M.L. 2016 Project Abstract
For the Period Ending June 30, 2020

PROJECT TITLE: Prairie Butterfly Conservation, Research, and Breeding – Phase II
PROJECT MANAGER: Jessica Petersen
AFFILIATION: MNDNR
MAILING ADDRESS: 500 Lafayette Rd, Box 25
CITY/STATE/ZIP: 55155
PHONE: (651) 259-5130
E-MAIL: jessica.d.petersen@state.mn.us
WEBSITE: N/A
FUNDING SOURCE: Environment and Natural Resources Trust Fund
LEGAL CITATION: M.L. 2016, Chp. 186, Sec. 2, Subd. 03c2 as extended by M.L. 2019, First Special Session, Chp. 4, Art. 2, Sec. 2, Subd. 19

APPROPRIATION AMOUNT: $329,000
AMOUNT SPENT: $329,000
AMOUNT REMAINING: $0

Sound bite of Project Outcomes and Results
Searches of western prairies suggest that seven of the 13 species considered are locally extirpated. Monitoring populations of extant prairie butterflies provides the foundation for adaptive management to conserve what remains. Surveys of the Dakota skipper at the reintroduction and adjacent sites indicate that dispersal is limited.

Overall Project Outcome and Results
Butterflies are in trouble in western Minnesota prairies. Ten species are of statewide conservation concern and two species are federally listed. Knowing where these species persist on the landscape is important to their conservation. Likewise, understanding the factors that affect population size is important to the conservation of existing populations. The skipper butterflies are difficult for untrained individuals to identify with certainty. The lack of qualified surveyors limits the ability of biologists and managers to search for skippers.

Seven of the 13 species were not found across all sites surveyed. All of these missing butterflies are skippers. We monitored populations of Dakota skipper and Pawnee skipper in response to prairie management. Conservation grazing, or perhaps the lack of fire, appears to be beneficial to persistence of Pawnee skipper. The results of Dakota skipper monitoring are less clear and will require additional years of monitoring. Dakota skippers at the reintroduction site appear highly localized to within a few hundred meters of the point of release. This is perhaps due to low dispersal ability, mortality, and/or lower detection ability with increasing radius from the release point. The MNDNR, MN Zoo, and USFWS partnered to successfully train at least 30 individuals to identify imperiled skippers, thus increasing the statewide capacity for monitoring greatly. All of these actions work to make more informed, science-based decisions about the conservation of rare butterflies for all Minnesotans to enjoy.

Project Results Use and Dissemination
During this project, the USFWS consulted project staff in drafting the recovery plans for both federally listed species, the Dakota skipper and the Poweshiek skipperling. Information gained from the surveys conducted through this project were essential in writing the recovery plans. These draft recovery plans were then disseminated for public comment and review.

The project manager in collaboration with the MN Zoo and USFWS developed species identification cards for the imperiled skipper species and their look-a-likes as part of the training sessions. These cards are specific to western Minnesota skippers and are an important tool in the continued survey and conservation of these rare skippers. We continue to receive complements and requests for these identification cards.

Environment and Natural Resources Trust Fund (ENRTF)
M.L. 2016 Work Plan Final Report

Date of Report: 15 August 2020

Final Report

Date of Work Plan Approval: 7 June 2016

Project Completion Date: 30 June 2020

PROJECT TITLE: Prairie Butterfly Conservation, Research, and Breeding – Phase II

Activities 4 & 5 by DNR (Activities 1 & 2 are being done by the Minnesota Zoo and are described in a separately submitted work plan - $421,000)

Project Manager: Jessica Petersen

Organization: Minnesota Department of Natural Resources

Mailing Address: 500 Lafayette Road, Box 25

City/State/Zip Code: St. Paul, Minnesota 55155

Telephone Number: (651) 259-5130

Email Address: jessica.d.petersen@state.mn.us

Web Address:

Location: Eleven counties in the prairie region of western Minnesota: Murray, Pipestone, Lincoln, Chippewa, Swift, Pope, Clay, Norman, Polk, Mahnomen, Kittson

Total ENRTF Project Budget:		
	ENRTF Appropriation:	**$329,000**
	Amount Spent:	**$329,000**
	Balance:	**$0**

Legal Citation: M.L. 2016, Chp. 186, Sec. 2, Subd. 03c2 as extended by M.L. 2019, First Special Session, Chp. 4, Art. 2, Sec. 2, Subd. 19

Appropriation Language:
$750,000 the second year is from the trust fund. Of this amount, $421,000 is to the Minnesota Zoological Garden and $329,000 is to the commissioner of natural resources in collaboration with the United States Fish and Wildlife Service to continue efforts to prevent the extinction of imperiled native Minnesota butterfly species through breeding, research, field surveys, and potential reintroduction. This appropriation is available until June 30, 2019, by which time the project must be completed and final products delivered.

Carryforward; Extension (a) The availability of the appropriations for the following projects is extended to June 30, 2020: (6) Laws 2016, chapter 186, section 2, subdivision 3, paragraph (c), Prairie Butterfly Conservation, Research, and Breeding - Phase II;

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

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. Ten of Minnesota's** prairie butterflies are of statewide conservation concern and two, the Poweshiek skipperling (*Oarisma poweshiek*) and Dakota skipper (*Hesperia dacotae*), are listed as Endangered and Threatened Species under the U.S. Endangered Species Act. Both have disappeared from the majority of their historic ranges (96+% for Poweshiek, 76+% for Dakota) in recent decades. Dakota skippers may only remain in one or two Minnesota locations. The Poweshiek skipperling 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 surveys across the remaining isolated known populations in Michigan, Wisconsin, and Manitoba indicate that fewer than 500 Poweshiek skipperlings likely remain globally.

In partnership with the US Fish and Wildlife Service and the Minnesota Department of Natural Resources, the Minnesota Zoo's Prairie Butterfly Conservation Program is establishing the world's first and only conservation breeding populations for endangered, threatened, and imperiled Minnesota-native prairie butterflies. We utilize the recognized organizational capacity and experience of the Minnesota Zoo for the conservation of endangered species.

Currently largely supported by a M.L. 2014 ENRTF (M.L. 2014, Chp. 226, Sec. 2, Subd. 05j-1), this new ENTRF Project 009-A will provide the resources necessary to continue and expand the Minnesota Zoo's Prairie Butterfly Conservation Program. Based on the recommendations from an independent working group, the Minnesota Zoo has been tasked with beginning the world's first wild population supplementations and reintroductions of endangered Poweshiek skipperlings and Dakota skippers. It will also allow the Minnesota Zoo to continue to research on the risk to these endangered butterflies of potential exposure to widely applied agricultural pesticides.

The Minnesota Zoo is collaborating with the Minnesota Department of Natural Resources (DNR) for this joint ENTRF. Described in a separate Work Plan, the DNR will simultaneously monitor the status of these and a number of additional targeted butterfly species on native prairie remnants across Minnesota and will work to train new surveys to help alleviate a severe shortage of qualified observers. 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 disappearance of these historically widespread Minnesota prairie butterflies is noteworthy and troubling.

III. OVERALL PROJECT STATUS UPDATES: [these are supplied by the Zoo as the project lead]

Project Status as of Nov. 30, 2016:

Project Status as of May 31, 2017:

Project Status as of Nov. 30, 2017:

Project Status as of May 31, 2018:

Project Status as of Nov. 30, 2018:

Project Status as of May 31, 2019:

Overall Project Outcomes and Results
Butterflies are in trouble in western Minnesota prairies. Ten species are of statewide conservation concern and two species are federally listed. Knowing where these species persist on the landscape is important to their conservation. Likewise, understanding the factors that affect population size is important to the conservation of existing populations. The skipper butterflies are difficult for untrained individuals to identify with certainty. The lack of qualified surveyors limits the ability of biologists and managers to search for skippers.

Seven of the 13 species were not found across all sites surveyed. All of these missing butterflies are skippers. We monitored populations of Dakota skipper and Pawnee skipper in response to prairie management. Conservation grazing, or perhaps the lack of fire, appears to be beneficial to persistence of Pawnee skipper. The results of Dakota skipper monitoring are less clear and will require additional years of monitoring. Dakota skippers at the reintroduction site appear highly localized to within a few hundred meters of the point of release. This is perhaps due to low dispersal ability, mortality, and/or lower detection ability with increasing radius from the release point. The MNDNR, MN Zoo, and USFWS partnered to successfully train at least 30 individuals to identify imperiled skippers, thus increasing the statewide capacity for monitoring greatly. All of these actions work to make more informed, science-based decisions about the conservation of rare butterflies for all Minnesotans to enjoy.

IV. PROJECT ACTIVITIES AND OUTCOMES:

ACTIVITY 1: Breeding and potential reintroduction of endangered butterflies (See separate work plan by MN Zoo)

ACTIVITY 2: Pesticides Research – Phase 2 (See separate work plan by MN Zoo)

ACTIVITY 3: Butterfly Survey and Status Monitoring (MN DNR)

Description:
The DNR will continue its critical survey efforts to locate wild populations of prairie butterflies implemented under the ENRTF in 2014, especially those that are federally- and state-listed. The number of sites will be reduced to 16, with more repeat surveys during the flight periods and more extensive surveys in the larger sites. These sites comprise a total of about 7500 acres in seven western MN counties, from Pipestone to Kittson. DNR will also initiate quantitative (abundance) monitoring of the two federally-listed species in at least one and up to 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 captive-reared insects are released.

Summary Budget Information for Activity 3:

ENRTF Budget: $319,362
Amount Spent: $319,362
Balance: $0

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, 2017
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, 2020
3. Quantitative monitoring initiated for any reintroduction effort	June 30, 2020

Activity Status as of Nov. 30, 2016:
Field surveys from 1 July 2016 through early September 2016 completed the field season in accordance with the amended work plan for the original grant to survey these butterflies (M.L. 2014, Chp. 226, Sec. 2, Subd. 05j-2), so no survey field work was performed as specified in this workplan. Please see the 30 November 2016 updates

for that project for details of work performed. Entry and other management of data from the 2016 field work continued using funds from this grant after funds from M.L. 2014, Chp. 226, Sec.2, Subd. 05j-2 were exhausted.

Activity Status as of May 31, 2017:
Used funds from this grant to complete data management and analysis and final report preparation for the M.L. 2014 grant, as we used funds from that grant intended for this purpose to instead conduct surveys in FY17 (July-Aug. 2016) as part of the amended work plan for that grant. Thus, the entire field season in calendar year 2016 was shifted to the M.L. 2014 grant, and the write up was shifted to the current grant. Expenditures from the current grant also include work done to prepare for the calendar year 2017 field work. Major tasks have been to determine what sites will be surveyed, to secure contractors for the survey work and the monitoring of Dakota skipper in the one site where it has survived, and to collaborate with the MN Zoo on planning the monitoring of captive reared Dakota skippers that will be released in a formerly occupied site.

Activity Status as of Nov. 30, 2017:
We revised the portfolio of sites to be surveyed during the 2017 flight season, dropping some of the previously surveyed sites and adding several sites not previously surveyed. Seventeen of the sites we had been surveying were dropped as being highly unlikely to harbor Dakota Skipper or Poweshiek Skipperling. We added seven sites that were not surveyed in previous years of this project and M.L. 2014 before it. Twenty three sites that had been surveyed during the previous years were retained for 2017 survey. Survey work began in mid-June and ended at the end of August. Seven of the 30 surveyed sites are in the far northwest (Parklands) cluster, eight are in the northwest (Beach Ridges) cluster, seven are in the central west (Moraines) cluster, and eight are in the southwest cluster. We secured well-qualified contractors to survey the southwest and central west sites and to conduct the monitoring of the one Dakota Skipper population we have found, [redacted]. DNR staff surveyed sites in the Beach Ridges and Parklands clusters. We also conducted survey in the Hole-in-the-Mountain Preserve following our regular protocol during the Zoo's release of reared Dakota Skipper adults there. This was done to compare the results with the Zoo's intensive localized monitoring in the site. We detected only one released skipper on our survey transects compared with numerous sightings by the Zoo staff. Our detection was significantly more distant from the release spot than any of the Zoo's, suggesting that the released butterflies did not disperse widely in the site. The monitoring results from the [redacted] sites are similar to the 2015 results, up a bit from 2016 but not so strong as 2014. No fire management has occurred in this site since the Spring of 2014, although a portion of the least productive of the subsites was burned in a wildfire in Fall 2015. Survey work in the [redacted] portion of the [redacted] detected this skipper only in the one pasture where it has been previously observed, reinforcing the likelihood that its presence in the ranch is confined to this one pasture. Dakota Skipper was not detected in any of the other 23 sites having appropriate habitat. Thirty sites were surveyed for Poweshiek Skipper, and as in all previous years no Poweshiek Skipperling was detected. And again, no Dusted Skipper, Arogos Skipper, Ottoe Skipper, Garita Skipperling, or Assiniboia Skipper was detected in any site. We found Pawnee Skipper in the handful of sites where we have observed it in previous surveys and in one of the newly added sites. It appears to respond positively to a moderate level of grazing. As in previous years, Regal Fritillary continues to be present in many of the sites, apparently doing well in some.

Since the end of field work we have been processing the data. There have been problems with the data from one contractor, but these are close to resolution.

Activity Status as of May 31, 2018:
We resolved the problems with the one contractor's data and completed data processing. We planned the 2018 field season and are close to completing the process of contracting some of the field work. A complication in the planning for the 2018 work has been the overdue retirement of the manager of the DNR component of this project at the beginning of April. Details of how this component will be managed are still being worked on.

We failed to explicitly note in the 30 Oct. 2017 update that we decided not to reduce the number of sites for survey to the 16 we specified in the work plan. As reported in that update, we surveyed 30 sites in 2017.

Amendment Request Nov. 6, 2018:
Amendment is requested to extend the DNR portion of the project by one year with a completion date of June 30, 2020. The project planned for an end date of June 30, 2019 that assumed a full 2018 field season and subsequent data analysis (Activity 3) and 2018 initiation of training workshops (Activity 4). The 2018 retirement of the project manager/subject matter expert and subsequent extended time it took to find a qualified replacement resulted in a restricted 2018 field season (Activity 3) and postponement of training workshops (Activity 4). A one-year extension is requested to allow for 1) a full 2019 field season that will fill gaps left from 2018 (Activity 3) and 2) complete training workshops as described in the Work Plan (Activity 4). This amendment will deliver by June 30, 2020 project outcomes as planned.

Project manager was also updated from Bruce Carlson to Jessica Petersen.

No other updates (budget or outcomes) are included in at this time. These will be provided in the upcoming Nov. 30 update.

Amendment pending further LCCMR and legislative action as of 11/30/18

Amendment Approved by LCCMR 5/31/2019.

Activity Status as of Nov. 30, 2018:
We were not able to replace the Project Manager, who retired at the end of April, with someone prepared to undertake the 2018 field work in time, and the retired Manager agreed to continue as a volunteer (after a month, hired on an emergency basis for the duration of the field season). However, some time was lost in the process, resulting in a slight reduction in the amount of work that was accomplished in the northwest part of the survey area compared with previous years.

Southwest and West-central sites
We (a contractor) surveyed 21 sites (6 of these are subdivisions of one large site) during at least one of the flight period blocks. All time blocks were surveyed at least once in 10 of these sites. The surveyed sites included 15 of the 18 sites surveyed in 2017 plus 6 sites that were not surveyed in 2017, although four of these had been surveyed in previous years of the project.

In the central subsites of Hole-in-the-Mountain Preserve where the MN Zoo released captive-reared Dakota skipper adults in 2017 and again in 2018 we conducted our standard surveys three times during the flight period of this species. The two transects located in more disjunct habitat patches in the preserve were surveyed twice during this skipper's flight period, and the transect in the patch in the Prairie Bank easement, contiguous to the preserve but grazed, was surveyed once during the period. We observed two Dakota skippers on one of the dates and one on a subsequent date, all along the transect in the ridge where the release point was located. The much more intensive and locally focused sampling by the Zoo detected many more Dakota skipper adults during this period, suggesting that dispersal of released adults was limited, or that the probability of detecting individual skippers that are present is low, probably both.

Other target species observed were Prairie ringlet, in three sites; Melissa blue, in six sites; Regal fritillary, in 17 sites; and Pawnee skipper in two sites. The ringlet was observed in modest numbers in two of the three sites, both private, unburned, and one grazed. Only a couple were observed in the third site, a large part of which is annually hayed and not burned. The Melissa blue exhibited a similar positive association with grazing, but was not as strongly negatively affected by burning. The pattern for both species in 2018 was similar to previous years. We encountered Pawnee skipper only in the two sites where we had previously observed it. These are

adjoining sites, one grazed and the other managed only with prescribed fire. As in the previous years, this skipper was far more numerous in the grazed site than in the fire-managed ones. And, as in previous years, the Regal fritillary was doing well in almost all of the sites, with single-transect counts of 100 or greater in 9 of the 14 sites surveyed during the peak of its flight. As in all previous years, Dakota skipper was not observed in any site other than the release site. Dusted skipper, Gorgone checkerspot, Poweshiek skipperling, Ottoe skipper, and Arogos skipper were not observed in any site. Two other target species, Garita skipperling and Uhler's arctic, were not historically present in this part of Minnesota.

Northwest sites

We (DNR staff) surveyed 14 sites during at least one of the flight period blocks. Neither of the target species that fly only during the third block, Arogos skipper and Ottoe skipper, were historically present in this part of the state, so only 3 blocks were scheduled for survey of these sites. Six of the 15 sites were surveyed at least once during all of the blocks in which target species were possibly present. Unavailability of required expertise during the second block prevented survey of this block in all but one of the five far-northwestern (Kittson Co.) sites. Three of the 14 sites were surveyed for the first time in 2018. All but two of the other 11 had all been surveyed in 2017 and these two plus eight of the remaining nine had been surveyed in most previous years since 2014.

As in all previous years we detected Dakota skipper at the [redacted] site complex only. This year all sightings were in the [redacted]. For the purpose of monitoring the [redacted] we conducted transect counts in the [redacted] more frequently during the Dakota skipper flight period than in other sites. In the [redacted] we conducted transect counts on six days over a 12-day period during the flight period of this skipper, on three days during an eight-day period in the Clay Co. parcel, and on two days during a four-day period in the [redacted]. The sighting rate in [redacted] was about the same as that in 2017. The rate has always been very low in the other two subunits. We also conducted a count during this period in one of the pastures of the ranch where we had not previously detected this species and again detected none. We were unable to schedule a count in the pasture where we had previously observed one or two per year.

We observed first-brood Gorgone checkerspot adults in two sites, both where we have previously observed them, as well as a number of larval colonies (offspring of the first-brood adults) in one of the two. We did not find this species in 2018 in the third site where we previously recorded it. We observed Prairie ringlet in nine sites; two of these were first-time surveys, otherwise all were sites where we had previously encountered this butterfly. No site surveyed unsuccessfully in 2018 during the flight period for this butterfly had an observation during a previous year of the project. Similar to the results in the southwest sites, the strongest numbers were in sites without any fire management. We encountered Melissa blue in six sites; most during the first brood flight period. All six had produced observations of this species during previous survey years. The strongest numbers were in sites with recent grazing and no fire management. Our observations of Pawnee skipper were again limited to the [redacted] complex and a small remnant of sandy/gravelly hill prairie in the southeast corner of Clay Co. In the [redacted] the two surveyed pastures in the [redacted] continued to produce the greatest number of sightings, while the [redacted] yielded only two observations and [redacted] none. We were unable to survey the [redacted] unit during this time block. The encounter rate in the small hill prairie site, which was retired from grazing only two or three years ago, was similar to that in the ranch pastures. As in the southwest sites, Regal fritillary was doing well in six sites surveyed during its flight period. Five of the sites in which it was not detected in surveys during its flight period are all north of its normal range limit in Polk Co., although one stray was encountered in a Kittson Co. site. This butterfly's absence from the two dune-form sand prairie sites is puzzling, as it is thriving in a similar site in southeastern Minnesota.

As in all previous years of this survey beginning in 2014 we did not encounter in any of the northwest sites Dusted skipper, Garita skipperling, Uhler's arctic, Poweshiek skipperling, and Assiniboia skipper. The failure to find Poweshiek skipperling in a previously unsurveyed site in Kittson Co. only six miles southeast of the extant population in Manitoba was especially disappointing. Although aerial photography suggested the site comprised some suitable habitat, on-the-ground inspection proved it to be slightly too wet.

Activity Status as of May 31, 2019:
Work was completed to prepare for upcoming field work. Contact was made with private landowners in the [redacted] area to secure access to sites. We have begun to collect management data from the previous year from TNC and the SNA program for the various sites in the [redacted]

We developed an ArcGIS app to collect precise data on Dakota skipper locations at the [redacted] We will employ a type of survey called distance sampling to attempt to account for detection problems inherent to many insect species. Distance sampling will allow us to calculate relative population estimate, which can be correlated with prairie management. With distance sampling we will walk fixed transects through suitable habitat, estimating distance to observations. We will conduct a minimum of 5 surveys during the flight period, surveying at least every other day under ideal weather conditions. We have started to model degree days accumulations to predict the emergence of Dakota skipper at [redacted]. Degree day modeling will ensure that we start sampling at the beginning of the flight period to allow for enough samples given the very short survey opportunity.

Activity Status as of Nov. 30, 2019:

The project manager conducted population monitoring at [redacted] area for Dakota skipper from July 8 – July 16. Surveys did not take place on two days due to heavy rains. In seven days of surveying, a total of 41 individuals were observed, 31 individuals during official transect surveys and an additional 10 individuals observed during meandering walks. The highest density of individuals remains at the [redacted]. The second highest density was at the grazed ranch. As in years past, the [redacted] and [redacted] had very low density of Dakota skipper. The recent prescribed burn in 2018 at the [redacted] unit seemed to stimulate blooming of the *Echinacea*, however only two individuals were seen over 3 days of surveys across a total of 7100 m of survey. The burn did not seem to harm or help the population of Dakota skipper at [redacted].

Incidentally, a single individual of a common ringlet was observed at the [redacted] during Dakota skipper surveys. Other incidental observations of target species including Dusted skipper and Gorgone checkerspot were noted by the project manager during butterfly community monitoring in the southeast portion of Minnesota associated with a different project. Dusted skipper had not been documented in the state since 2009 and only a few records of Gorgone checkerspot have been found through this project. These new records in a portion of the state that has not been surveyed for butterflies in many years, highlight a need for statewide long-term monitoring of the butterfly community.

Amendment Request December 4, 2019:
Contracts came in under budget, with more of the field work being covered by staff instead of contractors in 2019. We are requesting to move $36,491 from A3 Contracts to A3 Personnel.

All field equipment for the project has been purchased and Equipment/Supplies came in under budget. We are requesting to move $410 from A3 Equipment/Supplies to A4 Personnel. Additionally, we are requesting that the remaining amount that was budgeted for equipment, $1643, be moved to A3 Personnel.

Travel expenses are coming in below budget, while Personnel was under-budgeted. We are requesting to move $9,000 from A3 Travel Expenses to A3 Personnel.

Lastly, we are requesting to move $1 to A3 Personnel from A4 Travel budget (meals for workshop) to reflect the actual cost of the expense ($799).

Amendment Request Approved: December 11, 2019

Activity Status as of May 31, 2020:
We continued to coordinate imperiled prairie butterfly survey and monitoring efforts as well as zoo-reared release plans for Dakota skippers in 2020 and beyond. Similarly, we have been working with the Zoo staff, TNC biologists, and DNR botanists to develop plans for long-term habitat and Dakota skipper population monitoring protocols that could be used across the species range. To this end, we drafted a monitoring plan and applied for a USFWS recovery permit to adaptively manage for Dakota skipper and their habitat in Minnesota. We worked to ensure that monitoring will continue into the future.

The project manager continued to work with the data management staff to ensure that the public and conservation professionals can access data. We created county-level maps for every species of butterfly in Minnesota. Soon those maps will be available on the MN Taxa website housed on the MNDNR webpage.

Amendment Request as of August 12, 2020
Request moving $2,437 from A3 Travel to A3 Personnel. This is done as part of final budget closing and also because a travel budget was not needed during the reporting period due to COVID restrictions on travel and field work. The remaining travel budget of $2,437 was reallocated to personnel to focus time on processing project data and specimens and analyzing project outcomes.

Amendment Approved by LCCMR 8/24/2020

Final Report Summary Aug. 15, 2020:
We achieved the first outcome in this activity by extensively surveying many sites within the historic ranges and during adult flight phenology for each of the target species (Table 1). The two federally listed species were the primary targets for surveys throughout the grant period, the Dakota skipper and Poweshiek skipperling. Of the 94 sites surveyed for Dakota skippers, they were only found at the existing known sites in Clay County and the site of the MN Zoo reintroduction in Lincoln County. The population in Clay County consists of essentially five sites that are managed by various partners continues to appear stable, but numbers at some of the subpopulations are low, on the order of one or two individuals detected each year. Poweshiek skipperlings were not located at any of the 88 sites surveyed. Of the remaining targeted imperiled butterflies, six species were not detected at all (Arogos skipper, Dusted skipper, Assiniboia skipper, Ottoe skipper, Garita skipperling, and Uhler's arctic). We know from surveys in the southeastern part of the state that Dusted skipper remains there, but the stability of those populations is unknown. Pawnee skipper seems to be doing relatively well at the sites where it still exists, but the reality of the 12 positive detections is that there are only three populations, across six sites, two populations in Clay County and one in Pope County. The Prairie ringlet and the Gorgone checkerspot are also just hanging on in the western prairies. Melissa blue and Regal fritillaries are perhaps doing the best of all the imperiled prairie butterflies considered here. By no means is the search for these imperiled butterflies over, especially the ones we did not detect during surveys. Given the results of these surveys, priorities should be to expand the geographic scope of searches including land in the southeast and searches on private land. Significant portions of the populations of Dakota skipper and Pawnee skipper remain on private land. We know that populations of Gorgone checkerspot, Prairie ringlet, and Dusted skipper remain in the southeast and central portions of the prairie transition zone. It is possible that with continued searches in those areas could turn up populations of Arogos skipper and Ottoe skipper.

Table 1. Summary of each targeted species including the number of visits to a site on a particular date and the number of positive site/date detections. These data do not include abundance information, but rather just the total number and total detections at a given site on a given survey date.

Species	No. site/date visits	No. positive site/date detections
Arogos skipper	31	0
Dusted skipper	52	0

Species	No. site/date visits	No. positive site/date detections
Gorgone checkerspot	53	4
Prairie ringlet	45	8
Assiniboia skipper	27	0
Dakota skipper	94	16
Pawnee skipper	74	12
Ottoe skipper	31	0
Garita skipperling	9	0
Poweshiek skipperling	88	0
Uhler's arctic	9	0
Melissa blue	152	36
Regal fritillary	148	92

We were able to meet the second objective by collecting quantitative data on the effects of prairie management on Dakota skipper in 2017, 2018, and 2019 and Pawnee skipper in 2017 and 2018 across a variety of lands that are grazed, managed with prescribed burning, or hayed exclusively. We established standard monitoring protocols that can be used for years to come to continue to monitor these fragile populations. This early evidence suggests that Pawnee skipper responds well to grazing. The mechanism for this observation is unclear. For Dakota skipper the evidence is less clear. Anecdotally, fire doesn't appear to help or hurt the Dakota skipper dramatically. Prescribed burning certainly stimulates *Echinacea* production, as does grazing, but the subpopulations seem to be relatively stable regardless of management technique. The lands on which these species continue to reside provide a unique opportunity to continue to understand population and habitat responses through adaptive management monitoring.

We met the third objective of surveying the only reintroduction thus far of Dakota skipper in Minnesota. The landscape surrounding the release of Dakota skippers at Hole-in-the-Mountain including adjacent (~300 m) ridges, were searched during the release in 2017 and 2018. Only a few individuals were seen in the general vicinity of the release boxes. This reinforces two things we continue to understand about Dakota skipper and likely other similar species: 1. The detection probability is likely very low. We continue to work to estimate the detection probability for Dakota skipper, but doing so requires more detections than we can have in any one year due to its rarity. 2. The species does not disperse very far (<300 m) very regularly. We already knew this from past research, and these observations contribute to that understanding. The success of the reintroduction will need to be assessed fully once repeated releases cease.

ACTIVITY 4: DNR Butterfly identification and survey training (MN DNR)

Description: The DNR will conduct training workshops in identification and survey techniques to increase the number of qualified surveyors that can identify these butterflies, a critical need for a sustained long-term conservation effort. The target will be wildlife and other natural resource professionals. Special effort will be made to train field workers for the ENRTF-funded project M.L. 2015 03o, Effects of grazing vs. fire for prairie management, as they will be working in ca. 75 prairie sites in the state. Butterflies are one of the taxa being targeted for study, but the field workers will need special training to reliably identify most of the target species of this project.

Summary Budget Information for Activity 4:

ENRTF Budget: $9,638
Amount Spent: $9,638
Balance: $0

Outcome	Completion Date
1. Two training workshops in prairie butterfly identification and survey completed, with at least 5 individuals successfully trained and able to contribute to survey work. At least as many able to perform a sentinel function.	June 30, 2019

Activity Status as of Nov. 30, 2016:
Work on this activity was not begun during this reporting period.

Activity Status as of May 31, 2017:
We had discussions with a couple of individuals in hopes of bringing one on to help with this, but neither worked out. Initiation of this activity has been postponed until after this year's field season, although we are hoping the use the field season to provide some experience with the Dakota skipper for a couple of individuals who could be candidates to help with the training.

Activity Status as of Nov. 30, 2017:
No work on this activity was performed during this reporting period.

Activity Status as of May 31, 2018:
No workshops were conducted during this reporting period. We had some discussion in late winter with the USFWS about a joint effort, but the retirement of the DNR's project coordinator has put this on hold.

Activity Status as of Nov. 30, 2018:
Previous updates omitted a workshop conducted by the project manager for field workers for the ENRTF-funded project M.L. 2015 03o, Effects of grazing vs. fire for prairie management. Funds from this current appropriation were not used to support training of workers associated with the prairie grazing and fire project. Butterfly surveyors were trained in identification of prairie imperiled skippers using pinned specimens in April 2016.

We are planning a train-the-trainer type workshop for 2019 to expand the number of individuals with abilities to identify prairie skippers. Education materials are being developed including identification materials, power point presentations, a taxonomic key to species, and assessing availability of pinned specimens. The workshop will include an in-class training portion, followed by weekly online photo identification homework, leading up to a two day in-field component in and around Hole-in-the-Mountain preserve. Topics covered in the course will include identification of prairie skippers and look-alikes, identifying critical habitat, butterfly monitoring protocols, and photography best practices.

Amendment Request May 6, 2019:
An amendment is requested to adjust the budget to accommodate a catered boxed lunch at the Zoo for the first, in-class imperiled skipper identification workshop. Participants are coming from all over Minnesota and will have a very full day of extensive learning in the Zoo's education facility. Providing lunch and coffee to participants will encourage efficient use of their time and allow for an effective learning experience.

Budget amended to cover costs of box lunches for participants attending the first skipper identification workshop being held in the classroom at the Zoo (A4), a total of 36 people. $800 moved from A3 Travel Expenses for field surveys to A4 Travel Expenses for butterfly ID workshops

Amendment Approved by LCCMR 5/23/2019

Activity Status as of May 31, 2019:
We have made great progress on planning two imperiled skipper identification courses. One will take place in the classroom, and the other in the field. A total of 38 people have signed up for the workshop, this number is significantly higher than the 5 people anticipated in the original Work Plan Activity 4 Outcome. Increased

workshop attendance is being accommodated because there is a lot of interest and enthusiasm for the course with a much stronger than expected response to the workshop posting and registration. Instead of just 5 attendees, we actually had to cap the registration at 30 for the indoor and 40 for the field days. Registration was prioritized for those that work or live in the area where the imperiled skippers are most likely to be found.

The first workshop will be held at the Minnesota Zoo on May 22. A total of 30 participants led by 6 instructors are set to learn identification of 12 species of skippers in-depth and an additional 7 skipper species that folks should also be aware of. These include the imperiled skippers and their look-a-likes. Given that skipper identification can be incredibly difficult, the number of species was limited so participants can be successfully trained in the core imperiled skippers, especially the federally listed species. Presentations include: historical survey perspective, skipper identification, zoo rearing activities, best practices for management, how to survey for skippers, federal recommendations for reporting observations, and photography tips.

Training materials under development include pinned specimens from the University of Minnesota Insect Collection so participants will be able to learn from the material. Likewise, we created species cards for each of the core skippers the participants will learn. These cards included data from the MNDNR database compiled into county-level distribution maps and flight period histograms, as well as a brief physical description and photographs. Flashcards were created for each species as well so participants can continue to test themselves following the in-class portion of the workshop. Learning needs to continue after the workshop. To this end, we created weekly, online quizzes for participants (a total of four) to stay refreshed on identifications. Quizzes consist of 5-10 photograph identifications (multiple choice) and phenology related questions.

A second workshop will take place in the field, June 26-27. A total of 38 participants are signed up to attend the field workshop. Many of the participants are the same individuals as the in-class workshop. We will visit a total of 6 sites, 3 each day (Hole-in-the-Mountain Preserve, Altona WMA, Prairie Coteau SNA, and three Native Prairie Bank properties). Participants will receive the same educational materials developed for the in-class workshop (flashcards and species identification cards). Participants will learn field identification of imperiled skippers, including look-a-likes. Time will be spent learning to walk transect routes and identify potential habitat for imperiled skippers. We will also practice using binoculars and photography skills as most people/attendees do not hold federal permits to collect listed species and therefore must rely on visual, on-the-wing, observations instead of netting or trapping (both of which can result in kill or injury of butterflies).

Activity Status as of Nov. 30, 2019:
About 30 people attended the field workshop, plus five instructors. We were able to visit all six sites as planned. The zoo released a few Dakota skippers at Hole-in-the-Mountain TNC Preserve on the first day of the workshop. Participants were able to observe individuals of Dakota skippers perching and nectaring on flowers in the field. We also saw four other species of look-a-likes (Tawny edged skipper, Mystic skipper, Least skipper, and Peck's skipper) across the sites we visited. Participants noted that this time spent in the field with colleagues, learning to identify skippers in the field was essential to their learning. In the days following the workshop, several participants contacted the instructors asking for confirmation of identifications they had correctly performed. Feedback surveys were sent to participants following the field workshop. Participants overwhelmingly stated that they learned a great deal during the in-class and field workshops. The project manager continues to receive requests for the species identification cards developed for the workshop. Overall, these two workshops successfully trained about 30 individuals to identify imperiled skippers in Minnesota. This is a huge increase (at least three times as much) over the number of people in Minnesota that could identify skippers prior to the workshop.

Activity Status as of May 31, 2020:
This activity has been completed. There continues to be great interest in the materials that we developed in coordination with the MN Zoo for the workshops. The skipper identification cards have been requested by several individuals in the past 6 months as more and more interested individuals are seeking resources to help

search for imperiled butterflies. We have had requests from two local organizations, Dakota Parks and the Twin Cities North American Butterfly Association chapter group as well as from the USFWS to host additional skipper ID training workshops. The materials developed during the course of this project will continue to live on past its expiration.

Final Report Summary Aug. 15, 2020:
The single outcome for this objective was highly successful. We were able to train 30+ individuals to perform sentinel functions on the landscape. These individuals have reported back that they have had opportunities to search for imperiled skippers. Several of the attendees joined the project manager in the field in 2019 and 2020 to continue to gain experience with Dakota skipper and look-alike identifications. Given the short window for surveys, the perhaps incredibly low population sizes that may remain, and the low detection probability, it is essential to have more people, spread across a wider landscape continuing to look for these needles in a haystack.

V. DISSEMINATION:
Description: The presence of either of the Federally listed species (Poweshiek skipperling, Dakota skipper) will be communicated promptly to the MN Zoo, USFWS, and the owners/managers of sites where observed. All survey and monitoring results will be entered into the DNR Natural Heritage Information System. A major use of this database is environmental review. If USFWS initiates status review of any of the other species, the data for these will be made available. For the state-listed species, the species pages in the DNR website will be updated to reflect new information. Beyond the term of this project, the quantitative monitoring of selected sites will be analyzed for evidence of trends and for effects of particular management activities. These data may trigger more intensive research to determine causality.

Status as of Nov. 30, 2016:
The principal investigator participated in several meetings and discussions with MN Zoo partners, workers in Michigan and Manitoba, and USFWS to assess and plan details of captive breeding and reintroduction activities.

Status as of May 31, 2017:
Results of the survey for the targeted species under the M.L. 2014 grant are being incorporated into the respective pages in the revised Rare Species Guide on the DNR public web site.

Status as of Nov. 30, 2017:
The data from 2017 work are in the process of being incorporated into the DNR's publicly accessible databases. We made joint presentations with Zoo staff of this work in a couple of webinar series sponsored by the DNR intended to highlight research work of interest to natural resource professionals and others with an interest in natural history and conservation.

Status as of May 31, 2018:
The 2017 data have been incorporated into the DNR databases. We prepared a comprehensive report on the 2017 field work and distributed copies to all agencies, organizations, and interested private owners whose properties were surveyed (copy attached).

Status as of Nov. 30, 2018:
In July, the project manager along with MN Zoo staff and regional biologists participated in a USFWS led workshop to draft the recovery plan for Dakota skipper.

Status as of May 31, 2019:
In February, the project manager along with MN Zoo staff attended a week-long workshop with partners from Manitoba, Wisconsin, and Michigan to develop recovery plans for the upcoming year for Poweshiek skipperling.

Status as of Nov. 30, 2019:
The project manager, DNR land managers and environmental review staff, TNC managers and biologist, USFWS employees, and MN Zoo staff have been meeting to discuss management coordination and 2019 field survey results for Dakota skipper in Minnesota. These meetings are essential to continued survival of the population at [redacted] and continued reintroduction by the MN Zoo.

Data on Dakota skipper observations from 2019 were submitted to the DNR database and to the USFWS.

Status as of May 31, 2020:
The project manager participated in two meetings in February with partners, each were week-long discussions related to the immediate conservation needs of Poweshiek skipperling, and the long-term USFWS draft recovery planning for Poweshiek skipperling. We made a presentation to a local conservation group regarding the imperiled prairie butterflies. Likewise, the project manager authored a forthcoming article in the Minnesota Conservation Volunteer about insect declines in general, highlighting the prairie butterflies we know are declining.

Final Report Summary Aug. 15, 2020:
The data collected during the duration of the grant period has been entered into the DNR Natural Heritage Information system database. The project manager provided expert opinion at several USFWS led and partnership meetings to discuss and plan conservation actions for the federally listed species. We continue to communicate with local partners such as the MN Zoo, private land owners, and land managers for the locations where the species considered here continue to occur to ensure continued cooperation in conservation actions. The various rare species websites have been updated to reflect the current status of these imperiled butterflies.

During this project, the USFWS consulted project staff in drafting the recovery plans for both federally listed species, the Dakota skipper and the Poweshiek skipperling. Information gained from the surveys conducted through this project were essential in writing the recovery plans. These draft recovery plans were then disseminated for public comment and review.

The project manager in collaboration with the MN Zoo and USFWS developed species identification cards for the imperiled skipper species and their look-a-likes as part of the training sessions. These cards are specific to western Minnesota skippers and are an important tool in the continued survey and conservation of these rare skippers. We continue to receive complements and requests for these identification cards.

VI. PROJECT BUDGET SUMMARY:
A. ENRTF Budget Overview:

Budget Category	$ Amount	Overview Explanation
Personnel:	$ 159,100	DNR entomologist/project coordinator (1 clssfd @ 35% time, salary & benefits, 3 yrs); DNR asst entomologist (1 unclssfd @ 25% time, salary & benefits, 3 yrs; DNR data mgmt specialist (1 unclssfd @ 10% time, salary & benefits, 3 yrs; 1 graphics/Web design specialist (1 clssfd @ 10% time, salary & benefits, 1 yr)
Professional/Technical/Service Contracts:	$ 126,000	Survey & monitoring contracts (experienced butterfly surveyors)
Equipment/Tools/Supplies:	$ 3,156	Data measurement & collection, specimen curation supplies
Capital Expenditures over $5,000:	$	
Fee Title Acquisition:	$	
Easement Acquisition:	$	

Budget Category	$ Amount	Overview Explanation
Professional Services for Acquisition:	$	
Printing:	$	
Travel Expenses in MN:	$ 24,000	Travel to sites, meals, lodging during field work
Other:	$ 16,744	DNR Direct and Necessary*
TOTAL ENRTF BUDGET:	**$ 329,000**	

*Direct and Necessary expenses include both Department Support Services (Human Resources, IT Support, Safety, Financial Support, Communications Support, Planning Support, and Procurement Support) and Division Support Services. Department Support Services are described in the agency Service Level Agreement, and is billed internally to divisions based on rates that have been developed for each area of service. These services are directly related to and necessary for the appropriation. Department leadership services (Commissioner's Office and Regional Directors) are not assessed. Division Support Services include costs associated with Division business offices and clerical support. Those elements of individual projects that put little or no demand on support services such as large single-source contracts, large land acquisitions, and funds that are passed-thru to other entities are not assessed Direct and Necessary costs for those activities.

Explanation of Use of Classified Staff:
The project lead for butterfly monitoring is the Entomologist/Prairie Ecologist for the Minnesota Biological Survey (MBS). Survey work by MBS is currently focused on documenting the butterfly and moth fauna in unsurveyed areas of the state and will be conducted by a seasonal employee. This project is a natural complement to the Survey's normal work. The amount of work for the other classified position, Data Management Specialist, is small—218 hours over three years, or 3% of that position's time—and is expected to have minimal impact on the normal work of that position.

Explanation of Capital Expenditures Greater Than $5,000:
N/A

Number of Full-time Equivalents (FTE) Directly Funded with this ENRTF Appropriation:
2.2

Number of Full-time Equivalents (FTE) Estimated to Be Funded through Contracts with this ENRTF Appropriation:
0.8

B. Other Funds:
No other funds will be used for this part of the project.

VII. PROJECT STRATEGY:
A. Project Partners:
Minnesota Zoo

B. Project Impact and Long-term Strategy:
Two years of extensive mid- and late-summer surveys and one year of late-spring/early-summer surveys carried out by DNR under the current ENRTF grant (M.L. 2014 05j2) have confirmed that Minnesota's prairie-dependent butterflies are in serious trouble. Only one species, the Regal fritillary, appears to be holding its own. Most seriously, the federally endangered Poweshiek skipperling was not detected in any of the surveyed sites, lending further support to the conclusion that it is no longer extant in the state, formerly home to a major proportion of its global population. However, our surveys of the large sites in the far northwest corner of the state, which are only a few miles distant from the southern Manitoba population, the only one known to be extant in the tallgrass prairie region, have not be as extensive or intensive as desired. Further, inspection of new, very high-resolution aerial photography of this area has identified two potential sites that have never been surveyed.

Almost as troubling as the failure to find Poweshiek, the federally threatened Dakota skipper was observed in only one site (same one both years). However, this past summer one individual was photographed in another site by independent observers, in a part of the site not sampled by our transects. This vividly illustrates the difficulty of "proving" absence. Clearly, more extensive survey in this large site is warranted. For similar reasons several other large sites may support butterflies despite our failure so far to detect them. Our failure to find the main target of the early summer survey effort this past season, the first year we could survey during that period, supplemented by failure of an independent survey the previous year to find it in a subset of our sites, indicates that this species may have become as elusive as the previous two, requiring more than two years of effort to clarify its status.

Insect populations in general fluctuate from year to year, often quite dramatically, in response to weather, disease, predation, and other factors. Numbers can be driven too low to detect without extraordinary effort or luck by several years of unfavorable conditions and then quickly rebound with a year or two of favorable conditions. Additionally, accomplishing survey work during the short part of the flight period when numbers are at their peak and when weather conditions are conducive to activity that makes their presence readily detectable is challenging. Hence, a series of several years if really needed for confident determination of status.

The extension of survey effort accomplished with this project will greatly help resolve uncertainties about the status of Minnesota's prairie-dependent butterflies. In doing so, it may provide important clues regarding the cause(s) of their decline. Management of sites where they are found to be present will be modified to minimize risks and perhaps to enhance the quality of the habitat for the butterflies. Confirmation of presence will also trigger legal safeguards for those species that are federally or state listed. Discovery of extant colonies of Poweshiek in Minnesota will enable the Zoo to include Minnesota genotypes in captive rearing for reintroductions in the state. Monitoring of releases will determine whether they are successful, a critical component of this conservation strategy. Monitoring of these releases and of extant populations will contribute to the understanding of the factors that are major drivers in their population dynamics.

Monitoring is a long-term commitment, and this project will continue what has been initiated in the current project as well as possibly expand with additional sites. We intend this project to refine monitoring protocols developed in the current project for long-term employment. We will continue to work on strategies for funding the long-term work.

The observation in 2015 of a Dakota skipper in one of the survey sites by independently active "citizen-scientists" underscores the value of individuals who are in places where these butterflies are possible having the ability to recognize them. The identification workshops will increase the supply of such people, magnifying our capacity to survey (and possibly monitor) these insects. We intend to continue holding such workshops on an annual or biennial basis beyond the life of this grant, as trained persons leave and new, untrained ones arrive.

C. Funding History:

Funding Source and Use of Funds	Funding Timeframe	$ Amount
ENRTF (M.L. 2014 Chp. 226 Sec. 2 Subd. 05j-2): Appropriation of cash funds to support the MN DNR part of the project Imperiled Prairie Butterfly Conservation, Research, and Breeding Program, led by MN Zoo. This (Activity 3) consisted of surveys and initial monitoring of 11 prairie-dependent butterfly species.	FY14-FY16	$245,000
		$
		$

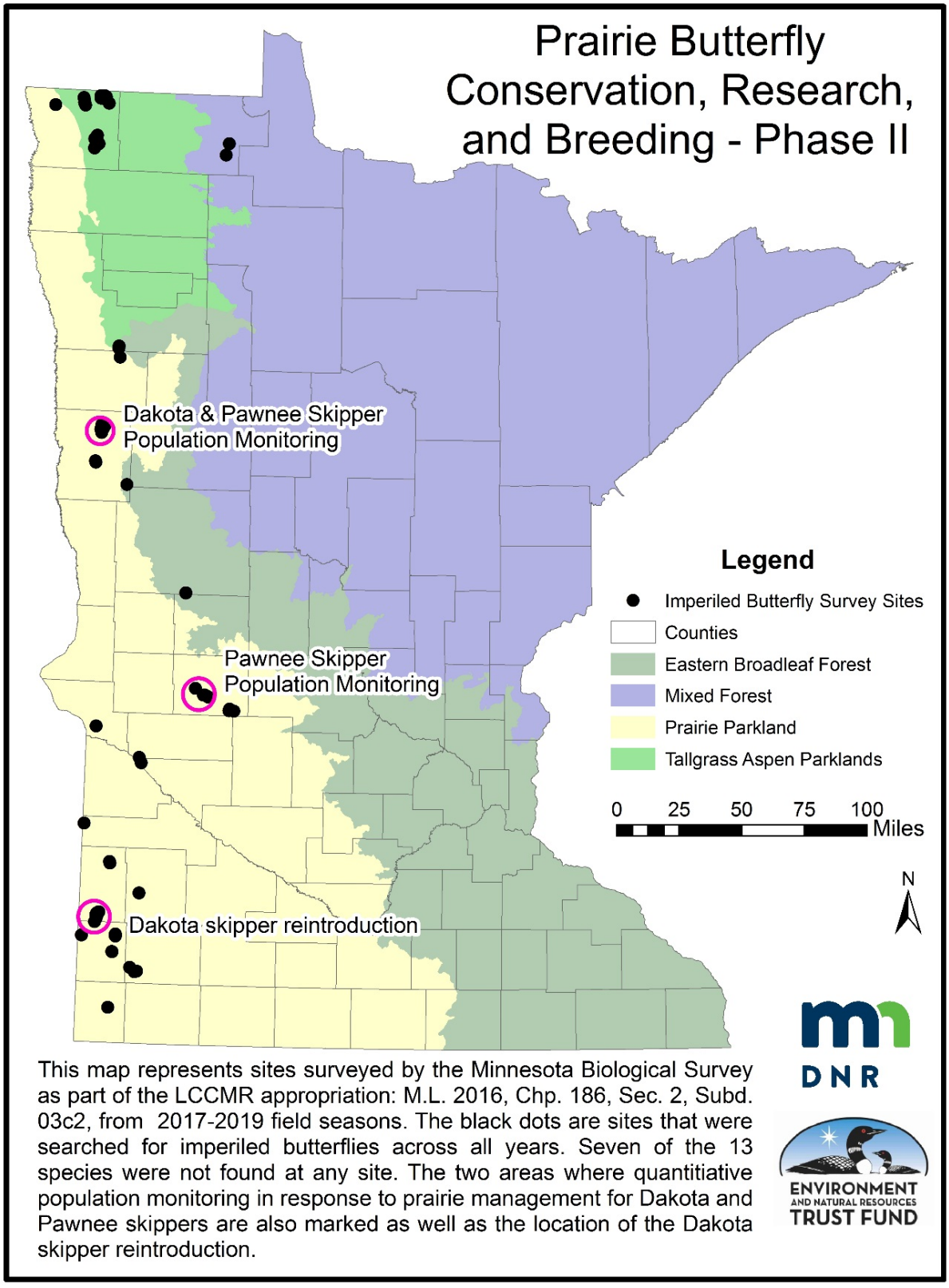
VIII. FEE TITLE ACQUISITION/CONSERVATION EASEMENT/RESTORATION REQUIREMENTS:

No acquisitions or restoration work is included in this part of the project.

IX. VISUAL COMPONENT or MAP(S):
See attached Map of survey sites superimposed on Prairie Plan map.

X. RESEARCH ADDENDUM:
N/A, per communication with LCCMR staff (continuation of project already vetted by peer review)

XI. REPORTING REQUIREMENTS:
Periodic work plan status update reports will be submitted no later than Nov. 30, 2016, May 31, 2017, Nov. 30, 2017, May 31, 2018, Nov. 30, 2018, and May 31, 2019. A final report and associated products will be submitted between June 30 and August 15, 2019.



This map represents sites surveyed by the Minnesota Biological Survey as part of the LCCMR appropriation: M.L. 2016, Chp. 186, Sec. 2, Subd. 03c2, from 2017-2019 field seasons. The black dots are sites that were searched for imperiled butterflies across all years. Seven of the 13 species were not found at any site. The two areas where quantitiative population monitoring in response to prairie management for Dakota and Pawnee skippers are also marked as well as the location of the Dakota skipper reintroduction.

Environment and Natural Resources Trust Fund
M.L. 2016 Final Project Budget

Project Title: Prairie Butterfly Conservation, Research, and Breeding – Phase II
Legal Citation: M.L. 2016, Chp. 186, Sec. 2, Subd. 03c2
Project Manager: Jessica Petersen
Organization: Minnesota Department of Natural Resources
M.L. 2016 ENRTF Appropriation: $ 329,000
Project Length and Completion Date: 4 years, June 30, 2020

ENVIRONMENT AND NATURAL RESOURCES TRUST FUND BUDGET	Activity 3 Budget Revised 8/24/2020	Amount Spent	Activity 3 Balance	Activity 4 Budget Revised 12/11/2019	Amount Spent	Activity 4 Balance	TOTAL BUDGET	TOTAL BALANCE
BUDGET ITEM								
Personnel (Wages and Benefits)	$200,672	$200,672	$0	$8,410	$8,410	$0	$209,082	$0
Project coordinator/Lead entomologist. $98,170 (70% salary, 30% benefits); .35 FTE for 3 yrs								
Entomologist $35,210 (70% salary, 30% benefits); 0.25 FTE for 3 yrs								
Data management specialist $17,000 (70% salary, 30% benefits); 0.1 FTE for 3 yrs								
Graphics/Web design Specialist $8,720 (50% salary, 50% benefits) 0.1 FTE for 1 yr								
Professional/Technical/Service Contracts	$89,509	$89,509	$0		$0		$89,509	$0
TBD (competitive bid); site surveys to detect presence of target butterfly species and quantitative monitoring in selected sites; 3 yrs								
Equipment/Tools/Supplies	$1,103	$1,103	$0		$0		$1,103	$0
field measuring/recording devices etc. (GPS), close-focusing binoculars, cameras, and entomological collecting and specimen curation tools								
Travel expenses in Minnesota	$11,763	$11,763	$0				$11,763	$0
Field work in-state travel and associated expenses								
Meals provided to participants in A4 butterfly ID workshop.FY19				$799	$799	$0	$799	$0
Other	$16,315	$16,315	$0	$429	$429	$0	$16,744	$0
DNR direct and necessary expenses** HR support (~$3,201), Safety support (~$755), Financial support (~$4,371), Communication support (~$1,236), IT support (~$6,147), Planning support (~$829), and Procurement support (~$235) necessary to accomplishing funded programs/projects. (see note below)								
COLUMN TOTAL	**$319,362**	**$319,362**	**$0**	**$9,638**	**$9,638**	**$0**	**$329,000**	**$0**