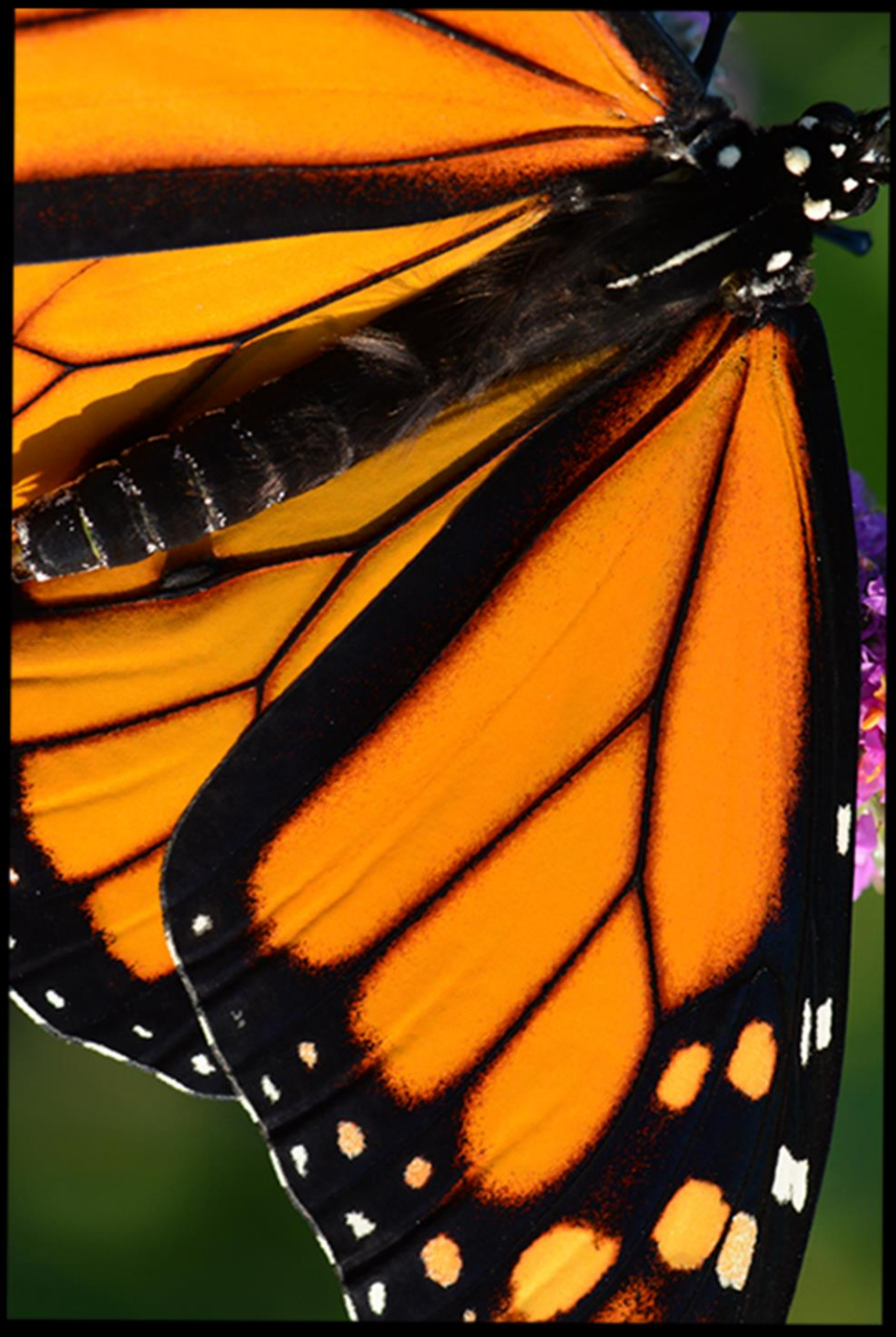

North Dakota Monarch Butterfly and Native Pollinator Strategy

April 2018

North Dakota Monarch Butterfly and Native Pollinator Strategy

First version December 2016
Second version April 2018

A collaborative effort by:

North Dakota Game and Fish Department
North Dakota Department of Agriculture
North Dakota Department of Transportation
North Dakota State University Extension Service
NDSU North Dakota Forest Service
North Dakota Parks and Recreation Department
U.S. Fish and Wildlife Service
USGS Northern Prairie Wildlife Research Center
USDA Forest Service – Dakota Prairie Grasslands
USDA Natural Resources Conservation Service
Pheasants Forever
The Nature Conservancy
North Dakota Grain Growers Association
Other Agricultural Organizations
United Prairie Foundation

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EXECUTIVE SUMMARY

The Monarch Butterfly has received considerable attention in recent years due to a drastic decline in population. Other pollinating insect species, such as honey bees, native bees and butterflies, are also believed to be declining. In 2014, two butterfly species in North Dakota were listed under the Endangered Species Act as threatened or endangered and one bumble bee was listed in March 2017. As of 2016, there are four additional insects in North Dakota, including the Monarch, which have been petitioned to be listed under the Endangered Species Act as well. The U.S. Fish and Wildlife Service is in the process of conducting status reviews in response to the petitions, which may take several years.

This North Dakota Monarch and Native Pollinator Strategy outlines voluntary actions to increase the Monarch population in its summer range and further pollinator conservation in North Dakota. The Strategy will increase our knowledge of the recently listed insects as well as those under review by the U.S. Fish and Wildlife Service and other species that may be petitioned in the future. This strategy will describe the efforts - habitat conservation, education and outreach, and research and monitoring - that have recently been implemented or are proposed to be implemented for Monarchs and other native pollinators in North Dakota. The North Dakota Game and Fish Department and the partners on this strategy will attempt to carry out conservation efforts to sustain these key species on the North Dakota landscape. The partners will agree to provide annual updates through the year 2020 on research or monitoring and report progress on implementation and effectiveness of the conservation actions to demonstrate success of Monarch and native pollinator conservation in North Dakota.

The intent of this Strategy is to preclude the need to list the Monarch and other pollinators as threatened or endangered under the Endangered Species Act. This Strategy will reveal conservation actions, activities or programs in development or currently in effect that will reduce threats or otherwise improve the status of the Monarch and other pollinators in North Dakota.

Monarch Butterfly

BACKGROUND

The Monarch Butterfly (*Danaus plexippus*) population has declined significantly in recent years, from a high of almost 1 billion Monarchs in 1996 to a low of 35 million in 2013. The eastern North American Monarchs migrate to overwintering areas in central Mexico, about 60 miles northwest of Mexico City. Here they form dense clusters on oyamel trees and the number of occupied hectares are measured every winter. One hectare is estimated to contain 50 million butterflies. In the winter of 2015-2016, the Monarch population had rebounded to 4.01 hectares and about 200 million butterflies, but fell to 2.91 hectares in 2016-2017 and 2.48 hectares in 2017-2018. To sustain the population of Monarchs for perpetuity, 6 hectares of occupied winter habitat is needed.

As a result of their decline, the U.S. Fish and Wildlife Service (Service) has received petitions to list the Monarch and several other pollinator species that may occur in North Dakota under the Endangered Species Act (ESA): Regal Fritillary (*Speyeria idalia*), Western Bumble Bee (*Bombus occidentalis*), and Yellow Banded Bumble Bee (*Bombus terricola*). The Dakota Skipper (*Hesperia dacotae*) was listed as threatened and the Poweshiek Skipperling (*Oarisma Poweshiek*) as endangered in November 2014. The Rusty Patched Bumble Bee (*Bombus affinis*) was listed as endangered inMarch 2017, although the species is believed to no longer occur in North Dakota. Additional petitions are expected if actions are not taken to reverse the decline or implement conservation to offset losses to pollinators. Listing a species as threatened or endangered under the ESA may restrict certain actions on private and public lands. Keeping species off the ESA list is the intent of the North Dakota Game and Fish Department's State Wildlife Action Plan (ND SWAP). The cost of protection or restoration of a listed species is often far greater than preventing or stemming the decline in the first place. Furthermore, pollinators are essential for food security and some species hold high public sentiment, such as Monarchs. The loss of these species would be a loss of biodiversity in North Dakota.

The June 20, 2014 Presidential Memorandum – Creating a Federal Strategy to Promote the Health of Honey Bees and Other Pollinators (Memorandum), addressed the severe decline of Monarchs. The Memorandum also highlights the significant loss of other pollinators, including honey bees, native bees, birds, bats and butterflies. Pollinators are essential to food production and contribute to the economy of the United States. Loss of pollinators could have drastic effects on the agricultural industry and the environment. The Memorandum directed a Pollinator Health Task Force to develop a National Strategy to Promote the Health of Honey Bees and Other Pollinators (National Strategy). This Strategy, released on May 19, 2015, addresses actions to achieve the following goals:

- reduce honey bee colony losses during winter to no more than 15% within 10 years
- increase the eastern Monarch population to 225 million butterflies occupying an area of 6 hectares in the overwintering grounds by 2020
- restore or enhance 7 million acres of land for pollinators over the next 5 years

The North Dakota Monarch and Native Pollinator Strategy (Strategy) will use voluntary actions in an attempt to increase the Monarch population and further pollinator conservation. The intent is to preclude listings under the ESA. While Monarchs are the primary focus of this Strategy, recently petitioned species are a secondary focus, and other pollinators that will also benefit are listed in Appendices A-D. In North Dakota, the principal pollinators are insects. Bats and birds other than the Ruby-throated Hummingbird (*Archilochus colubris*) are not thought to be significant pollinators in the state and will not be addressed in this Strategy. Honey Bees will also not be a focus of the Strategy but will certainly benefit from native pollinator conservation actions. The North Dakota Department of Agriculture developed a North Dakota Pollinator Plan to mitigate risks to Honey Bees and production agriculture while reducing Honey Bee exposure to pesticides (Sauter et al. 2016).

LIFE HISTORY

Monarch

The eastern population of Monarchs leave their winter roost in Mexico during the middle of March. They fly north to Texas and other southern states where they mate and females lay eggs on milkweed plants (genus *Asclepias*), usually a single egg per plant. During her life a female will lay 100 to 300 eggs. Eggs hatch in about four days and the Monarch larvae go through five instars as they grow for 10-14 days. The larvae then transform into a chrysalis and the tissues reorganize into a butterfly. After 10-14 days, the adult Monarch emerges. This 1st generation of adults produced from the overwintering Monarchs migrate northward to the Corn Belt states and some into North Dakota. These 1st generation adults complete a life cycle and a 2nd and 3rd generation are produced. Lastly, a 4th generation is produced and these adults (along with some late 3rd generation) enter a state of reproductive diapause and these are the generations that migrate south in September through November to the overwintering sites in central Mexico. North Dakota produces mostly 3rd and 4th generation Monarchs. (See Figure 1.)

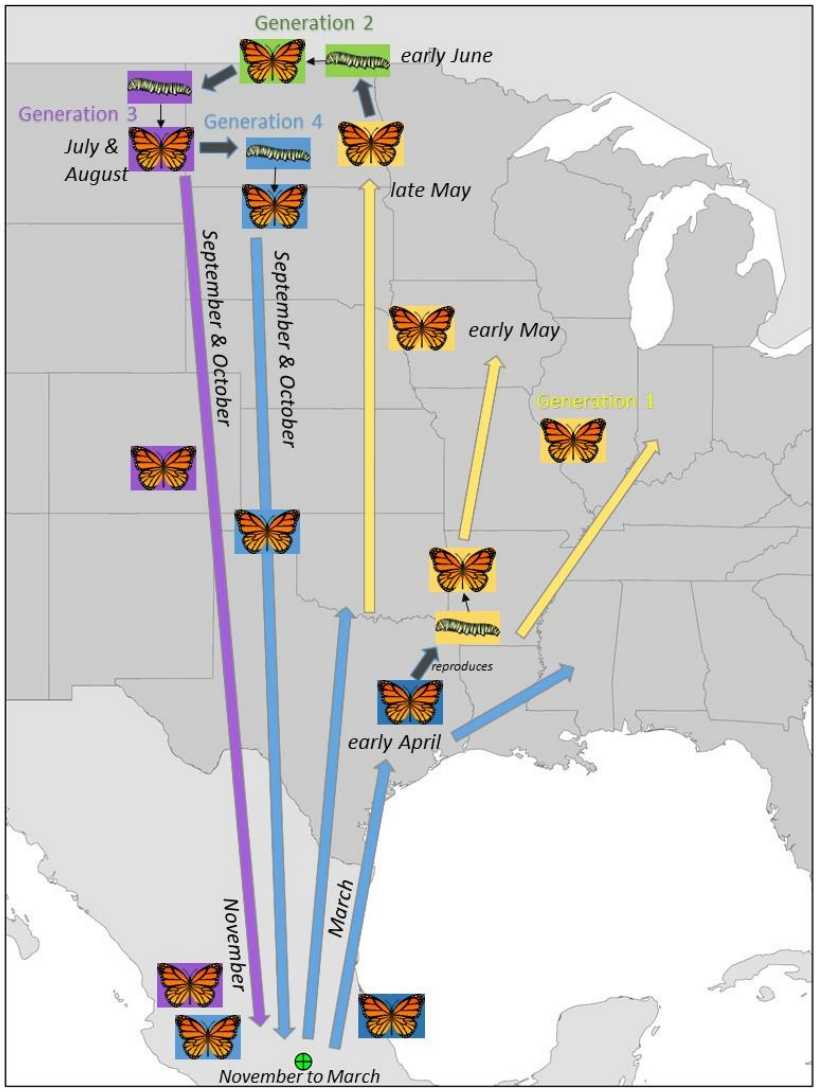


Figure 1. Migration of Monarchs and generations relevant to North Dakota.

Monarch larvae feed exclusively on milkweeds and although there are more than 130 species in North America, they have been recorded using 27 different species (Malcolm and Brower 1989). In North Dakota, there are 11 confirmed species of milkweed and possibly one species that was historically present (see Table 1). Some milkweeds are a more significant food source than others (i.e. Showy Milkweed vs. Green Comet Milkweed). Adult Monarchs feed on a variety of nectar producing plants, especially blazing stars (*Liatris spp.*), wild bergamot (*Monarda fistulosa*), asters (Aster spp.), coneflowers (*Echinacea spp.*), and goldenrods (*Solidago spp.*).


Monarch caterpillar

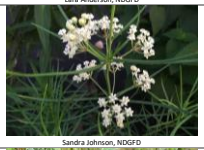
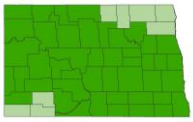
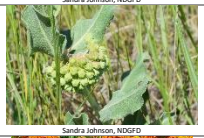
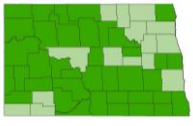
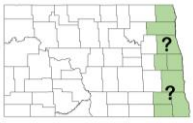
Native Pollinators

By far some of the most efficient and essential pollinators belong to the order Hymenoptera, more specifically the superfamily Apoidea – the bees. There are more than 4,000 bee species in the United States but an unknown number in North Dakota. The Honey Bee (*Apis mellifera*) is the most familiar but is nonnative to North America. Native bees can be placed into one of three broad groups: bumble bees, tunnel-nesting bees, and ground-nesting bees. Bumble bees are large, robust and incredibly effective pollinators. They are more social than the other bees which lead a solitary life. Almost all bees build nests, such as in abandoned rodent holes, hollow stems or holes in trees, or excavate their own burrows or tunnels in logs. The queens stock chambers with pollen and nectar for eggs and growing larvae, which may grow into workers or drones, and males and new queens in late winter.

Other key insect pollinators include members of the order Lepidoptera - butterflies and moths. About 150 species of butterflies have been identified in North Dakota and more than 1,400 moth species (Fauske 2009). Butterflies and moths go through a life cycle similar to the Monarch, with eggs, larvae, pupa, and adult. However, their ecology requirements to complete that life cycle range widely, from requiring expansive native prairie and specific larval food, to some being successful in a backyard garden.

Appendices A-D summarizes the North Dakota bumble bees, other native bees, and butterfly and moth pollinators.

Table 1. Milkweed species native to North Dakota.

Common Name	Scientific Name	Comments	Image	*Range
Swamp Milkweed	*Asclepias incarnata*	Uncommon, scattered occurrence in wetlands, wet meadows, moist prairies or roadsides.	 Sandra Johnson, NDGFD	
Wooly Milkweed	*Asclepias lanuginosa*	Rare, found in dry or gravelly hillside prairies.		
Oval-leaf Milkweed	*Asclepias ovalifolia*	Uncommon, found in riverbanks, open woods, or roadside ditches.	 Sandra Johnson, NDGFD	
Plains Milkweed	*Asclepias pumila*	Uncommon, found in dry prairies or grassland.		
Purple Milkweed	*Asclepias purpurascens*	Rare, found in prairie edges near wooded areas, oak savannah, or meadows in woodland.	 Alan Cressler, photo courtesy of Lady Bird Johnson Wildflower Center	
Showy Milkweed	*Asclepias speciosa*	Common, found in moist to well-drained soils in prairie, roadsides, fields, or open woodland.	 Lara Anderson, NDGF	
Slimleaf Milkweed	*Asclepias stenophylla*	Rare, found in dry, rocky prairies.	 Janice Lynn, photo courtesy of Lady Bird Johnson Wildflower Center	
Prairie Milkweed	*Asclepias sullivantii*	Rare, found in high quality tallgrass prairie.	 Sally and Andy Wasowski, photo courtesy of Lady Bird Johnson Wildflower Center	
Common Milkweed	*Asclepias syriaca*	Common, found in well-drained soils in prairie, roadsides, or fields.	 Lara Anderson, NDGFD	
Whorled Milkweed	*Asclepias verticillata*	Common, found in ditches and roadsides, prairies or open woods.	 Sandra Johnson, NDGFD	
Green Comet Milkweed	*Asclepias viridiflora*	Uncommon, found in dry to moist well-drained soils in prairies, roadsides or open woods.	 Sandra Johnson, NDGFD	
Butterfly Weed	*Asclepias tuberosa*	Unknown, no records in ND but may have occurred in tallgrass prairie.	 Sandra Johnson, NDGFD	

Range Maps: dark green = confirmed; light green = may be present

* Range maps based on Kartesz, J.T., The Biota of North America Program (BONAP). 2015. North American Plant Atlas. (http://bonap.net/napa). Chapel Hill, N.C.; and Shipunov, A. Flora of North Dakota: Checklist. 2012—onwards. (http://ashipunov.info/shipunov/fnddb/index.htm).

HABITAT CONSERVATION

Public Land

North Dakota is approximately 45 million acres in size but less than 3 million acres are owned in fee title by state or federal land management agencies. The National Strategy has directed Federal agencies to increase and improve pollinator habitat at facilities and land managed by the Federal government. In North Dakota, a considerable amount of federal and state land is native prairie, essential habitat for supporting numerous pollinators that are only found in expanses of grassland. Defoliation tools such as burning and grazing are utilized to maintain nectar and larval sources on native prairie. Several agencies such as the North Dakota Parks and Recreation Department and North Dakota Game and Fish Department (NDGFD) have voluntarily implemented native grass and wildflower plantings in recent years. Opportunity exists to expand and refine pollinator plantings on state and federal land but defoliation or other management techniques may be needed to maintain the vegetation. The attachments contain specific plans and tools that state, federal and other partner agencies will use in North Dakota to sustain Monarchs and other native pollinators.

Private Land

The vast majority of the land in North Dakota is held in private ownership. Creating habitat for pollinators in combination with agriculture production or even home gardens may increase plant yields. Pollinator strips along waterways will assist with water infiltration and may help prevent flooding. The U.S. Department of Agriculture's Natural Resource Conservation Service (NRCS) provides technical and financial assistance for pollinator habitat to private landowners and other partners. The NDGFD also works through its Private Lands Programs to provide interested landowners cost-share assistance for wildlife habitat projects. There is also considerable opportunity for homeowners, both within cities and rural landscapes, to create Monarch and pollinator gardens in their backyard. The North Dakota State University Extension Service is initiating native plant demonstration gardens and expanding its outreach services to encourage gardeners to plant a pollinator garden. (See Attachments).

Public and Private Sectors

There is potential for public sectors of government to modify practices that will sustain pollinator habitat, such as revisions to the mowing schedule of certain highway right-of-ways (ROW) or using native grasses and wildflowers in reclamation. However, haying and mowing of ROW provides a much needed source of hay for domestic animals and safety of the driving public. The North Dakota Department of Transportation is collaborating with partners to implement actions to benefit pollinator species where feasible with haying for agriculture purposes. Local sectors could develop a similar approach and identify specific areas to manage for the benefit of pollinators while balancing the needs of the public.

There are many ways that private sectors could help with pollinator conservation or offset losses of Monarch and native pollinator habitat due to development activities. Urban and suburban landscapes could reduce maintenance costs and beautify the landscape by replacing mown turfs with native plantings. Private business can even save energy and money by converting lawns to landscaping of native grasses and wildflowers that are easier to maintain and friendlier for the environment. Industry could incorporate pollinator plantings in pipeline corridors, reclamation areas, or even at their office campuses to contribute to pollinator conservation and promote environmental sustainability.

Monarch and Native Pollinator Best Management Practices

The following are voluntary recommendations for all parties when implementing conservation efforts for Monarchs and native pollinators in North Dakota.

- Consider the full life cycle needs by including both native larval host plants and adult nectar plants.
- Although native plants are preferred, select introduced grasses or cover crops may be supplemented to help with weed control during establishment.
- Use a mix of early, mid, and late blooming species to provide nectar sources season-long (see http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs141p2_001542.pdf)
- Examine the site beforehand for existing pollinator habitat. Recognize that features may already exist and do not need to be changed, such as native prairie.
- Leave dead trees or logs, or add them to the site for nesting bees. Drill holes in the logs.
- Use local or regional seed sources.
- Follow state and county weed laws. Common milkweed is not a state noxious weed, but it is considered a county noxious weed in a handful of North Dakota counties. See http://www.nd.gov/ndda/program/noxious-weeds
- Reduce or eliminate pesticide use. If control is needed, choose less harmful insecticides and apply pesticides selectively.
- Mowing or haying can be detrimental to insects if applied at the incorrect time. Develop a voluntary plan specific to the insects of interest to minimize impacts to plant growth. For example, for Monarchs, mowing could occur before May 15, during window of July 5-10, or after September 20. Mowing can be beneficial to milkweed if it occurs early in summer, to stimulate new growth which Monarch caterpillars prefer. Limit mowing to no more than twice per year and avoid mowing the entire habitat. Be cognizant of other wildlife when mowing, such as birds for which the primary nesting season runs from April 15 - August 1.

Considerations for Native Grass and Wildflower Plantings

Pollinator plantings should use a local seed source so the plants are adapted to the Northern Great Plains climate. Currently, there are few commercial growers of native plants in North Dakota. Also, the plant varieties are rather limited. Finding local seed source for the milkweed species listed in Table 1 may be difficult. Commercial growers and the USDA NRCS Plant Materials Center in Bismarck could work to develop native milkweed seed sources and other key pollinator plants.

Home Butterfly Garden

EDUCATION AND OUTREACH

Perhaps the most critical tool for conserving Monarchs and native pollinators is education. The public may be unaware of the full life cycle needs of Monarchs and other native insect pollinators. For example, many people do not realize that milkweed plants are the only plants that Monarch larva consume. Monarchs will cease to exist without milkweed. The NDGFD and its partners will work to broaden public awareness of the plight of these species and provide technical support and opportunities for conservation.

The following are some of the potential education and outreach actions.

- Evaluate current informational products and determine if they should be modified or new products developed specific to North Dakota.
- Partners, particularly the NDGFD and the North Dakota State University Extension Service, will use communication tools (e.g. website, television, news releases, social media) to inform the public and provide instructional pollinator habitat products.
- Schedule education and outreach events with the Pollinator Week as proclaimed by the Governor of the State of North Dakota.
- Produce an interactive map of North Dakota demonstration gardens, pollinator interpretive sites, and other public Monarch/pollinator gardens.
- Provide Monarch and pollinator educational products for teachers and schools.

There are numerous ventures and informational products for developing pollinator habitat or enhancing management:

- Monarch Joint Venture http://www.Monarchjointventure.org/
    - "The Monarch Joint Venture is a partnership of federal and state agencies, non-governmental organizations, and academic programs that are working together to support and coordinate efforts to protect the Monarch migration across the lower 48 states."
    - Provide numerous free resources such as Gardening for Monarchs, Rearing Monarchs Responsibly, or Schoolyard Butterfly Gardens.
    - 2016 Monarch Conservation Implementation Plan will help facilitate cooperation and coordination to achieve Monarch conservation goals http://Monarchjointventure.org/images/uploads/documents/2016_Monarch_Conservation_Implementation_Plan.pdf
- Pollinator Partnership http://www.pollinator.org/
    - A non-profit 501(c)3 organization dedicated to the protection and promotion of pollinators and their ecosystems.
    - Gardening and planting guides, pollinator learning center.
- Million Pollinator Garden Challenge http://millionpollinatorgardens.org/
    - The National Pollinator Garden Network is a collaboration of national, regional, and local gardening clubs to create more pollinator habitat.
- National Wildlife Federation Garden for Wildlife http://www.nwf.org/Home/How-to-Help/Garden-for-Wildlife.aspx
    - Community, schoolyard, landscapers and gardening tips.
- Xerces Society http://www.xerces.org/
    - Many resources including books, fact sheets, identification guides, reducing harm to pollinators from pesticides.
- North Dakota State University Extension Service http://www.ag.ndsu.edu/extension
    - Resources include demonstration gardens and publications on designing gardens for butterflies and pollinators.

- U.S. Fish and Wildlife Service Save the Monarch Butterfly http://www.fws.gov/savetheMonarch/
    - Funding, Monarch projects, and Monarch conservation.
- U.S. Fish and Wildlife Service Pollinators http://www.fws.gov/pollinators/
    - Podcasts and videos, pollinator gardens and trails, and more.
- U.S. Fish and Wildlife Service Prairies Conservation Campaign http://www.fws.gov/prairiesconservation/
    - Initiative to conserve working landscapes in the Prairie Pothole Region.
- U.S. Department of Transportation Federal Highway Administration Ecosystem and Vegetation Management – Pollinators
  https://www.environment.fhwa.dot.gov/ecosystems/vegmgmt_pollinators.asp
    - Guidance for state and local transportation to create or increase pollinator habitat of highway roadsides, and best management practices for pollinator-friendly roadside vegetation management.
- U.S. Department of Agriculture Natural Resources Conservation Service
  http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/plantsanimals/pollinate/
    - Financial and technical support for pollinators on farms, ranch, or backyard.
    - North Dakota Pollinators Fact Sheet
      http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs141p2_001542.pdf
- U.S. Department of Agriculture Forest Service Celebrating Wildflowers http://www.fs.fed.us/wildflowers/
    - Forest Service botanists and other specialists provide information on wildflowers on national forests and grasslands and the values of native plants.

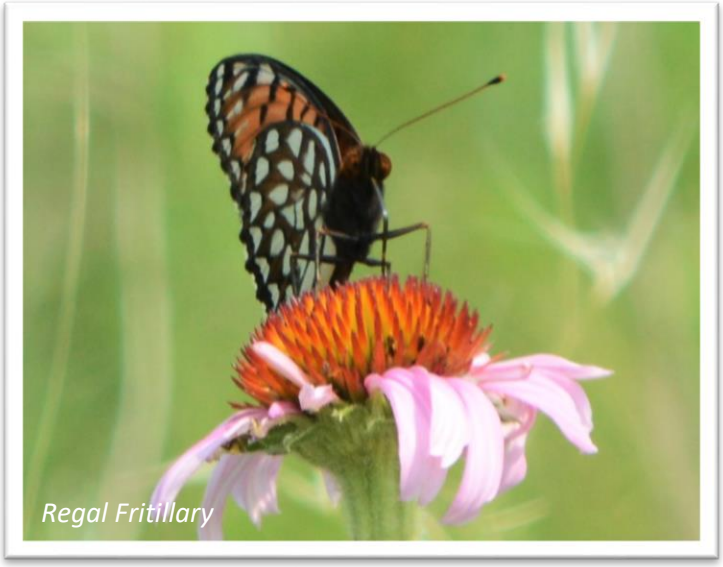
RESEARCH AND MONITORING

Relatively little effort has been expended in North Dakota with respect to researching or monitoring insect species. Surveys which have been conducted were typically at local scales and often on public land, such as at a National Wildlife Refuge. Furthermore, there are few entomologists or even hobbyists in North Dakota that are able to identify the copious numbers of insect species. As the interest in pollinators increases, so has the interest in researchers to become familiar with insects species. The NDGFD and many of the partners on this Strategy are working together to expand our knowledge base of native pollinators.

- Develop a strategy to complete a comprehensive statewide survey for key pollinator species to further define presence/absence.
- Evaluate gaps in our knowledge of pollinators and species that historically occurred in North Dakota.
- Identify key habitat and priority areas for pollinators.
- Monitor the effectiveness of created pollinator habitat.
- Document plant-pollinator interactions in the Pollinator Library http://www.npwrc.usgs.gov/pollinator/

Using citizen science will engage the public and advance knowledge of pollinator ecology, especially with Monarchs.

- Monarch Larva Monitoring Project – monitor larval Monarch populations and milkweed habitat http://mlmp.org/
- Monarch Watch Tagging –tags for adult Monarchs http://www.Monarchwatch.org/tagmig/tag.htm
- Journey North – track the Monarch migration each spring and fall http://www.learner.org/jnorth/Monarch/
- Project Monarch Health – Tracks the spread of a common monarch parasite http://monarchparasites.uga.edu/monarchhealth/index.html
- Butterflies and Moths of North America – collect and share Lepidoptera sightings http://www.butterfliesandmoths.org/get-involved
- Bumble Bee Watch – submit photographs of bumble bees for experts to identify them http://www.bumblebeewatch.org/



Regal Fritillary

PARTNERS

The partners of this Strategy will commit to implementing conservation efforts identified in the attachments to sustain Monarchs and other native pollinators on the landscape. The partners will agree to provide annual updates on research or monitoring and report progress on implementation and effectiveness of the conservation actions. This strategy will be a "living document" for the next 5 years, or until the year 2020, to implement conservation efforts and demonstrate success. It is recommended the updates are summarized in time to coincide with the Governor of the State of North Dakota proclaimed pollinator week in June of each year.

Key Partner Meetings and Workshops:

Monarch Butterfly Conservation Planning Update/Partner Meeting 2017
The North Dakota Game and Fish Department hosted a meeting on the status of Monarch Butterfly conservation planning on November 2, 2017 from 10:00 AM to noon, at the NDGFD Bismarck headquarters. More than 30 participated from 17 state and federal agencies, universities, and conservation organizations.
The following was discussed:

- An update on the Mid-America Monarch Conservation Strategy being led by the Midwest Association of Fish & Wildlife Agencies http://www.mafwa.org/?page_id=2347
    - Milkweed stem and acreage goals.
- Annual update to the ND Monarch Butterfly and Native Pollinator Strategy https://gf.nd.gov/wildlife/pollinators
- Partner updates
- Group discussion and feedback on conservation efforts for Monarchs in North Dakota.

ND Chapter of the Wildlife Society Workshop/Training on Pollinators in Peril: How can we help our Native Species
February 6, 2018, 9AM-5PM, Baymont Inn, Mandan ND
Sponsored by the ND Chapter of The Wildlife Society (NDCTWS), this workshop provided participants a background and training on pollinator biology, current research, short and long term management priorities, ESA concerns, and a rancher's perspective on how livestock management can positively affect pollinators. More than 200 participated in the workshop from numerous state and federal agencies, universities, agricultural groups, consultants, students, etc.

REFERENCES

Fauske, G. M. 04/14/2009. Moths of North Dakota: an online identification guide. Available at http://www.ndsu.nodak.edu/ndsu/ndmoths/ Accessed on May 25, 2016.

Malcolm, S.B., and L.P. Brower. 1989. Evolutionary and ecological implications of cardenolide sequestration in the monarch butterfly. Experientia 45: 284-295.

Sauter, J., S. Brunner and C. Larson. February 2016. North Dakota Pollinator Plan – A North Dakota Department of Agriculture Publication. https://www.nd.gov/ndda/files/resource/ND%20Pollinator%20Plan%202016.pdf

ATTACHMENTS

ATTACHMENT A. North Dakota Game and Fish Department

The North Dakota Game and Fish Department's mission is to "protect, conserve and enhance fish and wildlife populations and their habitat for sustained public consumptive and nonconsumptive use." The NDGFD Conservation Section provides technical input and guidance for energy, water, roads and bridges, and public land related projects, and includes the nongame wildlife program, threatened and endangered species, and directs the State Wildlife Action Plan. The Communication and Education Sections disseminate information to the public or perform education and outreach activities. The NDGFD Wildlife Division oversees management of Wildlife Management Areas (WMAs) and the Private Land Initiative.

HABITAT CONSERVATION

Public Land

The NDGFD owns or manages approximately 210,000 acres of land in the state. The land is managed primarily for game species but pollinators have benefited from practices such as establishing or reseeding land to native forbs and grasses. High diversity pollinator plantings are being implemented on a smaller scale (i.e. 1-5 acre plots). Also, some WMAs contain a considerable amount of native prairie and wildlife managers are implementing practices such as grazing which will invigorate native plants.

2016 - 2018 Public Land Conservation Efforts

- Pollinator plot established at NDGFD Conservation and Outdoor Skills Area in Bismarck.
- Pollinator plot established on Beulah Mine WMA
- Kids Pollinator Day on North Beulah Mine WMA, hosted by Knife River Pheasants Forever Chapter Beulah/Hazen, May 18, 2017.
- Grazing systems are being implemented on several WMAs.
- Provided State Wildlife Grant funding for tallgrass prairie restoration https://gf.nd.gov/wildlife/swg/project/t-37-r
- Pollinator plot established at NDGFD Conservation and Outdoor Skills Area in Minot on the state fairgrounds.
- Pollinator garden established at NDGFD entrance to main office in Bismarck.
- Contributing partner on National Fish and Wildlife Foundation Monarch Butterfly Conservation Fund project to restore 200 acres of agricultural lands to a diverse stand of native prairie vegetation on Tewaukon National Wildlife Refuge and WPAs.
- Supporting partner on several other grant proposals.

Private Land

The NDGFD Private Land Initiative (PLI) and the Private Land Open to Sportsmen (PLOTS) program provides cost-share and technical assistance for enhancing and developing wildlife habitat. The PLI staff deliver programs for grass/pollinator plantings and provide cost-share for new or existing Conservation Reserve Program (CRP) contracts.

2016 -2018 Private Land Conservation Efforts

- 20,000 acre CREP initiated in all southwest ND counties, as well as Burleigh and Emmons counties. 5,000 acres of pollinator plantings (CP42) are planned as part of the proposal. Approximately 47 acres planted in 2017.
- Approximately 1,000 acres of grass plantings were seeded in 2016 on various PLOTS tracts.
- Approximately 824 acres of grass/forb plantings seeded in 2017 on various PLOTS tracts.
- Cost share on CRP contracts (various signups and contracts, not all include pollinator plantings, but many include diverse mixes of native grasses and forbs.
- Supporting partner in the ND Department of Agriculture's Outdoor Heritage Fund (OHF) grant for a state Waterbank program. Producers are encouraged to plant pollinators, NDGFD provides additional cost share. Program was rolled out in spring 2016, NDDA is currently ranking offers.

- Continued support on a 40,000 acre CRP SAFE proposal for declining grassland birds. This SAFE project includes native grass/forb species to be planted which will provide pollinator habitat.
- Approximately 1,084 acres enrolled in 2017.
- Continued support of Pheasants Forever OHF grant – ND Pollinator Partnership where PF is cost sharing on diverse cover for new Wetland Reserve Program (WRP) contracts and upgrading cover on existing WRP contracts, located within 2 miles of active apiaries, which are also enrolled in PLOTS.
- Continued support for the North Dakota Natural Resources Trust Working Grasslands Program, which will provide cost share for grass/forbs and infrastructure, such as fencing and water, on expired CRP and declining grassland bird SAFE acres.
- Coordination with PLI field staff and local Pheasants Forever chapters interested in pollinator projects. (Primarily youth pollinator planting projects)
- Provided support for Pheasants Forever Honey Bee CRP SAFE proposal for 20,000 acres. Partnership with ND Beekeepers Association. (SAFE project is still pending USDA approval)
- Provided support to Pheasants Forever Precision Agriculture program for Best Management Practices. 12.7 acre pasture/hayland planting in 2017.
- Provided support for United Prairie Foundation's Outdoor Heritage Fund Prairie Project. 168 acres planted in 2017.
- For 2018, approximately 2,400 acres of grass/forb plantings are currently planned on various PLOTS tracts. Additional projects will likely be added.

EDUCATION AND OUTREACH

The NDGFD will use tools such as television, radio, magazine, and website to disseminate pollinator information.

2016-2018 Education and Outreach Efforts

- Outdoors Video News story: Pollinator Plots https://www.youtube.com/watch?v=3mClxp58Ido
- Outdoors Video News story: Monarch Monitoring https://www.youtube.com/watch?v=p_s-7LK6Kbg
- Outdoors Video News story: Bee Study https://www.youtube.com/watch?v=WjUOaPu1xEI
- Outdoor Video Webcast: Pollinators https://www.youtube.com/watch?v=JcjSqpHKDsY&list=PLU0hJKfkDFYBtgA5IpJNKZ85SJSR0WpVF&index=8&t=0s
- Pollinator display at the Conservation and Outdoor Skills Park at the ND State Fair.
- Developed a webpage on NDGFD website for pollinators. https://gf.nd.gov/wildlife/pollinators
- The NDGFD is in the process of developing informational pollinator publications such as brochures or posters.
- Pollinator display at NDGFD booth at Northern Corn and Soybean Expo February 13, 2018.
- In 2018, several schools will participate in the Urban Pollinator Program (UPP). The NDGFD developed curriculum and materials to start growing native plants in the classroom for planting at a site on school grounds.

RESEARCH AND MONITORING

The NDGFD has provided State Wildlife Grant funding and Cooperative Endangered Species Conservation Fund (i.e. Section 6 funding) for invertebrate research and monitoring in North Dakota. The NDGFD is working with partners to establish a statewide survey for key pollinator invertebrates.

Recently Completed Research

- Distribution of grassland insects in Eastern North Dakota. http://gf.nd.gov/wildlife/programs-grants/swg/nd-swg-projects/t-33-r
- Species distribution modelling of rare insect species in North Dakota, PI Dr. Brett Goodwin, University of North Dakota. https://gf.nd.gov/node/976

Ongoing Research and Monitoring

- Influence of land-use practices on site occupancy of Dakota Skippers and other prairie dependent butterflies, PI Dr. Ryan Limb, North Dakota State University, estimated completion 2018.
- Enhancing floral resources for high conservation priority pollinators, Dr. Torre Hovick, North Dakota State University, estimated completion 2020.
- Funding partner for statewide project “Monitoring Native Pollinators in North Dakota”, PI Dr. Ryan Limb and Dr. Torre Hovick, North Dakota State University. Project dates October 2016 – April 2021. The over-arching goal is to improve knowledge and understanding of native pollinator populations in the state of North Dakota. This includes knowledge of distribution, diversity, and abundance as well as the factors that may affect these community and population metrics.

ATTACHMENT B. North Dakota Department of Agriculture

The North Dakota Department of Agriculture's mission is to foster the long-term well-being of North Dakota by promoting a healthy economic, environmental and social climate for agriculture and the rural community through leadership, advocacy, education, regulation and other services. The North Dakota Department of Agriculture (NDDA) has seven divisions that operate many programs including pesticide registration and enforcement, an apiary registration and enforcement program and the North Dakota waterbank program. These programs are working on projects that will benefit pollinators including monarch butterflies as well as agricultural producers in North Dakota.

NORTH DAKOTA POLLINATOR PLAN

Under the leadership of Commissioner Goehring, the pesticide program and the apiary program created a pollinator plan to address issues in regards to pollinators and pesticide use in North Dakota. The plan contains best management practices (BMPs) designed to mitigate risk to honey bees, while minimizing the impact of that mitigation on production agriculture. Although the plan was developed with honey bees in mind, many aspects of the plan benefit native pollinators such as monarchs. The plan was developed using input from open meetings and comments and contains the perspective of many individuals from all affected entities.

Landowner/Grower BMPs

- **Agronomists should consider pollinator impacts when making pesticide recommendations.** Ensure that agronomists and crop consultants consider pollinator issues when making pesticide recommendations, including product choices and pesticide timing decisions.
- **Plant bee forage.** Plant flowering plants, trees, and shrubs to improve bee forage, especially in non-farmable or non-crop areas. Doing so provides forage and it may also concentrate bees away from fields to be treated with pesticides, thereby minimizing impacts to pollinators.
    - Many pesticide labels require untreated **vegetative buffer strips** around sensitive sites. Plant flowering plants in those buffer strips to provide additional bee forage.
    - If planting **cover crops**, add flowering plants into the mix. Even a small percentage of flowering plants can provide a considerable amount of forage for pollinators.
- **Utilize alternatives to talc/graphite in planters.** When planting seeds treated with insecticides, utilize alternatives to talc/graphite as they become available. The talc and graphite can abrade the insecticide treatment off of the seeds, thereby creating insecticide- containing dust that can drift onto hives and flowering plants.

Pesticide User BMPs

- **Use Integrated Pest Management (IPM).** Utilize economic thresholds and integrated pest management (IPM) to determine if insecticides are required to manage pests. When insecticides are required, try to choose insecticides with low toxicity to bees, short residual toxicity, or repellent properties towards bees.
- **Use registered pesticides according to the label.** Pesticide label language is developed to ensure that pesticides will not pose a risk of unreasonable adverse effects to human health or the environment. Failure to comply with the label not only puts humans and the environment at risk, it is also illegal. Many pesticides, especially insecticides, have use restrictions prohibiting applications when bees are foraging in the treatment area. Some labels prohibit applications when crops are blooming and require that the applicator notify beekeepers in the area prior to application. Always comply with these and other label restrictions to reduce risks. Applicators are bound by all directions, precautions, and restrictions on pesticide labeling, even when following other BMPs. Contact the NDDA with any questions on pesticide label language.
- **When possible, apply pesticides early morning or in the evening.** Pollinators are most active during daylight hours and when the temperature is over 55 degrees Fahrenheit. Apply pesticides early in the morning or in the evening when bees are less active to reduce the chances that bees will be foraging in or near the treatment site.
    - Be cognizant of temperature restrictions on pesticides. The efficacy of some pesticides is reduced at certain temperatures.

    - Be aware of temperature inversions when choosing the best time for applications.
- **Avoid drift.** Pesticide drift involves the off-site movement of pesticides through the air from the treatment site to adjacent areas, either in the form of mist, particles, or vapor. Drift reduces the effectiveness of the chemical applied since only part of the applied amount reaches the target. Drifting chemicals also pose a risk to non-target organisms that come in contact with the off-target residues. These insecticides can negatively affect bees and other beneficial insects by direct contact or by contaminating their forage and habitat. Drifting herbicides have the potential to further reduce quality forage available to pollinators. Contact NDSU Extension Service for more information on how to reduce pesticide drift.
- **Choose products with lower risk to bees.** Avoid dusts and wettable powder insecticide formulations. Dust and wettable powder pesticide formulations can leave a powdery residue which sticks to hairs on bees. Bees then bring the pesticide back to the hive and potentially expose the entire hive to the pesticide for an unknown amount of time. Granular and liquid formulations are safer for pollinators since granules are not typically picked up by bees, and liquids dry onto plant surfaces. Also choose products with lower residual toxicity to bees.

NORTH DAKOTA WATERBANK PROGRAM

The North Dakota Waterbank Program is a unique program which was developed by the NDDA and the North Dakota Game and Fish Department. The program was made available through a grant from the Outdoor Heritage Fund and the goal is to provide technical assistance and financial relief to those with inundated agricultural lands, as well as keep present water bodies intact to benefit wildlife, pollinators, and sportsmen of North Dakota. To be eligible landowners must meet multiple criteria including:

- Total acres enrolled can range from 10 to 160 acres; total acreage of adjacent land must be at least equal to qualifying wetland acreage but may not exceed four times the acreage of the wetlands.
- Landowners enter into agreements with the NDDA for 5 or 10 year periods.
- Payment rates will be as follows:
    - $20/acre/year for wetland acres
    - $40/acre/year for enrolled seeded upland acres (grass or pollinator mix)
    - $2/acre/year for enrolled public access acres (not compensated by other programs)

NDDA will also offer cost-sharing rates of up to $40.00/acre seed cost, towards a perennial pollinator mixture for upland seeding projects incorporated in this program.
Priority will be given to applicants with upland acres enrolled to be seeded to pollinator habitat mix.

FEDERAL ENVIRONMENTAL LAW IMPACT REVIEW COMMITTEE

In 2015, the North Dakota legislature passed House Bill 1432 which created a committee titled the Federal Environmental Law Impact Review Committee (FELIRC) that is chaired by the North Dakota Agriculture Commissioner. The bill appropriated $1.5 million to review pending federal actions that may detrimentally impact the North Dakota agriculture, energy, and oil sectors. One focus of the committee is the Endangered Species Act (ESA) as several species including monarch butterflies, have recently been petitioned for listing. Many species petitioned have little or no population, distribution, or habitat data in North Dakota and the committee is pursuing studies to decrease data gaps and ensure listing decisions are based on quality science. In 2016, the committee approved a comprehensive native pollinator study that surveys three sites in every county in North Dakota, two times per year, for five years. Field work for the study began in the spring of 2017. Goals of the study are to determine abundance and diversity of native bumblebees and butterflies across North Dakota; identify the relationship between land use practices, plant species, and native invertebrate species composition; and identify land management strategies to promote native invertebrate populations.

ATTACHMENT C. North Dakota Department of Transportation

The North Dakota Department of Transportation's (NDDOT) mission is to safely move people and goods. Through the National Environmental Policy Act (NEPA), the Office of Project Development of the NDDOT works closely with the Federal Highway Administration to ensure that transportation projects take into account the natural and human environments. The NDDOT has taken the initiative in 2016 to collaborate with agency partners to determine and prioritize projects that can have pollinator species incorporated or managed. These areas include: right of way (ROW) within widely separated divided highways as well as ROW adjacent to Wildlife Management Areas, Federal lands, state school lands, and native prairie. Limitations to pollinator establishment and management within NDDOT ROW include allowing for the continuation of haying the ROW for agriculture purposes.

2016 CONSERVATION EFFORTS

- N.D Highway 1804 Reconstruction - Pollinator species incorporated into seed mix for a roadway project on N.D Highway 1804, adjacent to U.S. Army of Corps of Engineers property with adjoining areas of native prairie.
- I-94 Reconstruction Project – Pollinator species incorporated into seed mix design for a project in western North Dakota, adjacent to U.S. Forest Service property containing native prairie.
- Crystal Springs Rest Area – Pollinator species incorporated into seed mix for drain field.
- Incorporate pollinator species into upland seed mixes for future wetland mitigation sites. Two sites identified so far:
    - Koenig Wetland Mitigation Site- Pollinator seed mix will be incorporated into upland seed mix for this wetland mitigation site in Stutsman County, North Dakota.
    - Kueber Wetland Mitigation Site – Pollinator species incorporated into the upland seed mix for this wetland mitigation site in Nelson County, North Dakota.

2018 CONSERVATION EFFORTS

- Hebron Rest Area Removal. The Hebron rest area ramps, pavement, sidewalk, and curb and gutter will be removed as part of an Interstate 94 construction project. The ditches will be cut and the rest of the embankment would be reshaped and kept in place, or used as borrow for the other portions of the I-94 project. Vegetation will need to reestablished on approximately 2.8 acres. The seed mix will include 2-3 flowering species from 3 different blooming periods (early, middle, and late). Reclamation of the Hebron rest area will be an economical and feasible opportunity to promote the North Dakota Monarch and Native Pollinator Strategy.

FUTURE GOALS

- Plant pollinator species at rest area locations to provide benefits to pollinators as well as increase the attractiveness of rest areas for the traveling public.
- Collaborate with NDDOT Districts and Maintenance staff on the mowing policy to facilitate pollinator establishment/management.
- Identify remnant habitats in ROW and prioritize roadside vegetation management practices in those areas to maintain and expand natural vegetation including site reclamation activities for both roadway projects and borrow area locations.
- Promote pollinator establishment with counties and municipalities in rural and urban plantings.
- As threat of listing several pollinator species under the Endangered Species Act continues; develop a more formal, long term pollinator plan for the NDDOT.

ATTACHMENT D. North Dakota State University Extension Service

The North Dakota Extension Service provides education to help North Dakotans improve their lives, livelihoods and communities. It serves as the link between the public and our land-grant university, North Dakota State University. The NDSU Extension Service is a trusted source of accurate and unbiased information.

In 2016 and 2017, information on butterfly and pollinator gardens was provided to the public through a wide array of new/revised publications, demonstration gardens and presentations:

PUBLICATIONS

As part of the pollinator initiative, the following Extension bulletins have been published and include lists of native and ornamental plants that will nourish pollinators including a list of native milkweeds and their suitability for different regions in North Dakota:

- *Butterfly Gardening in North Dakota*. This publication provides helpful hints on designing gardens that attract butterflies to landscapes. Illustrations and life cycles of popular butterflies are presented. There is detailed information on host plants for caterpillars and butterflies.
    - Knodel, J.J., G.M. Fauske, and E.E. McGinnis. 2016. Butterfly Gardening in North Dakota. NDSU Extension Service Pub. E1266, https://www.ag.ndsu.edu/publications/lawns-gardens-trees/butterfly-gardening-in-north-dakota
- *Bee-utiful Landscapes: Building a Pollinator Garden.* This document identifies major pollinators in North Dakota. It describes plants that provide nectar and pollen during the growing season, and provides advice on the safe use of pesticides.
    - McGinnis, E., J. Knodel, and T. Weinmann. 2016. Bee-utiful Landscapes: Building a Pollinator Garden. NDSU Extension Service Pub. No. H1811, https://www.ag.ndsu.edu/publications/lawns-gardens-trees/bee-utiful-landscapes-building-a-pollinator-garden

DEMONSTRATION GARDENS

The NDSU Extension Master Gardener Program is promoting an educational initiative to build pollinator gardens and to use home pesticides wisely. In 2016 and 2017, the Program funded and built 19 public pollinator gardens to use as teaching gardens. The following counties have Master Gardener pollinator gardens: Barnes, Burleigh, Cass, Cavalier, Dickey, Grand Forks, Kidder, McKenzie (2 gardens), McLean, Pierce, Ramsey, Richland, Rolette, Traill, Walsh, Ward (2 gardens), and Williams.

The goal is for Master Gardeners and their Extension agents to hold workshops in the teaching gardens to inspire homeowners to plant or expand their gardens to provide habitat and food for local pollinators including butterflies and bees. As an incentive, homeowners committed to meeting certain requirements can also apply for a free Master Gardener Certified Pollinator Garden sign. We have almost exhausted our initial order of 75 free signs.

PRESENTATIONS

Presentations on butterfly and pollinator gardens were featured at numerous gardening expos and workshops held across North Dakota. Thousands of gardeners attended these presentations.

Presentations were recorded and uploaded onto NDSU (http://www.ag.ndsu.edu) and Dakota Media Access (http://www.freetv.org) websites. Presentations are shown regularly on public access television. NDSU educators have shared information on protecting monarchs and native pollinators via television interviews, radio broadcasts and print media.

RESEARCH AND MONITORING

NDSU Extension Entomologist, Janet Knodel, has secured funding for future pollinator work in North Dakota through the USDA NIFA Crop Protection and Pest Management, Extension Implementation Program (EIP) grant.

The grant will fund collaborative pollinator resources with Michigan State University and encourage the planting of native and ornamental plants to increase pollinator friendly gardening. Three collaborative publications will be developed over the next three years: (1) Pollination in Vegetable Gardens and Fruit Orchards, (2) Pollinator Mimics in Gardens, and (3) Endangered Pollinators—Butterflies and Bees.

The EIP grant will also fund the building of 10 more Master Gardener Pollinator Gardens, educational field days, and a pollinator section on the IPM website to promote pollinator gardens and IPM friendly pest management practices.

CONTACTS

Esther McGinnis (esther.mcginnis@ndsu.edu) of the Department of Plant Sciences and Janet Knodel (janet.knodel@ndsu.edu) of the Department of Entomology.

ATTACHMENT E. NDSU North Dakota Forest Service

The mission of the NDSU North Dakota Forest Service is to care for, protect, and improve forest and related natural resources to enhance the quality of life for present and future generations.

HABITAT CONSERVATION
The North Dakota Forest Service offers several technical and financial assistance programs that may help to improve or preserve habitat beneficial to monarch or pollinator species. These programs include:

Community Forestry administers financial assistance programs that provide funds for community tree plantings and other forestry development projects each year. The agency provides leadership and technical assistance for tree planting plans, community forest management plans, shade tree ordinances, pest surveys and tree care workshops.

Forest Stewardship provides technical, financial and educational assistance to landowners and project partners to support the sound management of private forestland and windbreaks.

Forest Health serves to minimize the spread of pathogens and invasive tree pests, like the emerald ash borer (EAB), that pose a serious threat to the forest resources in North Dakota. The forest health manager coordinates the delivery of training to landowners, foresters and other natural resource professionals on insect and disease management. The agency encourages managing for a diversity of tree and shrub species, including flowering species for pollinators.

Fire Management ensures the protection of lives, property and natural resources by training, organizing and equipping North Dakota's 341 rural volunteer fire departments. Wildfire protection is improved through grants for wildfire hazard mitigation and "firewise" landscape projects.

State Forests provide wildland habitat, clean air and water, recreational opportunities and conservation benefits. The North Dakota Forest Service owns and manages five state forests encompassing 13,290 acres. The program's primary goal is to practice sound land stewardship to enhance the forest, grassland and wetland ecosystems found on the state forests.

EDUCATION AND OUTREACH
The North Dakota Forest Service administers an Information and Education program. The program offers youth and adults the knowledge and skills they need to make wise decisions about the conservation and wise use of North Dakota's forest resources. The agency sponsors "Project Learning Tree" workshops for teachers and youth leaders working with students in grades K-12.

ATTACHMENT F. North Dakota Parks and Recreation Department

The mission of the North Dakota Parks and Recreation Department is to provide and enhance outdoor recreation opportunities through diverse parks and programs that conserve the state's natural diversity. The Department's Natural Resource Program has a primary responsibility for protecting and enhancing the natural environments within the parks, preserves, natural areas including interpretive and recreational sites owned and managed by the Department.

HABITAT CONSERVATION- 2017-19

Native Prairie Restoration and Enhancements: A multi-site, long term, collaborative project with specific goal to restore, enhance, and sustain a healthy, diverse and sustainable native prairie thus enhancing the biodiversity on parklands, preserves and natural areas.

Project goals include: A) to restore the disturbed or degraded site to native mixed grass community structure that are important to butterfly species; B) to improve and increase native grassland habitat diversity, to support a balanced natural community; C) to provide educational opportunities for visitors to learn about and enjoy the native prairie ecosystem and the importance of habitat diversity and butterflies, D) to enhance visitors experiences and engage youth through native plant discoveries; and E) to promote the growth of native plants important to Native American culture.

Objective 1: Create, restore, enhance, and maintain butterfly habitat on state park lands.

> **Action: 1**) Develop and integrate regionally appropriate, diverse native seed mixes into ongoing restoration or enhancement projects.
>
> **Action: 2)** Encourage the inclusion of milkweed and wildflowers with high pollinator value in prairie restoration sites and landscape plantings with interpretive displays at high visibility areas within state park lands.

Table 2. Proposed Parkland Prairie Restorations and Enhancements

State Park Site	Completed Restorations 2016- 17 (Acres)	Prairie Enhancements 2018-19 (Acres)
Cross Ranch	0	1.5
Devils Lake	0	11
Ft. Abraham Lincoln	42.4	46.2
Ft. Stevenson	6.8	48.56
Icelandic	0	18.5
Lake Sakakawea	0	6
Turtle River	20.07	19.5
Beaver Lake	.26	.26
Turtle Mountain Recreational Area	.43	.43
Lewis & Clark IC	1.5	1.5
Totals	**70.96**	**153.45**

EDUCATION AND OUTREACH

This prairie restoration projects offer unique educational opportunities for visitors. In addition to the wildlife, soil and water conservation benefits, prairie restoration projects and its close proximity to park facilities enhance learning, promote creativity and encourage discovery through existing programs within the state park system.

a) **Development of interpretive panels** which will briefly describing the prairie restoration process and benefits, highlighting plants and why pollinators are important.

b) **Development of the restoration brochure** which will details on the prairie restorations including management and species checklist for visitors to engage in self-discovery.

c) **Present conservation education programs** and presentations at parks, workshops, meetings and festivals.

RESEARCH AND MONITORING

Post-seeding weed control is an important part of successful prairie reestablishment. Mechanical, prescribed fire, and chemical methods will be considered as part of the management plan.

- First Year:
  - When weed growth is 10-12" tall and before seed set, mow down to about 4-6" in height.
  - Mow again to 4-6" if weed growth reaches 10-12" (this mowing should be in mid- to late September).
  - Mow at a height that does not damage the basal leaves of the desired forbs.
  - Mow often enough so the cuttings do not smother emerging seedlings.
  - Spot spray only and avoid damage to desirable forbs.
- Second Year and Beyond
  - After the first growing season, mow weeds but avoid damage to desirable forbs.
  - Continue mowing until prairie plants dominate the prairie, usually 3-5 years after seeding.
  - Any chemical weed control should be limited to the spot spraying of individual nuisance species (e.g., Canadian thistle, wormwood)

Species enrichment and diversity of the restoration is important additional may be broadcasted if necessary.

Monitoring and collecting data in a systematic way will be necessary to follow long-term changes. Monitoring will be conducted during the first three growing seasons and again at years 5 and 10. Transects of 100m will be set within the plot and plant species and % composition will be collected at 10m intervals. Management decisions will be made to favor native vegetation and move the prairie to a native mixed grass prairie.

Record keeping and maintaining a written record of observations and management activities is important in order for future management to be informed by the past – avoid repeating mistakes, evaluating effects of management, plan future management actions. Budget record keeping will be maintained throughout the restoration process and is compiled in the restoration plans.

ATTACHMENT G. U.S. Fish and Wildlife Service

The mission of the U.S. Fish and Wildlife Service is working with others to conserve, protect and enhance fish, wildlife and plants and their habitats for the continuing benefit of the American people.

PARTNERS FOR FISH AND WILDLIFE PROGRAM

The ND PFW program works entirely on privately owned land to restore, enhance and create wildlife habitat.

HABITAT CONSERVATION

The following are FY16 accomplishments by the ND PFW program that have been identified as providing benefits to Monarch Butterflies and other pollinators:

- 3,334.4 acres of grassland habitat restoration within the Prairie Pothole Region of ND.
- 6,321.8 acres of grazing systems with at least 3 cells within the PPR of ND. Other managed grazing systems with less than 3 grazing cells were not identified as providing benefits for Monarchs.

NATIONAL WILDLIFE REFUGE SYSTEM

HABITAT CONSERVATION

North Dakota has 63 National Wildlife Refuges (NWR) that total 289,777 acres. There are 11 Wetland Management Districts (WMD) with 1,288 Waterfowl Production Areas (WPA) totaling 289,372 acres.

- Staff at multiple stations across the state collected milkweed seed to incorporate into native vegetation seedings.
- Staff throughout the state continue to annually utilize multi-species native vegetation mixes with a diversity of wildflowers to reseed old cropland Waterfowl Production Areas and Refuges.

EDUCATION AND OUTREACH

- Provided a field day for refuge volunteers to learn more about pollinators in an urban green space (Gisi Park, Bismarck). An expert in native prairie seedings (Dave Dewald) provided instruction on the nectar and larval sources present for monarchs and other pollinators. Volunteers and refuge staff also caught, tagged, and released monarchs as part of this field day. Data were report to www.monarchwatch.org by Meryl Bennett.
- Developed an interpretive panel that focused on pollinating species and benefits to people. This panel is displayed in kiosks on National Wildlife Refuge System lands across the state.
- Pollinator banners.

RESEARCH AND MONITORING

- Collaborated with North Dakota State University to identify butterflies on National Wildlife Refuge System Lands throughout the state. This study started in 2015, and ends in 2017.
- Collaborated with multiple groups (U.S. Geological Survey, Monarch Joint Venture, U.S. Fish and Wildlife Service Inventory and Monitoring Initiative, University of Minnesota), to develop monitoring protocols for better understanding monarch butterfly demographics.

ATTACHMENT H. USGS Northern Prairie Wildlife Research Center

The mission of NPWRC is to provide the scientific information needed to understand, conserve, and manage the Nation's natural capital with an emphasis on species and ecosystems of the Nation's interior. Although much of our pollinator and land-management science is focused in the Northern Great Plains, the application of our science has far-reaching applicability to policy and management across the U.S.

HABITAT CONSERVATION

Our center is a national leader in conducting applied research to inform natural resource management, policy and conservation delivery. Currently, NPWRC scientists are partnered with a diverse group of stakeholders whose primary focus is land management and habitat enhancement in the Northern Great Plains. Many of our current studies are funded or supported by partners who have specific information needs regarding pollinator conservation and habitat including the US Department of Agriculture-Farm Service Agency; US Department of Agriculture-Natural Resources Conservation Service; US Fish and Wildlife Service; US National Park Service; the Council on Food, Agriculture and Resource Economics; Pheasants Forever; and the Monarch Joint Venture.

EDUCATION AND OUTREACH

Northern Prairie scientists have developed a number of outreach products and conservation delivery tools focused on pollinators and invertebrates.

- NPWRC Pollinator Library (http://www.npwrc.usgs.gov/pollinator/). The Pollinator Library is a website offering free access to data on insect and host-plant interactions in the United States. The impetus for developing this website was to provide an easy to use search engine that documents and synthesizes information on pollinators, and the flowers they utilize, in support of pollinator conservation and management. As of 10/21/2016 there are 3,098 insect and host-plant records for North Dakota represented in the Pollinator Library, and over 27,000 nationally. Data published on the Pollinator Library are the result of contributions by scientists, biologists, and natural resource managers. The website allows users to conduct queried searches on specific insects, plants, land-use categories, and states.
- InVEST Managed Bee Habitat Module. The Integrated Valuation of Ecosystem Services and Tradeoffs Model (InVEST) is a scenario-based, ecosystem-services model developed by the Natural Capital Project (http://www.natural capitalproject.org). Northern Prairie scientists worked with our partners to develop a module for InVEST that allows for the quantification of floral resources for managed bees and have parameterized the module for the Northern Great Plains. Use of the managed bee module in conjunction with the other InVEST modules, allows for the effects of conservation to be quantified for not just managed bee habitat, but also for the suite of other natural capital resources (e.g., native bee, amphibian, waterfowl, and grassland bird habitat; carbon stores; native plants).
- USGS Pollinator Research and Monitoring outreach media:
    - NPWRC produced a video highlighting an ongoing (2014-) partnership between USGS and USDA to study the effects of land-use change on honey bee habitat and health. https://www.youtube.com/watch?v=3_O6RDdrfDc
    - The Proceedings of the National Academy of Sciences released a podcast discussing a pollinator research paper published by NPWRC scientists. http://www.pnas.org/site/misc/clintOttoPodcast.mp3
- Larson, D.L. 2008. Invasive Plant and Pollinator Interactions. Endangered Species Bulletin 33 (3): 46-49.

RESEARCH AND MONITORING

Pollinator Health, Ecosystem Services, and Land-Use. Clint Otto, Principal Investigator. NPWRC scientists are working with USDA partners to assess how land-use change in North Dakota affects pollinator habitats and health. Dr. Otto's work is designed to identify priority areas for conservation and to improve the effectiveness of USDA conservation programs for pollinators in the Northern Great Plains.

Integrated Landscape Modeling. David Mushet, Principal Investigator. NPWRC scientists are developing methodologies to quantify the effects of conservation on the multitude of services that wetland and grassland

ecosystems provide to society. This effort included development of a managed bee module for InVEST allowing for changes in floral resources needed by honey bees to be quantified in conjunction with other habitat and ecosystem service changes resulting from with both human-induced and naturally occurring, environmental alterations.

Monarch Butterfly Populations. Diane Larson, NPWRC Representative. Dr. Larson is working with a multi-agency/multi-disciplinary team to develop a monitoring strategy for monarch butterflies and the host- and nectar-plant resources that support their reproduction and migration. Larry Igl, Principal Investigator. Dr. Igl has been collecting annual population data of monarch butterflies on USDA-Conservation Reserve Program lands throughout North Dakota since 1998.

Plant-Pollinator Community Interactions. Diane Larson and Sam Droege (PWRC), Principal Investigators. NPWRC and PWRC scientists are working with NPS partners to understand effects of invasive flowering plants on endemic plants as a result of shared pollinators, and the ability of pollinators to switch resources when invasive plants are controlled.

NPWRC Current Products:

- Otto, CRV, C Roth, B Carlson, M Smart. 2016. Land-use change reduces habitat suitability for supporting managed honey bee colonies in the Northern Great Plains. Proceedings of the National Academy of Sciences 113(37):10430-10435.
- Larson, D.L., P.A. Rabie, S. Droege, J.L. Larson, M. Haar. 2016. Exotic plant infestation is associated with decreased modularity and increased numbers of connectors in mixed-grass prairie pollination networks. *PLoS ONE* 11(5): e0155068.
- Mushet, DM. 2016. The Integrated Landscape Monitoring Partnership: Current status and future directions. U.S. Geological Survey Open File Report 2016-1006, 59 p.
- Cornman, RS, CRV Otto, D Iwanowics, JS Pettis. 2015. Taxonomic characterization of honey bee (Apis mellifera) pollen foraging based on non-overlapping paired-end sequencing of nuclear ribosomal loci. PloS one 10(12):e0145365.
- Larson, D.L., S. Droege, P.A. Rabie, J.L. Larson, J. Devalez, M. Haar, and M. MacDermott-Kubeczko, 2014. Using a network modularity analysis to inform management of a rare endemic plant in the northern Great Plains, USA. Journal of Applied Ecology, 51:1024-1032.
- Gallant, AL, N Euliss Jr., Z Browning 2014. Mapping large-area landscape suitability for honey bees to assess the influence of land-use change on sustainability of national pollination services. PloS one 9(6):e99268.
- Spivak, M, E Mader, M Vaughan, N Euliss Jr. 2011. The Plight of the Bees. Environmental Science & Technology 45(1):34-38.
- Larson, D.L., R.A. Royer and M.R. Royer. 2006. Insect visitation and pollen deposition in an invaded prairie plant community. Biological Conservation 130: 148-159.

ATTACHMENT I. USDA Forest Service – Dakota Prairie Grasslands

With a multiple-use management focus, the USDA Forest Service manages over a million acres spread across three National Grasslands in North Dakota, part of the Dakota Prairie Grasslands. The mission of the Forest Service is "To sustain the health, diversity, and productivity of the Nation's forests and grasslands to meet the needs of present and future generations." Its motto is "Caring for the land and serving people."

HABITAT CONSERVATION

The Dakota Prairie incorporates forb species into all seed mixes for range restoration seeding, pipeline and oil and gas well reclamations, and road ditches. Refinements to improve the mix of seed are continually made, particularly as more native seeds are commercially available.

Oil well and pipeline reclamations increasingly include looking beyond the actual area disturbed by the action to find additional areas to do native prairie restoration planting, in efforts to improve pollinator habitat availability across the Grasslands.

In particular, the focus of the Sheyenne National Grassland in southeastern North Dakota is on grasslands restoration, including annual prescribed burns to improve vegetative composition.

EDUCATION AND OUTREACH

A native plant pollinator garden was established at the Buffalo Gap Campground information kiosk located just off Interstate 94 in southwestern North Dakota in 2011. The nearly 2000 square foot site includes approximately 40 native wildflower species and several native grasses to provide food and habitat for native insects. Metal tags identify the Latin botanical and common names for many of the species. Interpretive brochures and signs explain the importance of native plants and pollinators.

Dakota Prairie Grasslands has applied for a Joint Chiefs Landscape Restoration Partnership grant; part of the grant proposal is to establish a native plant restoration and pollinator garden at Jorgen’s Hollow Campground, Sheyenne National Grassland.

Throughout the year the agency participates in educational outreach via social media, in local schools, and community events in order showcase and bring awareness to the importance of grasslands, pollinators, and wildflowers that can be found on National Grasslands.

RESEARCH AND MONITORING

Dakota Skipper surveys are conducted on the Sheyenne National Grassland and Little Missouri National Grassland-McKenzie Ranger District; other lepidopteran species, including Monarchs and Regal Fritillaries, are recorded during these surveys if present. Habitat and population surveys will continue to occur on the Dakota Prairie Grasslands each year provided the necessary resources are available.

Research on pollinators of the Western Prairie Fringed Orchid, an Endangered Species Act threatened plant species, has recently been conducted on Sheyenne National Grassland.

Habitat identification tools are utilized, and continue to be refined, for Dakota Skipper for both Sheyenne and McKenzie Ranger Districts. These tools incorporate a variety of mapped habitat characteristics to help predict which USFS land areas may be good habitat for the Dakota Skipper. Ground truthing of the tools continues annually to better understand the habitat being used by the Dakota Skipper in particular, and pollinators in general.

The Dakota Prairie is actively seeking partners in order to gain more information regarding the species and habitat characteristics of bumblebees inhabiting the Grasslands in North Dakota and the habitat characteristics they prefer.

ATTACHMENT J. USDA Natural Resources Conservation Service

The Natural Resources Conservation Service is a leader in private lands conservation. The Agency provides technical assistance to landowners based on their wishes to reduce erosion, improve resource concerns such as soil health, water quantity, livestock forage and wildlife habitat. The Agency also provides financial assistance to eligible producers which is often enhanced with Partner funds to further promote installation and mitigate the initial cost and anxiety of trying new conservation practices.

The mission of the NRCS is "Helping People Help the Land."

HABITAT CONSERVATION

ND NRCS has established dedicated financial assistance to promote pollinator conservation within NRCS programs. NRCS has modified various planting specifications based on successes and failures found during monitoring efforts. Modifications were primarily changes in percentages of forbs and grasses intended to reduce issues with weedy plantings as well as targeting certain invertebrates with preferred forbs. Considerations are made for large scale plantings as well as small pollinator plots. The Agency is also making modifications to recognize the importance of species-targeted plantings, such as milkweed enriched plantings for Monarch butterflies and violet enriched plantings for the Regal fritillary.

Pollinators and soil health are current focal points in conservation. Cover crops are primarily applied to address concerns with soil health. Those same cover crops can provide secondary opportunities to address concerns with pollinator food and habitat as well as livestock feed resources. Slight modifications to a cover crop mix designed to maximize soil health can provide secondary wins for pollinators and livestock.

As more information becomes available, these modifications are anticipated to be applied to other species of bumble bees and butterflies.

EDUCATION AND OUTREACH

ND NRCS provided trial packets of forb and grass seed at public meetings including Ladies' Ag Nights, garden clubs and Earth Day events. The Agency increased attention on urban conservation and the opportunities to establish pollinator plots. Posters and publications were provided to the public regarding the importance of pollinators as well as increasing people's ability to identify different bees, flies, wasps, moths and butterflies. The Agency also brought in Xerces Society experts to provide pollinator identification training to employees.

RESEARCH AND MONITORING

ND NRCS has utilized the Xerces Society to establish a base level pollinator monitoring protocol, including population transects, invertebrate identification and photo point establishment within conservation programs.

The Agency is also currently working with Partners to establish a more detailed protocol for pollinator monitoring sites. The intent is to increase the available data and understanding of what ecological sites provide the physical characteristics necessary to support individual plant species, larger plant communities, hydrology, soils and the long-term management necessary to establish and/or maintain quality habitat for broad suites of species as well as specifically targeted species.

ATTACHMENT K. Pheasants Forever

Pheasants Forever is dedicated to the conservation of pheasants, quail and other wildlife through habitat improvements, public awareness, education and land management policies and programs.

HABITAT CONSERVATION

Bee and Butterfly Habitat Fund

Pheasants Forever has partnered with Project *Apis m*. and Browning's Honey to evolve efforts originally delivered through the Honey Bee and Monarch Butterfly Partnership. The program delivers, through NextGen Habitat Projects, much needed technical assistance to landowners for installing habitat practices from start to finish; including providing the appropriate seed mixtures. Habitat necessary for rapidly declining populations of Monarch Butterflies and Honey Bees is often also the very same diverse grassland and prairie flower habitat necessary for pheasants and a host of other wildlife species to thrive.

Honey Bee and Monarch Butterfly Partnership Program Accomplishments for 2015 -2017

Year	Projects	Acres	# of Milkweed Seeds Planted
2015	11	123.73	774,704
2016	18	190.50	874,800
2017	8	100.4	471,733
Total	**37**	**414.63**	**2,121,237**

Habitat for Honeybees – SAFE

Developed and submitted in partnership with the North Dakota Beekeeping Association a new 20,000 acre Conservation Reserve Program State Acres For wildlife Enhancement (SAFE) proposal to USDA Farm Service Agency. This SAFE proposal was targeted at improving foraging habitat for commercial honeybees, but seeding specifications included the use of milkweed, an important forage for honeybees and essential for the Monarch Butterfly lifecycle. Numerous coordination meetings have occurred between interested parties to come to agreement on seed mixes that will meet the objectives of the program and satisfy agency specification. Allocation for this important proposal yet to be fulfilled.

EDUCATION AND OUTREACH

North Dakota Youth Pollinator Habitat

Pheasants Forever received $20,000 in funding from the North Dakota Outdoor Heritage Fund (OHF) to develop a statewide Youth Pollinator Habitat Program. The objectives of this program are to increase awareness about decreasing pollinator populations, educate the general public on the importance of habitat for pollinators, and to establish quality pollinator habitat areas across the state. Working with state and local community partners, PF will use their expertise, equipment and networks to create pollinator habitat projects on public and private property throughout North Dakota. PF chapters will enlist the help of classrooms and youth groups (i.e. 4H, FFA, Boy Scouts, and Girl Scouts) in every aspect of the project (establishment, maintenance, & monitoring). Curriculum and educational activities will be provided to participating classrooms and youth groups so that project sites can serve as outdoor classrooms for future generations. Pheasants Forever and its partners will complete at least 10 youth pollinator habitat projects and engage a minimum of 200 participants over a two year period. The results of this program will benefit many species of pollinating insects and ground nesting birds by providing much needed foraging and nesting habitat. Other benefits include increased native plant diversity and decreased soil erosion.

The program will also serve as a model for landowners, land managers and others interested in providing habitat for managed and native pollinators. While there are many resource benefits related to this program, we feel the larger benefit comes in providing events and locations for individuals to learn about conservation issues like the plight of the pollinators and educating North Dakotans on the importance and value of sound conservation practices.

Summary of Work 2016 and 2017

Projects Completed: 4 **Youth Impacted: 147** **Pending Projects: 6**

FUTURE WORK

- Continue to deliver high quality habitat through the Bee and Butterfly Habitat Fund's NextGen Habitat Projects.
- Continue to work with Pheasants Forever Chapters and local youth groups to deliver education and outreach relating to the needs to pollinators as well as establish high quality habitat.
- Continue to advocate for key plant species to be included in conservation seed mixes.

ATTACHMENT L. The Nature Conservancy

The mission of The Nature Conservancy (TNC) is "to conserve the lands and waters on which all life depends." Since 1971, The Nature Conservancy has worked with landowners, ranchers, government agencies, partner organizations, and others to help keep North Dakota's waters clean and grasslands productive. Together, we have directly protected more than 42,000 acres that preserve North Dakota's natural heritage and provide places to hunt, hike, bird-watch and enjoy the outdoors.

HABITAT CONSERVATION

On the land TNC owns and manages in North Dakota, we employ several strategies to create, maintain and improve healthy pollinator habitat. These include:

- Grazing – Most of the properties TNC owns or manages are grazed by cattle or bison. We implement stocking rates and rotations to create healthy, heterogeneous grasslands. These grazing systems promote grassland bird diversity alongside healthy populations of native forbs and grasses that butterflies and pollinators require.
- Prescribed Fire – TNC uses and promotes the use of prescribed fire to mimic natural prairie disturbance regimes, reduce invasive plant species, invigorate fire-tolerant native species, and manage grazing. Prescribed burns generally occur in April and May each year, before monarchs arrive in the Dakotas. These burns are designed to target invasive cool season grasses that are threaten the floristic diversity of our prairies. In 2016 we used fire to improve the diversity of over 1,000 acres of prairie across North Dakota.
- Restoration – Portions of TNC's properties across North Dakota are former farmland. As funding becomes available, we are re-seeding these areas with native forbs and grasses to recreate quality grassland habitat for birds, butterflies and pollinators. In 2017, 80 acres on the Davis Ranch preserve in Sheridan County will be reseeded and, in 2018, 50 acres on our Pigeon Point preserve in Ransom County will be reseeded with diverse native seed mixes.
- Invasive Species Control – Invasive plants outcompete native species and can significantly reduce the floristic diversity of grassland ecosystems. Through fire, grazing, biological control, mechanical treatments and carefully selected herbicides, TNC works to remove invasive species from our properties, enhancing grassland quality.
- Private lands- TNC also financially supports a variety of private land conservation programs designed to protect native grasslands and restore lands back to conditions more favorable for grassland birds, pollinators, and other wildlife.

EDUCATION AND OUTREACH

TNC's website – www.nature.org – features many articles about native pollinators, their environmental and economic importance, and how to promote their survival and population growth. Similar information is disseminated periodically through TNC's magazine, the Tri-State Chapter newsletter, and The Nature Conservancy in North Dakota's Facebook page.

RESEARCH AND MONITORING

TNC has partnered with The Minnesota Zoo's Prairie Butterfly Conservation Program on a project to conserve imperiled prairie butterflies. Researchers from the Minnesota Zoo visited TNC prairies across North Dakota to conduct population surveys. The Zoo has already established a captive breeding population of the federally threatened Dakota skipper, and is interested in starting a program for the federally endangered Poweshiek skipperling. The Zoo collected eggs from related, but common, grass skippers to use as surrogates in the development of rearing and husbandry protocols.

In 2016, researchers from North Dakota State University conducted line-transect distance sampling and visual encounter surveys to determine butterfly species diversity, detection probabilities, occupancy and butterfly density at TNC's Davis Ranch property in Sheridan County.

TNC's Brown Ranch and Pigeon Point Properties in Ransom County are home to the western prairie fringed orchid. NDSU has conducted studies of the orchid and its pollinators at those locations.

TNC has also been working with the US Fish and Wildlife Service on a project to evaluate the impact of prescribed fire on Dakota skipper abundance and habitat quality. Although fire can be detrimental to butterfly eggs and larvae, its effects on floristic diversity and flower abundance are also important for sustaining diverse prairies essential for Dakota skipper populations. TNC is working to better understand these fire effects and balance prairie management requirements with Dakota skipper life cycle requirements.

TNC properties are often used for research and monitoring sites, and we hope to facilitate future pollinator studies.

ATTACHMENT M. North Dakota Grain Growers Association

The North Dakota Grain Growers Association is a non-profit agriculture association whose mission is to serve North Dakota wheat and barley producers with education, leadership, information and representation to increase profitability and enhance value added opportunities.

HABITAT CONSERVATION

North Dakota agriculture has a history and a heritage of sound environmental stewardship. The state's farmers and ranchers are the original conservationists providing the habitat for thousands of various species that inhabit our state. Every day North Dakota farmers and ranchers engage in conservation efforts that protect North Dakota's land and environment. From the use of precision farming techniques to no-till/minimum tillage efforts to effective rangeland/farmland management North Dakota farmers and ranchers are proven leaders in adopting and adapting new technologies into their operations for the benefit of all.

EDUCATION AND OUTREACH

Each year the North Dakota Grain Growers Association hosts an annual Environmental Tour (E-Tour) where the Association invites members of the Environmental Protection Agency into North Dakota for a week in June to demonstrate North Dakota's environmental stewardship. For the past 3 years NDGGA has made pollinator education/interaction an integral part of the E-Tour's events.

For example, for the last two years during the E-Tour the North Dakota Beekeepers Association has provided a living beehive demonstration where participants could observe through glass a beehive operation. Working together and through information sharing and hands-on demonstrations stakeholders can achieve a better understanding surrounding pollinators and pollinator issues.

ATTACHMENT N. Other Agricultural Organizations

NOTE: Agriculture is a dominant part of North Dakota's economy and landscape. There are numerous farm and specialized organizations which may contribute to pollinator conservation efforts in the future. At the time of this publication (December 2016), the following groups have indicated some efforts and/or the potential to expand in the future.

National Sunflower Association – Considering programs and outreach for sunflower growers.

North Dakota Corn Utilization Council and North Dakota Corn Growers Association – Affiliates of the National Corn Growers Association which participates in the Honey Bee Health Coalition. Information is also used to educate growers to help conserve the Monarch Butterfly.

ATTACHMENT O. United Prairie Foundation

United Prairie Foundation, Inc.is a Federal 501(c) 3 public non-profit organization, founded and operated in North Dakota. The Foundation has as its mission building a better prairie by restoring prairie grassland habitat – the same habitat prairie pollinators depend on for survival. Building wildlife grocery superstores is our plan. Milkweed and nectar plants that monarch butterflies depend on for survival are key components of a "Grocery Superstore" built by United Prairie Foundation and its partners.

United Prairie Foundation, Inc., founded in 2004, continues to grow and is becoming a leader in the field of habitat restoration. Existing habitat has been neglected and unmanaged for so long that most prairie habitats are not sustainable. The Foundation, through its mission projects, restore these neglected habitats and return them to functional grassland-based prairie habitat. The key to our success is the targeting of non-native invasive plants in all of the Foundation's habitat projects. In 2004 the Foundation began removing invasive trees from prairie habitats with a chainsaw and donated Bobcat loader. Since that first project in Ransom County, ND, the Foundation has continued to grow and is now working projects in South Dakota, Minnesota and North Dakota. The Foundation has restored 1000's of acres on both public and privately owned land.

Partnerships have developed with help from local family farms, five regional United States Fish & Wildlife Service Wetland Management Districts, Minnesota Department of Natural Resources, North Dakota Game and Fish Department, Wildlife Forever and the North Dakota Natural Resource and Trust. Recently, the Foundation entered into cooperative management agreements with numerous USFWS Districts to restore neglected low priority properties. Companies like Scheels, Bobcat, Arctic Cat, Evans Oil, Woodland Resort and others help fund the operation of heavy equipment allowing our continued growth and restored prairie acres to climb.

United Prairie prides itself on our community involvement. Our headquarters building, the Sheldon Community Center, is used extensively by local community groups. In our 14 years of operation we have been devoted exclusively to helping the people and habitats of the prairie. The Foundation operates with a Board of Directors and a local seven person steering committee.

HABITAT CONSERVATION

Prairie Project is a long term habitat development program being developed through a North Dakota Outdoor Heritage Fund grant, North Dakota Game and Fish Department and United Prairie Foundation. 100's of local ecotype prairie species have had seed harvested from remnant native prairies and are the major component in the seed mixes used in the Prairie Project. Preserving and propagating real North Dakota genetics is part of the project.

The Prairie Project is a new project whose goal is to restore prairie grasslands and create a source of highly diverse native prairie grass and forb seeds to be used in future grassland plantings. Our vision is to emulate, to the best of our ability, the historical conditions of the Tallgrass Prairie by replicating species composition, structure and function in our restorations. A total of 175 acres have been designated as Prairie Seed Source Plots and have been planted with high diverse local eco-type prairie seed mixes. Seeds cultivated from these plots will be made available at no charge to a wide range of end users:

- Private Landowners
- ND Counties
- ND Cities
- North Dakota Game and Fish Department
- North Dakota Department of Transportation
- Other groups supporting prairie development

Railroad Prairie is collaboration with the Red River Valley Western Railroad, North Dakota Natural Resource and Trust, Bayer Crop Science Feed a Bee program and United Prairie Foundation to create a restored prairie eco-system incorporating a recently dug drainage ditch located in Sheldon, ND showing agricultural producers a best management plan for maintaining waterways in North Dakota.

The identified 5 acre piece of property has recently had a drainage ditch dug to help with overland flooding the city experienced a few year ago. The ditch since has overgrown with cattails/Chinese elm/Cottonwood and will require in its current state regular attention with heavy equipment to serve its purpose of moving flood water. The prairie project will eliminate the ditch and install a swale which will provide the same flood protection as a ditch in good working order. The project will use deep rooted high diverse local eco-type prairie plants in the restoration process that will keep the swale in excellent shape providing years of low maintenance flood protection.

A true community partnership creating public awareness and education on the values of wetlands, grasslands, and riparian areas while illustrating the importance of maintaining soil health and the interconnection with water quality and the overall health of our natural resources.

Habitat Fire Team, a unique partnership has been formed to help both United Prairie Foundation restore native prairie habitats and the Enderlin/Sheldon Volunteer Fire Department add quality wildfire/rescue equipment to its toolbox. This partnership became functional in 2017 with 5 prescribed fires executed. United Prairie Foundation raised $20,000 for prescribed fire equipment which through sponsorship from Arctic Cat allowed for the purchase of a tracked UTV with a 75 gallon high pressure fire unit. All equipment owned by the Foundation is stored in the VFD for shared use.

Habitat Restoration has been an ongoing mission of the Foundation with 2017 celebrating the 600th acre of planted prairie habitat. Many of these planted prairies have used in excess of 100 species of local origin prairie plants. Seed mixes are collected throughout the year with the bulk being combine harvested in September and October. Some key points for Monarch Butterflies is the Foundation in 2016 harvested over 40 pounds of Swamp Milkweed seed. Expanded in 2017 the Foundation planted all 40 pounds, in addition to many pounds of common/showy milkweed and collected over 100 pounds of Swamp, Common and Showy milkweed. To date every acre seeded is part of a seed development program to repopulate North Dakota prairie. Additional interested partners are always being sought to expand prairie habitat. 2018 will see even more prairie planted as two USFWS Waterfowl Production Areas in Ransom County will get seeded this spring.

Prairie Plug Production 2500 swamp milkweed plugs were propagated and planted into new habitats in 2017. Another 1500 prairie plants were also propagated from seed and transplanted into restoration projects. A quick way to add some monarch habitat.

Converting Monocultures into wildlife grocery superstores is the mission. Wildlife grocery superstores that feed the ecosystem is the goal and Monarch butterflies like pheasants, deer, ducks and bees all benefit!

APPENDICES

Key

ESA listed as threatened or endangered
recently petitioned and species is under review for listing under the ESA
possible species of concern, declining, or future petitions imminent

Appendix A. Bumble Bees of North Dakota.

Common Name	Scientific Name	ND Range	Status	Habitat	Key Adult Food
Common Eastern Bumble Bee	*Bombus impatiens*	statewide	relatively abundant and widespread	woodland, grassland, farmland, wetlands, parks and gardens	commercial pollinator of greenhouse tomatoes
Two-spotted Bumble Bee	*Bombus bimaculatus*	east	relatively abundant and widespread	woodland, parks and gardens	thistle, clovers
Confusing Bumble Bee	*Bombus perplexus*	far east, possible	uncommon	woodland, wetlands, parks and gardens	honeysuckle, St. John's Wort
Half-black Bumble Bee	*Bombus vagans*	statewide	common	woodland, wetlands, parks and gardens	milkweed
Tri-colored Bumble Bee	*Bombus ternarius*	statewide	rare in the west, common east	woodland, wetlands	milkweed, goldenrod, clover, rabbitbrush, beebalm
Hunt Bumble Bee	*Bombus huntii*	statewide	common	open grassland, parks and gardens	sweetclover, black-eyed Susan, thistle
Central Bumble Bee	*Bombus centralis*	far west	uncommon in ND, moderately common elsewhere	open grassland	thistle, snowberry, onion
Yellow-banded Bumble Bee	*Bombus terricola*	statewide	common, possibly in decline	woodland, wetlands	willow, honeysuckle, asters
Western Bumble Bee	*Bombus occidentalis*	far west, *possible* might not occur in ND	in decline	open grassland, parks and gardens	sweetclover, rabbitbrush, thistle
Rusty-patched Bumble Bee	*Bombus affinis*	far east	in decline	woodland, parks and gardens	sunflower, goldenrod
Brown-belted Bumble Bee	*Bombus griseocollis*	statewide	relatively abundant and widespread	farmland, wetlands, parks and gardens	sunflower, clover, alfalfa
Southern Plains Bumble Bee	*Bombus fraternus*	far east	uncommon	grassland, gardens	St. John's Wort, bee balm, nigthshades
Red-belted Bumble Bee	*Bombus rufocinctus*	statewide	common	woodland, parks and gardens	sweet clover, thistle, aster
Yellow Bumble Bee	*Bombus fervidus*	statewide	common and widespread	open grassland, farmland, parks and gardens	sunflower, clover, thistle
Northern Amber Bumble Bee	*Bombus borealis*	statewide	uncommon	woodland	vetches, thistle, aster and comfrey
American Bumble Bee	*Bombus pensylvanicus*	statewide	uncommon, possibly in decline	open farmland and fields	goldenrod, vetches, clover
Black and Gold Bumble Bee	*Bombus auricomus*	far southeast	uncommon	open farmland and fields	bee balm, nightshades
Nevada Bumble Bee	*Bombus nevadensis*	statewide	common	open grassland and meadows	sunflower, currant, balsamroot
Lemon Cuckoo Bumble Bee	*Bombus citrinus*	east	widespread	parasitizes, several common hosts	aster, blazing star, goldenrod
Variable Cuckoo Bumble Bee	*Bombus variabilis*	far southeast	rare, possibly extinct	parasitizes, B. pensylvanicus is primary host	aster, goldenrod, coneflower
Indiscriminate Cuckoo Bumble Bee	*Bombus insularis*	north	rare	parasitizes, several hosts	goldenrods, clover
Gypsy Cuckoo Bumble Bee	*Bombus bohemicus*	east, north	rare, in decline	parasitizes, B. terricola and B. affinis are primary hosts	thistle, clover, goldenrod
Suckley Cuckoo Bumble Bee	*Bombus suckleyi*	north	uncommon, in decline	parasitizes, B. occidentalis is primary host	thistle, rabbitbrush, sunflower

Appendix B. Other Native Bees of North Dakota.

	Nests	Key Adult Food	Comments	Pollinator Importance
FAMILY APIDAE				
Carpenter Bees **Cuckoo Bees** **Honey Bees** **Bumble Bees** **>1,000 spp. in North America**	Carpenter Bees excavate tunnels in wood, Cuckoo Bees parasitize nests of Burrowing Bees, Bumble Bees underground and solitary	sweetclover, alfafa, thistles, fruit and vegetable producing flowers, composite flowers	small to large size, some of the most common bees	very high
FAMILY MEGACHILIDAE				
Mason Bees **Leaf-cutter Bees** **>630 spp. in North America**	most nests in holes in wood or hollow twigs, some underground, solitary	alfalfa, bergamot, composite flowers, thistle, sweetclover, fruit and vegetable producing flowers	small to medium size, carry pollen on belly	high
FAMILY HALICTIDAE				
Sweat Bees **>500 spp. in North America**	underground or in rotting wood, solitary to semi-social	composite flowers, alfalfa, yarrow, composite flowers	small size, attracted to sweat and may sting, usually black or brown but some are metallic green, copper, blue or gold	high
FAMILY ANDRENIDAE				
Burrowing Bees **(i.e. Andrenid Bees, Mining Bees)** **>1,200 spp. in North America**	underground, solitary but gregarious	early-blooming flowers, violets, composite flowers, willows	small to medium size, unlikely to sting, usually black but some have red or metallic green	very high
FAMILY COLLETIDAE				
Plasterer Bees **(i.e. Masked Bees, Cellophane Bees)** **~160 spp. in North America**	underground or in hollow twigs, solitary but gregarious	early-blooming flowers, composite flowers	small to medium size, primitive wasplike bees	high
FAMILY MELITTIDAE				
Mellitids **~32 spp. in North America**	underground, solitary but gregarious	collects oils from loosestrife spp.	small to medium size, narrow preference for pollen	low

Appendix C. Butterflies of North Dakota.

Common Name	Scientific Name	ND Range	Status	Habitat	Guild	Key Larval Food	Key Adult Food	Adult Flight
FAMILY HESPERIOIDEA								
Silver-spotted Skipper	*Epargyreus clarus*	statewide	common to locally abundant	wooded clearings	disturbance tolerant	wild licorice	dogbane	June through July
Northern Cloudy Wing	*Thorybes pylades*	statewide	common	woodland	habitat sensitive	Fabaceae spp. (legume)	silverberry, dogbane	late May to early June
Dreamy Dusky Wing	*Erynnis icelus*	north	common	woodland, aspen	habitat sensitive	aspen or willow	flower nectar	May to early June
Sleepy Dusky Wing	*Erynnis brizo*	northeast	uncommon	oak woodland	habitat sensitive	bur oak	flower nectar	May
Juvenal's Dusky Wing	*Erynnis juvenalis*	statewide	locally common	mixed oak woodland	habitat sensitive	bur oak	silverberry	May to early June
Afranius Dusky Wing	*Erynnis afranius*	west	common	aspen woodland, badlands	habitat sensitive	golden banner	flower nectar	May and July (2 broods)
Persius Dusky Wing	*Erynnis persius*	west, only Dunn Co.	rare	aspen woodland	habitat sensitive	Fabaceae spp. (legume)	flower nectar	May
Small Checkered Skipper	*Pyrgus scriptura*	far west	rare	badlands	habitat sensitive	scarlet globemallow	flower nectar	May/June and July/Aug (2 broods)
Checkered Skipper	*Pyrgus communis*	statewide	common	open dry ground, badlands	disturbance tolerant	scarlet globemallow	white flower nectar	May to Sept
Common Sooty Wing	*Pholisora catullus*	statewide	rare north, common	open space	disturbance tolerant	Chenopodiaceae or Amaranthaceae spp.	flower nectar	May/June and July/Aug (2 broods)
Mohave Sooty Wing	*Hesperopsis libya*	far west	rare	badlands	habitat sensitive	fourwing saltbush	rabbit bush	May/June and July/Aug (2 broods)
Arctic Skipper	*Carterocephalus palaemon*	far north	rare	woodland	habitat sensitive	Poaceae spp. (grasses)	flower nectar	late May to early June
Least Skipper	*Ancyloxypha numitor*	statewide	uncommon to rare	streams, wetlands	disturbance tolerant	aquatic Poaceae spp. (grasses)	flower nectar	June and Aug (2 broods)
Poweshiek Skipperling	*Oarisma poweshiek*	far southeast	ESA endangered species, very rare, possibly extirpated	native tallgrass prairie	habitat sensitive	little bluestem, prairie dropseed, or slender spike rush	Echinacea, black-eyed susan	mid-June to mid-July
Garita Skipperling	*Oarisma garita*	statewide	fairly common	open mixed-grass prairie	habitat sensitive	Poaceae spp. (grasses); esp. needlegrass and grama	flower nectar	late-May to July
European Skipper	*Thymelicus lineola*	northeast	uncommon	open areas, roadsides	disturbance tolerant	Timothy	flower nectar	mid-June to July
Uncas Skipper	*Hesperia uncas*	west	uncommon	mixed-grass and shortgrass prairie	habitat sensitive	Poaceae spp. (grasses), esp. grama	flower nectar	June and Aug (2 broods)
Common Branded Skipper	*Hesperia comma*	statewide	common	native prairie hilltops	habitat sensitive	Poaceae spp. (grasses)	Liatris spp.	late July through Aug
Ottoe Skipper	*Hesperia ottoe*	west	rare to locally common	native prairie hilltops	habitat sensitive	Poaceae spp. (grasses), esp. bluestem, grama and needlegrass	Echinacea	mid-June to early July

Common Name	Scientific Name	ND Range	Status	Habitat	Guild	Key Larval Food	Key Adult Food	Adult Flight
Pawnee Skipper	*Hesperia leonardus pawnee*	statewide	common	sandy native prairie	habitat sensitive	Poaceae spp. (grasses), esp. grama	Liatris spp., rabbit bush	August
Pahaska Skipper	*Hesperia pahaska*	west	uncommon	shortgrass prairie, badlands	habitat sensitive	Poaceae spp. (grasses), esp. grama	thistle	June
Dakota Skipper	*Hesperia dacotae*	statewide except NE and SW	ESA threatened species, rare	tall-grass and mixed-grass prairie	habitat sensitive	Poaceae spp. (grasses), esp. little bluestem	narrow-leaved coneflower	mid-June to early July
Peck's Skipper	*Polites peckius*	statewide	common	meadows, roadsides, open areas	disturbance tolerant	Poaceae spp. (grasses)	alfalfa, clover	mid-June through July
Tawny-edged Skipper	*Polites themistocles*	statewide	common	meadows, roadsides	disturbance tolerant	Poaceae spp. (grasses), esp. switchgrass	milkweeds	mid-June to July
Crossline Skipper	*Polites origenes*	west	uncommon to locally abundant	native prairie	habitat sensitive	Poaceae spp. (grasses)	Echinacea, milkweed, bergamot	mid-June to July
Long Dash	*Polites mystic*	statewide	common	meadows, roadsides	disturbance tolerant	Poaceae spp. (grasses)	alfalfa	mid-June to July
Rhesus Skipper	*Polites rhesus*	west	rare	badlands	habitat sensitive	Poaceae spp. (grasses), esp. blue grama	Missouri milk vetch	May
Northern Broken Dash	*Wallengrenia egeremet*	far southeast	locally common	oak savannah	habitat sensitive	Poaceae spp. (grasses), esp. switchgrass	white or pink flower nectar	late June through July
Sachem	*Atalopedes campestris*	sporadic	seasonal	lawns, open areas	disturbance tolerant	Poaceae spp. (grasses)	flower nectar	late summer
Argos Skipper	*Atrytone arogos*	far southeast, and Ward Co.	very rare, possibly extirpated	native tallgrass prairie	habitat sensitive	Poaceae spp. (grasses), esp. big bluestem	Echinacea, thistle	mid-June to July
Delaware Skipper	*Anatrytone logan*	statewide	common	prairie, roadsides, open areas	disturbance tolerant	Poaceae spp. (grasses)	flower nectar, milkweed, thistle	mid-June to July
Woodland Skipper	*Ochlodes sylvanoides*	west, only McKenzie Co.	locally common	woodland	habitat sensitive	Poaceae spp. (grasses)	flower nectar, asters	late July through August
Mulberry Wing	*Poanes massasoit*	far southeast	locally common	wet woodland, Sheyenne River	habitat sensitive	upright sedge	flower nectar	early July
Hobomok Skipper	*Poanes hobomok*	statewide	locally common	substantial woodland	habitat sensitive	Poaceae spp. (grasses)	flower nectar, Dame's rocket	late May through June
Broad-winged Skipper	*Poanes viator*	far southeast	rare, locally common	wetland, Sheyenne River	habitat sensitive	hairy sedge	swamp milkweed	late June through July
Dion Skipper	*Euphyes dion*	far southeast	rare	wetland, Sheyenne River	habitat sensitive	Cyperaceae spp. (sedges)	flower nectar	July to early August
Dun Skipper	*Euphyes vestris*	statewide	common	moist prairie, riparian forest edges	habitat sensitive	Cyperaceae spp. (sedges)	flower nectar, bergamot, buckbrush	July to early August
Dusted Skipper	*Atrytonopsis hianna*	statewide, more west	common	dry prairie hillsides	habitat sensitive	Poaceae spp. (grasses), esp. little bluestem	flower nectar	May to mid-June

Common Name	Scientific Name	ND Range	Status	Habitat	Guild	Key Larval Food	Key Adult Food	Adult Flight
Oslar's Roadside Skipper	*Amblyscirtes oslari*	west	uncommon	streambed hillsides in badlands	habitat sensitive	Poaceae spp. (grasses), esp. blue grama	flower nectar	June
Roadside Skipper	*Amblyscirtes vialis*	statewide, more west	uncommon	open areas in woodland	habitat sensitive	Poaceae spp. (grasses)	flower nectar, Indian hemp	May through June
Eufala Skipper	*Lerodea eufala*	east, only Cass Co.	rare, migrant	open areas, lawns	disturbance tolerant	Poaceae spp. (grasses)	flower nectar	late-summer migrant
Strecker's Giant Skipper	*Megathymus streckeri*	west	uncommon	badlands, short-grass prairie	habitat sensitive	yucca (*Yucca glauca*)	do not feed	late May through June
FAMILY PAPILIONIDAE								
Black Swallowtail	*Papilio polyxenes*	statewide	uncommon	gardens, roadsides, prairie hilltops	disturbance tolerant	Apiaceae spp. (parsley family, e.g. dill)	flower nectar	May and July (2 broods)
Old World Swallowtail (Baird's Swallowtail)	*Papilio Machaon Papilio bairdii*	west	uncommon	badlands	habitat sensitive	green sagewort	flower nectar, thistle	May and July (2 broods)
Anise Swallowtail	*Papilio zelicaon*	west	uncommon	badlands, gardens	disturbance tolerant	Apiaceae spp. (parsley family, e.g. dill)	flower nectar	May through early July
Giant Swallowtail	*Papilio cresphontes*	Ward, Cass, Barnes Co.	rare, migrant	hillsides, savanna	disturbance tolerant	does not reproduce in ND	bergamot, thistle	late-summer migrant only
Tiger Swallowtail	*Papilio glaucus*	statewide, primarily SE	uncommon, rare outside SE	deciduous woodland, streams	habitat sensitive	Prunus spp., birch, poplar, lilac	flower nectar, lilac, milkweed	June and early August (2 broods)
Canadian Tiger Swallowtail	*Papilio canadensis*	statewide	common	woodland, wooded urban	disturbance tolerant	poplar, willow, prunus spp., lilac	flower nectar, Indian hemp	June
Western Tiger Swallowtail	*Papilio rutulus*	unknown, questionable records in ND	rare or not present	riparian, parks, roadsides	N/A	poplar, willow, prunus spp., lilac	flower nectar	May and August (2 broods)
Two-tailed Swallowtail	*Papilio multicaudatus*	southwest	common	badlands, prairie hillsides	habitat sensitive	Prunus spp., serviceberry	flower nectar, thistle, dogbane	June through early August
Spicebush Swallowtail	*Papilio troilus*	questionable record in ND	rare or not present	woodland, open areas	N/A	does not reproduce in ND	flower nectar	migrant only
FAMILY PIERIDAE								
Spring White	*Pontia sisymbrii*	west, Golden Valley Co.	rare, only on known on Sentinel Butte	windy hilltops	habitat sensitive	Brassicaceae spp. (mustard)	unknown	April to early May
Checkered White	*Pontia protodice*	statewide	abundant	ubiquitous	disturbance tolerant	Brassicaceae spp. (mustard, cabbage)	flower nectar, alfalfa	May, July, September (3 broods)
Western White	*Pontia occidentalis*	statewide, more west	common	prairie hilltops, open areas	disturbance tolerant	Brassicaceae spp. (mustard, cabbage)	flower nectar, mustard	May and July (2 broods)
Mustard White	*Piers napi oleracea*	east-central, few records	rare	shady woodland	habitat sensitive	Brassicaceae spp. (mustard, cabbage)	flower nectar, mustard	June and August 92 broods)
Cabbage Butterfly	*Piers rapae*	statewide	abundant, non-native	ubiquitous	disturbance tolerant	Brassicaceae spp. (mustard, cabbage)	flower nectar	May to September (multiple broods)

Common Name	Scientific Name	ND Range	Status	Habitat	Guild	Key Larval Food	Key Adult Food	Adult Flight
Large Marble	*Euchloe ausonides*	Slope and Dunn Co.	rare	open areas, hillsides	disturbance tolerant	Brassicaceae spp.	flower nectar	May to July
Olympia Marble	*Euchloe olympia*	west	common	open prairie, sagebrush	habitat sensitive	Brassicaceae spp.	flower nectar	May to early June
Clouded Sulphur	*Colias philodice*	statewide	abundant	ubiquitous	disturbance tolerant	Fabaceae spp., alfalfa, peas, clover	flower nectar	May to September (multiple broods)
Alfalfa Butterfly (Orange Sulphur)	*Colias eurytheme*	statewide	abundant	ubiquitous	disturbance tolerant	Fabaceae spp., alfalfa	flower nectar	May to October (multiple broods)
Queen Alexandra's Sulphur	*Colias alexandra*	far west	very rare	badlands	habitat sensitive	Fabaceae spp.	flower nectar	early June to early August
Dog Face	*Zerene cesonia*	Slope and Cass Co.	rare, migrant	open prairie	N/A	does not reproduce in ND	flower nectar	migrant only
Cloudless Sulphur	*Phoebis sennae*	Dunn Co.	rare, migrant	open disturbed areas	disturbance tolerant	does not reproduce in ND	flower nectar	migrant only
Little Sulphur	*Eurema lisa*	Cass Co.	rare or not present	dry open areas	N/A	does not reproduce in ND	flower nectar	migrant only
Mexican Yellow	*Eurema mexicanum*	Slope and Grand Forks Co.	rare, migrant	roadsides, open areas	N/A	does not reproduce in ND	flower nectar	late-summer migrant only
Dainty Sulphur	*Nathalis iole*	statewide	rare, migrant	roadsides, open areas	N/A	does not reproduce in ND	flower nectar	late-summer migrant only
FAMILY LYCAENIDAE								
Harvester	*Feniseca tarquinius*	far east	rare, local	deciduous woodland near water	habitat sensitive	carnivorous, larvae feed on wooly aphids	aphid honeydew	May and August (2 broods)
Little Copper	*Lycaena phlaeas*	Cass Co.	rare or not present	disturbed areas	N/A	Polygonaceae spp. (dock)	flower nectar	unknown
Gray Copper	*Lycaena dione*	statewide	common	roadsides, prairie, disturbed areas	disturbance tolerant	Polygonaceae spp., (dock, *Rumex)*	flower nectar	late June through July
Bronze Copper	*Lycaena hyllus*	statewide	common	open wet meadows	disturbance tolerant	Polygonaceae spp., (dock, *Rumex)*	flower nectar	June and August (2 broods)
Ruddy Copper	*Lycaena rubida*	southwest	locally common	riparian, badlands	habitat sensitive	Polygonaceae spp., (dock, *Rumex)*	flower nectar	mid-June to early July
Purplish Copper	*Lycaena helloides*	statewide	common to abundant	ubiquitous	disturbance tolerant	Polygonaceae spp., (dock, *Rumex)*	flower nectar	June through September (multiple broods)
Acadian Hairstreak	*Satyrium acadicum*	statewide	common	willow streams and wetlands	habitat sensitive	Salix spp. (willow)	flower nectar, white	late June through July
Coral Hairstreak	*Satyrium titus*	statewide	common	shrubland, open woodland	habitat sensitive	Prunus spp., wild cherry and plum	flower nectar, white or purple	July through August
Edward's Hairstreak	*Satyrium edwardsii*	statewide	locally abundant	bur oak woodland	habitat sensitive	bur oak	flower nectar	late June through July

Common Name	Scientific Name	ND Range	Status	Habitat	Guild	Key Larval Food	Key Adult Food	Adult Flight
Banded Hairstreak	*Satyrium calanus*	statewide	common	bur oak woodland	habitat sensitive	bur oak	flower nectar, dogbane, milkweed, clover	late June through July
Striped Hairstreak	*Satyrium liparops*	statewide	common	shaded woodland	habitat sensitive	Rosaceae spp.	flower nectar, white clover	late June to early July
Sheridan's Hairstreak	*Callophrys sheridanni*	far west, few records	very rare	sagebrush, dry hillsides	habitat sensitive	Eriogonum spp. buckwheat	flower nectar	mid-April to mid-May
Juniper Hairstreak	*Mitoura siva*	far west	uncommon	badlands juniper breaks	habitat sensitive	Rocky mountain juniper	flower nectar	late May through June
Hoary Elfin	*Incisalia polia*	west-central	locally abundant	bearberry, aspen woodland	habitat sensitive	bearberry	flower nectar	mid-May
Western Pine Elfin	*Incisalia eryphon*	Slope Co.	locally abundant	ponderosa pines	habitat sensitive	ponderosa pine	flower nectar, currant	mid-June to early July
Gray Hairstreak	*Strymon melinus*	statewide	common	ubiquitous	disturbance tolerant	Fabaceae spp., many plant families	flower nectar	May, July and August (multiple broods)
Reakirt's Blue	*Echinargus isola*	statewide	rare, migrant	open areas	disturbance tolerant	does not reproduce in ND	flower nectar	late-summer migrant only
Eastern Tailed-Blue	*Cupido comyntas*	east	common	humid open areas	disturbance tolerant	Fabaceae spp.	flower nectar, clover	May to September (multiple broods)
Western Tailed-Blue	*Cupido amyntula*	northwest	locally abundant	humid wooded areas, Turtle Mtn	disturbance tolerant	Fabaceae spp.	flower nectar	June and August (2 broods)
Spring Azure **Summer Azure**	*Celastrina ladon* *Celastrina neglecta*	statewide	common, difficult to identify between species	open deciduous woodland, wetland, gardens	disturbance tolerant	Rosaceae spp. (juneberry, plum), dogwood, viburnum, spiraea	flower nectar, dogbane	Spring Azure May, Summer Azure June and August
Silvery Blue	*Glaucopsyche lygdamus*	statewide	common	open areas near woodland	disturbance tolerant	Fabaceae spp.	flower nectar	late May through June
Melissa Blue	*Plebejus melissa*	statewide	common to abundant	open areas, prairie	disturbance tolerant	Fabaceae spp.	flower nectar	mid-June and mid-August (2 broods)
Greenish Blue	*Plebejus saepiolus*	west	common to locally abundant	open woodland, roadsides, wetlands	disturbance tolerant	Fabaceae spp., white clover	flower nectar	June to mid-July
Boisduval's Blue	*Plebejus icarioides*	far southwest	uncommon	prairie, sagebrush	habitat sensitive	silvery lupine	flower nectar, wild buckwheat	June
Shasta Blue	*Plebejus shasta*	southwest	rare	sagebrush, rolling prairie	habitat sensitive	Fabaceae spp.	flower nectar	June
Acmon Blue	*Plebejus acmon*	southwest	rare	badlands	habitat sensitive	wild buckwheat (*Erogonum* spp.)	flower nectar	June and August (2 broods)
Arctic Blue (Rustic Blue)	*Plebejus glandon*	Burke Co.	rare	sand or gravel prairie	habitat sensitive	rockjasmine, unknown in ND	flower nectar	late May through June
FAMILY RIODINIDAE								
Mormon metalmark	*Apodemia mormo*	southwest	uncommon	badlands	habitat sensitive	wild buckwheat (Erogonum spp.)	rabbit bush	August
FAMILY NYMPHALIDAE								

Common Name	Scientific Name	ND Range	Status	Habitat	Guild	Key Larval Food	Key Adult Food	Adult Flight
Snout Butterfly	*Libytheana carinenta*	statewide	rare, migrant	open woodland, roadsides	disturbance tolerant	does not reproduce in ND	hackberry nectar, rabbit bush	late-summer migrant only
Gulf Fritillary	*Agraulis vanillae*	statewide	rare, migrant	open areas	disturbance tolerant	does not reproduce in ND	flower nectar	late-summer migrant only
Variegated Fritillary	*Euptoieta claudia*	statewide	abundant to uncommon	open areas, prairie, roadsides	disturbance tolerant	wide variety of plants	flower nectar	May, summer migrant
Great Spangled Fritillary	*Speyeria cybele*	statewide	common	woodland edges	habitat sensitive	violet spp. (Viola)	bergamot, thistle, blazing star, milkweed	June to early August
Aphrodite Fritillary	*Speyeria aphrodite*	statewide	common	open prairie	habitat sensitive	violet spp. (Viola)	thistle, bergamot, blazing star, milkweed	June to early August
Regal Fritillary	*Speyeria idalia*	statewide, more south	uncommon	mesic prairie	habitat sensitive	Birdfoot violet, viola spp.	thistle, blazing star, milkweed	June through August
Edward's Fritillary	*Speyeria edwardsii*	west	uncommon	badlands hilltops, prairie	habitat sensitive	violet spp. (Viola)	thistle	mid-June to July
Callippe Fritillary	*Speyeria callippe*	west	common to locally abundant	open prairie, hilltops	disturbance tolerant	violet spp. (Viola)	thistle, alfalfa	mid-June to July
Atlantis Fritillary	*Speyeria atlantis*	north	uncommon	open woodland, roadsides	disturbance tolerant	violet spp. (Viola)	bergamot	mid-June through July
Mormon Fritillary	*Speyeria mormonia*	north	uncommon	open areas, woodland edges	disturbance tolerant	violet spp. (Viola)	flower nectar, goldenrod	July
Silver-bordered Fritillary	*Boloria selene*	statewide	common	wet meadows, lake edges	disturbance tolerant	violet spp. (Viola)	flower nectar, goldenrod	May/ June and July/August
Meadow Fritillary	*Boloria bellona*	statewide, more east	common	wet meadows	habitat sensitive	violet spp. (Viola)	flower nectar,	May and July (2 broods)
Gorgone Checkerspot	*Chlosyne gorgone*	statewide	common	open areas, roadsides, fields	disturbance tolerant	Asteraceae spp.	flower nectar, yellow flowers	June and July/August (2 broods)
Silvery Checkerspot	*Chlosyne nycteis*	east	uncommon	humid woodland, riverbottoms	habitat sensitive	Asteraceae spp.	flower nectar, red clover	June to July
Harris' Checkerspot	*Chlosyne harrisii*	east, few records	rare	fens, wet meadows	habitat sensitive	Asteraceae spp.	flower nectar	June
Sagebrush Checkerspot	*Chlosyne acastus*	west	uncommon	badlands, riparian	habitat sensitive	rabbit bush	flower nectar, chokecherry	late May/early June, late July/early Aug (2 broods)
Texan Crescent	*Anthanassa texana*	statewide, one record	rare, migrant	dry open areas	disturbance tolerant	does not reproduce in ND	flower nectar	late-summer migrant only
Pearl Crescent	*Phyciodes tharos*	statewide	common	ubiquitous	disturbance tolerant	Asteraceae spp. (Asters)	flower nectar	May to September (multiple broods)
Northern Crescent	*Phyciodes cocyta*	north	locally abundant	moist woodland roadsides	disturbance tolerant	Asteraceae spp., small blue aster	flower nectar, white clover	June to July
Tawny Crescent	*Phyciodes batesii*	north and west	uncommon	woodland roadsides	disturbance tolerant	Asteraceae spp., smooth blue aster	flower nectar, white clover	June

Common Name	Scientific Name	ND Range	Status	Habitat	Guild	Key Larval Food	Key Adult Food	Adult Flight
Question Mark	*Polygonia interrogationis*	statewide, more southeast	rare	woodland	habitat sensitive	American elm, hackberry, nettles	rotting fruit, tree sap, carrion, dung	April/May, late June/August (2 broods)
Eastern Comma (aka Hop Merchant)	*Polygonia comma*	statewide	abundant	deciduous woodland, parks	disturbance tolerant	American elm, hops, nettle	rotting fruit, tree sap	April/May, late June/August (2 broods)
Satyr Comma (akak Satyr Anglewing)	*Polygonia satyrus*	questionable records in ND	rare or not present	open areas	N/A	nettles	rotting fruit, tree sap	unknown
Green Comma	*Polygonia faunus*	questionable record in ND	rare or not present	woodland	N/A	willow, birch, alder	flower nectar, carrion, dung	July or August
Hoary Comma (aka Zephyr)	*Polygonia cracilis*	questionable records in ND	rare or not present	woodland streams	N/A	currants	flower nectar, tree sap	unknown
Gray Comma	*Polygonia progne*	statewide	uncommon	woodland, parks, gardens	disturbance tolerant	currants	rotting fruit, tree sap	April/May, late June/August (2 broods)
Compton Tortoiseshell	*Nymphalis vaualbum*	statewide	rare to common	mature woodland	habitat sensitive	willow, birch, poplars	rotting fruit, tree sap	April/May, late June/August (2 broods)
California Tortoiseshell	*Nymphalis californica*	east	rare, migrant	woodland	disturbance tolerant	does not reproduce in ND	flower nectar	late-summer migrant only
Mourning Cloak	*Nymphalis antiopa*	statewide	common	ubiquitous, riparian	disturbance tolerant	willow, poplar, birch, elm	tree sap, rotting fruit	late April to July
Milbert's Tortoiseshell	*Aglais milberti*	statewide	rare to common	ubiquitous	disturbance tolerant	nettles, willows	flower nectar, tree sap, rotting fruit	May to September (multiple broods)
American Painted Lady	*Vanessa virginiensis*	statewide	common, migrant	open prairie, meadows	disturbance tolerant	Asteraceae spp., pussy toes	flower nectar	May to August
Painted Lady	*Vanesa cardui*	statewide	abundant, migrant	ubiquitous	disturbance tolerant	Asteraceae spp., thistles	flower nectar, thistles, asters	May to September
West Coast Lady	*Vanessa annabella*	statewide, migrant	rare, migrant	ubiquitous	disturbance tolerant	does not reproduce in ND	flower nectar	late-summer migrant only
Red Admiral	*Vanessa atalanta*	statewide	common	ubiquitous	disturbance tolerant	nettles	tree sap, rotting fruit, bird feces	April to September
Common Buckeye	*Junonia coenia*	statewide	uncommon	open areas, roadsides, lawns	disturbance tolerant	plantain, vervain	flower nectar, aster	May to September
White Admiral	*Limenitis arthemis*	statewide	common	woodland edges	habitat sensitive	willow, aspen, birch	sap, rotting fruit, carrion, dung, flower nectar	June to early July
Red-spotted Purple	*Limenitis arthemis*	south	rare	woodland	habitat sensitive	prunus, hawthorn, serviceberry, poplar	sap, rotting fruit, carrion, dung, flower nectar	late June to early July
Viceroy	*Limenitis archippus*	statewide	uncommon	open shrub, wet meadows, roadsides	disturbance tolerant	willow, poplar	aphid honeydew, carrion, dung, flower nectar	early June and early August (2 broods)

Common Name	Scientific Name	ND Range	Status	Habitat	Guild	Key Larval Food	Key Adult Food	Adult Flight
Weidemeyer's Admiral	*Limenitis weidemeyerii*	southwest	uncommon	badlands	habitat sensitive	poplar, willow, prunus	flower nectar, bergamot	mid-June through July
Hackberry Emperor	*Asterocampa celtis*	statewide	uncommon	woodland areas, wooded streams	habitat sensitive	common hackberry	sap, rotting fruit, carrion, dung	July
Tawny Emperor	*Asterocampa clyton*	east, one record	rare	woodland	habitat sensitive	common hackberry	sap, rotting fruit, carrion, dung	July to August
Northern Pearly Eye	*Enodia anthedon*	statewide	uncommon	shaded woodland	habitat sensitive	woodland grasses	sap, dung, carrion, fungi	July
Eyed Brown	*Satyrodes eurydice*	statewide	common to abundant	open wetlands, meadows	habitat sensitive	sedges	sap, bird feces, flower nectar	June through July
Little Wood Satyr	*Megisto cymela*	statewide, east	common	shaded woodland	habitat sensitive	orchard grass	sap, aphid honeydew	late May to July
Common Ringlet	*Coenonympha inornata*	statewide	abundant	open prairie, fields, meadows	disturbance tolerant	Poaceae spp. (grasses), needlegrass, poa spp.	flower nectar	late May to June
Common Wood Nymph	*Cercyonis pegala*	statewide	common	open prairie, fields, woodland edges	disturbance tolerant	Poaceae spp. (grasses), bluestem	rotting fruit, flower nectar	July to August
Mead's Wood Nymph	*Cercyonis meadii*	southwest	uncommon	badlands	habitat sensitive	Poaceae spp. (grasses), blue grama	flower nectar	August
Small Wood Nymph	*Cercyonis oetus*	southwest	uncommon	badlands, sagebrush, open woodland	habitat sensitive	Poaceae spp. (grasses)	flower nectar	July to August
Red-disked Alpine	*Erebia discoidalis*	questionable record in ND	rare or not present	grassy bog	N/A	Poaceae spp. (grasses)	flower nectar	July
Ridings' Satyr	*Neominois ridingsii*	west	rare or no longer present	shortgrass dry prairie	habitat sensitive	blue grama	flower nectar, yellow flowers	mid-June to early July
Uhler's Arctic	*Oeneis uhleri*	statewide, west	uncommon	prairie slopes	habitat sensitive	Poaceae spp. (grasses)	unknown	May to June
Alberta Arctic	*Oeneis alberta*	northwest	very rare	native prairie, dry bunchgrass	habitat sensitive	Poaceae spp. (grasses), festuca	unknown	mid-May
Monarch	*Danaus plexippus*	statewide, east	common	ubiquitous	disturbance tolerant	milkweed	flower nectar, milkweed, blazing star	mid-May to October
Queen	*Danaus glippus*	questionable record in ND	rare or not present	ubiquitous	disturbance tolerant	milkweed	flower nectar	migrant

Guild: a generalization of habitat sensitivity of the species.

Habitat Sensitive = specific to certain habitat types and/or larval food, e.g. Dakota Skippers are restricted to expanses of prairie

Disturbance Tolerant = less sensitive to human alterations of the landscape, e.g. Monarch Butterflies may be successful even in backyard gardens if milkweed is present

Appendix D. Moths of North Dakota.

	Number of Species in ND	Pollination Services	Pollinator Importance	Comments
FAMILY PRODOXIDAE – Yucca Moths	2	yucca plants	high – intentional pollinator	
FAMILY GLYPHIPTERIGIDAE – Sedge Moths	1	visits flowers	low- accidental pollinator	
FAMILY SESIIDAE – Clearwing Moths	9	visits flowers	low- accidental pollinator	
FAMILY CHOREUTIDAE – Choreutid Moths	1	visits flowers	low- accidental pollinator	
FAMILY SPHINGIDAE – Sphinx Moths/Hawkmoths/Hummingbird Moths	37	visits flowers	moderate – accidental pollinator	
Achemon Sphinx (*Eumorpha achemon*) Wild Cherry Sphinx (*Sphinx drupiferarum*) Spurge Hawkmoth (*Hyles euphorbiae*) White-lined Sphinx (*Hyles lineata*) Hermit Sphinx (*Lintneria eremitus*)		visits flowers	high	documented pollinators of Western Prairie Fringed Orchid (Travers et al. 2011)
FAMILY NOCTUIDAE – Owlet Moths	576	visits flowers	low- accidental pollinator	
Dusky Dune Moth (*Copablepharon longipenne*)				endangered in Canada

Travers, S. E., Fauske, G. M., Fox, K., Ross, A. A., & Harris, M. O. (2011). The hidden benefits of pollinator diversity for the rangelands of the Great Plains: Western prairie fringed orchids as a case study. Rangelands, 33(3), 20-26.