North Dakota Industrial Commission
Outdoor Heritage Fund Grant Application

Name of Organization
North Dakota State University

Federal Tax ID#
45-6002439

Contact Person/Title
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(co-PI) Dr. Deirdre A. Prischmann-Voldseth, Assistant Professor, NDSU Entomology

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List names of co-applicants if this is a joint proposal
Dr. Marion Harris
Dr. Deirdre A. Prischmann-Voldseth

MAJOR Directive:
Choose only one response

O **Directive A**. Provide access to private and public lands for sportsmen, including projects that create fish and wildlife habitat and provide access for sportsmen;

O **Directive B**. Improve, maintain, and restore water quality, soil conditions, plant diversity, animal systems and to support other practices of stewardship to enhance farming and ranching;

xx O **Directive C**. Develop, enhance, conserve, and restore wildlife and fish habitat on private and public lands; and

O **Directive D**. Conserve natural areas for recreation through the establishment and development of parks and other recreation areas.

Additional Directive
Choose all that apply

O **Directive A**. Provide access to private and public lands for sportsmen, including projects that create fish and wildlife habitat and provide access for sportsmen;

xx O **Directive B**. Improve, maintain, and restore water quality, soil conditions, plant diversity, animal systems and to support other practices of stewardship to enhance farming and ranching;

O **Directive C**. Develop, enhance, conserve, and restore wildlife and fish habitat on private and public lands; and

O **Directive D**. Conserve natural areas for recreation through the establishment and development of parks and other recreation areas.

Type of organization:

xx State Agency

O Political Subdivision

O Tribal Entity

O Tax-exempt, nonprofit corporation, as described in United States Internal Revenue Code (26 U.S.C. § 501 (c)

Project Name

Enhancing stewardship and agronomic benefits of seasonal wetlands for producers and wildlife in North Dakota: the role of beneficial insects and plant diversity

Abstract/Executive Summary. An Executive Summary of the project stating its objectives, expected results, duration, total project costs and participants. (no more than 500 words)

Seasonal wetlands are an integral part of the landscape in many areas of North Dakota. Their value as wildlife habitat and in preserving water quality is well known. However, **are there additional benefits that seasonal wetlands might be providing to wildlife and producers, in relation to insects?**

One aspect of seasonal wetlands that has not been fully assessed is their potential role as a refuge and reservoir for beneficial insects such as pollinators, natural enemies of crop pests, and insects that sustain wildlife. Within an agricultural matrix, remnant and edge habitat is often a valuable resource for these insects (e.g. provides shelter and food). Thus, seasonal wetland habitat can potentially contribute to the conservation of beneficial insects across the landscape, which is especially important for pollinators due to changes in land-use across the state (i.e. increasing agricultural acres). Furthermore, seasonal wetlands are likely important sources of insects that provide benefits to producers (enhanced pollination services, increased control of agricultural pests) and wildlife (more abundant food resources) on a larger geographical scale.

We plan to conduct a series of field surveys and experiments to address **four specific project objectives**: 1) Are seasonal wetlands refuges or reservoirs of beneficial insects? 2) What wetland plants would be the best targets for conservation and restoration efforts, in relation to beneficial insects? 3) How does the condition of wetland edges (limited or extended) impact the resident insect community? 4) What impact do wetland insects have on pest control within surrounding crops?

We **expect the following results** from the project: 1) document insects associated with seasonal wetlands, 2) identify potential benefits of wetland associated insects to producers and wildlife in North Dakota, and 3) determine how wetland stewardship could impact insects and maximize benefits. We plan to disseminate our results to stakeholders and the scientific community in several ways, e.g. meetings, conferences, scientific publications, articles in regional/trade magazines, and online.

Information generated by this project could be used to help farmers adjust management practices to maximize benefits associated with seasonal wetlands. This project could also help guide wetland restoration and mitigation efforts. In addition, if seasonal wetlands are functioning as refuges or reservoirs for beneficial insects, this could be used to inform policy and contribute to the development of landowner incentives for long-term sustainable management of these habitats.

This project primarily relates to grant **Directive C** and secondarily to **Directive B**. It's a **new project** (i.e. newly developed, not currently funded) with an anticipated **4-year duration** and a **total project cost** of $860,610 (of which $499,578 is the amount requested and $361,032 is matching funds).

Primary **participants** are Dr. Marion Harris (PI) and Dr. Deirdre Prischmann-Voldseth (co-PI), who are faculty in the NDSU Entomology Department. Harris's expertise is on plant-insect interactions, insect pollinators, and insect behavior. Prischmann-Voldseth's research focuses on insect pests and natural enemies within agronomic systems. We plan to hire a Research Scientist with expertise in ecosystem ecology involving grassland, wetland and agroecology systems to support and enhance strengths of other team members.

Amount of Grant request $ 499,578

Total Project Costs $ 860,610
(Note that in-kind and indirect costs can be used for matching funds)

Amount of Matching Funds $ 361,032 (cash and indirects)
If applicable. Please indicate if the matching funds will be in-kind, indirect or cash.

Source(s) of Matching Funds
North Dakota State University and the ND Agriculture Experiment Station

Certifications
xx O I certify that this application has been made with the support of the governing body and chief executive of my organization.

xx O I certify that if awarded grant funding none of the funding will be used for any of the exemptions noted on Page 1 of this application.

Narrative

Organization Information –
Include an overview of your organizational structure, including board, staff and volunteer involvement. (no more than 300 words)

North Dakota State University first opened as a public land grant institution in Fargo, North Dakota, in 1890, shortly after North Dakota officially became a state in November 1889. Initially known as the North Dakota Agricultural College, the college's name was changed to North Dakota State University in 1960. The North Dakota Agricultural Experiment Station and NDSU Extension Service are integral parts of the University. NDSU accepted its first graduate students in 1895.

NDSU has enjoyed steady growth, with enrollment now exceeding 14,500 students and over 700 faculty members. NDSU offers over 100 undergraduate and approximately 100 graduate programs in a wide variety of fields, with degrees awarded at the doctoral, master's, professional, and baccalaureate levels. In addition to their academic studies, students have opportunities to participate in approximately 300 student organizations, leadership development, civic engagement activities, fine arts, athletics, and study abroad.

NDSU is part of the North Dakota University System (NDUS) which includes 11 campuses across the state. The State Board of Higher Education (SBHE) is the policy-setting and governing body for the NDUS. The SBHE is made up of seven citizen members appointed to four-year terms by the governor, one student appointed by the governor to serve a one-year term, a non-voting faculty advisor and a non-voting staff advisor. NDSU is headed by a President, with a Provost who provides administrative leadership for all academic activities, including eight academic colleges and the graduate school.

NDSU's mission statement: "With energy and momentum, North Dakota State University addresses the needs and aspirations of people in a changing world by building on our land-grant foundation." With its land-grant mission to provide quality education, leading-edge research and excellent service, NDSU is acknowledged as a national leader among its peers.

Purpose of Grant – Describe the proposed project identifying how the project will meet the specific directive(s) of the Outdoor Heritage Fund Program

Identify project goals, strategies and benefits and your timetable for implementation. Include information about the need for the project and whether there is urgency for funding. Please indicate if this is a new project or if it is replacing funding that is no longer available to your organization. Identify any innovative features or processes of your project.

Need for the Project: The importance and stewardship of seasonal wetlands within agro-ecosystems is an increasingly relevant topic with multiple perspectives and goals. Favorable commodity markets and climatic conditions along with advances in technology have led to expansion of row crop agriculture across the Upper Midwest, including in North Dakota (Johnston 2013, Wright and Wimberly 2013). Such agricultural expansion can result in a reduction of suitable habitat available to support various stages of some wildlife populations, e.g. reduced availability of quality nesting habitat for game birds or to plant communities essential to insect pollinators. In areas of North Dakota where row crop agriculture exists or has expanded, seasonal wetlands often remain within the landscape and are farmed around.

Seasonal wetlands provide many ecosystem services, including habitat for wildlife and improved water quality. However, it is not well known to what degree seasonal wetlands may function as refuges for beneficial insects (providing shelter and food resources) and as reservoirs from which insects can migrate across the landscape providing pollination services and reducing problems with crop pests. Bolstering and sustainably supporting populations of beneficial insects through conservation management could in turn provide significant value-added benefits to both wildlife and producers.

This raises two key questions:

1) **within the context of the broader reduction of wildlife habitat due to crop expansion, have seasonal wetlands become even more critical as wildlife habitat?**
2) **can stewardship of seasonal wetland habitat lead to enhanced agronomic benefits for producers?**

Pollinators. Currently, in North Dakota an increasing amount of land is being used for crop production agriculture. This may lead to a reduction in acres available to support foraging, sheltering and nesting of insect pollinators. Pollinators are critical to the production of many agricultural crops, and declining pollinator health is a national concern (Woteki 2013). North Dakota is one of the primary overwintering sites for the nation's honeybees, not to mention the top honey producing state in the country (NASS 2013). Plants associated with seasonal wetlands are a potentially rich source of food and shelter for insect pollinators, especially within crop monocultures. In addition, if seasonal wetlands are functioning as refuges or reservoirs for pollinators, this information could inform policy and support further development of conservation management incentives for landowners.

Natural Enemies. Remnant and conservation habitats (e.g. grassed waterways, field edges, buffer strips) in good condition within and surrounding crop fields can support substantial beneficial insect populations (Dollar 2013) that could enhance control of agricultural pests by natural enemies, such as predators and parasitoids (Barbosa 1998). Non-crop plants can provide shelter and food resources (e.g. non-pest herbivores) that help maintain high densities of natural enemies in close proximity to fields, where they are ready to attack pests when they arrive, thus reducing crop damage and the need for costly insecticidal sprays. Seasonal wetlands are an integral part of the agricultural

landscape of North Dakota. However, their potential as a source of natural enemies and the impact of these beneficials within surrounding crop fields needs further study.

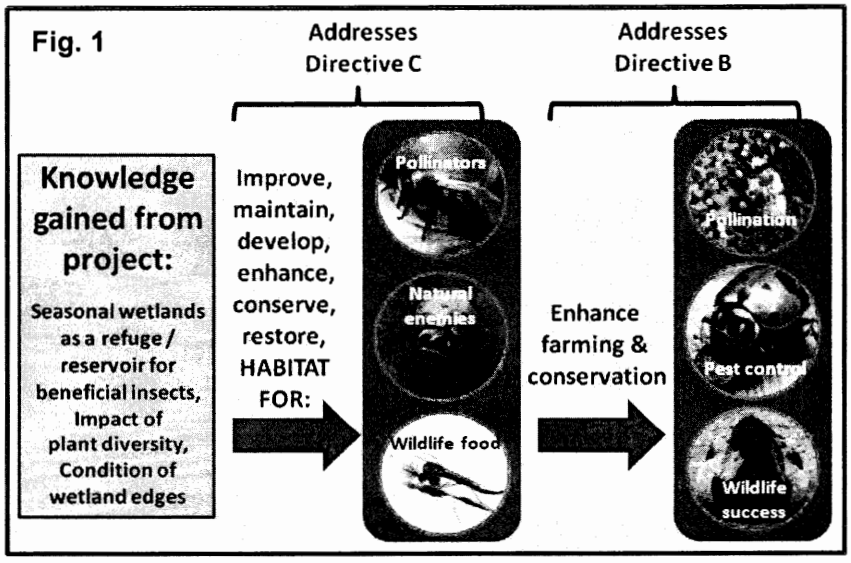
Food for Wildlife. Hunting waterfowl and upland game birds are key recreational activities and major sources of revenue in North Dakota (Southwick Associates 2012). Insects make up a significant portion of the diet of game birds (e.g. ducks, pheasants) and non-game species, and are especially important for reproductive females and young birds (Swanson et al. 1985, King and Wrubleski 1998). Key factors that may impact wetland insect populations are the availability of insect-preferred plant resources and the extent of "wetland edges" (we use the term "wetland edge" in reference to the area of wetland vegetation that occurs between the tilled field and the normally inundated shallow marsh zone). Although some studies have assessed wetland invertebrates, their focus was often on aquatic insects (Euliss and Mushet 1999, Gleason et al. 2004). More information is needed about how wetland plant diversity and edge condition impact beneficial insects associated with seasonal wetland habitat in our state.

Project Goals & How Project Meets Directives: There are 3 essential goals or outcomes of this project that we expect to achieve: 1) document insects associated with seasonal wetlands, 2) identify potential benefits of wetland associated insects to producers and wildlife in North Dakota, and 3) determine how wetland stewardship could impact insects and maximize benefits.

We have four **specific objectives/questions** that relate to the project goals:

1) Are seasonal wetlands refuges and/or reservoirs of beneficial insects?
2) What wetland plants would be the best targets for conservation and restoration efforts, in relation to beneficial insects?
3) How does the condition of wetland edges (limited or extended) impact the resident insect community?
4) What impact do wetland insects have on pest control within surrounding crops?

Answering these questions and meeting these goals clearly addresses **Directive C** (Develop, enhance, conserve, and restore wildlife and fish habitat on private and public lands) and **Directive B** (Improve, maintain, and restore water quality, soil conditions, plant diversity, animal systems and to support other practices of stewardship to enhance farming and ranching; Fig. 1).



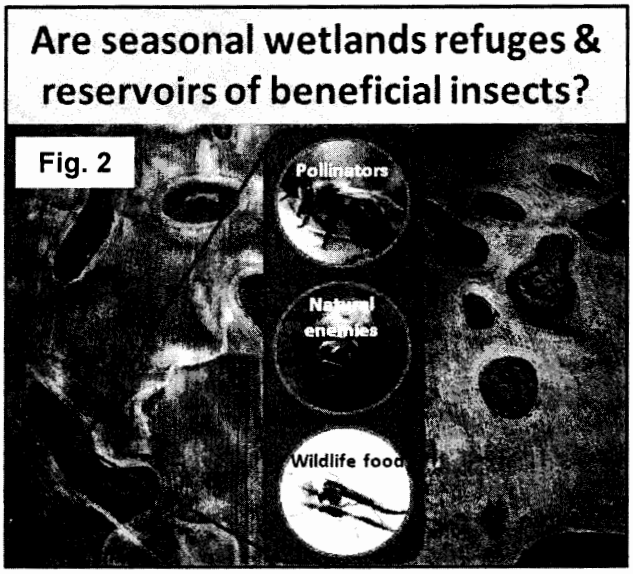
Potential Project Benefits: Determining if seasonal wetlands are habitats used by beneficial insects and understanding more about how plant diversity and wetland edge condition impacts the insect community can help conserve and enhance populations of pollinators, natural enemies and insects that are food for wildlife (Fig. 1). This in turn can potentially benefit wildlife (e.g. increased reproduction and survival of offspring) and agricultural production (e.g. enhanced pollination and pest control within crop fields). Information generated by this project could also help producers adjust management practices to maximize benefits associated with seasonal wetlands and help guide wetland restoration and mitigation efforts. In addition, if seasonal wetlands are functioning as refuges or reservoirs for pollinators and other beneficial insects, this could contribute to the development of landowner incentives for long-term sustainable management of these habitats.

Strategies & Methods: We plan to conduct a series of field surveys and experiments to address the project goals and objectives. We will identify 10-16 or more seasonal wetlands of generally similar size but with both limited and extended edge zones, targeting those located within corn/soybean agroecosystems. We will utilize paired wetland-crop sites (i.e. we will sample wetlands and in the adjacent crop fields) in order to distinguish between insects associated with seasonal wetlands and those present in the general crop environment.

Seasonal wetland plant community composition often varies to some degree both intra- and inter-annually and insects, especially more mobile ones, may only be associated with plants at certain points in time (e.g. during flowering). Therefore, we plan to sample throughout the season across 3 years to capture a large range of plant-insect associations.

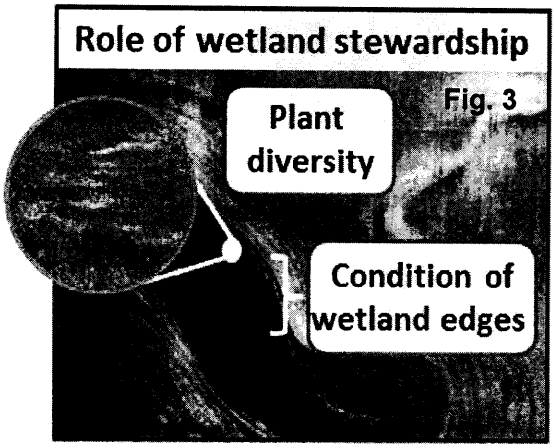
1) Are seasonal wetlands refuges and/or reservoirs of beneficial insects?

In order to answer this question we will establish transects within replicated wetland and paired crop field sites. We are primarily interested in terrestrial insects (including terrestrial life stages of aquatic insects). We will use a variety of sampling methods to quantify insects and document insect-plant associations, e.g. sweep nets, beat sheets, sticky traps, pitfall traps, bee bowls, and non-destructive plant counts. Sampling of the latter will use a transect method with 1 m^2 quadrats to document plant species occurrence and abundance (Barbour et al. 1999), and will determine those that are potentially important insect host plants (i.e. flowering forbs, etc.). Our focus will be on pollinators, natural enemies, and insects that are important food resources for avian wildlife (e.g. midges). We plan to sample bi-monthly from May/June-Aug.



2) What wetland plants would be the best targets for conservation and restoration efforts, in relation to beneficial insects?

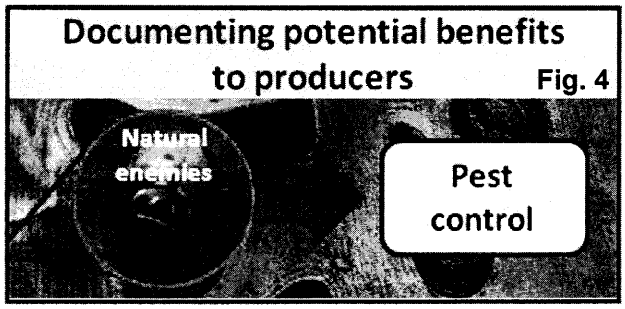
3) How does the condition of wetland edges (limited or extended) impact the resident insect community?



Objectives 2 and 3 will be addressed by focusing on specific aspects of the sampling described for Objective 1. For Objective 2, we will use beat sheets and non-destructive plant sampling to document the association of specific insects with particular plant species. Plants will be identified taxonomically to genus and species with any verification collections preserved by the pressing method. For Objective 3, we will compare our wetland sites that differ in edge condition to explore relationships between plant community complexity (area, diversity, occurrence of insect preferred plants) and resident insect populations.

4) What impact do wetland insects have on pest control within surrounding crops?

In order to address this question, we plan to conduct a series of experiments at our field sites. We will establish 4 transects (est. 100-150 m) radiating outward from the center of the wetland into the surrounding crop. We will also set up transects at paired crop field sites. Periodically along transects we will infest plants with crop pests from a lab-reared colony. Our plan is to initially focus on soybean and soybean aphids and secondarily on corn and corn leaf aphids. We will assess densities of pests and natural enemies every 3-7 d. We will also have controls in which the pests are protected from natural enemies (in cages) so we can separate effects of natural enemies and the environment on pest densities. Our expectation for these experiments is that if seasonal wetlands are a source of beneficial natural enemies, pest control should decrease as we move further away from the wetland, and there should be no impact of distance on pest control in paired crop field sites lacking wetlands. We plan to repeat these experiments at least twice during the growing season.



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Project Timetable: This is a **new project** and work cannot begin until funding is secured.

Personnel	Year 1				Year 2				Year 3				Year 4			
	Sp	Su	F	W	Sp	Su	F	W	Sp	Su	F	W	Sp	Su	F	W
Recruit & hire research scientist	●															
Research scientist working on project	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●
Recruit & hire graduate student				●												
Graduate student training / doing work					●	—	—	—	—	—	—	—	—	—	—	●
Hire hourly employee	●															
Hourly employee training / doing work	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●

Implementation / Research	Year 1				Year 2				Year 3				Year 4			
	Sp	Su	F	W	Sp	Su	F	W	Sp	Su	F	W	Sp	Su	F	W
Locate wetlands and paired field crop sites	●				●	(if needed)			●	(if needed)						
Contact landowners & obtain permission	●				●	(if needed)			●	(if needed)						
Finalize study design & protocols	●				●	(if needed)			●	(if needed)						
Bimonthly collection of insect/plant samples for Objs 1-3	●	—	●		●	—	●		●	—	●					
Sample processing	●	—	—	●	●	—	—	●	●	—	—	●		●	●	
Identification & preservation of samples		●	—	●		●	—	●		●	—	●				
Rearing insects for Obj 4					●	—	●		●	—	●		●	—	●	
Conducting field experiments for Obj 4					●	—	●		●	—	●		●	—	●	
Data entry			●	●			●	●			●	●		●	●	
Data analysis & interpretation			●	—	●		●	—	●		●	—	—	—	—	●

Management / Reporting	Year 1				Year 2				Year 3				Year 4			
	Sp	Su	F	W	Sp	Su	F	W	Sp	Su	F	W	Sp	Su	F	W
Initial management meeting	●															
Regular progress meetings (wk / bimonth)	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●
Regular evals /reports for granting agency				●	(or as requested)			●				●				
Final eval & report for granting agency																●
Presentations at meetings			●				●				●				●	
Present project info / results online				●				●				●				●
Write articles for regional publications				●				●				●				
Compose scientific publications								●	—	—	—	—	—	—	—	●

Innovative Features & Processes: Many projects tend to tackle issues from a singular point of view. We recognize that each stakeholder group (from production agriculture to conservation) has valid perspectives and needs, and we believe this project has potential benefits for multiple entities (i.e. can be a win-win endeavor). Additionally, we are approaching this project using a multidisciplinary approach. The expertise of our team members (field crops entomology, integrated pest management, plant-insect interactions, agriculture and wetland systems management and ecology) will contribute to our ability to consider the project from multiple points of view.

Management of Project – Provide a description of how you will manage and oversee the project to ensure it is carried out on schedule and in a manner that best ensures its objectives will be met.

Include a brief background and work experience for those managing the project.

Management Plans: Diligent and responsible management is key to a successful project. Our approach has several components that by design and when enacted, will ensure attainment of goals / objectives and timely completion of the project.

1) Define roles and responsibilities of all investigators and research staff, emphasizing oversight, goals, objectives, and timelines.
2) Establish oversight and communication plan for dealing with all aspects of the study, requiring frequent progress and status reporting by project staff.
3) Establish rules of responsible conduct for all research members and phases of the project, emphasizing scientific integrity, being mindful of timelines, proper data collection methods and management, and progress reporting.
4) Arrange systematic strategy and progress meetings to keep all personnel well informed on all aspects of the study and to ensure that all timeline and project phase requirements are being met. Evaluate progress, set goals / priorities / deadlines and, if needed, problem-solve and reevaluate priorities and deadlines.

Brief Background / Work Experience for Project Managers:

Dr. Marion Harris. Dr. Harris will contribute to all aspects of the project and supervise and oversee the PhD research scientist and assist with advising the graduate student. She received her PhD in 1986 from Michigan State U, and after working in various roles at Kansas State U, Massey U (New Zealand) and the Horticulture and Food Research Institute of New Zealand, joined the NDSU faculty in the Entomology Dept. as an Associate Professor in 2000. She is currently a full professor at NDSU. Her research focuses on insect-plant interactions and insect behavior. She has expertise not only with agronomic pests, especially of wheat, but also with insect pollinators. She has extensive experience working in interdisciplinary teams and managing projects with multiple personnel.

Dr. Deirdre Prischmann-Voldseth. Dr. Prischmann-Voldseth will also contribute to all aspects of the project and assist with advising the graduate student. She received her PhD in 2005 from Washington State U and completed a 2-yr postdoc at the USDA-ARS in Brookings SD on host plant resistance and biological control of corn rootworms. She then joined the NDSU faculty in the Entomology Dept. as an Assistant Professor in 2008. Her research focuses on field crops (soybean, corn, and potato systems) and management of agronomic pests. She also has experience with natural enemies of herbivore pests, insect identification, and integrated pest management. Like Dr. Harris, she has significant experience working in interdisciplinary teams and managing projects with multiple personnel.

PhD Research Scientist (to be hired). This individual will act as project manager and coordinator under the general direction and supervision of the PI (Harris). They will collaborate and coordinate with other project team members, supervise and advise project staff and graduate students, and manage day-to-day operations. Qualifications for this position require extensive work experience, including several years of post-doctoral work, previous project management of an ecosystem research study, plant identification skills and experience with landscape and/or restoration ecology in multiple systems (wetland, grassland, and agriculture).

Evaluation – Describe your plan to document progress and results.
How will you tell if the project is successful? Please be specific on the methods you will utilize to measure success. Note that regular reporting, final evaluation and expenditure reports will be required for every grant awarded.

Project managers would conduct both formative and summative evaluations to determine project success. Formative evaluations would be part of regular progress meetings, and their goal would be to identify issues and improve processes (e.g. problem solving, communication, adherence to timelines and budgets, progress toward goals) as the project occurs.

The summative (i.e. final) evaluation would primarily focus on accountability, or attainment of stated goals / objectives, and the quantity, quality, and delivery of outputs. Additionally, we would evaluate if the project: 1) contributed to gaps in basic knowledge, 2) provided new insights into the system, 3) generated recommendations for practitioners, researchers, or policy makers, and 4) identified promising new research areas. We would also evaluate if there are suggestions for improvement that would be relevant to future projects (i.e. lessons learned about project activities and processes).

Financial Information

ATTACHMENT: **Project Budget – Using the standard project budget format that is available on the website at** http://www.nd.gov/ndic/outdoor-infopage.htm**, please include a detailed total project budget that specifically outlines all the funds you are requesting.**

Project Expense	OHF Request	Applicant's Match Share (Cash) (8)	Applicant's Match Share (In-Kind)	Applicant's Match Share (Indirect)	Other Project Sponsor's Share
Salaries (1)	$ 342,680	$ 106,864	$	$	$
Fringe benefits (2)	$ 95,698	$ 32,058	$	$	$
Supplies (3)	$ 22,000	$	$	$	$
Equipment (4)	$ 6,000	$	$	$	$
Travel (5)	$ 21,600	$	$	$	$
Fees (6)	$ 9,600	$	$	$	$
Publication (7)	$ 2,000	$	$	$	$
Unrecovered indirect costs (8)	$ 0	$	$	$ 222,110	$
Total Project Costs	$ 499,578	$ 138,922	$ 0	$ 222,110	$ 0

xx O I certify that a project budget will be sent to the Commission

(1) Salaries = $342,680

- Research scientist ($65,000 per year × 4 years = **$260,000**). This project requires the additional skills of a responsible research scientist in the area of ecosystem ecology involving grassland, wetland and agroecology systems to support and enhance strengths of other research team members. Under the general guidance and direction of the PI, this researcher will act as project manager and coordinator, and lead and participate in all areas of the project (e.g. contact with producers / land owners, study site selection, study design, data collection, training and managing team personnel, designing research and data collection methods, developing data management protocols, analyzing and interpreting data, developing project reports, writing manuscripts for peer-review, etc.).
- Graduate student (MS level) ($17,000 per year × 3 years = **$51,000**). Due to the sampling intensity associated with the project we anticipate the MS student will take 3 years to finish their degree.
- Hourly worker ($7,920 per year × 4 years **= $31,680**). Summer: 40 hrs week at $9/hr for 12 wks. School year: 10 hrs week at $9/hr for 40 wks. The hourly worker will assist with collecting and processing samples.

(2) Fringe benefits = $95,698

- Research scientist ($22,750 per year × 4 years = **$91,000**). 35% of salary
- Graduate student ($510 per year × 3 years = **$1,530**). 3% of salary
- Hourly worker ($792 per year × 4 years **= $3,168**). 10% of salary

(3) Supplies = $22,000

- We will need certain supplies to survey plants and insects, collect & preserve samples, rear insects for experiments & conduct experiments, (e.g.: measuring tapes, quadrats, flags, insect nets, beat sheets, materials for pitfall traps and pollinator traps, vials, labels, boxes, pins, bags, plant press, light unit for microscope, bulbs, plastic containers, pots, soil, seed, fertilizer, cages, small brushes, tweezers, etc.).

(4) Equipment (equipment is > $5K**) = $6,000**

- Due to the sample-intensive nature of the project and need to accurately identify insects, we will need a dissecting microscope, and we hope to purchase a used model in Yr 1.

(5) Travel = $21,600

- We estimate that traveling to field sites (from Fargo ND) and between field sites will be approximately 500 miles per trip and we will be using a minivan at $0.63 per mile, so each trip would cost $315. We anticipate making 10 trips per year to find sites, collect data at sites, and establish/monitor field experiments (10 trips × $315 per trip × 4 years = **$12,600**).
- We plan to disseminate the results of this study at meetings/conferences, and estimate the cost associated with one conference as $1,500 (airfare, mileage, hotel, registration, per diem). In Yr1 and Yr2 we anticipate 1 person attending 1 conference per year and in Yr3 and Yr4 we anticipate 2 people attending 1 conference per year (6 trips × $1,500 per trip = **$9,000**).

(6) Fees = $9,600

- Fees associated with conducting this study on private land. We anticipate sampling 16 sites and would like to compensate producers with $150 per site per year ($150 per site × 16 sites × 4 years = **$9,600**).

(7) Publication costs = $2,000

- We anticipate that at least 2 scientific publications will result from this study, one in Yr3 and one in Yr4. We calculate the cost of publishing an article of typical length in a scientific journal is $1,000. (2 articles × $1,000 per article = **$2,000**).

(8) Non-federal matching funds (cash and indirects) = $361,032

- Dr. Marion Harris, Dr. Deirdre Prischmann-Voldseth and Warren Schmidt (the latter's Research Associate) will each devote 10% of their time to this project each year, which equates to $106,864 in matching funds for their salaries and $32,058 in matching funds for fringe benefits (30%) = **$138,922** total. Dr. Harris and Dr. Prischmann-Voldseth will work with other team members and contribute to the scientific foundation and implementation of the project, e.g. study design, data analysis and interpretation, producing reports, and outputs, etc. Mr. Schmidt will be involved in assisting with data collection and sample processing.
- NDSU will be providing indirect costs to support this project, and NDSU's federally approved indirect cost rate is 45% of modified total direct costs minus the cost of equipment ($499,578 - $6,000) × 45% = **$222,110**

(SEE NDSU APPROVAL ON PG 14).

Sustainability – Indicate how the project will be funded or sustained in future years.

Include information on the sustainability of this project after all the funding from the Outdoor Heritage Fund has been expended and whether the sustainability will be in the form of ongoing management or additional funding from a different source.

We anticipate that at the end of four years we will have a solid foundation of knowledge that will be shared with stakeholders, other relevant entities in North Dakota, and the scientific community. The project as currently described in this proposal would not be sustained per se, but would hopefully be extended in scope, e.g. we could investigate: 1) similar questions in other regions within North Dakota or other systems such as grassed waterways, buffer strips, or rangelands, 2) additional ecosystem services of insects associated with seasonal wetlands, and 3) how other land or wetland management practices (e.g. mitigation/restoration) impact the system. We would be interested in partnering with other entities, and hope to support the extended project using funding from other sources.

Partial Funding – Indicate how the project will be affected if less funding is available than that requested.

If less funding is available than requested we have a few ideas for modifying the project while trying to minimize compromises to the study's rigor, scientific validity, or impact, the extent of which would depend on the severity of budget reduction.

- Graduate student funding could be reduced or eliminated
- Could reduce the scope of the objectives (i.e. not focus on insects that are food for wildlife)
- Reduce dissemination of results at conferences

NDSU NORTH DAKOTA STATE UNIVERSITY

GRANT APPLICATION TRANSMITTAL

This page indicates university endorsement of the referenced proposal and is intended to be submitted to the sponsor organization.

Sponsor Organization:	**ND Industrial Commission**
Project Title:	Enhancing stewardship and agronomic benefits of seasonal wetlands for producers and wildlife in North Dakota: the role of beneficial insects and plant diversity
Principal Investigator/	**Marion Harris**
Department:	Entomology
Project Budget: Direct Costs $499,578 F&A N/A Total Project	$499,578
Authorized University Representative:	Amy B. Scott
Title:	Assistant Director, Sponsored Programs Administration
Address:	North Dakota State University 1735 Research Park Drive Fargo, ND 58105-5756
Phone:	(701) 231-8045
Signature:	Amy B. Scott
Date:	11-25-13

Any future notifications regarding this proposal, including award notices, should be directed to the authorized university representative at the address listed above.

Thank you.

SPONSORED PROGRAMS ADMINISTRATION
NDSU Dept 4000 | PO Box 6050 | Fargo ND 58108-6050 | 701.231.8045 | Fax 701.231.8098 | ndsu.research@ndsu.edu
Shipping address: Research I, 1735 NDSU Research Park Drive, Fargo, ND 58102

Scoring of Grants

All applications will be scored by the Outdoor Heritage Fund Advisory Board after your ten-minute oral presentation. The ranking sheet(s) that will be used by the Board is available on the website at http://www.nd.gov/ndic/outdoor-infopage.htm .

Awarding of Grants

All decisions on requests will be reported to applicants no later than 30 days after Industrial Commission consideration. Applicants whose proposals have been approved will receive a contract outlining the terms and conditions of the grant. Please note the appropriate sample contract for your organization on the website at http://www.nd.gov/ndic/outdoor-infopage.htm that set forth the general provisions that will be included in any contract issued by the North Dakota Industrial Commission. Please indicate if you can meet all the provisions of the sample contract. If there are provisions in that contract that your organization is unable to meet, please indicate below what those provisions would be.

Should this project be selected for funding and a contract is issued to NDSU, we request the sample language in article 11 and 20 be deleted and the following replacement language be inserted in articles 11 and 20 of the sample contract for a state entity.

11. Ownership of Work Product, Equipment and Materials
Title to all inventions and discoveries made solely by Contractor inventors resulting from the Agreement shall reside in Contractor; title to all inventions and discoveries made solely by Commission inventors resulting from the Agreement shall reside in Commission; title to all inventions and discoveries made jointly by Contractor and Commission inventors resulting from the Agreement shall reside jointly in Contractor and Commission. Inventorship shall be determined in accordance with U.S. Patent Law.

20. Compliance with Public Records Law
Contractor understands that, except for disclosures prohibited in this Agreement, the Commission must disclose to the public upon request any records it receives from the Contractor. Contractor further understands that any records that are obtained or generated by the Contractor under this Agreement, except for records that are confidential under this Agreement, may, under certain circumstances, be open to the public upon request under the North Dakota open records law. Contractor agrees to contact the Commission immediately upon receiving a request for information under the open records law and to comply with the Commission's instructions on how to respond to the request.

Responsibility of Recipient

The recipient of any grant from the Industrial Commission must use the funds awarded for the specific purpose described in the funds for the purposes stated under Exemptions on the first page of this application. the grant application and in accordance with the contract. The recipient cannot use any of (online version was cut off here).