of Poweshiek skipperling, Dakota skipper, and Regal Fritillary pictures.

X. ACQUISITION/RESTORATION REQUIREMENTS WORKSHEET: N/A

XI. RESEARCH ADDENDUM: See attached, for Activities 1-4.

XII. REPORTING REQUIREMENTS:

Periodic work plan status update reports will be submitted no later than November 30, 2014; May 31, 2015; November 30, 2015; May 31, 2016, November 30, 2016, and May 31, 2017. A final report and associated products will be submitted between June 30 and August 15, 2017.



Environment and Natural Resources Trust Fund														
M.L. 2014 Project Budget														
Project Title: Imperiled Prairie Butterfly Conservation, Research and Breeding Program - Minnesota Zoo portion														
Legal Citation: M.L. 2014, Chp. 226, Sec. 2, Subd. 05j-1														
Project Manager: Dr. Erik Runquist														
Organization: Minnesota Zoo														
M.L. 2014 ENRTF Appropriation: \$ 380,000 to the Minnesota Zoo														
Project Length and Completion Date: 3 years, June 30, 2017														
Date of Report: February 7, 2014														
ENVIRONMENT AND NATURAL RESOURCES TRUST FUND BUDGET	Activity 1 Budget	Amount Spent	Activity 1 Balance	Activity 2 Budget	Amount Spent	Activity 2 Balance	Activity 4 Budget	Amount Spent	Activity 4 Balance	Activity 5 Budget	Amount Spent	Activity 5 Balance	TOTAL BUDGET	TOTAL BALANCE
BUDGET ITEM	Zoo Conservation Breeding Program			Zoo Conservation Genetics Research			Zoo Pesticides Mortality Research			Zoo Prairie Butterfly and Pollinator Outreach Guides				
Personnel (Wages and Benefits) - Overall	\$273,500		\$273,500										\$273,500	\$273,500
Erik Runquist, Butterfly Conservation Biologist (State Program Administrator Principal @ 100% FTE; 70% salary, 30% benefits for 3 years - \$237,000).														
Zoo Project Analyst worker (1 unclassified @ 25% FTE, 70% salary and 30% benefits for 3 years - \$36,500) to support rearing, breeding, research and outreach operations														
Professional/Technical/Service Contracts														
TBD (competitive bid): DNA Sequencing				\$6,000		\$6,000							\$6,000	\$6,000
TBD (competitive bid): Pesticides residue testing							\$26,000		\$26,000				\$26,000	\$26,000
Equipment/Tools/Supplies														
Zoo conservation breeding operations: including tables, rearing cages, butterfly nets, and collecting supplies, plants	\$2,000		\$2,000										\$2,000	\$2,000
Zoo conservation genetics research: chemicals, reagents, pipette tips				\$2,000		\$2,000							\$2,000	\$2,000
Zoo pesticides research: chemicals, plants							\$1,600		\$1,600				\$1,600	\$1,600
Capital Expenditures Over \$5,000														
Purchase and outfitting of indoor chamber for the Zoo conservation breeding program	\$52,000		\$52,000										\$52,000	\$52,000
Printing														
Publication of prairie and prairie butterfly guides										\$8,000		\$8,000	\$8,000	\$8,000
Travel expenses in Minnesota														
Zoo: mileage, lodging, meals for travel to and between prairie sites for data collection and breeding operations	\$3,800		\$3,800										\$3,800	\$3,800
Other														
Zoo Travel expenses outside of MN. Mileage, lodging, meals for travel to and between prairie sites to obtain individuals for the Zoo conservation breeding program. All known viable populations of the Minnesota-native endangered butterflies are now outside of Minnesota in Wisconsin, Michigan, North Dakota, South Dakota, and Manitoba, necessitating out of state travel to obtain founder stock.	\$5,100		\$5,100										\$5,100	\$5,100
COLUMN TOTAL	\$336,400	\$0	\$336,400	\$8,000	\$0	\$8,000	\$27,600	\$0	\$27,600	\$8,000	\$0	\$8,000	\$380,000	\$380,000
Note: Activity 3 is On a separate budget sheet being managed by the DNR - Robert Dana Project Manager														



Poweshiek Skipperling

Fewer than 500 remain globally?
MN Endangered, Proposed US Endangered



Dakota Skipper

MN Endangered, Proposed US Threatened



Phil Delphey, USFWS



Regal Fritillary

Nearly extinct east of the Mississippi River
MN Species of Special Concern

