DISCLAIMER

The North Dakota Game and Fish Department submitted its revised State Wildlife Action Plan to the U.S. Fish and Wildlife Service on August 6, 2025. The plan will be reviewed by a Regional Review Team made up of state directors and USFWS regional leaders, with a final decision expected in late 2025.

The revised SWAP is available for use by conservation partners and the public, with the acknowledgement that it has not yet received official approval.

2025

NORTH DAKOTA

STATE WILDLIFE ACTION PLAN

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North Dakota State Wildlife Action Plan

2025

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List of Acronyms

CRP	Conservation Reserve Program
FY	Fiscal Year
HAPET	Habitat and Population Evaluation Team
KNWHA	Key Native Wildlife and Habitat Areas
MAFWA	Midwest Association of Fish and Wildlife Agencies
MLI	Midwest Landscape Initiative
NDGF	North Dakota Game and Fish Department (also referred to as 'Department')
SCP	Species of Conservation Priority (note: now referred to as SGCN)
SGCN	Species of Greatest Conservation Need
SGIN	Species of Greatest Information Need
SWAP	State Wildlife Action Plan
SWG	State Wildlife Grants
USFWS	U.S. Fish and Wildlife Service

Acknowledgements

The development and review of this plan involved contributions from numerous colleagues, state and federal agencies, and organizations. Since its first iteration in 2005, existing partnerships have grown stronger, and new alliances have emerged. The list of individuals who knowingly or unknowingly offered their support and input is extensive, and we are deeply thankful to all of you. We appreciate the efforts of Molly Cross, Meagan F. Oldfather, and the team at the North Central Climate Adaptation Science Center for providing climate adaptation case studies and for sharing their expertise with us. State Wildlife Grant-funded projects and other partner efforts have been instrumental in shaping this plan, and the wealth of knowledge gained about Species of Greatest Conservation Need is thanks to the exceptional work of researchers, technicians, and students. The Teaming with Wildlife coalition has been a steadfast advocate for the State Wildlife Grants program, Recovering America's Wildlife Act, and the execution of State Wildlife Action Plans, with the primary goal of preventing wildlife from becoming endangered, and for this, we are truly grateful. **Above all, we are grateful to the partners who implement the plan and help conserve, enhance, or restore the habitats essential for sustaining fish and wildlife species.**

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Maps produced by the NDGF.

SWAP SUMMARY TEMPLATE

The SWAP Summary Template summarizes and organizes key elements of the SWAP, offering links or page references to guide the Regional Review Teams, USFWS Regional Office of Conservation Investment (CI), and State reviewers to more detailed sections within the plan. By directing reviewers to the essential components, the Template can streamline the review and approval process. The Template also helps reviewers and users of the SWAP to understand how the updated SWAP has improved or identify significant changes from the previous Plan.

ELEMENT 1	The distribution and abundance of species of wildlife, including low and declining populations as each State fish and wildlife agency deems appropriate, that are indicative of the diversity and health of the State's Species of Greatest Conservation Need (SGCN).
SGCN	

Provide a brief summary of the methods, criteria, and processes used for selection of your SGCN.

North Dakota Game and Fish Department (NDGF or Department) Conservation Biologists compiled information available for species that may be at risk or declining. Sources consulted include (but not limited to) regional, national, or global watch lists, federal lists, international lists such as COSEWIC, NatureServe, iNaturalist, trend data such as Breeding Bird Survey, or data collected from State Wildlife Grant projects or other recent publications and research. Draft species lists were shared internally with Department staff as well as partners and experts for review and feedback. After gathering insight, the Department separated the list into two groups, species of greatest conservation need (SGCN) and species of greatest information need (SGIN). Expert focus groups based on taxa (amphibians, aquatic invertebrates, birds, fish, mammals, reptiles, terrestrial invertebrates) were established which helped the Department make final determinations on whether to add/remove species from the list as well as if the species should be categorized as an SGCN or SGIN.

Provide Section(s) and/or Page Number(s) of Source Information Here: Chapter 3, pages 26-38. Appendices A-F, pages 167-324.

Provide a brief summary of significant Element 1 changes from your previous Plan.

•2025 SWAP describes species as SGCN and SGIN rather than Species of Conservation Priority (SCP)
•2025 SWAP lists includes a more thorough assessment of aquatic/terrestrial invertebrates (both SGCN and SGIN)
• Eleven (11) species were removed from the 2015 list [birds(3), mammals(2), amphibians/reptiles(1), Fish(5)]
•Fifty (50) species were added to the 2025 SGCN [birds(16), mammals(3), amphibians/reptiles(1), fish(1), terrestrial invertebrates(19), aquatic invertebrates (10)
•Twenty (20) species were moved from the 2015 SCP to the 2025 SGIN [birds(3), mammals(10), amphibians/reptiles(5), fish(2)]
•Seventy-eight species were added to the 2025 SGIN [birds(8), mammals(4), amphibians/reptiles(7), fish(1), terrestrial invertebrates(36), aquatic invertebrates(22)
•The 2015 SWAP contained 115 species, the 2025 SWAP contains 232 species (134 SGCN, 98 SGIN)

ELEMENT 2	The location and relative condition of key habitats and community types essential to the conservation of each State's SGCN.
HABITATS	

Provide a brief summary explaining how your agency identified key habitats and community types essential to the conservation of SGCN and how the location and relative conditions of those habitats were determined.

The major land classes present in North Dakota were summarized into 8 categories (unbroken grassland, unbroken grassland/shrubland, restored grassland, emergent wetlands, open water, forest, developed, cropland). A landscape level approach was used to link species of SGCN to key landscapes or habitats, assess the relative condition of the landscape, highlight priority conservation issues, determine necessary conservation actions, identify research or survey needs, provide data on ideal habitat and landscape characteristics, and understand the impact of management practices on species within the area. This approach enhances the ability to address conservation needs at a broader, landscape level, ensuring that management actions are more effective and aligned with ecological realities. Additionally, North Dakota is part of the Midwest Association of Fish and Wildlife Agencies (MAFWA). MAFWA's Midwest Landscape Initiative identified Regional Species of Greatest Conservation Need in which 20 habitats were established to align with identified species. North Dakota connects the SGCN and SGIN to 10 of the MAFWA habitats plus the addition of "badlands" habitat. Each species was assigned up to four (4) habitat associations (Grasslands, wetlands, lakes and reservoirs, rivers and streams, big rivers, riparian, forest, badlands, agriculture cropland, developed, and soil).

The location and relative conditions of the habitats identified in the SWAP were derived from multiple sources including the macro group and group classifications from the United States National Vegetation Classification System (USNVC), Major Land Resource Areas (MLRA), Natural Resources Conservation Service (NRCS) ecological sites, Census of Agriculture, National Lakes Assessment, and EPA's Level IV ecoregions. Using Geographic Information Systems, Level IV ecoregions were analyzed alongside various land cover data, the Department's extant native prairie/unbroken grassland and native forest, and spatial biological planning tools, including key sites for SGCN. The boundaries of specific Level IV ecoregions were selected and adjusted (digitized) based on existing native vegetation and key biological data, highlighting areas where the highest concentration of SGCN may occur. From that, 20 Focus Areas were developed for

the 2025 SWAP that often represent rare types of native vegetation or natural communities within North Dakota. An addition to the 2025 SWAP is the Key Native Wildlife and Habitat Areas (KNWHA) spatial layer which was developed using the ND State Wildlife Action Plan Focus Areas. The KNWHA has become an important tool for not only minimizing impacts to native species and habitat during development such as wind energy, but can also serve as a tool for landscapes to prioritize conservation actions. The KNWHA is meant to enhance the SWAP Focus Areas by recognizing other landscapes which are vital for SGCNs that rely on larger tracts or complexes of essential native habitat.

Provide Section(s) and/or Page Number(s) of Source Information Here: Chapter 4, pages 43-81.

Provide a brief summary of significant Element 2 changes from your previous Plan.

•Conservation Reserve Program (CRP) grasslands have been removed as a specific focus area in the 2025 SWAP, but CRP and other restored/planted grassland remains an important component of the grassland landscape.
•The KNWHA spatial layer was updated for the 2025 SWAP with the latest assessment of extent unbroken grassland/shrubland (NDGF 2024) and the Waterfowl Breeding Pair Survey 2022 spatial layer.

ELEMENT 3	The problems that may adversely affect SGCN or their habitats, and priority research and surveys needed to identify factors that may assist in restoration and improved conservation of SGCN and their habitats.
THREATS/STRESSORS	

Provide a brief summary of the threats or stressors adversely affecting your state's SGCN and/or their habitats, including an overview of the process used to identify, prioritize, or inform research and/or survey actions to address threats or stressors.

The 2025 SWAP identifies the following top recurring threats for all habitats and the SGCNs associated with them:
•Conversion of habitat
•Invasive non-native species
•Fire suppression
•Underutilization of grazing
•Energy development impacts
•Conservation awareness

For both the 2015 and 2025 SWAP revision, the Department used A Standard Lexicon for Biodiversity Conservation: United Classifications of Threats and Actions (Salafsky et al. 2008). Thirty-five direct threats were included. Conservation actions were identified to address specific threats. The conservation actions identified in Tables 29 to 33 are either proven to be effective in North Dakota or represent practical solutions to help address the identified threats. During development of the 2025 SWAP, 14 NDGF staff convened a summit in 2024 with 62 private, state, federal and academic experts in wildlife research and natural resources management. Based on open discussions, priorities and uncertainties were identified and discussed at both the species and habitat level. Through the expert workshops and SWAP planning process, the Department amalgamated the information from all partners, as well as identified information that is lacking. In addition to the top recurring threats, each habitat type and associated SGCNs have a host of other identified threats described in the SWAP.

The NDGF identified adaptive management as being critical to the success of the SWAP and is best suited for selecting between or prioritizing management actions to address the identified threats or stressors. The elements of adaptive management are addressed under planning; implementation; and monitoring and evaluation. Through this process the goal is to develop both qualitative and quantitative aspects of monitoring species and their habitats. As implementation actions are identified, the NDGF will work from study results, existing literature or expert opinions and workshops, to identify mechanisms for measuring the success of specific conservation actions. Surveys and monitoring should be designed to understand species or their habitats in a way that contributes to the ability to manage or benefit populations.

Provide Section(s) and/or Page Number(s) of Source Information Here: Chapter 5, pages 82-83, 136. Figures 30-34, pages 84-88. Tables 29-33, pages 89-135. Chapter 6, pages 137-149. Appendices A-F, pages 167-324.

Provide a brief summary of significant Element 3 changes from your previous Plan.

No Significant Changes

ELEMENT 4	The actions necessary to conserve SGCN and their habitats and the priorities for implementing such conservation actions.
ACTIONS	

Provide a brief narrative summarizing the actions necessary to address threats to your SGCN and their habitats at the level and scale appropriate to your Plan and, if applicable, the processes you use to prioritize them.

The 2025 SWAP identifies the following top recurring conservation actions for all habitats and the SGCNs associated with them:
•Offer incentives and programs to protect, enhance, and restore habitat
•Control or reduce invasive species
•Offer incentives and programs to implement prescribed fire/controlled burns
•Support grazing as a grassland management tool
•Urge ecologically responsible energy development and suitable reclamation standards
•Public education and outreach

The conservation actions identified in Tables 29 to 33 are either proven to be effective in North Dakota or represent practical solutions to help address the identified threats. In addition to the top recurring conservation actions, each habitat type and associated SGCNs have a host of other identified conservation actions described in the SWAP. The same adaptive management process to prioritize addressing threats is discussed above in element 3.	
Provide Section(s) and/or Page Number(s) of Source Information Here: Chapter 5, pages 82-83, 136. Figures 30-34, pages 84-88. Tables 29-33, pages 89-135. Chapter 6, pages 137-149. Appendices A-F, pages 167-324.	
Provide a brief summary of significant Element 4 changes from your previous Plan .	
No Significant Changes	
ELEMENT 5 MONITORING	The provisions for periodic monitoring of SGCN and their habitats, for monitoring the effectiveness of conservation actions, and for adapting conservation actions as appropriate to respond to new information or changing conditions.
Provide a brief summary of the provisions for monitoring your SGCN and their habitats.	
Monitoring efforts focusing on condition, quantity, and quality of various habitats and landscapes are primarily conducted by various state and federal agencies within North Dakota. The NDGF uses these monitoring efforts to assess changes in surveyed habitat: Four square mile survey, waterfowl breeding population and habitat survey, US Forest Service land and resource monitoring, North Dakota forest health, USFWS Forest Inventory and Analysis, Watershed management program (ND Department of Environmental Quality), wildlife management area field mapping, photo point monitoring, wildlife management area native prairie monitoring, Natural heritage inventory of rare communities (ND Parks and Rec Department), national land cover database, conservation reserve program, and a variety species specific surveys for birds, amphibians and reptiles, mammals, fish, invertebrates and threatened and endangered species.	
Provide Section(s) and/or Page Number(s) of Source Information Here: Chapter 6, pages 140-149. Appendices A-F, pages 167-324.	
Provide a brief summary of the provisions for monitoring the effectiveness of conservation actions.	
Each SWG funded project identifies specific objectives, deliverables, and a plan, including the appropriate geographic scale, for how it will be monitored. Monitoring may be limited or less frequent for those conservation actions that have demonstrated beneficial effects. In addition to SWG funded conservation actions, partners will be encouraged to monitor conservation actions affecting SGCNs and associated habitat.	
Provide Section(s) and/or Page Number(s) of Source Information Here: Chapter 6, page 149.	
Provide a brief summary of the provisions for adapting conservation actions to respond to new information or changing conditions.	
Conservation actions that do not meet the project's objectives will be reevaluated. Databases of existing and newly obtained information allows the NDGF and partners to evaluate conservation actions and goals based on the best available information, which is a key component in maintaining efficient adaptability of the SWAP.	
Provide Section(s) and/or Page Number(s) of Source Information Here: Chapter 6, pages 137-139.	
Provide a brief summary of significant Element 5 changes from your previous Plan.	
No Significant Changes	
ELEMENT 6 REVIEW AND REVISION	Each State's provisions to review its Plan at intervals not to exceed 10 years.
Indicate the month and year when you plan to submit your next Comprehensive Review.	
By October 1st of 2035.	
Provide Section(s) and/or Page Number(s) of Source Information Here: Chapter 7, page 150.	
Provide a brief summary of significant Element 6 changes from your previous Plan .	
No Significant Changes	
ELEMENT 7 PARTNER INVOLVEMENT	Each State's provisions for coordination during the development, implementation, review, and revision of its Plan with Federal, State, and local agencies and Indian Tribes that manage significant areas of land or water within the State, or administer programs that significantly affect the conservation of species or their habitats.
Briefly summarize how Federal, State, and local agencies, Tribal Nations, and any other key partners were involved in the development of your Plan and any opportunities you may provide for their involvement in its implementation.	
Strengthening and developing partnerships is essential to the success of the SWAP which has opened an ongoing line of communication between the NDGF and partners that has continued through the 2025 revision. In late 2022, the Department received nearly 200 on a stakeholder survey regarding how the 2015 plan is utilized and what areas of the plan or emerging issues they would like to see emphasized. From late 2023 through April 2025, the Department met one-on-one with nearly 40 partners/partner groups to discuss the SWAP revision, changes proposed for the 2025 plan, needed improvements, and for the partners to contribute their knowledge and expertise early in the process. Thirty (30) different state and federal agencies and NGO's participated in revising the 2025 SGCN and SGIN lists, provided ideas for improving SWAP useability, and formed the foundation of the Threats and Actions chapter. Over the past two decades, nearly 75 SWG partner projects have been completed, encompassing all taxa and providing valuable research and conservation implementation based on the SWAP. The variety of projects and the large number of partners highlight the strength of the state's SWAP, demonstrating widespread commitment not only from Department staff but also from partners across the fish and	

wildlife community. Through collaborative efforts involving state and federal agencies, non-profit organizations, tribal entities, private landowners, and academic institutions, these partners have helped prioritize conservation actions, conduct critical research and monitoring, and enhance habitat restoration projects. Their collective efforts ensure the plan's goals are translated into effective conservation outcomes, fostering a landscape where wildlife populations can thrive while balancing the needs of local communities and land use.
Provide Section(s) and/or Page Number(s) of Source Information Here: Chapter 1, pages 12-14. Chapter 2, page 24. Chapter 8, pages 151-155. Figure 39, pages 152-154. Table 34, page 154-155.
Provide a brief summary of significant Element 7 changes from your previous Plan .
No Significant Changes

ELEMENT 8	Each State's provisions to provide the necessary public participation in the development, revision, and implementation of the Plan.
PUBLIC INVOLVEMENT	

Provide a brief summary of your efforts to inform the public of the revision planning and development process, to collect public input, and to incorporate that input into your revised Plan.
The Conservation Division staff, well-versed in SWG and SWAP message, effectively relay the SWAP revision planning and development process through media and in-person engagements. These staff members participate in numerous interviews and public presentations throughout the year, serving as an effective source of information. The NDGF Communications Division also plays a crucial role in public outreach, utilizing digital media, video, and print to share important updates on the SWAP revision. SWAP updates are posted on the NDGF website where the Department encourages public comment on the revision of the 2015 SWAP. The official comment period for the public is open for at least one month; however, comments are accepted at any time during and after SWAP development. Public comments are collected and considered for incorporation into the revised plan.
Provide Section(s) and/or Page Number(s) of Source Information Here: Chapter 8, pages 157-159. Tables 35-37, pages 157-159.
Provide a brief summary of how the public will be informed as your Plan is implemented, and any opportunities for the public to be involved in its implementation.
The Department recognizes the importance of keeping the public informed about local and national fish and wildlife issues. To achieve this, the Department employs various tools to communicate the progress and objectives of the State Wildlife Grants program and the State Wildlife Action Plan. A key method is through direct interaction between Department biologists and the public. The Conservation Division staff, well-versed in SWG and SWAP message, effectively relay plan implementation information through media and in-person engagements. These staff members participate in numerous interviews and public presentations throughout the year, serving as an effective source of information. The NDGF Communications Division also plays a crucial role in public outreach, utilizing digital media, video, and print to share important updates. Over the past decade, several dozen broadcast news features have been produced on SWG-funded research and priority conservation species as well as multiple ND Outdoors magazine articles pertaining to the SWAP, SWG, or SGCNs and other non-game species.
Provide Section(s) and/or Page Number(s) of Source Information Here: Chapter 8, pages 157-159. Tables 35-37, pages 157-159.
Provide a brief summary of significant Element 8 changes from your previous Plan.
No Significant Changes

EXECUTIVE SUMMARY

The 2025 North Dakota State Wildlife Action Plan (SWAP) is a strategy to conserve fish, wildlife, and their habitats with a focus on preventing species from becoming endangered. The 2025 SWAP is a revision of the 2015 SWAP and serves as a 10-year blueprint to guide conservation efforts and funding decisions under the State Wildlife Grant (SWG) program. However, the SWAP is widely used by a diverse array of conservation partners, policy makers, industry professionals, consultants, teachers, and scientists. The SWAP represents a unified effort involving various stakeholders aimed at creating and implementing conservation strategies to ensure the long-term protection and sustainability of the state's fish and wildlife species.

The first North Dakota SWAP was finalized in December 2005. It identified 100 Species of Conservation Priority, including information on distribution, abundance, habitat requirements, threats, conservation actions, and monitoring techniques. It also included information on a host of fish and wildlife that inhabited the state. This proved to be an important point in time as North Dakota had its first comprehensive strategic level plan to address management of nongame and rare or declining fish and wildlife resources. The second iteration of the SWAP was finalized in July 2015 and approved in February 2016. This version identified 115 Species of Conservation Priority and was structured to include a more unified approach to identifying threats and conservation actions by major habitat type. The 2025 North Dakota SWAP expands upon this successful approach.

The SWAP is built upon eight essential elements, identified by Congress, with an overall focus on species of greatest conservation need. The eight elements include: (1) information on the distribution and abundance of species of wildlife including low and declining populations; (2) descriptions of locations and relative condition of key habitats and community types; (3) problems affecting species and priority research or survey efforts needed; (4) conservation actions needed to conserve the identified species; (5) plans for monitoring species and the effectiveness of conservation actions; (6) plans for reviewing the strategy; (7) coordinating with federal, state, and local agencies and Tribal government on the development and implementation of the strategy; and (8) involve broad public participation.

Key components of the 2025 SWAP:

- **Species of Greatest Conservation Need (SGCN) and Species of Greatest Information Need (SGIN):** The previous SWAPs referred to this list as Species of Conservation Priority and were divided into 3 different levels of priority. A major change to the 2025 SWAP is that the principal list will be referred to as SGCN and no levels will be assigned. A second list of SGINs has been developed. While SGCNs are known to be at-risk or in decline, SGINs face uncertainty in terms of their status, range, or level of risk. Furthermore, the 2025 SWAP includes a more thorough assessment of terrestrial and aquatic invertebrates. There are 134 SGCNs and 98 SGINs identified in the 2025 SWAP.
- **Habitats:** The SWAP is a habitat based, rather than a species based approach. Many species require a variety of habitat types throughout their life cycle. To ensure their long-term survival, it's essential to maintain a diverse landscape, including grasslands, wetlands, forests, rivers, streams, riparian and cropland.
- **Threats:** The top recurring threats identified across all habitats include conversion of habitat; invasive non-native species; fire suppression; underutilization of grazing; energy development impacts (e.g., fragmentation, displacement of wildlife, and anthropogenic disturbance); and conservation awareness (e.g., lacking recognition of the critical role resilient habitats provide for wildlife, water quality, and the well-being of North Dakota's communities.)
- **Actions:** The top recurring actions identified across all habitats include offer incentives and programs to protect, enhance, and restore habitat; control or reduce invasive species; offer incentives and programs to implement prescribed fire/controlled burns; support grazing as a grassland management tool; urge ecologically responsible development and suitable reclamation standards; and public education and outreach.

- **Monitoring:** Developing and implementing statewide monitoring strategies for all SGCNs and their habitats is an ambitious task. It requires a flexible approach, ensuring that monitoring is aligned with well-defined performance metrics. The Department and partners regularly evaluate conservation efforts and management treatments through diverse monitoring techniques. New data will refine this process, facilitating the adoption of best practices for managing both species and habitats.
- **Revision:** The SWAP will undergo another revision in 2035, reinforcing its status as a living document that is routinely updated and adapts to changes and new information over time.
- **Partners:** Building and enhancing partnerships is crucial to the success of the SWAP. The effectiveness of these collaborations is demonstrated not only by accomplishments within the SWG program but also by the notable progress made in conserving SGCNs and their habitats through various partner-led initiatives.
- **Public:** Wildlife is entrusted in the care of state wildlife agencies to be safeguarded for its citizens. A key aspect of this role involves keeping the public informed about fish and wildlife topics, both locally and nationally, while also being receptive to their feedback.
- **Wildlife-Associated Recreation and Education:** The SWAP is vital in identifying strategies to conserve wildlife and their habitats, but equally important is to effectively increase public awareness and advocacy through various activities by increasing recreational and educational opportunities for the public. While this is not a required element of the SWAP, it is important for North Dakotans who enjoy the outdoors.

The completion of the 2025 SWAP marks the twenty-year anniversary of North Dakota's dedicated program for rare and declining fish and wildlife species. While significant progress has been achieved over the past two decades, much work remains. As North Dakota faces increasing habitat threats and challenges, the SWAP will be a critical tool for addressing these ongoing issues.

The Western Meadowlark, the state bird of North Dakota, continues to decline at about 1% per year. This iconic bird became the ambassador for the Meadowlark Initiative, a proactive and comprehensive effort to conserve grasslands in the state.

CHAPTER 1
INTRODUCTION

This chapter provides an overview of the State Wildlife Action Plan, the State Wildlife Grant Program, and the purpose it serves for fish and wildlife resources in North Dakota.

FOCUS ON RARE OR DECLINING SPECIES

The North Dakota Game and Fish Department (Department) is typically known for the management of big game species (e.g., White-tailed Deer and Mule deer) and recreational fisheries (e.g., Walleye and Northern Pike) across the state. In addition to those management responsibilities, the Department is also accountable for the management of nongame wildlife. In North Dakota, nongame wildlife represents more than 80% of the state's vertebrate fauna. Nearly 400 species of birds, 80 species of mammals, 75 fish, 16 reptiles, and 13 amphibians inhabit North Dakota. Freshwater mussels, crustaceans, and insects are also considered nongame and the exact total of invertebrates inhabiting the state is unknown. Often, nongame are the rarer and/or less studied species. Nongame species are an integral component in the balance of nature. The populations of many of these species are declining or thought to be at-risk. Preventing species from becoming listed as federally threatened or endangered is important. A listing has the potential to influence how public and private land is managed and used. The cost of protection or restoration of a listed species is far greater than preventing its decline in the first place. From an ecological perspective, loss of a seemingly insignificant species can cause other animals to decline or vanish. Such declines are hard to predict as many relationships are not yet well understood. Even so, animals that live in North Dakota are part of the state's legacy, and many people believe the demise of any species is tragic.

Since funding opportunities for nongame species management is limited, North Dakota's State Wildlife Action Plan (SWAP) is a strategy to guide the process of preserving the state's fish and wildlife resources for the future. Unlike previous versions which focused on species of conservation priority (SCP), the SWAP now refers to the list of species of greatest conservation need (SGCN) and species of greatest information need (SGIN) based on research by conservation biologists and input from various taxonomic experts within each discipline (i.e., avian, reptile, invertebrate, etc.).

Due to limited funding availability, Congress provides states with supplemental funding through Title IX of the Commerce, Justice, and State Appropriations Act under the Wildlife Conservation and Restoration Program (WCRP) for conservation of species which typically receive no monetary support. These funds were made available in fiscal year 2001 (FY01), which provided $50 million for distribution among states. In 2002, states received additional funding under a new program, State Wildlife Grants (SWG). Since then, SWG amounts available to all states through the Department of Interior have ranged from $46 to $76 million annually.

The annual apportionment for each state was determined using a distribution formula of 1/3 land area and 2/3 population. No state receives less than 1% or more than 5% of the total amount each year. Due to North Dakota's sparse population in relation to its large size, it receives the minimum of 1% of total funds. The average annual federal apportionment the Department received from FY15-FY24 is $599,051 (Figure 1) and provided North Dakota with approximately $6 million in federal funding (Figure 2) during that time frame. The SWG program is a matching grants program, meaning all federal dollars awarded must be matched with non-federal dollars. Matching funds from the Department along with project partners added nearly another $3 million dollars (Figure 2). Although the match requirement has changed over the years, the current requirement is that all projects require a 35% non-federal match for both implementation and research projects. SWG funding has decreased over the years, but the need for conservation of rare and declining species has only increased.

Although it has yet to come to fruition, the Recovering Americas Wildlife Act (RAWA) has the potential to provide states with a significant increase in funding in the future to address management and conservation of SGCN's. RAWA has undergone several iterations throughout its legislative history, first introduced in 2016, but the bill has yet to receive full bipartisan support in Congress. Even though it has yet to receive congressional approval, optimism remains high within the conservation community that it will someday pass and provide additional resources for North Dakota to implement its State Wildlife Action Plan.

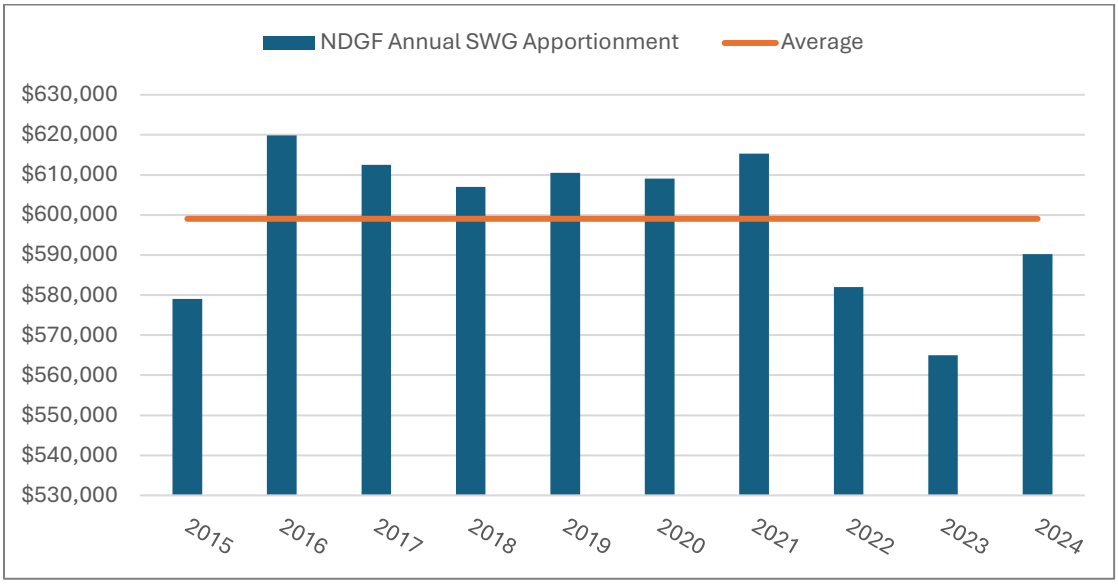


Figure 1. ND Game and Fish Department annual State Wildlife Grant allocation from 2015 – 2024.

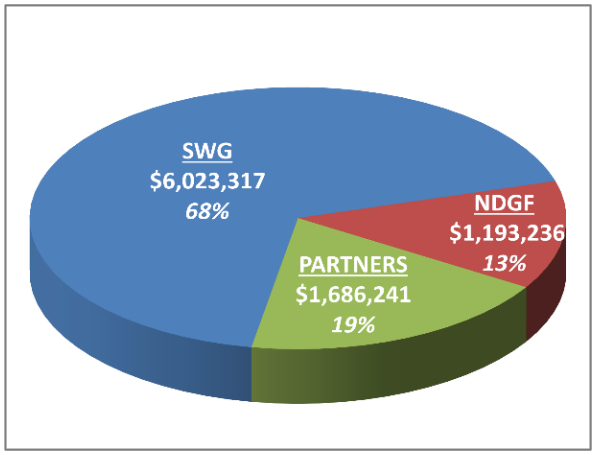


Figure 2. State Wildlife Grant, NDGF and matching partner dollars spent on projects in North Dakota from 2015-2024.

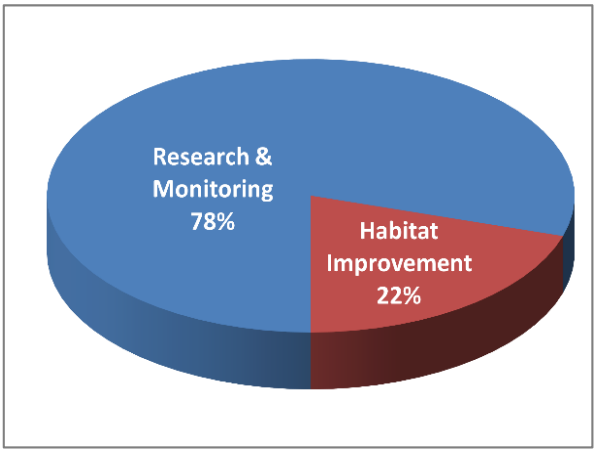


Figure 3. Percentage of State Wildlife Grant funds by project type.

EFFECTIVENESS OF SWAP AND SWG

In the 20+ years the SWG program has been in existence in North Dakota, over 80 individual projects with approximately 45 different partners have been initiated. While the projects have been wide-ranging, they can be described as falling into one of two categories for this report: 1) research and monitoring; and 2) habitat improvement. For the FY15-FY24 reporting period, research and monitoring efforts utilized 78% of SWG funds while habitat improvement projects consumed 22% of funds (Figure 3).

With limited funding resources and an overabundance of needs, the Department strives to balance the amount of survey and research projects while still contributing to substantial efforts to improve fish and wildlife habitat. A total of 42 research projects have been conducted over the years on dozens of wildlife species providing much needed information on their presence or absence in certain geographic areas, relative abundance, habitat needs and a variety of other life history traits. Several additional species occurrences have been documented in North Dakota because of these studies. Specifics of SWG projects on species and knowledge gained are provided in the SGCN species accounts.

For habitat related efforts in FY15-FY24, SWG has partnered on about four projects. These projects include efforts to restore/enhance or maintain grassland, riparian, and wetland habitat. During this reporting period, our efforts have resulted in approximately 11,000 protected acres via conservation agreements and/or restoration activities.

While the 2015 SWAP has certainly provided valuable guidance and direction, it is time to review and update the plan. Federal regulations require states to conduct periodic reviews of the SWAP not to exceed 10 years. The Department's 10-year deadline is October of 2025. Because of the size and scope of the SWAP, this process is not done easily in a few weeks or months. As a result, the Department has been working on updating its SWAP since 2023 and has submitted a final draft to the United State Fish and Wildlife Service for consideration in July 2025. Like the effort that was used to create the states strategic plan in 2005, this effort will address the same 8 elements mentioned below.

SWAP REQUIREMENTS

An important distinction or change occurred in 2007 when Congress recommended that states refer to their CWCS as **State Wildlife Action Plans or SWAP**. While the content and purpose of our plan never changed, we nonetheless refer to it as a SWAP. By accepting State Wildlife Grant funds, North Dakota and all other 49 states committed to completing a SWAP by October 1, 2005, 2015, 2025, then 2035, etc. For guidance, Congress identified eight required elements to be included in each state's SWAP.

The Eight Required Elements

1. The distribution and abundance of species of wildlife, including low and declining populations as each State fish and wildlife agency deems appropriate, that are indicative of the diversity and health of wildlife of the State (referred to as SGCN or SGIN in North Dakota).
2. The location and relative condition of key habitats and community types essential to the conservation of each State's SGCN.
3. The problems which may adversely affect SGCN or their habitats, and priority research and surveys needed to identify factors which may assist in restoration and improved conservation of SGCN and their habitats.
4. The actions necessary to conserve SGCN and their habitats and priorities for implementing such conservation actions.
5. The provisions for periodic monitoring of SGCN and their habitats, for monitoring the effectiveness of conservation actions, and for adapting conservation actions as appropriate to respond to new information and changing conditions.

6. Provisions to review the SWAP at intervals not to exceed ten years.
7. Provisions for coordination during the development, implementation, review, and revision of the Strategy with Federal, State, Tribal, and local agencies.
8. Provisions to provide necessary public participation in the development, revision, and implementation of the Strategy.

While each state's SWAP varies in its content and approach, its general purpose is to identify and focus on "species in greatest need of conservation," while still addressing the "full array of wildlife." Additionally, the SWAP is intended to promote a comprehensive approach to habitat and wildlife management to leverage conservation of all species.

STATE WILDLIFE GRANT SUCCESS STORY

Assessment of American Toad and Canadian Toad Populations in Eastern North Dakota: Is North Dakota a Hybrid Zone?

In North Dakota's 2015 State Wildlife Action Plan, the Canadian Toad (*Anaxryus hemiophrys*) was listed as a Species of Conservation Priority due to suspected population declines either throughout its range or specifically within the state. However, recent amphibian surveys in eastern North Dakota found Canadian Toads in half of the surveyed counties, with many of these populations being abundant (M. Smith: SWG T-44-R, 2014–2016; SWG T-52-R, 2018–2021). Misidentification with American Toads (*Anaxryus americanus*), which closely resemble Canadian Toads, may have influenced earlier data indicating population declines. In contrast, American Toads were found in only one county during prior surveys, with just three individuals captured over three years, indicating potential rapid population decline or local extirpation. While Canadian Toads are typically associated with prairie environments, American Toads are woodland obligates. Ongoing changes in land use, including shifts in agriculture, may further reduce woodland habitats across the state. Additionally, hybridization or genetic mixing between the two species may contribute to the apparent decline of one species as hybrids become more common than pure individuals. The findings from recent SWG projects support the removal of the Canadian Toad from the priority list and the addition of the American Toad as a Species of Greatest Conservation Need in the 2025 State Wildlife Action Plan.

In 2023, a State Wildlife Grant was awarded to Dr. Matthew Smith, Associate Professor of Practice at North Dakota State University, to survey for American Toads in eastern North Dakota. The project aims to determine whether the species has been extirpated from the state or, if still present, to identify key habitat characteristics supporting its persistence. The study also evaluates potential hybridization with Canadian Toads and whether such hybridization may have contributed to the American Toad's decline. During the 2024 field season, no pure American Toads were captured in North Dakota, though numerous hybrids were documented. Preliminary findings suggest that hybrid individuals in North Dakota may exhibit greater variability than previously reported. The research will continue through 2026.

CHAPTER 2
A LOOK AT NORTH DAKOTA

This chapter gives a brief description of the geography, geology, climate and tribal communities of North Dakota.

GEOGRAPHY AND GEOLOGY

North Dakota spans from longitude 97°W to 104°W and latitude 45°55'N to 49°N, making it the 19th largest state in the United States. It stretches 211 miles from north to south and 340 miles from east to west, covering a total of 70,699 square miles. The state is bordered by Minnesota to the east, Montana to the west, South Dakota to the south, and the Canadian provinces of Manitoba and Saskatchewan to the north. North Dakota's highest point is White Butte in the southwestern part of the state, standing at 3,506 feet above sea level, while its lowest point, at 750 feet above sea level, is in the extreme northeast.

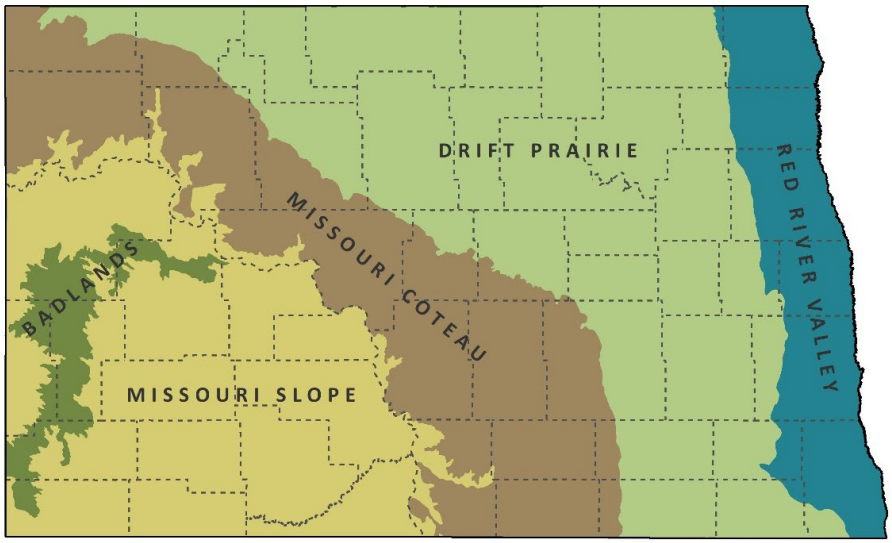


Figure 4. Major ecoregions of North Dakota.

Red River Valley

The Red River forms North Dakota's eastern border, with the Red River Valley extending 30 to 40 miles on either side. This flat plain was once the bed of the ancient Glacial Lake Agassiz, and much of the region is covered by silt and clay deposits typical of a lake bottom. Beach ridges scattered throughout the valley trace the former shoreline of the massive lake at different points in time. The valley gradually rises 500 feet over a bedrock escarpment, marking the natural boundary of the Red River Valley. The fertile organic soil makes this region some of the best farmland in the world.

Drift Prairie

The Drift Prairie stretches diagonally from northwestern to southeastern North Dakota. This glaciated landscape appears mostly flat with gentle, washboard-like undulations. The soil and climate create a transition zone between shortgrass and tallgrass prairie species. The region is dotted with a high concentration of seasonal and temporary wetlands. Although small grain farming is prevalent in some areas, other crops such as soybeans, dry beans, corn, and sunflowers are widely grown.

Missouri Coteau

The Missouri Coteau extends eastward from the Missouri River to the western boundary of the Drift Prairie, marking the western edge of North Dakota's glaciated terrain. Wetlands are abundant along the eastern edge of the Coteau but become fewer towards the Missouri River. The predominant land use in this region is a mix of small grain, corn, soybean, and sunflower farming, along with livestock ranching.

Missouri Slope

The Missouri Slope's sandstone and shale layers were mostly untouched by the glaciers that shaped eastern North Dakota. The area features an irregular topography, with occasional buttes rising above the landscape. Complex drainage systems create breaks in the terrain. Livestock ranching dominates the region, although small grain, corn and sunflower farming is also practiced.

Badlands

North Dakota's Badlands consist of a rugged landscape of buttes, rock outcrops, washouts, and hardwood draws along the banks of the Little Missouri River. The region is defined by poor soils, steep slopes, high erosion, and shortgrass prairie.

CLIMATE

North Dakota's climate is continental and is characterized by large variances in temperature, both on a seasonal and daily basis. Precipitation ranges from low to moderate, and air flow through the region creates windy conditions.

Air Masses

North Dakota is affected by regular changes in atmospheric air masses. Air masses from the polar region bring cold, dry air to the state. Northern Pacific air masses produce warmer, drier conditions, and tropical masses bring warm, wet weather. The Rocky Mountains frequently block air masses from the southern Pacific Ocean from reaching the state.

Temperature

North Dakota's average annual temperature ranges from 37° F in the northern part of the state to 43° F in the south. January is the coldest month. Temperatures average from 2° F in the north to 17° F in the southwest with an average of fifty days below 0˚. July is the warmest month with temperatures averaging 67° F in the north and 73° F in the south. Temperatures over 90˚are common. North Dakota's highest temperature was 121° F and the lowest -60° F, were both recorded in 1936.

Precipitation

Average annual rainfall or growing season precipitation ranges from 13 to 20 inches a year (Figure 5). The average increases from west to east, with the southeast receiving the highest average precipitation. Winter precipitation is highest in January. June is the wettest month, receiving 3 to 4 inches of rain. Areas such as the Turtle Mountains receive higher rainfall than the surrounding plains, due to higher elevations.

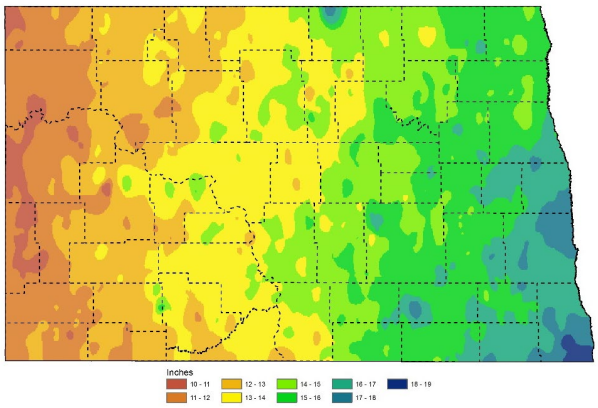


Figure 5. Average annual rainfall or growing season (April – September) precipitation for 30-year period, 1980-2010 (ND Department of Water Resources).

A Changing Climate

Shifts in long-term temperatures and precipitation patterns, as well as the frequency of extreme events, and seasonality, is referred to as climate change. As these patterns shift, North Dakota could be impacted in several ways: more severe droughts, increased flooding, changes in growing season, etc. It is important to understand climate change and predicted patterns to anticipate and prepare for how a changing climate alone, or in combination with other threats, might impact the state's wildlife and habitat. The following section consists of future projections of key climate variables, selected by subject matter experts, crucial for consideration for North Dakota wildlife and habitats. These focal climate variables include growing season length, temperature minimum and maximums, precipitation and its seasonality, drought, and flood risk.

Justification for Approach:

A climate change scenario planning approach was used to select a set of plausible yet contrasting future conditions that encompass the range of critical uncertainties for the climate variables of interest in North Dakota (Lawrence et al., 2021; Miller et al., 2022). The time-period used for all climate projections is a mid-century planning period centered around 2055 (2040 - 2069); this time period allows the incorporation of climate change into both short-term and long-term planning. A combination of 20 global circulation models CMIP5 (GCMs) for two emission scenarios (RCP4.5 RCP 8.5) were used to select the representative potential climate futures; divergent GCM-RCP combinations were assessed by examining bivariate plots of the following climate variables: wintertime (Dec-Feb) minimum temperature, wintertime (Dec-Feb) precipitation, summer (Jun - Aug) precipitation, growing season length, climatic water deficit, spring runoff, and days with a heat index > 90°. Chosen models had adequate model performance (Joyce & Coulson, 2020).

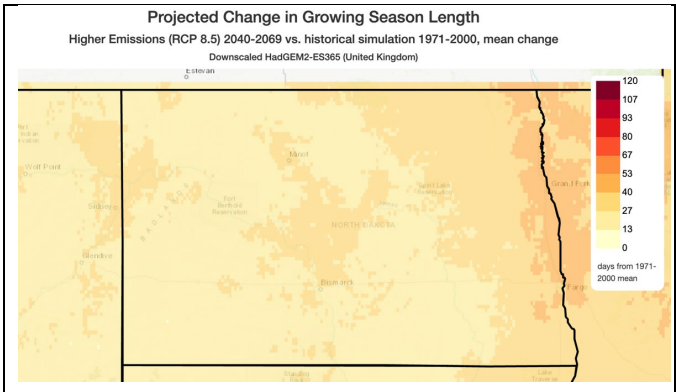
The following GCM-RCP combination were chosen to represent two scenarios:

- HadGEM2-ES365 RCP 8.5 [hotter conditions throughout the year, increase in wintertime precipitation and decrease in summertime precipitation, extended growing season with increased summertime drought]; 'hot drought'
- GFDL-ESM2M RCP 4.5 [warmer conditions largely evident in winter, averaged wintertime precipitation and increased summertime precipitation, no change in growing season length, reduced summertime drought]; 'warm and wet'

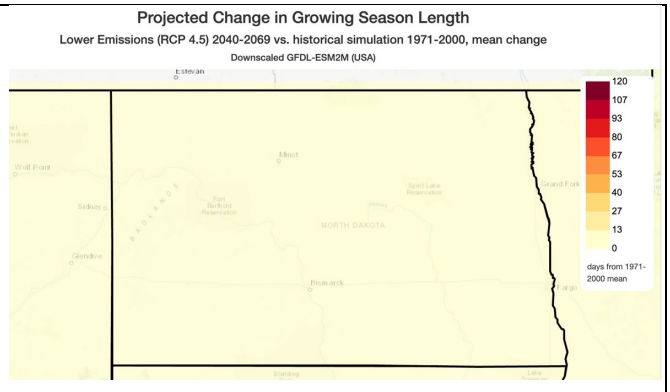
The maps provided below, with bulleted main take-aways, represent the two projected climate scenarios that span the range of critical uncertainties across key climate variables.

Growing Season Length

1. Growing seasons and frost-free periods are lengthening due to rising temperatures. Although, these changes may be beneficial for some crops and habitats, crop yields and habitat productivity may be negatively impacted due to heat and moisture stress, increase weed competition, and pest expansion. (Figure 6) (NCA5).



Dark orange 40-53 days, medium orange 27-40 days, light orange 13-27 days.

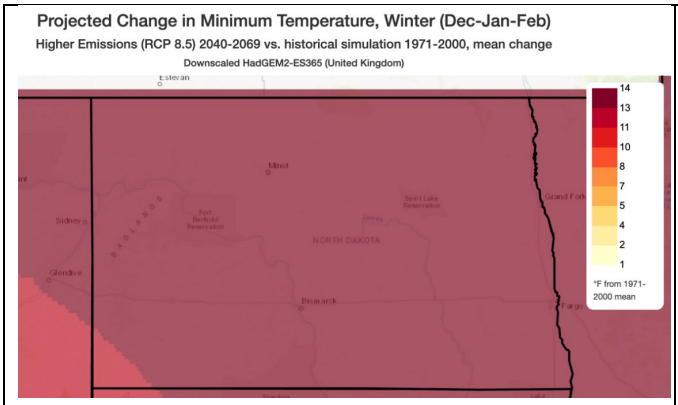


Light yellow 0-13 days.

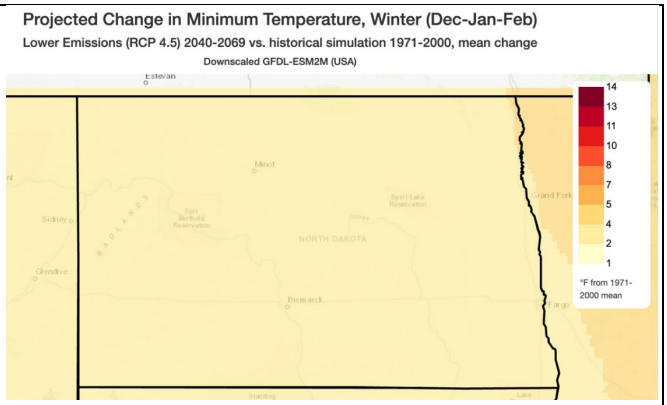
Figure 6. Projected growing season length for both 'scenarios.'

Temperature minimum and maximums

1. Since 1900, the annual average temperature in the Northern Great Plains has increased by 1.6-2.6 degrees F, and North Dakota has experienced the largest increase in the region (NCA5). While ND's summers have "warmed little," the number of very cold days has decreased across the region; since 2000, North Dakota's number of very cold days has been below the long-term average. (NCA5) A winter warming trend is projected to increase with changing climate (Figure 7).
2. Extremely hot days (days with a heat index over ≥ 90°C are also expected to increase with projected climate change in North Dakota (Figure 8).

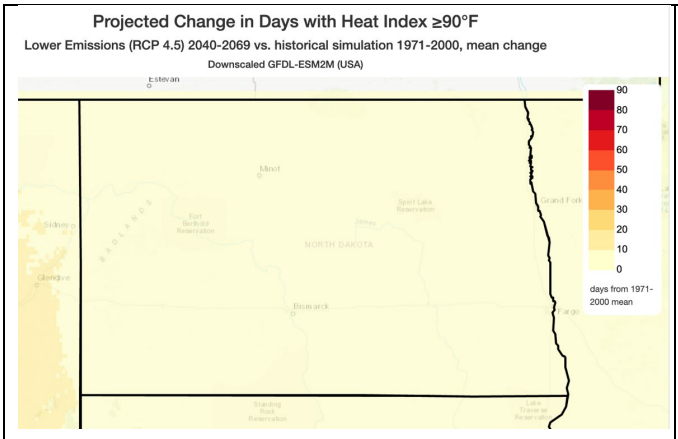


Dark red 13+ degrees F, light red 11-13 degrees F.

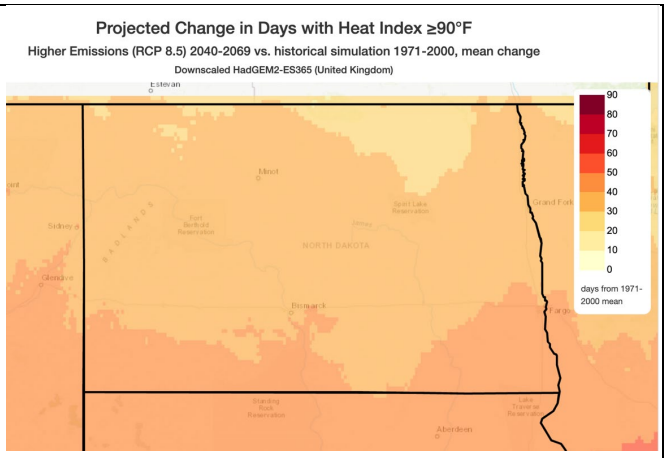


Light orange 2-4 degrees F, medium orange 4-5 degrees F.

Figure 7. Projected wintertime minimum temperature for both 'scenarios.'



Light yellow 0-10 days.

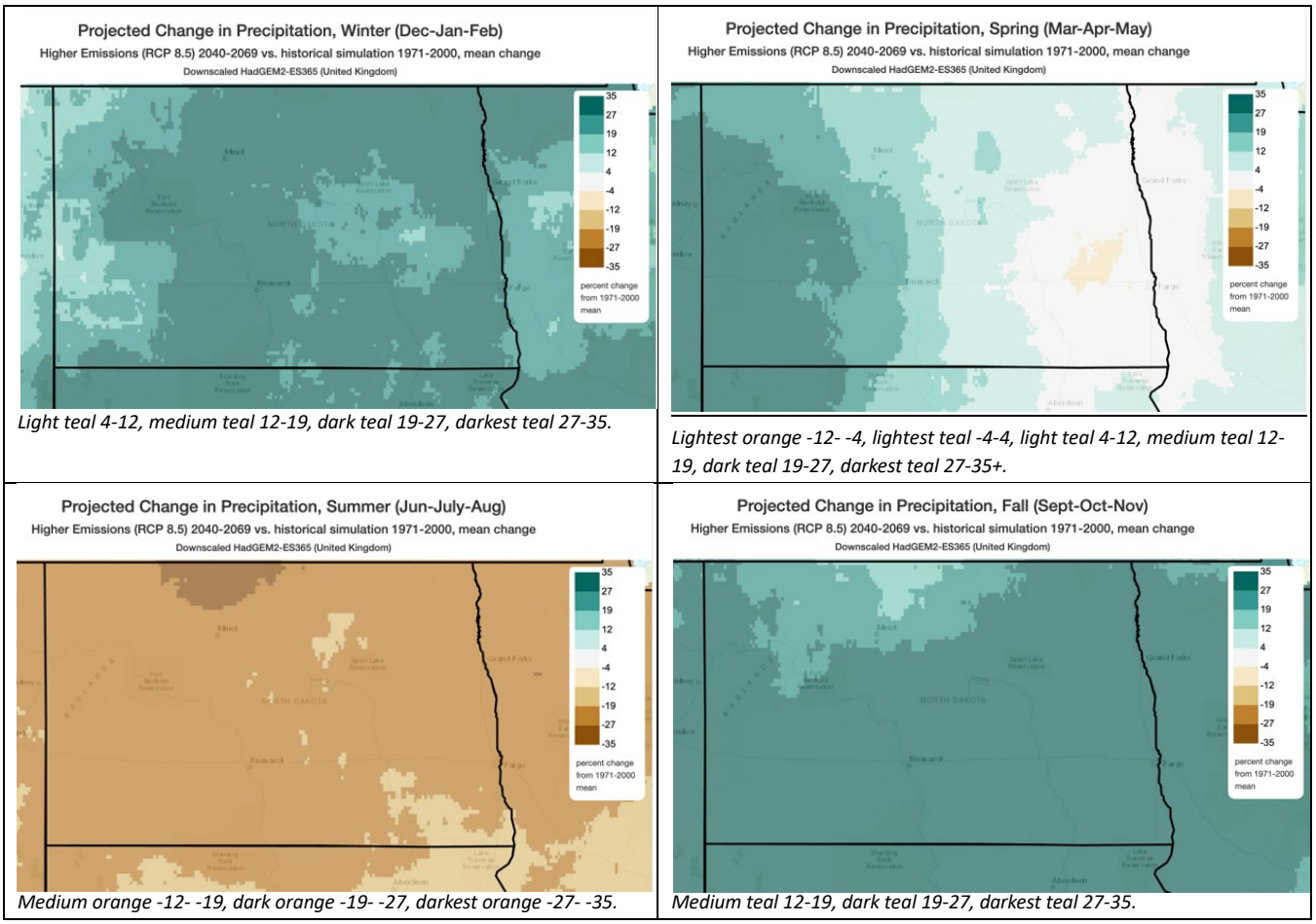


Lightest orange 10-20 days, light orange 20-30 days, medium orange 30-40 days, dark orange 40-50 days.

Figure 8. Projected change in number of hot days for both scenarios.

Change in Precipitation- Snow and seasonal dynamics

1. From 1950 to 2010, the number of snow-cover days declined within the greater Northern Great Plains region (NCA5). Despite projected increases in wintertime precipitation (Figure 9), warmer temperature drives faster snow loss.
2. The Northern Great Plains region is experiencing unprecedented extremes related to changes in climate, including severe droughts, floods, and wildfire. Flooding has been more common in the east while drought has been more common in the west in North Dakota (Figure 10).
    a. Flash droughts driven by warmer temperatures may increase in North Dakota.
    b. Heavier rainfall, combined with changes in land use and other factors is leading to increasing flood damage in the region (NCA5). There is a higher risk of floods with overall increasing projected precipitation in North Dakota, but the likelihood of these events is less certain due to high precipitation variability in climate projections.



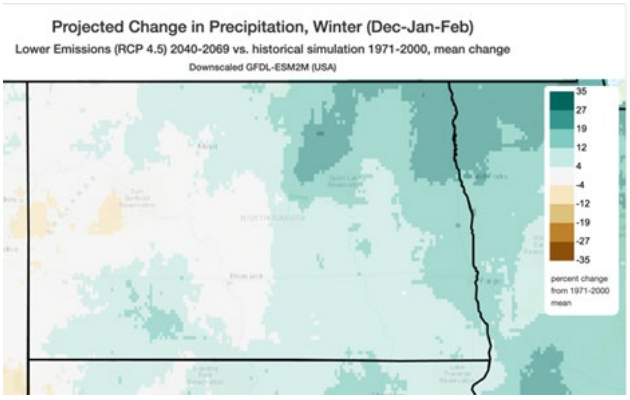
Light teal 4-12, medium teal 12-19, dark teal 19-27, darkest teal 27-35.

Lightest orange -12- -4, lightest teal -4-4, light teal 4-12, medium teal 12-19, dark teal 19-27, darkest teal 27-35+.

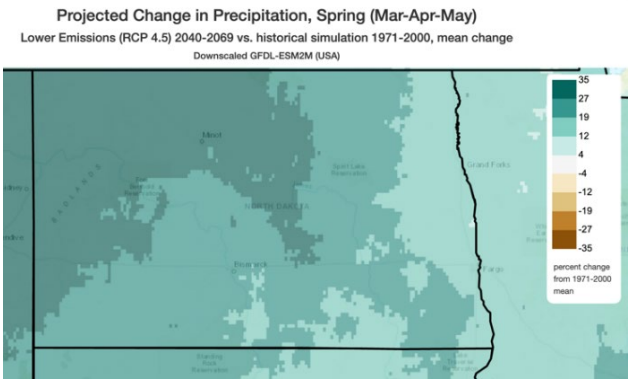
Medium orange -12- -19, dark orange -19- -27, darkest orange -27- -35.

Medium teal 12-19, dark teal 19-27, darkest teal 27-35.

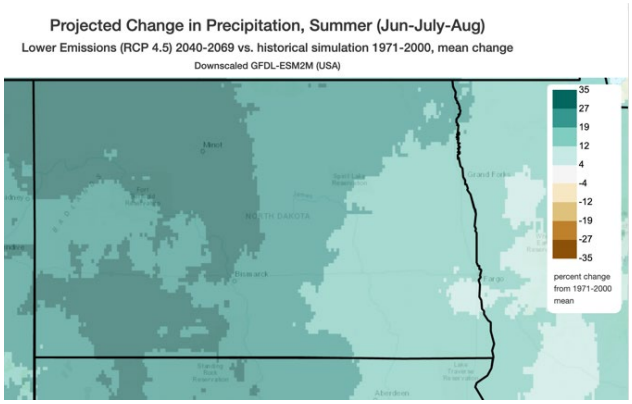
Figure 9. Projections for percent change in precipitation across the four seasons for the 'hot drought' scenario.



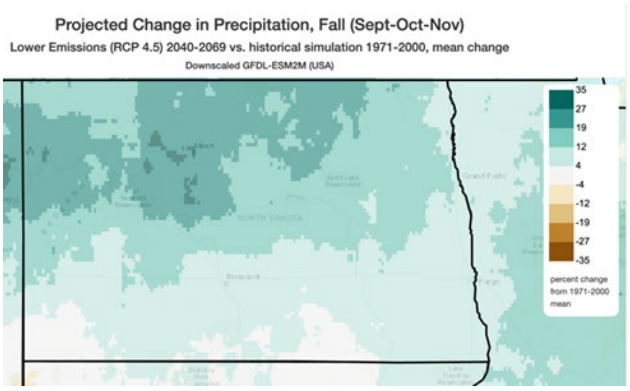
Light yellow -4- -12, lightest teal -4-4, light teal 4-12, medium teal 12-19, dark teal 19-27.



Light teal 4-12, medium teal 12-19, dark teal 19-27, darkest teal 27-35+.



Medium orange -12- -19, dark orange -19- -27, darkest orange -27- -35.



Light teal 4-12, medium teal 12-19, dark teal 19-27, darkest teal 27-35.

Figure 10. Projections for percent change in precipitation across the four seasons for the 'warm and wet' scenario.

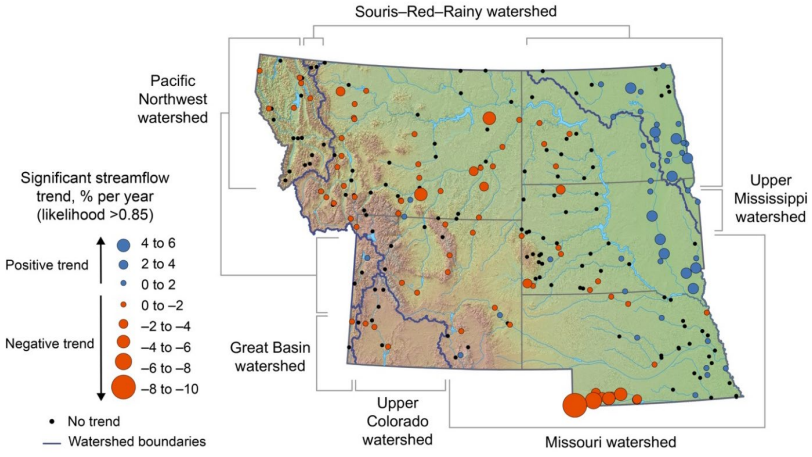


Figure 11. Water Resource Regions and Rivers, trends in annual peak streamflow, 1961-2020.
This map of the water resource regions and rivers within the region shows distinct east–west differences in trends in annual peak streamflow for 1961–2020, expressed as percent per year, where the size of the dot is relative to the size of the trend. Red dots are downward trends, and blue dots are upward trends. A likelihood-based approach is used to report these trend results. When a trend is identified, the trend likelihood value (likelihood = 1 – p-value/2) associated with the trend is between 0.85 and 1.0. In other words, the chance of the trend occurring in the specified direction is at least 85 out of 100. Smaller black dots are sites for which there were sufficient data for trend analysis, but likelihood was less than 0.85; that is, these sites do not exhibit a substantial trend in either direction.
Figure credit: USGS, NOAA NCEI, and CISESS NC (NCA5).

Adapting to a Changing Climate

Climate change can impact fish, wildlife, and the habitats they depend on in significant ways: shifts in species ranges, changes in behavioral or morphological traits, shifts in phenology, changes in species composition, increased pressure from non-native species, changes in predator/prey dynamics, etc. With an understanding of how climate change, in conjunction with other stressors, might impact North Dakota's wildlife and habitats, we can make more effective management decisions.

Climate Case Study: Climate Resiliency and Management Planning

Conversion of native vegetation poses one of the greatest challenges wildlife face in North Dakota and throughout the Great Plains (Figure 12). North Dakota has lost approximately 72% of its native grasslands, with conversion of the remaining grassland systems a continued threat (NDGF, unpublished). As conversion continues across the landscape, landowner programs that aim to keep native habitats intact and the restoration of vital habitats are becoming critical practices to halt and reverse declines in biodiversity (Lyons et al. 2023, Menz et al. 2013, Suding et al. 2015, Torok et al. 2021). There are several ways land managers might consider climate change while executing these practices.

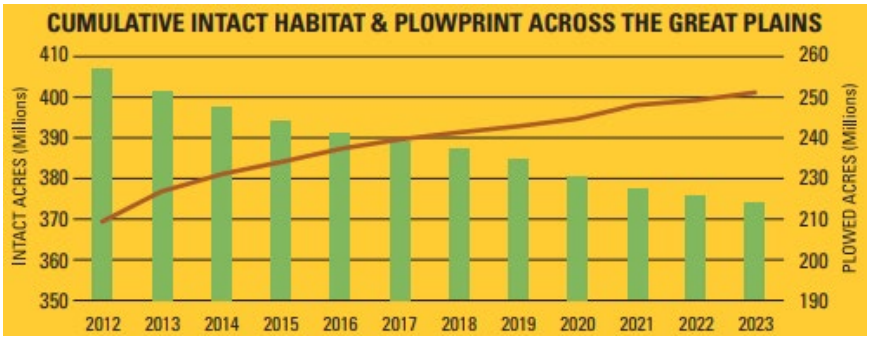


Figure 12. Estimated intact grassland acres and plowed acres across the Great Plains from 2012 to 2023 (2024 Plowprint Report).

1. Because the amount of available native habitat is continually being reduced due to conversion, restoring habitat has become an important practice to ensure enough habitat remains on the landscape. However successful restorations are expensive and require long-term commitments, limiting the amount of acres land managers can feasibly restore. Acknowledging these obstacles, land managers are then charged with the difficult task of ensuring limited resources go towards projects that will provide the greatest "bang for their buck". One way land managers can begin to prioritize is by considering a changing climate and the projects' ability to aid in climate resiliency. The Midwest Landscape Initiative, using data from The Nature Conservancy, has mapped areas throughout the Midwest that are climate resilient. Climate resiliency identifies lands and waters that can properly function under changing climate conditions. These areas are prioritized based on landscape diversity and connectedness. Components of the dataset include data from the resilient and connected network (RCN), recognized biodiversity values, connectivity and climate flow scores, geophysical settings, landforms, landscape diversity values, local connectedness metrics, and terrestrial resilience scores. The map in Figure 13 shows the least resilient to the most resilient lands based on these data. Using this information, land managers can make better decisions on where to prioritize restoration projects. Area's that are most resilient are comprised of healthy native communities and restoring areas adjacent to these parcels can expand and/or connect these areas of refugia and will likely have much greater benefits than restorations done in areas surrounded by least resilient lands.

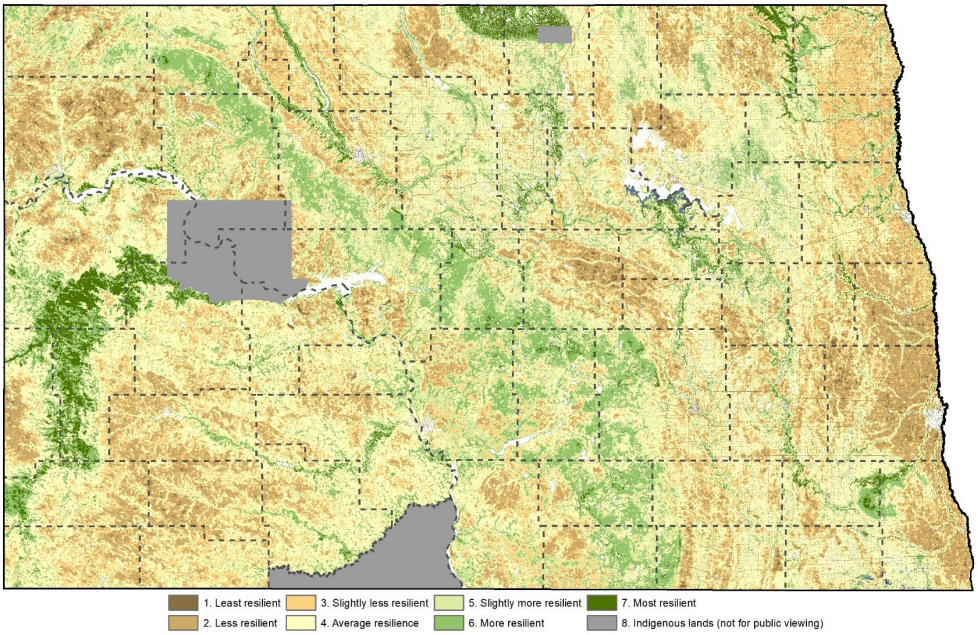


Figure 13. Priority areas based on landscape diversity and connectedness (Midwest Conservation Blueprint).

2. Like the climate resilient lands, the MLI, using the UN Environment Program World Biomass and Soil Carbon dataset (Soto-Navarro et al., 2020), has also mapped areas of climate resilience with a focus on carbon sequestration (Figure 14). These areas are prioritized based on the amount of above and below ground carbon stored. Areas that store higher amounts of carbon will play an important role in long term climate trends. Land managers can utilize this data to prioritize areas to protect, focusing on those with a higher capacity to store carbon.

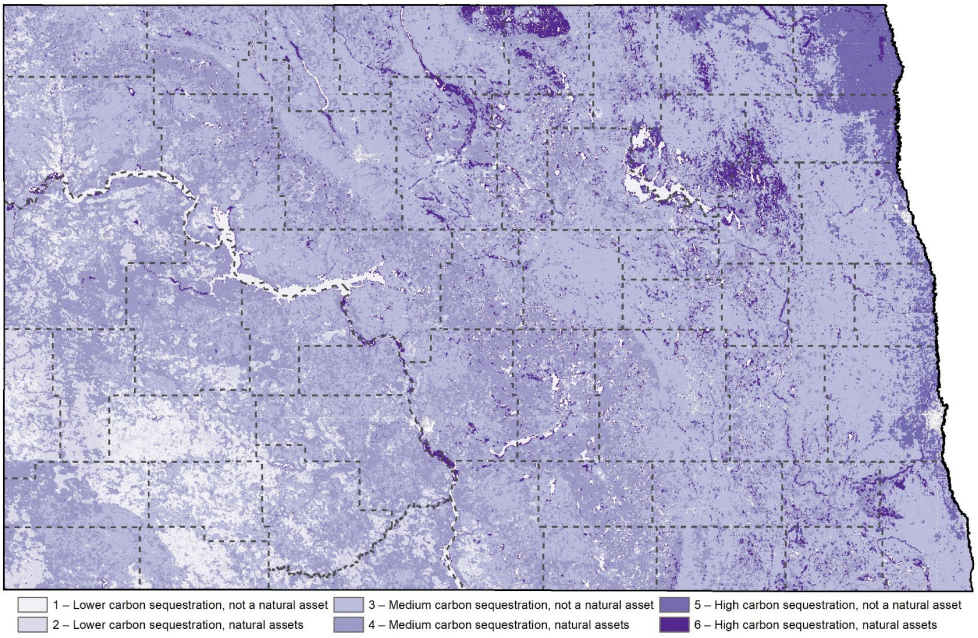


Figure 14. Priority areas based on the amount of above and belowground carbon stored (Midwest Conservation Blueprint).

TRIBAL COMMUNITIES

Tribal communities have played an important role in shaping North Dakota's history (State Historical Society, North Dakota Indian Affairs Commission). North Dakota is comprised of the traditional territories of Michif Piyii (Métis), Očhéthi Šakówiŋ, Yanktonai, Assiniboine, Mandan, Hidatsa, and Arikara, Hunkpapa, Tséstho'e (Cheyenne), Sisíthuŋwaŋ, Anishinabewaki, Itazipco, Apsáalooke (Crow), Bdewakantuwan (Mdewakanton), and Niitsítpiis-stahkoii (https://native-land.ca/). Today, in North Dakota there are five recognized tribes: the Mandan, Hidatsa, & Arikara Nation (Three Affiliated Tribes), the Spirit Lake Nation, the Standing Rock Sioux Tribe, and the Turtle Mountain Band of Chippewa Indians, as well as one Indian community: the Sisseton-Wahpeton Oyate Nation. There are more than 30,000 indigenous residents in North Dakota and several million acres of tribal land.

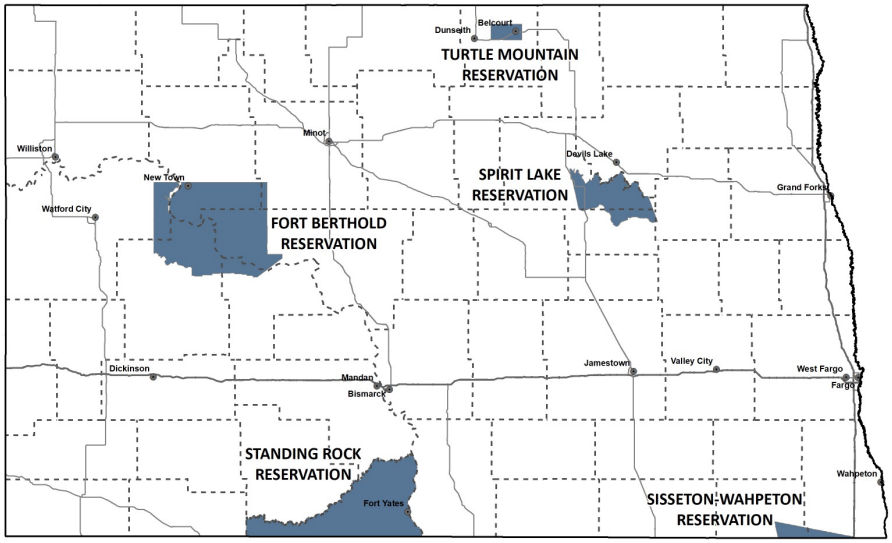


Figure 15. Tribal reservations of North Dakota.

The Importance of Culturally Significant Natural Resources to Tribal Communities in North Dakota

Culturally significant natural resources are essential to the well-being, identity, and sovereignty of tribal communities in North Dakota. These resources, including native plant species, wildlife, sacred landscapes, and water bodies, are integral to traditional practices, ceremonial life, and intergenerational knowledge transfer. For many tribal nations, the relationship with these natural elements is guided by long-standing stewardship principles that emphasize balance, respect, and sustainability.

The North Dakota State Wildlife Action Plan recognizes that effective conservation must include Indigenous perspectives and honor tribal knowledge systems. Respectful engagement with tribal governments is critical to understanding the cultural dimensions of wildlife and habitat management. Furthermore, the conservation of culturally important species and landscapes supports broader ecological and social goals, including the preservation of biodiversity, the protection of treaty rights, and the promotion of community resilience.

Developing relationships with tribal nations and implementation of conservation strategies enhances the relevance and long-term success of the SWAP. This approach aligns with shared values of protecting natural heritage for future generations while acknowledging the unique relationships that tribal communities maintain with the land and its resources.

TRIBAL SUCCESS STORY

American Marten

The American Marten (*Martes Americana*) was once fairly common in the Turtle Mountains and Pembina Hills. The species was extirpated by 1900 and confirmed observations of the species did not occur until the early 2000's. From 2006 to 2009, a State Wildlife Grant aimed at surveying River Otters and other meso-carnivores validated many more observations of martens in the Turtle Mountains. The American Marten was added as a Species of Conservation Priority in the 2015 State Wildlife Action Plan.

From 2022-2024, the North Dakota Game and Fish Department worked with the Turtle Mountain Band of Chippewa to assess the marten population within the Turtle Mountains. The reservation encompasses a substantial portion of this region, which contains extensive, intact tracts of the marten's preferred aspen habitat.

Researchers from Michigan State University used cubbies with bait or a lure to attract martens to investigate and leave behind a hair sample in the process. The genetic mark recapture survey has determined that there is a sizeable population of American Martens in the Turtle Mountains. The findings of this study – made possible through the successful partnership between the NDGF and the Turtle Mountain Band of Chippewa- supported the removal of the American Marten from the Species of Greatest Conservation Need list in the 2025 State Wildlife Action Plan.

CHAPTER 3
SPECIES OF GREATEST CONSERVATION NEED

This chapter outlines how the following element was identified:

Element 1: information on the distribution and abundance of species of wildlife, including low and declining populations as each State fish and wildlife agency deems appropriate, that are indicative of the diversity and health of the State's Species of Greatest Conservation Need (SGCN).

OVERVIEW

Congress identified the eight required elements to be addressed in the State Wildlife Action Plans (SWAP), which requires an update every 10 years. Element #1 is: *information on the distribution and abundance of species of wildlife, including low and declining populations as each State fish and wildlife agency deems appropriate, that are indicative of the diversity and health of the State's Species of Greatest Conservation Need (SGCN).* The SWAP must identify and focus on the recovery and conservation of SGCNs yet address the full array of wildlife and wildlife-related issues.

A key step in the SWAP revision process is reviewing the species list. In the 2015 North Dakota (ND) SWAP, the list was referred to as Species of Conservation Priority (SCP) and was divided into 3 different levels of priority. In the 2025 ND SWAP, the principal list will be referred to as Species of Greatest Conservation Need or SGCN and no levels will be assigned. A second list has been developed and will be referred to as Species of Greatest Information Need or SGIN. **While SGCNs are known to be at-risk or in decline, SGINs face uncertainty in terms of their status, range, or level of risk.**

Guidance and definitions for identifying the species on the list:

- N.D.C.C. § 20.1-01-02 (59). "Wildlife" means any member of the animal kingdom including any mammal, fish, bird (including any migratory, nonmigratory, or endangered bird for which protection is also afforded by treaty or other international agreement), amphibian, reptile, mollusk, crustacean, or other invertebrate . . . Wildlife does not include domestic animals as defined by section 36-01-00.1 or birds or animals held in private ownership.
- The term "species" includes taxonomic species as well as selected subspecies. If taxonomy is uncertain or scientific knowledge does not exist to identify to species level, an assemblage or species group may be used.
- Species must be fauna, not flora, and may include aquatic species and invertebrates. States have the option of choosing which taxa to include.
- The list may include both hunted and non-hunted species. States have the option of whether to include game species on the list.
- The list may include federally threatened or endangered species but is not mandatory. In previous ND SWAPS, all federally listed species were included. For the 2025 species list revision, federally listed species that are not known to occur, or occur infrequently, may be omitted, or moved to the SGIN list.
- The list is subject to change as new information becomes available. If it is determined that a species is at high or imminent risk, it may be added to the SGCN list prior to the 2035 revision.

LIST REVISION PROCESS

A team of four North Dakota Game and Fish Department Conservation Biologists led the review and development of the 2025 list. The following taxonomic groups were considered: birds, mammals, reptiles, amphibians, fish, terrestrial invertebrates, and aquatic invertebrates. The 2025 list includes a more thorough assessment of terrestrial and aquatic invertebrates compared to previous SWAP efforts. For comparison, the 2015 list only included invertebrates listed as federally threatened or endangered, or under review for listing. Migratory and wintering birds were also evaluated for the 2025 list, whereas previous efforts concentrated mainly on birds that nest in the state.

First, Department staff compiled the information available for species that may be at-risk or declining. For some taxa, such as birds, a tremendous amount of data and expert identified lists of species of concern are available. For many other species evaluated, there is a significant lack of data or even knowledge regarding the presence or distribution of the species in the state. Sources consulted included but was not limited to regional, national, or global watch lists, federal lists, international lists such as COSEWIC, NatureServe, iNaturalist, trend data such as Breeding Bird Survey, or data collected from State Wildlife Grant projects or other recent publications and research.

In January 2023, a preliminary list of potential species was shared internally with all Department staff for their review and feedback. The draft list was also sent to a broad group of partners and experts for review and feedback. The proposed revisions were divided into two tables: 1) species from the 2015 list and the Department's proposed actions for those species, and 2) species that were not on the 2015 list but have been identified as at-risk, declining, or priority species from other efforts or data sources. The proposed actions were: 1) keep (species is on 2015 list, retain on 2025 list); 2) add (add species to 2025 list); 3 remove (species is on 2015 list, do not include on 2025 list); or 4) undetermined (species evaluated but needs further review before making determination to add or exclude from list). After gathering insights from reviewers and engaging in discussions with other states about their strategies for the SGCN list, the Department decided to separate the list into two distinct groups: SGCNs and SGINs. In late 2023 and early 2024, expert focus groups based on taxa were established. There were differing opinions on whether to add or remove a species from the list and the smaller focus groups helped the Department make those determinations, including if the species should be categorized as an SGCN or SGIN. The draft 2025 SGCN and SGIN list was completed in July 2024 and made available on the Department's website (gf.nd.gov).

2025 SGCN and SGIN CRITERA/DEFINITONS

<u>SGCN includes species which are one or more of the following:</u>

a. Regionally or globally imperiled.
b. At-risk or experiencing declines either regionally or globally and North Dakota represents an important portion of their remaining range.
c. At-risk based on expert review or recent regional or global assessments.

<u>SGIN includes species which are one or more of the following:</u>

d. Potentially vulnerable but current scientific knowledge and expert understanding is lacking.
e. Potentially stable in North Dakota but may be experiencing declines in a substantial portion of their range.
f. Potentially stable but uncertainty about life history traits may make them at-risk.
g. Declining regionally or globally but uncertainty regarding the significance of North Dakota to its survival.

Summary of Changes

Table 1. Total number of species by taxa included on the 2025 list compared to the 2015 list.

Taxa	2015 SWAP List	Removed From 2015 List	Added to 2025 SGCN	Moved From 2015 List to 2025 SGIN	Added to 2025 SGIN	Total 2025 SGCN	Total 2025 SGIN	Total SGCN + SGIN
Birds	47	3	16	3	8	57	11	68
Mammals	21	2	3	10	4	12	14	26
Amphibians & Reptiles	11	1	1	5	7	6	12	18
Fishes	22	5	1	2	1	16	3	19
Terrestrial Invertebrates	4	0	19	0	36	23	36	59
Aquatic Invertebrates	10	0	10	0	22	20	22	42
TOTAL	**115**	**11**	**50**	**20**	**78**	**134**	**98**	**232**

The following species were removed from the 2015 list because the species has recovered, or the best available information indicates the species is not at-risk or declining.

Table 2. Species removed from 2015 List.

Taxa	Subtaxon or Group	Common Name	Scientific Name
Birds	Landbird	Bald Eagle	*Haliaeetus leucocephalus*
Birds	Landbird	Swainson's Hawk	*Buteo swainsoni*
Birds	Landbird	Dickcissel	*Spiza americana*
Mammals	Carnivore	American Marten	*Martes americana*
Mammals	Carnivore	River Otter	*Lontra canadensis*
Amphibians	Toad	Canadian Toad	*Anaxyrus hemiophrys*
Fishes	Catfish	Yellow Bullhead	*Ameiurus natalis*
Fishes	Lamprey	Chestnut Lamprey	*Ichthyomyzon castaneus*
Fishes	Lamprey	Silver Lamprey	*Ichthyomyzon unicuspis*
Fishes	Minnow	Logperch	*Percina caprodes*
Fishes	Minnow	River Darter	*Percina shumardi*

Taxonomic name changes from 2015 to 2025:

- McCown’s Longspur to Thick-billed Longspur

Table 3. Species of Greatest Conservation Need (SGCN).

SPECIES OF GREATEST CONSERVATION NEED (SGCN)						
Taxa	**Subtaxon or Group**	**Common Name**	**Scientific Name**	**a. Regionally or globally imperiled**	**b. At-risk, ND important**	**c. At-risk, expert review**
Birds	Landbird	American Kestrel	*Falco sparverius*			X
Birds	Landbird	Baird's Sparrow	*Centronyx bairdii*	X	X	
Birds	Landbird	Black-billed Cuckoo	*Coccyzus erythropthalmus*			X
Birds	Landbird	Bobolink	*Dolichonyx oryzivorus*	X	X	
Birds	Landbird	Brewer's Sparrow	*Spizella breweri*			X
Birds	Landbird	Brown Thrasher	*Toxostoma rufum*			X
Birds	Landbird	Burrowing Owl	*Athene cunicularia*			X
Birds	Landbird	Chestnut-collared Longspur	*Calcarius ornatus*	X	X	
Birds	Landbird	Ferruginous Hawk	*Buteo regalis*		X	
Birds	Landbird	Golden Eagle	*Aquila chrysaetos*			X
Birds	Landbird	Grasshopper Sparrow	*Ammodramus savannarum*	X	X	
Birds	Landbird	Greater Prairie-Chicken	*Tympanuchus cupido*	X		
Birds	Landbird	Greater Sage-Grouse	*Centrocercus urophasianus*	X		
Birds	Landbird	Harris's Sparrow	*Zonotrichia querula*		X	X
Birds	Landbird	Horned Lark	*Eremophila alpestris*			X
Birds	Landbird	Lark Bunting	*Calamospiza melanocorys*	X	X	
Birds	Landbird	LeConte's Sparrow	*Ammospiza leconteii*	X	X	
Birds	Landbird	Loggerhead Shrike	*Lanius ludovicianus*	X		
Birds	Landbird	Nelson’s Sparrow	*Ammospiza nelsoni*		X	
Birds	Landbird	Northern Harrier	*Circus hudsonius*		X	
Birds	Landbird	Prairie Falcon	*Falco mexicanus*			X
Birds	Landbird	Red-headed Woodpecker	*Melanerpes erythrocephalus*			X
Birds	Landbird	Ruffed Grouse	*Bonasa umbellus*			X
Birds	Landbird	Sharp-tailed Grouse	*Tympanuchus phasianellus*		X	
Birds	Landbird	Short-eared Owl	*Asio flammeus*	X		X
Birds	Landbird	Sprague's Pipit	*Anthus spragueii*	X	X	
Birds	Landbird	Thick-billed Longspur	*Rhynchophanes mccownii*	X		
Birds	Landbird	Western Meadowlark	*Sturnella neglecta*		X	
Birds	Shorebird	American Avocet	*Recurvirostra americana*		X	
Birds	Shorebird	American Golden-Plover	*Pluvialis dominica*	X		X
Birds	Shorebird	Buff-breasted Sandpiper	*Calidris subruficollis*	X		X
Birds	Shorebird	Dunlin	*Calidris alpina*	X		X
Birds	Shorebird	Hudsonian Godwit	*Limosa haemastica*	X	X	
Birds	Shorebird	Lesser Yellowlegs	*Tringa flavipes*	X	X	
Birds	Shorebird	Long-billed Curlew	*Numenius americanus*			X

SPECIES OF GREATEST CONSERVATION NEED (SGCN)						
Taxa	**Subtaxon or Group**	**Common Name**	**Scientific Name**	**a. Regionally or globally imperiled**	**b. At-risk, ND important**	**c. At-risk, expert review**
Birds	Shorebird	Long-billed Dowitcher	*Limnodromus scolopaceus*	X	X	
Birds	Shorebird	Marbled Godwit	*Limosa fedoa*	X	X	
Birds	Shorebird	Pectoral Sandpiper	*Calidris melanotos*	X	X	
Birds	Shorebird	Piping Plover	*Charadrius melodus*	X	X	
Birds	Shorebird	Ruddy Turnstone	*Arenaria interpres*	X	X	
Birds	Shorebird	Semipalmated Sandpiper	*Calidris pusilla*	X	X	
Birds	Shorebird	Short-billed Dowitcher	*Limnodromus griseus*	X		
Birds	Shorebird	Stilt Sandpiper	*Calidris himantopus*	X	X	
Birds	Shorebird	Upland Sandpiper	*Bartramia longicauda*		X	
Birds	Shorebird	Willet	*Tringa semipalmata*		X	
Birds	Shorebird	Wilson's Phalarope	*Phalaropus tricolor*		X	X
Birds	Waterbird	American Bittern	*Botaurus lentiginosus*		X	
Birds	Waterbird	Black Tern	*Chlidonias niger*	X	X	
Birds	Waterbird	Franklin's Gull	*Leucophaeus pipixcan*		X	
Birds	Waterbird	Horned Grebe	*Podiceps auritus*	X	X	
Birds	Waterbird	Least Tern (Interior)	*Sternula antillarum*	X		
Birds	Waterbird	Western Grebe	*Aechmophorus occidentalis*		X	
Birds	Waterbird	Whooping Crane	*Grus americana*	X		
Birds	Waterbird	Yellow Rail	*Coturnicops noveboracensis*		X	X
Birds	Waterfowl	Canvasback	*Aythya valisineria*		X	
Birds	Waterfowl	Lesser Scaup	*Aythya affinis*		X	
Birds	Waterfowl	Northern Pintail	*Anas acuta*	X	X	
Mammals	Bat	Big Brown Bat	*Eptesicus fuscus*	X		
Mammals	Bat	Eastern Red Bat	*Lasiurus borealis*			X
Mammals	Bat	Hoary Bat	*Lasiurus cinereus*			X
Mammals	Bat	Little Brown Bat	*Myotis lucifugus*	X		
Mammals	Bat	Northern Long-eared Bat	*Myotis septentrionalis*	X		
Mammals	Bat	Silver-haired Bat	*Lasionycteris noctivagans*			X
Mammals	Carnivore	Black-footed Ferret	*Mustela nigripes*	X		
Mammals	Carnivore	Eastern Spotted Skunk	*Spilogale putorius*	X		
Mammals	Carnivore	Gray Fox	*Urocyon cinereoargenteus*	X		
Mammals	Carnivore	Swift Fox	*Vulpes velox*			X
Mammals	Rodent	Black-tailed Prairie Dog	*Cynomys ludovicianus*	X		
Mammals	Rodent	Richardson's Ground Squirrel	*Urocitellus richardsonii*		X	
Amphibians	Toad	American Toad	*Anaxyrus americanus*			X

SPECIES OF GREATEST CONSERVATION NEED (SGCN)						
Taxa	**Subtaxon or Group**	**Common Name**	**Scientific Name**	**a. Regionally or globally imperiled**	**b. At-risk, ND important**	**c. At-risk, expert review**
Amphibians	Toad	Plains Spadefoot	*Spea bombifrons*			X
Reptiles	Lizard	Northern Prairie Skink	*Plestiodon septentrionalis*			X
Reptiles	Snake	Plains Hog-nosed Snake	*Heterodon nasicus*			X
Reptiles	Snake	Smooth Green Snake	*Opheodrys vernalis*			X
Reptiles	Turtle	Snapping Turtle	*Chelydra serpentina*			X
Fishes	Codfish	Burbot	*Lota lota*			X
Fishes	Minnow	Blacknose Shiner	*Notropis heterolepis*			X
Fishes	Minnow	Blue Sucker	*Cycleptus elongatus*		X	
Fishes	Minnow	Carmine Shiner	*Notropis percobromus*			X
Fishes	Minnow	Finescale Dace	*Chrosomus neogaeus*			X
Fishes	Minnow	Flathead Chub	*Platygobio gracilis*			X
Fishes	Minnow	Hornyhead Chub	*Nocomis biguttatus*			X
Fishes	Minnow	Northern Pearl Dace	*Margariscus nachtriebi*			X
Fishes	Minnow	Northern Redbelly Dace	*Chrosomus eos*			X
Fishes	Minnow	Pugnose Shiner	*Notropis anogenus*			X
Fishes	Minnow	Sicklefin Chub	*Macrhybopsis meeki*		X	
Fishes	Minnow	Sturgeon Chub	*Macrhybopsis gelida*		X	
Fishes	Minnow	Trout-perch	*Percopsis omiscomaycus*			X
Fishes	Sturgeon	Lake Sturgeon	*Acipenser fulvescens*	X		
Fishes	Sturgeon	Paddlefish	*Polyodon spathula*		X	
Fishes	Sturgeon	Pallid Sturgeon	*Scaphirhynchus albus*	X		
Terrestrial Invertebrates	Bumble Bee	American Bumble Bee	*Bombus pensylvanicus*	X		X
Terrestrial Invertebrates	Bumble Bee	Indiscriminate Cuckoo Bumble Bee	*Bombus insularis*			X
Terrestrial Invertebrates	Bumble Bee	Yellow-banded Bumble Bee	*Bombus terricola*			X
Terrestrial Invertebrates	Bumble Bee	Western Bumble Bee	*Bombus occidentalis*	X		X
Terrestrial Invertebrates	Bumble Bee	Yellow Bumble Bee	*Bombus fervidus*	X	X	X
Terrestrial Invertebrates	Solitary Bee	Ainslie's Cuckoo Nomad Bee	*Epeolus ainsliei*			X
Terrestrial Invertebrates	Beetle	Badlands Tiger Beetle	*Cicindela decemnotata*			X
Terrestrial Invertebrates	Tiger Beetle	Ghost Tiger Beetle	*Cicindela lepida*			X
Terrestrial Invertebrates	Tiger Beetle	Northern Sandy Tiger Beetle	*Cicindela limbata nympha*			X
Terrestrial Invertebrates	Butterfly	Monarch Butterfly	*Danaus plexippus*			X
Terrestrial Invertebrates	Butterfly	Mulberry Wing	*Poanes massasoit*	X		

SPECIES OF GREATEST CONSERVATION NEED (SGCN)						
Taxa	**Subtaxon or Group**	**Common Name**	**Scientific Name**	**a. Regionally or globally imperiled**	**b. At-risk, ND important**	**c. At-risk, expert review**
Terrestrial Invertebrates	Butterfly	Regal Fritillary	*Argynnis idalia*		X	X
Terrestrial Invertebrates	Butterfly	Tawny Crescent	*Phyciodes batesii*			X
Terrestrial Invertebrates	Moth	Abbreviated Underwing	*Catocala abbreviatella*			X
Terrestrial Invertebrates	Moth	Hera Sheepmoth	*Hemileuca hera*			X
Terrestrial Invertebrates	Moth	Whitney's Underwing	*Catocala whitneyi*	X		X
Terrestrial Invertebrates	Skipper	Broad-winged Skipper	*Poanes viator*	X		X
Terrestrial Invertebrates	Skipper	Dakota Skipper	*Hesperia dacotae*	X	X	X
Terrestrial Invertebrates	Skipper	Dion Skipper	*Euphyes dion*	X		X
Terrestrial Invertebrates	Skipper	Edwards' Hairstreak	*Satyrium edwardsii*			X
Terrestrial Invertebrates	Skipper	Hobomok Skipper	*Lon hobomok*			X
Terrestrial Invertebrates	Skipper	Ottoe Skipper	*Hesperia ottoe*			X
Terrestrial Invertebrates	Skipper	Poweshiek Skipperling	*Oarisma poweshiek*	X		X
Aquatic Invertebrates	Dragonfly	Plains Emerald	*Somatochlora ensigera*			X
Aquatic Invertebrates	Dragonfly	Subarctic Darner	*Aeshna subarctica*			X
Aquatic Invertebrates	Freshwater Mussel	Black Sandshell	*Ligumia recta*	X		
Aquatic Invertebrates	Freshwater Mussel	Creek Heelsplitter	*Lasmigona compressa*		X	
Aquatic Invertebrates	Freshwater Mussel	Creeper	*Strophitus undulatus*			X
Aquatic Invertebrates	Freshwater Mussel	Deertoe	*Truncilla truncata*		X	
Aquatic Invertebrates	Freshwater Mussel	Fragile Papershell	*Leptodea fragilis*			X
Aquatic Invertebrates	Freshwater Mussel	Mapleleaf	*Quadrula quadrula*			X
Aquatic Invertebrates	Freshwater Mussel	Pink Heelsplitter	*Potamilus alatus*			X
Aquatic Invertebrates	Freshwater Mussel	Pink Papershell	*Potamilus ohiensis*		X	
Aquatic Invertebrates	Freshwater Mussel	Threeridge	*Amblema plicata*			X
Aquatic Invertebrates	Freshwater Mussel	Wabash Pigtoe	*Fusconaia flava*	X		
Aquatic Invertebrates	Mayfly	a mayfly	*Raptoheptagenia cruentata*			X
Aquatic Invertebrates	Mayfly	a mayfly	*Apobaetis lakota*			X

SPECIES OF GREATEST CONSERVATION NEED (SGCN)						
Taxa	**Subtaxon or Group**	**Common Name**	**Scientific Name**	**a. Regionally or globally imperiled**	**b. At-risk, ND important**	**c. At-risk, expert review**
Aquatic Invertebrates	Mayfly	a mayfly	*Cercobrachys cree*			X
Aquatic Invertebrates	Mayfly	a mayfly	*Traverella lewisi*			X
Aquatic Invertebrates	Mayfly	a sand-dwelling mayfly	*Lachlania saskatchewanensis*		X	
Aquatic Invertebrates	Stonefly	Dakota Stonefly	*Perlesta dakota*		X	
Aquatic Invertebrates	Stonefly	Pawnee Stonefly	*Perlesta xube*			X
Aquatic Invertebrates	Stonefly	Plains Stripetail	*Isoperla longiseta*			X

Hudsonian Godwit

Monarch Butterfly

American Toad

Lake Sturgeon

Table 4. Species of Greatest Information Need (SGIN).

Species denoted with an asterisk (*) have been moved from the 2015 SCP list to the 2025 SGIN list.

SPECIES OF GREATEST INFORMATION NEED (SGIN)							
Taxa	**Subtaxon or Group**	**Common Name**	**Scientific Name**	**d. Scientific knowledge deficient**	**e. Potentially stable in ND, declining in range**	**f. Potentially stable but life history trait vulnerability**	**g. Declining, ND significance uncertain**
Birds	Landbird	Black-billed Magpie	*Pica hudsonia*		X	X	
Birds	Landbird	Chimney Swift	*Chaetura pelagica*				X
Birds	Landbird	Common Nighthawk	*Chordeiles minor*	X		X	
Birds	Landbird	Eastern Screech-Owl	*Megascops asio*	X			X
Birds	Landbird	Northern Flicker	*Colaptes auratus*				X
Birds	Landbird	Peregrine Falcon*	*Falco peregrinus*			X	
Birds	Landbird	Smith's Longspur	*Calcarius pictus*	X			
Birds	Landbird	Snowy Owl	*Bubo scandiacus*	X			
Birds	Landbird	Western Kingbird	*Tyrannus verticalis*				X
Birds	Shorebird	Red Knot (Rufa)*	*Calidris canutus*				X
Birds	Waterbird	American White Pelican*	*Pelecanus erythrorhynchos*			X	
Mammals	Bat	Fringed Myotis	*Myotis thysanodes*				X
Mammals	Bat	Long-eared Bat*	*Myotis evotis*	X			
Mammals	Bat	Long-legged Bat*	*Myotis volans*	X			
Mammals	Bat	Townsend's Big-eared Bat*	*Corynorhinus townsendii*				X
Mammals	Bat	Western Small-footed Bat*	*Myotis ciliolabrum*	X			
Mammals	Rodent	Franklin's Ground Squirrel	*Poliocitellus franklinii*		X		
Mammals	Rodent	Hispid Pocket Mouse*	*Chaetodipus hispidus*	X			
Mammals	Rodent	Plains Pocket Mouse*	*Perognathus flavescens*	X			
Mammals	Rodent	Sagebrush Vole*	*Lemmiscus curtatus*	X			
Mammals	Rodent	Ord's Kangaroo Rat	*Dipodomys ordii*	X			
Mammals	Shrew	Arctic Shrew*	*Sorex arcticus*	X			
Mammals	Shrew	Merriam's Shrew*	*Sorex merriami*	X			
Mammals	Shrew	Northern Water Shrew	*Sorex palustris*	X			
Mammals	Shrew	Pygmy Shrew*	*Sorex minutus*	X			
Amphibians	Frog	Cope's Gray Treefrog	*Hyla chrysoscelis*	X			

SPECIES OF GREATEST INFORMATION NEED (SGIN)							
Taxa	**Subtaxon or Group**	**Common Name**	**Scientific Name**	**d. Scientific knowledge deficient**	**e. Potentially stable in ND, declining in range**	**f. Potentially stable but life history trait vulnerability**	**g. Declining, ND significance uncertain**
Amphibians	Frog	Eastern Gray Treefrog	*Hyla versicolor*	X			
Amphibians	Frog	Wood Frog	*Lithobates sylvaticus*			X	
Amphibians	Salamander	Common Mudpuppy	*Necturus maculosus*	X			
Reptiles	Lizard	Sagebrush Lizard*	*Sceloporus graciosus*			X	
Reptiles	Lizard	Short-horned Lizard*	*Phrynosoma hernandesi*			X	
Reptiles	Snake	Common Gartersnake	*Thamnophis sirtalis*			X	
Reptiles	Snake	Plains Gartersnake	*Thamnophis radix*			X	
Reptiles	Snake	Red-bellied Snake	*Storeria occipitomaculata*			X	
Reptiles	Turtle	False Map Turtle*	*Graptemys pseudogeographica*			X	
Reptiles	Turtle	Smooth Softshell*	*Apalone mutica*			X	
Reptiles	Turtle	Spiny Softshell*	*Apalone spinifera*			X	
Fishes	Minnow	silvery minnows	*Hybognathus spp.*[1]	X			
Fishes	Minnow	Largescale Stoneroller*	*Campostoma oligolepis*	X			
Fishes	Minnow	Silver Chub*	*Macrhybopsis storeriana*	X			
Terrestrial Invertebrates	Bumble Bee	Ashton's Cuckoo Bumble Bee	*Bombus ashtonii*	X			X
Terrestrial Invertebrates	Bumble Bee	Black-and-gold Bumble Bee	*Bombus auricomus*	X			
Terrestrial Invertebrates	Bumble Bee	Rusty-patched Bumble Bee	*Bombus affinis*				X
Terrestrial Invertebrates	Bumble Bee	Suckley's Cuckoo Bumble Bee	*Bombus suckleyi*				X
Terrestrial Invertebrates	Solitary Bee	a leaf-cutter bee	*Megachile dakotensis*				X
Terrestrial Invertebrates	Solitary Bee	a mason bee	*Osmia illinoensis*				X
Terrestrial Invertebrates	Solitary Bee	a nomia bee	*Nomia universitatis*				X
Terrestrial Invertebrates	Solitary Bee	Nude Yellow Loosestrife Bee	*Macropis nuda*				X
Terrestrial Invertebrates	Solitary Bee	Susanna's Cellophane Bee	*Colletes susannae*	X			

[1] Genus assemblage.

SPECIES OF GREATEST INFORMATION NEED (SGIN)							
Taxa	**Subtaxon or Group**	**Common Name**	**Scientific Name**	**d. Scientific knowledge deficient**	**e. Potentially stable in ND, declining in range**	**f. Potentially stable but life history trait vulnerability**	**g. Declining, ND significance uncertain**
Terrestrial Invertebrates	Beetle	Nine-spotted Lady Beetle	*Coccinella novemnotata*				X
Terrestrial Invertebrates	Tiger Beetle	Great Plains Tiger Beetle	*Amblycheila cylindriformis*	X			
Terrestrial Invertebrates	Tiger Beetle	Splendid Tiger Beetle	*Cicindela splendida*				X
Terrestrial Invertebrates	Butterfly	Baird's Swallowtail	*Papilio machaon bairdii*	X			
Terrestrial Invertebrates	Butterfly	Gray Copper	*Tharsalea dione*		X		
Terrestrial Invertebrates	Butterfly	Greenish Blue	*Icaricia saepiolus*		X		
Terrestrial Invertebrates	Butterfly	Large Marble	*Euchloe ausonides*				X
Terrestrial Invertebrates	Butterfly	Mead's Wood-Nymph	*Cercyonis meadii*	X			
Terrestrial Invertebrates	Butterfly	Mormon Metalmark	*Apodemia mormo*	X			
Terrestrial Invertebrates	Butterfly	Persius Dusky Wing	*Erynnis persius*				X
Terrestrial Invertebrates	Butterfly	Purplish Copper	*Lycaena helloides*		X		
Terrestrial Invertebrates	Butterfly	Ridings' Satyr	*Neominois ridingsii*	X			
Terrestrial Invertebrates	Butterfly	Silvery Blue	*Glaucopsyche lygdamus*		X		
Terrestrial Invertebrates	Moth	a crambid snout moth	*Pyrausta pythialis*	X			
Terrestrial Invertebrates	Moth	Juanita Sphinx Moth	*Proserpina juanita*	X			
Terrestrial Invertebrates	Moth	Leadplant Flower Moth	*Schinia lucens*	X			
Terrestrial Invertebrates	Moth	Manitoba Oakworm Moth	*Anisota manitobensis*				X
Terrestrial Invertebrates	Skipper	Arogos Skipper	*Atrytone arogos*				X
Terrestrial Invertebrates	Skipper	Garita Skipperling	*Oarisma garita*	X			
Terrestrial Invertebrates	Skipper	Leonard's Skipper	*Hesperia leonardus*				X
Terrestrial Invertebrates	Skipper	Pahaska Skipper	*Hesperia pahaska*				X
Terrestrial Invertebrates	Skipper	Plains Branded Skipper	*Hesperia assinboia*	X			
Terrestrial Invertebrates	Skipper	Rhesus Skipper	*Polites rhesus*				X
Terrestrial Invertebrates	Skipper	Strecker's Giant-skipper	*Megathymus streckeri*				X
Terrestrial Invertebrates	Skipper	Uncas Skipper	*Hesperia uncas*				X

SPECIES OF GREATEST INFORMATION NEED (SGIN)							
Taxa	**Subtaxon or Group**	**Common Name**	**Scientific Name**	**d. Scientific knowledge deficient**	**e. Potentially stable in ND, declining in range**	**f. Potentially stable but life history trait vulnerability**	**g. Declining, ND significance uncertain**
Terrestrial Invertebrates	Grasshopper	Greenish-white Grasshopper	*Hypochlora alba*	X			
Terrestrial Invertebrates	Jumping spider	Apache Jumping Spider	*Phidippus apacheanus*				X
Aquatic Invertebrates	Anostroca	Ornate Fairy Shrimp	*Eubranchipus ornatus*		X		
Aquatic Invertebrates	Caddisfly	a giant case maker	*Ptilostomus angustipennis*	X			
Aquatic Invertebrates	Caddisfly	Long-horned Caddisfly	*Oecetis ochracea*	X			
Aquatic Invertebrates	Caddisfly	long-horned case makers	*Ceraclea spp.*[1]	X			
Aquatic Invertebrates	Caddisfly	Footed Micro Caddisfly	*Ochrotrichia tarsalis*	X			
Aquatic Invertebrates	Caddisfly	Net-spinning Caddisfly	*Hydropsyche piatrix*	X			
Aquatic Invertebrates	Caddisfly	Northern Caddisfly	*Anabolia ozburni*	X			
Aquatic Invertebrates	Caddisfly	Northern Case Maker	*Limnephilus perpusillus*	X			
Aquatic Invertebrates	Dragonfly	Boreal Whiteface	*Leucorrhinia borealis*	X			
Aquatic Invertebrates	Dragonfly	clubtails	*Stylurus spp.*[1]	X			
Aquatic Invertebrates	Dragonfly	Paiute Dancer	*Argia alberta*	X			
Aquatic Invertebrates	Dragonfly	spinylegs	*Dromogomphus spp.*[1]	X			
Aquatic Invertebrates	Gastropoda	sprites	*Promenetus spp.*[1]		X		
Aquatic Invertebrates	Hemiptera	Water Scorpion	*Nepa apiculata*	X			
Aquatic Invertebrates	Mayfly	a sand-dwelling mayfly	*Analetris eximia*	X			
Aquatic Invertebrates	Mayfly	small minnow mayflies	*Camelobaetidius spp.*[1]	X			
Aquatic Invertebrates	Mayfly	a small square-gilled mayfly	*Sparbarus lacustris*	X			
Aquatic Invertebrates	Mayfly	a small square-gilled mayfly	*Caenis youngi*	X			
Aquatic Invertebrates	Mayfly	a spiny-headed burrowing mayfly	*Pentagenia vittigera*	X			
Aquatic Invertebrates	Mayfly	Flat-headed Mayfly	*Stenacron minnetonka*	X			
Aquatic Invertebrates	Mayfly	White Sand-river Mayfly	*Pseudiron centralis*	X			

[1] Genus assemblage.

SPECIES OF GREATEST INFORMATION NEED (SGIN)							
Taxa	**Subtaxon or Group**	**Common Name**	**Scientific Name**	**d. Scientific knowledge deficient**	**e. Potentially stable in ND, declining in range**	**f. Potentially stable but life history trait vulnerability**	**g. Declining, ND significance uncertain**
Aquatic Invertebrates	Stonefly	Saskatoon Willowfly (winter stonefly)	*Oemopteryx fosketti*	X			

Boreal Whiteface

Sagebrush Lizard

Ord's Kangaroo Rat

Common Nighthawk

CLIMATE ADAPTATION CASE STUDY

Case Study 1: How will climate and land use change affect butterflies in the state of North Dakota?

Butterfly populations are experiencing declines across the globe, with land use practices and climate change emerging as important contributors to those trends[1-2]. Land use and climate change likely interact to influence butterfly abundance and distribution, with the relative strengths of these two stressors varying by geography and by species[3-5]. Future projections of climate and land use change effects on butterflies are also subject to various uncertainties. Coping with uncertainty about the future is a difficult task for scientists and managers alike. To address uncertainties when considering climate change, it may be especially useful to craft multiple divergent scenarios to explore what plausible futures might look like and then design management strategies around those scenarios[6].

This case study focuses on two grassland butterfly species regarded as Species of Greatest Conservation Need by North Dakota Game and Fish: the regal fritillary (*Speyeria idalia*) and Dakota skipper (*Hesperia dacotae*). We highlight the potential effects of climate change on these species and discuss scenario-based approaches to understanding and addressing potential effects.

Effects of climate change on the distribution of Dakota skippers

Recent work in the Northern Great Plains has shown that Dakota skipper abundance in North Dakota is driven by both land use and climate fluctuations[7-9]. Barnes et al. (9) specifically modeled the influence of climate conditions on Dakota skipper habitat use. Their modeling efforts allowed them to map future distributions of the species under different climate change scenarios (Figure 1). Their analysis showed that by the year 2100, most of the suitable habitat for Dakota skipper in the Northern Great Plains, including North Dakota, will be lost and shifted further north (Figure 1C). To incorporate uncertainty in the findings, this mapping exercise looked at where the multiple scenarios of future Dakota skipper distributions (based on current climate associations of the species) were in agreement. Figure 1 shows that the regions where suitable climate conditions may exist in the future are mainly in central Canada.

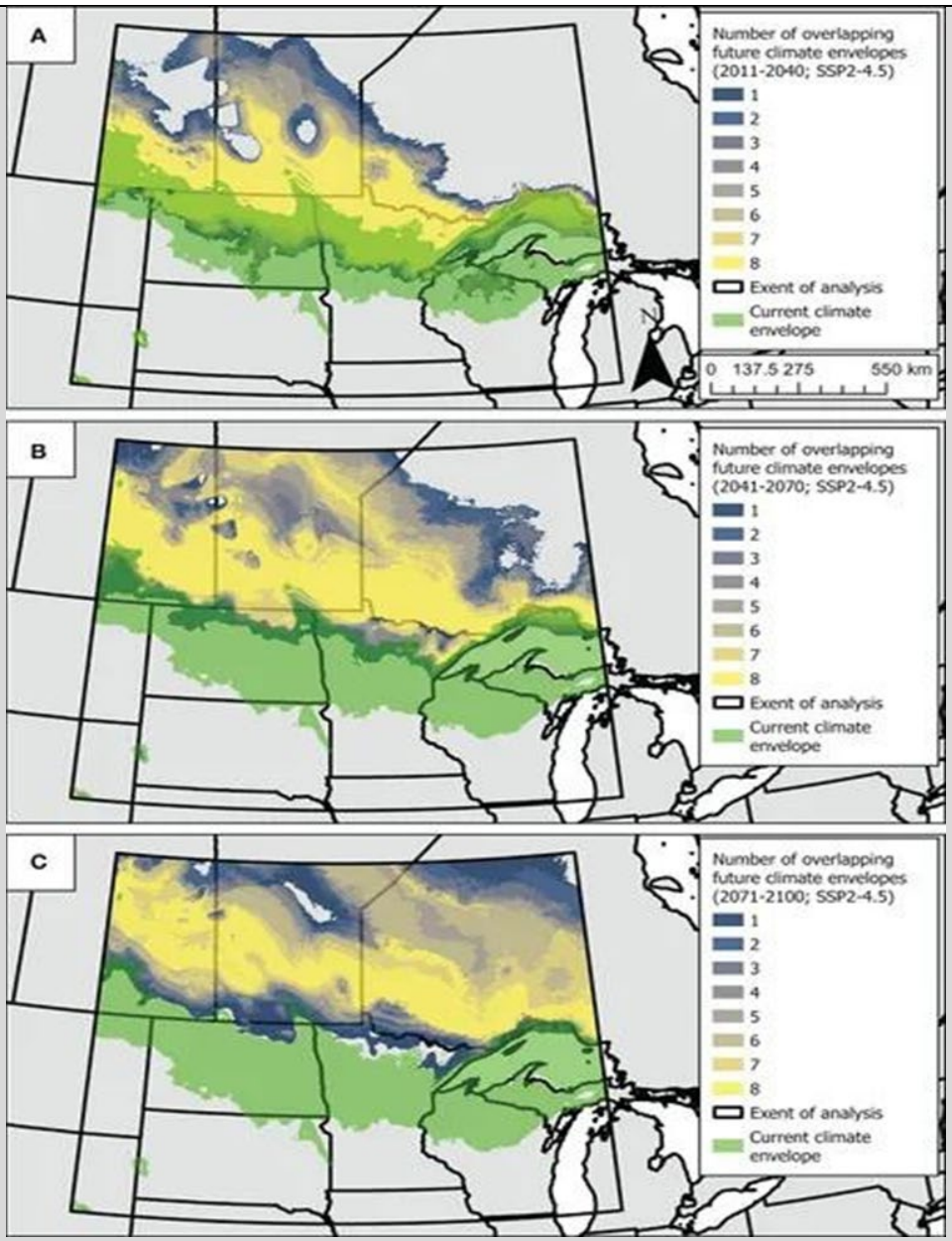


Figure 1. Reproduced from Barnes et al. (9). This figure shows the climate envelopes for 8 different climate models. Climate envelopes were defined as the range of bioclimatic conditions that were associated with suitable Dakota skipper habitat. The green polygons show where suitable bioclimatic conditions occur assuming current conditions. The numbers in the legend represent the number of climate models that forecasted suitable conditions in the future. Yellow regions, for example, show the most overlap in suitable conditions in the future, indicating more confidence in which changes have a higher possibility of occurring. Each panel represents a different period: 2011-2040 (A), 2041-2070 (B), and 2071-2100 (C). These panels were created assuming a SSP2-4.5 warming scenario, which is regarded as a middle-of-the-road scenario in terms of warming.

Effects of climate change on the distribution of regal fritillaries

Post van der Burg et al. (10) found that habitat use by regal fritillaries was controlled by the availability of grassland habitat and spring weather conditions. Therefore, under a moderate warming scenario, regal fritillary distributions would be expected to shift northward, resulting in a potential increase in habitat use in North Dakota's Prairie Pothole Region[10-11] (Figure 2B). This potential positive effect on

the regal fritillary in the region is persistent even if considered across multiple land use scenarios where agriculturally intensive land use futures reduced the amount of available habitat. However, when considering more extreme climate warming scenarios, the habitat use of this butterfly is projected to steeply decline (Figure 2C).

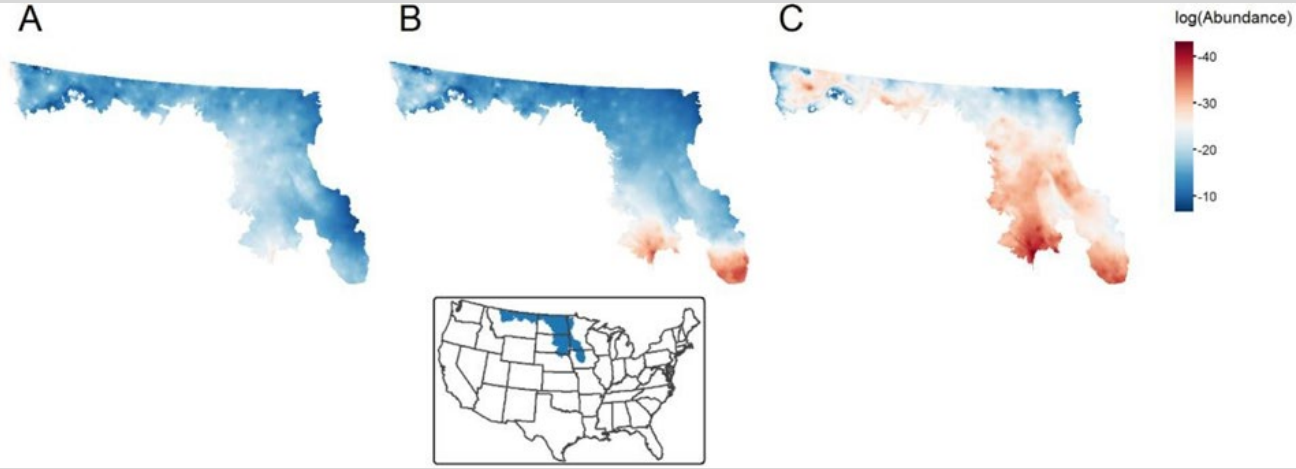


Figure 2. Figure reproduced from the Post van der Burg (1). These maps show predicted regal fritillary *habitat use (as abundance of use points) of pixels in the Prairie Pothole Region of the U.S. on the natural log scale. Regions in blue show higher use values and regions in red show lower use values. Panel A shows habitat use under current climate conditions; Panel B shows habitat use under moderate warming (Representative Concentration Pathway 4.5) in year 2100; and panel C shows habitat use under severe warming (Representative Concentration Pathway 8.5) in year 2100. Inset shows the location of the Prairie Pothole Region in the U.S.*

What do these analyses teach us about how to address uncertainty and develop potential management strategies?

The analyses by Barnes et al (9) and Post van der Burg et al. (11) provide insights into how uncertainty can be harnessed to inform managers about potential futures. When used within a formal decision-making framework, scenarios can help to assess how different management or conservation strategies, such as landscape-level planning, may perform under different conditions[6]. But such analyses may also be useful in more informal ways. For example, scenario thinking could be used by managers to explore best- and worst-case futures and develop plans for how to respond to those futures. Scenarios may also allow managers to think preemptively about how to avoid unintended consequences and strategize about which metrics need to be monitored in order to anticipate possible changes. Lastly, use of scenarios can be of assistance in making triage types of decisions. Our butterfly case studies suggest that local populations of two butterfly species in North Dakota could possibly disappear over time as the climate changes. Although grassland management will continue to be crucial for many species in the future, the specific species prioritized in the State Wildlife Action Plan may shift depending on the direction and magnitude of climate change. Thus, planning for which new species might be added as priorities to the SWAP would be an additional potential use of a scenario-based approach.

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CHAPTER 4
HABITAT AND COMMUNITY TYPES

This chapter outlines how the following element was identified:

Element 2: descriptions of locations and relative condition of key habitats and community types essential to species of greatest conservation need.

OVERVIEW

North Dakota lies within the Great Plains temperate grassland biome. The natural landscape was predominantly tallgrass, mixed-grass and shortgrass prairies and abundant, diverse freshwater wetlands. Over the past 150+ years, the prairie landscape has changed dramatically. It is estimated that more than 70% of the native prairie and 60% of the wetlands have been converted to other land uses, primarily annual crops, but also to roads and development. Abundant tree shelterbelts were planted to help reduce erosion and protect farmsteads. Several large reservoirs were constructed including Lake Sakakawea, which altered the natural flooding cycle of the Missouri River, North Dakota's largest riparian system. Roads, urbanization, and energy development are steadily increasing and expanding across North Dakota. There is, however, great potential to protect, conserve, and enhance habitat. Figure 16 provides a breakdown of the major land classes present in North Dakota today.

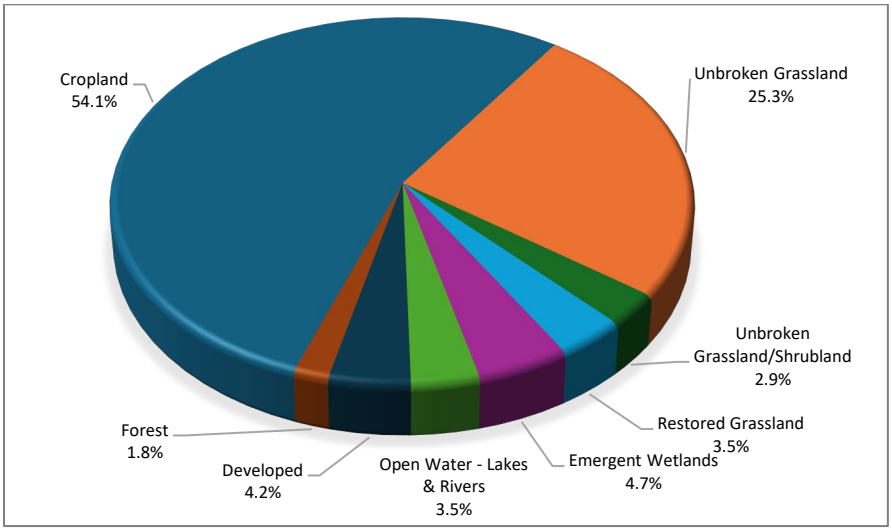


Figure 16. Percentage of North Dakota by land class.

Approximately 24.5 million acres of cropland (annually farmed land, includes alfalfa but excludes practices such as CRP), 11.47 million acres of unbroken grassland (native prairie), 1.3 million acres of unbroken grassland/shrubland (shrub-steppe, western ND primarily), 1.6 million acres of restored grassland, 2.15 million acres of emergent wetlands, 1.58 million acres of open water (lakes and rivers), 815 thousand acres of forest, and 1.89 million acres of developed (urban, transportation, industrial, etc.).

Many species require a variety of habitat types throughout their life cycle. To ensure their long-term survival, it's essential to maintain a diverse landscape, including grasslands, wetlands, forest, rivers, streams, and cropland. This approach goes beyond preserving a few small areas and calls for a broader, landscape-level perspective. Although cropland covers much of

North Dakota today, it was not historically part of the Great Plains' natural habitat. However, agriculture plays an important role in North Dakota's past, present, and future, providing benefits like nesting cover, migration stopovers, and winter food sources.

Adopting a habitat or landscape approach in conservation planning offers several benefits, including the ability to:

- **Link species of greatest conservation need** to key landscapes or habitats, sometimes within specific geographic areas or across multiple landscapes or ecoregions.
- **Assess the relative condition** of the landscape, providing insight into its current health and ecological status.
- **Highlight priority conservation issues** (direct threats) affecting the landscape, enabling targeted action.
- **Determine necessary conservation actions** and identify potential partners who are already involved in, or could contribute to, addressing these issues.
- **Identify research or survey needs** to gather information required to confirm conservation problems and necessary actions.
- **Provide data on ideal habitat and landscape characteristics** for specific areas, helping to define landscape goals to strive toward.
- **Understand the impact of management practices** on species within the area, as these practices can have varying effects depending on geographic context (see species accounts for more details).

This approach enhances the ability to address conservation needs at a broader, landscape level, ensuring that management actions are more effective and aligned with ecological realities.

Approximately 92% of North Dakota is privately owned, creating significant opportunities to collaborate with private landowners to conserve fish and wildlife resources. North Dakota farms and ranches are made up of cropland, rangeland, hayland, and other features like wetlands, wooded areas, and grassed waterways. The extent and quality of these elements will significantly impact the success of the SWAP and other conservation efforts aimed at preserving fish and wildlife species in the state. Many landowners have partnered with state, federal and conservation organizations to implement conservation practices.

Compared to other western states, North Dakota has limited public land. Of the state's 45.2 million acres, roughly 3.6 million acres are owned in fee title by state (just under 1 million acres) and federal (~2.66 million acres) land management agencies (Figure 17). Most public land is subject to multiple-use regulations, where fish and wildlife habitat is not the primary focus. However, many of these agencies collaborate with private producers to help manage the land. For instance, the Department leases certain wildlife management areas for grazing, haying, and food plots, while the U.S. Forest Service manages land for multiple purposes, including water, forage, wildlife, recreation, and industries like oil and gas. Although some public lands are vulnerable to conversion into cropland, much of it, such as the ND Department of Trust Lands, remains native vegetation. There is potential for working cooperatively with state and federal landholders to adjust management practices to benefit SGCNs and demonstrate the effectiveness of conservation tools to enhance wildlife habitat and populations.

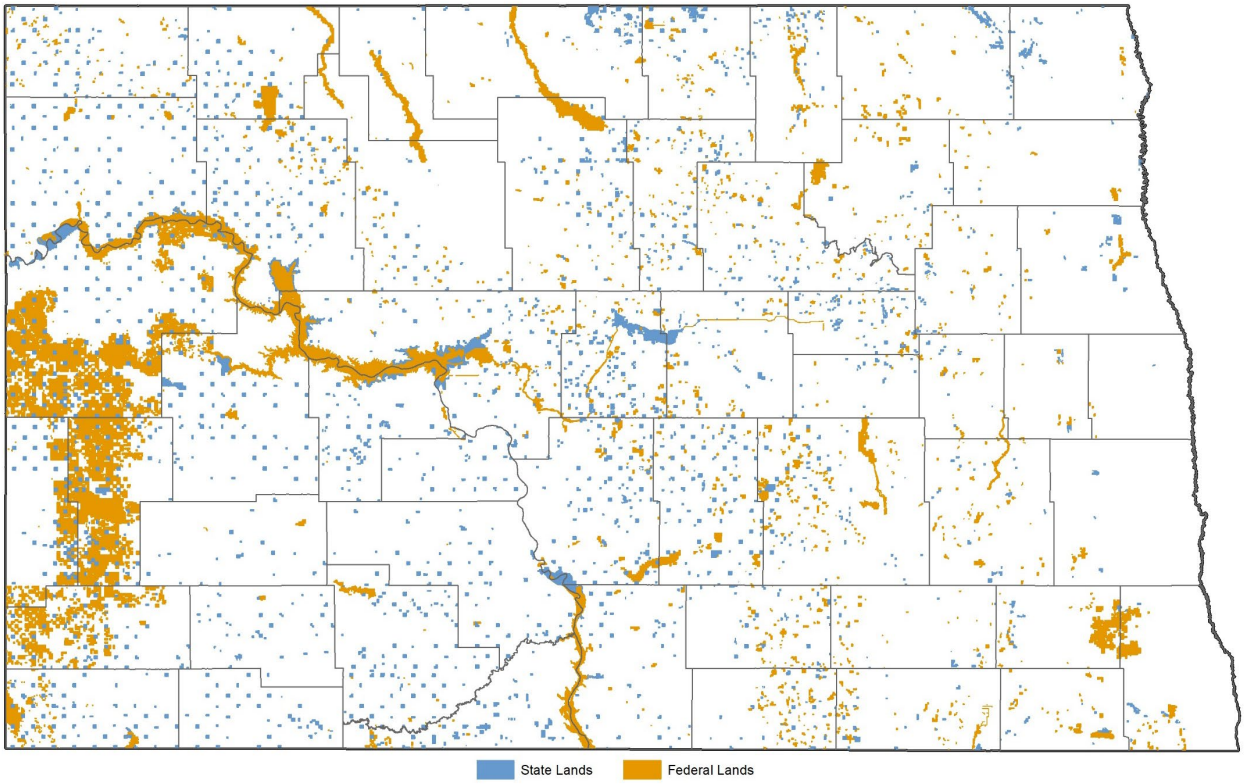


Figure 17. State and federal lands held in fee title.

ND Game and Fish Department Wildlife Management Area

U.S. Fish and Wildlife Service Waterfowl Production Area

SGCN and SGIN HABITAT ASSOCIATIONS

North Dakota is part of the Midwest Association of Fish and Wildlife Agencies (MAFWA). In 2021, MAFWA's Midwest Landscape Initiative spearheaded a project to identify Regional Species of Greatest Conservation Need (RSGCN). This initiative also established 20 habitats to align with the identified species. The tables below connect North Dakota's Species of Greatest Conservation Need (SGCN) and Species of Greatest Information Need (SGIN) to 10 of the 20 MAFWA habitats, along with badlands habitat. Each species was assigned up to four habitat associations.

Table 5. Species of Greatest Conservation Need (SGCN) habitat associations.

Taxon	Subtaxon or Group	Common Name	Scientific Name	Grasslands	Wetlands	Lakes and Reservoirs	Rivers and Streams	Big Rivers	Riparian	Forest	Badlands	Agriculture Cropland	Developed	Soil
Birds	Shorebird	American Avocet	*Recurvirostra americana*		X	X								
Birds	Waterbird	American Bittern	*Botaurus lentiginosus*	X	X	X								
Birds	Shorebird	American Golden-Plover	*Pluvialis dominica*	X	X							X		
Birds	Landbird	American Kestrel	*Falco sparverius*	X					X		X		X	
Birds	Landbird	Baird's Sparrow	*Centronyx bairdii*	X										
Birds	Waterbird	Black Tern	*Chlidonias niger*		X	X								
Birds	Landbird	Black-billed Cuckoo	*Coccyzus erythropthalmus*						X	X				
Birds	Landbird	Bobolink	*Dolichonyx oryzivorus*	X										
Birds	Landbird	Brewer's Sparrow	*Spizella breweri*	X										
Birds	Landbird	Brown Thrasher	*Toxostoma rufum*						X	X	X		X	
Birds	Shorebird	Buff-breasted Sandpiper	*Calidris subruficollis*	X	X							X		
Birds	Landbird	Burrowing Owl	*Athene cunicularia*	X							X			X
Birds	Waterfowl	Canvasback	*Aythya valisineria*		X	X								
Birds	Landbird	Chestnut-collared Longspur	*Calcarius ornatus*	X										
Birds	Shorebird	Dunlin	*Calidris alpina*		X	X								
Birds	Landbird	Ferruginous Hawk	*Buteo regalis*	X										
Birds	Waterbird	Franklin's Gull	*Leucophaeus pipixcan*		X	X						X		
Birds	Landbird	Golden Eagle	*Aquila chrysaetos*	X					X		X			
Birds	Landbird	Grasshopper Sparrow	*Ammodramus savannarum*	X							X			
Birds	Landbird	Greater Prairie-Chicken	*Tympanuchus cupido*	X										
Birds	Landbird	Greater Sage-Grouse	*Centrocercus urophasianus*	X										
Birds	Landbird	Harris's Sparrow	*Zonotrichia querula*						X	X			X	
Birds	Waterbird	Horned Grebe	*Podiceps auritus*		X	X								
Birds	Landbird	Horned Lark	*Eremophila alpestris*	X							X	X		
Birds	Shorebird	Hudsonian Godwit	*Limosa haemastica*		X	X								
Birds	Landbird	Lark Bunting	*Calamospiza melanocorys*	X							X			
Birds	Waterbird	Least Tern (Interior)	*Sternula antillarum*			X		X						
Birds	Landbird	LeConte's Sparrow	*Ammospiza leconteii*	X	X				X					
Birds	Waterfowl	Lesser Scaup	*Aythya affinis*	X	X	X								
Birds	Shorebird	Lesser Yellowlegs	*Tringa flavipes*		X	X	X							
Birds	Landbird	Loggerhead Shrike	*Lanius ludovicianus*	X					X		X		X	
Birds	Shorebird	Long-billed Curlew	*Numenius americanus*	X	X							X		
Birds	Shorebird	Long-billed Dowitcher	*Limnodromus scolopaceus*		X	X								
Birds	Shorebird	Marbled Godwit	*Limosa fedoa*	X	X	X								
Birds	Landbird	Nelson's Sparrow	*Ammospiza nelsoni*	X	X				X					

Taxon	Subtaxon or Group	Common Name	Scientific Name	Grasslands	Wetlands	Lakes and Reservoirs	Rivers and Streams	Big Rivers	Riparian	Forest	Badlands	Agriculture Cropland	Developed	Soil
Birds	Landbird	Northern Harrier	*Circus hudsonius*	X	X									
Birds	Waterfowl	Northern Pintail	*Anas acuta*	X	X							X		
Birds	Shorebird	Pectoral Sandpiper	*Calidris melanotos*		X	X								
Birds	Shorebird	Piping Plover	*Charadrius melodus*			X		X						
Birds	Landbird	Prairie Falcon	*Falco mexicanus*	X							X			
Birds	Landbird	Red-headed Woodpecker	*Melanerpes erythrocephalus*						X	X				
Birds	Shorebird	Ruddy Turnstone	*Arenaria interpres*		X	X								
Birds	Landbird	Ruffed Grouse	*Bonasa umbellus*							X				
Birds	Shorebird	Semipalmated Sandpiper	*Calidris pusilla*		X	X								
Birds	Landbird	Sharp-tailed Grouse	*Tympanuchus phasianellus*	X							X	X		
Birds	Shorebird	Short-billed Dowitcher	*Limnodromus griseus*		X	X								
Birds	Landbird	Short-eared Owl	*Asio flammeus*	X	X									
Birds	Landbird	Sprague's Pipit	*Anthus spragueii*	X										
Birds	Shorebird	Stilt Sandpiper	*Calidris himantopus*		X	X								
Birds	Landbird	Thick-billed Longspur	*Rhynchophanes mccownii*	X										
Birds	Shorebird	Upland Sandpiper	*Bartramia longicauda*	X										
Birds	Waterbird	Western Grebe	*Aechmophorus occidentalis*		X	X								
Birds	Landbird	Western Meadowlark	*Sturnella neglecta*	X							X	X		
Birds	Waterbird	Whooping Crane	*Grus americana*		X			X				X		
Birds	Shorebird	Willet	*Tringa semipalmata*	X	X	X								
Birds	Shorebird	Wilson's Phalarope	*Phalaropus tricolor*	X	X									
Birds	Waterbird	Yellow Rail	*Coturnicops noveboracensis*		X									
Mammals	Bat	Big Brown Bat	*Eptesicus fuscus*						X	X	X		X	
Mammals	Carnivore	Black-footed Ferret	*Mustela nigripes*	X							X			X
Mammals	Rodent	Black-tailed Prairie Dog	*Cynomys ludovicianus*	X							X			X
Mammals	Bat	Eastern Red Bat	*Lasiurus borealis*						X	X	X			
Mammals	Carnivore	Eastern Spotted Skunk	*Spilogale putorius*	X					X					
Mammals	Carnivore	Gray Fox	*Urocyon cinereoargenteus*	X					X					
Mammals	Bat	Hoary Bat	*Lasiurus cinereus*						X	X	X			
Mammals	Bat	Little Brown Bat	*Myotis lucifugus*						X	X	X		X	
Mammals	Bat	Northern Long-eared Bat	*Myotis septentrionalis*						X	X	X			
Mammals	Rodent	Richardson's Ground Squirrel	*Urocitellus richardsonii*	X										X
Mammals	Bat	Silver-haired Bat	*Lasionycteris noctivagans*						X	X	X			
Mammals	Carnivore	Swift Fox	*Vulpes velox*	X							X			X
Amphibians	Toad	American Toad	*Anaxyrus americanus*	X	X					X				X
Amphibians	Toad	Plains Spadefoot	*Spea bombifrons*	X										X
Reptiles	Lizard	Northern Prairie Skink	*Plestiodon septentrionalis*	X										
Reptiles	Snake	Plains Hog-nosed Snake	*Heterodon nasicus*	X										X
Reptiles	Snake	Smooth Green Snake	*Opheodrys vernalis*	X	X				X					
Reptiles	Turtle	Snapping Turtle	*Chelydra serpentina*		X	X	X						X	
Fishes	Minnow	Blacknose Shiner	*Notropis heterolepis*				X							
Fishes	Minnow	Blue Sucker	*Cycleptus elongatus*			X	X	X						
Fishes	Codfish	Burbot	*Lota lota*			X	X	X						
Fishes	Minnow	Carmine Shiner	*Notropis percobromus*				X							
Fishes	Minnow	Finescale Dace	*Chrosomus neogaeus*				X							
Fishes	Minnow	Flathead Chub	*Platygobio gracilis*			X	X	X						

Taxon	Subtaxon or Group	Common Name	Scientific Name	Grasslands	Wetlands	Lakes and Reservoirs	Rivers and Streams	Big Rivers	Riparian	Forest	Badlands	Agriculture Cropland	Developed	Soil
Fishes	Minnow	Hornyhead Chub	*Nocomis biguttatus*				X							
Fishes	Sturgeon	Lake Sturgeon	*Acipenser fulvescens*				X							
Fishes	Minnow	Northern Pearl Dace	*Margariscus nachtriebi*				X							
Fishes	Minnow	Northern Redbelly Dace	*Chrosomus eos*				X							
Fishes	Sturgeon	Paddlefish	*Polyodon spathula*			X		X						
Fishes	Sturgeon	Pallid Sturgeon	*Scaphirhynchus albus*			X		X						
Fishes	Minnow	Pugnose Shiner	*Notropis anogenus*				X							
Fishes	Minnow	Sicklefin Chub	*Macrhybopsis meeki*			X	X	X						
Fishes	Minnow	Sturgeon Chub	*Macrhybopsis gelida*			X	X	X						
Fishes	Minnow	Trout-perch	*Percopsis omiscomaycus*				X							
Terrestrial Invertebrates	Moth	Abbreviated Underwing	*Catocala abbreviatella*	X										
Terrestrial Invertebrates	Solitary Bee	Ainslie's Cuckoo Nomad Bee	*Epeolus ainsliei*	X										
Terrestrial Invertebrates	Bumble Bee	American Bumble Bee	*Bombus pensylvanicus*	X										
Terrestrial Invertebrates	Beetle	Badlands Tiger Beetle	*Cicindela decemnotata*								X			X
Terrestrial Invertebrates	Skipper	Broad-winged Skipper	*Poanes viator*		X				X					
Terrestrial Invertebrates	Skipper	Dakota Skipper	*Hesperia dacotae*	X										
Terrestrial Invertebrates	Skipper	Dion Skipper	*Euphyes dion*		X				X					
Terrestrial Invertebrates	Skipper	Edwards' Hairstreak	*Satyrium edwardsii*	X						X				
Terrestrial Invertebrates	Tiger Beetle	Ghost Tiger Beetle	*Cicindela lepida*			X	X	X	X					X
Terrestrial Invertebrates	Moth	Hera Sheepmoth	*Hemileuca hera*	X							X			
Terrestrial Invertebrates	Skipper	Hobomok Skipper	*Lon hobomok*	X			X		X	X			X	
Terrestrial Invertebrates	Bumble Bee	Indiscriminate Cuckoo Bumble Bee	*Bombus insularis*	X										
Terrestrial Invertebrates	Butterfly	Monarch Butterfly	*Danaus plexippus*	X	X				X				X	
Terrestrial Invertebrates	Butterfly	Mulberry Wing	*Poanes massasoit*	X	X				X					
Terrestrial Invertebrates	Tiger Beetle	Northern Sandy Tiger Beetle	*Cicindela limbata nympha*											X
Terrestrial Invertebrates	Skipper	Ottoe Skipper	*Hesperia ottoe*	X										
Terrestrial Invertebrates	Skipper	Poweshiek Skipperling	*Oarisma poweshiek*	X										
Terrestrial Invertebrates	Butterfly	Regal Fritillary	*Argynnis idalia*	X										
Terrestrial Invertebrates	Butterfly	Tawny Crescent	*Phyciodes batesii*	X					X	X				
Terrestrial Invertebrates	Bumble Bee	Western Bumble Bee	*Bombus occidentalis*	X									X	
Terrestrial Invertebrates	Moth	Whitney's Underwing	*Catocala whitneyi*	X										
Terrestrial Invertebrates	Bumble Bee	Yellow Bumble Bee	*Bombus fervidus*	X						X		X	X	
Terrestrial Invertebrates	Bumble Bee	Yellow-banded Bumble Bee	*Bombus terricola*	X	X				X	X			X	
Aquatic Invertebrates	Mayfly	a mayfly	*Raptoheptagenia cruentata*					X						
Aquatic Invertebrates	Mayfly	a mayfly	*Apobaetis lakota*				X							
Aquatic Invertebrates	Mayfly	a mayfly	*Cercobrachys cree*				X							
Aquatic Invertebrates	Mayfly	a mayfly	*Traverella lewisi*					X						
Aquatic Invertebrates	Mayfly	a sand-dwelling mayfly	*Lachlania saskatchewanensis*					X						
Aquatic Invertebrates	Freshwater Mussel	Black Sandshell	*Ligumia recta*				X							
Aquatic Invertebrates	Freshwater Mussel	Creek Heelsplitter	*Lasmigona compressa*				X							
Aquatic Invertebrates	Freshwater Mussel	Creeper	*Strophitus undulatus*				X							
Aquatic Invertebrates	Stonefly	Dakota Stonefly	*Perlesta dakota*				X							
Aquatic Invertebrates	Freshwater Mussel	Deertoe	*Truncilla truncata*				X							
Aquatic Invertebrates	Freshwater Mussel	Fragile Papershell	*Leptodea fragilis*				X							

Taxon	Subtaxon or Group	Common Name	Scientific Name	Grasslands	Wetlands	Lakes and Reservoirs	Rivers and Streams	Big Rivers	Riparian	Forest	Badlands	Agriculture Cropland	Developed	Soil
Aquatic Invertebrates	Freshwater Mussel	Mapleleaf	*Quadrula quadrula*				X							
Aquatic Invertebrates	Stonefly	Pawnee Stonefly	*Perlesta xube*				X							
Aquatic Invertebrates	Freshwater Mussel	Pink Heelsplitter	*Potamilus alatus*				X							
Aquatic Invertebrates	Freshwater Mussel	Pink Papershell	*Potamilus ohiensis*				X							
Aquatic Invertebrates	Dragonfly	Plains Emerald	*Somatochlora ensigera*				X							
Aquatic Invertebrates	Stonefly	Plains Stripetail	*Isoperla longiseta*				X							
Aquatic Invertebrates	Dragonfly	Subarctic Darner	*Aeshna subarctica*		X									
Aquatic Invertebrates	Freshwater Mussel	Threeridge	*Amblema plicata*				X							

Table 6. Species of Greatest Information Need (SGIN) habitat associations.

Taxon	Subtaxon or Group	Common Name	Scientific Name	Grasslands	Wetlands	Lakes and Reservoirs	Rivers and Streams	Big Rivers	Riparian	Forest	Badlands	Agriculture Cropland	Developed	Soil
Birds	Waterbird	American White Pelican	*Pelecanus erythrorhynchos*		X	X		X						
Birds	Landbird	Black-billed Magpie	*Pica hudsonia*	X					X	X	X			
Birds	Landbird	Chimney Swift	*Chaetura pelagica*										X	
Birds	Landbird	Common Nighthawk	*Chordeiles minor*	X					X		X		X	
Birds	Landbird	Eastern Screech-Owl	*Megascops asio*						X	X				
Birds	Landbird	Northern Flicker	*Colaptes auratus*						X	X			X	
Birds	Landbird	Peregrine Falcon	*Falco peregrinus*	X	X	X								
Birds	Shorebird	Red Knot (Rufa)	*Calidris canutus*			X		X						
Birds	Landbird	Smith's Longspur	*Calcarius pictus*	X										
Birds	Landbird	Snowy Owl	*Bubo scandiacus*	X	X							X		
Birds	Landbird	Western Kingbird	*Tyrannus verticalis*	X						X			X	
Mammals	Bat	Fringed Myotis	*Myotis thysanodes*	X					X	X	X			
Mammals	Bat	Long-eared Bat	*Myotis evotis*						X	X	X			
Mammals	Bat	Long-legged Bat	*Myotis volans*	X					X	X	X			
Mammals	Bat	Townsend's Big-eared bat	*Corynorhinus townsendii*						X	X	X			
Mammals	Bat	Western Small-footed Bat	*Myotis ciliolabrum*						X		X			
Mammals	Rodent	Franklin's Ground Squirrel	*Poliocitellus franklinii*	X										X
Mammals	Rodent	Hispid Pocket Mouse	*Chaetodipus hispidus*	X								X		X
Mammals	Rodent	Plains Pocket Mouse	*Perognathus flavescens*	X								X		X
Mammals	Rodent	Sagebrush Vole	*Lemmiscus curtatus*	X							X			
Mammals	Rodent	Ord's Kangaroo Rat	*Dipodomys ordii*	X								X		X
Mammals	Shrew	Arctic Shrew	*Sorex arcticus*	X	X				X					
Mammals	Shrew	Merriam's Shrew	*Sorex merriami*	X							X			X
Mammals	Shrew	Northern Water Shrew	*Sorex palustris*		X		X		X	X				
Mammals	Shrew	Pygmy Shrew	*Sorex minutus*	X	X					X				
Amphibians	Frog	Cope's Gray Treefrog	*Hyla chrysoscelis*	X	X		X		X					
Amphibians	Frog	Eastern Gray Treefrog	*Hyla versicolor*		X		X		X	X				

Taxon	Subtaxon or Group	Common Name	Scientific Name	Grasslands	Wetlands	Lakes and Reservoirs	Rivers and Streams	Big Rivers	Riparian	Forest	Badlands	Agriculture Cropland	Developed	Soil
Amphibians	Frog	Wood Frog	*Lithobates sylvaticus*		X				X	X				
Amphibians	Salamander	Common Mudpuppy	*Necturus maculosus*			X	X							
Reptiles	Lizard	Sagebrush Lizard	*Sceloporus graciosus*	X							X			
Reptiles	Lizard	Short-horned Lizard	*Phrynosoma hernandesi*	X							X			
Reptiles	Snake	Common Gartersnake	*Thamnophis sirtalis*	X	X								X	
Reptiles	Snake	Plains Gartersnake	*Thamnophis radix*	X	X								X	
Reptiles	Snake	Red-bellied Snake	*Storeria occipitomaculata*	X						X				
Reptiles	Turtle	False Map Turtle	*Graptemys pseudogeographica*				X	X						
Reptiles	Turtle	Smooth Softshell	*Apalone mutica*				X	X						
Reptiles	Turtle	Spiny Softshell	*Apalone spinifera*				X	X						
Fishes	Minnow	silvery minnows	*Hybognathus spp.*					X						
Fishes	Minnow	Largescale Stoneroller	*Campostoma oligolepis*					X						
Fishes	Minnow	Silver Chub	*Macrhybopsis storeriana*					X						
Terrestrial Invertebrates	Moth	a crambid snout moth	*Pyrausta pythialis*	X										
Terrestrial Invertebrates	Solitary Bee	a leaf-cutter bee	*Megachile dakotensis*	X										
Terrestrial Invertebrates	Solitary Bee	a mason bee	*Osmia illinoensis*	X										
Terrestrial Invertebrates	Solitary Bee	a nomia bee	*Nomia universitatis*	X										
Terrestrial Invertebrates	Jumping spider	Apache Jumping Spider	*Phidippus apacheanus*	X							X			
Terrestrial Invertebrates	Skipper	Arogos Skipper	*Atrytone arogos*	X										
Terrestrial Invertebrates	Bumble Bee	Ashton's Cuckoo Bumble Bee	*Bombus ashtoni*	X										
Terrestrial Invertebrates	Butterfly	Baird's Swallowtail	*Papilio machaon bairdii*	X							X			
Terrestrial Invertebrates	Bumble Bee	Black-and-gold Bumble Bee	*Bombus auricomus*	X										
Terrestrial Invertebrates	Skipper	Garita Skipperling	*Oarisma garita*	X						X				
Terrestrial Invertebrates	Butterfly	Gray Copper	*Tharsalea dione*	X	X				X					
Terrestrial Invertebrates	Tiger Beetle	Great Plains Tiger Beetle	*Amblycheila cylindriformis*	X										
Terrestrial Invertebrates	Butterfly	Greenish Blue	*Icaricia saepiolus*	X	X		X		X					
Terrestrial Invertebrates	Grasshopper	Greenish-white Grasshopper	*Hypochlora alba*	X										
Terrestrial Invertebrates	Moth	Juanita Sphinx Moth	*Proserpina juanita*	X						X	X		X	
Terrestrial Invertebrates	Butterfly	Large Marble	*Euchloe ausonides*	X			X		X					
Terrestrial Invertebrates	Moth	Leadplant Flower Moth	*Schinia lucens*	X										
Terrestrial Invertebrates	Skipper	Leonard's Skipper	*Hesperia leonardus*	X										
Terrestrial Invertebrates	Moth	Manitoba Oakworm Moth	*Anisota manitobensis*							X				
Terrestrial Invertebrates	Butterfly	Mead's Wood-Nymph	*Cercyonis meadii*							X				
Terrestrial Invertebrates	Butterfly	Mormon Metalmark	*Apodemia mormo*	X							X		X	
Terrestrial Invertebrates	Beetle	Nine-spotted Lady Beetle	*Coccinella novemnotata*	X						X		X	X	
Terrestrial Invertebrates	Solitary Bee	Nude Yellow Loosestrife Bee	*Macropis nuda*	X	X				X					
Terrestrial Invertebrates	Skipper	Pahaska Skipper	*Hesperia pahaska*	X						X				
Terrestrial Invertebrates	Butterfly	Persius Dusky Wing	*Erynnis persius*	X										
Terrestrial Invertebrates	Skipper	Plains Branded Skipper	*Hesperia assiniboia*	X										
Terrestrial Invertebrates	Butterfly	Purplish Copper	*Lycaena helloides*	X			X		X				X	
Terrestrial Invertebrates	Skipper	Rhesus Skipper	*Polites rhesus*	X										
Terrestrial Invertebrates	Butterfly	Ridings' Satyr	*Neominois ridingsii*	X										
Terrestrial Invertebrates	Bumble Bee	Rusty-patched Bumble Bee	*Bombus affinis*	X									X	
Terrestrial Invertebrates	Butterfly	Silvery Blue	*Glaucopsyche lygdamus*	X						X				
Terrestrial Invertebrates	Tiger Beetle	Splendid Tiger Beetle	*Cicindela splendida*											X

Taxon	Subtaxon or Group	Common Name	Scientific Name	Grasslands	Wetlands	Lakes and Reservoirs	Rivers and Streams	Big Rivers	Riparian	Forest	Badlands	Agriculture Cropland	Developed	Soil
Terrestrial Invertebrates	Skipper	Strecker's Giant-skipper	*Megathymus streckeri*	X							X			
Terrestrial Invertebrates	Bumble Bee	Suckley's Cuckoo Bumble Bee	*Bombus suckleyi*	X										
Terrestrial Invertebrates	Solitary Bee	Susanna's Cellophane Bee	*Colletes susannae*	X										
Terrestrial Invertebrates	Skipper	Uncas Skipper	*Hesperia uncas*	X						X	X			
Aquatic Invertebrates	Anostroca	Ornate Fairy Shrimp	*Eubranchipus ornatus*		X									
Aquatic Invertebrates	Caddisfly	a giant case maker	*Ptilostomis angustipennis*				X							
Aquatic Invertebrates	Caddisfly	Long-horned Caddisfly	*Oecetis ochracea*				X							
Aquatic Invertebrates	Caddisfly	long-horned case makers	*Ceraclea spp.*				X							
Aquatic Invertebrates	Caddisfly	Footed Micro Caddisfly	*Ochrotrichia tarsalis*				X							
Aquatic Invertebrates	Caddisfly	Net-spinning Caddisfly	*Hydropsyche piatrix*				X							
Aquatic Invertebrates	Caddisfly	Northern Caddisfly	*Anabolia ozburni*				X							
Aquatic Invertebrates	Caddisfly	Northern Case Maker	*Limnephilus perpusillus*				X							
Aquatic Invertebrates	Dragonfly	Boreal Whiteface	*Leucorrhinia borealis*		X									
Aquatic Invertebrates	Dragonfly	clubtails	*Stylurus spp.*				X							
Aquatic Invertebrates	Dragonfly	Paiute Dancer	*Argia alberta*		X									
Aquatic Invertebrates	Dragonfly	spinylegs	*Dromogomphus spp.*				X							
Aquatic Invertebrates	Gastropoda	sprites	*Promenetus spp.*		X									
Aquatic Invertebrates	Hemiptera	Water Scorpion	*Nepa apiculata*			X								
Aquatic Invertebrates	Mayfly	Flat-headed Mayfly	*Stenacron minnetonka*				X							
Aquatic Invertebrates	Mayfly	White Sand-river Mayfly	*Pseudiron centralis*					X						
Aquatic Invertebrates	Mayfly	a sand-dwelling mayfly	*Analetris eximia*				X							
Aquatic Invertebrates	Mayfly	small minnow mayflies	*Camelobaetidius spp.*				X							
Aquatic Invertebrates	Mayfly	a small square-gilled mayfly	*Sparbarus lacustris*				X							
Aquatic Invertebrates	Mayfly	a small square-gilled mayfly	*Caenis youngi*				X							
Aquatic Invertebrates	Mayfly	a spiny-headed burrowing mayfly	*Pentagenia vittigera*				X							
Aquatic Invertebrates	Stonefly	Saskatoon Willowfly (winter stonefly)	*Oemopteryx fosketti*				X							

GRASSLANDS

Prairie or grasslands are often classified as tallgrass, mixed-grass, and shortgrass. However, there is a broad spectrum, or combinations of grassland vegetation found across the state. Grasslands are a dynamic ecosystem, with vegetation composition, height, density and ground cover varying greatly from year to year depending on climate conditions and land use. Regardless of the visual quality or the level of invasion of nonnative or noxious species, curbing grassland destruction and fragmentation is essential to sustaining 62 SGCN and 55 SGIN grassland dependent species.

Grasslands may be native prairie or planted grassland, including pastures and rangeland, and all are frequently used for grazing livestock. The SWAP may refer to native prairie or unbroken grassland interchangeably. Definitions and attributes of unbroken grassland and restored grassland are as follows:

1) Unbroken Grassland – also referred to as "native prairie," (Figure 19). This is grassland that, according to best available spatial information, has not been converted to another land type or land cover (e.g. cropland, developed, roads). Other attributes:

- May be composed of native and/or non-native grasses and forbs.
- May be heavily invaded with nonnative species such as Kentucky bluegrass or smooth brome, but it is still considered unbroken/native prairie if there is no cultivation history.
- May be grazed or otherwise "disturbed" with animals, hayed, or burned. Managed grazing, haying and burning can be very beneficial to grasses and forbs.
- May be fenced, contain structures (e.g. old homesteads, water tanks, overhead lines), or two-track roads (i.e. with grass between the tire ruts).
- May contain shrubs (e.g. buffaloberry, chokecherry, silverberry bush), woody draws, or woody encroachment.
- May contain natural wetlands or created (e.g. stock dams).
- May be any size or configuration.

2) Restored Grassland – planted or reconstructed grassland (Figure 20). This typically occurs on previously cultivated land (broken prairie that was then used for crop production for several years). The most common type of restored grassland is federal Conservation Reserve Program (CRP), but other natural resource agencies operate grassland restoration programs. Other attributes:

- May be planted with native or non-native grass and/or forb species.
- May be grazed or otherwise "disturbed" with animals, hayed, or burned.
- May contain tree rows.
- May contain natural wetlands or created (e.g. stock dams).
- Enrolled land in restoration programs may remain in a grassland state after the contract has expired.

Tallgrass Prairie (Red River Valley)

The tallgrass prairie once predominantly covered the eastern quarter of North Dakota. The Red River of the North marks the boundary between North Dakota and Minnesota, and today, this area is commonly known as the Red River Valley. Around 10,000 years ago, the region was submerged under a vast glacial lake called Lake Agassiz. The flat terrain and fertile soil left behind by Lake Agassiz make the area ideal for intensive agriculture, producing crops like potatoes, beans, sugar beets, corn, and wheat. By the 20th century, much of the tallgrass prairie had been transformed into farmland, leaving only small patches of native vegetation. Some of these remnants of natural areas are connected to Lake Agassiz's ancient landscape. Diagonal ridges of sand and gravel formed along the shoreline of the lake, which are still visible today through aerial and satellite imagery. These beach ridges are part of the focus area known as Sand Deltas and Beach Ridges, which also include large fan-shaped sand deltas deposited by the lake. Highly saline areas, where high salt concentrations make farming unsuitable, have remained largely intact. The largest such area lies just west of Grand Forks and is known as the Saline Area

or the Grand Forks County Prairie. Compared to the mixed-grass prairie further west, the Red River Valley has fewer wetlands. The landscape is dominated by farmland with woodlot and shelterbelt plantings, although advancements in farming practices have resulted in the removal of many shelterbelts. Several streams, vital to native fish populations, flow across the Red River Valley from west to east and eventually drain into the Red River.

Eastern Mixed-Grass Prairie (Drift Prairie)

The Eastern mixed-grass prairie, also known as the Drift Prairie, serves as a transition zone between the wetter tallgrass prairie to the east and the drier shortgrass prairie to the west. Before settlement, the Drift Prairie had a high concentration of temporary and seasonal wetlands. Wetlands embedded in cropland are often farmed during dry years. Prominent geographic features within this region include the Pembina Hills, Turtle Mountains, and Devils Lake hills, which are included in the forest landscape. A significant area of untilled land, largely due to sandy, gravelly soil from a glacial lake delta, is found in and around McHenry County and south of the Turtle Mountains. Known as the Glacial Lake Deltas focus area, this region retains much of its native vegetation and wetlands. In recent years, irrigation has enabled previously unsuitable areas to be farmed, with crops such as potatoes now growing in these areas. The Souris River riparian zone divides the Glacial Lake Deltas. Another important focus area is the Devils Lake Basin, formed by glacial ice blockage. This area is characterized by a high concentration of larger wetlands or lakes and slightly less grassland than the Glacial Lake Deltas. It is a critical habitat for migrating waterfowl, waterbirds, and shorebirds. The Drift Prairie is relatively flat and has largely been converted to cropland, producing spring wheat, durum, other small grains, canola, corn, beans, sunflowers, and alfalfa. The Sheyenne and James rivers also wind through this region.

Mixed-Grass Prairie (Missouri Coteau)

The Missouri Coteau forms the western edge of glaciation in North Dakota, characterized by its distinctive hummocky, rolling hills that rise 150 to 500 feet above the Drift Prairie. The region is rich in wetlands, with approximately 800,000 basin acres, and alkaline lakes are more common here. Streams and rivers are scarce but intermittent streams occur in low areas. The northern part of the Coteau contains tracts of aspen parkland, though upland deciduous forests are largely absent. A significant portion of native prairie still exists in this region, and livestock grazing is common. Areas with gentler slopes, particularly along the western edge, have been converted to cropland, producing small grains, sunflowers, corn, and alfalfa hay. The Missouri Coteau is renowned for supporting some of the highest densities of breeding ducks in North America. The large amount of remaining or restored grassland and wetlands makes this area critical for numerous species of wildlife, and designation as the focus area Missouri Coteau.

Western Mixed-Grass/Short-grass Prairie (Missouri Slope)

The Western mixed-grass prairie and short-grass prairie is semiarid, unglaciated with level to rolling plains and occasional sandstone buttes or badlands formations. Natural wetland basins are limited, but small creeks and streams are plentiful. Some consider the Missouri River System/Breaks either part of or a boundary between the Missouri Coteau and Missouri Slope, but herein it's included in the Rivers, Streams and Riparian landscape. Shrub-steppe, an open landscape of sagebrush and perennial grasses, is found in the western one-third of the state, in and around the Badlands. Big sagebrush is found only in the extreme southwest corner of the state, within the Sagebrush Steppe focus area. Land use is primarily dryland farming of crops like spring and winter wheat, barley, sunflowers, corn, and cattle production. A substantial amount of native vegetation remains in the Missouri Slope.

Restored Grassland (Statewide)

Restored grassland is former cropland that has been converted back to grassland by replanting with tame or native grasses and forbs. One of the leading programs for restoring grasslands is the Conservation Reserve Program (CRP). Established in the 1985 Farm Bill, this program allowed producers to conserve marginal soils by retiring cropland for contracts of typically

10-15 years. The program provides income for producers and creates valuable wildlife habitat while conserving soil and water. In 2007, there were 3.38 million acres enrolled in CRP in North Dakota. By 2022, CRP enrollment had declined 63% to 1.24 million acres. There are, however, many other grassland restoration initiatives that have been established by various state, federal, and conservation organizations. Restored grasslands are also common on public lands throughout the state, including NDGF wildlife management areas and USFWS waterfowl production areas and refuges.

Grassland Classification Relationships

1) The Midwest Landscape Initiative developed *Voluntary Lexicon and Best Practice Recommendations for Midwest State Wildlife Action Plans* (May 2024). In line with recommendation 2.1, the following Macrogroup and Group classifications from the United States National Vegetation Classification System (USNVC) pertain to grassland habitat in North Dakota.

Macrogroup: M054 Central Lowlands Tallgrass Prairie https://www1.usgs.gov/csas/nvcs/unitDetails/860688
- Group: G075 Northern Tallgrass Prairie https://www1.usgs.gov/csas/nvcs/unitDetails/849293

Macrogroup: M051 Great Plains Mixedgrass & Fescue Prairie https://www1.usgs.gov/csas/nvcs/unitDetails/860481
- Group: G141 Northern Great Plains Mesic Mixedgrass Prairie https://www1.usgs.gov/csas/nvcs/unitDetails/856963
- Group: G331 Northern Great Plains Dry Mixedgrass Prairie https://www1.usgs.gov/csas/nvcs/unitDetails/856981
- Group 332: Northern Great Plains Rough Fescue Prairie https://www1.usgs.gov/csas/nvcs/unitDetails/856995

Macrogroup: M052 Great Plains Sand Grassland & Shrubland https://www1.usgs.gov/csas/nvcs/unitDetails/860480
- Group: G889 Northern Great Plains Sand Grassland https://www1.usgs.gov/csas/nvcs/unitDetails/1127110

2) Major Land Resource Areas (MLRA, Figure 18) form the basis for organizing and operating conservation programs, particularly USDA Natural Resources Conservation Service (NRCS) programs. NRCS Ecological Sites are defined by MLRAs and provide a consistent framework for classifying and describing rangeland and forestland soils and vegetation; thereby delineating land units that share similar capabilities to respond to management activities or disturbance. Below are the grassland habitat types that correspond to the MLRAs.

Grassland Region	MLRA
Tallgrass Prairie (Red River Valley)	56 Glacial Lake Agassiz
Eastern Mixed-grass Prairie (Drift Prairie)	53A Northern Dark Brown Glaciated Plains 55A Northern Black Glaciated Plains 55B Central Black Glaciated Plains 102A Rolling Till Prairie
Mixed-grass Prairie (Missouri Coteau)	53B Central Dark Brown Glaciated Plains
Western Mixed-Grass/Short-grass Prairie (Missouri Slope)	54 Rolling Soft Shale Plain 58D Northern Rolling Hills Plains, Eastern Part 60B Pierre Shale Plains, Northern Part 63A Northern Rolling Pierre Shale Plains

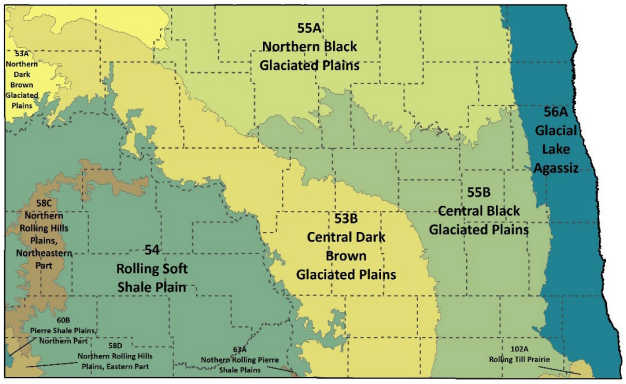


Figure 18. Major Land Resource Areas.

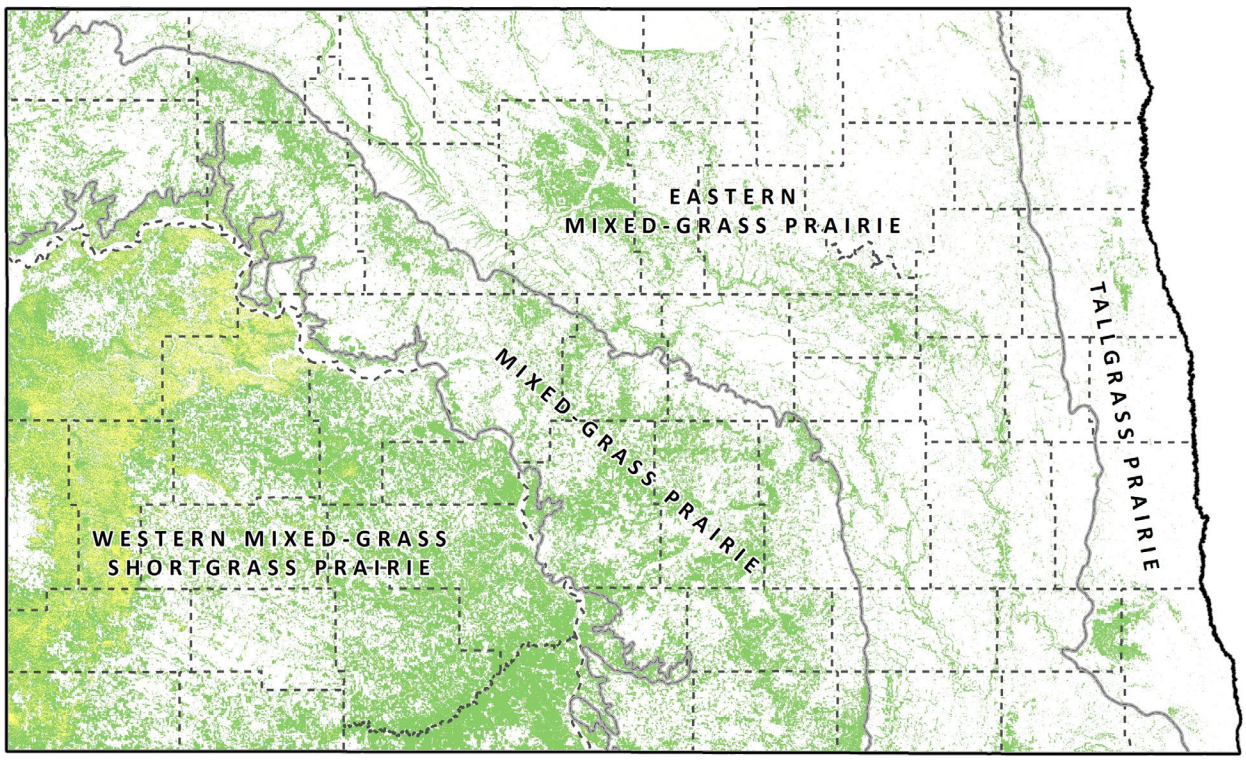


Figure 19. Estimated current extent of unbroken grassland (green) and unbroken grassland/shrubland (yellow) and major grassland ecoregions.

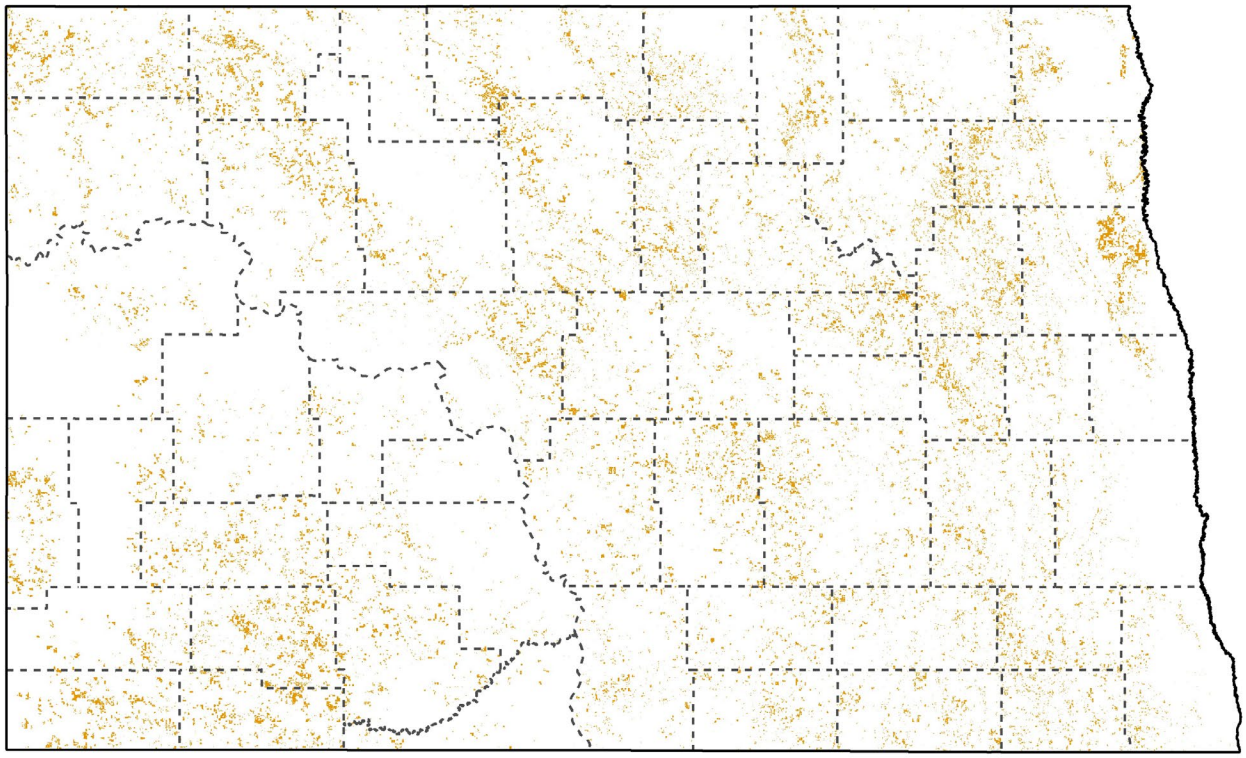


Figure 20. Estimated current extent of intact restored grassland (orange).

Table 7. Grassland dependent SGCN. Total = 62 species: 33 birds, 6 mammals, 2 amphibians, 3 reptiles, and 18 terrestrial invertebrates.

Grassland SGCN – Species of Greatest Conservation Need				
BIRDS		MAMMALS	REPTILES & AMPHIBIANS	TERRESTRIAL INVERTEBRATES
American Bittern	Lesser Scaup	Black-footed Ferret	American Toad	Abbreviated Underwing
American Golden-Plover	Loggerhead Shrike	Black-tailed Prairie Dog	Northern Prairie Skink	Ainslie's Cuckoo Nomad Bee
American Kestrel	Long-billed Curlew	Eastern Spotted Skunk	Plains Hog-nosed Snake	American Bumble Bee
Baird's Sparrow	Marbled Godwit	Gray Fox	Plains Spadefoot	Dakota Skipper
Bobolink	Nelson’s Sparrow	Richardson's Ground Squirrel	Smooth Green Snake	Edwards' Hairstreak
Brewer's Sparrow	Northern Harrier	Swift Fox		Hera Sheepmoth
Buff-breasted Sandpiper	Northern Pintail			Hobomok Skipper
Burrowing Owl	Prairie Falcon			Indiscriminate Cuckoo Bumble Bee
Chestnut-collared Longspur	Sharp-tailed Grouse			Monarch Butterfly
Ferruginous Hawk	Short-eared Owl			Mulberry Wing
Golden Eagle	Sprague's Pipit			Ottoe Skipper
Grasshopper Sparrow	Thick-billed Longspur			Poweshiek Skipperling
Greater Prairie-Chicken	Upland Sandpiper			Regal Fritillary
Greater Sage-Grouse	Western Meadowlark			Tawny Crescent
Horned Lark	Willet			Western Bumble Bee
Lark Bunting	Wilson’s Phalarope			Whitney's Underwing
LeConte's Sparrow				Yellow Bumble Bee
				Yellow-banded Bumble Bee

Tallgrass Prairie – Sheyenne National Grasslands

Shortgrass Prairie – Big Sagebrush

Table 8. Grassland dependent SGIN. Total = 55 species: 6 birds, 10 mammals, 1 amphibian, 5 reptiles, and 33 terrestrial invertebrates.

Grassland SGIN – Species of Greatest Information Need				
BIRDS	MAMMALS	REPTILES & AMPHIBIANS	TERRESTRIAL INVERTEBRATES	
Black-billed Magpie	Arctic Shrew	Common Gartersnake	a crambid snout moth (*Pyrausta pythialis*)	Leonard's Skipper
Common Nighthawk	Franklin's Ground Squirrel	Cope's Gray Treefrog	a leaf-cutter bee (*Megachile dakotensis*)	Mormon Metalmark
Peregrine Falcon	Fringed Myotis	Plains Gartersnake	a mason bee (*Osmia illinoensis*)	Nine-spotted Lady Beetle
Smith's Longspur	Hispid Pocket Mouse	Red-bellied Snake	a nomia bee (*Nomia universitatis*)	Nude Yellow Loosestrife Bee
Snowy Owl	Long-legged Bat	Sagebrush Lizard	Apache Jumping Spider	Pahaska Skipper
Western Kingbird	Merriam's Shrew	Short-horned Lizard	Arogos Skipper	Persius Dusky Wing
	Ord's Kangaroo Rat		Ashton's Cuckoo Bumble Bee	Plains Branded Skipper
	Plains Pocket Mouse		Baird's Swallowtail	Purplish Copper
	Pygmy Shrew		Black-and-gold Bumble Bee	Rhesus Skipper
	Sagebrush Vole		Garita Skipperling	Ridings' Satyr
			Gray Copper	Rusty-patched Bumble Bee
			Great Plains Tiger Beetle	Silvery Blue
			Greenish Blue	Strecker's Giant-skipper
			Greenish-white Grasshopper	Suckley's Cuckoo Bumble Bee
			Juanita Sphinx Moth	Susanna's Cellophane Bee
			Large Marble	Uncas Skipper
			Leadplant Flower Moth	

Mixed-grass Prairie – Missouri Coteau

Mixed-grass Prairie

Short-grass Prairie

Restored Grassland

WETLANDS

A wetland is an area that is inundated or saturated by surface or groundwater long enough to support vegetation typically adapted for life in saturated soil. Wetlands are classified depending on how long water and vegetation are present. These range from temporary wetlands that typically hold water for only a few weeks, to permanent wetlands that hold water year-round. North Dakota has about 2.4 million acres of wetlands remaining from an estimated 5 million acres that once existed (Figure 21). The highest wetland densities are in the Missouri Coteau and Drift Prairie, collectively known as the Prairie Potholes region. Some areas contain more than 150 wetlands per square mile. However, the destruction and alteration of wetlands, particularly shallow temporary basins, is widespread due to draining, filling, burning, farming, and other practices. From 1997 to 2009, over 50,000 basins were lost, representing a 3.3% overall decrease. Wetlands within cropland may lack emergent vegetation, while those in pasture or rangeland often suffer from overuse and degradation due to cattle. Wetlands are highly dynamic, influenced by weather cycles, and may experience periods of drought or flooding. Conservation efforts for many SGCNs and other wetland-associated wildlife depend on maintaining a mosaic of wetlands and grasslands. While no specific focus areas for conservation have been identified, nearly all wetlands are crucial for water filtration, surface water storage, and providing essential wildlife habitat.

Wetland Classification Relationships

1) The Midwest Landscape Initiative developed *Voluntary Lexicon and Best Practice Recommendations for Midwest State Wildlife Action Plans* (May 2024). In line with recommendation 2.1, the following Macrogroup and Group classifications from the United States National Vegetation Classification System (USNVC) pertain to wetland habitat in North Dakota.

Macrogroup: M069 Eastern North American Marsh, Wet Meadow & Shrubland https://www1.usgs.gov/csas/nvcs/unitDetails/860627
- Group: G125 Eastern North American Freshwater Marsh https://www1.usgs.gov/csas/nvcs/unitDetails/837180
- Group: G770 Midwest Wet Prairie, Wet Meadow & Shrub Swamp https://www1.usgs.gov/csas/nvcs/unitDetails/894450

Macrogroup: M071 Great Plains Marsh, Wet Meadow, Shrubland & Playa https://www1.usgs.gov/csas/nvcs/unitDetails/860542
- Group: G35 Great Plains Freshwater Marsh https://www1.usgs.gov/csas/nvcs/unitDetails/857034
- Group: G336 Great Plains Wet Prairie, Wet Meadow & Seepage Fen https://www1.usgs.gov/csas/nvcs/unitDetails/857050
- Group: G337 Great Plains Riparian Wet Meadow & Shrubland https://www1.usgs.gov/csas/nvcs/unitDetails/857066

Macrogroup: M077 Great Plains Saline Wet Meadow & Marsh https://www1.usgs.gov/csas/nvcs/unitDetails/860569
- Group: G324 Great Plains Saline Wet Meadow & Marsh https://www1.usgs.gov/csas/nvcs/unitDetails/848823
- Group: G534 Western Great Plains Saline Wet Meadow https://www1.usgs.gov/csas/nvcs/unitDetails/860851

Macrogroup: M877 North American Boreal & Subboreal Alkaline Fen https://www1.usgs.gov/csas/nvcs/unitDetails/907538
- Group: G183 Midwest Prairie Alkaline Fen https://www1.usgs.gov/csas/nvcs/unitDetails/835830

2) Wetland Types

Permanent - surface water is present throughout the year in all years.

Permanent Wood-bordered - deep surface water is present year-round, and the wetland periphery is predominantly woodland.

Semipermanent - surface water is present year-round in most years. During dry years, however, water may disappear as early as midsummer.

Seasonal - surface water is present for extended periods in spring and early summer but usually disappears during late summer and fall.

Temporary - surface water present for a brief period during early spring following snowmelt and occasionally for several days following heavy rainstorms during the late spring, summer, and fall.

Alkali - highly saline shallow water and alkali salt flats.

Working Wetlands (cropped wetlands) - occur in basins with soils that are frequently cultivated.

Fens - surface water is sometimes lacking but bottom soils saturated by alkaline ground-water seepage.

Slope Wetlands - occur primarily in southwest North Dakota.

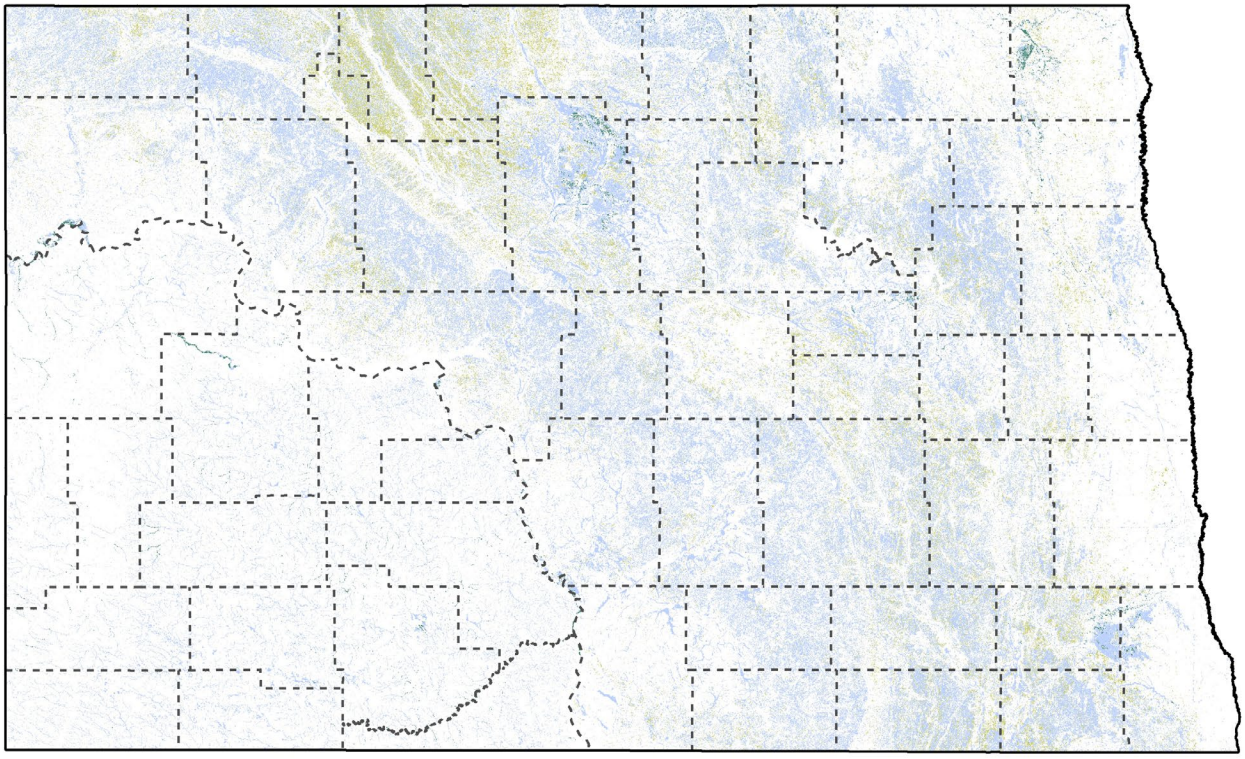


Figure 21. Estimated current extent of emergent wetlands (blue), forested wetlands (dark green), and working or cropped wetlands (tan).

Emergent wetland

Emergent wetland

Working or cropped wetland

Restored wetlands

Table 9. Wetland dependent SGCN. Total = 39 species: 30 birds, 1 amphibian, 2 reptiles, 5 terrestrial invertebrates, and 1 aquatic invertebrate.

Wetland SGCN – Species of Greatest Conservation Need				
BIRDS		REPTILES & AMPHIBIANS	TERRESTRIAL INVERTEBRATES	AQUATIC INVERTEBRATES
American Avocet	Marbled Godwit	American Toad	Broad-winged Skipper	Subarctic Darner
American Bittern	Nelson’s Sparrow	Smooth Green Snake	Dion Skipper	
American Golden-Plover	Northern Harrier	Snapping Turtle	Monarch Butterfly	
Black Tern	Northern Pintail		Mulberry Wing	
Buff-breasted Sandpiper	Pectoral Sandpiper		Yellow-banded Bumble Bee	
Canvasback	Ruddy Turnstone			
Dunlin	Semipalmated Sandpiper			
Franklin's Gull	Short-billed Dowitcher			
Horned Grebe	Short-eared Owl			
Hudsonian Godwit	Stilt Sandpiper			
LeConte's Sparrow	Western Grebe			
Lesser Scaup	Whooping Crane			
Lesser Yellowlegs	Willet			
Long-billed Curlew	Wilson's Phalarope			
Long-billed Dowitcher	Yellow Rail			

Table 10. Wetland dependent SGIN. Total = 18 species: 3 birds, 3 mammals, 3 amphibians, 2 reptiles, 3 terrestrial invertebrates, and 4 aquatic invertebrates.

Wetland SGIN – Species of Greatest Information Need				
BIRDS	MAMMALS	REPTILES & AMPHIBIANS	TERRESTRIAL INVERTEBRATES	AQUATIC INVERTEBRATES
American White Pelican	Arctic Shrew	Common Gartersnake	Gray Copper	Boreal Whiteface
Peregrine Falcon	Northern Water Shrew	Cope's Gray Treefrog	Greenish Blue	Ornate Fairy Shrimp
Snowy Owl	Pygmy Shrew	Eastern Gray Treefrog	Nude Yellow Loosestrife Bee	Paiute Dancer
		Plains Gartersnake		sprites (*Promenetus spp*.)
		Wood Frog		

LAKES AND RESERVOIRS

Lakes differ from wetlands due to their shape and size. According to the US Environmental Protection Agency (USEPA), a lake is defined as a standing body of water greater than 2.5 acres and has a depth of at least 3 feet for inclusion into the National Lakes Assessment. In North Dakota, 337 public lakes and reservoirs are recognized by the North Dakota Department of Environmental Quality (NDDEQ 2023). Of those 337 lakes, 151 are man-made reservoirs and 186 are natural lakes. The Department currently manages over 400 fishing waters for public access and some degree of management by regional biologists. Reservoirs, on the other hand, are typically created by damming waterbodies to fulfill a management objective such as flood control or recreation (Figure 22).

Lakes and reservoirs exhibit a wide range of sizes, shapes and depths driven by local climate, precipitation, land-use, geology, and groundwater inputs. Lakes typically contain three major habitat types: littoral (near-shore), pelagic (open-water) and benthic (lake bottom). Most lakes and reservoirs support warmwater fish species composition such as walleye, bass, and bluegill. However, Lake Sakakawea contains a significant cold water habitat due to its size and depth, capable of supporting a viable salmon management program and fishery. Other notable lakes throughout the state include Devils Lake, Lake Oahe, and several productive prairie walleye fisheries, such as Lake Alkaline. Lakes in North Dakota are particularly vulnerable to non-point source pollution, largely due to the extensive agricultural activity in the state.

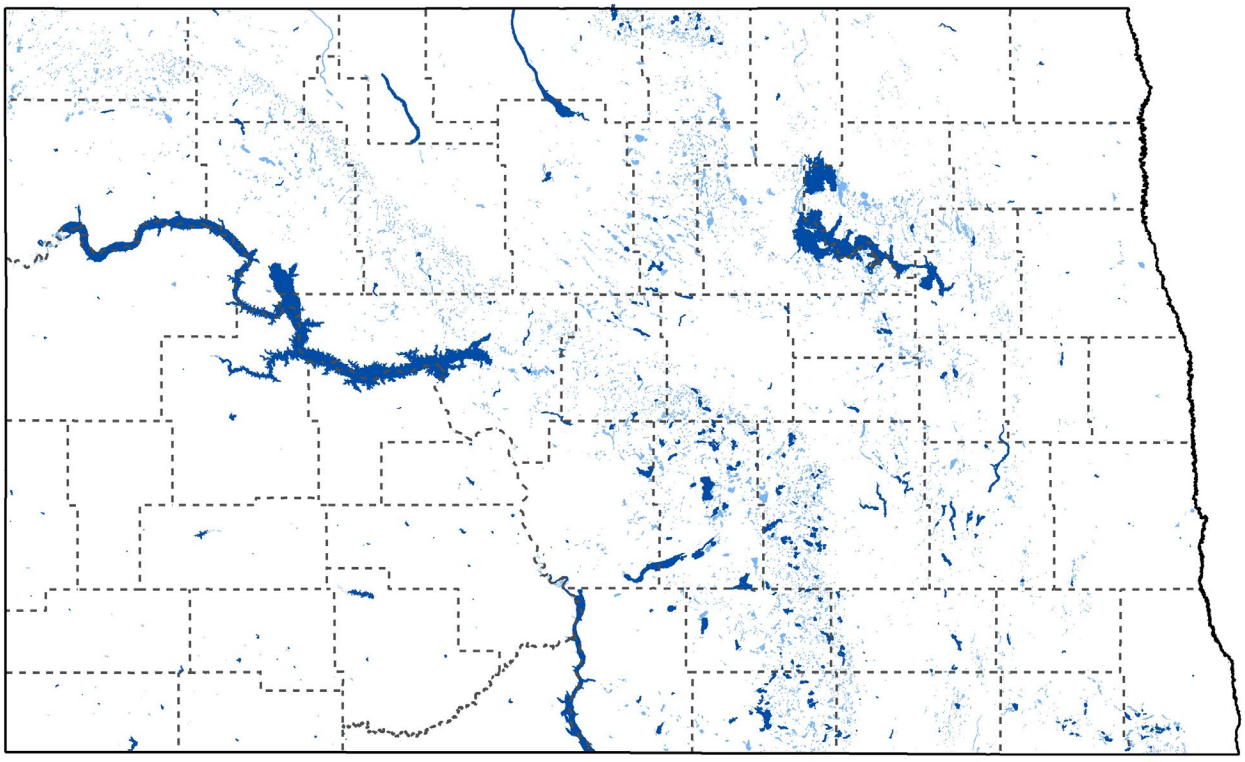


Figure 22. Lakes and reservoirs. Darker blue indicates fishing waters for public access.

Table 11. Lake and reservoir dependent SGCN. Total = 30 species: 21 birds, 1 reptile, 1 terrestrial invertebrate, and 7 fish.

Lake and Reservoir SGCN – Species of Greatest Conservation Need				
BIRDS		REPTILE	TERRESTRIAL INVERTEBRATES	FISHES
American Avocet	Long-billed Dowitcher	Snapping Turtle	Ghost Tiger Beetle	Burbot
American Bittern	Marbled Godwit			Blue Sucker
Black Tern	Pectoral Sandpiper			Flathead Chub
Canvasback	Piping Plover			Sicklefin Chub
Dunlin	Ruddy Turnstone			Sturgeon Chub
Franklin's Gull	Semipalmated Sandpiper			Paddlefish
Horned Grebe	Short-billed Dowitcher			Pallid Sturgeon
Hudsonian Godwit	Stilt Sandpiper			
Least Tern (Interior)	Western Grebe			
Lesser Scaup	Willet			
Lesser Yellowlegs				

Table 12. Lake and reservoir dependent SGIN. Total = 5 species: 3 birds, 1 amphibian, and 1 aquatic invertebrate.

Lake and Reservoir SGIN – Species of Greatest Information Need		
BIRDS	AMPHIBIAN	AQUATIC INVERTEBRATES
American White Pelican	Common Mudpuppy	Water Scorpion
Peregrine Falcon		
Red Knot (Rufa)		

Devils Lake

Chase Lake NWR colonial waterbird nesting island

RIVERS, STREAMS AND RIPARIAN

This landscape component includes all rivers, streams, and their associated riparian areas spread across North Dakota (Figure 23). Rivers and streams are linear, flowing bodies of water that often feature alternating slower pools and faster-moving riffles and runs. These habitats can differ significantly in size, shape, flow speed, gradient, turbidity, nutrient levels, substrate composition, and more. Seasonal changes impact flow, with spring typically being the wettest time of year, and some smaller streams may even dry up completely during the summer, making them ephemeral.

"Big Rivers," operate quite differently from smaller river habitats, supporting distinct faunal communities not typically found in smaller bodies of water. These rivers are more influenced by regional rainfall and runoff than by local conditions. Their flow is generally swift and steady year-round, with fewer seasonal variations compared to smaller rivers and streams. Due to their faster currents, big rivers tend to be more turbid, as sediments remain suspended in the water longer. This also causes frequent shifts in the channel bottom as sand, gravel, and silt are continually moved and redeposited. In the Midwest, the Missouri and Mississippi Rivers are classified as Big Rivers, while other river habitats are categorized as rivers and streams.

A riparian zone is the area between a body of water and the adjacent upland, characterized by unique soil conditions and vegetation that requires abundant water. This zone includes wetlands and portions of the floodplain that support riparian plant life. Typically, it consists of trees, shrubs, and understory vegetation such as various grasses and forbs, though some areas may naturally lack trees. In eastern North Dakota, riparian zones are dominated by green ash and elm trees, while cottonwoods are more common in the western part of the state. Though riparian zones cover a relatively small area, they are crucial habitats for numerous wildlife species and play a vital role in maintaining stream health.

River floodplains and riparian habitats form narrow corridors of unique ecosystems. Overgrazing by cattle in some regions has degraded riparian habitats, contributing to reduced water quality, including impairments from fecal coliform bacteria and Escherichia coli. Development, particularly increased housing along the Missouri River, has disturbed some wildlife species and destroyed riparian habitats. Additionally, many small low-head dams have obstructed fish movement. While larger dams, such as the Garrison Dam, have brought numerous benefits, they have also disrupted natural processes like cottonwood regeneration and fish migration. According to North Dakota's 2020-2022 Integrated Water Quality Report (NDDEQ 2023), 39% of rivers and streams are classified as fully supporting but threatened for aquatic life use, 29% are fully supporting aquatic life, and 32% are not supporting aquatic life use. Non-point source pollution, such as siltation/sedimentation and stream habitat loss, is a leading cause of aquatic life impairment. Dissolved oxygen depletion, caused by organic enrichment, and nuisance algae and plant growth due to excessive nutrient loading are also significant concerns.

Rivers, Streams and Riparian Classification Relationships

1) The Midwest Landscape Initiative developed *Voluntary Lexicon and Best Practice Recommendations for Midwest State Wildlife Action Plans* (May 2024). In line with recommendation 2.1, the following Macrogroup and Group classifications from the United States National Vegetation Classification System (USNVC) pertain to rivers, streams and riparian habitat in North Dakota.

Macrogroup: M029 Central Hardwood Floodplain Forest https://www1.usgs.gov/csas/nvcs/unitDetails/838650
- Group: G652 Midwest Floodplain Forest https://www1.usgs.gov/csas/nvcs/unitDetails/877317

Macrogroup: M028 Great Plains Flooded & Swamp Forest https://www1.usgs.gov/csas/nvcs/unitDetails/860485
- Group: G147 Great Plains Cottonwood – Green Ash Floodplain Forest https://www1.usgs.gov/csas/nvcs/unitDetails/856756

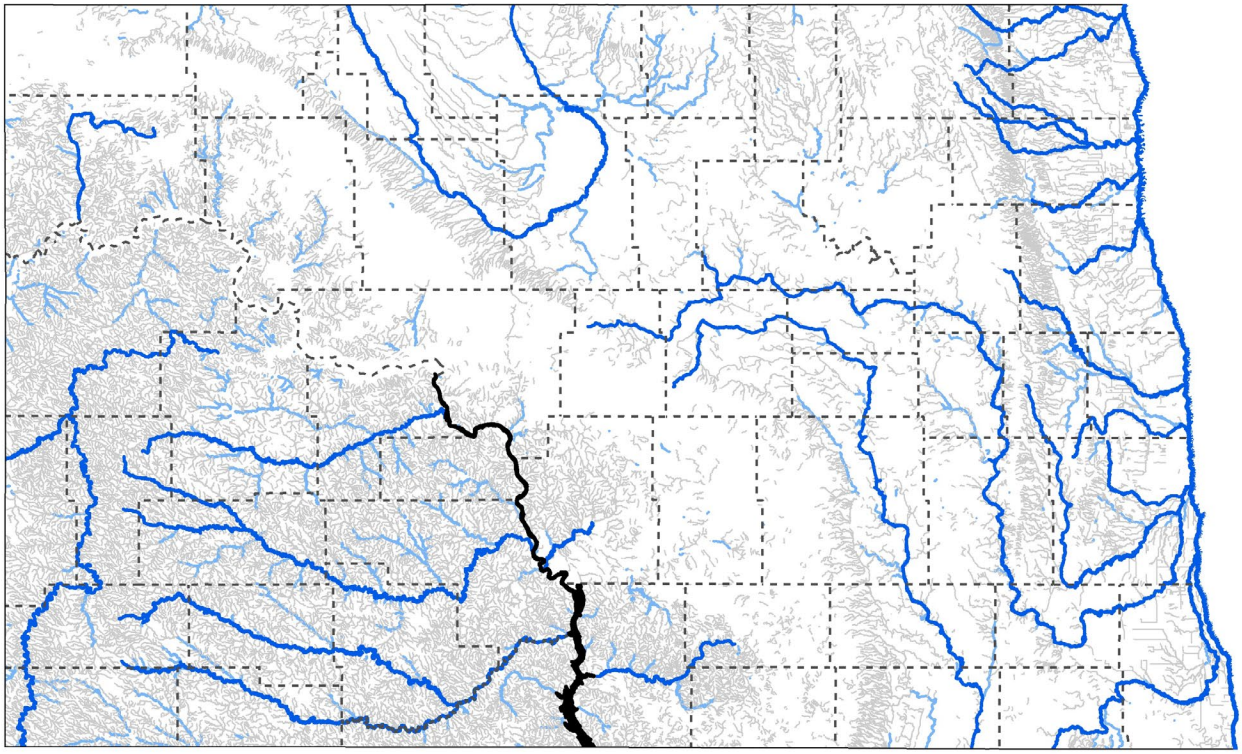


Figure 23. Intermittent streams (gray), perennial rivers (light blue; thicker and darker blue line indicate focus areas), and big rivers (black, Missouri River and Lake Oahe).

Sheyenne River

Little Missouri River

Missouri River/Lake Oahe – Big River

Red River - Drayton Dam modification

Table 13. River and stream dependent SGCN. Total = 34 species: 1 bird, 1 reptile, 2 terrestrial invertebrates, 16 aquatic invertebrates, and 14 fishes.

River and Stream SGCN – Species of Greatest Conservation Need						
BIRDS	REPTILE	TERRESTRIAL INVERTEBRATES	AQUATIC INVERTEBRATES		FISHES	
Lesser Yellowlegs	Snapping Turtle	Ghost Tiger Beetle	a mayfly (*Apobaetis lakota*)	Mapleleaf	Burbot	Northern Pearl Dace
		Hobomok Skipper	a mayfly (*Cercobrachys cree*)	Pawnee Stonefly	Blacknose Shiner	Northern Redbelly Dace
			Black Sandshell	Pink Heelsplitter	Blue Sucker	Pugnose Shiner
			Creek Heelsplitter	Pink Papershell	Carmine Shiner	Sicklefin Chub
			Creeper	Plains Emerald	Finescale Dace	Sturgeon Chub
			Dakota Stonefly	Plains Stripetail	Flathead Chub	Trout-perch
			Deertoe	Threeridge	Hornyhead Chub	Lake Sturgeon
			Fragile Papershell	Wabash Pigtoe		

Table 14. River and stream dependent SGIN. Total = 29 species: 3 amphibians, 3 reptiles, 1 mammal, 3 terrestrial invertebrates, 16 aquatic invertebrates, and 3 fishes.

River and Stream SGIN – Species of Greatest Information Need					
REPTILES & AMPHIBIANS	MAMMAL	TERRESTRIAL INVERTEBRATES	AQUATIC INVERTEBRATES		FISHES
Common Mudpuppy	Northern Water Shrew	Greenish Blue	a giant case maker (*Ptilostomis angustipennis*)	Long-horned Caddisfly	Largescale Stoneroller
Cope's Gray Treefrog		Large Marble	a sand-dwelling mayfly (*Analetris eximia*)	long-horned case makers (*Ceraclea* spp.)	Silver Chub
Eastern Gray Treefrog		Purplish Copper	a small square-gilled mayfly (*Caenis youngi*)	Net-spinning Caddisfly	silvery minnows (*Hybognathus* spp.)
False Map Turtle			a small square-gilled mayfly (*Sparbarus lacustris*)	Northern Caddisfly	
Smooth Softshell			a spiny-headed burrowing mayfly (*Pentagenia vittigera*)	Northern Case Maker	
Spiny Softshell			clubtails (*Stylurus* spp.)	Saskatoon Willowfly (winter stonefly)	
			Flat-headed Mayfly	small minnow mayflies (*Camelobaetidius* spp.)	
			Footed Micro Caddisfly	spinylegs (*Dromogomphus* spp.)	

Table 15. Big river (Missouri River and Lake Oahe) dependent SGCN. Total = 14 species: 3 birds, 1 terrestrial invertebrate, 3 aquatic invertebrates, and 7 fishes.

Big River SGCN – Species of Greatest Conservation Need				
BIRDS	TERRESTRIAL INVERTEBRATE	AQUATIC INVERTEBRATES	FISHES	
Least Tern (Interior)	Ghost Tiger Beetle	a mayfly (*Raptoheptagenia cruentata)*	Burbot	Sturgeon Chub
Piping Plover		a mayfly *(Traverella lewisi)*	Blue Sucker	Paddlefish
Whooping Crane		a sand-dwelling mayfly *(Lachlania saskatchewanensis)*	Flathead Chub	Pallid Sturgeon
			Sicklefin Chub	

Table 16. Big river (Missouri River and Lake Oahe) dependent SGIN. Total = 6 species: 1 bird, 3 reptiles, 1 aquatic invertebrate.

Big River SGIN – Species of Greatest Information Need		
BIRDS	REPTILES	AQUATIC INVERTEBRATE
American White Pelican	False Map Turtle	White Sand-river Mayfly
Red Knot (Rufa)	Smooth Softshell	
	Spiny Softshell	

Table 17. Riparian dependent SGCN. Total = 26 species: 9 birds, 8 mammals, 1 reptile, 8 terrestrial invertebrates.

Riparian SGCN – Species of Greatest Conservation Need			
BIRDS	MAMMALS	REPTILE	TERRESTRIAL INVERTEBRATES
American Kestrel	Big Brown Bat	Smooth Green Snake	Broad-winged Skipper
Black-billed Cuckoo	Eastern Red Bat		Dion Skipper
Brown Thrasher	Eastern Spotted Skunk		Ghost Tiger Beetle
Golden Eagle	Gray Fox		Hobomok Skipper
Harris's Sparrow	Hoary Bat		Monarch Butterfly
LeConte's Sparrow	Little Brown Bat		Mulberry Wing
Loggerhead Shrike	Northern Long-eared Bat		Tawney Crescent
Nelson’s Sparrow	Silver-haired Bat		Yellow-banded Bumble Bee
Red-headed Woodpecker			

Table 18. Riparian dependent SGIN. Total = 19 species: 4 birds, 7 mammals, 3 amphibians, 5 terrestrial invertebrates.

Riparian SGIN – Species of Greatest Information Need			
BIRDS	MAMMALS	AMPHIBIANS	TERRESTRIAL INVERTEBRATES
Black-billed Magpie	Arctic Shrew	Cope's Gray Treefrog	Gray Copper
Common Nighthawk	Fringed Myotis	Eastern Gray Treefrog	Greenish Blue
Eastern Screech-Owl	Long-eared Bat	Wood Frog	Large Marble
Northern Flicker	Long-legged Bat		Nude Yellow Loosestrife Bee
	Northern Water Shrew		Purplish Copper
	Townsend's Big-eared bat		
	Western Small-footed Bat		

FORESTS

This landscape component includes larger tracts of native upland deciduous forest scattered throughout North Dakota, as well as unique stands of natural coniferous forest (Figure 24). Less than 2% of the state is forested, which includes deciduous and coniferous forests, wooded shrubland, and riparian forests. Approximately 72% of the state's forestland is deciduous forest. Larger tracts of deciduous forest, designated as Focus Areas, include the Pembina Gorge, Turtle Mountains, Devils Lake Hills, and Killdeer Mountains. The Ponderosa Pines is a key coniferous forest Focus Area. Smaller, scattered deciduous forest tracts are found along the bluffs of the Sheyenne River and on the north- and east-facing slopes of the Badlands (woody draws). These natural upland forests are a rare and unique community in North Dakota. Most forested areas in the state are privately owned and primarily used for cattle grazing. While over-harvesting for wood products does not appear to be a major issue, the lack of forest regeneration in some areas is a concern. Additionally, clearing of trees for farming or other development continues to impact these forested areas.

Forest Classification Relationships

1) The Midwest Landscape Initiative developed *Voluntary Lexicon and Best Practice Recommendations for Midwest State Wildlife Action Plans* (May 2024). In line with recommendation 2.1, the following Macrogroup and Group classifications from the United States National Vegetation Classification System (USNVC) pertain to forest habitat in North Dakota.

Macrogroup: M012 Central Midwest Oak Forest, Woodland & Savanna https://www1.usgs.gov/csas/nvcs/unitDetails/838459
- Group: G181 Central Midwest Oak Openings & Barrens https://www1.usgs.gov/csas/nvcs/unitDetails/837682

Macrogroup: M501 Central Rocky Mountain Dry Lower Montane-Foothill Forest https://www1.usgs.gov/csas/nvcs/unitDetails/877291
- Group: G209 Rocky Mountain Foothill-Rock Outcrop Limber Pine – Juniper Woodland https://www1.usgs.gov/csas/nvcs/unitDetails/836637
- Group: G213 Central Rocky Mountain Ponderosa Pine Open Woodland https://www1.usgs.gov/csas/nvcs/unitDetails/836566
- Group: G216 Black Hills-Northwestern Great Plains Ponderosa Pine Forest & Woodland https://www1.usgs.gov/csas/nvcs/unitDetails/836663

Macrogroup: M151 Great Plains Forest & Woodland https://www1.usgs.gov/csas/nvcs/unitDetails/860458
- Group: G324 Great Plains Mesic Forest & Woodland https://www1.usgs.gov/csas/nvcs/unitDetails/856641
- Group: G146 Northeastern Great Plains Aspen Woodland https://www1.usgs.gov/csas/nvcs/unitDetails/849192
- Group: G328 Northwestern Great Plains Aspen Woodland https://www1.usgs.gov/csas/nvcs/unitDetails/849198
- Group: G329 Great Plains Bur Oak Forest & Woodland https://www1.usgs.gov/csas/nvcs/unitDetails/849207

Macrogroup: M029 Central Hardwood Floodplain Forest https://www1.usgs.gov/csas/nvcs/unitDetails/838650
- Group: G652 Midwest Floodplain Forest https://www1.usgs.gov/csas/nvcs/unitDetails/877317

Macrogroup: M028 Great Plains Flooded & Swamp Forest https://www1.usgs.gov/csas/nvcs/unitDetails/860485
- Group: G147 Great Plains Cottonwood – Green Ash Floodplain Forest https://www1.usgs.gov/csas/nvcs/unitDetails/856756

Pembina Gorge

Woody draws

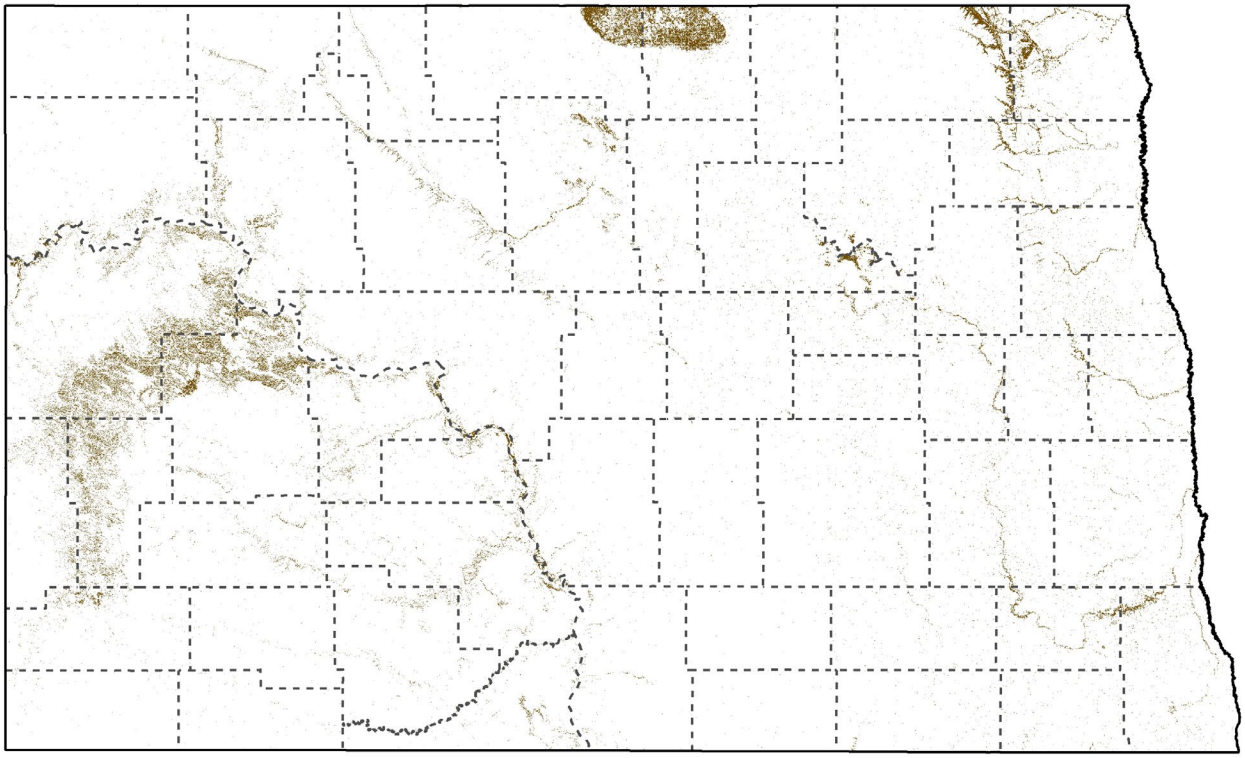


Figure 24. Forest (dark brown).

Table 19. Forest dependent SGCN. Total = 17 species: 5 birds, 6 mammals, 1 amphibian, 5 terrestrial invertebrates.

Forest SGCN – Species of Greatest Conservation Need			
BIRDS	MAMMALS	AMPHIBIAN	TERRESTRIAL INVERTEBRATES
Black-billed Cuckoo	Big Brown Bat	American Toad	Edwards' Hairstreak
Brown Thrasher	Eastern Red Bat		Hobomok Skipper
Harris's Sparrow	Hoary Bat		Tawny Crescent
Red-headed Woodpecker	Little Brown Bat		Yellow Bumble Bee
Ruffed Grouse	Northern Long-eared Bat		Yellow-banded Bumble Bee
	Silver-haired Bat		

Table 20. Forest dependent SGIN. Total = 21 species: 4 birds, 6 mammals, 1 reptile, 2 amphibians, 8 terrestrial invertebrates.

Forest SGIN - Species of Greatest Information Need				
BIRDS	MAMMALS	REPTILES & AMPHIBIANS	TERRESTRIAL INVERTEBRATES	
Black-billed Magpie	Fringed Myotis	Eastern Gray Treefrog	Garita Skipperling	Nine-spotted Lady Beetle
Eastern Screech-Owl	Long-eared Bat	Red-bellied Snake	Juanita Sphinx Moth	Pahaska Skipper
Northern Flicker	Long-legged Bat	Wood Frog	Manitoba Oakworm Moth	Silvery Blue
Western Kingbird	Northern Water Shrew		Mead's Wood-Nymph	Uncas Skipper
	Pygmy Shrew			
	Townsend's Big-eared bat			

BADLANDS

This landscape encompasses the area associated with the Little Missouri River drainage, commonly known as the Badlands (Figure 25). This highly dissected terrain was shaped by water erosion of soft silt or clay soils and the collapse following lignite coal bed fires. Badly eroded clay-scoria slopes, buttes, and steep canyons are prevalent throughout the region. Thickets of small trees and shrubs, or woody draws of cottonwood and green ash, naturally occur on north- or east-facing escarpments. Bare hills, scattered with Rocky Mountain juniper, and shortgrass prairie dominate the bottomlands and tops of buttes. A few small, unique stands of native coniferous forest are found, specifically in Billings, Golden Valley, Slope, and Bowman counties. The absence of fire has allowed juniper to expand and encroach upon some areas. Ephemeral or intermittent streams are common in steep valleys, while natural wetlands are rare; however, water impoundments are abundant. Cattle grazing is the most prevalent land use, but the area is a popular destination for outdoor recreation such as hunting, hiking and biking. Oil and gas development has occurred in this region since the 1950s but has intensified since around 2009. The Killdeer Mountains and Ponderosa Pines Focus Areas lie within the Badlands' exterior boundaries but are categorized under Upland Forest.

The Badlands has abundant caves or crevices, or naturally occurring cavities formed underground or in the face of a cliff or hillside. In North Dakota, caves are usually not large enough for a human to enter. However, they may be very important hibernacula and overwintering areas for bats.

Badlands Classification Relationships

1) The Midwest Landscape Initiative developed *Voluntary Lexicon and Best Practice Recommendations for Midwest State Wildlife Action Plans* (May 2024). In line with recommendation 2.1, the following Macrogroup and Group classifications from the United States National Vegetation Classification System (USNVC) pertain to Badlands habitat in North Dakota.

Macrogroup: M501 Central Rocky Mountain Dry Lower Montane-Foothill Forest https://www1.usgs.gov/csas/nvcs/unitDetails/877291
- Group: G209 Rocky Mountain Foothill-Rock Outcrop Limber Pine – Juniper Woodland https://www1.usgs.gov/csas/nvcs/unitDetails/836637
- Group: G213 Central Rocky Mountain Ponderosa Pine Open Woodland https://www1.usgs.gov/csas/nvcs/unitDetails/836566
- Group: G216 Black Hills-Northwestern Great Plains Ponderosa Pine Forest & Woodland https://www1.usgs.gov/csas/nvcs/unitDetails/836663

Macrogroup: M052 Great Plains Sand Grassland & Shrubland https://www1.usgs.gov/csas/nvcs/unitDetails/860480
- Group: G889 Northern Great Plains Sand Grassland https://www1.usgs.gov/csas/nvcs/unitDetails/1127110

Macrogroup: M115 Great Plains Badlands Vegetation https://www1.usgs.gov/csas/nvcs/unitDetails/860626
- Group: G566 Great Plains Badlands Vegetation https://www1.usgs.gov/csas/nvcs/unitDetails/857182

Macrogroup: M116 Great Plains Cliff, Scree & Rock Vegetation https://www1.usgs.gov/csas/nvcs/unitDetails/860694
- Group: G567 Great Plains Cliff, Scree & Rock Vegetation https://www1.usgs.gov/csas/nvcs/unitDetails/857191

Badlands topography.

Badlands cattle grazing and woody draws.

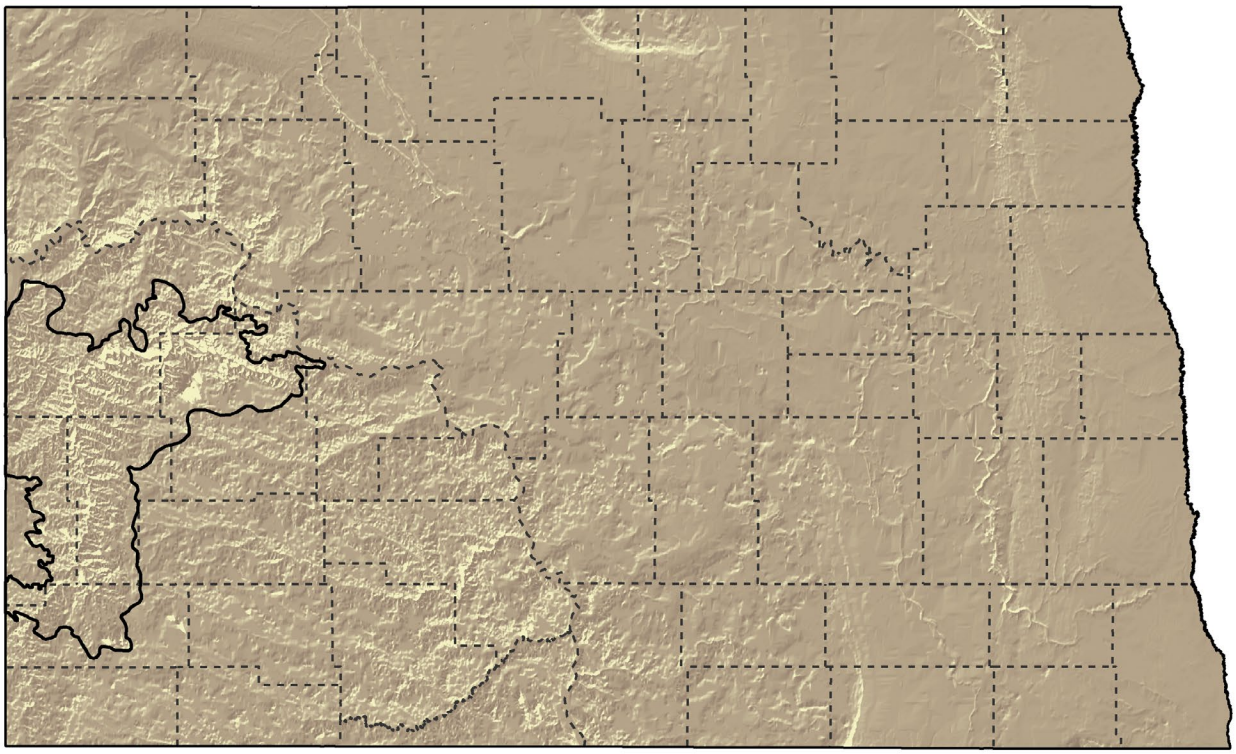


Figure 25. The badlands region (black outline) and shaded relief.

Table 21. Badlands use by SGCN. Total = 22 species: 11 birds, 9 mammals, 2 terrestrial invertebrates.
An asterisk (*) indicates species that utilize caves and crevices.

Badlands SGCN – Species of Greatest Conservation Need				
BIRDS		MAMMALS		TERRESTRIAL INVERTEBRATES
American Kestrel	Lark Bunting	Big Brown Bat*	Little Brown Bat*	Badlands Tiger Beetle
Brown Thrasher	Loggerhead Shrike	Black-footed Ferret	Northern Long-eared Bat	Hera Sheepmoth
Burrowing Owl	Prairie Falcon	Black-tailed Prairie Dog	Silver-haired Bat	
Golden Eagle	Sharp-tailed Grouse	Eastern Red Bat	Swift Fox	
Grasshopper Sparrow	Western Meadowlark	Hoary Bat		
Horned Lark				

Table 22. Badlands use by SGIN. Total = 17 species: 2 birds, 7 mammals, 2 reptiles, 6 terrestrial invertebrates.
An asterisk (*) indicates species that utilize caves and crevices.

Badlands SGIN – Species of Greatest Information Need				
BIRDS	MAMMALS		REPTILES	TERRESTRIAL INVERTEBRATES
Black-billed Magpie	Fringed Myotis*	Sagebrush Vole	Sagebrush Lizard	Apache Jumping Spider
Common Nighthawk	Long-eared Bat*	Townsend's Big-eared bat*	Short-horned Lizard	Baird’s Swallowtail
	Long-legged Bat*	Western Small-footed Bat*		Juanita Sphinx Moth
	Merriam's Shrew			Mormon Metalmark
				Strecker’s Giant-skipper
				Uncas Skipper

OTHER

Agriculture Cropland

North Dakota is home to over 25,000 farms, with more than 38 million acres classified as farmland. Of this, over 26 million acres are dedicated to cropland, which includes hayland and perennial grass cover (2022 Census of Agriculture). This habitat category focuses on cultivated agriculture cropland areas used for the annual production of adapted crops for harvest, including grains and row crops (Figure 26). The state leads the nation in producing soybeans, wheat, canola, and dry edible beans. However, much of the land now used for crops was established at the expense of losing grassland, wetlands, or other natural habitats. Cropland provides certain advantages for wildlife by providing food, cover, and potential nesting sites. Additionally, many farms participate in conservation programs and adopt practices that benefit local wildlife.

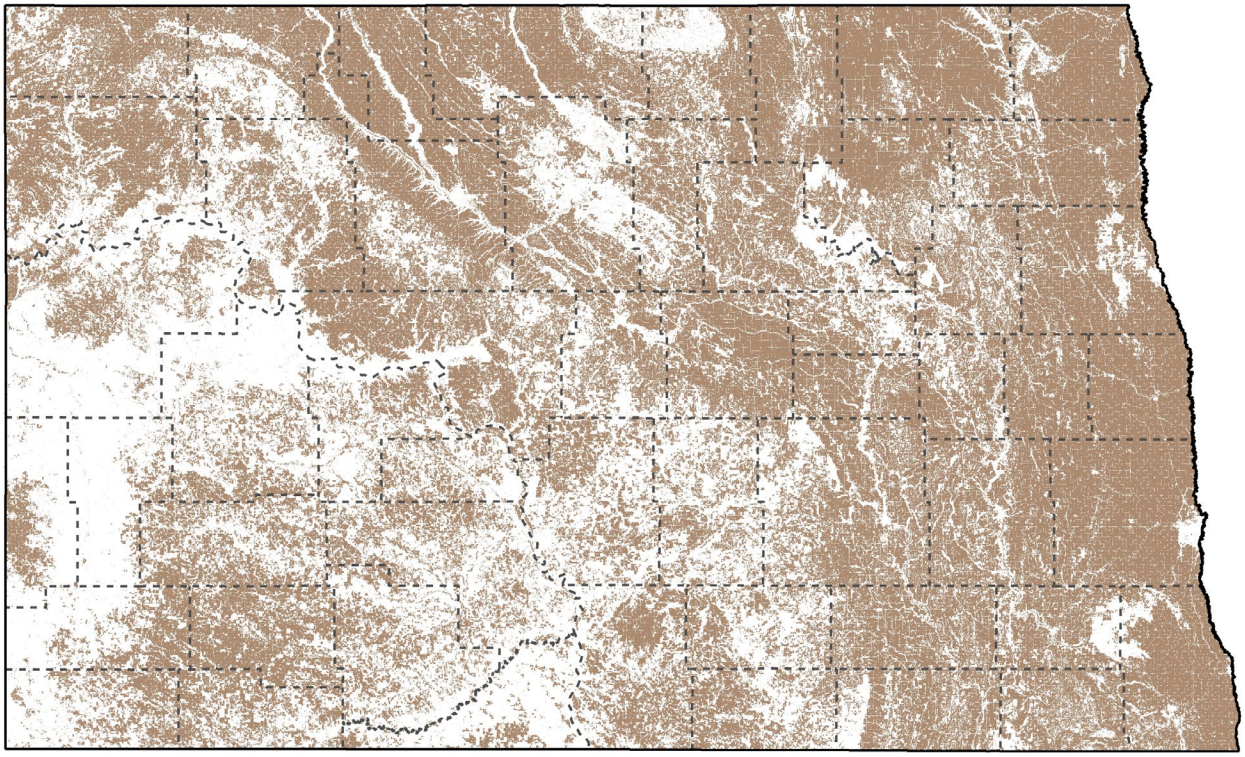


Figure 26. Cultivated agriculture cropland (brown).

Table 23. Agriculture cropland use by SGCN. Total = 10 species: 9 birds, 1 terrestrial invertebrate.

Agriculture Cropland SGCN – Species of Greatest Conservation Need		
BIRDS		TERRESTRIAL INVERTEBRATE
American Golden-Plover	Northern Pintail	Yellow-banded Bumble Bee
Buff-breasted Sandpiper	Sharp-tailed Grouse	
Franklin's Gull	Western Meadowlark	
Horned Lark	Whooping Crane	
Long-billed Curlew		

Table 24. Agriculture cropland use by SGIN. Total = 5 species: 1 bird, 3 mammals, 1 terrestrial invertebrate.

Agriculture Cropland SGIN – Species of Greatest Information Need		
BIRDS	MAMMALS	TERRESTRIAL INVERTEBRATE
Snowy Owl	Hispid Pocket Mouse	Nine-spotted Lady Beetle
	Ord's Kangaroo Rat	
	Plains Pocket Mouse	

Agriculture landscape southwest North Dakota.

Agriculture land is utilized by big game species.

Whooping Cranes foraging in corn stubble.

Long-billed Curlews often forage in cropland or hayland.

Developed Areas

Developed areas are dominated by constructed materials such as buildings and roads, residential areas, commercial or industrial centers, transportation and utility corridors, and may include intensively modified open areas such as golf courses and parks (Figure 27). While some vegetation may be present, these areas are typically dominated by man-made structures. North Dakota's population was estimated at 796,568 in 2024, with more than half living in urban areas. There are about 107,000 miles of roads, including paved, gravel and unsurfaced roads. While the actual road surfaces do not function as habitat, the adjacent ditches or roadsides can play a key role in providing habitat for some species, especially in areas where natural habitat is limited. Developed land totals nearly 1.9 million acres and covers 4.2% of the state.

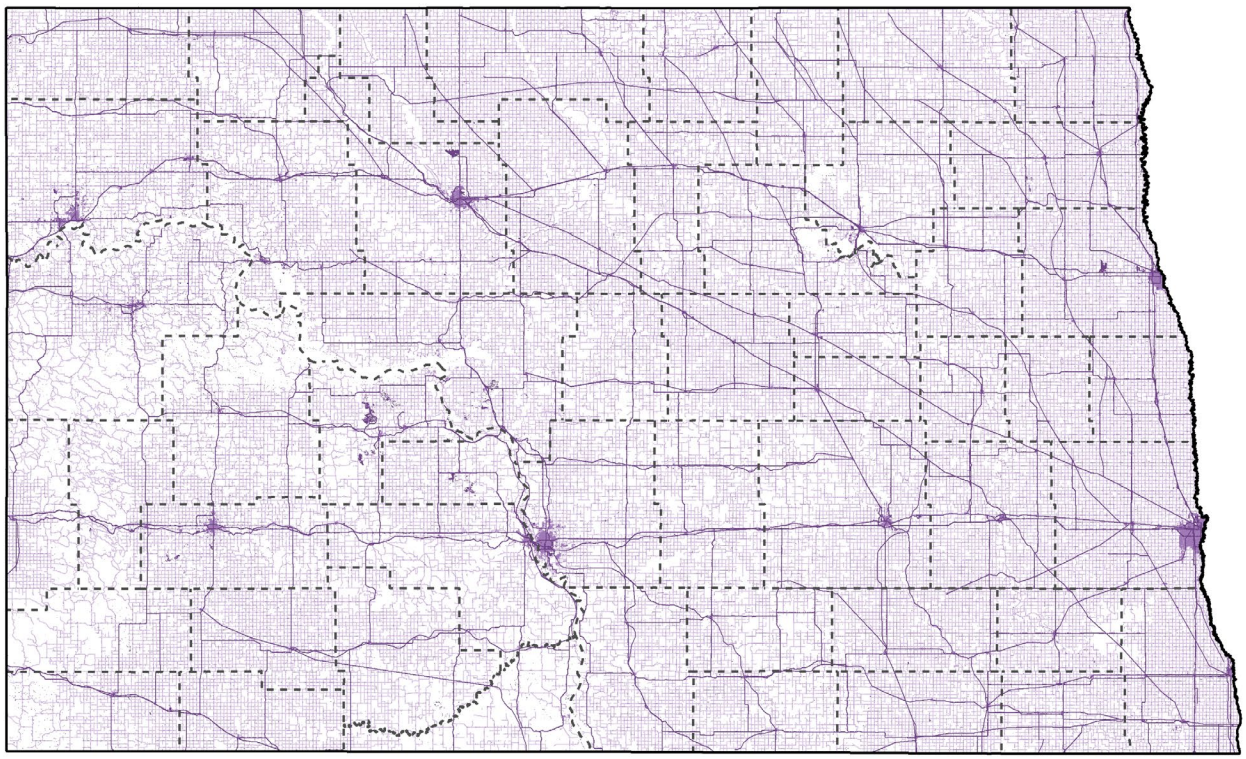


Figure 27. Developed land (purple), including towns and cities, roads, railroads, industrial and energy facilities.

Table 25. Developed area use SGCN. Total = 12 species: 4 birds, 2 mammals, 1 reptile, 5 terrestrial invertebrates.

Developed Areas SGCN – Species of Greatest Conservation Need				
BIRDS	MAMMALS	REPTILE	TERRESTRIAL INVERTEBRATES	
American Kestrel	Big Brown Bat	Snapping Turtle	Hobomok Skipper	Yellow Bumble Bee
Brown Thrasher	Little Brown Bat		Monarch Butterfly	Yellow-banded Bumble Bee
Harris's Sparrow			Western Bumble Bee	
Loggerhead Shrike				

Table 26. Developed area use SGIN. Total = 11 species: 4 birds, 2 reptiles, 5 terrestrial invertebrates.

Developed Areas SGIN – Species of Greatest Information Need			
BIRDS	REPTILES	TERRESTRIAL INVERTEBRATES	
Chimney Swift	Common Gartersnake	Juanita Sphinx Moth	Purplish Copper
Common Nighthawk	Plains Gartersnake	Mormon Metalmark	Rusty-patched Bumble Bee
Northern Flicker		Nine-spotted Lady Beetle	
Western Kingbird			

Pollinator garden in developed urban area.

Upland game birds using roadsides.

Soil

This habitat type is distinct because it can coexist with any other habitat. It includes any underground habitat formed entirely within mineral soil. Soil habitats are dug by burrowing species rather than created by geological forces. As a result, they are often small and temporary, filling in due to erosion and soil settling. Many species use underground burrows for various purposes, such as resting, raising young, or storing food. These species may dig the burrows themselves, take over burrows from other species, or inhabit abandoned ones. For this discussion, a species was classified as using soil habitats only if it spends most of its time in subterranean spaces.

Table 27. Soil use by SGCN. Total = 11 species: 1 bird, 4 mammals, 1 reptile, 2 amphibians, 3 terrestrial invertebrates.

Soil SGCN – Species of Greatest Conservation Need				
BIRD	MAMMALS		REPTILE & AMPHIBIAN	TERRESTRIAL INVERTEBRATES
Burrowing Owl	Black-footed Ferret	Richardson's Ground Squirrel	Plains Hog-nosed Snake	Badlands Tiger Beetle
	Black-tailed Prairie Dog	Swift Fox	American Toad	Ghost Tiger Beetle
			Plains Spadefoot	Northern Sandy Tiger Beetle

Table 28. Soil use by SGIN. Total = 6 species: 5 mammals, 1 terrestrial invertebrate.

Soil SGIN – Species of Greatest Information Need		
MAMMALS		TERRESTRIAL INVERTEBRATES
Franklin's Ground Squirrel	Ord's Kangaroo Rat	Splendid Tiger Beetle
Hispid Pocket Mouse	Plains Pocket Mouse	
Merriam's Shrew		

Burrowing Owl

Franklin's Ground Squirrel

FOCUS AREAS

In certain instances, there was enough information or justification to designate Focus Areas within specific landscapes. The EPA's Level IV ecoregions served as the foundation for identifying these Focus Areas in the 2015 SWAP. Using Geographic Information Systems, Level IV ecoregions were analyzed alongside various land cover data, the Department's extant native prairie/unbroken grassland and native forest, and spatial biological planning tools, including key sites for Species of Greatest Conservation Need. The boundaries of specific Level IV ecoregions were selected and adjusted (digitized) based on existing native vegetation and key biological data, highlighting areas where the highest concentration of SGCN may occur.

Focus Areas typically display distinct or easily identifiable differences in vegetation, soils, topography, hydrology, or land use. These areas are highly variable in size and often represent rare types of native vegetation or natural communities within North Dakota. Twenty-one Focus Areas were developed for the 2015 SWAP. Conservation Reserve Program (CRP) grasslands have been removed as a specific focus area in the 2025 SWAP, but CRP and other restored/planted grassland remains an important component of the grassland landscape. Therefore, a total of 20 Focus Areas are identified in the 2025 SWAP (Figure 28). Wetlands are considered a key component within these Focus Areas where they are present. The Badlands, a unique land feature, also contains designated Focus Areas, though these are categorized under other landscapes (for example, the Ponderosa Pines Focus Area is included within the Upland Forest landscape).

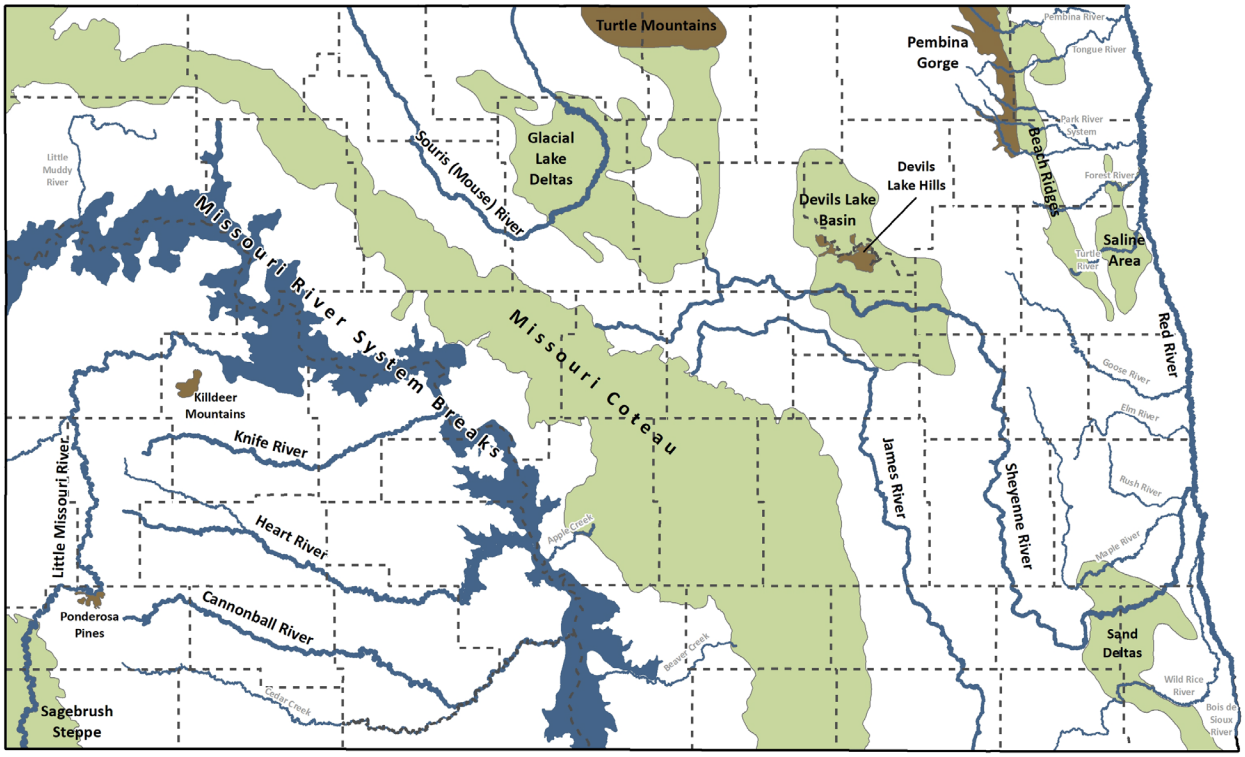


Figure 28. SWAP Focus Areas. Rivers labeled in light gray are tributaries of focus areas.

Saline Area

This region is characterized by saline soils, caused by salty groundwater rising to the surface from underlying sandstone. As a result, much of the land is unsuitable for crop farming, with grazing taking place in most uncultivated areas. Salt-tolerant plants thrive here, and many of the wetlands are brackish. The area contains several large tracts of native tallgrass prairie, each over 640 acres, but most of it remains unprotected. Grand Forks County Prairie Partners advocate for its preservation, though urban expansion poses a threat, as much of the area lies within 15 miles of Grand Forks.

Key SGCNs: Greater Prairie-Chicken, LeConte's Sparrow, Short-eared Owl, Yellow Rail, Regal Fritillary

Key SGINs: Arctic Shrew

Sand Deltas and Beach Ridges

Thick sand deposits, formed from river sediments carried to glacial Lake Agassiz, have created windblown sand dunes, with the largest being the Sheyenne Delta in the southern Red River Valley. The Beach Ridges run in parallel lines of sand and gravel, along with a smaller delta east of the Pembina Gorge. Some agricultural activities, including irrigation, occur in the deltas and around the beach ridges. The Sand Deltas focus area encompasses the Sheyenne National Grasslands, managed by the US Forest Service, making it the largest publicly owned tallgrass prairie preserve in the United States. Oak savannahs thrive in the delta areas, with the Sheyenne River flowing through them. Privately owned native tallgrass prairie stands are also located adjacent to the Sheyenne National Grasslands.

Key SGCNs: American Kestrel, Greater Prairie-Chicken, Northern Prairie Skink, Plains Hog-nosed Snake, Dakota Skipper, Poweshiek Skipperling

Key SGINs: Plains Pocket Mouse

Glacial Lake Deltas

This area, characterized by glaciated flat sheets of sand and gravel or rolling sand dunes, is largely unsuitable for cropland. The drought-prone soils are mainly used for cattle grazing, although some cropland exists, with irrigation making previously unsuitable land farmable. Wet conditions will flood portions of grassland and hayland. Tallgrass prairie communities are also present within this focus area, where the vegetative cover is sparse and dominated by species such as Little Bluestem, Indiangrass, Prairie Sandreed, Switchgrass, and Sand Bluestem.

Key SGCNs: American Kestrel, LeConte's Sparrow, Richardson's Ground Squirrel, Dakota Skipper

Devils Lake Basin

Extensive wetland drainage and intensive farming dominate the northern part of the focus area due to its rich soils and relatively flat terrain. Larger wetlands and lakes are more common here, partly due to the drainage of smaller, temporary, and seasonal wetlands for agricultural purposes. Since 1993, the water levels of Devils Lake have been rising at unprecedented rates, climbing 31.68 feet to a record elevation of 1,454.3 feet above mean sea level in June 2011. This rise has flooded 167,070 acres (261 square miles) of land since 1993. The Sheyenne River meanders through the southern part of the basin, with many adjacent non-wooded uplands remaining intact.

Key SGCNs: American Bittern, Lesser Scaup, Ruddy Turnstone, Eastern Spotted Skunk

Key SGINs: Franklins Ground Squirrel, Arctic Shrew

Missouri Coteau

The rolling, steep topography of this area has largely prevented it from being farmed, allowing a significant portion of native prairie to remain intact. However, conversion to agriculture and industrial development is ongoing. Cattle grazing is the most common land use, and numerous wetlands of various types are scattered throughout the region. Considerable conservation efforts, particularly focused on grassland preservation, have been directed toward the Coteau.

Key SGCNs: American Bittern, Baird's Sparrow, Bobolink, Chestnut-collared Longspur, Ferruginous Hawk, Grasshopper Sparrow, Hudsonian Godwit, LeConte's Sparrow, Lesser Yellowlegs, Long-billed Dowitcher, Marbled Godwit, Nelson's Sparrow, Northern Harrier, Northern Pintail, Pectoral Sandpiper, Semipalmated Sandpiper, Sharp-tailed Grouse, Short-billed Dowitcher, Short-eared Owl, Sprague's Pipit, Stilt Sandpiper, Upland Sandpiper, Western Meadowlark, Willet, Wilson's Phalarope, Richardson's Ground Squirrel, Dakota Skipper, Monarch Butterfly, Regal Fritillary

Key SGINs: Franklin's Ground Squirrel

Sagebrush Steppe

Eroded buttes, scoria mounds, and salt pans give this area a landscape similar to the badlands. The characteristic big sagebrush ecosystem has been significantly altered by livestock grazing, conversion to cropland, and oil and gas development. Despite this, extensive

conservation efforts over the past decade have focused on improving Greater Sage-Grouse habitat. However, the remaining fragile habitat is highly fragmented and continues to face ongoing threats.
Key SGCNs: Brewer's Sparrow, Greater Sage-Grouse, Long-billed Curlew, Thick-billed Longspur, Swift Fox, Hera Sheepmoth
Key SGINs: Sagebrush Lizard, Ord's Kangaroo Rat, Merriam's Shrew, Sagebrush Vole

Missouri River System/Breaks

The Missouri River, the longest river in the United States, begins in the Rocky Mountains of Montana and flows southeast to join the Mississippi River in Missouri. It forms the largest river system in North Dakota. The system is divided into sections: the Upper Missouri River/Yellowstone River, Lake Sakakawea, the Missouri River below Garrison Dam, and Lake Oahe, which starts just south of Bismarck/Mandan. Secondary rivers in the Missouri River System/Breaks Focus Area include the Yellowstone River, Little Muddy Creek, Apple Creek, and Beaver Creek (at Lake Oahe). Other major tributaries, such as the Little Missouri River, Knife River, Heart River, and Cannonball River, are separate Focus Areas. The damming of the Missouri River in the 1950s significantly altered its natural flow. The River Breaks feature steep, dissected topography with woody draws, riparian forests, and upland shortgrass prairie. The loss of natural flooding, which stimulates cottonwood growth, has inhibited cottonwood regeneration. Human development and urban expansion are increasing, particularly around the Bismarck/Mandan and Williston areas.
Key SGCNs: Least Tern, Piping Plover, Red-headed Woodpecker, Little Brown Bat, Northern Long-eared Bat, Blue Sucker, Burbot, Flathead Chub, Northern Redbelly Dace, Paddlefish, Pallid Sturgeon, Sicklefin Chub, Sturgeon Chub, Dakota Stonefly, Plains Stripetail
Key SGINs: Red Knot, Common Gartersnake, False Map Turtle, Smooth Softshell, Spiny Softshell, Paiute Dancer

Little Missouri River

The Little Missouri River originates in eastern Wyoming and flows north through the badlands of western North Dakota. In North Dakota, Beaver Creek is a secondary Focus Area, flowing into the Little Missouri River before it eventually empties into Lake Sakakawea at Little Missouri Bay. While areas of plains cottonwood forest still occur along the riverbanks, their extent has been significantly reduced from historic levels. Juniper tree encroachment is becoming more prevalent in these cottonwood forests. Cattle grazing and unrestricted use along much of the river pose potential threats in North Dakota.
Key SGCNs: Golden Eagle, Red-headed Woodpecker, Little Brown Bat, Northern Long-eared Bat, Flathead Chub, Northern Redbelly Dace, Sicklefin Chub, Sturgeon Chub, Plains Stripetail
Key SGINs: Short-horned Lizard, Fringed Myotis, Long-eared Bat, Long-legged Bat, Townsend's Big-eared Bat, Western Small-footed Bat, Winter Stonefly

Knife River

The Knife River originates in the badlands of west-central North Dakota and flows eastward for 200 miles before joining the Missouri River. The watershed faces threats from poor land use practices, leading to increased erosion and higher sediment loads. Runoff from surrounding lands contributes to water quality impairment in the watershed.
Key SGCNs: Blue Sucker, Flathead Chub, Northern Redbelly Dace, Fragile Papershell
Key SGINs: False Map Turtle, Spiny Softshell, Small Square-gilled Mayfly

Heart River

The Heart River flows across approximately 180 miles of western North Dakota, beginning in Billings County within the Little Missouri National Grasslands. It flows eastward, passing through the Patterson Reservoir near Dickinson, and is joined by the Green River at Gladstone, which is a secondary focus area included with the Heart River. The river continues through Lake Tschida, formed by the Heart Butte Dam, before turning northeast and flowing into the Missouri River south of Mandan. The Heart River is threatened by several land use practices, including reduced riparian width, loss of native riparian plant diversity, overgrazing of the riparian zone, stream bank erosion, and channel filling with sediments. Increased runoff from the watershed further contributes to impairment.
Key SGCNs: Flathead Chub, Northern Redbelly Dace, Dakota Stonefly
Key SGINs: False Map Turtle, Spiny Softshell, Spinylegs

Cannonball River

The Cannonball River flows 135 miles from west to east across southwestern North Dakota before emptying into Lake Oahe. Instream flow can vary greatly, ranging from nearly none during dry years to 95,000 cubic feet per second during wet years. Both the upper and lower portions of the Cannonball River and its tributaries are threatened by high nutrient levels and increased sedimentation, likely resulting

from land use practices within the watershed. Pathogens have also been identified as impairments to the river system. Cedar Creek is a secondary river included in this focus area.
Key SGCNs: Blue Sucker, Flathead Chub, Northern Redbelly Dace, Dakota Stonefly
Key SGINs: False Map Turtle, Smooth Softshell, Spiny Softshell, Spinylegs

Red River and Tributaries
The Red River basin drains 39,300 square miles across a three-state region, including 21,000 acres of eastern North Dakota. Its largest North Dakota tributary is the Sheyenne River, while secondary rivers include the Bois de Sioux, Wild Rice, Elm, Goose, Turtle, Forest, Park River System, and the Tongue and Pembina Rivers. Many of these rivers are impacted by channelization and flood control impoundments, which were implemented to manage land drainage for agriculture. The region also features extensive drainage ditch systems that alter the natural hydrology of the basin. Agricultural runoff and wastewater inputs contribute further to impairing the system.
Key SGCNs: American Toad, Gray Fox, Burbot, Blacknose Shiner, Carmine Shiner, Finescale Dace, Hornyhead Chub, Northern Pearl Dace, Northern Redbelly Dace, Pugnose Shiner, Silver Chub, Trout-perch, Dakota Stonefly, Plains Stripetail, sand-dwelling mayfly
Key SGINs: Common Mudpuppy, Cope's Gray Treefrog, Eastern Gray Treefrog, Wood Frog

Sheyenne River
The Sheyenne River basin spans nearly 900,000 acres, making it the largest contributing tributary to the Red River in terms of area. It originates in the mixed grass region of central North Dakota and flows southeast toward its confluence with the Red River. Agricultural and ranching practices throughout the region, along with wastewater discharge, have impacted water quality in this drainage. The construction of an outlet from Devils Lake into the Sheyenne River has altered the flow, elevation, and water quality. The Maple and Rush Rivers are secondary Focus Areas, entering the Sheyenne River near its confluence with the Red River.
Key SGCNs: Black-billed Cuckoo, Gray Fox, Little Brown Bat, Blacknose Shiner, Carmine Shiner, Northern Pearl Dace, Northern Redbelly Dace, Pugnose Shiner, Trout-perch, Black Sandshell, Creek Heelsplitter, Creeper, Mapleleaf, Pink Heelsplitter, Threeridge, Wabash Pigtoe, Dakota Stonefly, Plains Stripetail
Key SGINs: Common Gartersnake, Red-bellied Snake

James River
The James River begins in the Drift Prairie of central North Dakota and flows south into South Dakota. The area is primarily used for agriculture. A large reservoir north of Jamestown serves flood control and municipal needs. Land use practices and water withdrawal have been identified as threats to this river system. Many stretches of the river are impaired by high nutrient loads and sedimentation.
Key SGCNs: Blacknose Shiner, Carmine Shiner, Pugnose Shiner, Black Sandshell, Creeper, Deertoe, Fragile Papershell, Plains Emerald

Souris (Mouse) River
The Souris (Mouse) River originates in eastern Saskatchewan, flowing south into northern North Dakota before returning north into Canada. Water flow is regulated by two large reservoirs in Saskatchewan and several smaller dams in North Dakota. The primary land use in this drainage is agriculture. Many stretches of the river are impaired by high nutrient content and sedimentation, with wastewater discharge further affecting water quality. The region also experienced major flooding in 2011.
Key SGCNs: Northern Pearl Dace, Trout-perch
Key SGINs: Long-horned Casemaker, Northern case maker

Pembina Gorge
The Pembina Gorge is a small but steep and dissected escarpment located on the edge of the Drift Prairie, bordering the Red River Valley and Canada. The area is dominated by deciduous forests, including Bur Oak, Quaking Aspen, Green Ash, Cottonwood, and American Elm. The steep slopes help preserve the natural woodland community, while the flatter areas have been cleared for cropland, including small grains, sunflowers, and flax. Off-road vehicle trail systems have been developed, and there is ongoing advocacy for more trails through the Gorge. The Pembina Gorge on the North Dakota side is likely a key migration corridor, as high numbers of raptors have been documented migrating through the Canadian side of the Pembina Valley. The Pembina River, Tongue River, and Park River System run east-west through the Gorge, while Upland Forest on flat land lies to the east in the Beach Ridges focus area.
Key SGCNs: Black-billed Cuckoo, Ruffed Grouse, Eastern Red Bat, Gray Fox, Hoary Bat, Silver-haired Bat
Key SGINs: Copes Gray Treefrog, Eastern Gray Treefrog, Wood Frog, Arctic Shrew, Boreal Whiteface, Giant Case Maker

Turtle Mountains

Set in the northern Drift Prairie, the rolling topography and an additional 10 inches of precipitation per year support deciduous forest cover, including Bur Oak, Aspen, Green Ash, Paper Birch, Boxelder, Sumac, Serviceberry, and Snowberry. The Turtle Mountains rise 600 to 800 feet above the surrounding prairie and wetland landscape. The soil in this region is erodible and poorly suited for farming, although some agricultural activity does occur. Native woodland clearings have been converted into pastureland. The area is dotted with hundreds of large, deep ponds and lakes.

Key SGCNs: Ruffed Grouse, Eastern Red Bat, Hoary Bat, Silver-haired Bat, Subarctic Darner

Key SGINs: Red-bellied Snake, Wood Frog, Arctic Shrew, Northern Water Shrew, Pygmy Shrew, Boreal Whiteface

Devils Lake Hills

The deciduous forest bordering Devils Lake is similar to that of the Pembina Hills, featuring Bur Oak, Quaking Aspen, and Birch. However, much of the natural forest along the shorelines of the lake has been submerged due to the recent rise in water levels.

Key SGCNs: Eastern Red Bat, Hoary Bat, Little Brown Bat, Silver-haired Bat, Subarctic Darner

Key SGINs: Wood Frog, Arctic Shrew, Boreal Whiteface

Killdeer Mountains

Separated from the main stem of the badlands, the Killdeer Mountains rise 700 to 1,000 feet above the surrounding prairie landscape, with the highest point reaching 3,314 feet—about 200 feet lower than the state's highest peak, White Butte. The dominant deciduous vegetation includes Bur Oak, Quaking Aspen, Green Ash, Paper Birch, Western Black Birch, and American Elm. Grazing occurs on private land, while the Killdeer Wildlife Management Area spans the Killdeer Mountains.

Key SGCNs: Golden Eagle, Little Brown Bat

Ponderosa Pines

Coniferous forest is rare in North Dakota, and this stand of Ponderosa Pine in the southwestern part of the state is located at the northeastern most edge of its overall range. It may be an outlier of the pines from the Black Hills of South Dakota. In the summer of 2004, a fire swept through the region, burning several hundred acres of pine. Occasional management may be necessary to prevent the encroachment of pines into native prairie.

Key SGCNs: Little Brown Bat

Key SGINs: Fringed Myotis, Long-eared Bat, Long-legged Bat, Townsend's Big-eared Bat, Western Small-footed Bat

STATE WILDLIFE GRANT SUCCESS STORY

Survey of Mussels and Aquatic Invertebrates in North Dakota

Freshwater mussels are in decline throughout North America due to a variety of reasons such as pollution and dams altering flow regimes of lotic waterbodies. In 2024, the North Dakota Game and Fish Department partnered with Valley City State University (VCSU) to evaluate mussel species and aquatic invertebrate species composition within the state's river and stream ecosystems. A similar survey was conducted in 2008-2010 with the new survey incorporating environmental DNA (eDNA), passive integrated transponder tags (PIT tags), along with an evaluation of potential aquatic invertebrate SGCN or SGIN's. Preliminary results reveal an increase in mussel diversity and density in the Goose River, along with population increases for the Fatmucket and Creek Heelsplitter in Baldhill Creek. Regarding other aquatic invertebrates, a potential new stonefly genus, *Amphinemura*, was collected in central North Dakota. The project is scheduled for at least one more field season with results pending.

KEY NATIVE WILDLIFE AND HABITAT AREAS

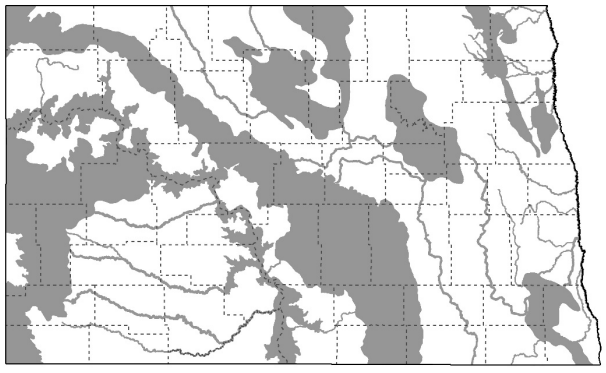
The Key Native Wildlife and Habitat Areas (KNWHA) spatial layer was developed using the ND State Wildlife Action Plan Focus Areas, landscapes where unbroken grassland is ≥ 40% within a 4 square mile area, and landscapes where the accessibility for breeding duck pairs per square mile is greater than 60 ("Thunderstorm Map"). The original KNWHA was developed in 2021 as a planning tool for wind energy development (see Wind Energy Development in North Dakota Best Management Practices, June 2021). However, the KNWHA has become an important tool for not only minimizing impacts to native species and habitat during development such as wind energy, but can also serve as a tool for landscapes to prioritize conservation actions. **The KNWHA is meant to enhance the SWAP Focus Areas by recognizing other landscapes which are vital for SGCNs that rely on larger tracts or complexes of essential native habitat** (Figure 29).

High represents a mostly intact or unique landscape. These areas may contain large tracts of land that have not been converted from their native state to other uses, such as cropland and developed areas, and therefore a less fragmented landscape. These areas are known for their high species richness and biodiversity. The KNWHA categorizes all SWAP Focus Areas, plus the Badlands region, as High.

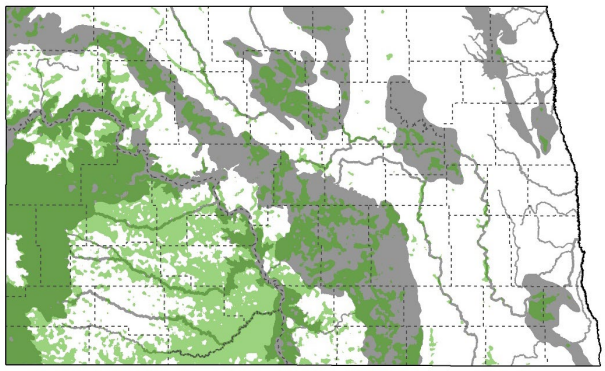
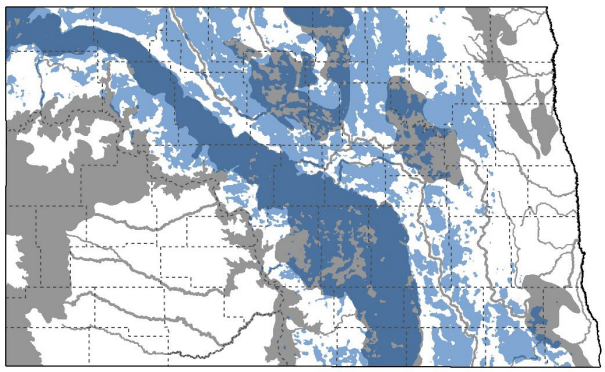
Medium includes areas not identified as High but where unbroken grassland is ≥ 40% within a 4 square mile area, and areas where the accessibility for breeding duck pairs per square mile is greater than 60. Medium areas represent lands that are partially broken or a disturbed landscape. These areas may contain medium to large tracts of land that have not been converted from their native state to other uses, such as cropland and developed areas, and therefore a more fragmented landscape.

Low represents a highly fragmented landscape and much of the land has been converted from its native state to other uses, such as cropland and developed areas.

The KNWHA spatial layer was updated for the 2025 SWAP with the latest assesment of extent unbroken grassland/shrubland (NDGF 2024) and the Waterfowl Breeding Pair Survey 2022 spatial layer. Similar to the original 2021 KNWHA, the updated 2025 KNWHA spatial layer was developed using the SWAP Focus Areas, areas where unbroken grassland/shrubland is ≥ 40% within a 4 square mile area, and areas where the accessibility for breeding duck pairs per square mile is greater than 60.



All SWAP Focus Areas, plus the Badlands region, are categorized as High.

	Green indicates where unbroken grassland/shrubland is ≥ 40% within a 4 square mile area. These are categorized as Medium, if outside the High areas.
	Blue indicates where accessibility for breeding duck pairs per square mile is greater than 60. This spatially explicit model was developd to target waterfowl populations that prioritize habitats (i.e. wetland complexes) to benefit upland nesting waterfowl. This model effectively charactizes areas important to many of the wetland dependent SGCNs and SGINs beyond just waterfowl. These are categorized as Medium, if outside the High areas.

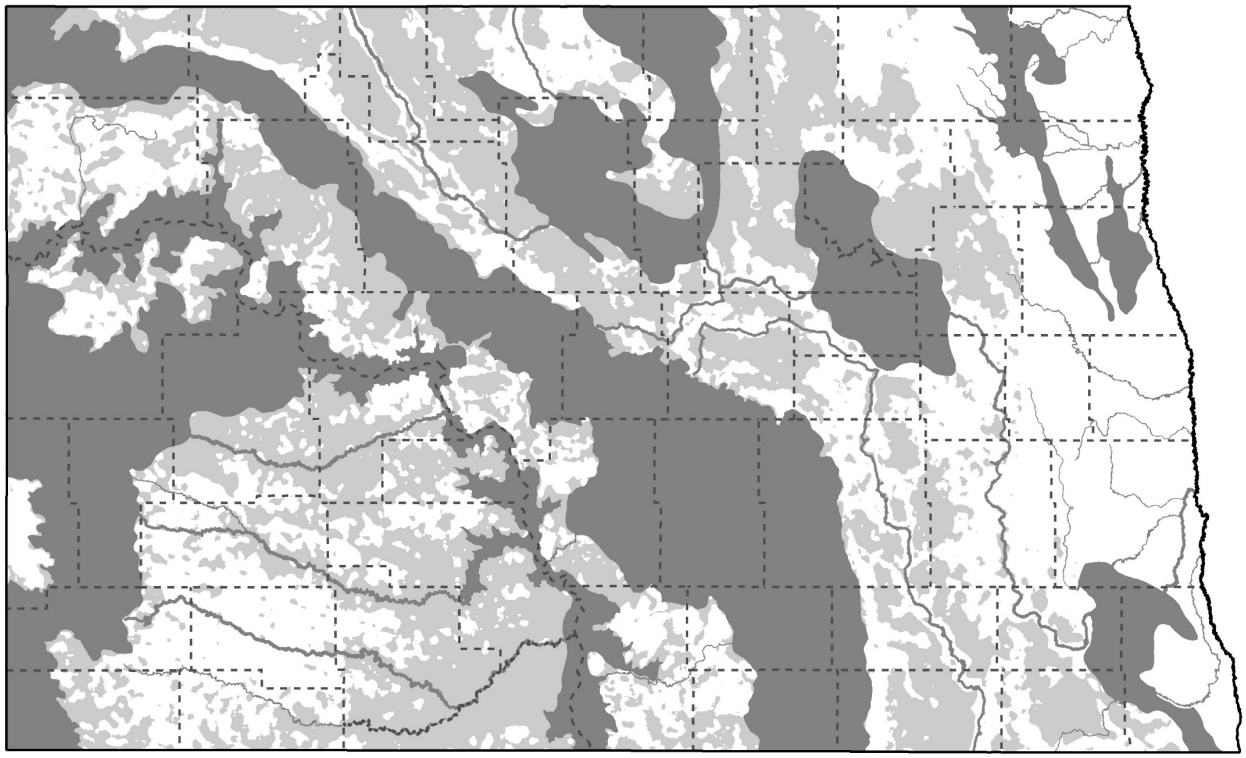


Figure 29. 2025 Key Native Wildlife and Habitat Areas. Dark gray = High; medium gray = Medium; white = Low.

CHAPTER 5
THREATS AND ACTIONS

This chapter includes information on the required elements:

Element 3: descriptions of problems which may adversely affect species of greatest conservation need or their habitats, and priority research and survey efforts needed to identify factors which may assist in restoration and improved conservation of those species and habitats.

Element 4: descriptions of conservation actions determined to be necessary to conserve the species of greatest conservation need and habitats and priorities for implementing such actions.

IDENTIFYING AND HIGHLIGHTING THREATS AND ACTIONS

North Dakota State Wildlife Action Plan Summits

For the 2015 and 2025 State Wildlife Action Plan revision, North Dakota followed *Best Practices for State Wildlife Action Plans Voluntary Guidance to States for Revision and Implementation* produced by the Association of Fish and Wildlife Agencies (2012). This report's best practices recommendation for creating consistency across SWAPs for classifying threats and conservation actions was to follow definitions and classifications in *A Standard Lexicon for Biodiversity Conservation: United Classifications of Threats and Actions* (Salafsky et al. 2008). The Conservation Measures Partnership (CMP), in collaboration with the IUCN Species Survival Commission, developed the unified classifications as a standard language for terms used by the conservation community. The classification has been revised several times, with revisions made available in 2015 (Version 2.0) and in late 2024 (Version 4.0). Note, the ND SWAP uses only the direct threats classifications from the CMP. The conservation actions identified in Tables 29 to 33 are either proven to be effective in North Dakota or represent practical solutions to help address the identified threats.

In 2014, during the revision of the 2015 SWAP, the NDGF hosted the first State Wildlife Action Plan Summit. The summit was held to inform/update interested agencies, groups, and individuals on the status of the SWAP review and to gather additional input on important issues. In total, 62 people attended the summit from 23 agencies/groups. The summit began with background information of the SWAP, a history of the State Wildlife Grant (SWG) program in North Dakota, and the process used to revise the Species of Conservation Priority list. The afternoon session was divided into five breakout habitat groups: Grasslands; Badlands; Woodlands; Rivers and Streams; and Wetlands and Lakes. Participants were instructed to join the habitat group for which they have the most expertise. The standard lexicon (Salafsky et al. 2008) was used to categorize direct threats for the habitat type. The unified direct-threats classification is structured in a hierarchical fashion, with first and second levels being comprehensive, consistent and exclusive. Some direct threats are not applicable to North Dakota (e.g. volcanoes) and those were excluded. Thirty-five direct threats were included. Conservation actions were identified to address the specific threats. A moderator of each group led the participants in a discussion and recorded all responses. At the conclusion of the afternoon session, participants were each given five "dot stickers" to place what they consider the greatest threats among the various habitat types.

On September 11, 2024, the NDGF hosted a second State Wildlife Action Plan Summit. The meeting was attended by 62 participants from 30 different state and federal agencies and NGOs, in addition to 14 NDGF staff members who were either running the event or participating in the sessions. Similar to 2014, the summit began with a SWAP overview, the process used to revise the species of greatest conservation need list, ideas for improving the SWAP for useability, and a presentation

from the North Central Climate Adaptation Science Center on incorporating climate change in the SWAP. The afternoon session was divided into five breakout habitat groups: Grasslands; Badlands; Forest; Rivers, Streams and Riparian; and Wetlands and Lakes. Participants were instructed to join the habitat group for which they have the most expertise. The direct threats and conservation action tables from the 2015 SWAP were used as a baseline for adding, removing, or modifying threats and conservation actions. The CMP 2.0 revision was used (note: version 4.0 was not made available until after the summit). Each group's moderator facilitated a discussion and recorded all responses. The voting process took place in two stages. First, at the end of the breakout session, group members were asked to vote on the greatest threats and conservation actions for the habitat group they had joined. Then, participants gathered as a large group to vote on the greatest threats and conservation actions among all habitats. The results of the voting are shown in Figures 30 to 34 and summarize participants' perceptions of the most significant habitat threats and their recommendations for focusing conservation efforts to address those threats. Tables 29 to 33 include all threats and actions identified by the habitat breakout groups. Note the threats and actions are not listed in order of priority in the tables.

The approach of using the CMP in a habitat-based approach versus species specific approach may differ from other state's SWAPs. Since many SGCNs share the same habitat, the North Dakota SWAP focuses on threats and conservation actions at the habitat level. Species specific threats and management recommendations are identified in the Species Accounts (see Appendices A to F).

Participants at the September 11, 2024 North Dakota State Wildlife Action Plan Summit.

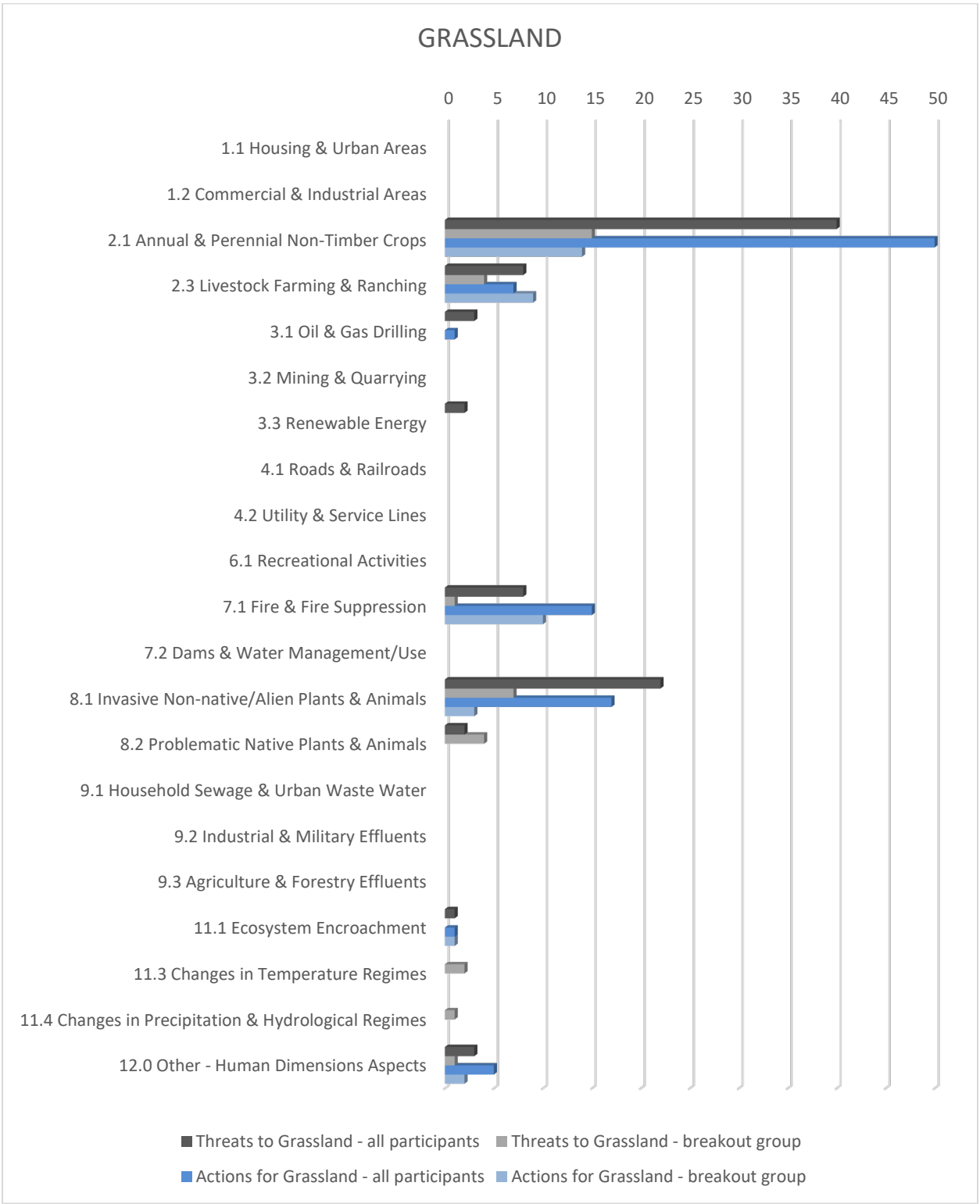


Figure 30. Responses from SWAP Summit participants on threats to grasslands and the areas to focus conservation actions.

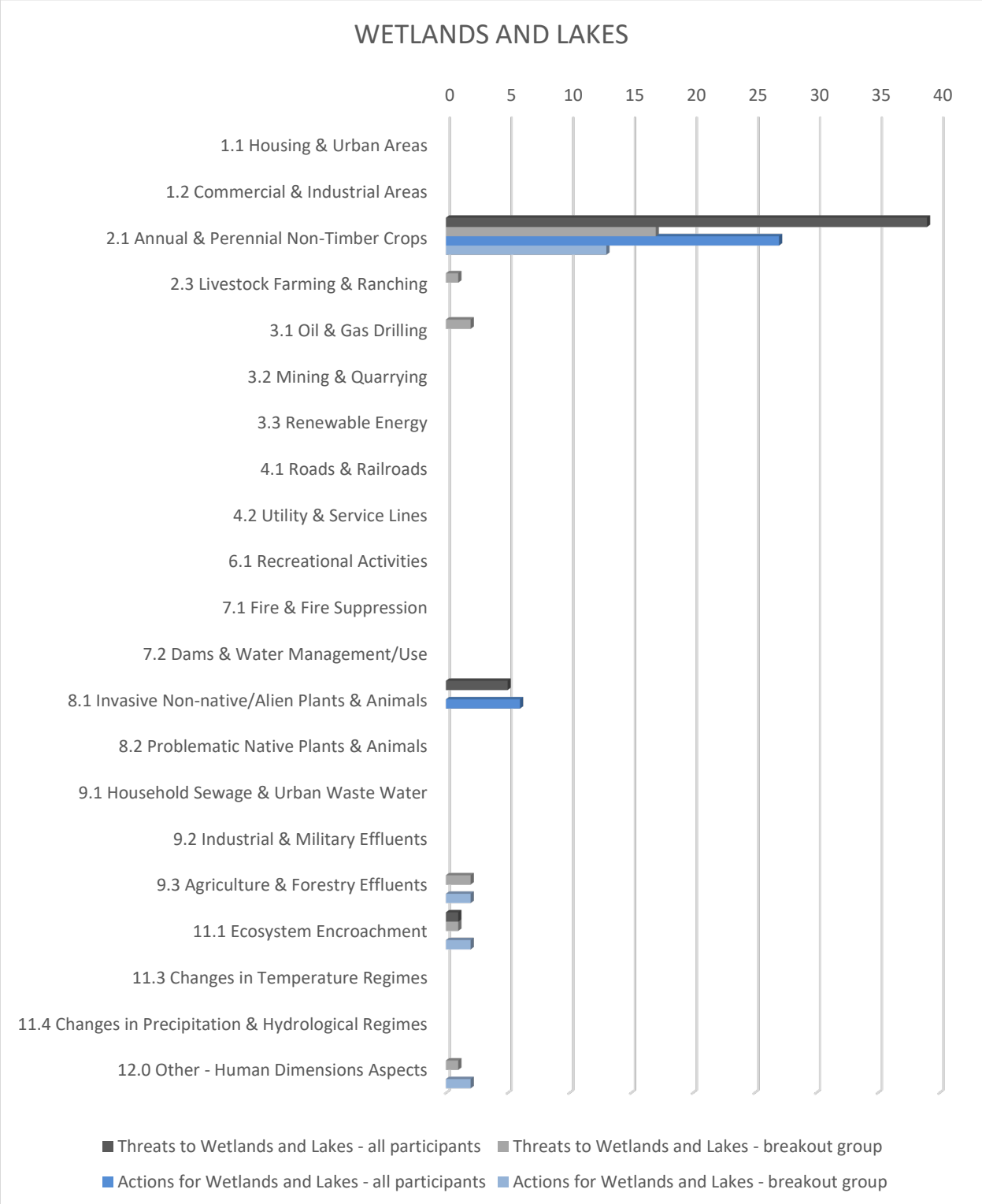


Figure 31. Responses from SWAP Summit participants on threats to wetlands and lakes and the areas to focus conservation actions.

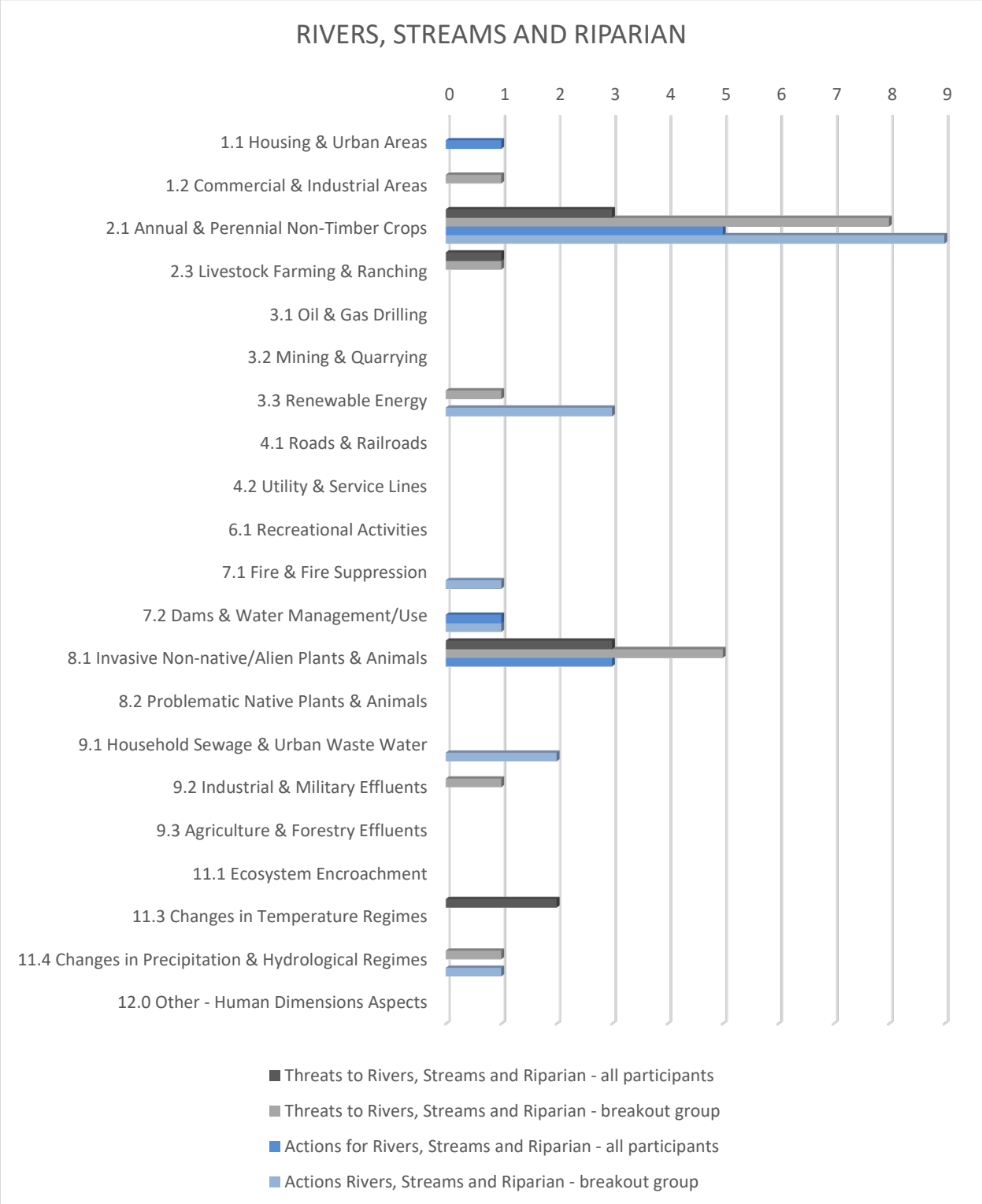


Figure 32. Responses from SWAP Summit participants on threats to rivers, streams and riparian and the areas to focus conservation actions.

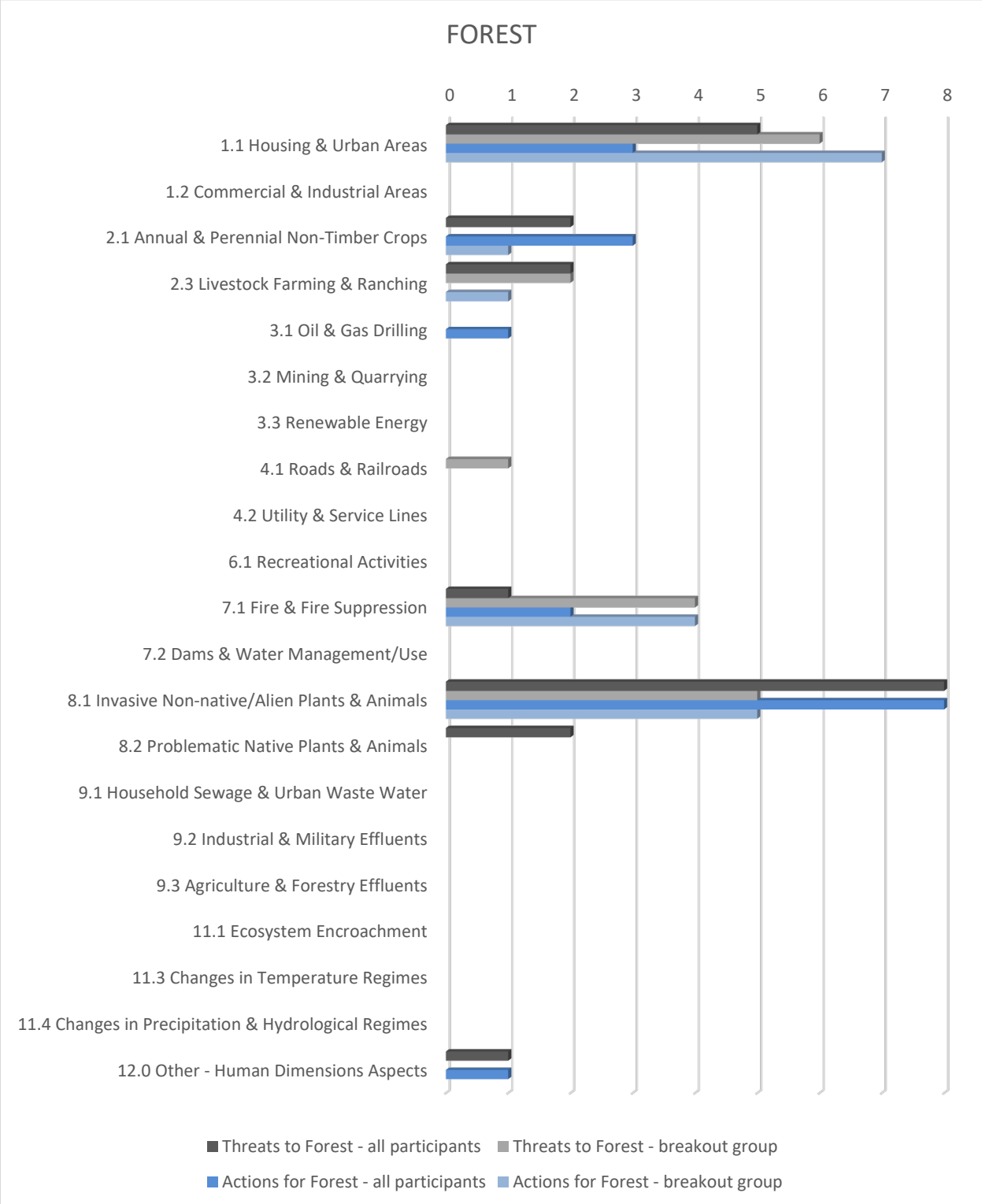


Figure 33. Responses from SWAP Summit participants on threats to forest and the areas to focus conservation actions.

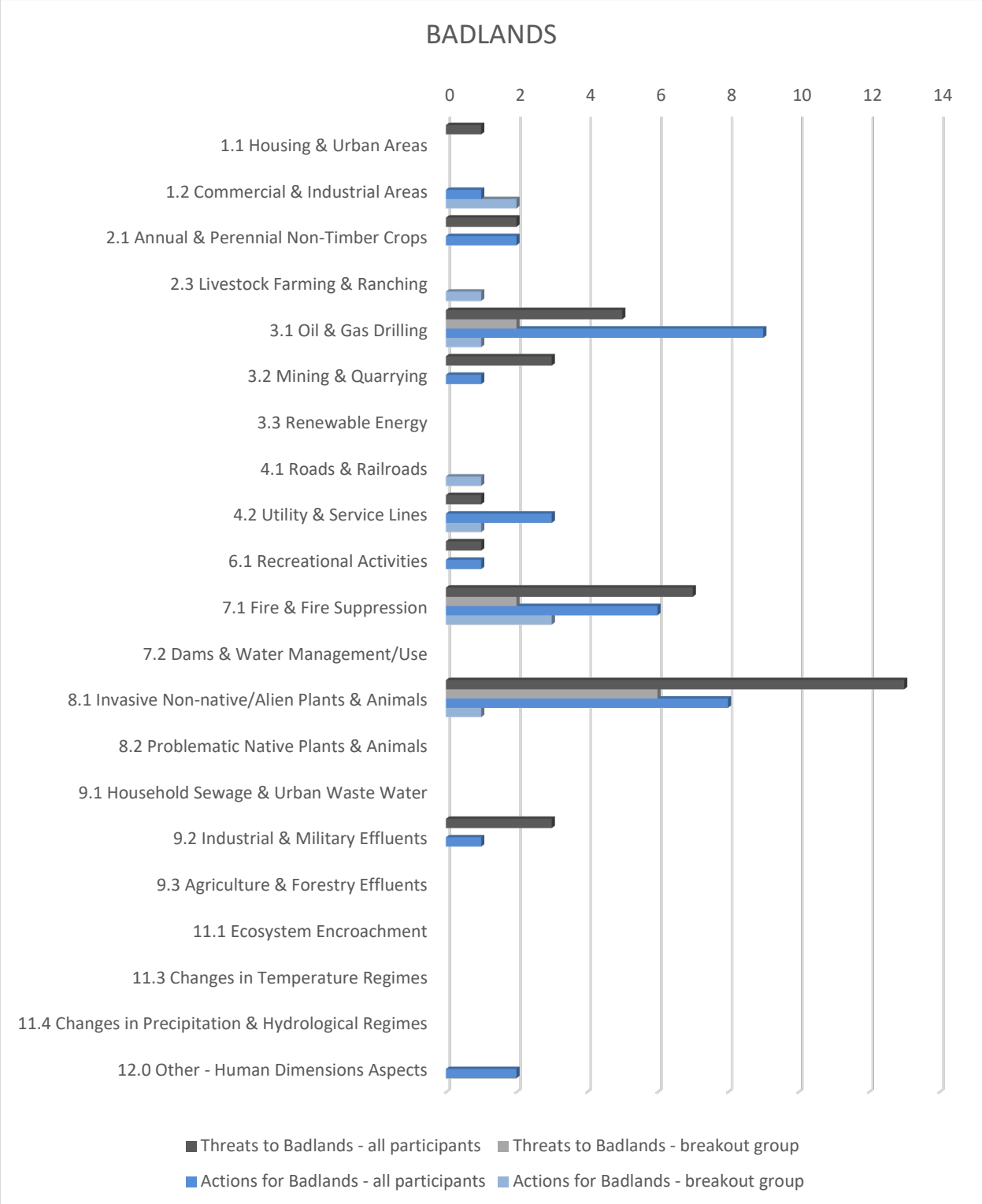


Figure 34. Responses from SWAP Summit participants on threats to badlands and the areas to focus conservation actions.

GRASSLAND THREATS AND ACTIONS

Table 29. Direct threats and conservation actions for grasslands.
Threats and actions are not listed in order of priority.

CLASSIFICATION	THREAT TO GRASSLAND	CONSERVATION ACTION
1. RESIDENTIAL & COMMERCIAL DEVELOPMENT		
1.1 Housing & Urban Areas	a) conversion of grassland to urban development b) fragmentation of grassland from urban development c) disturbance associated with urban development can disperse noxious/invasive weeds d) vegetation planted for ornamental purposes can invade adjacent native prairies e) mowing of adjacent native and/or tame grasslands for ornamental grooming f) pesticide/herbicide application and drift impacts adjacent plant/wildlife species composition g) loss of grazing and burning of grasslands near urban and recreational areas h) predation of grassland wildlife by domestic animals near urban areas i) direct mortality to wildlife species, particularly birds, from collisions with glass on buildings	i. offer incentives and programs to protect, enhance, and restore grasslands ii. develop or support programs, initiatives and statutory language that strengthen the efficacy of conservation measures iii. urge ecologically responsible urban planning and zoning iv. urge ecologically responsible urban and county policies v. public education and outreach for native landscaping and management vi. increase awareness, understanding, and appreciation of the grassland ecosystem vii. bird-friendly building designs viii. promote responsible and conscientious use of pesticides
1.2 Commercial & Industrial Areas	a) conversion and disturbance of grassland associated with industrial development b) increased garbage load, illegal dumping c) disturbance associated with development can proliferate noxious/invasive weeds d) direct mortality to wildlife species, particularly birds, from collisions with glass on buildings e) increasing demand for data center capacity	i. develop or support programs, initiatives and statutory language that strengthen the efficacy of conservation measures ii. urge ecologically responsible ordinances and suitable reclamation standards iii. bird-friendly building designs iv. education and outreach for native landscaping and management
1.3 Tourism & Recreational Areas	a) disturbance associated with recreational development can disperse noxious/invasive weeds b) pesticide/herbicide application and drift impacts adjacent plant/wildlife species composition c) unrestrained domestic animals can harass wildlife d) introducing woody plant species to native grasslands e) improper management of grasslands within recreational areas	i. promote “Keep It Native” campaign for greenways, trails, recreational areas, and minimize project footprint ii. public education and outreach for native landscaping and management iii. promote ecotourism iv. urge ecologically responsible ordinances v. encourage active management of grasslands, including grazing vi. promote responsible and conscientious use of pesticides vii. review policies to allow flexibility in proper management of grasslands
2. AGRICULTURE		

CLASSIFICATION	THREAT TO GRASSLAND	CONSERVATION ACTION
2.1 Annual & Perennial Non-Timber Crops	a) conversion of grassland to cropland development b) fragmentation of grassland due to cropland development c) displacement of grassland wildlife during conversion process d) pesticide application and drift impacts on adjacent plant/wildlife species composition, effect on pollinators e) increase in soil erosion from wind and water resulting in deposition in grasslands f) decline in soil health g) impacts to water table and water infiltration rates h) changing farm demographics resulting in shift from livestock ranching to crop production, loss of connection to the land, and loss of rural community lifestyle i) salinization of land that has been converted to cropland j) increase of noxious weeds and invasive plants when grassland is converted	i. offer incentives and programs to protect, enhance, and restore grasslands ii. use a targeted approach to protect, enhance, and restore the most vulnerable grasslands and/or those of high ecological value and connectivity iii. develop or support programs, initiatives and statutory language that strengthen the efficacy of conservation measures iv. offer midterm conservation agreements for grassland management and protection v. promote working lands conservation agreements vi. strengthen Farm Bill regulatory provisions (i.e. sodbuster, sodsaver) vii. offer incentives for wildlife friendly farming, tax-based or direct payments viii. promote and support regenerative grazing management, collaborate with grassland based agricultural groups ix. support demo projects and best management practices x. promotion of cover crops and soil health xi. promote equal risk management for grassland-based agriculture xii. promote responsible and conscientious use of pesticides
2.3 Livestock Farming & Ranching	a) absence of grazing b) underutilization of grazing or over-rest c) overutilization of grazing or overgrazing d) shift from ranching (pro-grass) lifestyle to confined animal feeding operations e) disturbance, erosion, and decline in soil health in high livestock traffic areas f) opposing attitude of using prescribed fire as co-management tool g) non-traditional livestock farms may proliferate disease transmission, genetic mixing, escapees, to wild populations h) inappropriate fencing (i.e. not wildlife-friendly) i) incentives to convert grassland to cropland j) public perception that livestock are bad for the climate and lack of knowledge on the importance of grasslands for carbon sequestration and storage k) increase of noxious weeds and invasive plants from poor grazing management practices l) changing farm demographics resulting in shift from livestock ranching to crop production, loss of connection to the land, and loss of rural community lifestyle	i. encourage grazing as a grassland management tool for high resistance and resilience ii. develop or support programs, initiatives and statutory language that strengthen the efficacy of conservation measures iii. develop provisions for Farm Bill disaster assistance for livestock producers iv. promote equal risk management for grassland-based agriculture v. establish grassbanks between state/federal/non-governmental land and private ranches vi. incentivize good grazing management vii. promote and support regenerative grazing management, use best management practices or ecological site descriptions viii. build market and corporate support of grass-based livestock ix. support grazing lands coalitions and work with grass-based agriculture groups x. use best management practices or ecological site descriptions xi. assessment of economic and ecological values of grasslands and associated wildlife, ecosystem services xii. promote carbon credits, biodiversity credits

CLASSIFICATION	THREAT TO GRASSLAND	CONSERVATION ACTION
		xiii. encourage smooth wire, at least for bottom wire, and apply visibility markers (wildlife-friendly fencing) xiv. encourage temporary or virtual fencing when possible xv. promote responsible livestock practices that minimize disease spread (i.e. double fences, appropriate removal of carcasses, etc.) xvi. educate the public on the benefits of working grasslands xvii. support prescribed fire, including training and education
3. ENERGY PRODUCTION & MINING		
3.1 Oil & Gas Drilling	a) conversion of grassland to well pads, field or production facilities, access roads b) fragmentation of grassland to well pads, field or production facilities, access roads c) disturbance associated with oil and gas development can proliferate noxious/invasive weeds d) inadequate or improper reclamation e) illegal dumping of materials and waste f) loss of grazing due to disturbance to livestock g) increased wildfire risk from drilling and operational activities h) anthropogenic disturbance to grassland associated wildlife, e.g. dust, light and noise pollution i) diminished forage quality and plant communities due to increased road dust j) social apathy to negative ecological impacts of oil and gas drilling k) governance apathy to negative ecological impacts of oil and gas drilling	i. well pad and facility consolidation, minimize footprint of development ii. engage in early consultation with the siting of well pads iii. develop crucial habitat maps or species avoidance areas iv. follow/implement best management practices v. incentivize companies for implementing ecologically sound development vi. urge ecologically responsible ordinances and suitable reclamation standards and foster relationships with oil companies to stimulate ecologically sound development vii. urge requirements to promptly reclaim dry or abandoned wells viii. enforce regulatory compliance and close loopholes which are used to delay or avoid reclamation ix. public education and outreach x. public disclosure of impacts/footprint xi. research the impacts of oil and gas drilling on grassland habitat and wildlife xii. explore novel alternatives to offset impacts of oil and gas development
3.2 Mining & Quarrying	a) conversion of grassland to mines or quarries b) anthropogenic disturbance to grassland associated wildlife c) inadequate or improper reclamation d) increase of noxious weeds and invasive plants when grassland is mined	i. minimize footprint of development ii. suitable reclamation standards iii. promote or develop local and state ordinances iv. delay or halt mining/quarrying for new metals or minerals until local ordinances have been approved
3.3 Renewable Energy	a) conversion of grassland to alternative fuel crops b) fragmentation of grassland by wind or solar facilities c) promotion of non-native, monotypic alternative fuel crops d) direct or indirect mortality of wildlife species from structures e) altered wildlife migrations	i. offer incentives and programs to protect, enhance, and restore grasslands ii. incentivize companies for implementing ecologically sound development alongside carbon incentives iii. urge ecologically responsible ordinances and suitable reclamation standards iv. urge accountability for ecological impacts

CLASSIFICATION	THREAT TO GRASSLAND	CONSERVATION ACTION
	f) anthropogenic disturbance to grassland associated wildlife, e.g. dust, noise and light pollution g) displacement of wildlife	v. minimize footprint of development vi. research to determine the best areas for placement to minimize impacts to wildlife vii. use livestock to control weeds viii. establish pollinator-friendly plantings under solar arrays
4. TRANSPORTATION & SERVICE CORRIDORS		
4.1 Roads & Railroads	a) conversion of grassland to roads and railroads b) fragmentation of grassland by roads and railroads c) anthropogenic disturbance to grassland associated wildlife, e.g. noise, dust d) direct mortality and displacement of wildlife species with vehicles or trains e) roads acting as migration barriers for terrestrial wildlife f) proliferate noxious/invasive weeds g) road and railway incident secondary effects, e.g. spills and explosions h) improper herbicide uses in railroad rights-of-way i) potential for wildfires, either accidental or from negligent actions j) road salt impacts to roadside plants and rights-of way	i. urge ecologically responsible ordinances and suitable reclamation standards ii. appropriate mitigation, e.g. native grassland ecosystems iii. appropriate road restrictions, including speed limits iv. reasonable timing restrictions for construction v. maintain natural corridors or construct wildlife crossings vi. use pipelines versus trucking liquids and gas vii. use native local ecotype seed, including pollinator-friendly, when seeding road rights-of-way viii. promote adjustments in the timing and frequency of mowing along rights-of-way to minimize impacts to wildlife
4.2 Utility & Service Lines	a) fragmentation of grassland by utility and service lines b) disturbance associated with development of utility and service lines can proliferate noxious/invasive weeds c) inadequate reclamation d) intensification and accumulation of infrastructure e) reduced management and flexibility in easement rights-of-way f) direct mortality of wildlife species, particularly birds, by collision or electrocution g) wildlife displacement from tall structures	i. consolidation corridors ii. encourage buried lines when feasible iii. urge ecologically responsible ordinances and suitable reclamation standards iv. engage in early consultation with the siting of utility and service lines v. reasonable timing restrictions for construction vi. require line marking devices vii. use avian protection plans or guidance documents to minimize bird/powerline interactions viii. use native local ecotype seed, including pollinator-friendly, when reseeding easement rights-of-way
5. BIOLOGICAL RESOURCE USE		
5.1 Hunting & Collecting Terrestrial Animals	a) anthropogenic disturbance to grassland associated wildlife, e.g. off-road travel, dog training during nesting season and brood rearing period b) disturbance/movement can proliferate noxious/invasive weeds c) wildlife value or changing public attitudes towards wildlife, promoting the introduction of nonnative species for hunting d) insufficient regulations for collection or harvest of certain wildlife, e.g. reptiles and amphibians e) poaching	i. urge ecologically responsible ordinances ii. increase enforcement and deterrents iii. reevaluate or develop regulations pertaining to collection or harvest of certain wildlife, e.g. reptiles and amphibians iv. public education and outreach v. encourage appropriate management of native grasslands vi. amend dog training laws and regulations to minimize impacts to wildlife during sensitive life cycle periods

CLASSIFICATION	THREAT TO GRASSLAND	CONSERVATION ACTION
	f) supplemental feeding g) conversion of native grassland to facilitate hunting desires, e.g. converting native to dense nesting cover, trees, food plots, and improper herbicide use h) lead ammunition impacts to non-target wildlife	vii. encourage non-toxic ammunition use
5.2 Gathering Terrestrial Plants	a) unregulated collection of edible/medicinal plants for commercial use/sale b) spreading invasive species	i. increase enforcement and deterrents ii. public education and outreach
5.3 Logging & Wood Harvest	a) not a threat	i. use as management tool to restore grassland
5.4 Fishing & Harvesting Aquatic Resources	a) anthropogenic disturbance to grassland associated wildlife, e.g. off-road travel b) disturbance/movement can proliferate noxious/invasive weeds c) poaching	i. urge ecologically responsible ordinances ii. increase enforcement and deterrents iii. public education and outreach
6. HUMAN INTRUSIONS & DISTURBANCE		
6.1 Recreational Activities	a) damage to grassland habitat from off-road vehicles and trail establishment/fragmentation b) anthropogenic disturbance to grassland associated wildlife, e.g. off-road travel, geocaching, paintball, unauthorized camping c) littering d) proliferate noxious/invasive weeds e) potential for wildfires, either accidental or from negligent actions f) discouraging proper management of grasslands	i. restrict or eliminate off-road vehicle use in environmentally sensitive areas ii. engage in early consultation with the siting of recreational areas iii. urge ecologically responsible ordinances iv. increase enforcement, deterrents and fines v. public education and outreach vi. promote equipment and off-road vehicle hygiene to prevent the spread of noxious weeds
6.2 Military Exercises	a) anthropogenic disturbance to grassland associated wildlife	i. support responsible processes
6.3 Work & Other Activities	a) anthropogenic disturbance to grassland associated wildlife	i. urge ecologically responsible ordinances
7. NATURAL SYSTEMS MODIFICATIONS		
7.1 Fire & Fire Suppression	a) fire suppression results in woody encroachment, succession, loss of native diversity, and increase in wildfire risk or severity due to increased fuel loads b) lack of funding for fire management c) public resistance to use of prescribed fire/controlled burns d) insufficient awareness regarding the advantages of prescribed fire/controlled burns	i. offer incentives and programs to implement prescribed fire/controlled burns ii. support fire coalitions and cooperative ventures iii. obtain funding for fire management programs, staff and training iv. involve and educate rural or local fire departments v. develop fire management plans vi. public education and outreach vii. support pro-prescribed fire strategies viii. encourage post-fire reclamation
7.2 Dams & Water Management/ Use	a) conversion of grassland to impoundment b) may proliferate concentration of salts, heavy metals, etc.	i. offer incentives and programs for alternative water sources, e.g. wells, portable water ii. reclaim deteriorating dams and dugouts

CLASSIFICATION	THREAT TO GRASSLAND	CONSERVATION ACTION
	c) addition of water may proliferate the spread of West Nile virus and other diseases to grassland associated wildlife d) inappropriate movement of water as water management e) change in water infiltration rates f) tile and surface drainage g) hydrological impacts from irrigation and ditching h) degradation of grasslands from livestock congregation at dams and impoundments	iii. education about dynamic water systems and water management iv. incentivize buffers/exclusion zones
7.3 Other Ecosystem Modification	a) loss of pollinators b) loss of native plant diversity c) diminishing soil health, e.g. compaction and loss of water infiltration d) changes in water systems e) loss of genetics for both plants and wildlife f) noxious weeds and invasive plants g) improper use of herbicides h) improper placement of woody vegetation	i. promote diversity ii. plant diverse grass and forb mixes and pollinator plantings iii. promote soil health iv. ecosystem education and awareness v. follow/implement best management practices for timing and frequency of mowing vi. follow/implement best management practices for windbreaks or woody plantings
7.4 Removing / Reducing Human Maintenance	a) loss of indigenous peoples management regimes, e.g. loss of fires set by indigenous peoples	i. include indigenous peoples culture and values
8. INVASIVE & PROBLEMATIC SPECIES, PATHOGENS & GENES		
8.1 Invasive Non-Native / Alien Plants & Animals	a) spread and proliferation of invasive or detrimental plants, e.g. Kentucky bluegrass, smooth brome b) spread and proliferation of noxious weeds c) spread and proliferation of invasive woody vegetation d) feral and free-roaming domestic animals e) hybridization concern	i. removal or reduction of invasive or detrimental plants using grazing, fire, chemical and mechanical treatments ii. removal or reduction of noxious weeds using grazing, fire, chemical, mechanical and biological treatments iii. prohibit or disincentive new seeding of invasive or detrimental plants, particularly Kentucky bluegrass and smooth brome iv. incentivize native plant seeding v. develop recommended plant lists and sources of local ecotype seed vi. engage the horticultural industry to educate and promote recommended plants and reduce the use of problematic invasive or detrimental plants vii. public education and outreach viii. support programs and initiatives to reduce or remove feral animals from native habitat ix. encourage pet owners to keep animals indoors, in an outdoor enclosure, or on a leash, to protect both the welfare of the animal and wildlife x. research control or reduction of invasive plants xi. incentivize and promote adaptive management or climate informed approach xii. engage in climate adaptation strategies

CLASSIFICATION	THREAT TO GRASSLAND	CONSERVATION ACTION
8.2 Problematic Native Species	a) spread and proliferation of native woody vegetation, e.g. Eastern red cedar, Rocky Mountain juniper, aspen and Western snowberry b) grasshoppers	i. removal or reduction of undesirable native plants using grazing, fire, chemical and mechanical treatments ii. develop programs and incentives for woody invasive management, including outreach and education programs iii. promote natural control iv. public education and outreach v. consider climate adaptation in woody species management
8.3 Introduced Genetic Material	a) genetically modified plants enable the use of a broad range of pesticides and herbicides b) increase of herbicide resistant plants c) risk of loss of genetics with plants and wildlife d) neonicotinoid effects on non-target organisms	i. promote pragmatic use of herbicides and pesticides
8.4 Pathogens & Microbes		
9. POLLUTION		
9.1 Domestic & Urban Waste Water	a) pipeline leaks b) inappropriate disposal of untreated sewage c) non-point runoff from housing and urban areas, e.g. fertilizer and pesticides from lawns and golf courses	i. require pipeline warning system for leak detection ii. improve reporting and disclosure of incidents iii. increase enforcement and deterrents iv. public education and outreach
9.2 Industrial & Military Effluents	a) pipeline leaks, e.g. oil and brine water b) oil and brine water spills at production or exploration facilities c) oil and brine water spills during transportation d) inappropriate disposal of brine water e) inappropriate disposal of radioactive waste f) coal mining and coal-fired power plant waste seepages	i. require pipeline warning system for leak detection ii. require check valves to contain oil in pipeline in the event of a pipeline rupture iii. improve reporting and disclosure of incidents iv. quantify the magnitude of incidents, full disclosure of environmental impact v. increase enforcement, deterrents and fines vi. support policies to update deteriorating infrastructure
9.3 Agriculture & Forestry Effluents	a) fertilizer and pesticide runoff from cropland b) runoff from improperly designed or sited feedlots	i. require warning system for waste leakage detection ii. require full containment feedlot runoff control system iii. improve reporting and disclosure of incidents iv. quantify the magnitude of incidents, full disclosure of environmental impact v. increase enforcement, deterrents and fines
9.4 Garbage & Solid Waste	a) illegal waste sites b) litter	i. improve reporting and disclosure of incidents ii. increase enforcement, deterrents and fines
9.5 Air-borne Pollutants	a) dust, e.g. from increased traffic on gravel roads, mines or quarries, coal-fired power plants, b) pesticide or herbicide drift c) hydrogen sulfide d) excess carbon dioxide e) wind dispersion of nutrients, pollution, or sediments f) wildfire smoke	i. require warning system for air-borne pollutant detection ii. quantify the magnitude of incidents, full disclosure of environmental impact iii. increase enforcement, deterrents and fines iv. promote carbon credits

CLASSIFICATION	THREAT TO GRASSLAND	CONSERVATION ACTION
9.6 Excess Energy	a) light and thermal pollution causing disturbance to grassland associated wildlife, e.g. from natural gas flaring or urban areas b) noise pollution, e.g. from increased traffic, work sites c) data center disturbance to wildlife, e.g., noise, heat	i. improve reporting and disclosure of incidents ii. quantify the magnitude of incidents, full disclosure of environmental impact iii. increase enforcement, deterrents and fines
10. GEOLOGICAL EVENTS		
10.3 Avalanches / Landslides	a) land sloughing	i. offer incentives or programs for sensitive or susceptible land
11. CLIMATE CHANGE		
11.1 Ecosystem Encroachment	a) changes in species composition b) changes in phenology c) changes in species life cycle requirements d) timing and intensity of weather events	i. alter management plans to adapt to predicted changes ii. provide habitat connectivity to ease species shifts iii. research predicted changes and potential impacts iv. monitor effect of changes v. some change is natural, dynamic landscape
11.2 Changes Geochemical Regimes		
11.3 Changes Temperature Regimes	a) proliferates invasive plants (see Case Study 2) b) limits management actions (see Casey Study 2) c) loss of wildlife or plant production (see Case Study 1) d) increased mortality of wildlife	i. establish grassbanks between state/federal/non-governmental land and private ranches ii. promotion of cover crops and soil health
11.4 Changes Precipitation & Hydrological Regimes	a) proliferates invasive plants (see Case Study 2) b) limits management actions (see Case Study 2) c) loss of wildlife or plant production (see Case Study 1)	i. establish grassbanks between state/federal/non-governmental land and private ranches ii. promotion of cover crops and soil health
11.5 Severe / Extreme Weather Events	a) siltation, sedimentation and erosion b) proliferate invasive plants	i. offer incentives and programs to protect, enhance, and restore grasslands ii. incentivize buffers
12. OTHER		
12.1 Human Dimensions	a) social apathy of the value of healthy grasslands and ecosystem services they provide b) lack of knowledge of grassland ecosystem c) view of grasslands as being of no significance, e.g. “wasteland” d) public misconception that livestock are bad for the environment	i. increase awareness, understanding, and appreciation of the grassland ecosystem and ecosystem services ii. public education and outreach iii. support grassland coalitions iv. provide demonstration sites v. incorporate grassland education into K-12 classrooms vi. human dimension research/surveys

CLIMATE ADAPTATION CASE STUDY

Case Study 2: Managing Invasive Grasses in Native Temperate Prairies

Land conversion continues to reduce the already greatly diminished extent of grassland in North Dakota and other Great Plains states[1]. Grassland ecosystems, which support sensitive wildlife including Dakota skipper (*Hesperia dacotae*), Sprague's pipit (*Anthus spragueii),* and plains hog-nosed snake (*Heterodon nasicus*), are also being reshaped by the extensive spread of invasive plant species[2]. Repeated prescribed fire is a crucial management tool for controlling invasive vegetation, such as smooth brome (*Bromus inermis* Leyss.) and Kentucky bluegrass (*Poa pratensis* L.), in North Dakota grasslands[3]. By strategically burning at times of the year when cool-season invasives are growing and warm-season natives are largely dormant, prescribed fire can reduce existing invasions or prevent new incursions[4]. The effectiveness of this management tool can be sensitive to the vegetation composition, seasonal variability, and antecedent conditions[4]; changing climate conditions may further modify the effectiveness and use of this approach:

1) Action Effectiveness: Warming climate brings earlier springs and, when moisture is sufficient, extends plant growth later into the fall[5]; plant and animal adjustments to these changes are species-specific and not always predictable[6]. If active growth periods of natives and invasives become more overlapping, prescribed fire will become less effective (Figure 1B). In contrast, if growth periods become more separated, prescribed fire's effectiveness for controlling invasives would presumably increase (Figure 1C). However, species-specific shifts in wildlife phenology may also complicate the use of prescribed fire; for example fire is often avoided during vulnerable parts of the breeding season for some ground nesting birds[7]. Moreover, warming climate may bring new invasive species with growth patterns that overlap natives' to the region[8,9] (Figure 1D).

2) Logistics and Social Support: Warming temperature and changing seasonality may limit the times when prescribed fire can be implemented safely, making this management tool more logistically challenging[10]. Disconnect between the windows when prescribed fire is allowed and feasible and when fire is most effective will also likely limit use[7]. There are already negative perceptions concerning fire in the region[11], which may be exacerbated by increasing fire potential overall in the region[5], resulting in prescribed fire being a less socially feasible management option.

How might management adapt to these changes?

- Future research is needed to examine how the timing of phenological events for invasive grasses, native grasses, and wildlife will coincide with current and future windows of feasible prescribed fire. If prescribed fire is no longer a feasible option in the future, other actions such as targeted grazing or haying may need to be considered.

- Rigid prescriptions of management may not meet management goals in a changing climate[10]. Instead, management plans that accommodate shifting prescribed fire seasons may be more

effective. Further, adjusting seasons or timing of fire may require changes to funding and hiring cycles to allow for more flexible resources.

- With the uncertainty inherent in the changing climate and species' responses, it is crucial to evaluate the effectiveness of both current and new management approaches. Adaptive management approaches, such as the Native Prairie Adaptive Management program[12], incorporates rigorous monitoring, modeling, and feedbacks between model output and future management actions to determine the most effective management approach.

- Early detection of and rapid response to new invasives may reduce future management challenges[8].

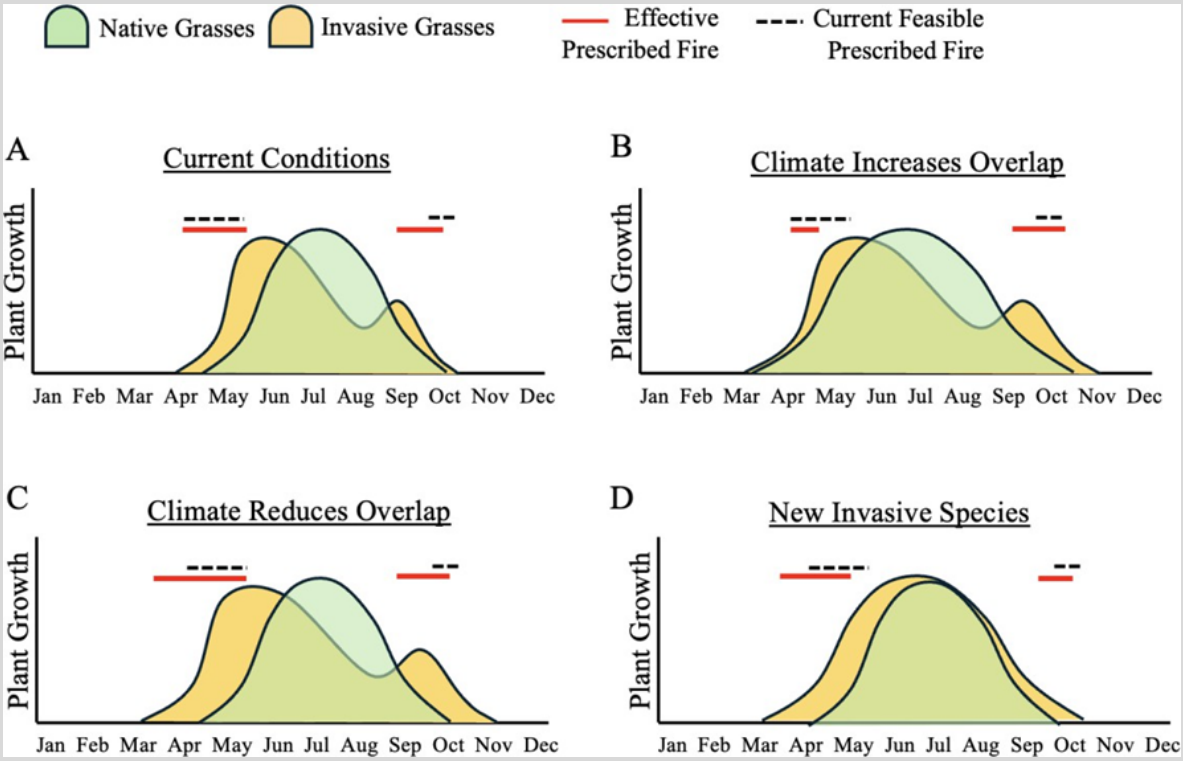


Figure 1. Changing climate conditions will alter the time of the year at which prescribed fire is both feasible and effective. In current conditions (A) prescribed fire can be both effective and feasible in the early spring and mid-fall. If climate change increases the phenological overlap between native and invasive grasses (B), the time window for effective prescribed fire will be reduced. If climate change reduces the phenological overlap between native and invasive grasses (C), the time window for effective fire will be increased relative to current conditions. A new invasive species, such as a warm-season grass shown here, could also change the seasonal effectiveness of prescribed fire for promoting native vegetation (D). For simplicity, the window of time for effective prescribed fire (red solid line) shifts across these four scenarios but the time window for current feasible fire (black dashed line) does not vary. However, in North Dakota the number of days for conducting prescribed fire has decreased in the spring and increased in the early fall since the 2000s.[10]. Figures are conceptual; they do not depict quantitative values.

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WETLANDS AND LAKES THREATS AND ACTIONS

Table 30. Direct threats and conservation actions for wetlands and lakes.
Threats and actions are not listed in order of priority.

CLASSIFICATION	THREAT TO WETLANDS AND LAKES	CONSERVATION ACTION
1. RESIDENTIAL & COMMERCIAL DEVELOPMENT		
1.1 Housing & Urban Areas	a) conversion of wetlands to urban development b) loss of federal jurisdiction of wetlands (i.e. Section 404) c) vegetation planted for ornamental purposes can invade adjacent wetlands d) mowing of adjacent wetland vegetation for ornamental grooming e) pesticide/herbicide application and drift impacts adjacent plant/wildlife species composition f) loss of grazing and burning of grasslands near urban and recreational areas g) predation of wetland wildlife by domestic animals near urban areas h) modification of wetland basins within urban areas to create lakes	i. offer incentives and programs to protect, enhance, and restore wetlands ii. develop or support programs, initiatives and statutory language that strengthen the efficacy of conservation measures iii. avoid and minimize impacts to wetlands; mitigate unavoidable impacts iv. work with partners to develop ecologically responsible urban planning and zoning v. work with partners to develop ecologically responsible urban and county policies vi. public education and outreach for native landscaping and management vii. increase awareness, understanding, and appreciation of the wetland ecosystem viii. promote responsible and conscientious use of pesticides
1.2 Commercial & Industrial Areas	a) conversion of wetlands to commercial and industrial development b) loss of federal jurisdiction of wetlands (i.e. Section 404) c) disturbance associated with development can proliferate noxious/invasive weeds	i. develop or support programs, initiatives and statutory language that strengthen the efficacy of conservation measures ii. avoid and minimize impacts to wetlands; mitigate unavoidable impacts iii. work with partners to develop ecologically responsible urban planning and zoning iv. work with partners to develop ecologically responsible ordinances and suitable reclamation standards v. education and outreach for native landscaping and management
1.3 Tourism & Recreational Areas	a) expanding lake cabin developments b) disturbance associated with recreation development can disperse noxious/invasive weeds c) pesticide application and drift impacts adjacent plant/wildlife species composition d) unrestrained domestic animals can harass wildlife e) improper management of wetlands within recreational areas	i. urge ecologically responsible ordinances ii. public education and outreach for native landscaping and management iii. encourage appropriate management of wetlands iv. promote responsible and conscientious use of pesticides
2. AGRICULTURE		
2.1 Annual & Perennial Non-Timber Crops	a) conversion of wetlands to cropland development b) tile and surface drainage of wetlands	i. offer incentives and programs to protect, enhance, and restore wetlands

CLASSIFICATION	THREAT TO WETLANDS AND LAKES	CONSERVATION ACTION
	c) inappropriate drainage of wetlands onto neighboring properties d) displacement of wetland wildlife during conversion process e) pesticide application and drift impacts on adjacent plant/wildlife species composition f) increase in soil erosion and sedimentation into wetlands from lack of residual cover on cropland g) impacts to water table and water infiltration rates h) salinization of land that has been converted to cropland i) increase of pesticides and herbicides with new crop development j) increase of noxious weeds and invasive plants when wetlands are disturbed k) regulations or incentives that support the conversion of wetlands to cropland development	ii. use a targeted approach to protect, enhance, and restore the most vulnerable wetlands and/or those of high ecological value and connectivity iii. development of offsets for marginal cropland/wetlands iv. develop or support programs, initiatives and statutory language that strengthen the efficacy of conservation measures v. maintain and enforce Farm Bill regulatory provisions (i.e. swampbuster) vi. include isolated wetlands in Section 404 and offer incentives and programs to maintain, restore or enhance, including grassland buffers vii. offer incentives for wildlife friendly farming, tax-based or direct payments (e.g. cropped wetlands program) viii. flowage easements for downstream drainage ix. offer midterm conservation agreement for wetland management and protection x. support demo projects and best management practices, public outreach and education for wetlands xi. explore new techniques to address impacts to water table xii. promotion of cover crops and soil health xiii. promote responsible and conscientious use of pesticides xiv. promote equal risk management for grassland-based agriculture, to keep grassland and wetland complexes intact xv. reduce bottlenecks to public participation in compliance (regional rules)
2.3 Livestock Farming & Ranching	a) heavy grazing in and around wetlands resulting in total loss of aquatic plants b) disturbance, erosion, and decline in soil health in high livestock traffic areas c) shift from ranching (pro-grass) lifestyle to confined animal feeding operations d) inappropriate fencing (i.e. not wildlife-friendly) e) regulations or incentives that support the conversion of wetlands f) public perception that livestock are bad for the climate and lack of knowledge on the importance of grasslands and wetlands for carbon sequestration and storage g) increase of noxious weeds and invasive plants from poor grazing management practices h) changing farm demographics resulting in shift from livestock ranching to crop production, loss of connection to the land, and loss of rural community lifestyle	i. offer incentives and programs to protect, enhance, and restore wetlands ii. encourage grazing as a grassland management tool for high resistance and resilience iii. develop or support programs, initiatives and statutory language that strengthen the efficacy of conservation measures iv. incentivize good grazing management v. promote and support regenerative grazing management, use best management practices or ecological site descriptions vi. support grazing lands coalitions and work with grass-based agriculture groups vii. promote equal risk management for grassland-based agriculture viii. use best management practices or ecological site descriptions ix. assessment of economic and ecological values of grasslands and associated wildlife, ecosystem services

CLASSIFICATION	THREAT TO WETLANDS AND LAKES	CONSERVATION ACTION
		x. promote carbon credits, biodiversity credits xi. encourage temporary or virtual fencing when possible, discourage fencing through wetlands xii. promote off-site watering systems for cattle xiii. promote responsible livestock practices that minimize disease spread (i.e. double fences, appropriate removal of carcasses, etc.) xiv. educate the public on the benefits of working grasslands and wetlands
3. ENERGY PRODUCTION & MINING		
3.1 Oil & Gas Drilling	a) conversion of wetlands to well pads, field or production facilities b) fragmentation of wetlands from well pads, field or production facilities, access roads c) dewatering wetlands and lakes for frack water d) disturbance associated with oil and gas development can proliferate noxious/invasive weeds e) loss of federal jurisdiction of wetlands (i.e. Section 404) f) inadequate or improper reclamation g) illegal dumping of materials and waste h) illegal filling of wetlands i) anthropogenic disturbance to wetland associated wildlife, e.g. dust, light and noise pollution j) social apathy to negative ecological impacts of oil and gas drilling k) governance apathy to negative ecological impacts of oil and gas drilling	i. well pad and facility consolidation, minimize footprint of development ii. engage in early consultation with the siting of well pads iii. avoid and minimize impacts to wetlands; mitigate unavoidable impacts iv. follow/implement best management practices v. incentivize companies for implementing ecologically sound development vi. urge ecologically responsible ordinances and suitable reclamation standards and foster relationships with oil companies to stimulate ecologically sound development vii. urge requirements to promptly reclaim dry or abandoned wells viii. enforce regulatory compliance and close loopholes which are used to delay or avoid reclamation ix. public education and outreach x. public disclosure of impacts/footprint xi. research the impacts of oil and gas drilling on wetlands and wildlife xii. explore novel alternatives to offset impacts of oil and gas development
3.2 Mining & Quarrying	a) conversion of wetlands to mines or quarries b) anthropogenic disturbance to wetland associated wildlife c) unregulated gravel pit management d) inadequate or improper reclamation e) creates wetlands that act as ecological sinks f) increase of noxious weeds and invasive plants when land is mined	i. minimize footprint of development ii. avoid and minimize impacts to wetlands; mitigate unavoidable impacts iii. suitable reclamation standards iv. promote or develop local and state ordinances v. delay or halt mining/quarrying for new metals or minerals until local ordinances have been approved
3.3 Renewable Energy	a) conversion of wetlands to alternative fuel crops b) fragmentation of wetland complexes by wind or solar facilities c) loss of federal jurisdiction of wetlands (i.e. Section 404) d) direct or indirect mortality of wildlife species from structures	i. offer incentives and programs to protect, enhance, and restore wetlands ii. incentivize companies for implementing ecologically sound development alongside carbon incentives iii. avoid and minimize impacts to wetlands; mitigate unavoidable impacts

CLASSIFICATION	THREAT TO WETLANDS AND LAKES	CONSERVATION ACTION
	e) altered wildlife migrations f) anthropogenic disturbance to grassland associated wildlife, e.g. dust, noise and light pollution displacement of wildlife	iv. urge ecologically responsible ordinances and suitable reclamation standards v. urge accountability for ecological impacts vi. minimize footprint of development vii. research and model to determine best areas for placement to minimize impacts to wildlife viii. use livestock to control weeds ix. establish pollinator-friendly plantings under solar arrays
4. TRANSPORTATION & SERVICE CORRIDORS		
4.1 Roads & Railroads	a) conversion of wetlands to roads and railroads b) fragmentation of wetland complexes by roads and railroads c) roads acting as dams d) anthropogenic disturbance to wetland associated wildlife, e.g. noise, dust e) proliferate noxious/invasive weeds f) road and railway incident secondary effects, e.g. spills and explosions, run-off g) improper herbicide uses in railroad rights-of-way h) road salt impacts to roadside plants and rights-of way	i. urge ecologically responsible ordinances and suitable reclamation standards ii. avoid and minimize impacts to wetlands; mitigate unavoidable impacts iii. appropriate road restrictions, including speed limits iv. reasonable timing restrictions for construction v. use pipelines versus trucking liquids and gas vi. use native local ecotype seed, including pollinator-friendly, when seeding road rights-of-way vii. promote wetland restoration and creation to minimize flooding impacts to roads/infrastructure
4.2 Utility & Service Lines	a) fragmentation of wetland complexes by utility and service lines b) disturbance associated with development of utility and service lines can proliferate noxious/invasive weeds c) inadequate reclamation d) intensification and accumulation of infrastructure e) direct mortality of wildlife species, particularly birds, by collision or electrocution	i. consolidate corridors ii. encourage buried lines when feasible iii. urge ecologically responsible ordinances and suitable reclamation standards iv. engage in early consultation with the siting of utility and service lines v. avoid and minimize impacts to wetlands; mitigate unavoidable impacts vi. reasonable timing restrictions for construction vii. require line marking devices viii. use avian protection plans or guidance documents to minimize bird/powerline interactions ix. use native local ecotype seed, including pollinator-friendly, when reseeding easement rights-of-way
5. BIOLOGICAL RESOURCE USE		
5.1 Hunting & Collecting Terrestrial Animals	a) anthropogenic disturbance to wetland associated wildlife, e.g. off-road travel, dog training during nesting season and brood rearing period b) disturbance/movement can proliferate noxious/invasive weeds c) insufficient regulations for collection or harvest of certain wildlife, e.g. reptiles and amphibians d) poaching e) lead ammunition impacts to non-target wildlife	i. urge ecologically responsible ordinances ii. increase enforcement and deterrents iii. public education and outreach iv. reevaluate or develop regulations pertaining to collection or harvest of certain wildlife, e.g. reptiles and amphibians v. amend dog training laws and regulations to minimize impacts to wildlife during sensitive life cycle periods vi. encourage non-toxic ammunition use

CLASSIFICATION	THREAT TO WETLANDS AND LAKES	CONSERVATION ACTION
5.4 Fishing & Harvesting Aquatic Resources	a) anthropogenic disturbance to wetland associated wildlife, e.g. off-road travel b) disturbance/movement can proliferate noxious/invasive weeds c) wildlife value orientations or changing public attitudes towards wildlife, e.g. stimulate illegal fishing/collection of aquatic species, or promote the introduction of nonnative species for fishing d) insufficient regulations for collection or harvest of certain wildlife, e.g. amphibians e) spread of aquatic nuisance species f) unregulated commercial take of aquatic resources g) poaching	i. urge ecologically responsible ordinances ii. increase enforcement, deterrents and fines iii. reevaluate laws pertaining to wetland associated wildlife iv. public education and outreach v. reevaluate or develop regulations pertaining to collection or harvest of certain wildlife, e.g. amphibians vi. follow aquatic nuisance species regulations and recommendations
6. HUMAN INTRUSIONS & DISTURBANCE		
6.1 Recreational Activities	a) damage to wetland habitat from off-road vehicles b) anthropogenic disturbance to wetland or lake associated wildlife, e.g. boating c) impacts to shoreline and submerged vegetation from wake boating d) littering e) spread of aquatic nuisance species	i. restrict or eliminate off-road vehicle use in environmentally sensitive areas ii. increase enforcement, deterrents and fines iii. public education and outreach iv. develop regulations for wake boat use v. follow aquatic nuisance species regulations and recommendations
6.2 Military Exercises	a) anthropogenic disturbance to wetland associated wildlife	i. support responsible processes
6.3 Work & Other Activities	a) anthropogenic disturbance to wetland associated wildlife	i. urge ecologically responsible ordinances
7. NATURAL SYSTEMS MODIFICATIONS		
7.1 Fire & Fire Suppression	a) fire suppression results in woody encroachment or cattail invasion b) public resistance to use of prescribed fire/controlled burns c) insufficient awareness regarding the advantages of prescribed fire/controlled burns d) improper timing or use of fire, e.g. burning wetlands in the fall for spring crop development e) insufficient awareness regarding the advantages of prescribed fire/controlled burns	i. offer incentives and programs to implement prescribed fire/controlled burns ii. public education and outreach iii. support pro-prescribed fire strategies i. research the effects of fire management ii. develop fire management plans iii. proper timing of prescribed fire/controlled burns
7.2 Dams & Water Management/ Use	a) conversion of natural wetland or other existing habitat to impoundment b) wetland consolidation c) impoundments may proliferate concentration of salts, heavy metals, etc. d) inappropriate movement of water as water management e) change in water infiltration rates f) hydrological impacts from irrigation and ditching	i. offer incentives and programs to protect, enhance, and restore wetlands ii. offer incentives and programs for alternative water sources, e.g. wells, portable water iii. reclaim deteriorating dams and dugouts iv. education about dynamic water systems and water management v. incentivize buffers/exclusion zones vi. exclude impoundments in ecologically sensitive or inappropriate areas

CLASSIFICATION	THREAT TO WETLANDS AND LAKES	CONSERVATION ACTION
	g) degradation of grasslands from livestock congregation at dams and impoundments	vii. monitor and research water quality viii. construct fish passages on existing dams
7.3 Other Ecosystem Modification	a) loss of hygrophyte diversity b) diminishing soil health, e.g. compaction and loss of water infiltration c) changes in water systems d) tile and surface drainage e) amplification of run-off events f) modification of watersheds g) channelization	i. promote wetland plant diversity ii. promote soil health iii. ecosystem education and awareness iv. research impacts of tile drainage on wetland ecosystems v. research and inventory aquatic invertebrates within diverse wetlands (stage and health)
7.4 Removing / Reducing Human Maintenance	a) loss of indigenous peoples management regimes	i. include indigenous peoples culture and values
8. INVASIVE & PROBLEMATIC SPECIES, PATHOGENS & GENES		
8.1 Invasive Non-Native / Alien Plants & Animals	a) spread and proliferation of invasive or detrimental plants, e.g. hybrid cattail b) spread and proliferation of noxious weeds c) spread and proliferation of invasive woody vegetation d) aquatic nuisance species e) feral and free-roaming domestic animals f) fish stocking	i. removal or reduction of invasive or detrimental plants using grazing, fire, chemical and mechanical treatments ii. removal or reduction of noxious weeds using grazing, fire, chemical, mechanical and biological treatments iii. develop recommended plant lists and sources of local ecotype seed iv. engage the horticultural industry to educate and promote recommended plants and reduce the use of problematic invasive or detrimental plants v. public education and outreach vi. support programs and initiatives to reduce or remove feral animals from native habitat vii. encourage pet owners to keep animals indoors, in an outdoor enclosure, or on a leash, to protect both the welfare of the animal and wildlife viii. research control or reduction of invasive plants ix. evaluate impacts of fish stocking, decrease rates or do not stock fish in ecologically sensitive wetlands x. follow aquatic nuisance species regulations and recommendations
8.2 Problematic Native Species	a) Spread and proliferation of reed canarygrass	i. removal or reduction of undesirable native plants using grazing, fire, chemical and mechanical treatments
8.3 Introduced Genetic Material	a) genetically modified plants enable the use of a broad range of pesticides and herbicides b) increase of herbicide resistant plants c) neonicotinoid effects on non-target organisms	i. promote pragmatic use of herbicides and pesticides
8.4 Pathogens & Microbes		
9. POLLUTION		

CLASSIFICATION	THREAT TO WETLANDS AND LAKES	CONSERVATION ACTION
9.1 Domestic & Urban Waste Water	a) pipeline leaks b) inappropriate disposal of untreated sewage c) septic system drainage into wetlands and lakes d) non-point runoff from housing and urban areas, e.g. fertilizer and pesticides from lawns and golf courses	i. require pipeline warning system for leak detection ii. improve reporting and disclosure of incidents iii. increase enforcement and deterrents iv. encourage building setback, no structures within 100 feet (minimum) of wetland or lake v. require septic setback, or lagoon septic systems vi. incentivize wetland buffers vii. discourage fertilizer use
9.2 Industrial & Military Effluents	a) pipeline leaks, e.g. oil and brine water b) oil and brine water spills at production or exploration facilities c) oil and brine water spills during transportation d) inappropriate disposal of brine water e) inappropriate disposal of radioactive waste f) coal mining and coal-fired power plant waste seepages g) nonpoint runoff from military bases	i. require pipeline warning system for leak detection ii. require check valves to contain oil in pipeline in the event of a pipeline rupture iii. improve reporting and disclosure of incidents iv. quantify the magnitude of incidents, full disclosure of environmental impact v. increase enforcement, deterrents and fines
9.3 Agriculture & Forestry Effluents	a) fertilizer and pesticide runoff from cropland b) runoff from improperly designed or sited feedlots c) livestock excrement and urine, point source pollution d) tile drainage, nonpoint source pollution	i. require warning system for waste leakage detection ii. require full containment feedlot runoff control system iii. improve reporting and disclosure of incidents iv. quantify the magnitude of incidents, full disclosure of environmental impact v. promote and support regenerative grazing vi. increase enforcement, deterrents and fines vii. follow/implement best management practices
9.4 Garbage & Solid Waste	a) illegal waste sites b) litter	i. improve reporting and disclosure of incidents ii. increase enforcement, deterrents and fines
9.5 Air-borne Pollutants	a) dust, e.g. from increased traffic on gravel roads, mines or quarries, coal-fired power plants, b) pesticide or herbicide drift c) hydrogen sulfide d) excess carbon dioxide, released during wetland tillage e) wind dispersion of nutrients, pollution, or sediments f) mercury contamination from wildfire smoke	i. require warning system for air-borne pollutant detection ii. quantify the magnitude of incidents, full disclosure of environmental impact iii. increase enforcement, deterrents and fines iv. promote carbon credits
9.6 Excess Energy	a) light and thermal pollution causing disturbance to grassland associated wildlife, e.g. from natural gas flaring or urban areas b) noise pollution, e.g. from increased traffic, work sites c) data center disturbance to wildlife, e.g., noise, heat	i. improve reporting and disclosure of incidents ii. quantify the magnitude of incidents, full disclosure of environmental impact iii. increase enforcement, deterrents and fines
10. GEOLOGICAL EVENTS		
10.3 Avalanches / Landslides	a) land sloughing	i. offer incentives or programs for sensitive or susceptible land ii. incentive wetland buffers

CLASSIFICATION	THREAT TO WETLANDS AND LAKES	CONSERVATION ACTION
11. CLIMATE CHANGE		
11.1 Ecosystem Encroachment	a) changes in species composition b) changes in phenology c) changes in species life cycle requirements d) timing and intensity of weather events	i. alter management plans to adapt to predicted changes ii. provide habitat connectivity to ease species shifts iii. research predicted changes and potential impacts iv. monitor effect of changes v. some change is natural, dynamic landscape
11.2 Changes Geochemical Regimes		
11.3 Changes Temperature Regimes	a) proliferates invasive plants b) limits management actions c) loss of wildlife or plant production d) increased mortality of wildlife e) transition of wetlands to lakes (see Case Study 3)	i. offer incentives and programs to protect, enhance, and restore wetlands
11.4 Changes Precipitation & Hydrological Regimes	a) proliferates invasive plants b) increase duration and frequency c) changes to wet/dry cycle d) transition of wetlands to lakes (see Case Study 3)	i. alter management plans
11.5 Severe / Extreme Weather Events	a) siltation, sedimentation and erosion b) proliferate invasive plants c) consolidation of wetlands from flooding or prolonged wet periods	i. offer incentives and programs to protect, enhance, and restore wetlands ii. incentivize buffers
12. OTHER		
12.1 Human Dimensions	a) social apathy of the value of healthy wetlands and ecosystem services b) lack of knowledge of wetlands ecosystem c) view of wetlands as being of no significance, e.g. “wasteland” d) public misconception that livestock are bad for the environment	i. increase awareness, understanding, and appreciation of the wetland ecosystem and ecosystem services ii. public education and outreach iii. provide demonstration sites iv. incorporate wetland education into K-12 classrooms v. human dimension research/surveys

CLIMATE ADAPTATION CASE STUDY

Case Study 3: Climate and land use changes are turning wetlands into large lakes, with consequences for ducks and North Dakota infrastructure

Wetlands in North Dakota occur on continuums of both size and hydroperiod, or the duration they hold water, ranging from small temporary wetlands to large permanent wetlands (Figure 1). Changes in land use practices, climate, and weather are shifting the size and hydroperiod of some wetlands. These changes may have large effects on wildlife dependent on wetland habitat, including ducks.

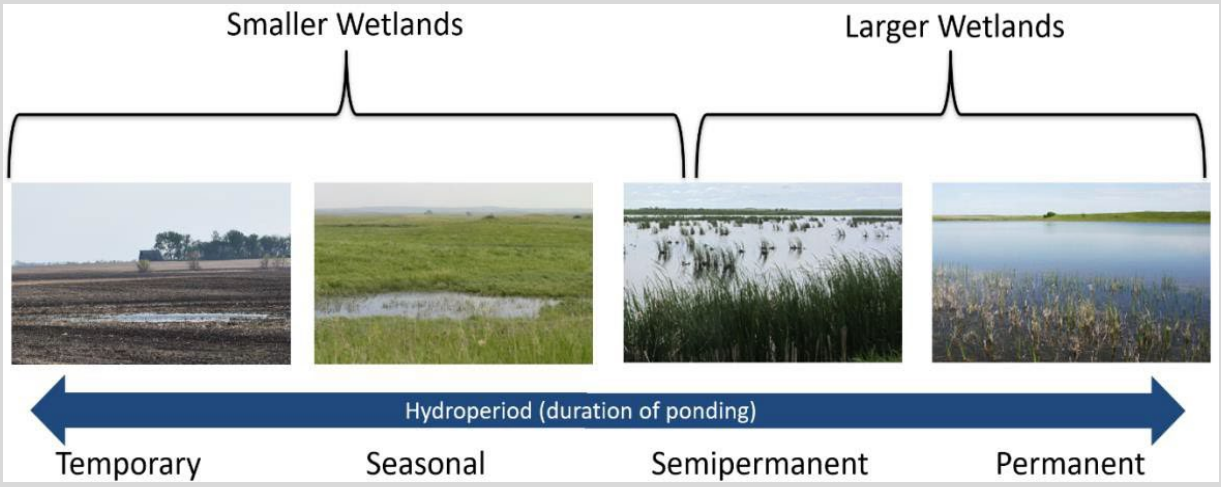

Figure 1. *Examples of wetlands of North Dakota arranged on a continuum of hydroperiod (duration it holds water) and general size. Photographs by the U.S. Geological Survey.*

Not all wetlands are changing the same way. Most temporary and seasonal wetlands that are unmodified by direct drainage have maintained similar hydroperiods through time, i.e., they typically still dry up annually[1-3]. However, larger semipermanent and permanent wetlands are transitioning into larger and more interconnected lakes[4-6]. These historically semipermanent wetlands that have shifted to lakes are generally not being replaced by shifts in smaller wetlands, resulting in losses to this important wetland class. Both changes in climate and land use, as well as their interactive effects, appear to be contributing to this loss of semipermanent wetlands.

Climate Drivers: The climate has shifted to a wetter period in North Dakota, evident since the early 1990s[7]. This wetter period has resulted in more surface water runoff into wetlands. Precipitation patterns are also shifting to more intense rainfall events during the summer[8]; intense rainfall contributes more to runoff than less intense events. As wetlands fill in response to increased precipitation, larger wetland basins are disproportionately influenced relative to smaller wetland basins.

Land-use Drivers: There has been an increase in tilled agricultural landcover throughout North Dakota[9], and tilled agricultural land generates greater precipitation runoff than grasslands[10-12]. Additionally, consolidation drainage, the practice of draining smaller wetlands into larger wetlands has driven increases in the water levels and extent of semipermanent and permanent wetlands in North Dakota[4,5].

Additive and interacting factors: Increasing magnitude and intensity of rainfall, runoff on agricultural land, and consolidation drainage all combine to have profound additive and perhaps synergistic effects that accelerate the conversion of semipermanent and permanent wetlands into large lakes that eventually have stable water levels and are often interconnected with other waterbodies[5,6,13].

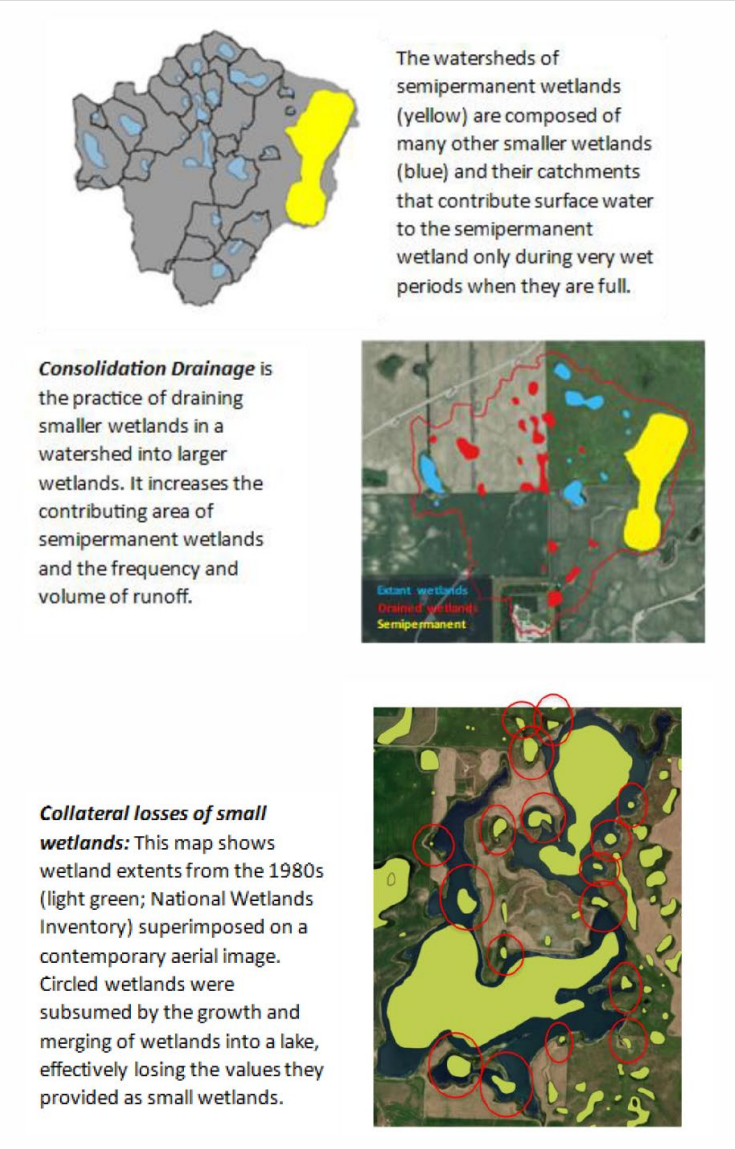

Figure 2. Example processes by which wetlands may be changing. Photographs by the U.S. Geological Survey.

Implications for ducks: Semipermanent wetlands provide critical habitat for ducks during mid to late summer for brood rearing and feather molt for adults after smaller wetlands dry up. Within semipermanent wetlands, deep marsh habitats with submerged aquatic vegetation provides abundant invertebrate forage for ducks, while interspersed emergent vegetation provides security. When semipermanent wetlands become interconnected lakes, they have less aquatic vegetation and provide fewer invertebrate foods and less security for ducks and their broods. Additionally, interconnected

lakes often have fish which further degrades their utility for ducks. Without semipermanent wetlands on the North Dakota landscape the state would produce far fewer ducks.

Implications for North Dakota infrastructure: When wetlands increase in size, they often flood homes, farmsteads, businesses, roads, and railways. Moreover, the issues scale up over higher- order watersheds, because when water levels of a wetland reach their spill point, they shed more water to the higher-level watersheds[5,13]. This spillover magnifies flooding issues on the larger landscape and likely contributes to flooding of Devils Lake and the Missouri and Red Rivers. Such flooding has significant economic consequences. For example, Federal and state transportation department have spent hundreds of millions of dollars in North Dakota to raise roads, including around Devils Lake.

Conservation options: While both climate and land use changes are impacting wetlands, it is likely that coordinated watershed-scale conservation activities can mitigate the water level increases from climate change[6]. However, more research is needed to better understand the relative benefits of grassland protection or restoration versus restoring wetlands within semipermanent wetland watersheds. For example, better information on the relative rate and magnitude of effects of changing landscape conditions across different watersheds could help to inform where an approach of resisting the loss of semipermanent wetlands may be possible, and where the impacts are great enough for resistance to be impractical so that an approach of accepting or even directing some areas to shift to interconnected lakes may be appropriate. Such a science-based approach to decision making could support land use decisions that affect agriculture, wildlife habitats, native and economically important sport fisheries, and transportation infrastructure.

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RIVERS, STREAMS AND RIPARIAN THREATS AND ACTIONS

Table 31. Direct threats and conservation actions for rivers, streams and riparian.
Threats and actions are not listed in order of priority.

CLASSIFICATION	THREAT TO RIVERS, STREAMS & RIPARIAN	CONSERVATION ACTION
1. RESIDENTIAL & COMMERCIAL DEVELOPMENT		
1.1 Housing & Urban Areas	a) conversion of riparian to urban development b) streambank and shoreline stabilization c) channelization d) vegetation planted for ornamental purposes can invade adjacent wetlands e) mowing of aquatic or riparian vegetation for ornamental grooming f) pesticide/herbicide application and drift impacts adjacent plant/wildlife species composition g) predation of wetland wildlife by domestic animals near urban areas h) increased or altered runoff due to non-porous surface increases	i. offer incentives and programs to protect, enhance, and restore rivers, streams and riparian ii. develop or support programs, initiatives and statutory language that strengthen the efficacy of conservation measures iii. avoid and minimize impacts to aquatic systems; mitigate unavoidable impacts iv. implement soil bioengineering for streambank and shoreline stabilization v. work with partners to develop ecologically responsible urban planning and zoning policies vi. public education and outreach for native landscaping and management vii. increase awareness, understanding, and appreciation of the river or stream ecosystem viii. promote responsible and conscientious use of pesticides
1.2 Commercial & Industrial Areas	a) conversion of riparian to commercial and industrial development b) streambank and shoreline stabilization c) channelization d) water withdrawal and entrapment and impingement e) potential for spills	i. avoid and minimize impacts to aquatic systems; mitigate unavoidable impacts ii. implement soil bioengineering for streambank and shoreline stabilization iii. protection of instream flows iv. implement entrainment and impingement reduction recommendations, best management practices v. work with partners to develop ecologically responsible urban planning and zoning vi. work with partners to develop ecologically responsible ordinances and suitable reclamation standards vii. maintain appropriate water management
1.3 Tourism & Recreational Areas	a) expanding cabin developments b) dock/marina development c) disturbance associated with recreation development can disperse noxious/invasive weeds d) increased chemical or pesticide application and drift impacts adjacent plant/wildlife species composition e) unrestrained domestic animals can harass wildlife	i. urge ecologically responsible ordinances ii. promote responsible and conscientious use of pesticides
2. AGRICULTURE		

CLASSIFICATION	THREAT TO RIVERS, STREAMS & RIPARIAN	CONSERVATION ACTION
2.1 Annual & Perennial Non-Timber Crops	a) conversion of riparian to cropland development b) displacement of riparian associated wildlife during conversion process c) channelization and dredging d) pesticide application and drift impacts on adjacent plant/wildlife species composition e) increase in soil erosion and sedimentation into wetlands from lack of residual cover on cropland f) impacts to water table and water infiltration rates g) water withdrawal for irrigation and entrapment and impingement h) tile drainage, wetland loss and altered hydrology i) increase of noxious weeds and invasive plants when riparian areas are disturbed	i. offer incentives and programs to protect, enhance, and restore rivers, streams and riparian, and uplands, i.e. grasslands and wetlands ii. develop or support programs, initiatives and statutory language that strengthen the efficacy of conservation measures iii. protection of instream flows iv. maintain and enforce Farm Bill regulatory provisions v. offer incentives for aquatic friendly farming, tax-based or direct payments vi. offer midterm conservation agreements for riparian management and protection vii. support demo projects and best management practices, including public outreach and education on ecosystem services that riparian systems provide viii. explore new techniques to address impacts to water table ix. promotion of cover crops and soil health x. implement entrainment and impingement reduction recommendations, best management practices xi. develop and implement watershed plans xii. use forestry best management practices for wooded riparian xiii. integrated pest management xiv. promote responsible and conscientious use of pesticides
2.3 Livestock Farming & Ranching	a) heavy grazing in and around rivers and streams resulting in total loss of aquatic or riparian vegetation b) disturbance, erosion, and decline in soil health in high livestock traffic areas c) shift from ranching (pro-grass) lifestyle to confined animal feeding operations d) pesticide runoff e) waste runoff f) inappropriate fencing (i.e. not wildlife-friendly) g) increase of noxious weeds and invasive plants from poor grazing management practices	i. offer incentives and programs to protect, enhance, and restore rivers, streams and riparian ii. develop or support programs, initiatives and statutory language that strengthen the efficacy of conservation measures iii. incentivize good grazing management iv. fence livestock out of waterways and shorelines v. offer incentives and programs for alternative water sources, e.g. wells, portable water vi. promote and support regenerative grazing management, use best management practices or ecological site descriptions vii. support grazing lands coalitions, work with grass-based agriculture groups, and associated outreach activities viii. use best management practices or ecological site descriptions ix. feedlot setbacks x. develop crucial habitat maps or species avoidance areas xi. develop watershed plans

CLASSIFICATION	THREAT TO RIVERS, STREAMS & RIPARIAN	CONSERVATION ACTION
		xii. encourage temporary or virtual fencing when possible, discourage fencing across rivers and streams xiii. promote off-site watering systems for cattle xiv. promote responsible livestock practices that minimize disease spread (i.e. double fences, appropriate removal of carcasses, etc.)
2.4 Freshwater Aquaculture	a) illegal introductions	i. increase enforcement, deterrents and fines
3. ENERGY PRODUCTION & MINING		
3.1 Oil & Gas Drilling	a) conversion of riparian to well pads, field or production facilities b) fragmentation of riparian from well pads, field or production facilities, access roads c) illegal dewatering rivers and streams for frack water d) disturbance associated with oil and gas development can proliferate noxious/invasive weeds e) inadequate or improper reclamation f) illegal dumping of materials and waste or incidental spill g) anthropogenic disturbance to aquatic system associated wildlife, e.g. dust, light and noise pollution h) social apathy to negative ecological impacts of oil and gas drilling i) governance apathy to negative ecological impacts of oil and gas drilling	i. well pad and facility consolidation, minimize footprint of development ii. increase deterrents and fines iii. foster relationships with oil companies to stimulate ecologically sound development iv. engage in early consultation with the siting of well pads v. avoid and minimize impacts to aquatic systems; mitigate unavoidable impacts vi. follow/implement best management practices vii. incentivize companies for implementing ecologically sound development viii. urge ecologically responsible ordinances and suitable reclamation standards and foster relationships with oil companies to stimulate ecologically sound development ix. urge requirements to promptly reclaim dry or abandoned wells x. enforce regulatory compliance and close loopholes which are used to delay or avoid reclamation xi. public education and outreach xii. public disclosure of impacts/footprint xiii. research the impacts of oil and gas drilling on streams, rivers and riparian, and wildlife xiv. maintain appropriate water management
3.2 Mining & Quarrying	a) conversion of streams or riparian to mines or quarries b) conversion of non-jurisdictional stream beds c) sand and gravel washing in stream d) anthropogenic disturbance to aquatic system associated wildlife e) inadequate or improper reclamation, abandonment f) increase of noxious weeds and invasive plants when land is mined	i. minimize footprint of development ii. avoid and minimize impacts to aquatic systems; mitigate unavoidable impacts iii. protection of instream flows iv. best management practices, e.g. gabion-lined channel v. follow suitable reclamation standards vi. proper setback vii. promote or develop local and state ordinances viii. delay or halt mining/quarrying for new metals or minerals until local ordinances have been approved
3.3 Renewable Energy	a) conversion of riparian to energy facility b) fragmentation of aquatic complexes by wind or solar facilities	i. offer incentives and programs to protect, enhance, and restore rivers, streams and riparian

CLASSIFICATION	THREAT TO RIVERS, STREAMS & RIPARIAN	CONSERVATION ACTION
	c) hydropower interrupts the river continuum d) direct or indirect mortality of wildlife species from structures e) altered wildlife migrations f) anthropogenic disturbance to aquatic or riparian associated wildlife, e.g. dust, noise and light pollution displacement of wildlife	ii. incentivize companies for implementing ecologically sound development alongside carbon incentives iii. avoid and minimize impacts to aquatic systems; mitigate unavoidable impacts iv. urge ecologically responsible ordinances and suitable reclamation standards v. urge accountability for ecological impacts vi. minimize footprint of development vii. dam removal or modification viii. research and model to determine best areas for placement to minimize impacts to wildlife ix. use livestock to control weeds x. establish pollinator-friendly plantings under solar arrays
4. TRANSPORTATION & SERVICE CORRIDORS		
4.1 Roads & Railroads	a) conversion of riparian to roads and railroads b) fragmentation of aquatic complexes by roads and railroads c) roads functioning as dams d) culverts, alter natural water movement or promote unnatural movement e) erosion and sedimentation f) anthropogenic disturbance to aquatic system associated wildlife, e.g. noise, dust g) direct mortality of wildlife species with vehicles or trains h) proliferate noxious/invasive weeds i) road and railway incidents secondary effects, e.g. spills and explosions, run-off j) inadequate reclamation k) improper herbicide uses in railroad rights-of-way l) road salt impacts to roadside plants and rights-of way	i. urge ecologically responsible ordinances and suitable reclamation standards ii. avoid and minimize impacts to aquatic systems; mitigate unavoidable impacts iii. use best management practices for erosion and sediment control iv. appropriate road restrictions, including speed limits v. seasonal restrictions for construction vi. use pipelines versus trucking liquids and gas vii. maintain natural corridors or construct wildlife crossings viii. considerations for fish passage at bridge/railroad crossings ix. use native local ecotype seed, including pollinator-friendly, when seeding road rights-of-way x. promote wetland restoration and creation to minimize flooding impacts to roads/infrastructure
4.2 Utility & Service Lines	a) fragmentation of aquatic complexes by utility and service lines b) disturbance associated with development of utility and service lines can proliferate noxious/invasive weeds c) inadequate reclamation d) intensification and accumulation of infrastructure e) direct mortality of wildlife species, particularly birds, by collision or electrocution f) altered predator/prey dynamics	i. consolidate corridors ii. encourage buried lines when feasible iii. urge ecologically responsible ordinances and suitable reclamation standards iv. engage in early consultation with the siting of utility and service lines v. avoid and minimize impacts to aquatic systems; mitigate unavoidable impacts vi. seasonal restrictions for construction vii. require line marking devices ix. use avian protection plans or guidance documents to minimize bird/powerline interactions

CLASSIFICATION	THREAT TO RIVERS, STREAMS & RIPARIAN	CONSERVATION ACTION
		viii. use native local ecotype seed, including pollinator-friendly, when reseeding easement rights-of-way
5. BIOLOGICAL RESOURCE USE		
5.1 Hunting & Collecting Terrestrial Animals	a) anthropogenic disturbance to aquatic or riparian associated wildlife, e.g. off-road travel, dog training during nesting season and brood rearing period b) disturbance/movement can proliferate noxious/invasive weeds c) insufficient regulations for collection or harvest of certain wildlife, e.g. reptiles and amphibians d) poaching e) lead ammunition impacts to non-target wildlife	i. urge ecologically responsible ordinances ii. increase enforcement and deterrents iii. reevaluate or develop regulations pertaining to collection or harvest of certain wildlife, e.g. reptiles and amphibians iv. increase public education and outreach efforts v. amend dog training laws and regulations to minimize impacts to wildlife during sensitive life cycle periods vi. encourage non-toxic ammunition use
5.3 Logging & Wood Harvesting	a) firewood transportation b) inadequate laws	i. increase public education and outreach efforts ii. evaluate current laws and regulations iii. follow firewood cutting and movement regulations
5.4 Fishing & Harvesting Aquatic Resources	a) anthropogenic disturbance to aquatic or riparian associated wildlife, e.g. off-road travel b) disturbance/movement can proliferate noxious/invasive weeds c) wildlife value orientations or changing public attitudes towards wildlife, e.g. stimulate illegal fishing/collection of aquatic species, or promote the introduction of nonnative species for fishing d) insufficient regulations for collection or harvest of certain wildlife, e.g. amphibians e) spread of aquatic nuisance species f) unregulated commercial take of aquatic resources g) poaching	i. urge ecologically responsible ordinances ii. increase enforcement, deterrents and fines iii. reevaluate or develop regulations pertaining to collection or harvest of certain wildlife, e.g. amphibians iv. public education and outreach v. follow aquatic nuisance species regulations and recommendations
6. HUMAN INTRUSIONS & DISTURBANCE		
6.1 Recreational Activities	a) damage to rivers, streams and riparian habitat from off-road vehicles b) anthropogenic disturbance to aquatic or riparian associated wildlife, e.g. boating c) impacts to shoreline and submerged vegetation from wake boating d) littering e) spread of aquatic nuisance species	i. increase enforcement, deterrents and fines ii. restrict or eliminate off-road vehicle use in environmentally sensitive areas iii. increase public education and outreach efforts (i.e. signage) iv. reclamation/rehabilitation v. develop regulations for wake boat use vi. follow aquatic nuisance species regulations and recommendations
6.2 Military Exercises	a) anthropogenic disturbance to aquatic and riparian associated wildlife	i. support responsible processes
6.3 Work & Other Activities	a) anthropogenic disturbance to aquatic and riparian associated wildlife	i. urge ecologically responsible ordinances
7. NATURAL SYSTEMS MODIFICATIONS		

CLASSIFICATION	THREAT TO RIVERS, STREAMS & RIPARIAN	CONSERVATION ACTION
7.1 Fire & Fire Suppression	a) wildfire in riparian habitat b) public resistance to use of prescribed fire/controlled burns	i. increase public education and outreach efforts ii. implement prescribed fire/controlled burns
7.2 Dams & Water Management/ Use	a) conversion of natural stream, river or other existing habitat to impoundment b) impoundments may proliferate concentration of salts, heavy metals, etc. c) low-head dams impeded fish passage d) addition of water may proliferate spread of West Nile virus to riparian associated wildlife e) inappropriate movement of water as water management f) lack of cottonwood regeneration due to altered hydrology g) aggradation/degradation/sedimentation h) change in water infiltration rates i) dry dams or retention dams j) water supply projects	i. offer incentives and programs to protect, enhance, and restore rivers, streams and riparian ii. offer incentives and programs for alternative water sources, e.g. wells, portable water iii. reclaim deteriorating dams and dugouts iv. incentivize low-head dam removal and/or modification v. do not develop dry dams or retention dams vi. education about dynamic water systems and water management vii. incentivize buffers/exclusion zones viii. exclude impoundments in ecologically sensitive or inappropriate areas ix. monitor and research water quality x. develop and implement watershed plans xi. implement best management practices upstream xii. rehabilitate existing dams to incorporate fish passage
7.3 Other Ecosystem Modification	a) loss of hygrophyte diversity b) diminishing soil health, e.g. compaction and loss of water infiltration c) changes in water systems d) tile and surface drainage, impacts to water quality, hydrology and wetland loss e) dry dams and retention dams f) impacts to riparian wildlife g) amplification of run-off events h) modification of watersheds i) channelization	i. promote wetland plant diversity ii. promote soil health iii. ecosystem education and awareness iv. research impacts of tile drainage on wetland ecosystems v. construct fish passages on existing dams vi. re-evaluate surface/subsurface laws, regulations and policies vii. incorporate climate smart native species
7.4 Removing / Reducing Human Maintenance	a) loss of indigenous peoples management regimes	i. include indigenous peoples culture and values
8. INVASIVE & PROBLEMATIC SPECIES, PATHOGENS & GENES		
8.1 Invasive Non-Native / Alien Plants & Animals	a) spread and proliferation of invasive or detrimental plants, e.g. hybrid cattail b) spread and proliferation of noxious weeds c) spread and proliferation of invasive woody vegetation d) spread of invasive insects, e.g. emerald ash borer, Japanese beetle e) aquatic nuisance species f) feral and free-roaming domestic animals	i. removal or reduction of invasive or detrimental plants using grazing, fire, chemical and mechanical treatments ii. removal or reduction of noxious weeds using grazing, fire, chemical, mechanical and biological treatments iii. develop recommended plant lists and sources of local ecotype seed iv. engage the horticultural industry to educate and promote recommended plants and reduce the use of problematic invasive or detrimental plants

CLASSIFICATION	THREAT TO RIVERS, STREAMS & RIPARIAN	CONSERVATION ACTION
	g) fish stocking h) increased pesticide use in riparian areas i) competitive advantage of invasive species	v. public education and outreach vi. follow aquatic nuisance species regulations and recommendations vii. support programs and initiatives to reduce or remove feral animals from native habitat viii. encourage pet owners to keep animals indoors, in an outdoor enclosure, or on a leash, to protect both the welfare of the animal and wildlife ix. research control or reduction of invasive plants x. evaluate impacts of fish stocking, decrease rates or do not stock fish in ecologically sensitive wetlands xi. integrated pest management xii. follow firewood cutting and movement regulations
8.2 Problematic Native Species	a) spread and proliferation of reed canarygrass	i. removal or reduction of undesirable native plants using grazing, fire, chemical and mechanical treatments
8.3 Introduced Genetic Material	a) genetically modified plants enable the use of a broad range of pesticides and herbicides b) increase of herbicide resistant plants c) neonicotinoid effects on non-target organisms d) potential pesticide resistance	i. promote pragmatic use of herbicides and pesticides
8.4 Pathogens & Microbes	a) Dutch elm disease	i. follow firewood cutting and movement regulations ii. increase public education/outreach efforts
9. POLLUTION		
9.1 Domestic & Urban Waste Water	a) pipeline leaks b) inappropriate disposal of untreated sewage c) septic system drainage into rivers and streams d) non-point runoff from housing and urban areas, e.g. fertilizer and pesticides from lawns and golf courses	i. require pipeline warning system for leak detection ii. improve reporting and disclosure of incidents iii. increase enforcement and deterrents iv. encourage building setback, no structures within 100 feet (minimum) of river or stream v. require septic setback, or lagoon septic systems vi. incentivize riparian herbaceous or forest buffers vii. discourage synthetic fertilizer use
9.2 Industrial & Military Effluents	a) pipeline leaks, e.g. oil and brine water b) oil and brine water spills at production or exploration facilities c) oil and brine water spills during transportation d) inappropriate disposal of brine water e) inappropriate disposal of radioactive waste f) coal mining and coal-fired power plant waste seepages g) nonpoint runoff from military bases h) thermal pollution i) emerging contaminants (i.e., PFAS)	i. require pipeline warning system for leak detection ii. require check valves to contain oil in pipeline in the event of a pipeline rupture iii. improve reporting and disclosure of incidents iv. quantify the magnitude of incidents, full disclosure of environmental impact v. increase enforcement, deterrents, and fines vi. additional monitoring vii. improved reclamation and remediation
9.3 Agriculture & Forestry Effluents	a) fertilizer and pesticide runoff from cropland b) runoff from improperly designed or sited feedlots	i. require warning system for waste leakage detection ii. require full containment feedlot runoff control system

CLASSIFICATION	THREAT TO RIVERS, STREAMS & RIPARIAN	CONSERVATION ACTION
	c) livestock excrement and urine (fecal coliform), Escherichia coli, point source pollution d) tile drainage, nonpoint source pollution e) in-stream turbation f) improper disposal of pesticides	iii. improve reporting and disclosure of incidents iv. quantify the magnitude of incidents, full disclosure of environmental impact v. promote and support regenerative grazing vi. increase enforcement, deterrents and fines vii. follow/implement best management practices
9.4 Garbage & Solid Waste	a) illegal waste sites b) litter c) landfill leachate	i. improve reporting and disclosure of incidents ii. increase enforcement, deterrents and fines iii. install monitoring wells
9.5 Air-borne Pollutants	a) dust, e.g. from increased traffic on gravel roads, mines or quarries, coal-fired power plants, b) pesticide or herbicide drift c) hydrogen sulfide d) methane e) CO2 f) decreased photosynthesis g) wind dispersion of nutrients, pollution, or sediments h) mercury contamination from wildfire smoke	i. require warning system for air-borne pollutant detection ii. quantify the magnitude of incidents, full disclosure of environmental impact iii. increase enforcement, deterrents and fines iv. promote carbon credits/sequestration
9.6 Excess Energy	a) light and thermal pollution causing disturbance to riparian associated wildlife, e.g. from natural gas flaring or urban areas b) noise pollution, e.g. from increased traffic, work sites c) data center disturbance to wildlife, e.g., noise, heat	i. improve reporting and disclosure of incidents ii. quantify the magnitude of incidents, full disclosure of environmental impact iii. increase enforcement, deterrents and fines
10. GEOLOGICAL EVENTS		
10.3 Avalanches / Landslides	a) land sloughing b) anthropogenic causes to bank, destabilization	i. offer incentives or programs for sensitive or susceptible land ii. implement methods for streambank and shoreline stabilization iii. incentive riparian herbaceous or forest buffers
11. CLIMATE CHANGE		
11.1 Ecosystem Encroachment	a) changes in native and invasive species composition b) changes in phenology c) changes in species life cycle requirements d) timing and intensity of weather events	i. alter management plans to adapt to predicted changes ii. provide habitat connectivity to ease species shifts iii. research predicted changes and potential impacts iv. monitor effect of changes v. some change is natural, dynamic landscape vi. hybridizing climate tolerant species vii. offer incentives/programs for ecologically sensitive areas viii. identify riparian refugia based on climate models
11.2 Changes Geochemical Regimes		

CLASSIFICATION	THREAT TO RIVERS, STREAMS & RIPARIAN	CONSERVATION ACTION
11.3 Changes Temperature Regimes	a) proliferates invasive plants b) increased duration and frequency c) lower oxygen d) reduced instream flows e) increased algae f) higher water temperature g) shorter winter season h) increased fires i) drought j) increased temperature degree days k) limits management actions	i. alter management plans ii. protection of instream flows iii. offer incentives and programs to protect, enhance, and restore riparian areas iv. support data collection efforts v. evaluate carbon sequestration programs vi. habitat suitability modelling
11.4 Changes Precipitation & Hydrological Regimes	a) proliferates invasive plants b) loss of wildlife or plant production c) increased mortality of wildlife	i. offer incentives and programs to protect, enhance, and restore riparian areas ii. alter management plans iii. maintain instream flows
11.5 Severe / Extreme Weather Events	a) siltation, sedimentation and erosion b) proliferate invasive plants c) consequences of urban development in floodplain	i. offer incentives and programs to protect, enhance, and restore rivers, streams and riparian ii. incentivize buffers iii. prohibit development in the floodplain iv. oppose dry dams, drainage projects
12. OTHER		
12.1 Human Dimensions	a) social apathy of the value of healthy wetlands and ecosystem services they provide b) lack of knowledge of aquatic ecosystem c) economic incentives	i. increase awareness, understanding, and appreciation of the aquatic ecosystem and ecosystem services ii. increase public education and outreach iii. provide demonstration sites iv. incorporate wetland education into K-12 classrooms v. human dimension research/surveys vi. economic incentives for beneficial activities

FOREST THREATS AND ACTIONS

Table 32. Direct threats and conservation actions for forest.
Threats and actions are not listed in order of priority.

CLASSIFICATION	THREAT TO FOREST	CONSERVATION ACTION
1. RESIDENTIAL & COMMERCIAL DEVELOPMENT		
1.1 Housing & Urban Areas	a) conversion of forest to urban development b) vegetation planted for ornamental purposes can invade adjacent forest c) pesticide/herbicide application and drift impacts to adjacent forest habitat d) predation of forest wildlife by domestic animals near urban areas e) increased noise and light pollution	i. offer incentives and programs to protect, enhance, and restore forest habitat ii. develop or support programs, initiatives and statutory language that strengthen the efficacy of conservation measures iii. urge ecologically responsible urban planning and zoning iv. urge ecologically responsible urban and county policies v. public education and outreach for native landscaping and management vi. increase awareness, understanding, and appreciation of the forest/woodland ecosystem vii. increase education regarding the impact of free-roaming domestic animals and wildlife conflicts viii. promote responsible and conscientious use of pesticides
1.2 Commercial & Industrial Areas	a) conversion of forest to commercial and industrial development b) fragmentation of forest c) vegetation planted for ornamental purposes can invade adjacent forest d) pesticide/herbicide application and drift impacts to adjacent forest e) increased noise and light pollution f) increased risk of wildfire g) vacant or abandoned commercial and industrial areas	i. offer incentives and programs to protect, enhance, and restore forest habitat ii. develop or support programs, initiatives and statutory language that strengthen the efficacy of conservation measures iii. urge ecologically responsible planning and zoning iv. urge ecologically responsible urban and county policies v. education and outreach vi. consolidate new developments to minimize disturbance vii. promote responsible and conscientious use of pesticides
1.3 Tourism & Recreational Areas	a) expanding cabin developments b) city campground expansion into forest c) golf courses, skill hills	i. urge ecologically responsible planning and zoning ii. urge ecologically responsible urban and county policies iii. education and outreach iv. increase awareness, understanding, and appreciation of the forest/woodland ecosystem
2. AGRICULTURE		
2.1 Annual & Perennial Non-Timber Crops	a) conversion of forest to cropland development b) fragmentation of forests due to cropland development	i. offer incentives and programs to protect, enhance, and restore forests, e.g. Forest Stewardship Tax Law

CLASSIFICATION	THREAT TO FOREST	CONSERVATION ACTION
	c) pesticide/herbicide application and drift impacts to adjacent forest habitat d) increase in soil erosion and sedimentation from removal of trees e) impacts to water table and water infiltration rates, drain tile	ii. develop or support programs, initiatives and statutory language that strengthen the efficacy of conservation measures iii. offer midterm conservation agreements for native forest management and protection i. maintain Farm Bill regulatory provisions ii. offer incentives for wildlife friendly farming, tax-based or direct payments iii. increase awareness and utilization of forestry best management practices iv. promote responsible and conscientious use of pesticides
2.2 Wood & Pulp Plantations	a) promotes a monoculture of trees b) non-native tree expansion	i. use forestry best management practices
2.3 Livestock Farming & Ranching	a) heavy grazing in and around forests resulting in loss of understory vegetation and prohibits regeneration b) disturbance, erosion, and decline in soil health in high livestock traffic areas c) conversion of forest to large, confined animal feeding operations d) incentives that convert forest to cropland e) increase of noxious weeds and invasive plants from poor grazing management practices	i. offer incentives and programs to protect, enhance, and restore forests, e.g. Forest Stewardship Tax Law ii. develop or support programs, initiatives and statutory language that strengthen the efficacy of conservation measures iii. incentivize good grazing management iv. manage livestock grazing in sensitive upland forest v. offer incentives and programs for alternative water sources, e.g. wells, portable water vi. promote and support regenerative grazing management vii. support grazing lands coalitions viii. use forestry best management practices ix. feedlot setbacks x. promote carbon credits, biodiversity credits xi. encourage smooth wire, at least for bottom wire, and apply visibility markers (wildlife-friendly fencing) xii. encourage temporary or virtual fencing when possible xiii. promote responsible livestock practices that minimize disease spread (i.e. double fences, appropriate removal of carcasses, etc.)
3. ENERGY PRODUCTION & MINING		
3.1 Oil & Gas Drilling	a) conversion of forest to well pads, field or production facilities, access roads b) fragmentation of forest to well pads, field or production facilities, access roads c) disturbance associated with oil and gas development can proliferate noxious/invasive weeds d) inadequate or improper reclamation e) illegal dumping of materials and waste f) anthropogenic disturbance to forest associated wildlife, e.g. dust, noise and light pollution	i. well pad and facility consolidation, minimize footprint of development ii. engage in early consultation with the siting of well pads iii. develop crucial habitat maps or species avoidance areas iv. follow/implement best management practices v. incentivize companies for implementing ecologically sound development

CLASSIFICATION	THREAT TO FOREST	CONSERVATION ACTION
	g) diminished forage quality and plant communities due to increased road dust h) increased wildfire risk from drilling and operational activities i) social apathy to negative ecological impacts of oil and gas drilling j) governance apathy to negative ecological impacts of oil and gas drilling k) increased risk of accidental discharge of chemicals or waste	vi. urge ecologically responsible ordinances and suitable reclamation standards and foster relationships with oil companies to stimulate ecologically sound development xiii. urge requirements to promptly reclaim dry or abandoned wells xiv. enforce regulatory compliance and close loopholes which are used to delay or avoid reclamation vii. public education and outreach viii. public disclosure of impacts/footprint ix. research the impacts of oil and gas drilling on forest habitat and wildlife x. explore novel alternatives to offset impacts of oil and gas development
3.2 Mining & Quarrying	a) conversion of forest to mines or quarries, or for riprap b) inadequate or improper reclamation c) increase of noxious weeds and invasive plants when forest is mined	i. minimize footprint of development (e.g. consolidate disturbance) ii. suitable reclamation standards iii. tree mitigation iv. education and outreach v. promote or develop local and state ordinances vi. delay or halt mining/quarrying for new metals or minerals until local ordinances have been approved
3.3 Renewable Energy	a) conversion of forest for alternative fuel crops b) fragmentation of forest by wind or solar facilities c) direct or indirect mortality of wildlife species from structures d) anthropogenic disturbance to forest associated wildlife, e.g. noise, light e) increase of noxious weeds and invasive plants when land is disturbed	i. offer incentives and programs to protect, enhance, and restore forests ii. engage in early consultation with the siting of well pads iii. develop crucial habitat maps or species avoidance areas iv. follow/implement best management practices v. incentivize companies for implementing ecologically sound development vi. urge ecologically responsible ordinances and suitable reclamation standards vii. urge accountability for ecological impacts viii. minimize footprint of development ix. tree mitigation x. research to determine best areas for placement to minimize impacts to wildlife xi. use livestock to control weeds xii. establish pollinator-friendly plantings under solar arrays
4. TRANSPORTATION & SERVICE CORRIDORS		
4.1 Roads & Railroads	a) conversion of forest to roads and railroads b) fragmentation of forest by roads and railroads c) anthropogenic disturbance to forest associated wildlife, e.g. dust, noise and light pollution	i. urge ecologically responsible ordinances and suitable reclamation standards ii. appropriate road restrictions, including speed limits iii. reasonable timing restrictions for construction iv. use pipelines versus trucking liquids and gas

CLASSIFICATION	THREAT TO FOREST	CONSERVATION ACTION
	d) direct mortality of wildlife species with vehicles or trains e) proliferate noxious/invasive weeds f) road and railway incident secondary effects, e.g. spills and explosions g) improper herbicide uses in railroad rights-of-way h) potential for wildfires, either accidental or from negligent actions i) road salt impacts to roadside plants and rights-of way j) inadequate reclamation	v. tree mitigation vi. use forestry best management practices vii. maintain natural corridors or construct wildlife accommodations, i.e. jump outs, wildlife crossings, etc. viii. use native local ecotype seed, including pollinator-friendly, when seeding road rights-of-way
4.2 Utility & Service Lines	a) conversion of forest during line development b) fragmentation of forest by utility and service lines c) disturbance associated with development of utility and service lines can proliferate noxious/invasive weeds d) inadequate reclamation e) intensification and accumulation of infrastructure f) direct mortality of wildlife species, particularly birds, by collision or electrocution g) changes in predator community (i.e. utility poles attract raptors which may increase depredation on other wildlife)	i. consolidation corridors, or overlapping easements ii. urge ecologically responsible ordinances and suitable reclamation standards iii. engage in early consultation with the siting of utility and service lines iv. tree mitigation v. reasonable timing restrictions for construction vi. require line marking devices ii. use avian protection plans or guidance documents to minimize bird/powerline interactions vii. use native local ecotype seed, including pollinator-friendly, when reseeding easement rights-of-way
5. BIOLOGICAL RESOURCE USE		
5.1 Hunting & Collecting Terrestrial Animals	a) anthropogenic disturbance to forest associated wildlife, e.g. off-road travel b) disturbance/movement can proliferate noxious/invasive weeds c) wildlife value or changing public attitudes towards wildlife, promoting the introduction of nonnative species for hunting d) damage to trees from certain tree stands and clearing of trees for shooting lanes e) insufficient regulations for collection or harvest of certain wildlife, e.g. reptiles and amphibians f) poaching g) supplemental feeding h) lead ammunition impacts to non-target wildlife	i. urge ecologically responsible ordinances ii. increase enforcement and deterrents iii. reevaluate or develop regulations pertaining to collection or harvest of certain wildlife, e.g. reptiles and amphibians iv. encourage using portable tree stands, do not use screw-in steps v. public education and outreach vi. encourage non-toxic ammunition use
5.2 Gathering Terrestrial Plants	a) unregulated collection of edible/medicinal plants for commercial use/sale	i. increase enforcement and deterrents ii. public education and outreach
5.3 Logging & Wood Harvest	a) unregulated logging	i. develop Forest Stewardship Management Plans, follow a silvicultural prescription ii. use forestry best management practices
5.4 Fishing & Harvesting Aquatic Resources	a) anthropogenic disturbance to forest associated wildlife, e.g. off-road travel	i. urge ecologically responsible ordinances ii. increase enforcement and deterrents iii. public education and outreach

CLASSIFICATION	THREAT TO FOREST	CONSERVATION ACTION
	b) disturbance/movement can proliferate noxious or invasive weeds c) poaching	
6. HUMAN INTRUSIONS & DISTURBANCE		
6.1 Recreational Activities	a) damage to forests from off-road vehicles b) anthropogenic disturbance to forest associated wildlife, e.g. geocaching unauthorized camping, firewood collection, wildlife harassment (e.g. drones) c) trail development through sensitive habitat or key wildlife areas d) proliferate noxious or invasive weeds e) potential for wildfires, either accidental or from negligent actions f) unauthorized recreational shooting/explosive targets	i. increase enforcement, deterrents and fines ii. restrict or eliminate off-road vehicle use in environmentally sensitive areas iii. engage in early consultation with the siting of recreational areas and trails iv. public education and outreach
6.2 Military Exercises	a) anthropogenic disturbance to forest	i. support responsible processes
6.3 Work & Other Activities	a) anthropogenic disturbance to forest	i. urge ecologically responsible ordinances ii. increase enforcement, deterrents and fines
7. NATURAL SYSTEMS MODIFICATIONS		
7.1 Fire & Fire Suppression	a) fire suppression results in poor forest health and increase in wildfire risk or severity due to increased fuel loads b) lack of funding for fire management c) public resistance to use of prescribed fire/controlled burns d) insufficient awareness regarding the advantages of prescribed fire/controlled burns	i. offer incentives and programs to implement prescribed fire ii. support fire coalitions and cooperative ventures iii. obtain funding for fire management programs, staff and training iv. involve and educate rural or local fire departments v. public education and outreach vi. support pro-prescribed fire strategies vii. research the effects of fire management viii. promote and use forestry best management practices
7.2 Dams & Water Management/ Use	a) conversion of forest to impoundment b) impoundments may proliferate concentration of salts, heavy metals, etc. c) lack of regeneration due to altered hydrology d) inappropriate siting of impoundment e) dry dams or retention dams f) proliferate noxious or invasive weeds g) degradation of forest from livestock congregation at dams and impoundments	i. offer incentives and programs to protect, enhance, and restore forest ii. offer incentives and programs for alternative water sources, e.g. wells, portable water iii. reclaim deteriorating dams and dugouts iv. remove low-head dams v. do not develop dry dams or retention dams vi. education about dynamic water systems and water management vii. incentivize buffers/exclusion zones viii. exclude impoundments in ecologically sensitive or inappropriate areas ix. develop and implement watershed plans

CLASSIFICATION	THREAT TO FOREST	CONSERVATION ACTION
7.3 Other Ecosystem Modification	a) diminishing soil health, e.g. compaction and loss of water infiltration	i. promote soil health ii. ecosystem education and awareness
7.4 Removing / Reducing Human Maintenance	a) lack of succession b) disease c) invasive species d) loss of indigenous peoples management regimes	i. education and outreach ii. promote and use best management practices iii. support funding and programs iv. include indigenous peoples culture and values
8. INVASIVE & PROBLEMATIC SPECIES, PATHOGENS & GENES		
8.1 Invasive Non-Native / Alien Plants & Animals	a) spread and proliferation of invasive or detrimental plants, e.g. Kentucky bluegrass, smooth brome b) spread and proliferation of noxious weeds c) spread and proliferation of invasive woody vegetation d) spread of invasive insects, e.g. emerald ash borer, Japanese beetle e) feral and free-roaming domestic animals	i. removal or reduction of invasive or detrimental plants using fire, chemical and mechanical treatments ii. removal or reduction of noxious weeds using fire, chemical, mechanical and biological treatments iii. develop recommended plant lists and sources of local ecotype seed iv. engage the horticultural industry to educate and promote recommended plants and reduce the use of problematic invasive or detrimental plants v. public education and outreach vi. enforce emerald ash borer regulations vii. follow firewood cutting and movement regulations viii. support programs and initiatives to reduce or remove feral animals from native habitat ix. encourage pet owners to keep animals indoors, in an outdoor enclosure, or on a leash, to protect both the welfare of the animal and wildlife x. research control or reduction of invasive plants xi. use forestry best management practices
8.2 Problematic Native Species	a) aspen decay b) damaging pests, e.g. forest tent caterpillar	i. encourage mechanical options for control of pests versus insecticides ii. maintain or improve forest stand health
8.3 Introduced Genetic Material	a) genetically modified plants enable the use of a broad range of pesticides and herbicides b) increase of herbicide resistant plants c) risk of loss of genetics with plants and wildlife d) neonicotinoid effects on non-target organisms	i. promote pragmatic use of herbicides and pesticides
8.4 Pathogens & Microbes	a) Dutch elm disease b) aspen decay	i. monitor trees for disease ii. use fire or mechanical disturbance to encourage aspen regeneration iii. utilize preventative guidelines iv. education and outreach
9. POLLUTION		
9.1 Domestic & Urban Waste Water	a) pipeline leaks b) inappropriate disposal of untreated sewage c) non-point runoff from housing and urban areas, e.g. fertilizer and pesticides from lawns and golf courses	i. require pipeline warning system for leak detection ii. improve reporting and disclosure of incidents iii. increase enforcement and deterrents iv. public education and outreach

CLASSIFICATION	THREAT TO FOREST	CONSERVATION ACTION
9.2 Industrial & Military Effluents	a) pipeline leaks, e.g. oil and brine water b) oil and brine water spills at production or exploration facilities a) oil and brine water spills during transportation b) inappropriate disposal of brine water c) inappropriate disposal of radioactive waste d) coal mining and coal-fired power plant waste seepages	i. require pipeline warning system for leak detection ii. require check valves to contain oil in pipeline in the event of a pipeline rupture iii. improve reporting and disclosure of incidents iv. quantify the magnitude of incidents, full disclosure of environmental impact v. increase enforcement, deterrents and fines vi. support policies to update deteriorating infrastructure
9.3 Agriculture & Forestry Effluents	a) fertilizer and pesticide runoff from cropland b) runoff from improperly designed or sited feedlots	i. require warning system for waste leakage detection ii. require full containment feedlot runoff control system iii. improve reporting and disclosure of incidents iv. quantify the magnitude of incidents, full disclosure of environmental impact v. increase enforcement, deterrents and fines
9.4 Garbage & Solid Waste	a) illegal waste sites b) litter	i. improve reporting and disclosure of incidents ii. increase enforcement, deterrents and fines
9.5 Air-borne Pollutants	a) dust, e.g. from increased traffic on gravel roads, mines or quarries, coal-fired power plants, b) pesticide or herbicide drift c) hydrogen sulfide d) excess carbon dioxide e) wind dispersion of nutrients, pollution, or sediments f) wildfire smoke	i. require warning system for air-borne pollutant detection ii. quantify the magnitude of incidents, full disclosure of environmental impact iii. increase enforcement, deterrents and fines iv. promote carbon credits
9.6 Excess Energy	a) light and thermal pollution causing disturbance to forest associated wildlife, e.g. from natural gas flaring or urban areas b) noise pollution, e.g. from increased traffic, work sites c) data center disturbance to wildlife, e.g., noise, heat	i. improve report and disclosure of incidents ii. quantify the magnitude of incidents, full disclosure of environmental impact iii. increase enforcement, deterrents and fines
10. GEOLOGICAL EVENTS		
10.3 Avalanches / Landslides	a) land sloughing	i. offer incentives or programs for sensitive or susceptible land
11. CLIMATE CHANGE		
11.1 Ecosystem Encroachment	a) changes in species composition b) changes in phenology c) changes in species life cycle requirements d) timing and intensity of weather events	i. alter management plans to adapt to predicted changes ii. provide habitat connectivity to ease species shifts iii. research predicted changes and potential impacts iv. monitor effect of changes, utilize existing data v. some change is natural, dynamic landscape
11.2 Changes Geochemical Regimes		

CLASSIFICATION	THREAT TO FOREST	CONSERVATION ACTION
11.3 Changes Temperature Regimes	a) proliferates invasive plants b) proliferates tree disease c) limits management actions d) loss of wildlife or plant production e) increased mortality of wildlife	i. offer incentives and programs to protect, enhance, and restore forests
11.4 Changes Precipitation & Hydrological Regimes	a) proliferates invasive plants b) pests increase c) prolonged drought causes tree mortality d) increased duration and frequency	i. alter management plans
11.5 Severe / Extreme Weather Events	a) siltation, sedimentation and erosion b) proliferate invasive plants c) consequences of urban development in floodplain d) high wind events can destroy trees e) prolonged flooding causes tree mortality	i. offer incentives and programs to protect, enhance, and restore forests ii. incentivize buffers iii. prohibit development in the floodplain iv. oppose dry dams, drainage projects
12. OTHER		
12.1 Human Dimensions	a) social apathy of the value of the healthy forests and ecosystem services they provide b) lack of knowledge of the forest ecosystem	i. increase awareness, understanding, and appreciation of forests and ecosystem services ii. public education and outreach iii. provide demonstration sites iv. incorporate forest education into K-12 classrooms v. human dimension research/surveys vi. promote North Dakota Natural Areas Registry

BADLANDS THREATS AND ACTIONS

Table 33. Direct threats and conservation actions for badlands.
Threats and actions are not listed in order of priority.

CLASSIFICATION	THREAT TO BADLANDS	CONSERVATION ACTION
1. RESIDENTIAL & COMMERCIAL DEVELOPMENT		
1.1 Housing & Urban Areas	a) conversion of badlands habitats to urban development, and in some cases, county ordinances that promote larger lots rather than smaller (such as 10 acres as opposed to 1 acre) b) fragmentation of badlands habitats from urban development c) disturbance associated with urban development can disperse noxious/invasive weeds d) vegetation planted for ornamental purposes can invade adjacent native prairies e) mowing of adjacent native and/or tame grasslands for ornamental grooming f) pesticide/herbicide application and drift impacts adjacent plant/wildlife species composition g) loss of grazing and burning of grasslands near urban and recreational areas h) predation of grassland wildlife by domestic animals near urban areas i) vacant or abandoned housing (e.g. temporary housing units) j) increased noise and light pollution k) lower tolerance to wildlife as rural communities become urban areas	i. offer incentives and programs to protect, enhance, and restore badlands habitat ii. develop or support programs, initiatives and statutory language that strengthen the efficacy of conservation measures iii. urge ecologically responsible urban planning and zoning iv. urge ecologically responsible urban and county policies v. public education and outreach for native landscaping and management vi. increase awareness, understanding, and appreciation of the badlands ecosystem vii. increase education regarding the impact of free-roaming domestic animals and wildlife conflicts
1.2 Commercial & Industrial Areas	a) conversion and disturbance of badlands habitats associated with industrial lodging b) increased garbage load, illegal dumping c) disturbance associated with development can proliferate noxious/invasive weeds d) direct mortality to wildlife species e) increased noise and light pollution f) increased risk of wildfire g) vacant or abandoned commercial and industrial areas	i. develop or support programs, initiatives and statutory language that strengthen the efficacy of conservation measures ii. urge ecologically responsible ordinances and suitable reclamation standards iii. consolidate new developments to minimize disturbance iv. consider state mitigation standards
1.3 Tourism & Recreational Areas	a) conversion of badlands habitats to tourism and recreational areas b) disturbance associated with recreational development can disperse noxious/invasive weeds c) pesticide/herbicide application and drift impacts adjacent plant/wildlife species composition d) unrestrained domestic animals can harass wildlife	i. promote “Keep It Native” campaign for greenways, trails, recreational areas, and minimize project footprint ii. urge ecologically responsible ordinances and responsible siting of new development iii. public education and outreach
2. AGRICULTURE		

CLASSIFICATION	THREAT TO BADLANDS	CONSERVATION ACTION
2.1 Annual & Perennial Non-Timber Crops	a) conversion of badlands habitat to cropland development b) fragmentation of badlands habitats due to cropland development c) displacement of wildlife during conversion process d) pesticide/herbicide application and drift impacts adjacent plant/wildlife species composition e) increase in soil erosion from lack of residual cover on cropland f) decline in soil health g) impacts to water table and water infiltration rates h) changing farm demographics resulting in a shift from livestock ranching to crop production, loss of connection to the land, and loss of rural community lifestyle	i. offer incentives and programs to protect, enhance, and restore badlands habitat ii. develop or support programs, initiatives and statutory language that strengthen the efficacy of conservation measures iii. strengthen Farm Bill regulatory provisions (i.e. swampbuster, sodbuster, sodsaver) iv. support regulatory reform of practices that promote conversion of habitat to crop v. offer incentives for wildlife friendly farming, tax-based or direct payments vi. promote and support regenerative grazing management, collaborate with grassland based agricultural groups vii. support demo projects and best management practices viii. promotion of cover crops and soil health ix. promote responsible and conscientious use of pesticides x. promote equal risk management for grassland-based agriculture
2.3 Livestock Farming & Ranching	a) absence of grazing b) underutilization of grazing or over-rest c) overutilization of grazing or overgrazing d) shift from ranching (pro-grass) lifestyle to confined animal feeding operations e) disturbance, erosion, and decline in soil health in high livestock traffic areas f) opposing attitude of using prescribed fire as co-management tool g) non-traditional livestock farms may proliferate disease transmission, genetic mixing, escapees, to wild populations h) inappropriate fencing (i.e. not wildlife-friendly) i) incentives to convert grassland to cropland j) public perception that livestock are bad for the climate and lack of knowledge on the importance of grasslands for carbon sequestration and storage k) increase of noxious weeds and invasive plants from poor grazing management practices	i. encourage grazing as a grassland management tool for high resistance and resilience ii. develop or support programs, initiatives and statutory language that strengthen the efficacy of conservation measures iii. develop provisions for Farm Bill disaster assistance for livestock producers iv. establish grassbanks between state/federal/non-governmental land and private ranches v. incentivize good grazing management vi. promote and support regenerative grazing management use existing resources such as best management practices and ecological site descriptions vii. build market and corporate support of grass-based livestock viii. support grazing lands coalitions and work with grass-based agriculture groups ix. use best management practices or ecological site descriptions x. assessment of economic and ecological values of grasslands and associated wildlife, ecosystem services xi. promote carbon credits, biodiversity credits xii. encourage smooth wire, at least for bottom wire, and apply visibility markers (wildlife-friendly fencing) xiii. encourage temporary or virtual fencing when possible xiv. educate the public on the benefits of working grasslands

CLASSIFICATION	THREAT TO BADLANDS	CONSERVATION ACTION
		xv. support prescribed fire, including training and education xvi. promote responsible livestock practices that minimize disease spread (i.e. double fences, appropriate removal of carcasses, etc.)
3. ENERGY PRODUCTION & MINING		
3.1 Oil & Gas Drilling	a) conversion of badlands habitats to well pads, field or production facilities, access roads b) fragmentation of badlands habitats to well pads, field or production facilities, access roads c) disturbance associated with oil and gas development can proliferate noxious/invasive weeds d) inadequate or improper reclamation e) illegal dumping of materials and waste f) increased wildfire risk from drilling and operational activities g) anthropogenic disturbance to grassland associated wildlife, e.g. dust, noise and light pollution h) diminished forage quality and plant communities due to increased road dust i) social apathy to negative ecological impacts of oil and gas drilling j) governance apathy to negative ecological impacts of oil and gas drilling k) increased risk of accidental discharge of chemicals or waste	i. well pad and facility consolidation, minimize footprint of development ii. engage in early consultation with the siting of well pads iii. develop crucial habitat maps or species avoidance areas iv. follow/implement best management practices v. incentivize companies for implementing ecologically sound development vi. urge ecologically responsible ordinances and suitable reclamation standards and foster relationships with oil companies to stimulate ecologically sound development xv. urge requirements to promptly reclaim dry or abandoned wells xvi. enforce regulatory compliance and close loopholes which are used to delay or avoid reclamation vii. public education and outreach viii. public disclosure of impacts/footprint ix. research the impacts of oil and gas drilling on grassland habitat and wildlife x. explore novel alternatives to offset impacts of oil and gas development
3.2 Mining & Quarrying	a) conversion of badlands habitats to mines or quarries b) anthropogenic disturbance to grassland associated wildlife, e.g. dust, noise and light pollution c) inadequate or improper reclamation d) increase of noxious weeds and invasive plants when grassland is mined e) increased risk of accidental chemicals or waste f) decrease in soil health and increase in soil erosion	i. minimize footprint of development (e.g. consolidate disturbance) ii. suitable reclamation standards iii. education and outreach iv. promote or develop local and state ordinances v. delay or halt mining/quarrying for new metals or minerals until local ordinances have been approved
3.3 Renewable Energy	a) conversion of badlands habitats to energy facilities b) fragmentation of badlands by energy facilities c) direct or indirect mortality of wildlife species from structures d) anthropogenic disturbance to badlands associated wildlife, e.g. noise, light e) increase of noxious weeds and invasive plants when land is disturbed	i. incentivize companies for implementing ecologically sound development ii. urge ecologically responsible ordinances and suitable reclamation standards iii. urge accountability for ecological impacts iv. minimize footprint of development v. research to determine the best areas for placement to minimize impacts to wildlife vi. use livestock to control weeds vii. establish pollinator-friendly plantings under solar arrays

CLASSIFICATION	THREAT TO BADLANDS	CONSERVATION ACTION
4. TRANSPORTATION & SERVICE CORRIDORS		
4.1 Roads & Railroads	a) conversion of badlands habitats to roads and railroads b) fragmentation of badlands habitats by roads and railroads c) anthropogenic disturbance to grassland associated wildlife, e.g. dust, noise and light pollution d) direct mortality and displacement of wildlife species with vehicles or trains e) roads acting as migration barriers for terrestrial wildlife f) proliferate noxious/invasive weeds g) road and railway incident secondary effects, e.g. spills and explosions h) improper herbicide uses in railroad rights-of-way i) potential for wildfires, either accidental or from negligent actions j) road salt impacts to roadside plants and rights-of way	i. urge ecologically responsible ordinances and suitable reclamation standards ii. appropriate mitigation, e.g. native grassland ecosystems iii. appropriate road restrictions, including speed limits iv. reasonable timing restrictions for construction v. maintain natural corridors or construct wildlife accommodations, i.e. jump outs, wildlife crossings, etc. vi. use pipelines versus trucking liquids and gas vii. use native local ecotype seed, including pollinator-friendly, when seeding road rights-of-way viii. promote adjustments in the timing and frequency of mowing along rights-of-way to minimize impacts to wildlife
4.2 Utility & Service Lines	a) fragmentation of badlands habitats by utility and service lines b) disturbance associated with development of utility and service lines can proliferate noxious/invasive weeds c) inadequate reclamation d) intensification and accumulation of infrastructure e) reduced management and flexibility in easement rights-of-way f) direct mortality of wildlife species, particularly birds, by collision or electrocution g) changes in predator community (i.e. utility poles attract raptors which may increase depredation on other wildlife)	i. consolidation corridors, or overlapping easements ii. encourage buried lines when feasible iii. urge ecologically responsible ordinances and suitable reclamation standards iv. engage in early consultation with the siting of utility and service lines v. reasonable timing restrictions for construction vi. require line marking devices iii. use avian protection plans or guidance documents to minimize bird/powerline interactions vii. use native local ecotype seed, including pollinator-friendly, when reseeding easement rights-of-way
5. BIOLOGICAL RESOURCE USE		
5.1 Hunting & Collecting Terrestrial Animals	a) anthropogenic disturbance to badlands associated wildlife, e.g. off-road travel, dog training during nesting and brood-rearing period b) disturbance/movement can proliferate noxious/invasive weeds c) wildlife value or changing public attitudes towards wildlife, promoting the introduction of nonnative species for hunting d) insufficient regulations for collection or harvest of certain wildlife, e.g. reptiles and amphibians e) poaching f) supplemental feeding g) increased wildlife violations in western North Dakota	i. urge ecologically responsible ordinances ii. increase enforcement and deterrents iii. reevaluate or develop regulations pertaining to collection or harvest of certain wildlife, e.g. reptiles and amphibians iv. public education and outreach v. amend dog training laws and regulations to minimize impacts to wildlife during sensitive life cycle periods vi. encourage non-toxic ammunition use

CLASSIFICATION	THREAT TO BADLANDS	CONSERVATION ACTION
	h) lead ammunition impacts to non-target wildlife	
5.2 Gathering Terrestrial Plants	a) unregulated collection of edible/medicinal plants for commercial use/sale	i. increase enforcement and deterrents ii. public education and outreach
5.3 Logging & Wood Harvest	a) not a threat	i. use as management tool to restore grassland
5.4 Fishing & Harvesting Aquatic Resources	a) anthropogenic disturbance to grassland associated wildlife, e.g. off-road travel b) disturbance/movement can proliferate noxious or invasive weeds c) poaching d) increased wildlife violations in western North Dakota	i. urge ecologically responsible ordinances ii. increase enforcement and deterrents iii. public education and outreach
6. HUMAN INTRUSIONS & DISTURBANCE		
6.1 Recreational Activities	a) damage to badlands habitat from off-road vehicles b) anthropogenic disturbance to badlands associated wildlife, e.g. unauthorized camping, target shooting, firewood collection, wildlife harassment (e.g. drones) c) trail development through sensitive habitat or key wildlife areas d) littering e) spelunking, spread of White-Nose Syndrome f) proliferate noxious or invasive weeds g) potential for wildfires, either accidental or from negligent actions	i. restrict or eliminate off-road vehicle use in environmentally sensitive areas ii. engage in early consultation with the siting of recreational areas iii. urge ecologically responsible ordinances iv. increase enforcement, deterrents and fines v. public education and outreach
6.2 Military Exercises	a) anthropogenic disturbance to badlands associated wildlife	i. support responsible processes
6.3 Work & Other Activities	a) anthropogenic disturbance to badlands associated wildlife b) increased illegal drug manufacturing, smuggling and trafficking in western North Dakota; disturbance to wildlife or habitat	i. urge ecologically responsible ordinances ii. increase enforcement, deterrents and fines
7. NATURAL SYSTEMS MODIFICATIONS		
7.1 Fire & Fire Suppression	a) fire suppression results in woody encroachment, succession, loss of native diversity, and increase in wildfire risk or severity due to increased fuel loads b) inappropriate fire control (fire breaks, bulldozers) c) lack of funding for fire d) public resistance to use of prescribed fire/controlled burns e) insufficient awareness regarding the advantages of prescribed fire/controlled burns	i. offer incentives and programs to implement prescribed fire/controlled burns ii. support fire coalitions and cooperative ventures iii. obtain funding for fire management programs, staff and training iv. involve and educate rural or local fire departments v. develop fire management plans vi. public education and outreach vii. support pro-prescribed fire strategies
7.2 Dams & Water Management/ Use	a) conversion of badlands habitat, e.g. slope wetlands, to impoundment b) may proliferate concentration of salts, heavy metals, etc.	i. offer incentives and programs for alternative water sources, e.g. wells, portable water ii. reclaim deteriorating dams and dugouts

CLASSIFICATION	THREAT TO BADLANDS	CONSERVATION ACTION
	c) addition of water may proliferate the spread of West Nile virus and other diseases to grassland associated wildlife d) inappropriate movement of water as water management e) change in water infiltration rates f) proliferate noxious or invasive weeds g) degradation of grasslands from livestock congregation at dams and impoundments	iii. education about dynamic water systems and water management iv. incentivize buffers/exclusion zones
7.3 Other Ecosystem Modification	a) loss of pollinators b) loss of native plant diversity c) diminishing soil health, e.g. compaction and loss of water infiltration d) changes in water systems e) loss of bat/cavity roosting habitat	i. promote diversity ii. plant diverse grass and forb mixes and pollinator plantings iii. promote soil health iv. ecosystem education and awareness v. follow/implement Best Management Practices for tree removal (e.g. timing)
7.4 Removing / Reducing Human Maintenance	b) loss of indigenous peoples management regimes, e.g. loss of fires set by indigenous peoples	ii. include indigenous peoples culture and values
8. INVASIVE & PROBLEMATIC SPECIES, PATHOGENS & GENES		
8.1 Invasive Non-Native / Alien Plants & Animals	a) spread and proliferation of invasive or detrimental plants, e.g. Kentucky bluegrass, smooth brome b) spread and proliferation of noxious weeds c) spread and proliferation of invasive woody vegetation d) spread of invasive insects, e.g. emerald ash borer, Japanese beetle e) feral and free roaming domestic animals	i. removal or reduction of invasive or detrimental plants using grazing, fire, chemical and mechanical treatments ii. removal or reduction of noxious weeds using grazing, fire, chemical, mechanical and biological treatments iii. prohibit or disincentive new seeding of invasive or detrimental plants, particularly Kentucky bluegrass and smooth brome iv. incentivize native plant seeding v. develop recommended plant lists and sources of local ecotype seed vi. engage the horticultural industry to educate and promote recommended plants and reduce the use of problematic invasive or detrimental plants vii. public education and outreach viii. support programs and initiatives to reduce or remove feral animals from native habitat ix. encourage pet owners to keep animals indoors, in an outdoor enclosure, or on a leash, to protect both the welfare of the animal and wildlife x. research control or reduction of invasive plants xi. follow firewood cutting and movement regulations xii. install boot brushes at trail heads xiii. encourage weed free hay programs xiv. minimize/consolidate disturbance (e.g. development) xv. incentivize and promote adaptive management or climate informed approach

CLASSIFICATION	THREAT TO BADLANDS	CONSERVATION ACTION
8.2 Problematic Native Species	a) spread and proliferation of native woody vegetation, e.g. Eastern red cedar, Rocky Mountain juniper	i. removal or reduction of undesirable native plants using grazing, fire, chemical and mechanical treatments ii. develop programs and incentives for woody invasive management iii. promote natural control iv. public education and outreach v. consider climate adaptation in woody species management
8.3 Introduced Genetic Material	a) genetically modified plants enable the use of a broad range of pesticides and herbicides b) increase of herbicide resistant plants c) risk of loss of genetics with plants and wildlife	ii. promote pragmatic use of herbicides and pesticides
8.4 Pathogens & Microbes	a) Dutch elm disease b) Plague (prairie dogs, mammals)	i. utilize preventative guidelines ii. education and outreach
9. POLLUTION		
9.1 Domestic & Urban Waste Water	a) pipeline leaks b) inappropriate disposal of untreated sewage c) non-point runoff from housing and urban areas, e.g. fertilizer and pesticides from lawns and golf courses	i. require pipeline warning system for leak detection ii. improve reporting and disclosure of incidents iii. increase enforcement and deterrents iv. public education and outreach
9.2 Industrial & Military Effluents	a) pipeline leaks, e.g. oil and brine water b) oil and brine water spills at production or exploration facilities c) oil and brine water spills during transportation d) inappropriate disposal of brine water e) inappropriate disposal of radioactive waste f) coal mining and coal-fired power plant waste seepages	i. require pipeline warning system for leak detection ii. require check valves to contain oil in pipeline in the event of a pipeline rupture iii. improve reporting and disclosure of incidents iv. quantify the magnitude of incidents, full disclosure of environmental impact v. increase enforcement, deterrents and fines vi. support policies to update deteriorating infrastructure
9.3 Agriculture & Forestry Effluents	a) fertilizer and pesticide runoff from cropland b) runoff from improperly designed or sited feedlots	i. require warning system for waste leakage detection ii. require full containment feedlot runoff control system iii. improve reporting and disclosure of incidents iv. quantify the magnitude of incidents, full disclosure of environmental impact v. increase enforcement, deterrents and fines
9.4 Garbage & Solid Waste	a) illegal waste sites b) litter	i. improve reporting and disclosure of incidents ii. increase enforcement, deterrents and fines
9.5 Air-borne Pollutants	a) dust, e.g. from increased traffic on gravel roads, mines or quarries, coal-fired power plants, b) pesticide or herbicide drift c) hydrogen sulfide d) excess carbon dioxide e) wind dispersion of nutrients, pollution, or sediments f) wildfire smoke	i. require warning system for air-born pollutant detection ii. quantify the magnitude of incidents, full disclosure of environmental impact iii. increase enforcement, deterrents and fines iv. promote carbon credits

CLASSIFICATION	THREAT TO BADLANDS	CONSERVATION ACTION
9.6 Excess Energy	a) light and thermal pollution causing disturbance to grassland associated wildlife, e.g. from natural gas flaring or urban areas b) noise pollution, e.g. from increased traffic, work sites c) data center disturbance to wildlife, e.g., noise, heat	i. improve reporting and disclosure of incidents ii. quantify the magnitude of incidents, full disclosure of environmental impact iii. increase enforcement, deterrents and fines
10. GEOLOGICAL EVENTS		
10.3 Avalanches / Landslides	a) land sloughing	i. offer incentives or programs for sensitive or susceptible land
11. CLIMATE CHANGE		
11.1 Ecosystem Encroachment	a) changes in species composition b) changes in phenology c) changes in species life cycle requirements d) timing and intensity of weather events	i. alter management plans to adapt to predicted changes ii. provide habitat connectivity to ease species shifts iii. research predicted changes and potential impacts iv. monitor effect of changes, utilize existing data v. some change is natural, dynamic landscape
11.2 Changes Geochemical Regimes		
11.3 Changes Temperature Regimes	a) proliferates invasive plants b) limits management actions c) loss of animal or plant production d) increased mortality of animals	i. establish grassbanks between state/federal/non-governmental land and private ranches ii. promotion of cover crops and soil health
11.4 Changes Precipitation & Hydrological Regimes	a) proliferates invasive plants b) limits management actions c) loss of wildlife or plant production	i. establish grassbanks between state/federal/non-governmental land and private ranches ii. promotion of cover crops and soil health
11.5 Severe / Extreme Weather Events	a) siltation, sedimentation and erosion b) proliferate invasive plants	i. offer incentives and programs to protect, enhance, and restore grasslands ii. incentivize buffers
12. OTHER		
12.1 Human Dimensions	a) social apathy of the value of healthy badlands habitats and ecosystem services they provide b) lack of knowledge of badlands ecosystem c) view of badlands as being of no significance, e.g. “wasteland” d) public misconception that livestock are bad for the environment e) misdirected conservation efforts, e.g. planting trees in grasslands, increased trail pressure	i. increase awareness, understanding, and appreciation of the badlands ecosystem and ecosystem services ii. public education and outreach iii. support grassland coalitions iv. provide demonstration sites v. incorporate badlands education into K-12 classrooms vi. human dimension research/surveys

THREATS AND ACTIONS SUMMARY - ALL HABITATS

For all habitat types, the following are the top recurring threats:

1) **Conversion of habitat**
   The most frequent conversion occurs when grassland is broken and transformed to annual crop production. This process often includes the conversion of small, shallow wetlands embedded within grasslands. Urban, commercial and industrial development also results in the conversion of habitat, including forests and riparian areas.
2) **Invasive non-native species**
   The spread and proliferation of invasive or detrimental plants, noxious weeds, woody vegetation, and aquatic nuisance species negatively impact the health and resilience of native habitats.
3) **Fire suppression**
   The lack or removal of fire in the grassland ecosystem results in woody encroachment, succession, and loss of native diversity.
4) **Underutilization of grazing**
   The grassland ecosystem needs large grazing herbivores. The absence or underutilization of grazing in the grassland ecosystem results in succession, loss of native diversity, and loss of landscape heterogeneity.
5) **Energy development impacts**
   Increasing demand and development of North Dakota's abundant energy resources may result in the direct conversion of habitat, fragmentation, displacement of wildlife, and anthropogenic disturbance.
6) **Conservation awareness**
   Insufficient public recognition of the critical role resilient habitats and the important ecosystem services they provide for wildlife, water quality, and the well-being of North Dakota's communities.

For all habitat types, the following are the top recurring actions:

1) **Offer incentives and programs to protect, enhance, and restore habitat**
   The use of voluntary conservation programs is a common approach for landowners and partners to conserve habitat. Programs should encourage working lands, offer midterm conservation agreements for management and protection of habitat, and promote equal risk management for grassland-based agriculture.
2) **Control or reduce invasive species**
   Remove or reduce invasive or detrimental plants, noxious weeds, and woody vegetation by using grazing, fire, chemical and mechanical treatments. Enforce aquatic nuisance species and invasive tree pest regulations and recommendations.
3) **Offer incentives and programs to implement prescribed fire/controlled burns**
   Prescribed fire or controlled burns can improve the health of the ecosystem, reduce the intensity or risk of wildfires, and remove invasive plants.
4) **Support grazing as a grassland management tool**
   Promote and support regenerative grazing management and work with grass-based agriculture groups. Incentivize good grazing management, build market and corporate support of grass-based livestock, and promote carbon and biodiversity credits.
5) **Urge ecologically responsible energy development and suitable reclamation standards**
   Engage in early consultation and foster relationships with energy proponents, incentivize companies for implementing ecologically sound development, and urge requirements for prompt and proper reclamation.
6) **Public education and outreach**
   Enhance public awareness, understanding, and appreciation of North Dakota's diverse habitats and wildlife.

CHAPTER 6
MONITORING

This chapter includes information on the required element:

Element 5: descriptions of the proposed plans for monitoring species and their habitats identified in the first element, for monitoring the effectiveness of the conservation actions in the fourth element, and for adapting these conservation actions to respond appropriately to new information or changing conditions.

OVERVIEW

This chapter describes the process of adaptive management, a synopsis of habitat and species monitoring efforts, and opportunities for storing data that will be collected or compiled through implementation of the SWAP. These monitoring components complement each other and will provide a more comprehensive assessment of the efficacy of the SWAP.

Developing a multifaceted statewide monitoring program has many challenges. North Dakota is a large state of roughly 45 million acres, with about 90% held in private ownership. Approximately 600 species of vertebrates spend at least a portion of their life cycle within this geographic area. Roughly 120 - 150 of these species (largely game species) have varying degrees of monitoring or survey work conducted on them by several agencies. The two principal agencies that conduct much of that monitoring are the North Dakota Game and Fish Department and the U.S. Fish and Wildlife Service. The U.S. Forest Service, U.S. Army Corps of Engineers, U.S. National Park Service and various universities conduct lesser amounts. Most of the remaining 450 vertebrate species receive considerably less monitoring. Now with the addition of a host of invertebrates to the SWAP it includes more challenges. Most surveys conducted for these species are somewhat disjointed and/or are secondary in terms of monitoring objectives. A shortage of resources frequently limits the degree and scope of surveys which are initiated. In some instances, volunteers or private citizens with bird watching or similar interests carry out monitoring efforts. For example, each year the U.S. Geological Survey coordinates the annual Breeding Bird Survey, and the National Audubon Society coordinates a Christmas Bird Count; both are conducted largely by volunteers. Other examples include reptile and amphibian inventories on national parks and grassland bird surveys on fish and wildlife refuges.

There is no existing framework that can be easily modified to implement a monitoring plan for all the state's indigenous species and their habitats. Developing a monitoring plan for North Dakota's SGCN and habitats will require a multifaceted approach that includes but is not limited, to amalgamating the information from existing monitoring efforts to create a central reporting system and repository, modifying or expanding current surveys to include species of greatest conservation need where feasible, and implementing new monitoring efforts.

Perhaps most important to developing a statewide monitoring plan is pooling or sharing past, present and future survey information collected in North Dakota by land management agencies, universities, non-government organizations, the public, etc. Individually these monitoring efforts are somewhat small, infrequent, and often conducted on a local spatial scale (e.g. refuge or park). However, when information from these surveys is viewed collectively, or in conjunction with other surveys over time, meaningful presence, absence, range and distribution data can be generated. It is clear there will be a need to work cooperatively with these agencies, and across state lines, to coordinate monitoring efforts. The Midwest Landscape Initiative (MLI) is a coalition of state wildlife agencies and organizations in the 13 states of the Midwest Association of Fish and Wildlife Agencies (MAFWA). In November 2024, the MLI finalized *Inventory and Monitoring Resources for Midwest SWAPS and Regional Conservation Planning* to help inform Midwest SWAP monitoring.

ADAPTIVE MANAGEMENT

Adaptive management (Hollings 1987) is an iterative process to improve the speed with which we learn and incorporate that learning into management and planning. Adoption of adaptive management inherently makes the leap from implicit uncertainty in the knowledge of the systems under management, to explicit acknowledgement of key uncertainties about systems and management of those systems. Identifying and reducing the number of key uncertainties becomes an objective of system management.

There are several requirements or steps to building and adopting an adaptive management system. They are:

- Managers include scientists and stakeholders in planning of programs and developing of measures of effectiveness. In so doing three key elements are identified:
  - Measurable indicators of system responses to management alternatives.
  - Policies, programs or activities that will affect the system.
  - Ecological processes that link management actions to changes in the measurable indicators.
- Develop tools to predict outcomes from a suite of management alternatives.
- Identify key uncertainties in the system.
- Develop and implement management actions.
- Monitor indicators or proxies for responses to management actions.
- Evaluate information gathered during monitoring. This process includes reporting of consequences, development of recommendations to the management and stakeholders, and further refinement of key uncertainties and measurable indicators.
- Re-evaluation of management plans, programs or actions with stakeholders and scientists and adjusting (if necessary).

The objectives of a monitoring program are:

1. To assist in establishing scientifically based priorities for allocating limited resources.
2. Provide information and develop tools to assist management in decision making and planning.
3. To increase our ecological understanding of species and their habitats.
4. Provide data to identify and evaluate the effects of management actions and programs.

These objectives are consistent with the tenets of adaptive management, which is a system of improved management by design. Adopting an approach of proactive and flexible management is critical to the success of the SWAP. Functionally, managers have always adapted programs to better meet the Department's objectives. The use of an adaptive management system for monitoring species and their habitats will lead to more effective management of fish and wildlife resources.

This process is best suited for selecting between or prioritizing management actions. The elements of adaptive management will be addressed under three headings: Planning; Implementation; and Monitoring and Evaluation. Planning includes setting objectives, identifying key uncertainties, identifying indicators and formulating models. Implementation is where plans become action at the habitat and species level. Monitoring and evaluation can happen at two levels, either species or habitat measurements. The monitoring focus is determined by objective, ability and practicality.

Planning

The Department has an array of resources to incorporate into the planning process. These include, but are not limited, to federal, state, non-governmental conservation organizations, universities, and other scientists. These experts all have extensive knowledge and are involved with existing monitoring programs that can contribute to the overall wildlife planning community. A series of annual workshops involving both terrestrial and aquatic experts were used to develop threats and conservation actions for CWCS in 2005. These meetings included private, state, federal and academic experts in wildlife

research and natural resource management. Based on open discussions, priorities and uncertainties were identified and discussed at both the species and habitat level. This process was used again to revise the threats and conservation actions for the SWAP. In the fall of 2014, the NDGF convened the first SWAP Summit and in 2024 the SWAP Summit was repeated to review threats and conservation actions and identify emerging conservation issues (see Chapter 5). The Department recognizes that the complexity of information required to address adaptive management models for all species and habitats statewide does not exist. Through the expert workshops and SWAP planning process, the Department has amalgamated the information from all partners, as well as identified information that is lacking. Through this process the goal is to develop both qualitative and quantitative aspects of monitoring species and their habitats.

Implementation

Implementation involves following through with management and conservation actions on the landscape. From workshop and management planning efforts, either a single or suite of management actions will be developed. In a learning-modeling framework there are 3 ways to approach management alternatives. Each has differing costs in both time and money. These approaches are Trial and Error, Stepwise, and Complete Enumeration or the Horse Race approach (Figure 35). Trial and Error is a single step approach that is usually the least expensive method but can take substantially longer to evaluate programs with many alternatives for delivery. Stepwise is similar in cost to Trial and Error but can switch to an alternative without revisiting the planning process. Time is saved and monetary costs include the additional planning for alternatives. The Horse Race is the most efficient way to compare a suite of alternatives, but it can be prohibitive to implement and monitor all reasonable alternatives simultaneously. The approach best suited for each individual program or action will be used depending on logistics and budgets.

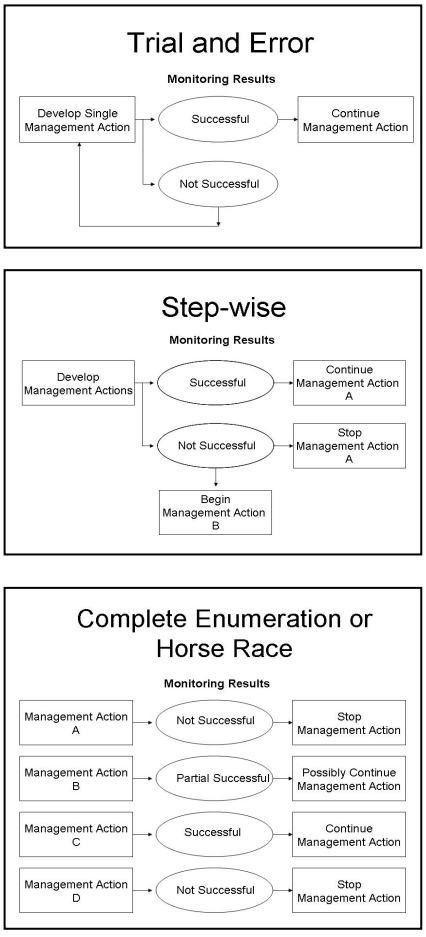


Figure 35. Visual depictions of Learning by Design.

Single species management for wildlife planning, such as raptor recovery or re-introduction type efforts, is rare and expensive. Management action usually involves providing for or protecting habitat necessary to the life cycle of one or more SGCN. Understanding habitat associations, and species response to habitat manipulation, becomes crucial to the evaluation of program delivery. As implementation actions are defined, mechanisms for measuring habitat capacity and/or species response must too. The Department will work from study results, existing literature or expert opinions and workshops, to identify mechanisms for measuring the success of specific conservation actions.

Monitoring and Evaluation

Monitoring is incomplete without evaluation. Monitoring is discussed here in the context that it leads toward evaluation and is not solely the "collection of data." Monitoring as a part of the adaptive management process is the periodic collection of data to be analyzed for the purpose of informing management on the efficacy of a program. Specifically, when possible, it is addressing the question, "Is/Are the management action/s having the intended species or habitat response?" The answers to this question are vital to the evolution of both science and management. Monitoring should be designed to help us to understand species or their habitats in a way that contributes to the ability to manage or benefit populations. Where information is lacking, it is necessary to develop demographic, range, population, and species habitat use information to begin the process of informed management planning.

HABITAT MONITORING

North Dakota has a diversity of habitat types and conditions. Quantity and quality of habitat in relation to the larger landscape, climate, land use practices such as grazing or fire, and various other biotic and abiotic factors will affect species' use of habitat. Many monitoring efforts focus on condition, quantity and quality of various habitats or landscapes. Most of these efforts are conducted by state and federal agencies. The following are examples of habitat monitoring that incorporate issues of scale and condition to track habitat quantity and quality over time at varying geographic scales. The Department will continue to use these monitoring efforts to assess changes in surveyed habitat.

- Four-Square-Mile Survey: In 1987, the USFWS initiated a survey to annually measure wetland habitat conditions and assess habitat use and productivity of waterfowl populations. This survey was developed by statisticians and biologists from Northern Prairie Wildlife Research Center and is administered and conducted in conjunction with USFWS HAPET offices. Conducted annually in a sub-sample of 500 foursquare mile plots throughout the Prairie Pothole Region of the U.S. (estimated 150-200 in North Dakota), and in more recent years has expanded to south and west of the Missouri River in North Dakota. The condition of habitat (e.g. wetland status, grassland, CRP) is documented in addition to waterfowl census. This effort attains habitat quantity, quality, and use information.
- Waterfowl Breeding Population and Habitat Survey for South and North Dakota: This aerial survey conducted in May of each year provides an overview of general waterfowl breeding population and climate conditions for most of North Dakota. The habitat information helps biologists make predictions as to the year's waterfowl production but could be utilized to make inferences of breeding habitat quantity and quality for other wetland associated birds. The number of wetlands and conditions (e.g. poor, good) are documented. This effort attains habitat quantity and quality information along with population estimates.
- US Forest Service Land and Resource Monitoring: The USFS conducts a variety of habitat monitoring efforts on the Little Missouri National Grasslands, Sheyenne National Grasslands, and Cedar River National Grasslands (collectively known as Dakota Prairie Grasslands) in North Dakota. Woody draw habitat trends in the badlands, Stream and Wetland Condition, Visual Obstruction Readings (VOR), and similarity index for seral state determinations (Floristic Quality Index) are just a few examples of habitat condition monitoring the USFS conducts. These are outlined in the Dakota Prairie Grasslands Biennial Monitoring Evaluation Report. This effort attains habitat quality information.
- North Dakota Forest Health - ND Forest Service: Through a cooperative agreement with the North Dakota Forest Service, North Dakota State University Extension Service, NDSU Department of Plant Pathology, and Department of Plant Sciences, a forest health specialist has been funded for North Dakota to coordinate and direct forest health monitoring and management throughout the state. This involves conducting insect and disease surveys, providing educational outreach, and delivering training and technical assistance to natural resource professionals. This effort led to the development of the *North Dakota Forest Action Plan*. This serves as a strategic framework to outline priority forest resources, designate important issues, and identify strategies to address challenges and opportunities. Additionally, the *Turtle Mountain Landscape Forest Stewardship Plan* was developed with a goal of establishing the current baseline condition of the forested resource and identify mutual goals for future forested conditions."
- Northern Research Station's Forest Inventory and Analysis (FIA) - US Forest Service: According to the USFS website "The Forest Inventory and Analysis (FIA) collects, analyzes, reports and distributes data about the Nation's forests: how much forest exists who owns it, what condition it is in, where it is located, and how it has changed". The North Research Station is responsible for inventorying more than 176 million acres of forest land spread across 3 states, including North Dakota. This information can be used in many ways, such as in evaluating wildlife habitat conditions, assessing the sustainability of ecosystem management practices, and supporting planning and decision-making activities undertaken by public and private enterprises. The FIA Program combines this information with related data on insects, diseases, and other types of forest damage and stressors to assess the health, condition, and potential

future risks to forests. The Nationwide Forest Inventory (NFI) component is the best-known component of the FIA program. This component consists of a three-stage systematic sample of sites across all forested lands of the U.S.

- Watershed Management Program – ND Department of Environmental Quality (DEQ): The Watershed Management Program is primarily responsible for monitoring and assessing water quality in streams, rivers, lakes and wetlands across North Dakota. This is done by developing Total Maximum Daily Loads (TMDLs), maintaining an ambient monitoring network, conducting lake water quality assessments, conducting biological monitoring and providing technical assistance for watershed projects. Additionally, implementation initiatives such as the Nutrient Reduction Strategy, the Basin Water Quality Management Framework and information/ education programs are conducted.
- North Dakota Game and Fish Department
    - Wildlife Management Area Field Mapping: The NDGF maps vegetation features and managed portions of state-owned wildlife management areas in a GIS. This effort included mapping the boundaries of fields, identifying the field status (e.g. native prairie, dense nesting cover, crop type), and activity for that year (e.g. idle, grazed, hayed, burned). This mapping effort will, over time, provide detailed, local level habitat status. This effort attains habitat quantity and quality information.
    - Photo Point Monitoring: The NDGF maintains a database of photo point locations on WMAs, PLOTS, and USFS managed land. Some photographs date back to 1960, allowing for habitat change monitoring over 50+ years.
    - Wildlife Management Areas Native Prairie Monitoring: Over the past several years, native prairie mapping has been done for all Wildlife Management Areas (WMAs). A total of 38,184 acres of native prairie were mapped statewide, approximately 17% of the total WMA acreage. There are grazing systems put in place on 34,389 acres, however, this is a mix of both native grasslands and replanted grasslands. In 2024, a monitoring system was put in place to begin to better understand the current conditions of the native grasslands throughout the state, with a priority given to tracts that have a current management regime (grazing system) in place. Working with the United States Fish and Wildlife Service, random transections were generated within WMA grasslands and a monitoring system was created, like that of the Native Prairie Adaptive Management protocol. Two seasonal employees were hired to collect data using the Belt Transect Method, working throughout WMAs in the western half of the state (to be continued in 2025 throughout the eastern half).
- Natural Heritage Inventory of Rare Communities – ND Parks and Recreation Department: The main purpose of the Natural Heritage Inventory is to identify North Dakota's natural features and establish priorities for their protection. Information from the Heritage Inventory has been used to identify high quality natural areas and potential nature preserves. This effort attains habitat quantity and quality information.

Monitoring Statewide Changes in Habitat

National Land Cover Database

The Annual National Land Cover Database (NLCD) provides a seamless land cover for the entire United States for the years 1985 to 2023. There are 16 standard land cover classifications that allow for comparing land cover changes and trends over time. Changes in pixels depict a change in land cover type, or habitat type. While the NLCD is not absolute, it is considered one of the leading tools for analyzing habitat changes on a statewide basis over time. Figure 36 depicts changes from herbaceous cover (grassland, pasture, shrubland and emergent wetlands) to cultivated cropland or developed from 2015 to 2023. The map illustrates the percent change or loss of habitat per 1 square mile that has occurred since the 2015 SWAP. Despite the collaboration among various partners to implement conservation strategies aimed at protecting, restoring, and enhancing habitats, these measures have not kept pace with the widespread habitat loss that has occurred in the past 10 years.

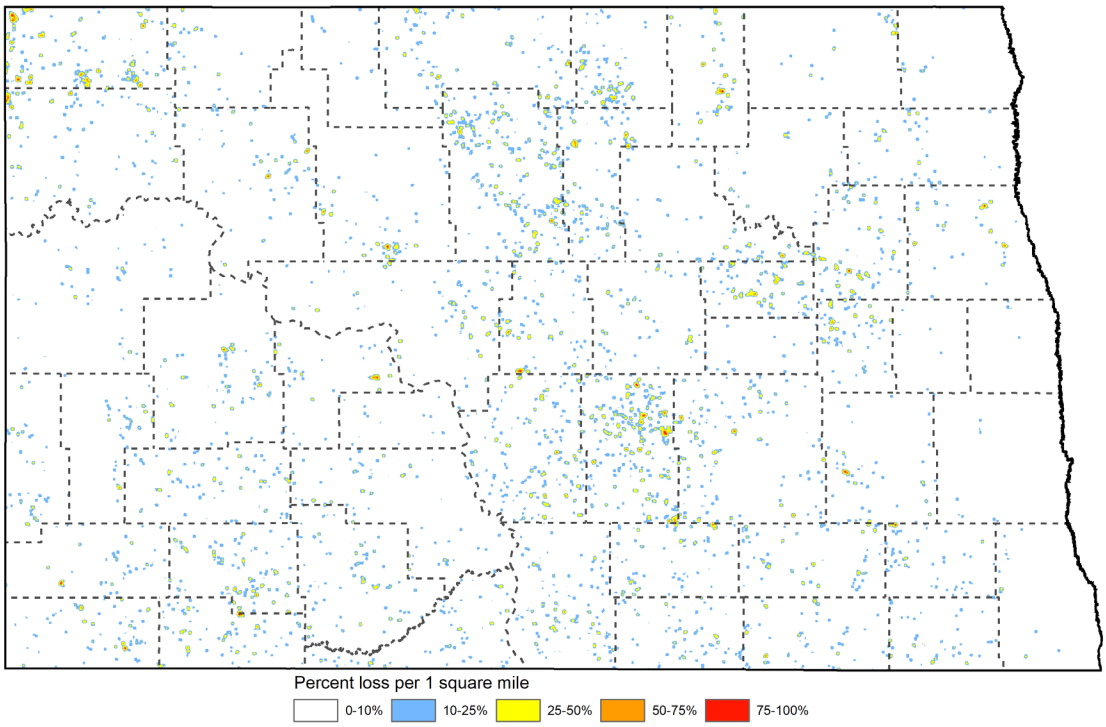
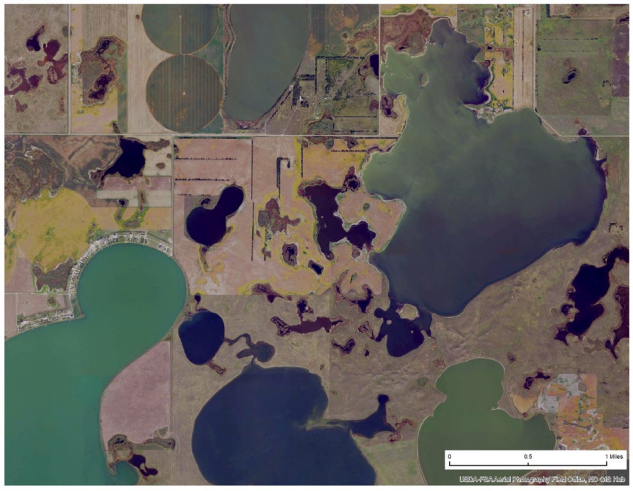


Figure 36. Change in grassland, shrubland, pasture and emergent wetland land cover classes to cultivated crops or developed land cover classes, from 2015 to 2023. Illustrated as percent change or loss of habitat per 1 square.

Wetlands

Of the nearly 5 million natural wetland acres, 60% have been lost or converted. Furthermore, the conversion of grasslands and changes in wetland hydrology, influenced by wetland drainage and consolidation, along with climate and alterations in land use, have had profound and lasting effects on the prairie and wetland ecosystems (Figure 37). See Case Study 3.

2004 aerial image of central Kidder County. More intact grasslands, wetlands, and abundant shoreline habitat availability for species such as Piping Plover.



2024 aerial image of central Kidder County. Landscape changes can cause a shift towards more permanent and full lakes, a phenomenon referred to as lakefication.

Figure 37. Illustration of hydrologic shifts in wetlands from 2004 to 2024.

Conservation Reserve Program

The USDA Conservation Reserve Program (CRP) has a significant positive impact on soil, water, and habitat conservation, making it one of the most remarkable conservation and wildlife success stories in North Dakota. Landowners can participate in various CRP practices, from planting native or introduced grasses to creating filter strips or specialized habitats like pollinator areas. The program's positive effects on wildlife, including increased waterfowl populations and improved grassland bird nesting, are well documented. CRP grasslands can be found in every county, ranging from near-pristine native grasslands to areas dominated by non-native species like Kentucky Bluegrass and Smooth Brome. Despite some CRP lands declining in quality over time, they still provide critical breeding and wintering habitats for numerous wildlife species. At its peak in 2007, CRP enrollment reached 3.38 million acres, but it has since declined by 63% to 1.24 million acres as of 2022 due to factors such as shifts in agricultural practices, lower rental rates, and reduced acreage caps (Figure 38). This decline has had a detrimental effect on many species of greatest conservation need and species of greatest inventory need. A stronger focus on working lands, an increase in rental rates, and a higher acreage cap may be needed to reverse this trend.

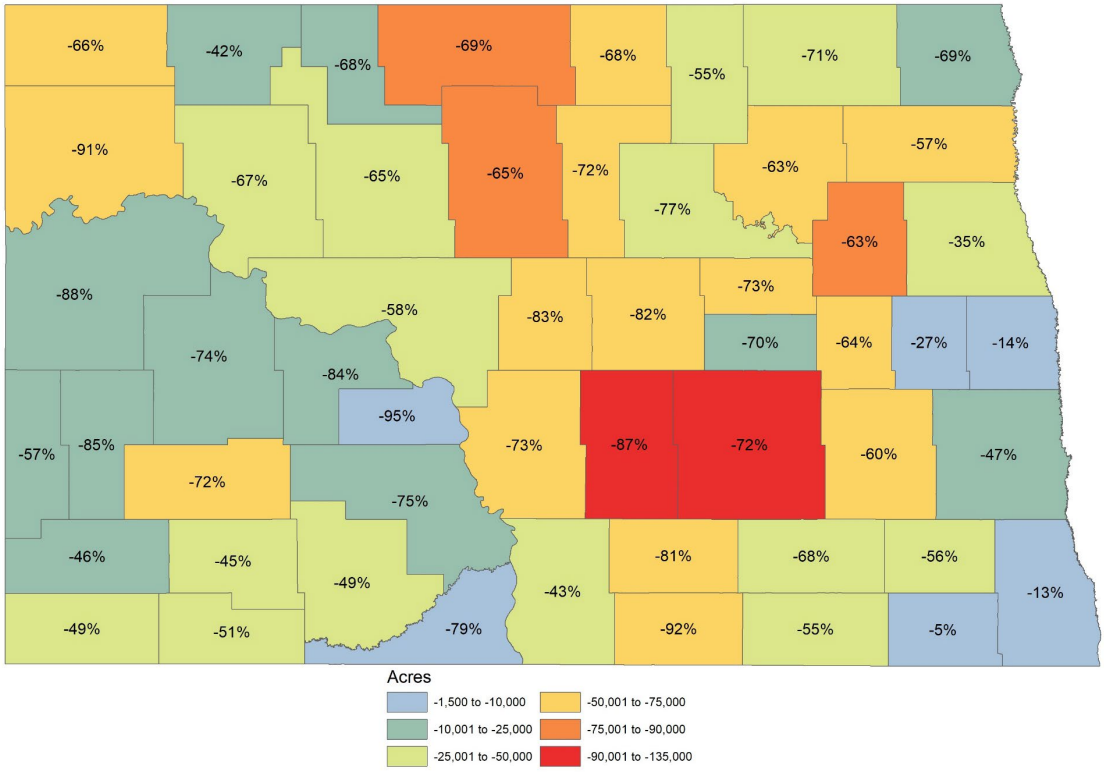


Figure 38. Percent loss of CRP general and continuous enrollment acres from 2007 to 2022.

SPECIES MONITORING

Species specific research and survey efforts, needs, and monitoring plans may be found in Appendices A-F.

BIRDS

There are 57 species of birds listed as SGCN, and 11 species listed as SGIN. This represents the largest group of taxa on the list, and some of the more commonly studied and/or monitored species. See Appendix A for species specific monitoring efforts. The USFWS and USGS are two key partner agencies that state wildlife agencies collaborate with on various bird monitoring programs. In March 2025, bird experts that work in North Dakota were asked for feedback on the significance of various bird monitoring programs and efforts in North Dakota. Experts were asked to score from 1 (least important) to 5 (extremely important) for maintaining or expanding various bird monitoring efforts in North Dakota. Some of the programs listed are well-established, while others have been minimally or never implemented in the state. See Appendix A for species specific monitoring efforts.

Extremely Important - Bird Survey/Monitoring Efforts to Maintain or Increase (in order from highest to lowest)

- Breeding Bird Survey – the best long-term population trend data for most breeding birds. Ensuring that all 44 BBS are executed every year is essential, and to strategically create new routes where needed.
- Waterfowl Breeding Population and Habitat Survey – critical for Adaptive Harvest Management and long-term trends of waterfowl populations.
- Four-square Mile Breeding Waterfowl Survey – critical for allocation of conservation resources.
- Lek Surveys – crucial for monitoring prairie grouse and good indicator nesting habitat quality and availability.
- eBird – demonstrates potential for various applications, yet there is a need for more skilled users to enhance its effectiveness.
- North American Bird Banding Program/Bird Banding Lab – critical national program for management of migratory birds and estimating vital rates, but should be used in targeted situations.

Important - Bird Survey/Monitoring Efforts to Maintain or Increase (in order from highest to lowest)

- Integrated Monitoring in Bird Conservation Regions – currently occurring in limited region of ND. Potential to survey areas typically not sampled and collect valuable data, but could duplicate other efforts that are less costly.
- Long-billed Curlew Survey – specialized survey but could be adapted to better complement other efforts (e.g., BBS).
- GPS or Satellite Tracking – valuable tool for species specific research needs.
- Raptor Nest Inventory – important to maintain for infrastructure siting and reducing impacts to sensitive raptors.
- Multi Species Inventory & Monitoring – not currently implemented in ND but would produce substantial dataset of species occupancy.
- Colonial Waterbird Inventory – periodic inventory (e.g. every 10 years) to track change in colony locations and size would be valuable.
- International Shorebird Survey – not currently implemented in ND. Necessary shorebird identification skills and fluctuating nature of suitable habitats might pose challenges for conducting surveys, yet the survey may provide valuable insights into at-risk shorebird populations.

Lower Importance - Bird Survey/Monitoring Efforts to Maintain or Increase (in order from highest to lowest)

- Inventory & Monitoring of Secretive Marsh Birds – not currently implemented in ND or possibly elsewhere. Methods could be used in future studies or improved with ARUs.
- Breeding Bird Atlas – interest exists in conducting a follow-up on Breeding Birds of North Dakota (Stewart, 1975), but number of people/birders and financial resources are limited.
- Integrated Waterbird Management & Monitoring – not currently implemented in ND. The Four-square Mile survey achieves similar outcomes and is regarded as a more effective survey.
- Motus Wildlife Tracking System – currently few towers in ND. It can best be utilized with targeted and species specific research needs.

- MAPS Program – currently one station in ND. Labor and time intensive but the program is valuable for assessing demographic information, especially if it targeted SGCN or SGIN.
- Nightjar Survey Network – not currently implemented in ND. Useful survey but few nightjar species in ND, and only one on SGIN list.
- Christmas Bird Count – positive effort to encourage birding as an outdoor activity, but limited use for managing wintering birds in ND.
- Breeding Shorebird Survey – specialized survey with specific objectives. The BBS achieves similar outcomes.

Additional Actions for Birds

- Future monitoring should follow recommendations North American Bird Conservation Initiative 'Opportunities for Improving Avian Monitoring'.
- Consider employing Autonomous Recording Units (ARUs) in existing and future monitoring/survey efforts.
- Explore the potential for surveys to address a wider range of birds, for instance, Piping Plover monitoring could also apply to other shorebirds that breed in the same areas.

AMPHIBIANS AND REPTILES

There are 2 species of amphibians, and 4 reptiles listed as SGCN, along with 4 amphibians and 8 reptiles listed as SGIN. There is no statewide monitoring effort in place. A monitoring system using presence/absence data will produce distribution trends over time. See Appendix B for species specific monitoring efforts.

Existing Surveys

- Reptiles and amphibians have been surveyed recently by North Dakota State University on select state Wildlife Management Areas.
- Smaller local surveys are being conducted by state universities. Records can be tracked in the NDGF nongame database.
- Citizen based reports are collected by private organizations such as Herpmapper.

National Surveys

Several national organizations have developed standardized monitoring protocols. Once these protocols are adopted as national standards, they could serve as potential monitoring schemes to consider for North Dakota.

- PARC - Partners in Amphibian and Reptile Conservation http://www.parcplace.org/
- ARMI – Amphibian Research and Monitoring Initiative http://armi.usgs.gov/
- NAAMP – North American Amphibian Monitoring Program https://www.usgs.gov/centers/eesc/science/north-american-amphibian-monitoring-program

Amphibian and Reptile Monitoring/Survey Goal

- No statewide monitoring effort is currently in place. Collaboration with NDSU to develop a citizen science-based monitoring protocol has occurred.

MAMMALS

North Dakota's SWAP includes 12 SGCN and 14 SGIN mammal species. A monitoring protocol for mammals, especially small mammals, has been identified as one of the greatest needs for mammal conservation. It was agreed that a monitoring system using presence/absence data to develop trends would be the most effective means for tracking changes in small mammal distribution over time. The NDGF has identified this as a major need in this SWAP and will continue to develop a monitoring protocol. See Appendix C for species specific monitoring efforts.

Existing Surveys

- Swift fox will be monitored by the NDGF.

- Black-tailed Prairie Dogs (BTPD) are monitored as part of a range-wide survey as stated in the North Dakota Black-tailed Prairie Dog Management Plan. The USFS Dakota Prairie Grasslands and Theodore Roosevelt National Park survey their lands for BTPD.
- Presence/absence of Black-Footed Ferrets will be noted during black-tailed prairie dog surveys.
- University research includes local level projects, typically on targeted species.

Mammal Monitoring/Survey Goals

- Development of an acoustic monitoring plan for bats is in development by the ND Bat Working Group, a group of state partners that includes the NDGF.
- The NDGF will partner and share information with various agencies where opportunities exist to best monitor mammal populations.
- The NDGF incidental reporting system will be used to augment data on mammal populations.
- The NDGF will continue work to develop a monitoring protocol to track species within the state.
- The NDGF will develop a protocol such that future funded research may be combined with other independent studies for more robust estimates based on sample size.

FISH

North Dakota's SWAP includes 16 SGCN and 3 SGIN fish species. Many of these species can be monitored by niche based upon habitat needs, such as riffle stream fishes. The list also includes species that must be monitored individually due to habitat preferences (e.g. Blacknose Shiner) or small population (e.g. Pallid Sturgeon). See Appendix D for species specific monitoring efforts.

Existing Surveys

- The NDGF partners with VCSU to survey select streams on a yearly basis.
- The NDDEQ IBI stream surveys and prairie fish surveys cover substantial reaches of major rivers in the state.
- Individual species monitoring, such as for pallid sturgeon, are conducted by partnering agencies.
- NDGF conducts annual surveys for young-of-the-year paddlefish and tags adult paddlefish.

Fish Monitoring/Survey Goals

- SGCN fish species are monitored with a combination of annual lake and river/stream surveys.

INVERTEBRATES

Invertebrates are the largest taxa group in North Dakota. Freshwater mussels have been included in the SWAP since its original development in 2005. In the 2015 revision, three butterflies were added. This edition will be the Department's first effort to include aquatic insects and a more robust evaluation of terrestrial insects. The NDGF does not currently monitor insect populations internally, but by working with and supporting partners, has begun to compile information, identify data gaps, and work towards a better understanding of population trends.

Terrestrial Invertebrates

Twenty-three terrestrial insects are identified as SGCN with another 37 listed as SGIN. See Appendix E for species specific monitoring efforts.

Insect Monitoring/Survey Goals

- Continue to compile insect data.
    - Presence/absence
    - Range and distribution
- Develop monitoring protocols for species added to the SGCN list.

Aquatic Invertebrates

Insects are the largest taxa group in North Dakota and ten specific taxa have been incorporated as SGCN. The NDGF does not monitor insect populations currently but recognizes the importance of gathering this information. The lack of information on insect populations is a daunting task to overcome. The NDGF has started to compile known information to identify the most important data gaps. The Department also plans to begin evaluating aquatic insect assemblages on waterbodies associated with state Wildlife Management Areas. See Appendix F for species specific monitoring efforts.

Existing Surveys

- No existing NDGF annual surveys are in place, but development of standardized surveys are currently planned.
- The NDDEQ surveys aquatic insects as a part of an IBI development and stream assessment program for prairie streams.
- University research conducts surveys on a local level.

Insect Monitoring/Survey Goals

- Continue to collect data to develop range and distribution on aquatic SGCN.

Freshwater Mussels

Ten species of mussels are listed as SGCN. This represents two thirds of the species known to inhabit North Dakota. Freshwater mussels have been surveyed by VCSU through various SWG projects, and a framework monitoring protocol was developed. See Appendix F for species specific monitoring efforts.

Existing Surveys

- Freshwater mussels will be surveyed periodically by contract to track populations.

Freshwater Mussel Monitoring/Surveys Goals

- Implement a monitoring protocol to evaluate freshwater mussel species within the state using information gathered during opportunistic SWG projects.

THREATENED AND ENDANGERD SPECIES

There are twelve federal threatened or endangered species on the SGCN or SGIN list. These include Whooping Crane, Piping Plover, Red Knot, Pallid Sturgeon, Black-footed Ferret, Northern Long-eared Bat, Suckley's Cuckoo Bumble Bee, Rusty Patched Bumble Bee, Monarch Butterfly, Regal Fritillary, Poweshiek Skipperling, and Dakota Skipper.

Existing Surveys

- Whooping Crane: spring and fall migration sightings are reported to the USFWS or NDGF Migratory Game Bird Biologists.
- NPWRC is leading research and survey efforts on Piping Plovers.
- The USACE conducts annual monitoring of Piping Plovers and Least Terns along the Missouri River System.
- The USFWS monitors Pallid Sturgeon in the Missouri River system.
- Black-footed Ferrets are considered extirpated but would be reported if sighted during Black-tailed Prairie Dog surveys.
- Black-footed Ferrets identified in the Department's Furbearer Observation Report will be investigated.
- Dakota Skipper are currently monitored closely at known sites as well as potential sites identified by surveyors.
- Several partners survey bats annually in the state. Northern Long-eared Bats are report to the USFWS.
- Pollinators have been surveyed by NDSU, USGS Northern Prairie Wildlife Research Center, and USFWS HAPET.

STATE WILDLIFE GRANT SUCCESS STORY

Producing Beef and Birds: Impacts of High Intensity Short Duration Grazing on Grassland Songbirds

Grasslands are the most endangered habitat type on the continent, and in the world. As grasslands disappear, the species that rely on these ecosystems disappear alongside them. One example is the decline of grassland songbirds, who were found to be the most at-risk bird species group with nearly 75% of grassland species exhibiting population declines. Given the 15.6 million acres of grasslands in North Dakota, many of which are primarily used for cattle production, there are opportunities to engage in different rotational grazing methods that provide dual outcomes for livestock and grassland birds simultaneously. Currently available research has examined the effects of cattle grazing on variables such as forage production and on grassland nesting birds, however, such research has focused primarily on continuous and longer rotational (LR) grazing methods. A shorter rotational grazing system with higher stocking rates and shorter paddock times called high intensity, short duration (HISD) has recently received attention due to its ecosystem benefits such as carbon sequestration, water filtration, and other ecosystem services. Considering the drastic declines in grassland bird populations, there is interest in understanding the impact of HISD on this important avian group.

The following research questions were asked as it relates to grassland bird production in LR and HISD grazing practice systems: Does nest success of grassland nesting songbirds, shorebirds, waterfowl, and grouse vary between HISD and traditional rotational grazing practices? Does total nesting productivity (number of nests and nest success of grassland nesting songbirds, shorebirds, waterfowl, and grouse) vary between HISD and traditional rotational grazing practices? Do structural vegetation measures generally important for nest success vary between HISD and traditional grazing practices? What factors predict nest success for grassland nesting birds in grazed grasslands (e.g., vegetation structure, grazing practice, abiotic factors, etc.)?

From 2020-2025, a State Wildlife Grant was awarded to the University of North Dakota to carry out this project. Taylor Linder, Graduate Research Assistant, UND, led the research under Dr. Susan Ellis-Felege (UND), Marissa Ahlering (The Nature Conservancy), and Kaylan Kemink (Ducks Unlimited). Completion of the dissertation, in addition to publication of individual chapters, is anticipated in late 2025. Preliminary results indicate significantly more species on HISD sites compared to LR grazing sites; nest trampling was overall very low and more likely to occur on LR grazing sites; and Chestnut-collared Longspurs and Horned Lark were greater on LR grazing sites compared to HISD sites. Overall, there were insignificant differences in reproduction variables between the grazing practices.

MONITORING CONSERVATION ACTIONS

Understanding species response to conservation actions is crucial to program delivery. As SWG funded conservation actions are implemented, monitoring the effectiveness of the actions will be a requirement of each project. Each project will identify specific objectives, deliverables, and a plan, including the appropriate geographic scale, for how it will be monitored. Monitoring may be limited or less frequent for those conservation actions that have demonstrated beneficial effects. Conservation actions that do not meet the project's objectives will be reevaluated. In addition to SWG funded conservation actions, partners will be encouraged to monitor conservation actions affecting SGCNs and associated habitat.

DATABASES

Databases of existing and newly obtained information allows the Department and partners to evaluate conservation actions and conservation goals based on the best available information. This will be a key component in maintaining efficient adaptability of the state's plan as we progress into the implementation phase. It will also provide enhanced accessibility and additional information to be used in revisions of the state's SWAP. There are several options for storing and obtaining spatial data and other information to support habitat and species monitoring efforts. Databases or opportunities which will be used are presented below.

ND Game and Fish Department Spatial Database

The nongame database was developed to maintain spatial information on SGCN and other nongame species. Data incorporated into the nongame database is derived from several sources including SWG projects, Department survey efforts, Scientific Collection reports and the public. This information is used to augment other monitoring efforts to bolster knowledge of these species. The Department also maintains an extensive database of fish and wildlife information which is available only to Department staff. Examples include grouse lek sites, nongame fish stream sampling, Black-tailed Prairie Dog towns, or telemetry data. GIS databases will continue to grow in use for maintaining species and habitat information.

North Dakota GIS Hub

The North Dakota GIS Hub was created in 2001 because of widespread demand from state agencies wanting a mechanism for sharing the great amount of GIS data useful to many agencies. The GIS Hub provides easy and quick access to a large amount of geographic information such as aerial imagery, land cover, topography, National Wetlands Inventory, statewide parcel dataset, federal and state land ownership, roads and more. All data is available for download and can be accessed. The ND GIS Hub may be found at https://www.gis.nd.gov/

The North Dakota Natural Heritage Program

Within North Dakota, the ND Parks and Recreation Department (NDPRD) Natural Heritage Program has served as a repository for rare and unique species and habitat information. However, a lack of funding and other resources has limited the effectiveness of the program with respect to data entry, retrieval and the ability of staff to network with those who carry out monitoring and survey efforts across the state. The Department provided the Natural Heritage Program with a state wildlife grant to upgrade its software to allow for more efficient data entry and retrieval. The Natural Heritage Program serves as the primary repository for plant information and the Department is the primary repository for wildlife information. In 2010 the Natural Heritage Program staff developed a list plant species of conservation priority and completed a species account for each, including conservation threats and actions. Although the SWAP may include information on plants, use of SWG funding restricted to wildlife and their habitats. Nonetheless, plants compose habitat, and many species are rare and/or declining. The supplementary plant document may be requested from the Department or NDPRD.

CHAPTER 7
REVIEWING THE STATE WILDLIFE ACTION PLAN

This chapter includes information on the required element:

Element 6: descriptions of procedures to review the SWAP at intervals not to exceed ten years.

Each state is required to update the SWAP at least every 10 years. To meet the 2025 SWAP deadline, Department staff initiated the revision process in 2023. Over the next 18 to 20 months, substantial time was devoted to extensive scoping, communicating with our partners and the public, amalgamating new information, reviewing documents and a host of other tasks associated with revising a larger strategic level planning document. Based on our experience with this process, and the level of satisfaction from our partners and the public, we do not believe that the benefits of revising the SWAP more frequently (e.g. every 5 years) is justified. Should an emerging issue arise that requires a revision to the SWAP, such as adding SGCNs, the Department will conduct a Minor Revision. The Department commits to a Major Revision of the SWAP in 2035.

STATE WILDLIFE ACTION PLAN PARTNER SUCCESS STORY

The Meadowlark Initiative

The Meadowlark Initiative was created in response to the steady decline of North Dakota's state bird, the Western Meadowlark, which has been decreasing at a rate of approximately 1% per year and is listed as a Species of Greatest Conservation Need (SGCN) in both the 2015 and 2025 North Dakota State Wildlife Action Plans. Launched in 2020 by the NDGF, the Meadowlark Initiative is a statewide strategy that brings together the knowledge, resources, and efforts of partners in conservation, agriculture, and industry to enhance, restore, and sustain North Dakota's native grasslands. The ongoing loss of prairie affects not only grassland-dependent species, but also people, communities, traditions, and overall quality of life—impacting water, soil, energy, and food systems. The initiative envisions vibrant, healthy grasslands that support biodiversity and foster prosperity for wildlife, pollinators, ranching operations, and local communities. The Meadowlark Initiative is not a standalone program, but a coordinated effort among multiple partners to sustain North Dakota's grasslands- a Conservation Action consistently prioritized in all versions of the SWAP.

In 2021, the Meadowlark Initiative Regional Conservation Partnership Program (RCPP) was approved by the USDA Natural Resources Conservation Service. Fourteen partner organizations have committed to combining their resources to leverage RCPP funding, using an innovative spatial modeling approach to prioritize land management and conservation rental activities. Their shared goals include converting 20,000 acres of marginal cropland to diverse native perennial vegetation, enhancing 50,000 acres of existing and restored native grasslands, and restoring or improving 10,000 acres of wetlands within reconstructed grassland complexes.

CHAPTER 8
COORDINATING WITH PARTNERS AND THE PUBLIC

This chapter includes information on the required elements:

Element 7: coordinating the development, implementation, review, and revision of the plan with Federal, State, and local agencies and Indian tribes that manage significant land and water areas within the State or administer programs that significantly affect the conservation of identified species and habitats.

Element 8: broad public participation is an essential element of developing and implementing the SWAP, the projects that are carried out while the SWAP is developed, and the Species in Greatest Need of Conservation that Congress has indicated such programs and projects are intended to emphasize.

COORDINATING WITH PARTNERS

Strengthening and developing partnerships is essential to the success of the SWAP. During the initial development of the 2005 SWAP, this was achieved through two main approaches: group meetings and individual outreach. Initially, group meetings were held to introduce the newly implemented SWG program and gather broad insights from larger groups of experts on the state's natural resources. After synthesizing this information, individual experts were consulted to further refine the ideas. This process not only laid the foundation for the original SWAP but also opened an ongoing line of communication between the Department and its partners that continued through the 2015 and 2025 SWAP revision. The exchange of information between our partners and the Department is a continuous process, but there was a need to provide a way to connect our partners together to share new information and spark new ideas to further the conservation of SGCNs and their habitats. To promote the sharing of information, several gatherings have been held, including SWAP coordination sessions in 2006 and 2010, and SWAP Summits held in 2014 and 2024.

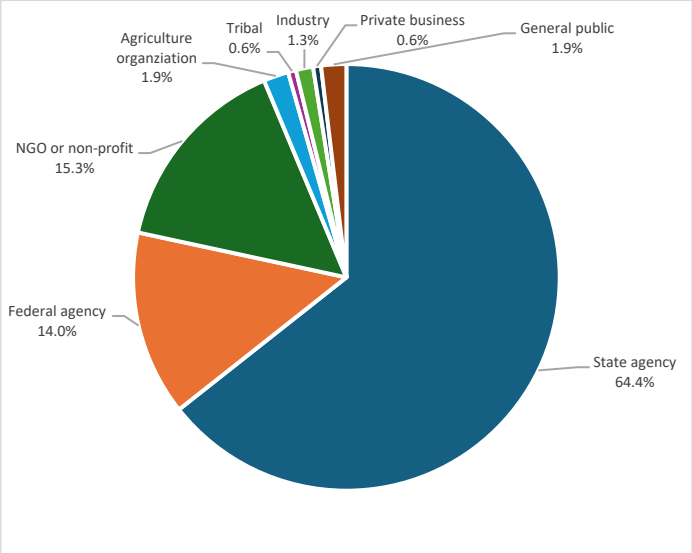
The success of these partnerships is evident not only in the achievements under the SWG program, but significant progress has been made in the conservation of SGCNs and their habitats by partners through various programs. Over the past two decades, nearly 75 SWG partner projects have been completed, encompassing all taxa and providing valuable research and conservation implementation based on the SWAP. See https://gf.nd.gov/wildlife/swg. The variety of projects and the large number of partners highlight the strength of the state's SWAP, demonstrating widespread commitment not only from Department staff but also from partners across the fish and wildlife community.

Beyond using SWG funding, conservation partners have played a vital role in implementing and delivering the ND SWAP by contributing expertise, resources, and on-the-ground support to protect the state's diverse habitats and wildlife. Through collaborative efforts involving state and federal agencies, non-profit organizations, tribal entities, private landowners, and academic institutions, these partners have helped prioritize conservation actions, conduct critical research and monitoring, and enhance habitat restoration projects. Their collective efforts ensure the plan's goals are translated into effective conservation outcomes, fostering a landscape where wildlife populations can thrive while balancing the needs of local communities and land use.

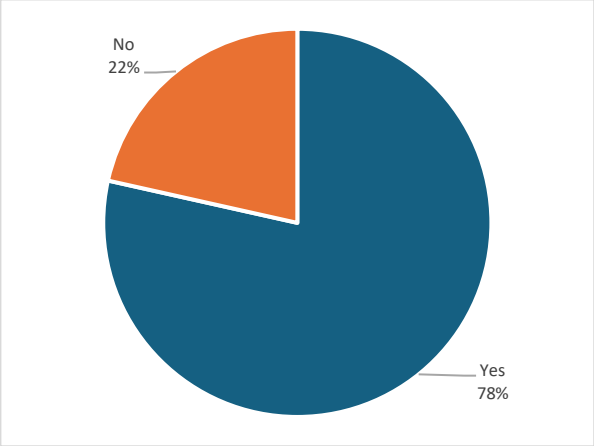
SWAP Stakeholder Survey 2022

On November 3, 2022, the Department requested partners to complete a SWAP survey on how they use the plan and what areas of the plan or emerging issues they would like to see emphasized. The survey closed on December 15, 2022, and 195 responses were counted. This survey helped guide the Department in revising the 2025 SWAP. The following are the key results from the survey:

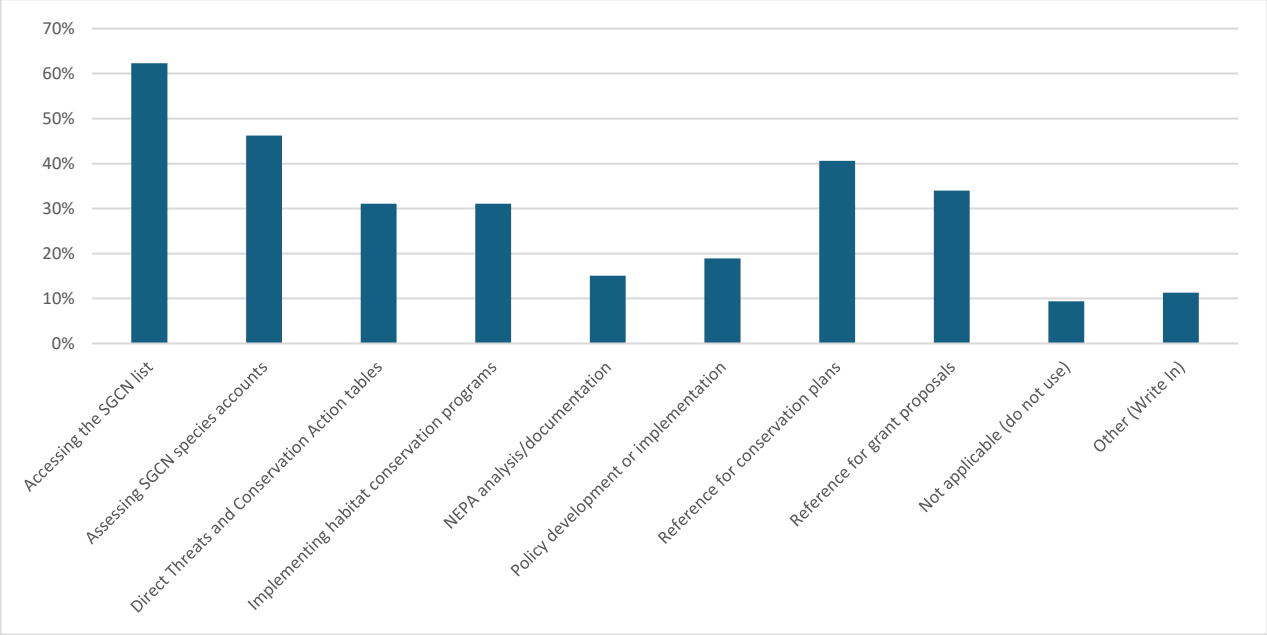
Who do you work for or represent?



Are you familiar with the 2015 State Wildlife Action Plan, including the plan itself or the 115 species listed?

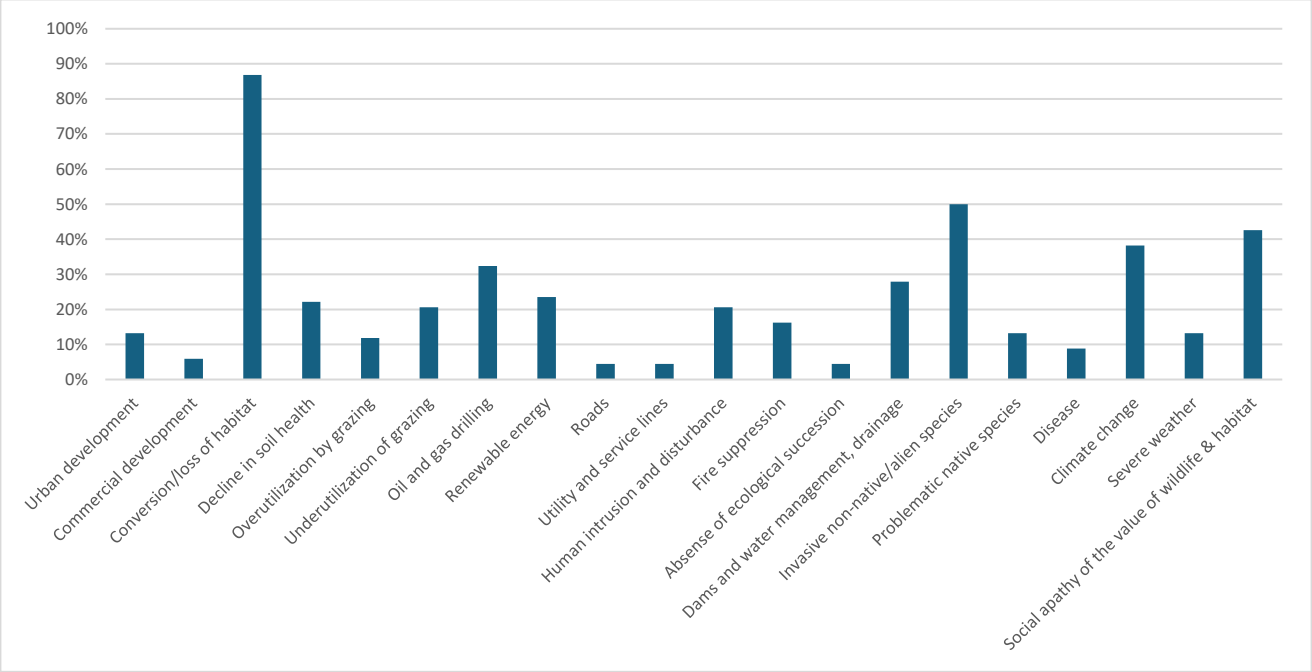


How do you use the 2015 ND State Wildlife Action Plan? Check all that apply.

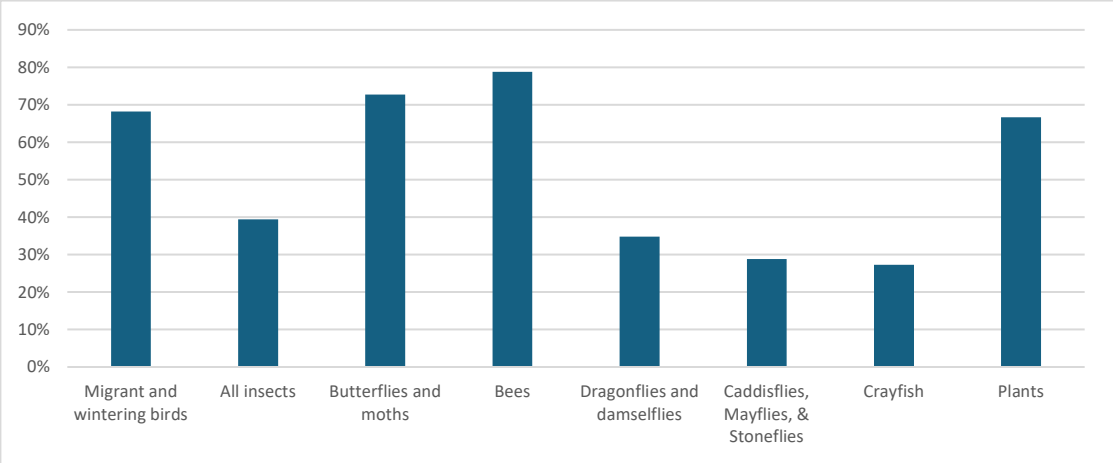


'Other' Write Ins: developing research objectives to inform species management; education or teaching; ensuring ND Administrative Code is protective of aquatic species; Integrated Natural Resources Plan (Sikes Act); media programs; Outdoor Heritage Fund; reference for publications; Surface Coal Mining Wildlife Inventory and Monitoring Plan; Climate Change addendum for class activity; Wetland Mitigation Banks; pollinator projects; environmental analysis of roadway projects.

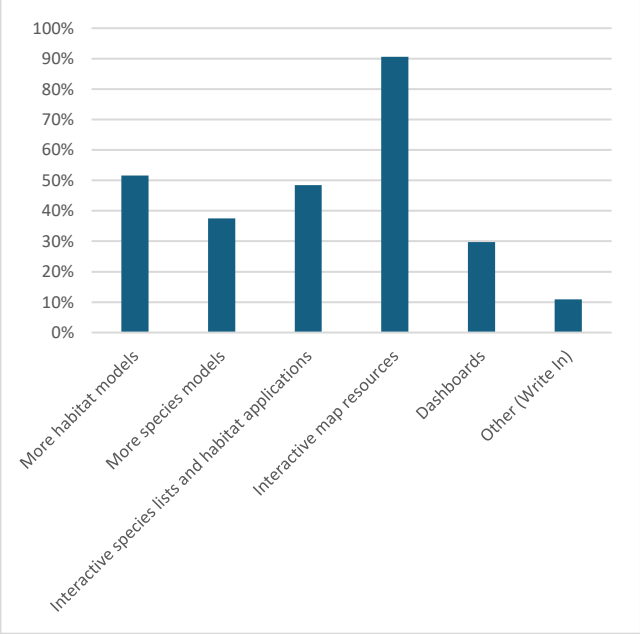
What challenges or threats do you see as most important to species in North Dakota? You may select up to 5 options.



The current species list includes birds (breeding birds and ESA listed), mammals, reptiles and amphibians, fish, freshwater mussels, and the four insect species listed or proposed for listing under the ESA. Please indicate if you think we should consider the following species/groups of species for the 2025 list:

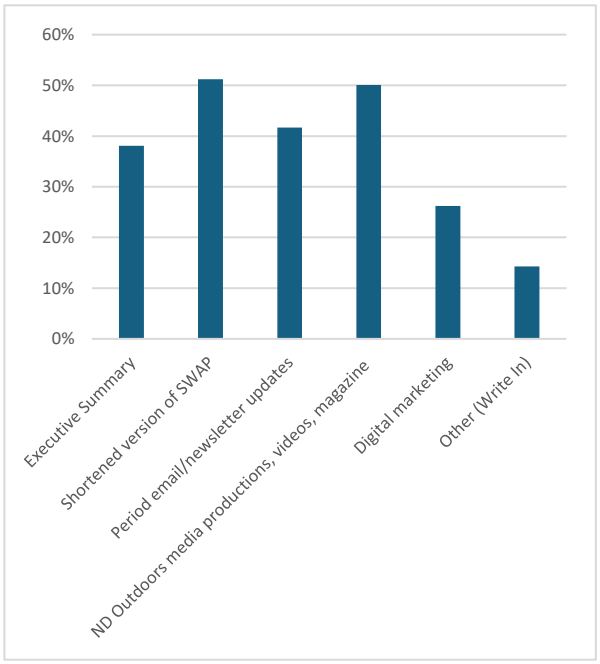


What tools do you want to see included in the next version of the ND State Wildlife Action Plan?



'Other' Write Ins: climate projections and range shift models; landscape and habitat management; known species and habitat details (finer than county level); links to other species management plans; more citizen science.

How else could we improve the ND State Wildlife Action Plan to make it easier to use, more accessible or more recognized? Check all that apply.



'Other' Write Ins: alphabetize the species lists; awareness campaign; FAQ sheet; infographics or one-pagers; public outreach focus on landowners/small towns; radio programs; action videos to support species.

Figure 39. Results from 2022 stakeholder survey.

Individual Partner Coordination Meetings 2023-2024

From late 2023 through April 2025, the Department met one-on-one with partners to discuss the SWAP revision, changes proposed for the 2025 plan, needed improvements, and for the partners to contribute their knowledge and expertise early in the process. Meetings were held in-person or virtually and started with the Department providing a brief history of the SWAP, significant changes proposed (i.e., changing the name from Species of Conservation Priority to Species of Greatest Conservation Need, including insect SGCNs), followed by an open discussion about how partners use the SWAP.

Table 34. State Wildlife Action Plan partner meetings for the 2025 update.

PARTNER COORDINATION MEETINGS			
PARTNER	DATE	PARTNER	DATE
US Forest Service	12/12/2023	FMHA	2/1/2024
North Dakota Dept. of Environmental Quality	12/13/2023	North Dakota Dept. of Water Resources	2/1/2024
North Dakota Dept. of Transportation	12/20/2023	US Army Corps of Engineers	2/1/2024
University of Jamestown	1/4/2024	EPA	2/1/2024
Prairie Pothole Joint Venture	1/5/2024	Pheasants Forever	2/5/2024
World Wildlife Fund	1/8/2024	United Tribes Technical College	2/5/2024
North Dakota Parks & Recreation	1/16/2024	US Fish & Wildlife Service	2/6/2024
University of North Dakota	1/17/2024	North Dakota State University & Extension Service	2/6/2024
North Dakota Public Service Commission	1/18/2024	North Dakota Trust Lands	2/12/2024

PARTNER COORDINATION MEETINGS			
PARTNER	DATE	PARTNER	DATE
The Nature Conservancy	1/19/2024	North Dakota Wildlife Federation	2/13/2024
Valley City State University	1/19/2024	Ducks Unlimited	3/27/2024
North Dakota Natural Resources Trust	1/23/2024	Audubon Great Plains	4/15/2024
American Bird Conservancy	1/23/2024	Delta Waterfowl	4/16/2024
Northern Great Plains Joint Venture	1/24/2024	USGS Northern Prairie Wildlife Research Center	5/6/2024
USDA-NRCS	1/24/2024	Rancher/Grazer stakeholder meeting	5/14/2024
North Dakota Forest Service	1/25/2024	National Park Service	5/16/2024
USDA – Wildlife Services	1/29/2024	Grazing Association	5/22/2024
Turtle Mountain Band of Chippewa Indians	1/31/2024	SWAP Summit	9/11/2024
Xerces Society	1/31/2024	NDDOT Tribal Coordination Meeting	4/9/2025

SWAP Summit 2024

On September 11, 2024, the NDGF hosted a second State Wildlife Action Plan Summit. The meeting was attended by 62 participants from 30 different state and federal agencies and NGOs, in addition to 14 NDGF staff members who were either running the event or participating in the sessions. Like 2014, the summit began with a SWAP overview, the process used to revise the species of greatest conservation need list, ideas for improving the SWAP for useability, and a presentation from the North Central Climate Adaptation Science Center on incorporating climate change in the SWAP. The results of this meeting formed the foundation of Chapter 5, Threats and Actions.

Grasslands and grazing tour, July 2021.

NDGF and Minnesota DNR view the Drayton Dam modification.

NDGF Director Jeb Williams speaks at a Habitat and Hunting Access Summit in December 2024.

Research Ecologist Andy Boyce releases a Western Meadowlark fitted with a GPS transmitter.

STATE WILDLIFE ACTION PLAN PARTNER SUCCESS STORY

Outdoor Heritage Fund – Working Grassland Partnership

North Dakota's Outdoor Heritage Fund (OHF) was established in 2013 as a program to provide grants to state agencies, tribal governments, political subdivisions, and nonprofit organizations for conservation practices. The OHF will receive up to $40 million per biennium from oil and gas production tax revenue. Higher priority is given to projects that enhance conservation practices in this state by supporting one or more statutorily identified directives: access to private and public lands for sportsmen and women; improving, maintaining and restoring water quality, soil conditions, plant diversity, animal systems, and by supporting other practices of stewardship to enhance farming and ranching; developing, enhancing, conserving, and restoring wildlife and fish habitat on private and public lands; and conserving natural areas and creating other areas for recreation through the establishment and development of parks and other recreation areas.

The North Dakota Natural Resources Trust submitted the original Working Grassland Partnership (WGP) proposal to OHF in 2016. The need to maintain grassland habitat in North Dakota is vitally important for the wildlife species that depend on healthy grasslands. The WGP proposal acknowledged the North Dakota State Wildlife Action Plan and the decline of grassland-dependent species, such as the Western Meadowlark, as key reasons for the project's necessity. The WGP focuses on expiring CRP grasslands and providing options to landowners to retain these acres in grassland. Incentive-based upfront least payments and cost-share is provided to private landowners for grazing infrastructure, to transition former CRP acres into working, bird-friendly grazing lands for livestock operations. Due to the success of the WGP, the North Dakota Natural Resources Trust has submitted additional Outdoor Heritage Fund proposals and is now working on its seventh award. To date, WGP grants from the OHF have resulted in 196 landowner agreements and the enrollment of 84,650 acres.

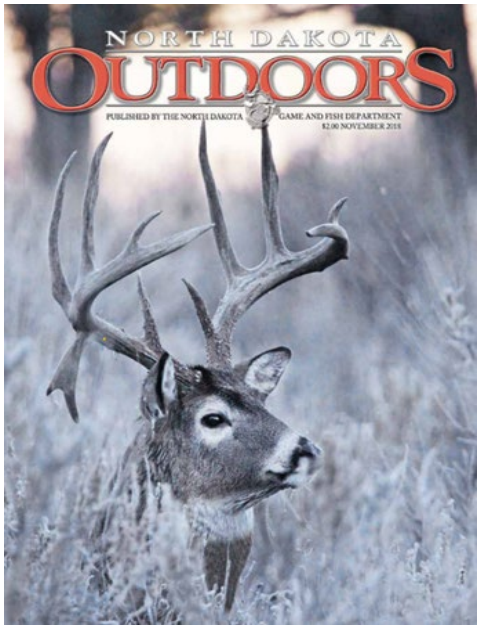
PUBLIC PARTICIPATION

The mission of the North Dakota Game and Fish Department is to protect, conserve, and enhance fish and wildlife populations, along with their habitats, to support both consumptive and non-consumptive public use. The Department serves as the primary governmental advocate for fish and wildlife, working diligently to conserve and improve these resources while safeguarding them from irreversible harm. Their goal is to ensure the long-term preservation of these natural resources for the benefit of North Dakota's citizens. As part of this responsibility, the Department recognizes the importance of keeping the public informed about local and national fish and wildlife issues. To achieve this, the Department employs various tools to communicate the progress and objectives of the State Wildlife Grants program and the State Wildlife Action Plan. A key method is through direct interaction between Department biologists and the public. The Conservation Division staff, well-versed in SWG and SWAP message, effectively relay this information through media and in-person engagements. These staff members participate in numerous interviews and public presentations throughout the year, serving as an effective source of information.

The Department's Communications Division also plays a crucial role in public outreach, utilizing digital media, video, and print to share important updates. Over the past decade, several broadcast news features have been produced on SWG-funded research and priority conservation species. These stories air statewide on network television and local cable channels. Additionally, the Department offers a weekly webcast on their website, featuring interviews with experts on various topics. The department also publishes a monthly magazine, *North Dakota Outdoors*, which regularly highlights wildlife issues, including detailed coverage of the SWG program. The magazine has featured extensive articles on SWG and SGCN efforts. All these resources are accessible on the Department website, making information on the benefits of the SWG programs widely available to the public.

Table 35. ND Outdoors magazine articles pertaining to the SWAP, SWG, or SGCNs and nongame species.

ND OUTDOORS MAGAZINE	
TITLE	DATE
Focus on Grasslands in a Prairie State	July 2016
Moss-back Makeover - Snapping Turtles in North Dakota	October 2016
Migratory Bird Treaty Turns 100	October 2016
North Dakota's Shorebird Connection	May 2017
Sage Grouse Recovery Effort Underway	May 2017
Milkweeds for Monarchs	June 2017
Forgotten Fish of Western North Dakota's Small Streams	June 2017
Grassland Birds	July 2017
Keeping Common Birds Common	June 2020
Powerful Prairie Melody Fading	June 2021
Lasting Look at Conspicuous Birds	June 2022
Rattlesnake Health Check	July 2022
Answering Curlew Questions	June 2023
Birding Beyond Your Back Yard	July 2023
Sturgeon Return to Pembina River	November 2023
Soaring out of Obscurity	May 2024
Last of the Leks	May 2024
Study Follows State Bird	June 2024



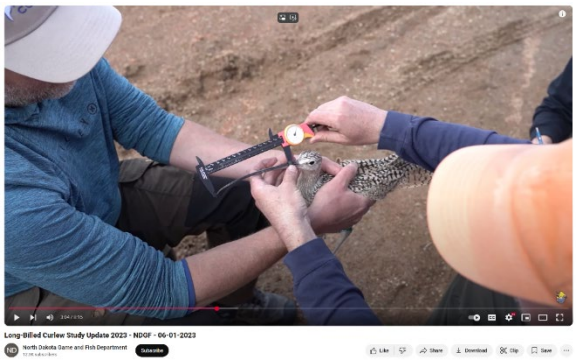
ND OUTDOORS MAGAZINE	
TITLE	DATE
New Species Added to SWAP	July 2024
Listening for Grassland Birds	July 2024
Water Quality Indicators	November 2024
A Checkoff for Nongame	February 2025

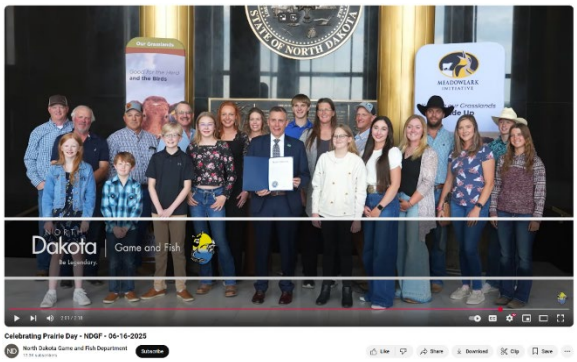
Table 36. ND Outdoors broadcast news features pertaining to the SWAP, SWG, SGCNs, or other nongame species.

ND OUTDOORS NEWS BROADCAST TV			
TITLE	DATE	TITLE	DATE
State Wildlife Action Plan	05/18/2015	North American Wetlands Conservation Act	12/03/2019
Turtles in ND	07/14/2015	Bird Watching	04/28/2020
Pollinator PLOTS	08/10/2015	Baby Animals	06/15/2020
Northern Prairie Wildlife Research Center	09/15/2015	American Bitterns	08/24/2020
River Watch	10/19/2015	Wetland Restoration Project	09/22/2020
Swift Fox Survey	11/16/2015	Mussel Relocation on the Sheyenne River	11/16/2020
Wetland Recharge	04/11/2016	Bald Eagle Comeback	03/16/2021
Pollinator Plots	05/31/2016	The Importance of Pollinators	04/20/2021
Grassland Birds	06/27/2016	Prairie Chicken Partnership	04/27/2021
Monarch Study	07/05/2016	Bat Study	06/28/2021
Bee Study	08/09/2016	Conservation Forage Program	07/05/2021
Prairie Rattlesnakes	10/24/2016	Ruffed Grouse Displaying	04/14/2022
CREP – NDGF	04/24/2017	Long-billed Curlew Study	06/14/2022
Sage Grouse Transplant	05/08/2017	Counting Birds for Nearly 60 years!	07/11/2022
Watchable Wildlife Photo Contest	09/04/2017	Rattlesnake Den	07/14/2022
Painted Lady Butterflies	09/25/2017	Grazing-Grasslands-Birds	08/15/2022
Aspen Tree Management	11/20/2017	How You Can Help Pollinators!	04/25/2023
Owls	03/05/2018	Long-billed Curlews Returned to North Dakota	06/05/2023
Paddlefish Tagging	04/30/2018	Paddlefish Tagging Garrison Reach	06/13/2023
Monarch Life Cycle	06/22/2018	Toad Study	07/17/2023
Grassland Birds	07/02/2018	Drayton Dam Modification	10/02/2023
Conservation and Outdoor Skills Park	07/05/2018	Lake Sturgeon Stocking	10/11/2023
Burrowing Owls	08/13/2018	Watchable Wildlife Tax Checkoff	02/26/2024
Pollinator Project	09/24/2018	Bald Eagle Nests	04/01/2024
Stream Fish Surveys	10/01/2018	Sage Grouse 2024	04/22/2024
Paddlefish Stocking	10/22/2018	Western Meadowlark Tagging	06/10/2024
Monarch Park Pass	03/11/2019	ARUs and Grassland Birds	07/08/2024
Bald Eagle Nests	04/09/2019	Aquatic Invertebrates Survey	11/18/2024
Long-Billed Curlews	06/17/2019	Tracking Long-billed Curlews and Western Meadowlarks	02/24/2025
Paddlefish Garrison Reach of Missouri River	06/24/2019	Bird Watching in North Dakota	06/02/2025
Amphibian Study	08/12/2019	Celebrating Prairie Day	06/16/2025
Softshell Turtles	10/21/2019		

Table 37. ND Outdoors weekly webcasts pertaining to the SWAP, SWG, or SGCNs and nongame species.

ND OUTDOORS WEEKLY WEBCAST	
TITLE	DATE
State Wildlife Action Plan	05/14/2015
Baby Animals	06/11/2015
Baby Animals	06/09/2016
Birding in ND	06/01/2017
Pollinators	03/01/2018
Bird Watching in North Dakota	04/25/2019
Paddlefish Population in the Garrison Reach of Missouri River	06/13/2019
Simple Tips and Tricks of Bird Watching	05/07/2020
Baby Animals	06/10/2020
Wildlife Production Habitat	06/18/2020
Bald Eagles Today	03/04/2021
Long-billed Curlews	06/16/2022
Why Pollinators Are Important	04/27/2023
Long-Billed Curlew Study Update 2023	06/01/2023
Birding in North Dakota	06/14/2023
Sage Grouse Populations	04/18/2024
Why Are Wetlands Important?	05/09/2024
Leave Baby Animals Alone at This Time of Year	06/06/2024
Habitat for Wildlife Production!	06/27/2024
State Wildlife Action Plan Revision 2025	10/24/2024
Tracking Nongame Bird Species	02/25/2025
Baby Wildlife 2025	05/29/2025





SUMMARY OF PARTNER AND PUBLIC REVIEW PROCESS

The following summarizes the timeline of the review process for the 2025 North Dakota State Wildlife Action Plan.

- Draft SGCN and SGIN list for Department internal review: 1/19/2023 through 2/24/2023.
- Draft SGCN and SGIN list for partner and species expert review: fall 2023 through early 2024.
- 2025 Spring Advisory Board Meetings: April 14, 15, 21 and 22. The North Dakota Game and Fish Department Advisory Board hosts public meetings at eight locations across the state. These public meetings provide citizens with an opportunity to discuss fish and wildlife issues and ask questions of their district advisors and agency personnel. NDGF personnel presented an update on the SWAP and provided an opportunity for the public to provide feedback.
- Draft SWAP for partner and public review: 5/20/2025 through 6/30/2025.
- Submit final SWAP to the U.S. Fish and Wildlife Service: August 2025.
- Anticipated approval: October 2025.

CHAPTER 9
WILDLIFE-ASSOCIATED RECREATION AND EDUCATION

This chapter includes information on nature-based recreation and education.

WILDLIFE-ASSOCIATED RECREATION

A significant challenge for the Department and for the future of species of greatest conservation need is to stay relevant within societal changes occurring within North Dakota and the whole nation. Although North Dakota historically has a strong outdoor heritage, the changing demographics and urbanization of our population is having an impact on societal views of hunting, fishing and general conservation ethics. The Department relies on our constituents for a funding base as well as for political support to fulfill our mission to protect, conserve and enhance fish and wildlife populations and their habitat for sustained public use. The Department needs to continuously improve or expand our strategies to engage the public and increase conservation awareness of fish and wildlife resources and the actions to combat threats.

Nature-based recreation and education is vital for effective State Wildlife Action Plans. To increase public awareness of conservation needs; while maintaining their personal connection with nature, biodiversity is important to individuals participating in nature-based recreation. Therefore, by restoring and protecting vital habitats, the Department ensures future generations can enjoy and observe a diversity of wildlife.

By conserving wildlife diversity, we're also enhancing the experience of wildlife watchers which contribute significantly to the state's economy. According to the *2022 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation*, wildlife-watching participants contributed 250.2 billion dollars or 63% of the total annual expenditures for wildlife-related recreation in the United States (Figure 40).

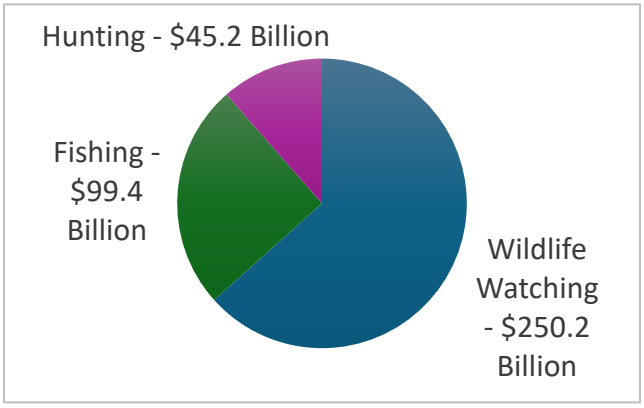


Figure 40. Economic contributions of outdoor activities.

SWAPs are vital in identifying strategies to conserve wildlife and their habitats, but equally important is to effectively increase public awareness and advocacy through various activities by increasing recreational and educational opportunities for the public.

The following actions were identified to increase public participation and education:

- **Hunting and Fishing:** SWAPs often identify threats to both terrestrial and aquatic habitats for both game and nongame species. By protecting or restoring habitat, SGCN's also benefit from management of games species.
- **Wildlife Viewing and Photography:** By conserving diverse ecosystems and protecting wildlife, SWAPs support wildlife viewing activities, such as birdwatching and nature photography. These activities provide significant economic benefits to local communities.
- **Outdoor Recreation:** Healthy ecosystems, protected by SWAPs, offer a wide range of outdoor recreational opportunities, including hiking, camping, and boating. These activities contribute to physical and mental well-being and support local economies.

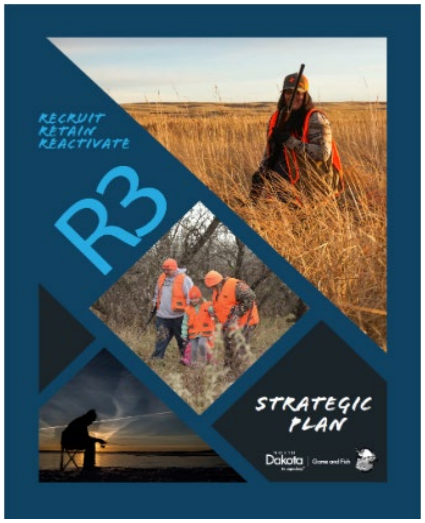
- **Nature-Based Tourism:** SWAPs can help promote nature-based tourism, attracting visitors from around the world. This can generate revenue for local businesses and create jobs in the tourism industry.
- **Public Access:** Many SWAPs include provisions for increasing public access to wildlife-rich areas through the development of trails, wildlife viewing platforms, and interpretive signage.
- **Shooting Ranges:** Shooting sports have gained considerable popularity with limited ranges in the state. Shooting sports also contribute considerable federal dollars to the Department and the local economy. The Department currently manages five public shooting ranges on its wildlife management areas.

EDUCATION

Environmental education is extremely relevant to the successful implementation of the SWAP. Educating our constituents on conservation threats and actions is key in creating advocacy for issues such as habitat loss, climate change, urbanization, wetland drainage, energy development and other threats to our SGCNs. Individuals that are conservation informed appreciate North Dakota's landscapes and can advocate change through legislative actions, community outreach, agricultural producer support as well as teaching future generations of conservation challenges.

The Department experiences several challenges in implementing environmental education programs such as funding, personnel, societal changes, lack of empathy for the environment and lack of volunteers to assist in the implementation of programs. By implementing additional opportunities for education, we develop additional advocacy to successful implement our SWAP and hopefully recover more SGCNs. However, to stay relevant today, the Department has identified the following enhancements to our existing environmental education programs.

- **Educational and Interpretive Opportunities:** SWAPs can support educational programs and interpretive centers that teach people about wildlife, ecology, and conservation. These programs can inspire future generations of conservationists and outdoor enthusiasts. The Department maintains a Conservation & Outdoor Skills Park at the North Dakota State Fairgrounds and at the Outdoors & Wildlife Learning Site (OWLS) at the Headquarters property in Bismarck.
- **Pollinator Education/Demonstration Plots:** By promoting and implementing urban pollinator plots, the Department can educate people regarding the importance of maintaining a healthy prairie ecosystem and its importance to bee's and other pollinator species. The Department maintains a list of preferred blooming plants in North Dakota on its website for anyone interested in learning more about gardening for pollinators.
- **Community Science:** Providing the public an opportunity to actively participate in research and monitoring efforts connects them with nature as well as providing needed monitoring data.
- **Outreach/Communication:** Utilize the Department's communication strategies to increase awareness of conservation activities promoting landscape stewardship and education opportunities.
- **Producer Education:** Create workshops or field trips to inform agricultural producers of programs available to benefit their operation as well as for wildlife production.
- **Recruit, Retain, Reactivate (R3):** Increase marketing efforts and expand programs to support R3 goals such as supporting and incentivizing hunting and fish mentorships opportunities, bolstering external partnerships with other state and federal agencies, tribal governments, nongovernmental agencies and industry partners. Approximately 25% of North Dakota residents participate in fishing/hunting activities, which makes the R3 Strategic Plan a top priority.



- **Shooting sports:** Increase activities associated with school-associated recreational shooting leagues and programs to help sustain and increase outdoor recreation activities outside of the school setting.
- **Hunter and Bow Hunter Safety/Fur Harvester Programs:** Continue to support and expand programs to teach safety and conservation strategies to participants. As a means of increasing participation and, as a matter of convenience, hunter education courses include the regular in-person course, along with the home-study version, along with archery. Most participants choose the in-person course (Figure 41 and Figure 42).

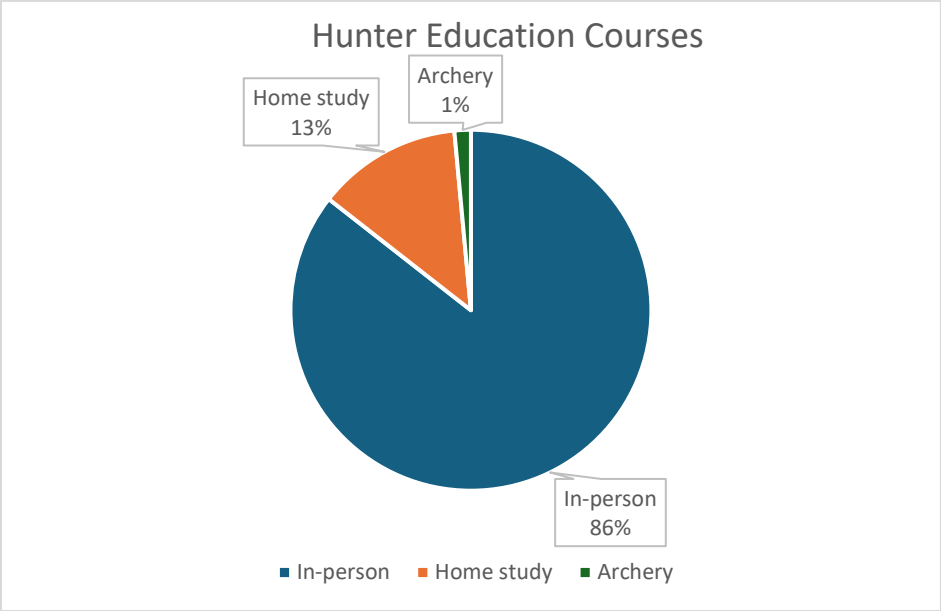


Figure 41. Percentage of participants for hunter education courses offered at the Department.

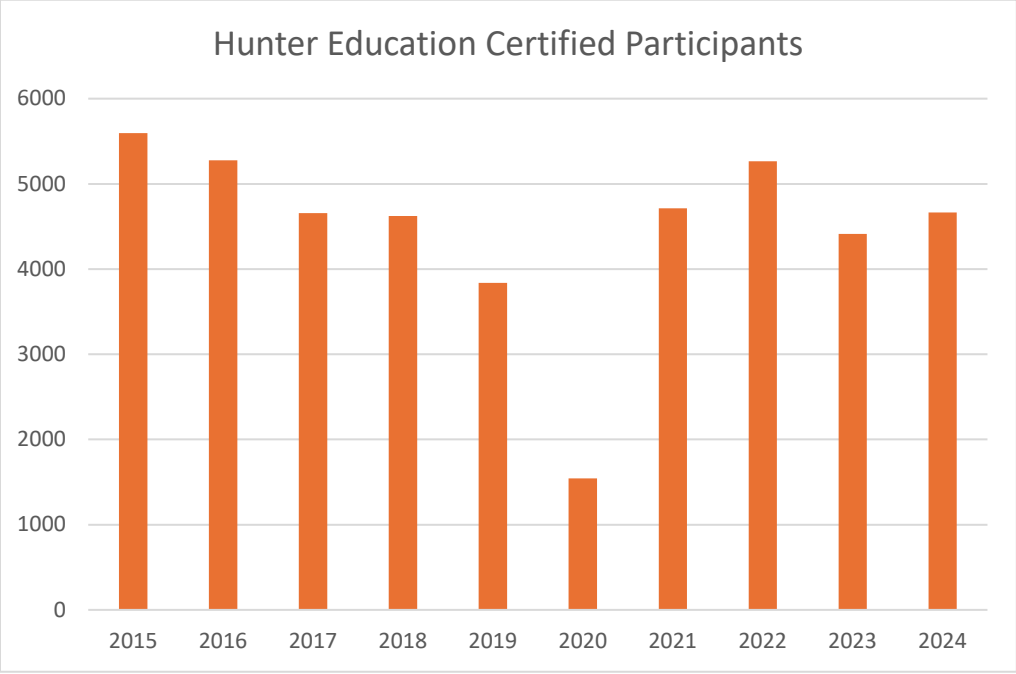


Figure 42. Hunter education participants from 2015-2024.

- **Boating and Water Safety:** Continue enhancing programs to instruct and educate participants to reduce boating and other water related incidents. Despite Department efforts, participation has decreased over the last ten years (Figure 43).

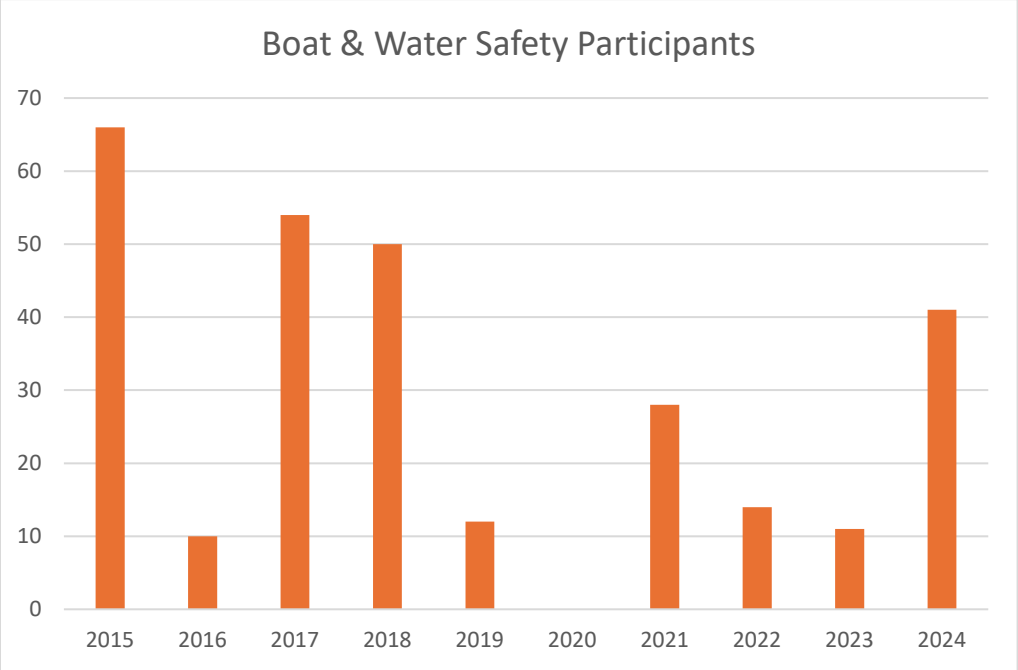


Figure 43. Boat and water safety participants at the Department from 2015-2024.

By investing in nature-based recreation and education, we build advocacy for the conservation of wildlife and their habitats. SWAPs not only protect biodiversity but also safeguard the recreational opportunities that enrich lives and contribute to our state's economy. Through successful implementation of the SWAP, we can ensure that future generations will have the opportunity to experience the many recreational benefits that wildlife and their habitats provide to our constituents.

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APPENDIX A
BIRD SGCN SPECIES ACCOUNTS

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Table 1. Bird SGCN and SGIN categories.

	Species of Greatest Conservation Need			Species of Greatest Information Need			
Common Name	**SGCN a. Regionally or globally imperiled**	**SGCN b. At-risk or declining, ND important**	**SGCN c. At-risk, expert review**	**SGIN d. Scientific knowledge deficient**	**SGIN e. Potentially stable in ND, declining in range**	**SGIN f. Potentially stable but life history trait vulnerability**	**SGIN g. Declining, ND significance uncertain**
American Avocet		X					
American Bittern		X					
American Golden-Plover	X		X				
American Kestrel			X				
Baird's Sparrow	X	X					
Black Tern	X	X					
Black-billed Cuckoo			X				
Bobolink	X	X					
Brewer's Sparrow			X				
Brown Thrasher			X				
Buff-breasted Sandpiper	X		X				
Burrowing Owl			X				
Canvasback		X					
Chestnut-collared Longspur	X	X					
Dunlin	X		X				
Ferruginous Hawk		X					
Franklin's Gull		X					
Golden Eagle			X				
Grasshopper Sparrow	X	X					
Greater Prairie-Chicken	X						
Greater Sage-Grouse	X						
Harris's Sparrow		X	X				
Horned Grebe	X	X					
Horned Lark			X				
Hudsonian Godwit	X	X					
Lark Bunting	X	X					
Least Tern (Interior)	X						
LeConte's Sparrow	X	X					
Lesser Scaup		X					
Lesser Yellowlegs	X	X					
Loggerhead Shrike	X						
Long-billed Curlew			X				
Long-billed Dowitcher	X	X					
Marbled Godwit	X	X					
Nelson’s Sparrow		X					
Northern Harrier		X					
Northern Pintail	X	X					
Pectoral Sandpiper	X	X					
Piping Plover	X	X					
Prairie Falcon			X				
Red-headed Woodpecker			X				
Ruddy Turnstone	X	X					
Ruffed Grouse			X				
Semipalmated Sandpiper	X	X					
Sharp-tailed Grouse		X					
Short-billed Dowitcher	X						
Short-eared Owl	X		X				
Sprague's Pipit	X	X					
Stilt Sandpiper	X	X					

	Species of Greatest Conservation Need			Species of Greatest Information Need			
Common Name	**SGCN a. Regionally or globally imperiled**	**SGCN b. At-risk or declining, ND important**	**SGCN c. At-risk, expert review**	**SGIN d. Scientific knowledge deficient**	**SGIN e. Potentially stable in ND, declining in range**	**SGIN f. Potentially stable but life history trait vulnerability**	**SGIN g. Declining, ND significance uncertain**
Thick-billed Longspur	X						
Upland Sandpiper		X					
Western Grebe		X					
Western Meadowlark		X					
Whooping Crane	X						
Willet		X					
Wilson's Phalarope		X	X				
Yellow Rail		X	X				
American White Pelican						X	
Black-billed Magpie					X	X	
Chimney Swift							X
Common Nighthawk				X		X	
Eastern Screech-Owl				X			X
Northern Flicker							X
Peregrine Falcon						X	
Red Knot (Rufa)							X
Smith's Longspur				X			
Snowy Owl				X			
Western Kingbird							X

Bird SGCN includes species which are one or more of the following:

a. Regionally or globally imperiled.
   - G1, G2 or G3
   - R2R Tipping Point 2024 = red or orange
   - IUCN = vulnerable or endangered
   - BBS survey-wide trend ≥ -2.0
   - PIF Pop change ≥ -70%
   - Shorebird change ≥ -70%

b. At-risk or experiencing declines either regionally or globally and North Dakota represents an important portion of their remaining range.
   - eBird % breeding pop ND ≥ 5
   - Max week % pop in ND ≥ 10
   - ACAD = RS

c. At-risk based on expert review or recent regional or global assessments.

SGIN includes species which are one or more of the following:

a. Potentially vulnerable but current scientific knowledge and expert understanding is lacking.
b. Potentially stable in North Dakota but may be experiencing declines in a substantial portion of their range.
c. Potentially stable but uncertainty about life history traits may make them at-risk.
d. Declining regionally or globally but uncertainty regarding the significance of North Dakota to its survival.

Table 2. Partner and bird conservation lists for bird SGCNs.

Common Name	USFWS BCC Continental	USFWS BCC BCR 11	USFWS BCC BCR17	PPJV Priority	NGPJV Priority	Midwest RSGCN	R2R Tipping Point	ACAD BCR 11	ACAD BCR 17	Nature Serve	IUCN Red List	COSEWIC
American Avocet				X				RS		G5	LC	
American Bittern								RC		G5	LC	
American Golden-Plover	X	nb					Orange	WL		G5	LC	
American Kestrel								CBSD		G5	LC	
Baird's Sparrow	X	X	X	X	X	Watchlist	Red	WL, RS	WL, RC	G4	LC	SC
Black Tern	X	X	X			RSGCN		CBSD, RC, RS		G4	LC	NAR
Black-billed Cuckoo	X	X	X		X	RSGCN		CBSD, RC		G5	LC	
Bobolink	X	X	X	X		RSGCN	Orange	WL, RS	WL	G5	LC	SC
Brewer's Sparrow					X			CBSD	CBSD, RC	G5/S3	LC	
Brown Thrasher								RC		G5	LC	
Buff-breasted Sandpiper	X	nb		X		RSGCN	Orange			G4	VU	SC
Burrowing Owl			X		X				CBSD	G4	LC	E
Canvasback				X				RS		G5	LC	
Chestnut-collared Longspur	X	X	X	X	X	Watchlist	Red	WL, RC, RS	WL, RC, RS	G5	VU	E
Dunlin		nb		X				CBSD*		G5	NT	
Ferruginous Hawk			X		X			RS	RC	G4	LC	SC
Franklin's Gull	X	X	X					RC, RS	CBSD	G5	LC	
Golden Eagle										G5/S3	LC	NAR
Grasshopper Sparrow		X	X	X	X	RSGCN		CBSD, RC	CBSD, RC, RS	G5	LC	
Greater Prairie-Chicken				X		RSGCN	Red	WL, RC	WL, RC	G4	NT	EXT
Greater Sage-Grouse				X	X		Red	WL, RC	WL, RC	G3	NT	E
Harris's Sparrow							Yellow	WL	WL	G5	NT	SC
Horned Grebe							Yellow	WL, RC		G5	VU	SC
Horned Lark								CBSD	CBSD	G5	LC	
Hudsonian Godwit	X	nb		X			Red	WL, RS		G4	VU	T
Lark Bunting			X	X	X	Watchlist		CBSD, RC	CBSD, RC, RS	G5	LC	T
Least Tern (Interior)	X					RSGCN	Orange			G4/S1	LC	
LeConte's Sparrow	X	X				RSGCN	Orange	WL, RC		G5	LC	
Lesser Scaup				X				RS		G5	LC	
Lesser Yellowlegs	X	nb		X			Orange	WL		G5	VU	T
Loggerhead Shrike					X			CBSD, RC	CBSD	G4	NT	T

Common Name	USFWS BCC Continental	USFWS BCC BCR 11	USFWS BCC BCR17	PPJV Priority	NGPJV Priority	Midwest RSGCN	R2R Tipping Point	ACAD BCR 11	ACAD BCR 17	Nature Serve	IUCN Red List	COSEWIC
Long-billed Curlew		X		X	X			RC	RC	G5/S2	LC	SC
Long-billed Dowitcher				X			Orange	WL, RS	WL	G5	NT	
Marbled Godwit	X	X	X	X	X	RSGCN		WL, RC, RS	WL, RC	G5	VU	
Nelson's Sparrow						RSGCN		WL, RS	WL	G5	LC	NAR
Northern Harrier			X					RC	RC	G5	LC	NAR
Northern Pintail				X	X		Yellow	WL, RC		G5	LC	
Pectoral Sandpiper	X	nb		X			Orange	WL, RC		G5	LC	
Piping Plover				X		RSGCN	Orange	WL, RC, RS	WL, RC	G3/S1	NT	E
Prairie Falcon			X							G5/S3	LC	NAR
Red-headed Woodpecker	X	X	X		X	RSGCN		CBSD, RC	CBSD	G5	LC	E
Ruddy Turnstone							Orange			G5	NT	
Ruffed Grouse										G5	LC	
Semipalmated Sandpiper						Watchlist	Orange	WL, RC		G5	NT	
Sharp-tailed Grouse				X	X	Watchlist		RS	RS	G5	LC	
Short-billed Dowitcher	X	nb		X			Orange	WL		G5	VU	
Short-eared Owl	X	X	X		X	RSGCN		CBSD, RC	CBSD, RC	G5	LC	T
Sprague's Pipit	X	X	X	X	X	RSGCN	Orange	WL, RC, RS	WL, RC, RS	G3/S3	VU	T
Stilt Sandpiper				X			Orange	WL, RC	WL	G5	NT	
Thick-billed Longspur	X	X	X	X	X		Red	WL, RC, RS	WL, RC, RS	G4/S3	LC	T
Upland Sandpiper				X	X	RSGCN		RC, RS	RS	G5	LC	
Western Grebe	X	X	X					RS		G5	LC	SC
Western Meadowlark				X		RSGCN		CBSD	RS	G5	LC	
Whooping Crane						RSGCN	Orange	WL, RS	WL	G1/SX	EN	E
Willet	X	X	X	X		Watchlist		WL, RC, RS	WL, RC	G5	LC	
Wilson's Phalarope				X	X					G5	LC	
Yellow Rail	X	X				RSGCN	Yellow	WL, RC		G4/S2	LC	SC

Table 3. Descriptions for partner and bird conservation lists.

	Description	Categories	Reference
USFWS BCC Continental 2021 List	Birds at the Continental scale likely to become candidates for Listing under the Endangered Species Act without additional conservation action.	X = on list nb = nonbreeding	https://www.fws.gov/sites/default/files/documents/birds-of-conservation-concern-2021.pdf
USFWS BCC BCR 11 2021 List	Birds in BCR 11 (i.e. Prairie Pothole region) likely to become candidates for listing under the Endangered Species Act without additional conservation action.	X = on list nb = nonbreeding	https://www.fws.gov/sites/default/files/documents/birds-of-conservation-concern-2021.pdf
USFWS BCC BCR 17 2021 List	Birds in BCR 17 (i.e. Northern Great Plains region) likely to become candidates for listing under the Endangered Species Act without additional conservation action.	X = on list nb = nonbreeding	https://www.fws.gov/sites/default/files/documents/birds-of-conservation-concern-2021.pdf
PPJV Priority Species	Priority species identified in the 2017 Prairie Pothole Joint Venture Implementation Plan.	X = on list	https://ppjv.org/resources/
NGPJV Priority Species	Northern Great Plains Joint Venture Priority Species Table 2021.	X = on list	https://ngpjv.org/resources/
Midwest RSGCN	The Midwest Landscape Initiative (MLI) developed a Regional Species of Greatest Conservation Need (RSGCN) List to provide an effective, collaborative focus and approach for regional wildlife diversity conservation in the Midwest.	RSGCN = Regional Species of Greatest Conservation Need Watchlist: high concern, but insufficient information or the region had low regional responsibility	https://www.mlimidwest.org/midwest-regional-species-of-greatest-conservation-need/
Road to Recovery (R2R) Tipping Point Species 2024 List	In 2020, a new collaborative effort was formed to address the loss of 3 billion birds. Road to Recovery (R2R) is a conservation science initiative to recover species identified as "Tipping Point" species and avoid listing status.	Red = Red Watch List: highest urgency based on multiple high vulnerability scores, usually including perilously low population size and steeply declining or unknown population trend. Orange = Orange Watch List: species with very large long-term population loss (> 75%); OR species with large long-term loss (>50%) and with continued or accelerated recent declines resulting in a loss ≥ 30% over the most recent 3 generations or a half-life < 30 years. Yellow = Yellow Watch List: species experienced large long-term population loss (≥ 50%), but now show relatively stable or even increasing populations over the most recent 3-generation period.	https://r2rbirds.org/tipping-point-species/
Avian Conservation Assessment Database **ACAD BCR 11** **ACAD BCR 17**	The Avian Conservation Assessment Database (ACAD) provides conservation assessment data and rankings for all North American bird species at multiple geographic scales. Species of Regional Importance designations for BCR 11 and BCR 17.	WL = WatchList: species that meet a minimum threshold of overall vulnerability based on a combination of small and declining populations, limited distributions, and high threats throughout their ranges. CBSD = Common Bird in Stee Decline: species that occur regularly in significant numbers during the breeding season, but long-term regional decline of at least 50%. RC = Regional Concern: species that occur regularly in significant numbers in the BCR, but high regional threats or moderate regional threats with moderate to large population declines. RS = Regional Stewardship: high importance of the BCR to the species, >25% of the population.	https://pif.birdconservancy.org/ https://pif.birdconservancy.org/avian-conservation-assessment-database/

	Description	Categories	Reference
IUCN Red List	The International Union for Conservation of Nature (IUCN) Red List is an indicator of the health of the world's biodiversity.	LC = Least Concern: not high risk NT = Near Threatened: close or likely to qualifying as high risk VU = Vulnerable: high risk of extinction in the wild EN = Endangered: very high risk of extinction in the wild	https://www.iucnredlist.org/
NatureServe	NatureServe is a compilation of data on the location and ecological condition of species and ecosystems.	G = Global ranking; S =State ranking 1 = Critically Imperiled 2 = Imperiled 3 = Vulnerable 4 = Apparently Secure 5 = Secure	https://explorer.natureserve.org/
COSEWIC	Committee on the Status of Endangered Wildlife in Canada, national status of wild species that are considered to be at risk in Canada under the Species at Risk Act (SARA).	Ext = Extirpated: no longer existing in the wild in Canada, but occurring elsewhere. E = Endangered: facing imminent extirpation or extinction. T = Threatened: likely to become endangered if limiting factors are not reversed. SC = Special Concern: may become threatened or endangered wildlife species because of a combination of biological characteristics and identified threats. NAR = Not at Risk: has been evaluated and found to be not at risk of extinction given the current circumstances.	https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry.html

Table 4. Population trends for bird SGCNs.

Common Name	Global Population	% Global Pop in BCR 11	% Global Pop in BCR 17	eBird % Pop Breeding ND	eBird State Rank	Max Week Abundance in ND	Max Week % Pop in ND	BBS Trend Survey-wide	BBS Trend ND	eBird Trend Range-wide	eBird Trend ND	ND BCR17 IMBCR Trends	Population Change	Urgency/ Half-life
American Avocet	460,000	30.37	2.03	3.46	5 of 22	17-May	5.25	0.4	0.70			48.2%	-40%	
American Bittern	2,500,000	23.42	1.11	9.62	1 of 26	20-Sep	19.84	-0.9	0.00	-32.4	-39.5			
American Golden-Plover	500,000					4-Oct	16.62						-70%	14
American Kestrel	9,200,000	1.72	2.23	0.35	18 of 44	26-Apr	1.16	-1.4	-1.00	-20.3	-21.4	-16.0%	-48%	>50
Baird's Sparrow	3,400,000	74.02	24.81	10.01	2 of 5	30-Aug	56.63	-2.3	-4.00			-8.9%	-71%	>50
Black Tern	5,100,000	27.71	0.89	8.19	1 of 23	17-May	16.25	-2.6	-1.80	-33.7	-3.1	-48.6%		
Black-billed Cuckoo	880,000	6.58	0.46	1.26	7 of 26	5-July	3.30	-1.5	-3.90	-4.7	-28.1	46.7%	-68%	37
Bobolink	10,000,000	46.73	11.91	19.32	1 of 32	12-July	21.19	-1.7	0.00	-21.7	-19.8		-60%	48
Brewer's Sparrow	17,000,000	2.21	10.8	0.06	14 of 14	7-June	0.12	-1.5		-12.2	-32.5		-35%	>50
Brown Thrasher	6,200,000	10.62	9.28	3.39	7 of 39	23-Aug	6.24	-1.00	-1.00	-10	-21.8		-37%	>50
Buff-breasted Sandpiper	56,000					26-July	48.31						-60%	
Burrowing Owl	18,000,000	0.54	2.06	0.1	14 of 18	19-July	0.20	-1.2	-4.30	-27.5	-36.9	-46.0%	-35%	
Canvasback	690,000	68.64	4.33	18.03	1 of 14	11-Oct	38.43	-0.7	1.60	-26.7				
Chestnut-collared Longspur	3,100,000	57.3	40.78	18.93	2 of 6	23-Aug	32.47	-2.3	-2.90				-85%	21
Dunlin	5,500,000	0.61				24-May	3.15			-32			-80%	18
Ferruginous Hawk	110,000	51.53	14.6	3.41	7 of 16	1-Nov	5.73	1.1	0.20				39%	>50
Franklin's Gull	830,000	54.25	1.34	8.2	2 of 13	20-Sep	27.68	-0.6	-2.00	6.7	23.5			
Golden Eagle	130,000	0.51	1.65	0.09	15 of 16	11-Jan	1.46	0.2	0.40	-18.5	18.5		6%	>50
Grasshopper Sparrow	34,000,000	20.38	31.42	14.99	3 of 40	2-Aug	17.20	-2.8	-4.50	-15.6	-12.9	0.1%	-68%	15
Greater Prairie-Chicken	360,000	5.09	9.61	0.11	7 of 11			1.6					>50%	
Greater Sage-Grouse	430,000	5.48	20.08					-2.2		-15.2	53.5		-67%	>40
Harris's Sparrow	2,000,000					27-Sep	25.11			-15.3			-63%	
Horned Grebe	620,000	9.55	0.15	0.76	2 of 4	26-Apr	11.43	-1.9	-2.00	-30.2				
Horned Lark	140,000,000	7.7	4.15	1.02	12 of 37	8-Mar	7.07	-1.7	-1.90	-14.2	-5.4	3.4%	-65%	25
Hudsonian Godwit	77,000					17-May	15.29						-90%	6
Lark Bunting	12,000,000	8.27	41.59	3.78	6 of 10	21-June	4.10	-4.2	-7.00	-55.7	-51.9		-86%	12
Least Tern (Interior)	120,000	0.19	0.2	0.04	27 of 31	19-July	0.05			-8.4	-12.7			20
LeConte's Sparrow	5,100,000	24.12	0.09	4.47	1 of 6	6-Sep	42.68	-1.6	-2.90	-23.4	-60.7		-61%	43
Lesser Scaup	3,700,000	25.89	0.93	3.95	2 of 14	1-Nov	35.03	-1.1	1.40	-20.6	-2.2			
Lesser Yellowlegs	660,000	3.69				26-July	12.35	-2.4		-12.7	0.7		-70%	9
Loggerhead Shrike	7,000,000	4.96	6.34	0.77	17 of 31	19-July	1.21	-2.8	-2.30	-26.1	1.1		-74%	24
Long-billed Curlew	140,000	23.91	19.78	0.8	13 of 17	31-May	1.04	0.00	0.50	-9.9	14	22.3%		
Long-billed Dowitcher	650,000	1.02				26-July	21.13			-18.8			-70%	
Marbled Godwit	170,000	56.64	11.74	15.26	1 of 15	14-June	19.08	-0.6	-0.10				10%	

Common Name	Global Population	% Global Pop in BCR 11	% Global Pop in BCR 17	eBird % Pop Breeding ND	eBird State Rank	Max Week Abundance in ND	Max Week % Pop in ND	BBS Trend Survey-wide	BBS Trend ND	eBird Trend Range-wide	eBird Trend ND	ND BCR17 IMBCR Trends	Population Change	Urgency/ Half-life
Nelson's Sparrow	1,000,000	65.06	2.13	19.49	1 of 6	24-May	36.05	0.9	1.90					>50
Northern Harrier	820,000	20.07	6.65	6.45	3 of 24	21-June	7.28	-1.00	0.20	-23.8	-33.6		-37%	>50
Northern Pintail	5,100,000	4.91	0.84	2.55	2 of 15	29-Mar	9.60	-2.9	-0.30	-10.5	-28.7	-43.1%		
Pectoral Sandpiper	1,600,000	2.57				26-July	18.99						-60%	16
Piping Plover	8,400	50.29	12.51	9.73	3 of 20	28-June	15.94			-7.2	-25.1		-40%	
Prairie Falcon	110,000	4.53	7.94	0.61	14 of 16	6-Sep	3.35	1.00	-0.30	-23.3	32.5		41%	>50
Red-headed Woodpecker	1,800,000	6.26	4.58	0.18	30 of 35	6-Sep	0.71	-1.2	-1.90	22	42.6	40.1%	-67%	>50
Ruddy Turnstone	600,000	0.37				24-May	10.88			-10.8			-70%	21
Ruffed Grouse	18,000,000	0.46	0.03	0.01	23 of 23			0.4		4.3	-11		31%	>50
Semipalmated Sandpiper	2,300,000	3.74	0.09			31-May	12.21						-60%	
Sharp-tailed Grouse	760,000	49.49	30.75	17.78	2 of 14			0.9	1.80	14.5	10.2		19%	>50
Short-billed Dowitcher	150,000	1.23				17-May	5.68			-20.5			-80%	9
Short-eared Owl	2,300,000	0.77	1.38	0.19	9 of 12	19-Apr	6.10	-3.5	-3.00	-3.8	11.2	-40.6%	-65%	
Sprague's Pipit	1,400,000	80.89	17.49	7.65	2 of 3	26-Apr	16.06	-4.3	-3.40			-10.0%	-75%	10
Stilt Sandpiper	1,200,000	8.06				26-July	40.09						-70%	
Thick-billed Longspur	840,000	35.31	40.36					-2.0	-4.50				-94%	>50
Upland Sandpiper	750,000	39.8	34.91	15.5	2 of 22	17-May	19.36	0.5	0.40	-8.6	-5.1	5.6%		
Western Grebe	1,000,000	43.01	6.53	24.72	1 of 16	12-July	29.95	-0.1	4.80	-15.6	-14.4			
Western Meadowlark	100,000,000	23.75	30.62	7.3	6 of 22	2-Aug	9.06	-1.0	-1.00	-8.1	-14	-3.0%	-42%	50
Whooping Crane	500*	0.6												
Willet	250,000	55.45	4.02	6.47	4 of 30	17-May	7.65	-0.7	-0.80	-3.7	12.6		20%	
Wilson's Phalarope	1,500,000	16.72	3.23	1.71	2 of 18	31-May	15.86	-0.5	0.20			-39.5%	-60%	
Yellow Rail	12,000	7.78	0	1.45	1 of 4	24-Aug	7.46	0.4	0.70					

Table 5. Descriptions of bird population trends.

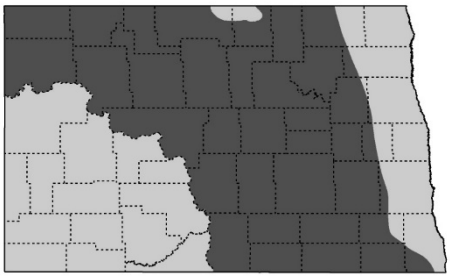
	Description	Reference
Global Population	An estimate of the global population size (breeding-aged individuals). The PIF Population Estimates Database provides breeding population estimates for all landbird species in the continental USA and Canada at various spatial scales. For waterfowl, the estimate is from NAWMP. If asterisk, other source.	https://pif.birdconservancy.org/avian-conservation-assessment-database/
% Global Pop in BCR 11 **BCR 17**	Percent of the global population in region during breeding season.	https://pif.birdconservancy.org/avian-conservation-assessment-database/
eBird % Pop in ND	Percent of the global population that occurs in the state.	https://www.birds.cornell.edu/home/us-state-level-conservation-data-summaries/
eBird State Rank	Rank of the percent breeding population. The first number is North Dakota's rank out of total number of states with non-zero breeding percentage.	https://www.birds.cornell.edu/home/us-state-level-conservation-data-summaries/
Max Week Abundance in ND	The maximum week mid-point date where abundance is greatest in ND (during any season), calculated using weekly percent of population estimates.	https://www.birds.cornell.edu/home/us-state-level-conservation-data-summaries/
Max Week % Pop in ND	The maximum percent of the global population that occurs in ND during the Max Week.	https://www.birds.cornell.edu/home/us-state-level-conservation-data-summaries/
BBS Trend Survey-wide **BBS Trend ND**	North American Breeding Bird Survey 1966 - 2022 trend analysis.	https://eesc.usgs.gov/MBR/
eBird Trend Range-wide **eBird Trend ND**	Cumulative change in estimated relative abundance from 2012 through 2022. Median value is provided.	https://science.ebird.org/en
ND BCR17 IMBCR Trends	Integrated Monitoring in Bird Conservation Regions (IMBCR) Program. BCR17 portion of ND only. Estimates how much a population is increasing or decreasing each year of the monitoring period based on the median trend estimate from density.	https://www.birdconservancy.org/what-we-do/science/monitoring-and-tracking/
Population Change	For landbirds, estimate from Partners in Flight Landbird Conservation Plan (2016) percent change in population from 1970-2014. For shorebirds, estimated total percent change in abundance during fall migration across North America from 1980-2019 (Smith et al. 2023).	https://partnersinflight.org/resources/the-plan/ https://academic.oup.com/condor/article/125/2/duad003/7031074
Half-Life	Partners in Flight Landbird Conservation Plan (2016) prediction of how many years in the future until a population size that is half of the current abundance is expected to be observed. Includes June 2024 ACAD updates.	https://partnersinflight.org/resources/the-plan/

American Avocet *Recurvirostra americana*

Description/Identification: L 18”, WS 31”, 11 oz. Body is black and white with a striking orange-cinnamon head and neck, thin up-curved bill, and blue legs.

Status: Occurs in North Dakota from April to October. Peak breeding season mid-May to early July.

Reason for SGCN Designation: At-risk, ND range important (SGCN b.). ND ranks 5th out of 22 states for highest percent of the global population (3.46%) during the breeding season (eBird). The American Avocet is not experiencing severe declines, but some evidence of recent declines. ND has high stewardship responsibility for this species in the Prairie Pothole Region.



American Avocet primary (dark gray) and possible/uncommon (light gray) breeding range. Photo Credit: NDGF

Habitat: American Avocets use exposed, sparsely vegetated salt flats, sandbars, peninsulas, mudflats, or islands with beaches. Shallow water (<1m) in tilled, alkali, ephemeral, temporary, seasonal, semi-permanent, permanent wetlands, or lakes. Islands appear to host higher breeding densities than along shorelines. In North Dakota, avocets favor large islands with beaches, located in shallow water, and islands constructed in wetlands. Nest on unvegetated ground or in areas with short, sparse vegetation. Nests may be slightly elevated, within about 60 m of water edge, and often near a clump of vegetation or debris. Most often nest in loose colonies, sometimes in association with terns, but not likely with gulls, pelicans, or cormorants. Foraging usually takes place in shallow water <20 cm deep for aquatic invertebrates, small fish, seeds, or terrestrial vertebrates on land.

Threats: Loss and degradation of wetlands, drainage and wetland consolidation. Classified as climate-endangered, American Avocet is projected to lose more than half of its current distribution by 2050, with no net gains of new areas (Audubon). Breeding density may be determined by availability of suitable islands. High water years can limit nesting substrate. Nest losses attributed to flooding and predation. Avocets are outcompeted by gulls, pelicans and cormorants for nesting sites. More frequent or intense harmful algal blooms. Increasing applications of agrochemicals and adverse impacts to water quality, the wetland vegetative community, and the aquatic invertebrate community. Human presence at nesting site during early laying stages can cause abandonment. Collisions with human-made structures (e.g. overhead lines, wind turbines).

Research and Monitoring: Habitat requirements and demographics have been broadly researched. Little known about reproductive success, annual adult survival, or fledgling survival. Additional information is needed on migration and wintering behaviors. The Breeding Bird Survey, eBird and Partners in Flight Databases are key sources of information on distribution and population trends. The USFWS coordinated a breeding shorebird survey from 2004 to 2018. A colonial waterbird inventory in ND was conducted in 2014-2015 and American Avocets were incidentally observed and recorded. Nine colonies were discovered, and 48 breeding pairs were estimated (mean colony size 6, range 1-30 pairs).

Management Recommendations:

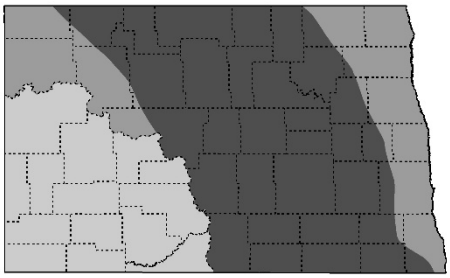
- Preserve and maintain wetland complexes.
- Restore hydrology and vegetation to degraded wetlands.
- Manage vegetation on the periphery of islands for sparseness.
- Leave grassed buffer strips around wetlands and waterways to prevent erosion and runoff into wetlands.
- Follow aquatic nuisance species rules and regulations.
- Follow beneficial or best practices during the design, siting, construction, operation, and maintenance of tall structures (e.g. transmission lines, communication towers, wind turbines).

American Bittern *Botaurus lentiginosus*

Description/Identification: L 28", WS 42", 1.5 lb. Long, boldly striped neck with a pointed bill and greenish legs.

Status: Occurs in North Dakota from mid-April to late October. Peak breeding season early June to late July.

Reason for SGCN Designation: At-risk, ND range important (SGCN b.). ND ranks 1st out of 26 states for highest percent of the global population (9.62%) during the breeding season (eBird). The American Bittern is declining, and ND has high stewardship responsibility for this species in the Prairie Pothole Region.



American Bittern primary (dark gray), secondary (medium gray) and possible/uncommon (light gray) breeding range. Photo Credit: NDGF

Habitat: American Bitterns use a variety of freshwater wetlands including seasonal, semi-permanent, temporary, permanent, fens or restored wetlands. They prefer wetlands which are > 3 ha (~7 acres), average 13.5 ha (~33 acres), with a large amount of tall, emergent vegetation present such as rushes, sedges, cattails, or common reed. Use wetland complexes with adjacent uplands of hayland, CRP, or idle grasslands. Most commonly nest among dense emergent vegetation over shallow water, 5-20 cm deep. Bitterns will also nest in adjacent uplands of mid to tall (over 30 cm), dense, native or tame grasslands with moderate litter. Avoid heavily grazed grasslands and tilled land. The bittern's cryptic color helps it blend into surrounding habitat where it patiently waits for prey species of insects, amphibians, small fish, mammals, or crayfish.

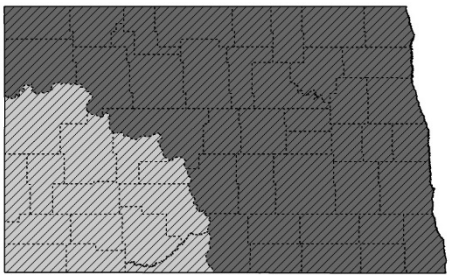
Threats: Loss of grassland/wetland complexes. Loss and degradation of wetlands, drainage and wetland consolidation. Hydrologic shifts in wetlands of the PPR due to wetland consolidation and drainage, climate and land use changes (i.e. lakeification). Classified as climate-endangered, American Bittern is projected to lose more than half of its current distribution by 2050, with no net gains of new areas (Audubon). Increasing applications of agrochemicals and adverse impacts to water quality, the wetland vegetative community, and the aquatic invertebrate community. More frequent or intense harmful algal blooms. Aquatic nuisance species spreading and damaging wetland ecosystems. Migration routes of American Bitterns using satellite telemetry data found that many birds (63%) breeding in the central part of North America wintered in the Everglades of Florida, an area impacted by a variety of threats. Decline in the southern portion of the species range may be linked to declining amphibian populations. The American Bittern is at the top of the food chain, and its presence is a good indicator of environmental quality. Some mortality with communication towers.

Research and Monitoring: Habitat requirements and demographics have been extensively researched. Additional information is needed on migration and wintering behaviors. The Breeding Bird Survey, eBird and Partners in Flight Databases are key sources of information on distribution and population trends.

Management Recommendations:

- Protect and conserve areas where complexes of high-density, medium to large wetlands and large blocks of grassland remain intact.
- Use tall, dense native grasses and sedges when replanting or restoring grassland along wetland edges.
- Maintain a wide vegetative margin around wetlands.
- Delay mowing, haying or burning grasslands until after August 1.
- Mow, hay or burn every 2-5 years to maintain residual vegetation.
- Follow beneficial or best practices during the design, siting, construction, operation, and maintenance of tall structures (e.g. transmission lines, communication towers, wind turbines).

American Golden-Plover *Pluvialis dominica*



American Golden-Plover primary (dark gray/hatch) and possible/uncommon (light gray/hatch) migration range. Photo Credit: Adobe Stock

Description/Identification: L 10.5", WS 26", 5 oz. Breeding/spring plumage: black breast and belly, golden yellow spots on back. Fall/nonbreeding plumage: lack black breast and belly, yellow spots fade to white.

Status: Migrates through North Dakota in mid-April to late May and early August to early November.

Reason for SGCN Designation: Regionally or globally imperiled, at-risk based on expert review (SGCN a., c.). The peak week for American Golden-Plover migration in ND (~4-Oct) hosts >15% (16.62) of the global population. The American Golden-Plover population is suspected to be slowly declining.

Habitat: American Golden-Plovers breed in the far northern tundra of North America and winter in the grasslands and coastline of southern South America. This shorebird is one of the longest-distance migrants in the Western hemisphere. Historically, during migration golden-plovers would stopover in the natural grassland and wetland habitat of the Midwest, including North Dakota. Presently, much of the traditional stopover habitat has been converted to other uses, mostly tilled agriculture. Golden-plovers now use tilled cropland, untilled harvested fields, short grasslands and native prairie, cropland ponds, mudflats, and shallow water or exposed shorelines of wetlands. More likely to be find in crop fields with standing water than fields that are wet or dry. Feed on earthworms and a variety of terrestrial invertebrates, some aquatic invertebrates, and seeds.

Threats: Loss and degradation of grasslands. Loss of wetlands, drainage and wetland consolidation. Loss of habitat on the breeding and wintering grounds and amplified effects of climate change in arctic habitats. Classified as climate-threatened, American Golden-Plover is projected to lose more than half of its current distribution by 2080, with potential net gains of new areas (Audubon). Hyperabundant geese populations alter tundra habitat and may limit the availability of nesting habitat for artic-breeding shorebirds. Increasing applications of agrochemicals and adverse impacts to water quality, the wetland vegetative community, and the aquatic invertebrate community. American Golden-Plover may be exposed to high concentrations of synthetic insecticides in non-buffered cropland ponds during the spring migration. More frequent or intense harmful algal blooms. Aquatic nuisance species spreading and damaging wetland ecosystems.

Research and Monitoring: Habitat requirements and demographic studies have been broadly researched on the breeding grounds. Information lacking on migration strategies, stopover sites, and wintering behaviors. Multiple large-scale shorebird monitoring programs are key sources of information on distribution and population trends. However, minimal focus has been directed at research or monitoring migrant shorebirds in ND.

Management Recommendations:

- Maintain wetland complexes.
- Conserve shallow, working wetlands in cropland.
- Plant vegetative buffer strips around wetlands in cropland.
- Protect and conserve intact tracks of native prairie/unbroken grassland and maintain grazing operations.
- Identify and target high priority landscapes, habitats, and stopover sites for protection.
- Burn, mow, and graze grasslands to provide areas of shorter, sparser vegetation.
- Conscientious and appropriate application of agrochemicals.

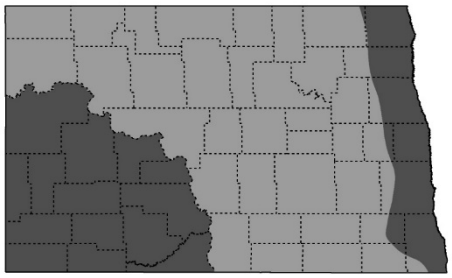
American Kestrel *Falco sparverius*

Description/Identification: L 9”, WS 22”, 4.1 oz. Small falcon, males have blue-gray wings, rust-colored back and tail, and double black stripes on face. Females are heavily barred.

Status: Occurs in North Dakota primarily from mid-March to October. Rare in other months. Peak breeding season mid-April to June.

Reason for SGCN Designation: At-risk based on expert review and recent regional assessments (SGCN c.). ND ranks 18th out of 44 states for highest percent of the global population during the breeding season (eBird). The American Kestrel is declining, and the population decreased 48% since 1970.

Habitat: American Kestrels use open to semi-open grasslands, agricultural land, badlands, and brushy margins of open woodland. Kestrels are cavity nesters and will nest in natural holes, tree crevices, or man-made nest boxes. They frequently perch on utility lines and poles. Primary prey includes large insects such as grasshoppers, beetles, dragonflies and butterflies, and in the winter will prey on mice and small birds.



American Kestrel primary (dark gray) and secondary (medium gray) breeding range. Photo Credit: NDGF

Threats: Loss of grassland. Removal of trees with nest cavities. Kestrels are secondary cavity nesters, and the loss of woodpecker-excavated cavities or other natural cavities limits the availability of nesting sites. West Nile virus, increasing competition/depredation from Cooper’s Hawks, environmental contaminates, and pesticides have been suggested as possible reasons for the kestrel’s population declines. Nest abandonment is greater in higher human disturbance areas. Classified as climate-threatened, American Kestrel is projected to lose more than half of its current distribution by 2080, with potential net gains of new areas (Audubon).

Research and Monitoring: Habitat requirements and demographic studies have been well researched but little effort in North Dakota. Additional information is needed on migration and wintering behaviors. The Breeding Bird Survey, eBird and Partners in Flight Databases are key sources of information on distribution and population trends.

Management Recommendations:

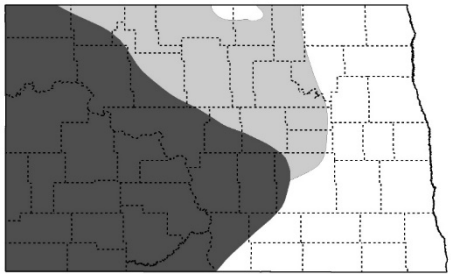
- Protect and conserve large tracts of grasslands.
- Reconstruct or restore grassland adjacent to existing tracts of native prairie/unbroken grassland.
- Maintain open areas with large live and dead trees.
- When converting tree communities to grassland, leave a few individual trees or mosaic of trees.
- Construct kestrel nest boxes and place them in low human disturbance areas.
- Conscientious and appropriate application of agrochemicals.

Baird's Sparrow *Centronyx bairdii*

Description/Identification: L 5.5", WS 8.75", 0.6 oz. Brownish overall except for yellow-orange color on a flat head. Narrow band of fine dark streaks on the breast.

Status: Occurs in North Dakota from early May to early September. Peak breeding season early June to late July.

Reason for SGCN Designation: Regionally and globally imperiled, ND range important (SGCN a., b.). ND ranks 2nd out of 5 states for highest percent of the global population (10.01%) during the breeding season (eBird). The Baird's Sparrow is declining precipitously, and the population has decreased 71% since 1970. ND has high stewardship responsibility for this species.



Baird's Sparrow primary (dark gray) and possible/uncommon (light gray) breeding range. Photo Credit: NDGF

Habitat: Baird's Sparrows prefer idle native mixed-grass prairie, lightly to moderately grazed pastures, and tame grasslands. CRP, wet meadows, or dense grass within hayland and cropland are utilized to a lesser extent. Vegetative structure may influence use more than vegetative species composition. Stands of grasses with narrow leaves are readily used whereas stands with broad-leaved grasses or abundant low-growing shrubs such as snowberry are often avoided. Native plant communities with needlegrass, grama, Junegrass, and bluestem species are correlated with high Baird's Sparrow abundance in North Dakota. The percentage of club moss cover also is positively correlated to high abundance. Minimum area requirements for Baird's Sparrows are unknown, but it is presumed large, contiguous tracts of native prairie are required to maintain populations. Nest on the ground. Forages on the ground for insects and seeds.

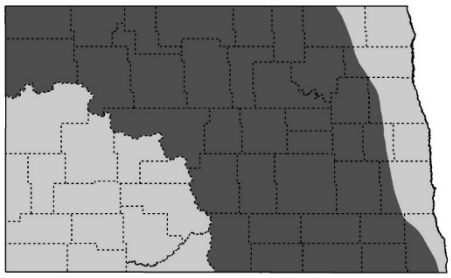
Threats: Loss of grassland. Degradation of grasslands from invasive plants, woody encroachment, succession, and loss of diversity. Particularly, invasion of yellow sweetclover causes a decrease in occurrence. Loss of ranching heritage and grass-based operations, grazing is essential to grassland health and diversity. Loss of grassland on the wintering grounds in the Chihuahuan Desert. Classified as climate-endangered, Baird's Sparrow is projected to lose more than half of its current distribution by 2050, with no net gains of new areas (Audubon). Parasitism by Brown-headed Cowbirds may be greater than for other grassland birds.

Research and Monitoring: Habitat requirements and demographic studies have been broadly researched on the breeding grounds. Additional information is needed on migration and wintering behaviors. The Breeding Bird Survey, eBird and Partners in Flight Databases are key sources of information on distribution and population trends.

Management Recommendations:

- Protect and conserve large, intact tracks of native prairie/unbroken grassland.
- Reconstruct or restore grassland adjacent to existing tracts of native prairie/unbroken grassland.
- Use native grasses when replanting or restoring grassland.
- Promote well-managed grazing lands and working grasslands for biodiversity, sustainability, and resiliency.
- Prevent or remove shrubs and tall woody vegetation in grasslands, either mechanically or by prescribed fire.
- Delay mowing or haying until August 1.
- Avoid or minimize placement of development (e.g. energy, housing, utility lines) or other human infrastructure in native prairie/unbroken grassland.
- Follow beneficial or best practices during the design, siting, construction, operation, and maintenance of tall structures (e.g. transmission lines, communication towers, wind turbines).

Black Tern *Childonias niger*



Black Tern primary (dark gray) and possible/uncommon (light gray) breeding range. Photo Credit: NDGF

Description/Identification: L 9.75", WS 24", 2.2 oz. Nearly all black except for gray wings and white undertail.

Status: Occurs in North Dakota from early May to mid-September. Peak breeding season early June to mid-July.

Reason for SGCN Designation: At-risk, ND range important (SGCN b.). ND ranks 1st out of 23 states for highest percent of the global population (8.19%) during the breeding season (eBird). Holarctic, large population and large geographic range. The Black Tern is declining, and ND has high stewardship responsibility for this species.

Habitat: Black Terns use wetland complexes of shallow wetlands, with an equal amount of open water and emergent vegetation. Sometimes brackish or alkaline, semi-permanent, marshes and wetlands, lake margins, edges of islands or slow-moving rivers, wet meadows, restored wetlands, and occasionally stock ponds are used. Stable water levels throughout the breeding season and abundant nest substrate are important. Large areas of open water used for foraging. Prefers wetlands surrounded by grassland rather than agricultural fields. Nests singly or semi-colonially, usually less than 20 pairs, on a floating mat of residual vegetation in sparse to moderately dense emergent vegetation. The nest is 2-20 cm above water that is 0.05-1.2 meters deep. Occasionally nest on abandoned muskrat houses, deserted nests of other wetland birds, mudflats, sandbars, or artificial platforms. Forages for insects over both land and water. Small fish are also consumed.

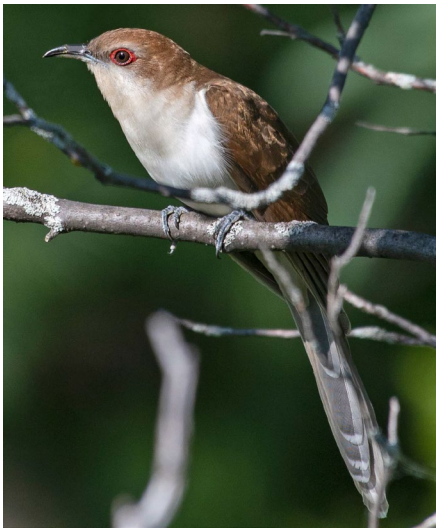
Threats: Loss and degradation of wetlands, drainage and wetland consolidation. Hydrologic shifts in wetlands of the PPR due to wetland consolidation and drainage, climate and land use changes (i.e. lakeification). Classified as climate-threatened, Black Tern is projected to lose more than half of its current distribution by 2080, with potential net gains of new areas (Audubon). Increasing applications of agrochemicals and adverse impacts to water quality, the wetland vegetative community, and the aquatic invertebrate community. More frequent or intense harmful algal blooms. Aquatic nuisance species spreading and damaging wetland ecosystems. Woody vegetation around wetlands negatively affects tern presence. Black Terns may be tolerant of human activity near nesting colonies, but colony should not be entered. Collisions with human-made structures (e.g. overhead lines, wind turbines).

Research and Monitoring: Habitat requirements and demographics have been researched. Additional information is needed on migration and wintering behaviors. The Breeding Bird Survey, eBird and Partners in Flight Databases are key sources of information on distribution and population trends. The most recent colonial waterbird inventory in ND was conducted in 2014-2015. Eighteen colonies were discovered, and 107 breeding pairs were estimated (mean colony size 6, range 1-20 pairs) but the survey did not encompass all areas of potential tern habitat.

Management Recommendations:

- Preserve and maintain wetland complexes.
- Restore hydrology and vegetation to degraded wetlands.
- Prevent encroachment of woody vegetation around wetlands.
- Conduct management to open cattail-choked wetlands.
- Follow aquatic nuisance species rules and regulations.
- Follow beneficial or best practices during the design, siting, construction, operation, and maintenance of tall structures (e.g. transmission lines, communication towers, wind turbines).

Black-billed Cuckoo *Coccyzus erythropthalmus*

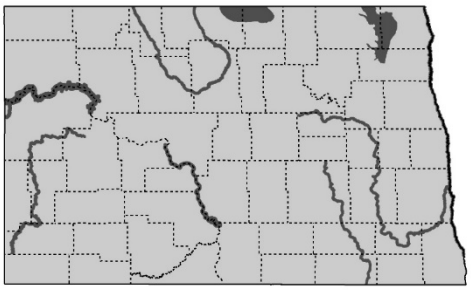


Description/Identification: L 12”, WS 17.5”, 1.8 oz. Slender, long-tailed, brown upperside, and off-white underneath. The black bill and red eye ring distinguish it from the yellow-billed cuckoo.

Status: Occurs in North Dakota from mid-May to late-September. Peak breeding season mid-June to late July.

Reason for SGCN Designation: At-risk based on recent regional assessments (SGCN c.). ND ranks 7th out of 26 states for highest percent of the global population (1.26%) during the breeding season (eBird). The Black-billed Cuckoo is declining, and the population decreased 68% since 1970.

Habitat: Black-billed Cuckoos prefer brushy margins or openings of woodlands, and thickets of small trees or shrubs on the prairie. Also uses riparian areas, shelterbelts, and wooded areas of towns and farmsteads. Nest in trees or thick brush usually 1-2 meters above the ground. Primarily insectivorous, feeding on large caterpillars, beetles, grasshoppers, crickets, butterflies, and occasionally fruits. Cuckoos will even readily consume noxious species such as tent caterpillars. May be area sensitive, requiring larger tracts (at least 1 ha) of forest habitat.



Black-billed Cuckoo primary (dark gray) and possible (light gray) breeding range. Photo Credit: Adobe Stock

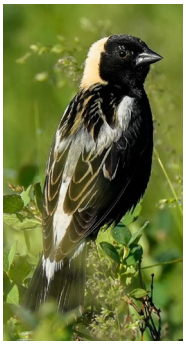
Threats: Loss and degradation of native riparian habitat. Development in wooded areas along major rivers may reduce cuckoo nesting habitat. Overgrazing of woody draws and other woodlands affects the vegetative structure and composition. Black-billed Cuckoos rely heavily on caterpillars for food and can be especially gregarious during caterpillar outbreaks. Pesticide use may reduce prey availability. Classified as climate-threatened, Black-billed Cuckoo is projected to lose more than half of its current distribution by 2080, with potential net gains of new areas (Audubon). Some mortality from collisions with structures and communication towers, probably in part due to nocturnal migration behavior.

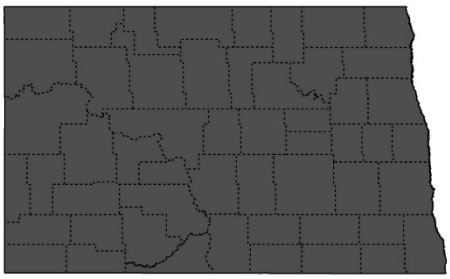
Research and Monitoring: Habitat requirements are generally known. Little is known about reproductive success, annual adult survival, or fledgling survival. Additional information is needed on migration and wintering behaviors. The Breeding Bird Survey, eBird and Partners in Flight Databases are key sources of information on distribution and population trends. Monitoring could involve targeted call-response surveys.

Management Recommendations:

- Protect and restore native riparian habitats.
- Limit or exclude grazing in riparian areas.
- Choose pesticides with the lowest toxicity to non-target organisms, or use biological insecticides such as B.t.
- Prune tent caterpillar masses from trees.
- Follow beneficial or best practices during the design, siting, construction, operation, and maintenance of tall structures (e.g. transmission lines, communication towers, wind turbines).

Bobolink *Dolichonyx oryzivorus*





Bobolink primary (dark gray) breeding range. Photo Credit: NDGF

Description/Identification: L 7", WS 11.5", 1.5 oz. Males sport a black belly, white rump and back, white patch on wings, and yellow hind neck. The female is yellowish-buff overall.

Status: Occurs in North Dakota from early May to late September. Peak breeding season early June to late August.

Reason for SGCN Designation: At-risk, ND range important (SGCN b.). ND ranks 1st out of 32 states for highest percent of the global population (19.32%) during the breeding season (eBird). The Bobolink is declining, and the population decreased 60% since 1970. ND has high stewardship responsibility for this species.

Habitat: Bobolinks prefer habitats of moderately tall, dense vegetation and will readily use planted grasslands. Vegetation structure is more important than vegetation composition. Native and tame grasslands, hayland, light to moderately grazed pasture, no-till cropland, small-grain fields, old fields, wet meadows, CRP, and DNC habitats are all utilized if the cover is tall and relatively dense. Positively associated with the area of emergent herbaceous wetlands within the surrounding landscape. Abundance is negatively correlated with percent clubmoss, bare ground, and communities dominated solely by native grass. Typically avoids areas with woody vegetation and woodland edges. Nest on the ground, often beneath a large forb. Forages on a variety of seeds and insects. Frequently uses stiff vegetation or heavy-stemmed forbs as perches and singing substrate.

Threats: Loss of grassland, especially the loss of CRP. Degradation of grasslands from invasive plants, woody encroachment, succession, and loss of diversity. Loss of ranching heritage and grass-based operations, grazing is essential to grassland health and diversity. Classified as climate-threatened, Bobolink is projected to lose more than half of its current distribution by 2080, with potential net gains of new areas (Audubon). Moderate to heavy Brown-headed Cowbird parasitism. Direct and indirect impacts from energy development, Bobolinks exhibit displacement from areas within and surrounding wind turbines.

Research and Monitoring: Habitat requirements and effects of management practices such as grazing, burning and haying have been broadly researched on the breeding grounds. Additional information is needed on migration and wintering behaviors. The Breeding Bird Survey, eBird and Partners in Flight Databases are key sources of information on distribution and population trends.

Management Recommendations:

- Protect and conserve large, intact tracks of native prairie/unbroken grassland and tame grassland.
- Reconstruct or restore grassland adjacent to existing tracts of native prairie/unbroken grassland.
- Graze or hay expired CRP. The density of Bobolinks is 94% lower in CRP fields converted to cropland, but effects are less if expired CRP is converted to grazed grassland (-58%) or hayland (-32%).
- Promote well-managed grazing lands and working grasslands for biodiversity, sustainability, and resiliency.
- Prevent or remove shrubs and tall woody vegetation in grasslands, either mechanically or by prescribed fire.
- Delay mowing or haying until August 1. Provide hayland areas and mow as late as possible. High densities of Bobolinks have been found using hayland mowed the previous year.
- Avoid or minimize placement of development (e.g. energy, housing, utility lines) or other human infrastructure in native prairie/unbroken grassland and tame grasslands.
- Follow beneficial or best practices during the design, siting, construction, operation, and maintenance of tall structures (e.g. transmission lines, communication towers, wind turbines).

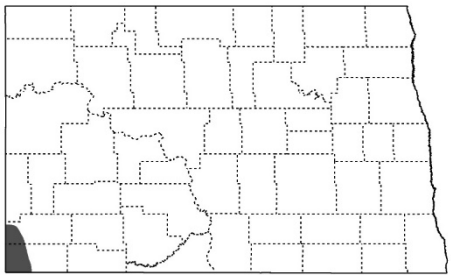
Brewer's Sparrow *Spizella breweri*

Description/Identification: L 5.5", WS 7.5", 0.37 oz. Gray-brown overall, unstreaked breast, white eye ring, and small bill.

Status: Occurs in North Dakota from early May to mid-August. Peak breeding season mid-May to late July.

Reason for SGCN Designation: Regionally or globally imperiled (SGCN a.). ND ranks 14th out of 14 states for highest percent of the global population (0.06%) during the breeding season (eBird). The Brewer's Sparrow is slowly declining, and the population has decreased 35% since 1970. Limited range in ND, at-risk of being extirpated from the state.

Habitat: A sagebrush-obligate, Brewer's Sparrows are closely associated with shrub communities dominated by big sagebrush (*Artemisia tridenta*). Sagebrush grasslands with >10% average shrub cover and average shrub height of 0.5-1.5 m are preferred. Abundance decreases where shrub cover falls below 10-13 percent. Occasionally use CRP grasslands or shortgrass prairies. Prefer nesting in medium-sized, alive or mostly alive shrubs of 50-90 cm tall with the nest located from 7-104 cm off the ground. Forage in tall, live shrubs or on ground for alfalfa weevils, aphids, caterpillars, beetles, or seeds.



Brewer's Sparrow primary (dark gray) breeding range. Photo Credit: Adobe Stock

Threats: Loss and degradation of big sagebrush habitat. Fire can destroy sagebrush and can take many years for the community to recover. Invasion of non-native grass or forb species (e.g. clubmoss) could negatively affect the sagebrush community. Brewer's Sparrow abundance decreased significantly with increasing well density/km² in Wyoming. Classified as climate-threatened, Brewer's Sparrow is projected to lose more than half of its current distribution by 2080, with potential net gains of new areas (Audubon).

Research and Monitoring: Habitat requirements are generally known. Additional information is needed on migration and wintering behaviors. The Breeding Bird Survey, eBird and Partners in Flight Databases are key sources of information on distribution and population trends.

Management Recommendations:

- Protect and conserve intact tracts of sagebrush, especially those dominated by big sagebrush.
- Remove encroaching conifer trees from big sagebrush habitat.
- Avoid frequent burning. Historically, sagebrush (a slow regenerator) burned only every 60-100 years.
- Promote well-managed grazing lands and working sagebrush for biodiversity, sustainability, and resiliency.
- Avoid pesticide use in sagebrush habitats, or delay spraying until September.
- Greater Sage-Grouse may be a useful umbrella species and management actions targeted at sage-grouse will be beneficial for Brewer's Sparrow.

Brown Thrasher *Toxostoma rufum*

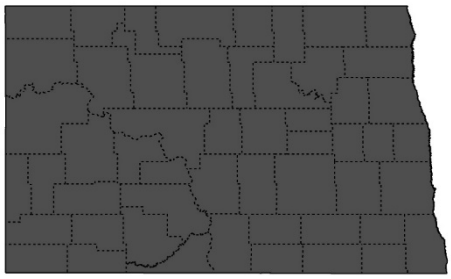
Description/Identification: L 11.5”, WS 13”, 2.4 oz. Rufous upperparts, whitish underparts with coarse dark streaks, and long tail.

Status: Occurs in North Dakota from mid-April to early October. Peak breeding season late May to early July.

Reason for SGCN Designation: At-risk based on expert review (SGCN c.). ND ranks 7th out of 39 states for highest percent of the global population (3.39%) during the breeding season (eBird). The Brown Thrasher is declining, and the population decreased 37% since 1970.

Habitat: Brown Thrashers prefer open brushy woods, riparian woodlands, woody draws and thickets of small trees or shrubs. Also uses shelterbelts and wooded areas of cities/towns, parks and farmsteads. Nest in dense shrubs or trees, 1-2 meters above the ground. Forages on the ground for a variety of insects, especially beetles, and occasionally fruits, nuts and seeds or grain.

Threats: Loss and degradation of native riparian habitat. Loss of shelterbelts. Overgrazing of woody draws and other woodlands affects the vegetative structure and composition. Pesticide use may reduce prey availability. Frequent host of Brown-headed Cowbirds but



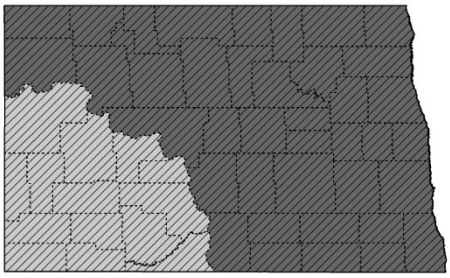
Brown Thrasher primary (dark gray) breeding range. Photo Credit: NDGF

Research and Monitoring: Habitat requirements are generally known. Additional information is needed on migration and wintering behaviors. The Breeding Bird Survey, eBird and Partners in Flight Databases are key sources of information on distribution and population trends.

Management Recommendations:

- Protect and restore native riparian habitats.
- Limit or exclude grazing in riparian areas.
- Rejuvenate and plant new shelterbelts, but do not plant shelterbelts in native prairie.
- Choose pesticides with the lowest toxicity to non-target organisms, or use biological insecticides such as B.t
- Prune tent caterpillar masses from trees.
- Follow beneficial or best practices during the design, siting, construction, operation, and maintenance of tall structures (e.g. transmission lines, communication towers, wind turbines).

Buff-breasted Sandpiper *Calidris subruficollis*



Buff-breasted Sandpiper primary (dark gray/hatch) and possible/uncommon (light gray/hatch) migration range. Photo Credit: Adobe Stock

Description/Identification: L 8.5", WS 18", 2.2 oz. Slender, plain buffy face, pale buffy breast with spotting on sides, bright yellow legs and short dark bill.

Status: Migrates through North Dakota in May, and late July to early October.

Reason for SGCN Designation: Regionally or globally imperiled, at-risk based on expert review (SGCN a., c.). The peak week for Buff-breasted Sandpiper migration in ND (~26-July) hosts >45% (48.31) of the global population. The Buff-breasted Sandpiper is declining precipitously. Small and declining population, limited breeding and nonbreeding range. Migrates primarily through Central Flyway.

Habitat: Buff-breasted Sandpipers breed along the Arctic coastlines of Alaska and Canada, and winter in the Pampas of southeastern South America. This shorebird is one of the longest-distance migrants in the Western hemisphere. Historically, during migration they would stopover in short-stature grasslands in the Central Flyway and the Midwest, including North Dakota. Presently, much of the traditional stopover habitat has been converted to other uses, mostly tilled agriculture. Buff-breasted Sandpipers now use tilled cropland (often with emerging crops), untilled harvested fields, short-stature grasslands, and wetland habitats to a lesser degree. Feed on earthworms and a variety of terrestrial invertebrates such as beetles, spiders, ants, and seeds.

Threats: Loss and degradation of grasslands. Loss of habitat on the breeding and wintering grounds and amplified effects of climate change in arctic habitats. Hyperabundant geese populations alter tundra habitat and may limit the availability of nesting habitat for artic-breeding shorebirds. Loss and degradation of migratory stopover habitat and impacts of human activity at important stopover areas such as the Texas Coastal Plain. Increasing applications of agrochemicals.

Research and Monitoring: Demographic studies are limited. Information lacking on migration strategies, stopover sites, and wintering behaviors. Multiple large-scale shorebird monitoring programs are key sources of information on distribution and population trends. However, minimal focus has been directed at research or monitoring migrant shorebirds in ND.

Management Recommendations:

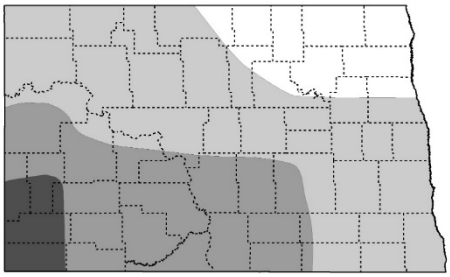
- Identify and target high priority landscapes, habitats, and stopover sites for protection.
- Burn, mow, and graze grasslands to provide areas of shorter, sparser vegetation.
- Conscientious and appropriate application of agrochemicals.

Burrowing Owl *Athene cunicularia*

Description/Identification: L 9.5", WS 21", 5 oz. A small owl with long legs, a spotted dark brown and buffy breast, white throat, and large yellow eyes.

Status: Occurs in North Dakota from April to September. Peak breeding season early May to mid-August.

Reason for SGCN Designation: At-risk based on expert review and recent regional and global assessments (SGCN c.). ND ranks 14th out of 18 states for highest percent of the global population during the breeding season (eBird). The Burrowing Owl is declining, and the population has decreased 35% since 1970.



Burrowing Owl primary (dark gray), secondary (medium gray) and possible/uncommon (light gray) breeding range. Photo Credit: NDGF

Habitat: Burrowing Owls are found in open grasslands of sparse, short vegetation (<10 cm) and bare ground such as in moderately or heavily grazed pasture. Native prairie, tame pasture, hayland, fallow fields, road and railway rights-of-way are used. Rely exclusively on burrowing mammals to create burrows for nest sites. Most often use abandoned Black-tailed Prairie Dog and Richardson's Ground Squirrel burrows within active colonies, may use badger, woodchuck, skunk, fox, and coyote burrows. Sometimes concentrate nests at the edge of colonies, presumably because of increased perch availability, high insect populations, and proximity to foraging areas. Availability of perches such as fence posts, dirt mounds, large rocks, or utility poles may be an important characteristic of territories. Feed primarily on arthropods and small mammals such as voles.

Threats: Loss of grassland. Removal of prairie dogs or ground squirrels from colonies causes a deterioration of burrows and denser, taller vegetation, and owls may discontinue use of those sites. Pesticides reduce prey availability and improper pesticide use may be directly harmful to Burrowing Owls. Classified as climate-endangered, Burrowing Owl is projected to lose more than half of its current distribution by 2050, with no net gains of new areas (Audubon). Collisions with human-made structures (e.g. overhead lines, wind turbines).

Research and Monitoring: Habitat requirements are generally known. Additional information is needed on migration and wintering behaviors. The Breeding Bird Survey, eBird and Partners in Flight Databases are key sources of information on distribution and population trends.

Management Recommendations:

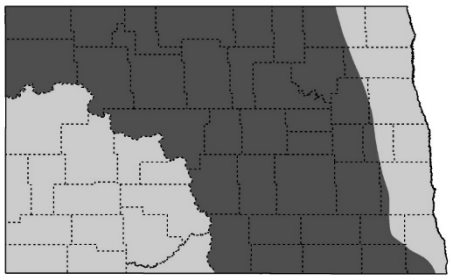
- Preserve traditional nesting sites. Burrowing Owls often reuse nesting sites from previous years.
- Maintain large, contiguous areas of native grassland and treeless plains.
- Provide a mosaic of tall grass for foraging, short grass for nesting and roosting.
- Artificial nest structures may be used where burrows are scarce.
- Allow moderate to intense grazing in areas that support tall vegetation.
- Refrain from lethal control of burrowing mammals during the period when Burrowing Owls are nesting.
- Maintain abandoned prairie dog colonies at short vegetation <8 cm with mowing or grazing.
- Promote well-managed grazing lands and working grasslands for biodiversity, sustainability, and resiliency.
- Conscientious and appropriate application of agrochemicals.
- Follow beneficial or best practices during the design, siting, construction, operation, and maintenance of tall structures (e.g. transmission lines, communication towers, wind turbines).

Canvasback *Aythya valisineria*

Description/Identification: L 21", WS 29", 2.7 lb. Long, pointed, black bill on a sloping, dark red head (male), red eye, gray and white pattern on back and sides.

Status: Occurs in North Dakota from mid-March to mid-December. Peak breeding season from mid-May to mid-August.

Reason for SGCN Designation: At-risk, ND range important (SGCN b.). ND ranks 1st out of 14 states for highest percent of the global population (18.03%) during the breeding season (eBird). ND has high stewardship responsibility for this species.



Canvasback primary (dark gray) and possible/uncommon (light gray) breeding range. Photo Credit: NDGF

Habitat: Canvasbacks use semi-permanent wetlands, small lakes, or deep water marshes containing emergent cover such as bulrush and cattails. Occasionally use shallow river impoundments managed for waterfowl. Canvasbacks are an ecological specialist and rely heavily on deep, more stable wetlands for breeding. Feed primarily on wild celery and pondweeds, but also on roots, tubers, grass seeds, and some aquatic invertebrates such as mollusks. Nest over water in fairly dense stands of emergent vegetation of bulrush, reeds, and cattails. Nests are typically located within 1-20 yards from the edge of open water. Shallow wetlands with beds of sago pondweed or widgeongrass are especially important as migration stopover sites in North Dakota.

Threats: Loss and degradation of wetlands, drainage and wetland consolidation. Hydrologic shifts in wetlands of the PPR due to wetland consolidation and drainage, climate and land use changes (i.e. lakeification). Increasing applications of agrochemicals and impacts to water quality, the wetland vegetative community, and the aquatic invertebrate community. More frequent or intense harmful algal blooms. Aquatic nuisance species spreading and damaging wetland ecosystems. Human disturbance, such as by recreational boaters, at staging and stopover sites. Collisions with human-made structures (e.g. overhead lines, wind turbines).

Research and Monitoring: Habitat requirements and demographics have been extensively researched on the breeding grounds. The Waterfowl Breeding Population and Habitat Survey (May Survey) is a long-standing survey conducted in the U.S. and Canada and provides annual breeding population estimates for most ducks in North America. The NDGF has also conducted an annual spring breeding duck survey since 1948.

Management Recommendations:

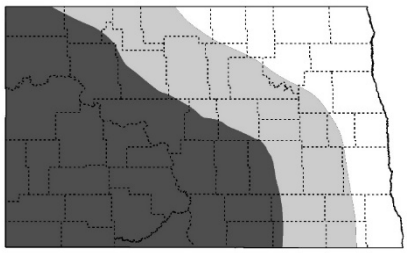
- Preserve and conserve semi-permanent wetlands and wetland complexes.
- Restore hydrology and vegetation to degraded wetlands.
- Leave or plant grassed buffer strips around wetlands and waterways to prevent erosion and runoff into wetlands.
- Conduct management to open cattail-choked wetlands.
- Stocking fish in shallow wetlands can be detrimental to waterfowl production.
- Conscientious and appropriate application of agrochemicals.
- Follow aquatic nuisance species rules and regulations.
- Follow beneficial or best practices during the design, siting, construction, operation, and maintenance of tall structures (e.g. transmission lines, communication towers, wind turbines).

Chestnut-collared Longspur *Calcarius ornatus*

Description/Identification: L 6”, WS 10.5”, .67 oz. Males have a chestnut collar, black belly, yellowish cheek and upper throat, and white outer tail feathers on a black tail. Females are grayish-buff overall with some streaking.

Status: Occurs in North Dakota from late March to mid-October. Peak breeding season early May to early August.

Reason for SGCN Designation: Regionally and globally imperiled, ND range important (SGCN a., b.). ND ranks 2nd out of 6 states for highest percent of the global population (18.93%) during the breeding season (eBird). The Chestnut-collared Longspur is declining precipitously, and the population has decreased 85% since 1970. ND has high stewardship responsibility for this species.



Chestnut-collared Longspur primary (dark gray) and possible/uncommon (light gray) breeding range. Photo Credit: NDGF

Habitat: Chestnut-collared Longspurs prefer large (>250 acres) native prairie pastures. Level to rolling, open, arid, mixed-grass and shortgrass prairie with 20-30 cm vegetation height is preferred but will use habitats of 10-77 cm. Uncommon in other grazed grasslands, hayland, undisturbed CRP, and cropland. Positively associated with percent clubmoss cover, percent bare ground, and plant communities dominated by native grass. Negatively associated with vegetation height-density, higher litter depth, density of low-growing shrubs, and plant communities dominated by shrubs and introduced grasses. Nest on the ground, often by a cowpie or under a clump of grass. Forages on the ground for seeds, insects and spiders. Frequently perches on rocks, fences, or stiff vegetation.

Threats: Loss of grassland. Degradation of grasslands from invasive plants, woody encroachment, succession, and loss of diversity. Particularly, invasion of yellow sweetclover causes a decrease in occurrence. Loss of ranching heritage and grass-based operations, grazing is essential to grassland health and diversity. Loss of grassland on the wintering grounds in the Chihuahuan Desert. Classified as climate-endangered, Chestnut-collared Longspur is projected to lose more than half of its current distribution by 2050, with no net gains of new areas (Audubon). Direct and indirect impacts from energy development, Chestnut-collared Longspurs exhibit displacement from areas within and surrounding wind turbines.

Research and Monitoring: Habitat requirements and demographic studies have been broadly researched on the breeding grounds. Additional information is needed on migration and wintering behaviors. The Breeding Bird Survey, eBird and Partners in Flight Databases are key sources of information on distribution and population trends.

Management Recommendations:

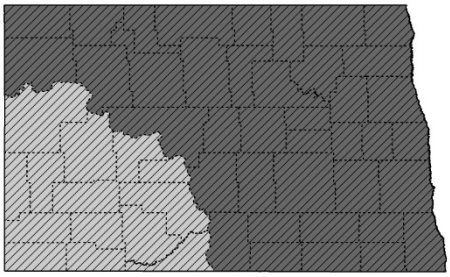
- Protect and conserve large, intact tracks of native prairie/unbroken grassland.
- Reconstruct or restore grassland adjacent to existing tracts of native prairie/unbroken grassland.
- Use native grasses when replanting or restoring grassland.
- Promote well-managed grazing lands and working grasslands for biodiversity, sustainability, and resiliency.
- Prevent or remove shrubs and tall woody vegetation in grasslands, either mechanically or by prescribed fire.
- Delay mowing or haying until August 1.
- Avoid or minimize placement of development (e.g. energy, housing, utility lines) or other human infrastructure in native prairie/unbroken grassland.
- Follow beneficial or best practices during the design, siting, construction, operation, and maintenance of tall structures (e.g. transmission lines, communication towers, wind turbines).

Dunlin *Calidris alpina*

Description/Identification: L 8.5”, WS 17”, 2.1 oz. Breeding/spring plumage: stocky body, black belly, slightly drooping bill. Fall/nonbreeding plumage: drab gray and brownish.

Status: Migrates through North Dakota primarily in the spring, mid-April to early June. Limited occurrence in the fall.

Reason for SGCN Designation: Regionally or globally imperiled, at-risk based on expert review (SGCN a., c.). The peak week for Dunlin migration in ND (~24-May) hosts >3% (3.15) of the global population. Common bird in steep decline. Holarctic, large population and distribution but experts suspect the population of all North American subspecies are declining.



Dunlin primary (dark gray/hatch) and possible/uncommon (light gray/hatch) migration range. Photo Credit: NDGF

Habitat: In the Western Hemisphere, Dunlins breed in the far northern coastal tundra of North America and winter along the Pacific, Atlantic and Gulf coasts of the U.S. and northern Mexico. This shorebird is an intermediate to short-distance migrant. The interior population, *C. a. hudsonia*, may migrate directly from the Gulf Coast of Texas to North Dakota, before their final flight to breeding grounds along the Hudson Bay. The eastern Prairie Pothole region of the Dakotas, Minnesota and Manitoba is important spring stopover habitat, peaking in late May (~May 24-25). Dunlins primarily use a variety of shallow water wetlands and lakes, mudflats, and sandy, rocky or exposed shorelines. Forage in shallow water for a variety of invertebrates, earthworms, amphipods, or seeds.

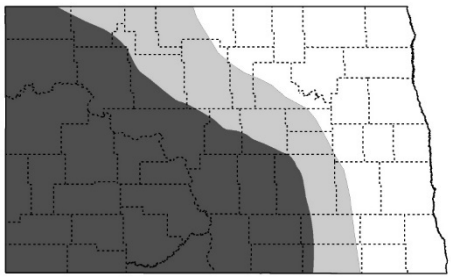
Threats: Loss and degradation of wetlands, drainage and wetland consolidation. Loss of habitat on the breeding and wintering grounds and amplified effects of climate change in arctic and coastal habitats. Classified as climate-endangered, Dunlin is projected to lose more than half of its current distribution by 2050, with no net gains of new areas (Audubon). Hyperabundant geese populations alter tundra habitat and may limit the availability of nesting habitat for artic-breeding shorebirds. Loss and degradation of migratory stopover habitat and impacts of human activity at important stopover areas such as the Lower Mississippi Alluvial Valley and Texas Gulf Coast. Coastal development (urban and industry sprawl), coastal erosion, storm surges, oil or industrial effluent spills, impaired water quality and microplastics are threats to wintering habitat. Increasing applications of agrochemicals and adverse impacts to water quality, the wetland vegetative community, and the aquatic invertebrate community. More frequent or intense harmful algal blooms. Aquatic nuisance species spreading and damaging wetland ecosystems.

Research and Monitoring: Habitat requirements and demographic studies have been broadly researched on the breeding grounds. Information lacking on migration strategies, stopover sites, and wintering behaviors. Multiple large-scale shorebird monitoring programs are key sources of information on distribution and population trends. However, minimal focus has been directed at research or monitoring migrant shorebirds in ND.

Management Recommendations:

- Maintain wetland complexes.
- Conserve shallow, working wetlands in cropland.
- Plant vegetative buffer strips around wetlands in cropland.
- Identify and target high priority landscapes, habitats, and stopover sites for protection.
- Conscientious and appropriate application of agrochemicals.

Ferruginous Hawk *Buteo regalis*



Ferruginous Hawk primary (dark gray) and possible/uncommon (light gray) breeding range. Photo Credit: NDGF

Description/Identification: L 23", WS 56", 3.5 lb. The largest hawk in North Dakota, it varies in coloration from almost completely white with a trace of reddish-brown, to nearly all dark brown.

Status: Occurs in North Dakota from mid-March to October. Peak breeding season late April to early July.

Reason for SGCN Designation: At-risk, ND range important (SGCN b.). Global population breeding in ND: PIF estimate 3.83%, eBird estimate 3.41%. ND ranks 7th out of 16 states for highest percent of the global population (3.41%) during the breeding season (eBird). The Ferruginous Hawk is stable to increasing in some parts of its range but has declined in ND. Once the most common hawk in North Dakota, the Ferruginous Hawk has all but disappeared from many historical nesting areas.

Habitat: Ferruginous Hawks inhabit a variety of open grasslands and shrub communities. Cultivated fields, high elevations, and forest interiors are avoided. Both native and tame grasslands are utilized, as well as hayland, and pastures. Most nests are in solitary trees, but may nest on or near the ground, in large shrubs, on utility structures, or hay bales. Will nest on hills <10 meters above the surrounding area and facing south or west. Primary prey includes prairie dogs, ground squirrels and jackrabbits. Birds are a small percentage of their diet and are fed mostly to fledglings.

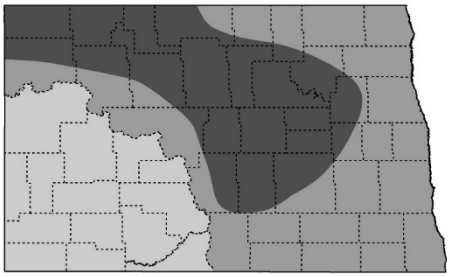
Threats: Loss of grassland. Degradation of grasslands from invasive plants, succession, and loss of diversity. The destruction of Black-tailed Prairie Dogs towns in southwestern North Dakota and Richardson's Ground Squirrel colonies east of the Missouri River due to poisoning, conversion to cropland, and other factors may also negatively affect hawk populations. Pesticides reduce prey availability and improper pesticide use may be directly harmful. This species is extremely sensitive to human disturbance, will avoid nesting within 0.7 km of occupied buildings. Disturbance of nest sites near development activities may lower reproductive success, cause nest abandonment, or reduce territory reoccupancy in subsequent years. Some mortality from collisions with overhead lines or wind turbines, or electrocution.

Research and Monitoring: Habitat requirements and demographic studies have been broadly researched on the breeding grounds. Additional information is needed on migration and wintering behaviors. The Breeding Bird Survey, eBird and Partners in Flight Databases are key sources of information on distribution and population trends.

Management Recommendations:

- Protect and conserve intact tracks of native prairie/unbroken grassland.
- When converting tree communities to grassland, leave a few individual trees or mosaic of trees.
- Minimize activity within 1 mile of active nests from late March to mid-August.
- Conscientious and appropriate application of agrochemicals.
- Follow beneficial or best practices during the design, siting, construction, operation, and maintenance of tall structures (e.g. transmission lines, communication towers, wind turbines).
- Use avian protection plans or guidance documents to minimize bird/powerline interactions.

Franklin's Gull *Leucophaeus pipixcan*



Franklin's Gull primary (dark gray), secondary (medium gray) and possible/uncommon (light gray) breeding range. Photo Credit: NDGF

Description/Identification: L 14.5", WS 36", 10 oz. Black head, large white spots on black wing tips, breeding adults have red bill.

Status: Occurs in North Dakota from early April to mid-November. Peak breeding season late May to mid-July.

Reason for SGCN Designation: At-risk, ND range important (SGCN b.). ND ranks 2nd out of 13 states for highest percent of the global population (8.2%) during the breeding season (eBird). Large population and large geographic range. The Franklin's Gull is stable to increasing but ND has high stewardship responsibility for this species in the Prairie Pothole Region. ND has several large nesting colonies and is important stopover habitat for migrating gulls.

Habitat: Nesting colonies occur in extensive prairie wetlands with cattail, bulrush, or other emergent vegetation. The number of nests in a colony may number in the hundreds or thousands. Nests built of floating mats of vegetation, on muskrat houses, or other debris. Water depth at nest varies from 15-180 cm. During the nesting period, individuals stay generally within 30km of colony. Several large, established colonies in North Dakota but readily shift sites due to climate, drought and fluctuating water levels. Forage over water or in agricultural fields for flying insects, grains/seeds, dragonflies, earthworms, grasshoppers, and other matter.

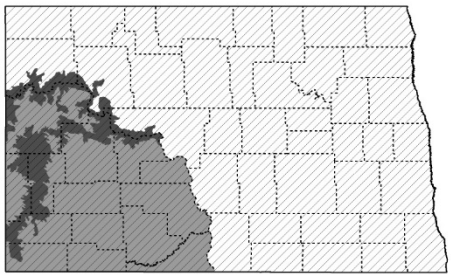
Threats: Loss and degradation of wetlands, drainage and wetland consolidation. Hydrologic shifts in wetlands of the PPR due to wetland consolidation and drainage, climate and land use changes (i.e. lakeification). Classified as climate-threatened, Franklin's Gull is projected to lose more than half of its current distribution by 2080, with potential net gains of new areas (Audubon). Increasing applications of agrochemicals and adverse impacts to water quality, the wetland vegetative community, and the aquatic invertebrate community. More frequent or intense harmful algal blooms. Aquatic nuisance species spreading and damaging wetland ecosystems. Colonial waterbirds are highly susceptible to disease such as botulism or avian influenza. The Franklin's Gull is sensitive to human disturbance and could abandon a colony if excessive disturbance occurs, particularly during the pre-nesting period. Mortality from collisions with overhead lines.

Research and Monitoring: Habitat requirements and demographics have been researched. Additional information is needed on migration and wintering behaviors. The Breeding Bird Survey, eBird and Partners in Flight Databases are key sources of information on distribution and population trends. The most recent colonial waterbird inventory in ND was conducted in 2014-2015. Eight colonies were discovered and ~20,690 breeding pairs were estimated (mean colony size 2,586, range 17-10,000 pairs).

Management Recommendations:

- Protect and conserve wetland complexes.
- Identify and target high priority landscapes, habitats, and staging areas for protection.
- Conserve shallow, working wetlands in cropland.
- Follow aquatic nuisance species rules and regulations.
- Follow beneficial or best practices during the design, siting, construction, operation, and maintenance of tall structures (e.g. transmission lines, communication towers, wind turbines).

Golden Eagle *Aquila chrysaetos*



Golden Eagle primary (dark gray) and secondary (medium gray) breeding range. Winter and migration range (hatch). Photo Credit: NDGF

Description/Identification: L 30", WS 79", 10 lb. Dark brown overall, feathered legs, brown eyes, and black beak. The head turns golden as an adult.

Status: Year-round and migratory. Peak breeding season early April to July.

Reason for SGCN Designation: Regionally or globally imperiled (SGCN a.). ND ranks 15th out of 16 states for highest percent of the global population during the breeding season (eBird). Although Golden Eagles are stable to slightly declining, they are susceptible to increasing incidental take and disturbance due to changes on the landscape at both state and national levels.

Habitat: Golden Eagles use open shrubland and grasslands of shortgrass, mixed-grass, and xeric grasslands. Avoids heavily forested areas but will use riparian or woodland/brushland habitat. Typically nest on cliffs but also in trees such as cottonwood and green ash, or even on or near the ground. Nests on cliffs generally face southerly. Nests will be reused by returning eagles or a new pair. Some are associated with black-tailed prairie dog towns. Primary prey includes ground squirrels and jackrabbits; however, eagles are opportunistic and other prey include wild turkey, coyote, big game young, porcupine, striped skunk, great-horned owl, and waterfowl.

Threats: Loss of grasslands and shrubland, habitat modification. Eagles may be limited by the abundance of their primary prey, rabbits and ground squirrels. Pesticides reduce prey availability and improper pesticide use may be directly harmful. Human activity such as recreational viewing, research activities, noise, agricultural or energy development activities, or the mere presence of humans may agitate nesting eagles if the disturbance is close (<330 ft.) and/or persistent. Disturbance of nest sites may lower reproductive success, cause nest abandonment, or reduce territory reoccupancy in subsequent years. Classified as climate-endangered, Golden Eagle is projected to lose more than half of its current distribution by 2050, with no net gains of new areas (Audubon). Collisions with vehicles, overhead lines, wind turbines or other structures, electrocution, and lead poisoning. Poaching is rare but is a senseless cause of mortality.

Research and Monitoring: Habitat requirements and demographic studies have been broadly researched on the breeding grounds. Additional information is needed on migration and wintering behaviors. The Breeding Bird Survey, eBird and Partners in Flight Databases are key sources of information on distribution and population trends.

Management Recommendations:

- Protect and conserve intact tracks of native prairie/unbroken grassland.
- Maintain a 0.5-mile buffer zone of minimal surface occupancy within 0.5 mile of nests (i.e. roads, mining operations, energy development, etc.).
- Minimize activity within 0.5 mile of active nests from February to mid-September.
- Conscientious and appropriate application of agrochemicals.
- Follow beneficial or best practices during the design, siting, construction, operation, and maintenance of tall structures (e.g. transmission lines, communication towers, wind turbines).
- Use avian protection plans or guidance documents to minimize bird/powerline interactions.
- Encourage non-toxic ammunition use.

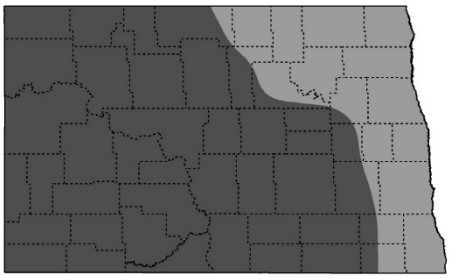
Grasshopper Sparrow *Ammodramus savannarum*

Description/Identification: L 5”, WS 7.75”, 0.6 oz. Short-tailed, flat-headed, yellowish with unmarked breast. Yellow spot between the eyes and bill.

Status: Occurs in North Dakota from late April to early October. Peak breeding season late May to late July.

Reason for SGCN Designation: At-risk, ND range important (SGCN b.). ND ranks 3rd out of 40 states for highest percent of the global population (14.99%) during the breeding season (eBird). The Grasshopper Sparrow is declining, and the population has decreased 68% since 1970.

Habitat: Grasslands of intermediate height, clumped vegetation, patches of bare ground, moderate litter depth, and sparse woody vegetation are preferred. Uses native and tame grasslands, CRP, hayland, and occasionally cropland. Avoids tall, dense grasslands and excessively shrubby habitats. Nest on the ground and well concealed by overhanging grasses. Area sensitive and require large grasslands although territory size is small <2 ha. Forages on the ground for insects, primarily grasshoppers.



Grasshopper Sparrow primary (dark gray) and secondary (medium gray) breeding range. Photo Credit: NDGF

Threats: Loss of grassland. Degradation of grasslands from invasive plants, woody encroachment, succession, and loss of diversity. Loss of ranching heritage and grass-based operations, grazing is essential to grassland health and diversity. Brown-headed Cowbird parasitism is generally low but may be moderate to high in some regions. Direct and indirect impacts from energy development, Grasshopper Sparrows exhibit displacement from areas within and surrounding wind turbines.

Research and Monitoring: Habitat requirements, demographic studies, and effects of management practices such as grazing, burning and haying have been broadly researched on the breeding grounds. Additional information is needed on migration and wintering behaviors. The Breeding Bird Survey, eBird and Partners in Flight Databases are key sources of information on distribution and population trends.

Management Recommendations:

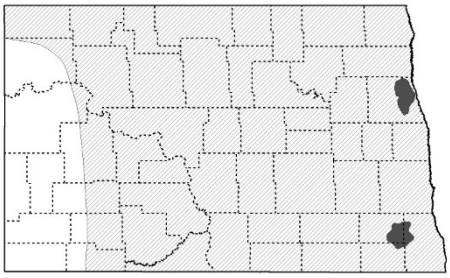
- Protect and conserve large, intact tracks of native prairie/unbroken grassland and tame grassland.
- Reconstruct or restore grassland adjacent to existing tracts of native prairie/unbroken grassland.
- Use native grasses when replanting or restoring grassland.
- Graze or hay expired CRP. The density of Grasshopper Sparrows is 82% lower in CRP fields converted to cropland, but density will increase if expired CRP is converted to grazed grassland (+8%) or hayland (+40%).
- Promote well-managed grazing lands and working grasslands for biodiversity, sustainability, and resiliency.
- Prevent or remove shrubs and tall woody vegetation in grasslands, either mechanically or by prescribed fire.
- Delay mowing or haying until August 1.
- Avoid or minimize placement of development (e.g. energy, housing, utility lines) or other human infrastructure in native prairie/unbroken grassland.
- Follow beneficial or best practices during the design, siting, construction, operation, and maintenance of tall structures (e.g. transmission lines, communication towers, wind turbines).

Greater Prairie-Chicken *Tympanuchus cupido*

Description/Identification: L 17", WS 28", 2.0 lb. A short, rounded tail and completely barred body. Males have long tufts of feathers and orange air sacs on the sides of the neck.

Status: Year-round resident. Peak breeding season late April to late June.

Reason for SGCN Designation: Regionally and globally imperiled, ND range important (SGCN a., b.). ND ranks 7th out of 11 states for highest percent of the global population during the breeding season (eBird). Following European settlement, populations were documented to have increased from 1880 to 1930, but current populations have declined >50% since 1970 (PIF). At-risk of extirpation from North Dakota.



Greater Prairie-Chicken current primary (dark gray) and historical (black hatch) breeding range. Photo Credit: NDGF

Habitat: Historically, the Greater Prairie-Chicken was dependent upon tallgrass prairie oak woodland in central North America. As the birds moved into North Dakota, tallgrass prairie interspersed with cropland became the preferred habitat. Today, the presence of woody vegetation may reduce nest success. The amount of grassland and wetland in the landscape may positively influence prairie chickens while forest cover and distance from nearest lek are negative influences. Leks are located in areas of bare ground or short cover. Females nest reasonably close to the lek site, 2-5 km, and in relatively dense vegetation. Broods use habitat >25 cm tall, particularly lowlands or areas that contain sedges and usually are wet in the spring. Winter roosting habitat occurs in areas of switchgrass, shelterbelts, or the woody vegetation along cropland edges. Food items include leaves, seeds, buds, and insects but rely primarily on agricultural crops for food through the winter.

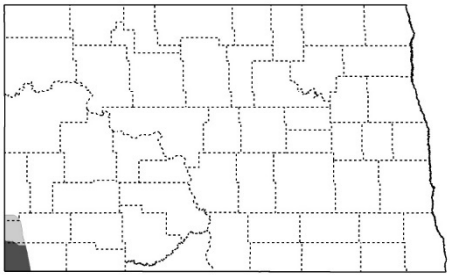
Threats: Loss of grassland. Degradation of grasslands from invasive plants, woody encroachment, succession, and loss of diversity. A lack of habitat corridors between outlying populations prevents interconnectivity among populations. Nests may be parasitized by Ring-necked Pheasants, or pheasants may be the source of interspecific competition. Hybridization with Sharp-tailed Grouse. Increasing applications of agrochemicals and possible impacts to food availability for broods. Mortality from collisions with fences, utility wires, and vehicles.

Research and Monitoring: Habitat requirements and demographic studies have been broadly researched on the breeding grounds. The NDGF and cooperators conduct ground counts on prairie chicken leks in Grand Forks County and the Sheyenne National Grasslands.

Management Recommendations:

- Protect remaining tallgrass prairie remnants, particularly where leks have been identified.
- Use native grasses and forbs when replanting or restoring grassland.
- Use rotational disturbance every 3-5 years, with prescribed burning as the preferred method.
- Minimize woody encroachment in priority management areas.
- Create habitat corridors to connect isolated populations.
- Do not mow or hay from April 15 – August 1. When cutting, leave the highest possible height (12-24 inches).
- Conscientious and appropriate application of agrochemicals.
- Avoid constructing fences through or near leks and install visibility markers to existing fences.
- Follow beneficial or best practices during the design, siting, construction, operation, and maintenance of tall structures (e.g. transmission lines, communication towers, wind turbines).

Greater Sage-Grouse *Centrocercus urophasianus*



Greater Sage-Grouse primary (dark gray) and possible/uncommon (light gray) range. Photo Credit: NDGF

Description/Identification: L 28", WS 38", 6.3 lb. The largest of North American grouse species, males are dark brown overall with white breast, pointed tail, and yellow above eye.

Status: Year-round resident. Peak breeding season early April to early July.

Reason for SGCN Designation: Regionally and globally imperiled (SGCN a.). The Greater Sage-Grouse is declining precipitously, and the population has decreased 67% since 1970. The sage-grouse range has contracted substantially in North Dakota and in 2024 there were two remaining active leks. This species is at imminent risk of extirpation from North Dakota.

Habitat: Greater Sage-Grouse is a sagebrush-obligate, particularly big sagebrush. Silver sagebrush and rabbitbrush are utilized to a lesser extent. Riparian, upland meadows, irrigated and non-irrigated croplands, and pasturelands are also used, especially for brood-rearing habitat. Leks may be natural openings within a sagebrush community or created by disturbance such as dry stream bed channels, ridges, grassy meadows, burned areas, gravel pits, plowed fields, and roads. Nest under larger bushes generally within 1.5-3 km of the lek. Brood-rearing habitat should contain succulent herbaceous vegetation such as false dandelion, hawksbeard, milk-vetch, and insects such as grasshoppers. Rely nearly exclusively on big sagebrush for food during winter.

Threats: Loss and degradation of big sagebrush habitat. The quality of remaining sagebrush has declined due to overgrazing, fire suppression or excessive fire, invasion of exotic plants, and fragmentation. Classified as climate-endangered, Greater Sage-Grouse is projected to lose more than half of its current distribution by 2050, with no net gains of new areas (Audubon). Disturbance to leks and nesting sites from direct and indirect human activity. Sage-grouse may lack resistance to West Nile virus. Hybridization with Sharp-tailed Grouse. Mortality from collisions with fences, utility wires, and vehicles. Direct and indirect impacts from energy development, sage-grouse exhibit displacement from areas within and surrounding wind turbines and oil/gas development.

Research and Monitoring: Habitat requirements and demographic studies have been broadly researched on the breeding grounds. The recent translocation of sage-grouse from Wyoming to ND to augment the population was mostly unsuccessful. The NDGF and cooperators conduct ground counts on sage-grouse leks that have been active in the past 10 years.

Management Recommendations:

- Protect existing big sagebrush stands through easements or land acquisition.
- Include big sagebrush when reclaiming croplands and grassland restoration.
- Do not burn big sagebrush habitat and rehabilitate previously burned sites.
- Promote well-managed grazing lands and working sagebrush for biodiversity, sustainability, and resiliency.
- Avoid constructing fences through or near leks and install visibility markers to existing fences.
- Remove single trees that serve as raptor perches.
- Avoid or minimize placement of development (e.g. energy, housing, utility lines) or other human infrastructure in sagebrush.
- Follow beneficial or best practices during the design, siting, construction, operation, and maintenance of tall structures (e.g. transmission lines, communication towers, wind turbines).

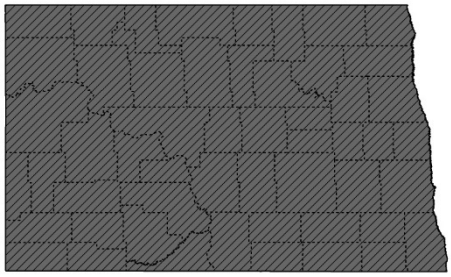
Harris's Sparrow *Zonotrichia querula*

Description/Identification: L 7.5", WS 10.5", 1.3 oz. Males and females similar, pink bill, dark crown, black face and bib in breeding plumage. The largest sparrow in North America.

Status: Spring and fall migrant, some overwinter. Occurs in ND from late April to late May, mid-September to mid-November, and occasionally from mid-November thru April.

Reason for SGCN Designation: At-risk based on expert review (SGCN c.). The Harris's Sparrow is declining, and the population decreased 63% since 1970. North Dakota and the Central Flyway have high stewardship responsibility for this species.

Habitat: In North Dakota, Harris's Sparrows are common in backyards and frequent bird feeders during the spring and fall migration. They forage in the open on the ground, often with other migrant sparrows. Harris's Sparrows breed in a small area between the boreal forest and tundra of northern Canada. They nest on the ground, often under small shrubs. They overwinter in the southern Great Plains, primarily Nebraska to Texas.



Harris's Sparrow primary (dark gray/hatch) migration range. Photo Credit: NDGF

Threats: Loss of habitat on the breeding and wintering grounds and amplified effects of climate change in artic habitats. Harri's Sparrows are common at backyard bird feeders during migration and winter. Bird feeders attract predators that feed on Harris's Sparrows and other songbirds, and experience higher levels of disease threats when congregated at feeding sites.

Research and Monitoring: Additional information is needed on migration and wintering behaviors.

Management Recommendations:

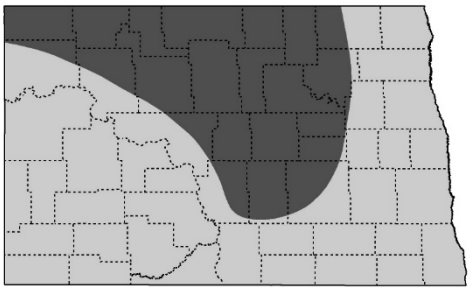
- Create a bird-friendly backyard, with native grasses and wildflowers, shrubs and trees.
- Clean bird feeders weekly with a 10% bleach solution.

Horned Grebe *Podiceps auritus*

Description/Identification: L 14”, WS 18”, 1 lb. A straight black bill with a white tip, black head with solid yellow patch, reddish neck, and scaly gray back.

Status: Occurs in North Dakota from early April to mid-November. Peak breeding season June to early August.

Reason for SGCN Designation: Globally imperiled (SGCN a.). ND ranks 2nd out of 4 states for highest percent of the global population during the breeding season (eBird). The peak week for Horned Grebe migration in ND (~26-April) hosts >10% (11.43) of the global population. Holarctic, large population and large geographic range. The Horned Grebe is thought to be declining precipitously in North America and Europe. ND has high stewardship responsibility for this species.



Horned Grebe primary (dark gray) and possible/uncommon (light gray) breeding range. Photo Credit: NDGF

Habitat: Horned Grebes use small to moderate-sized (1-10 ha), shallow freshwater or slightly brackish/alkaline wetlands and marshes with beds of emergent vegetation, particularly sedges, rushes, and cattails, and substantial areas of open water. Nest either singly or in small loose congregations. Nests are typically built over water on a floating platform or anchored to emergent vegetation. Diet consists of primarily small fish (e.g. carp, darters, perch, and sticklebacks), but also aquatic invertebrates.

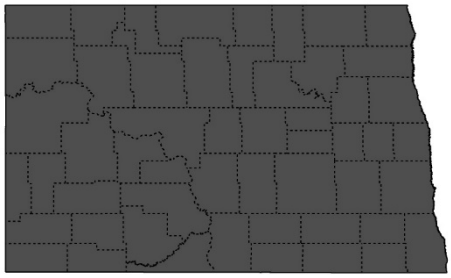
Threats: Loss and degradation of wetlands, drainage and wetland consolidation. Hydrologic shifts in wetlands of the PPR due to wetland consolidation and drainage, climate and land use changes (i.e. lakeification). Classified as climate-endangered, Horned Grebe is projected to lose more than half of its current distribution by 2050, with no net gains of new areas (Audubon). Increasing applications of agrochemicals and adverse impacts to water quality, the wetland vegetative community, and the aquatic invertebrate community. More frequent or intense harmful algal blooms. Aquatic nuisance species spreading and damaging wetland ecosystems. Collisions with human-made structures (e.g. overhead lines, wind turbines).

Research and Monitoring: Habitat requirements and demographics have been broadly researched but little effort in North Dakota. Additional information is needed on migration and wintering behaviors. eBird and Partners in Flight Databases are key sources of information on distribution and population trends. Poor detection on the Breeding Bird Survey. The most recent colonial waterbird inventory in ND was conducted in 2014-2015. Six single nesting pairs were counted but the survey may have missed nesting birds.

Management Recommendations:

- Maintain wetland complexes.
- Identify and target high priority landscapes, habitats, and staging areas for protection.
- Prevent and remove encroachment of woody vegetation around wetlands.
- Discourage wetland tillage and protect from drainage.
- Follow aquatic nuisance species rules and regulations.
- Follow beneficial or best practices during the design, siting, construction, operation, and maintenance of tall structures (e.g. transmission lines, communication towers, wind turbines).

Horned Lark *Eremophila alpestris*



Horned Lark primary (dark gray) breeding and year-round range. Photo Credit: NDGF

Description/Identification: L 7.25", WS 12", 1.1 oz. Pale brown upperparts, white belly, dark breastband and dark feather tufts or "horns" that can be raised or lowered.

Status: Year-round, some migratory. Peak breeding season late March to mid-July.

Reason for SGCN Designation: At-risk based on expert review and recent global assessments (SGCN c.). ND ranks 12th out of 37 states for highest percent of the global population (1.02%) during the breeding season (eBird). The Horned Lark is declining, and the population has decreased 65% since 1970.

Habitat: Horned Larks prefer short-stature grasslands, sparse vegetation and bare ground, with little or no woody vegetation. Use native, restored or tame grasslands that have been recently burned, hayed, or grazed. Commonly use cropland such as wheat and small grains, or other agriculture fields early in the growing season. Avoids tall, dense grasslands with high litter and excessively shrubby habitats. Nest on bare or sparsely vegetated ground, near tufts of grass, rocks, manure or other objects. Forages on the ground primarily for seeds. Insects consumed in spring and fall and fed to young.

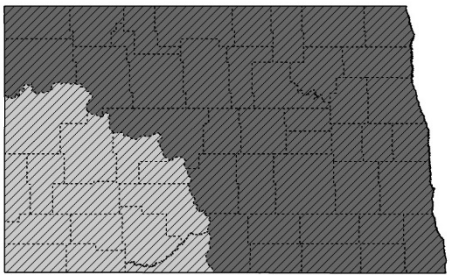
Threats: Loss of grassland. Degradation of grasslands from invasive plants, woody encroachment, succession, and loss of diversity. Loss of ranching heritage and grass-based operations, grazing is essential to grassland health and diversity. Woodland encroachment and planting trees in or near edges of grasslands. Increasing applications of agrochemicals and possible exposure causing pesticide acute toxicity. Mortality from collisions with wind turbines and other tall structures.

Research and Monitoring: Habitat requirements, demographic studies, and effects of management practices such as grazing, burning and haying have been broadly researched on the breeding grounds. Additional information is needed on migration and wintering behaviors. The Breeding Bird Survey, eBird and Partners in Flight Databases are key sources of information on distribution and population trends.

Management Recommendations:

- Protect and conserve large, intact tracks of native prairie/unbroken grassland and tame grassland.
- Reconstruct or restore grassland adjacent to existing tracts of native prairie/unbroken grassland.
- Use native grasses when replanting or restoring grassland.
- Graze or hay expired CRP. The density of Horned Larks is higher in cropland than CRP, but density will increase if expired CRP is converted to grazed grassland (+65%) or hayland (+67%).
- Promote well-managed grazing lands and working grasslands for biodiversity, sustainability, and resiliency.
- Burning has a positive short-term (1-3 years post-burn) response by Horned Larks.
- Prevent or remove shrubs and tall woody vegetation in grasslands, either mechanically or by prescribed fire.
- Delay mowing or haying until August 1.
- Conscientious and appropriate application of agrochemicals.
- Follow beneficial or best practices during the design, siting, construction, operation, and maintenance of tall structures (e.g. transmission lines, communication towers, wind turbines).

Hudsonian Godwit *Limosa haemastica*



Hudsonian Godwit primary (dark gray/hatch) and possible/uncommon (light gray) migration range. Photo Credit: NDGF

Description/Identification: L 15.5", WS 29", 11 oz. Breeding/spring plumage: dark rufous belly, dark back, white rump, slightly upturned orange bill. Fall/nonbreeding plumage: plain gray.

Status: Migrates through North Dakota in mid-April through early June, and late July through early September.

Reason for SGCN Designation: Regionally or globally imperiled, at-risk based on expert review (SGCN a., c.). The peak week for Hudsonian Godwit migration in ND (~17-May) hosts >15% (15.29) of the global population. Small population, limited breeding and nonbreeding range. The Hudsonian Godwit is declining precipitously.

Habitat: Hudsonian Godwits breed in wet-sedge meadows intermixed with forest in the arctic and subarctic regions of Alaska and Canada, and winter in coastal and inland wetland areas of southern South America. This shorebird is a long-distance migrant. During migration, they migrate from South America over the Pacific Ocean and through the Great Plains on the northbound route. On the southbound route, fewer stopover in the Great Plains, then over the Atlantic Coast and Ocean and south through central South America. Recent GPS tracking data indicates the Prairie Pothole Region is a high-density stopover area, particularly in the spring. Uses a variety of wetlands, lakes, and cropland ponds during migration. Forages in shallow wetlands for a variety of aquatic and terrestrial invertebrates such as amphipods, flies, beetles, small fish and seeds.

Threats: Loss and degradation of wetlands, drainage and wetland consolidation. Loss of habitat on the breeding and wintering grounds and amplified effects of climate change in arctic and coastal habitats. Loss and degradation of migratory stopover habitat and impacts of human activity at important stopover areas. Increasing applications of agrochemicals and adverse impacts to water quality, the wetland vegetative community, and the aquatic invertebrate community. Hudsonian Godwits may be exposed to high concentrations of synthetic insecticides in non-buffered cropland ponds during the spring migration. More frequent or intense harmful algal blooms. Aquatic nuisance species spreading and damaging wetland ecosystems. Collisions with overhead lines.

Research and Monitoring: Habitat requirements and demographic studies have been researched on the breeding grounds. Some recent GPS tracking work on migration strategies, stopover sites, and wintering behaviors. Multiple large-scale shorebird monitoring programs are key sources of information on distribution and population trends. However, minimal focus has been directed at research or monitoring migrant shorebirds in ND.

Management Recommendations:

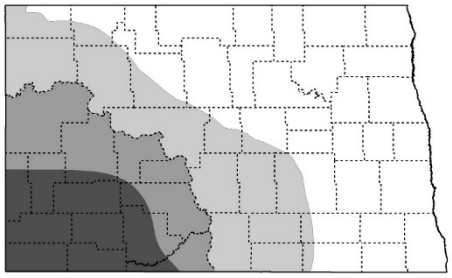
- Maintain wetland complexes.
- Conserve shallow, working wetlands in cropland.
- Plant vegetative buffer strips around wetlands in cropland.
- Identify and target high priority landscapes, habitats, and stopover sites for protection.
- Conscientious and appropriate application of agrochemicals.

Lark Bunting *Calamospiza melanocorys*

Description/Identification: **:** L 7”, WS 10.5”, 1.3 oz. Males all black except for broad patches of white on wings and tips of the tail. Females are gray-brown with dark streaks on a white breast.

Status: Occurs in North Dakota from early May to early September. Peak breeding season late May to early August.

Reason for SGCN Designation: Regionally and globally imperiled, ND range important (SGCN a., b.). ND ranks 6th out of 10 states for highest percent of the global population (3.78%) during the breeding season (eBird). The Lark Bunting is declining precipitously, and the population has decreased 86% since 1970.



Lark Bunting primary (dark gray), secondary (medium gray) and possible/uncommon (light gray) breeding range. Photo Credit: NDGF

Habitat: Lark Buntings prefer grasslands of low to moderate height with a component of shrubs such as sagebrush, silverberry or Western wild rose bush. Cropland, CRP, hayland and roadsides also are used. Abundance may be positively correlated with coverage of shrubs, bare ground, and small clubmoss. Nests are built on the ground under forbs, low shrubs, cactus, yucca, or tall grass for protection. Lark Buntings may be area sensitive and require large tracts of contiguous grassland. Feed on a variety of insects and seeds. Lark Buntings were once abundant east of the Missouri River in the coteau and drift prairie. The breeding range has contracted substantially since 1970.

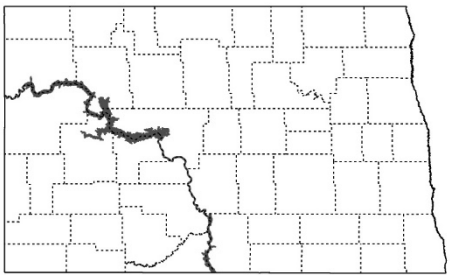
Threats: Loss of grassland and sagebrush. Degradation of grasslands from invasive plants, woody encroachment, succession, and loss of diversity. Loss of ranching heritage and grass-based operations, grazing is essential to grassland health and diversity. Increasing applications of agrochemicals and possible exposure causing pesticide acute toxicity.

Research and Monitoring: Habitat requirements are generally known but the effects of management practices such as grazing, burning and haying have not been broadly researched on the breeding grounds. Little is known about reproductive success, annual adult survival, or fledgling survival. Additional information is needed on migration and wintering behaviors. The Breeding Bird Survey, eBird and Partners in Flight Databases are key sources of information on distribution and population trends.

Management Recommendations:

- Protect and conserve large, intact tracks of native prairie/unbroken grassland and sagebrush.
- Reconstruct or restore grassland adjacent to existing tracts of native prairie/unbroken grassland.
- Use native grasses when replanting or restoring grassland and incorporate native shrubs.
- Promote well-managed grazing lands and working grasslands for biodiversity, sustainability, and resiliency.
- Prevent tall woody vegetation in grasslands, either mechanically or by prescribed fire, but do not remove the shrub component (sagebrush, rabbitbrush).
- Delay mowing or haying until August 1.
- Install wildlife escape ladders in stock tanks.
- Conscientious and appropriate application of agrochemicals.
- Follow beneficial or best practices during the design, siting, construction, operation, and maintenance of tall structures (e.g. transmission lines, communication towers, wind turbines).

Least Tern (Interior) *Sterna antillarum athalassos*



Least Tern (Interior) primary (dark gray) breeding range. Photo Credit: NDGF

Description/Identification: L 9", WS 20", 1.5 oz. The smallest tern species in North America. Bright yellow bill with a black tip, yellow legs and white forehead.

Status: Occurs in North Dakota from mid-May to early September. Peak breeding season mid-June to mid-July.

Reason for SGCN Designation: Regionally or globally imperiled (SGCN a.). The Interior Least Tern was listed as a Federal endangered species on 5/28/1985 and was delisted due to recovery on 1/13/2021. However, it remains a priority due to limited range and breeding habitat in North Dakota.

Habitat: Least Terns use sparsely vegetated sandbars or shoreline salt flats of lakes along the Missouri River System (Lake Sakakawea, Missouri River, Lake Oahe and Yellowstone River) in North Dakota. Usually nests in small colonies (<20 nests) with nests spaced far apart. The nest is a hollow scrape, sometimes located among stones. The size of nesting areas is highly dependent on water levels. Forage primarily for small (2-9 cm), non-spiny fish but also shrimp and other invertebrates. Foraging takes place close to the nesting colony.

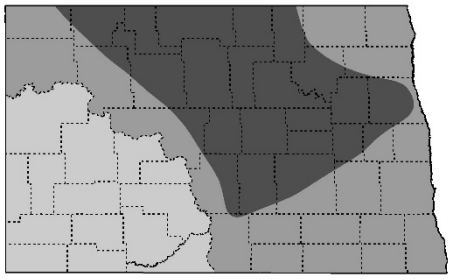
Threats: As a result of channelization, irrigation, and dam construction along the Missouri River, sandbar habitat for nesting has been drastically altered. Current river flows do not mimic natural river flows instrumental in forming sandbar habitat. High water releases during peak breeding season may flood nests. Environmental contaminants from oil/gas or other environmental spills may enter the Missouri River System. Encroachment of woody vegetation onto sandbars reduces nesting habitat availability. Nests may be destroyed by recreationists using sandbars or by the release of water during mid-summer when terns are still on the nest. Low water levels increase access of mammalian predators. Classified as climate-endangered, Least Tern is projected to lose more than half of its current distribution by 2050, with no net gains of new areas (Audubon). Mortality from collisions with overhead lines and collisions with wind turbines is of increasing concern.

Research and Monitoring: Habitat requirements and demographics have been extensively researched on the breeding grounds. Information lacking on migration strategies, stopover sites, and wintering behaviors. A draft post-delisting monitoring plan has been developed.

Management Recommendations:

- Mimic natural flows on the Missouri River to create sandbar habitat.
- The creation of dredged islands or clearing of sandbar vegetation may provide new nesting habitat for terns, but the productivity is presumed to be much less than for natural sites.
- Use mechanical and chemical applications to remove vegetation.
- Raise awareness among boaters and outdoor enthusiasts to avoid approaching nesting sites, including keeping dogs on leashes, and limit human access to sandbars or sensitive areas where terns are nesting.
- Follow aquatic nuisance species rules and regulations.
- Follow beneficial or best practices during the design, siting, construction, operation, and maintenance of tall structures (e.g. transmission lines, communication towers, wind turbines).

LeConte's Sparrow *Ammospiza leconteii*



LeConte's Sparrow primary (dark gray), secondary (medium gray) and possible/uncommon (light gray) breeding range. Photo Credit: NDGF

Description/Identification: L 5", WS 6.5", 0.46 oz. Pale, yellow-brown, fine streaks along the breast and sides, and a white stripe on crown.

Status: Occurs in North Dakota from mid-April to mid-October. Peak breeding season late May to mid-July.

Reason for SGCN Designation: At-risk, ND range important (SGCN b.). ND ranks 1st out of 6 states for highest percent of the global population (4.47%) during the breeding season (eBird). The LeConte's Sparrow is declining, and the population has decreased 61% since 1970. ND has high stewardship responsibility for this species.

Habitat: LeConte's Sparrows use open habitat of marshy or sedge meadows, moist areas of level uplands and lowlands, native or tame prairie, CRP, DNC, hayfields, and idle pasture. CRP is very important breeding habitat for this species under wet conditions. Occur in both natural and restored wetlands, with a higher proportion in alkali or permanent wetlands than temporary, seasonal, or semipermanent. Ares of tall, thick herbaceous vegetation and dense litter are used. Breed in hummocky alkali fens, tallgrass prairie, wet-meadow zones of wetlands, tame hayfields, and former cropland planted to tame grass. Tolerant of some shrubs, such as scattered willows. Nest on or just above the ground in dense vegetation. Usually forage on the ground for arthropods and seeds.

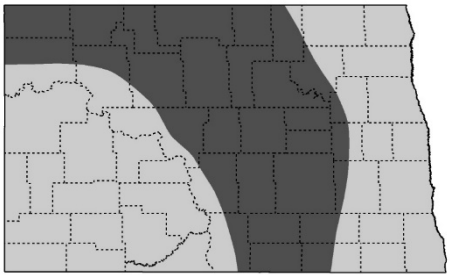
Threats: Loss of grassland and loss of grassland/wetland complexes Loss and degradation of wetlands, drainage and wetland consolidation. Hydrologic shifts in wetlands of the PPR due to wetland consolidation and drainage, climate and land use changes (i.e. lakeification). Classified as climate-endangered, Le Conte's Sparrow is projected to lose more than half of its current distribution by 2050, with no net gains of new areas (Audubon). Presence is affected by the yearly moisture conditions. Increased woodland cover may negatively affect this species.

Research and Monitoring: Habitat requirements are generally known. Little is known about reproductive success, annual adult survival, or fledgling survival. Additional information is needed on migration and wintering behaviors. The Breeding Bird Survey, eBird and Partners in Flight Databases are key sources of information on distribution and population trends.

Management Recommendations:

- Protect and conserve large, intact tracks of native prairie/unbroken grassland and tame grassland.
- Reconstruct or restore grassland adjacent to existing tracts of native prairie/unbroken grassland.
- Graze or hay expired CRP. The density of LeConte's Sparrows is 100% lower in CRP fields converted to cropland, but effects are less if expired CRP is converted to grazed grassland (-87%) or hayland (-75%).
- Grazing or burning is crucial to maintaining open, diverse grasslands.
- Delay mowing or haying until August 1.
- Avoid or minimize placement of development (e.g. energy, housing, utility lines) or other human infrastructure in native prairie/unbroken grassland.
- Protect and restore wetlands, including the wetland margins, and within grassland landscapes.
- Use prairie cordgrass and other tall vegetation when restoring wetland buffers.
- Use fencing to exclude cattle from wetlands and wetland edges. Develop a livestock watering system instead of direct watering.

Lesser Scaup *Aythya affinis*



Lesser Scaup primary (dark gray) and possible/uncommon (light gray) breeding range. Photo Credit: NDGF

Description/Identification: L 16.5", WS 25", 1.8lb. Medium-sized diving duck, mostly black and white (male), with purple and green iridescence on the head, blue bill. Female brownish-gray with patches of white at the base of the bill.

Status: Occurs in North Dakota from early March to mid-December. Peak breeding season from mid-May to mid-August.

Reason for SGCN Designation: At-risk, ND range important (SGCN b.). ND ranks 2nd out of 14 states for highest percent of the global population (3.95%) during the breeding season (eBird). The peak week for Lesser Scaup migration in ND (~1-Nov) hosts >35% (35.03) of the global population. ND has high stewardship responsibility for this species.

Habitat: Medium-large semi-permanent wetlands in grassland dominated landscapes. Lesser Scaup uses large seasonal and semi-permanent wetlands and lakes with emergent vegetation including bulrush, cattail, and sedges. Nest over water or on the ground near water, but also in the uplands and on islands. Lesser Scaup have increased in the Prairie Pothole Region over the past several decades, possibly in part due to CRP on the landscape. Feed on aquatic invertebrates, especially chironomids and amphipods, crustaceans and mollusks.

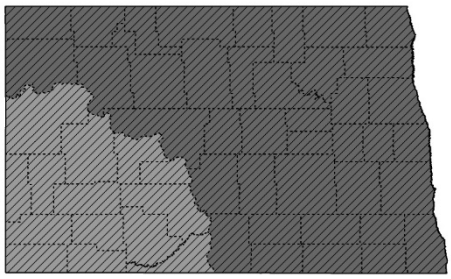
Threats: Loss of grassland/wetland complexes. Loss and degradation of wetlands, drainage and wetland consolidation. Hydrologic shifts in wetlands of the PPR due to wetland consolidation and drainage, climate and land use changes (i.e. lakeification). Classified as climate-threatened, Lesser Scaup is projected to lose more than half of its current distribution by 2080, with potential net gains of new areas (Audubon). Increasing applications of agrochemicals and adverse impacts to water quality, the wetland vegetative community, and the aquatic invertebrate community. More frequent or intense harmful algal blooms. Aquatic nuisance species spreading and damaging wetland ecosystems. Stocking or movement of fish into wetlands alters the aquatic invertebrate and plant community. Collisions with overhead lines and wind turbines.

Research and Monitoring: Habitat requirements and demographics have been extensively researched on the breeding grounds. The Waterfowl Breeding Population and Habitat Survey (May Survey) is a long-standing survey conducted in the U.S. and Canada and provides annual breeding population estimates for most ducks in North America. The NDGF has also conducted an annual spring breeding duck survey since 1948.

Management Recommendations:

- Preserve large tracts of grasslands and wetland complexes.
- Maintain a diversity of planted grasslands, including tame and multi-species native grassland restoration.
- Maintain grasslands free of or with little woody vegetation.
- Restore hydrology and vegetation to degraded wetlands.
- Leave grassed buffer strips around wetlands and waterways to prevent erosion and runoff into wetlands.
- Delay haying or mowing until after August 1.
- Stocking fish in shallow wetlands can be detrimental to waterfowl production.
- Follow aquatic nuisance species rules and regulations.
- Follow beneficial or best practices during the design, siting, construction, operation, and maintenance of tall structures (e.g. transmission lines, communication towers, wind turbines).

Lesser Yellowlegs *Tringa flavipes*



Lesser Yellowlegs primary (dark gray/hatch) and secondary (medium gray/hatch) migration range. Photo Credit: NDGF

Description/Identification: L 10.5", WS 24", 2.8 oz. Upperparts gray-brown, underparts white with little barring on flanks, long yellow legs.

Status: Migrates through North Dakota in early April through late May, and mid-June through late October. Ubiquitous throughout the spring, summer and fall in ND.

Reason for SGCN Designation: Regionally or globally imperiled, at-risk based on expert review (SGCN a., c.). ND hosts nearly 5% (4.24) of global population in the post-breeding migration season. The peak week for Lesser Yellowlegs migration in ND (~26-July) hosts >10% (12.35) of the global population. The Lesser Yellowlegs is declining precipitously. Concern for the species has elevated in recent years.

Habitat: Lesser Yellowlegs breed in the boreal forest and forest/tundra transition areas of Alaska and Canada, and winter in a variety of wetland types in the southern U.S., the Caribbean, Central and South America. This shorebird is an intermediate to long-distance migrant. During migration, they occur across North America, but the majority migrate through the Great Plains and Mississippi Flyway. Recent GPS tracking data indicates the Prairie Pothole Region, Mississippi Alluvial Plain, and Argentine Pampas are frequent and high-density stopover areas. Uses a variety of wetlands, lakes, and cropland ponds during migration. Forage in shallow wetlands for a variety of aquatic and terrestrial invertebrates such as amphipods, flies, beetles, small fish and seeds.

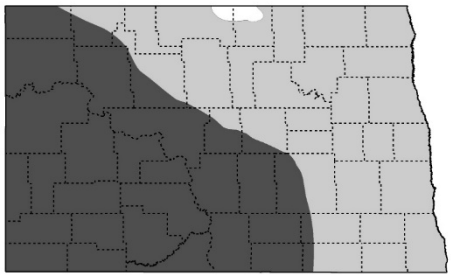
Threats: Loss and degradation of wetlands, drainage and wetland consolidation. Loss of habitat on the breeding and wintering grounds and amplified effects of climate change in arctic and coastal habitats. Classified as climate-endangered, Lesser Yellowlegs is projected to lose more than half of its current distribution by 2050, with no net gains of new areas (Audubon). Hyperabundant geese populations alter tundra habitat and may limit the availability of nesting habitat for artic-breeding shorebirds. Loss and degradation of migratory stopover habitat and impacts of human activity at important stopover areas such as the Lower Mississippi Alluvial Valley and Texas Gulf Coast. Increasing applications of agrochemicals and adverse impacts to water quality, the wetland vegetative community, and the aquatic invertebrate community. Lesser Yellowlegs may be exposed to high concentrations of synthetic insecticides in non-buffered cropland ponds during the spring migration. More frequent or intense harmful algal blooms. Aquatic nuisance species spreading and damaging wetland ecosystems. Potentially unstainable levels of harvest of Lesser Yellowlegs in the Caribbean and northeastern South America. Collisions with human-made structures (e.g. overhead lines, wind turbines).

Research and Monitoring: Habitat and demographic studies have been conducted on breeding grounds. Information lacking on migration strategies, stopover sites, and wintering behaviors. Multiple large-scale shorebird monitoring programs are key sources of information on distribution and population trends. However, minimal focus has been directed at research or monitoring migrant shorebirds in ND.

Management Recommendations:

- Maintain wetland complexes.
- Conserve shallow, working wetlands in cropland.
- Plant vegetative buffer strips around wetlands in croplands.
- Identify and target high priority landscapes, habitats, and stopover sites for protection.
- Conscientious and appropriate application of agrochemicals.

Loggerhead Shrike *Lanius ludovicianus*



Loggerhead Shrike primary (dark gray) and possible/uncommon (light gray) breeding range. Photo Credit: NDGF

Description/Identification: L 9", WS 12", 1.7 oz. Gray body, black wings, white wing patch, black eye mask and white throat.

Status: Occurs in North Dakota from mid-March to late September. Peak breeding season early May to mid-July.

Reason for SGCN Designation: Regionally or globally imperiled (SGCN a.). ND ranks 17th out of 31 states for highest percent of the global population during the breeding season (eBird). The Loggerhead Shrike is declining precipitously, and the population has decreased 74% since 1970.

Habitat: Loggerhead Shrikes use open grasslands with thickets of small trees or shrubs and interspersed with bare ground. They can be found using a variety of habitats including prairies, pastures, sagebrush, fencerows, shelterbelts, riparian areas, open woodlands, farmsteads, suburban areas, mowed road rights-of-way, and cemeteries. Grazed or ungrazed lands are used. Scattered thick or thorny shrubs and trees are used for nesting, hunting perches, and prey impalement locations. Often an isolated tree within these habitats is chosen for the nest site but also nest in linear tree habitats. Nests are well concealed and placed 1-2.5 meters above the ground. Forage over shorter grass for arthropods, mammals, birds, reptiles, amphibians, and sometimes carrion.

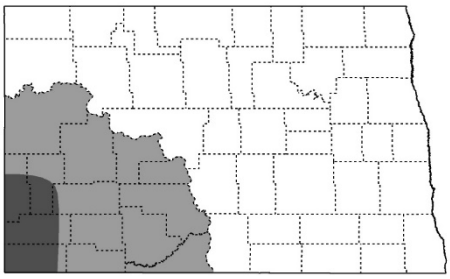
Threats: Loss of grassland. Degradation of grasslands from invasive plants, succession, and loss of diversity. Excessive tree encroachment into grasslands can have negative impacts. However, removal of all small trees and shrubs will limit nesting sites. A number may be killed by automobiles when plucking injured or dead insects from roads. Increasing applications of agrochemicals and possibly limit prey abundance.

Research and Monitoring: Habitat requirements, demographic studies, and effects of management practices such as grazing, burning and haying have been broadly researched on the breeding grounds. Additional information is needed on migration and wintering behaviors. The Breeding Bird Survey, eBird and Partners in Flight Databases are key sources of information on distribution and population trends.

Management Recommendations:

- Protect and conserve large, intact tracks of native prairie/unbroken grassland.
- Reconstruct or restore grassland adjacent to existing tracts of native prairie/unbroken grassland.
- Use native grasses when replanting or restoring grassland.
- Promote well-managed grazing lands and working grasslands for biodiversity, sustainability, and resiliency.
- Maintain low, thick shrubs and trees along fence lines and other areas in pasture.
- Diversify shelterbelts by incorporating thorny trees and bushes such as hawthorn, hedge rose, buffaloberry or willows.
- Conscientious and appropriate application of agrochemicals.

Long-billed Curlew *Numenius americanus*



Long-billed Curlew primary (dark gray) and secondary (medium gray) breeding range. Photo Credit: NDGF

Description/Identification: L 23", WS 35", 1.3 lb. Long, down-curved bill, buffy overall with pink-cinnamon underwings visible in flight.

Status: Occurs in North Dakota from mid-April to August. Peak breeding season late April to late June.

Reason for SGCN Designation: Regionally or globally imperiled (SGCN a.). ND ranks 13th out of 17 states for highest percent of the global population during the breeding season (eBird). The Long-billed Curlew is declining, and their range in ND has contracted substantially.

Habitat: Long-billed Curlews use expansive, open, level to gently rolling or sloping grasslands of short vegetation such as short-grass and grazed mixed-grass prairie. Cropland and hayland are also commonly used. Areas where the vegetation height is <10 cm are preferred. Proximity to water is possibly an important factor in habitat selection. Nest in the dry uplands, in grassland or cropland. Nests are often located near cow dung or other conspicuous objects for concealment. Wet meadows are used for feeding, loafing, and by young fledglings. Forage in grassland, cultivated fields, stubble fields, and black-tailed prairie dog colonies for terrestrial invertebrates such as grasshoppers and beetles.

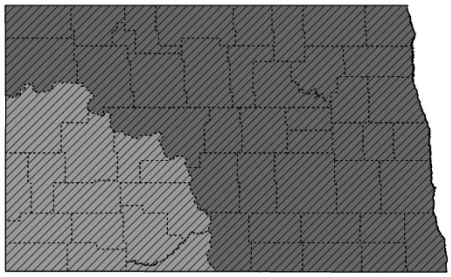
Threats: Loss of grassland. Degradation of grasslands from invasive plants, woody encroachment, succession, and loss of diversity. Grazing is beneficial to grassland health and diversity, but grazing during the nesting period may impact curlews by trampling or lower hatching success. Curlews have high site fidelity, and the modification of nesting habitat may cause disruptions in the life cycle. Classified as climate-endangered, Long-billed Curlew is projected to lose more than half of its current distribution by 2050, with no net gains of new areas (Audubon). Increasing applications of agrochemicals. Early mowing and normal farming practices can destroy nests or kill the adult on the nest.

Research and Monitoring: Habitat requirements and demographics have been broadly researched on the breeding grounds. Little known about reproductive success, annual adult survival, or fledgling survival. Satellite and GPS transmitters deployed on 11 adult curlews in ND in 2022 and 2023 to identify migratory and wintering habitats. The Breeding Bird Survey, eBird and Partners in Flight Databases are key sources of information on distribution and population trends. Long-billed Curlews were surveyed on established routes in 2004-2005 and since 2018 in ND.

Management Recommendations:

- Protect and conserve large, intact tracks of native prairie/unbroken grassland and tame grasslands.
- Reconstruct or restore grassland adjacent to existing tracts of native prairie/unbroken grassland.
- Use native grasses when replanting or restoring grassland.
- Avoid grazing until late May or late June, to allow birds time to settle and initiate nests.
- Remove tall, dense vegetation in the fall with haying and grazing.
- Prevent or remove shrubs and tall woody vegetation in grasslands, either mechanically or by prescribed fire.
- Do not drag hayfields to break up cowpies.
- Curlews have been documented successfully using fall-seed crops (i.e. winter wheat).
- Minimize pesticide and herbicide use on grasslands.

Long-billed Dowitcher *Limnodromus scolopaceus*



Long-billed Dowitcher primary (dark gray/hatch) and secondary (medium gray/hatch) migration range. Photo Credit: NDGF

Description/Identification: L 11.5", WS 19", 4 oz. Breeding/spring plumage: rufous neck and belly, dark barring on sides. Fall/nonbreeding plumage: drab gray, barring absent.

Status: Migrates through North Dakota in mid-April through late May, and early July through early November.

Reason for SGCN Designation: At-risk based on expert review (SGCN c.). ND hosts > 5% (8.39) of global population in the post-breeding migration season. The peak week for Long-billed Dowitcher migration in ND (~26-July) hosts >20% (21.13) of the global population. The Long-billed Dowitcher is declining precipitously.

Habitat: Long-billed Dowitchers breed in a small region of the tundra from northeast Russia, northern Alaska and northwest Canada, and winters in coastal areas of the southern U.S. and Central America. This shorebird is an intermediate-distance migrant. During migration, they use the Prairie Pothole Region extensively. Uses a variety of wetlands, lakes, and cropland ponds during migration. Prefer freshwater over brackish water. Feeds on a variety of aquatic and terrestrial invertebrates such as midges, beetles, but also seeds.

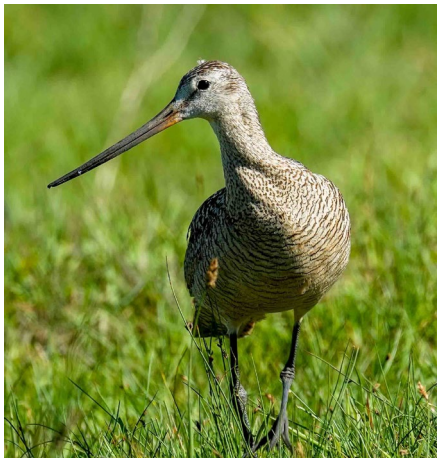
Threats: Loss and degradation of wetlands, drainage and wetland consolidation. Loss of habitat on the breeding and wintering grounds and amplified effects of climate change in arctic and coastal habitats. Classified as climate-stable, Long-billed Dowitcher is projected to maintain more than half of its current distribution (Audubon). Loss and degradation of migratory stopover habitat and impacts of human activity at important stopover areas. Increasing applications of agrochemicals and adverse impacts to water quality, the wetland vegetative community, and the aquatic invertebrate community. Long-billed Dowitchers may be exposed to high concentrations of synthetic insecticides in non-buffered cropland ponds during the spring migration. More frequent or intense harmful algal blooms. Aquatic nuisance species spreading and damaging wetland ecosystems.

Research and Monitoring: Demographic studies are limited. Information lacking on migration strategies, stopover sites, and wintering behaviors. Multiple large-scale shorebird monitoring programs are key sources of information on distribution and population trends. However, minimal focus has been directed at research or monitoring migrant shorebirds in ND.

Management Recommendations:

- Maintain wetland complexes.
- Conserve shallow, working wetlands in cropland.
- Plant vegetative buffer strips around wetlands in cropland.
- Identify and target high priority landscapes, habitats, and stopover sites for protection.
- Conscientious and appropriate application of agrochemicals.

Marbled Godwit *Limosa fedoa*

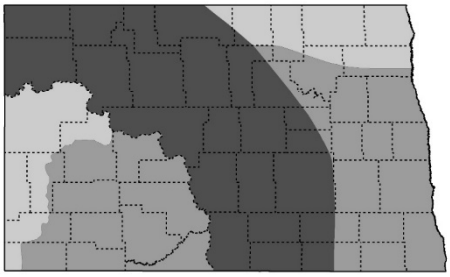


Description/Identification: L 18”, WS 30”, 13 oz. Buff-brown, barring underneath, long up-turned, flesh-colored bill with a dark tip, and orangish underwings visible in flight.

Status: Occurs in North Dakota from early April to early October. Peak breeding season mid-April to mid-June.

Reason for SGCN Designation: At-risk, ND range important (SGCN b.). ND ranks 1st out of 15 states for highest percent of the global population (15.26%) during the breeding season (eBird). The Marbled Godwit is declining precipitously, and ND has high stewardship responsibility for this species.

Habitat: Marbled Godwits require large expanses of short, sparse to moderately vegetated uplands for nesting. High next success requires extensive grass cover and a high quantity of wetlands. Godwits prefer native grassland over tame, but will use pastures, idle grasslands, and hayland. Grazed or recently grazed and burned uplands are often more attractive. Nest on the ground, in dry uplands or wet meadow areas. Adults with broods will use taller, denser grass. Semi-permanent, seasonal, and temporary wetlands with shallow water and little dense emergent vegetation are used for foraging. Also forage in the uplands, wet meadows, and roadsides. Primary prey items include insects, aquatic tubers, leeches, and small fish.



Marbled Godwit primary (dark gray), secondary (medium gray), and possible/uncommon (light gray) breeding range. Photo Credit: NDGF

Threats: Loss of grassland and grassland/wetland complexes. Loss and degradation of wetlands, drainage and wetland consolidation. Hydrologic shifts in wetlands of the PPR due to wetland consolidation and drainage, climate and land use changes (i.e. lakeification). Classified as climate-endangered, Marbled Godwit is projected to lose more than half of its current distribution by 2050, with no net gains of new areas (Audubon). Increasing applications of agrochemicals and adverse impacts to water quality, the wetland vegetative community, and the aquatic invertebrate community. Early mowing can destroy nests or kill the adult on the nest. Collisions with overhead lines and wind turbines.

Research and Monitoring: Habitat requirements and demographics have been broadly researched on the breeding grounds. Little known about annual adult survival or fledgling survival. Information lacking on migration strategies, stopover sites, and wintering behaviors. The Breeding Bird Survey, eBird and Partners in Flight Databases are key sources of information on distribution and population trends.

Management Recommendations:

- Protect and conserve large, intact tracks of native prairie/unbroken grassland and wetland complexes.
- Reconstruct or restore grassland adjacent to existing tracts of native prairie/unbroken grassland.
- Restore hydrology and vegetation to degraded wetlands.
- Use native grasses when replanting or restoring grassland.
- Burn, mow, and graze grasslands to provide areas of shorter, sparser vegetation.
- Minimize pesticide and herbicide use on grasslands.
- Remove tall, dense vegetation in the fall by using haying and grazing.
- Prevent or remove shrubs and tall woody vegetation in grasslands, either mechanically or by prescribed fire.
- Follow beneficial or best practices during the design, siting, construction, operation, and maintenance of tall structures (e.g. transmission lines, communication towers, wind turbines).

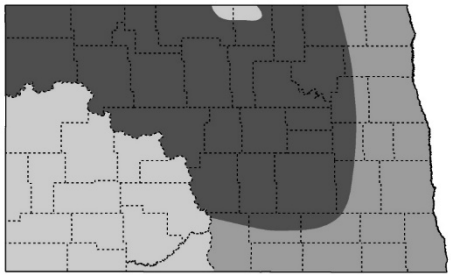
Nelson's Sparrow *Ammospiza nelsoni*

Description/Identification: L 5", WS 7", 0.6 oz. Yellow face and throat, finely-streaked breast, gray nape and crown, and pronounced white belly.

Status: Occurs in North Dakota from mid-May to mid-October. Peak breeding season mid-June to late July.

Reason for SGCN Designation: At-risk, ND range important (SGCN b.). ND ranks 1st out of 6 states for highest percent of the global population (19.49%) during the breeding season (eBird). The Nelson's Sparrow is generally stable, ND has high stewardship responsibility.

Habitat: Nelson's Sparrows prefer freshwater wetlands with dense, emergent vegetation as prairie cordgrass, cattails, bulrushes, sedges or common reed. Also use fens, wet meadows, lake margins, native grasslands with tall vegetation, CRP and DNC. Occur in both natural and restored wetlands, with a higher proportion in alkali or permanent wetlands than temporary, seasonal, or semipermanent. Tolerates some shrubby vegetation such as scattered willows. Nest on the ground or within the grass column, slightly above in shallow-marsh and deep-marsh zones of wetlands in dry years and the wet-meadow zone of wetlands in wet years. Deep litter level is preferred. Forage on the ground for insects and seeds.



Nelson's Sparrow primary (dark gray), secondary (medium gray) and possible/uncommon (light gray) breeding range. Photo Credit: NDGF

Threats: Loss and degradation of wetlands, drainage and wetland consolidation. Hydrologic shifts in wetlands of the PPR due to wetland consolidation and drainage, climate and land use changes (i.e. lakeification). Classified as climate-endangered, Nelson's Sparrow is projected to lose more than half of its current distribution by 2050, with no net gains of new areas (Audubon). Increasing applications of agrochemicals and adverse impacts to water quality, the wetland vegetative community, and the aquatic invertebrate community. Annual grazing, mowing, and haying of wetland edges is detrimental to their preferred habitat. Harmful concentrations of mercury have been reported in a breeding population of Nelson's Sparrows in northeastern North Dakota. For reasons that are unclear, this species is more prone to colliding with buildings than other bird species.

Research and Monitoring: Habitat requirements are generally known. Little known about reproductive success, annual adult survival, or fledgling survival. Additional information is needed on migration and wintering behaviors. The Breeding Bird Survey, eBird and Partners in Flight Databases are key sources of information on distribution and population trends.

Management Recommendations:

- Protect and conserve wetlands, including the wetland margins.
- Restore hydrology and vegetation to degraded wetlands.
- Use prairie cordgrass and other tall vegetation when restoring wetland buffers.
- Use fencing to exclude cattle from wetlands and wetland edges. Develop a livestock watering system to reduce or eliminate direct watering.
- Follow bird-friendly building designs.
- Use flashing lights versus steady-burning lights on communication and other towers.

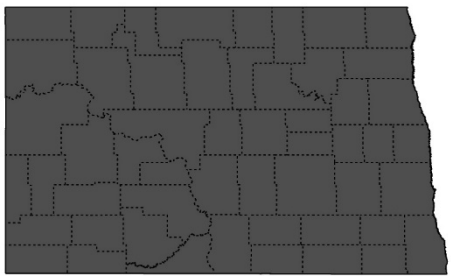
Northern Harrier *Circus cyaneus*

Description/Identification: L 18”, WS 43”, 15 oz. Both the pale gray male and slightly larger, brown female, sport an obvious white rump patch.

Status: Occurs in North Dakota from mid-February to mid-November. Peak breeding season late April to mid-July.

Reason for SGCN Designation: At-risk, ND range important (SGCN b.). ND ranks 3rd out of 24 states for highest percent of the global population (6.45%) during the breeding season (eBird). The Northern Harrier is declining, and the population has decreased 37% since 1970 (PIF).

Habitat: Harriers use relatively open, tall, dense grasslands for nesting and wetlands of tall (>60 cm), dense vegetation with abundant residual vegetation for foraging. Native or tame vegetation in wet or dry grasslands, fresh to alkali wetlands, CRP, lightly grazed pastures, croplands, shrublands and fallow fields are utilized. Nest primarily on the ground in grassland or wet meadows but have been observed using platforms of vegetation over water. Nests are often placed in stands of western snowberry. Nesting sites selected may be dictated by microtine vole populations, their primary prey. In North Dakota, Northern Harriers have been found to be positively associated with the amount of grassland in a landscape and negatively associated with amount of forest cover.



Northern Harrier primary (dark gray) breeding, spring and fall range. Photo Credit: NDGF

Threats: Loss of grassland and loss of grassland/wetland complexes. Loss and degradation of wetlands, drainage and wetland consolidation. Classified as climate-endangered, Northern Harrier is projected to lose more than half of its current distribution by 2050, with no net gains of new areas (Audubon). Early cutting/mowing may destroy nests or young. Changes in the harrier population size may be closely related to vole populations. The use of insecticides and rodenticides may reduce prey availability. Nest predation is a key source of mortality. May avoid wind facilities, exhibit behavioral responses and displacement from areas within and surrounding wind turbines.

Research and Monitoring: Habitat requirements and demographic studies have been researched on the breeding grounds. Additional information is needed on migration and wintering behaviors. The Breeding Bird Survey, eBird and Partners in Flight Databases are key sources of information on distribution and population trends.

Management Recommendations:

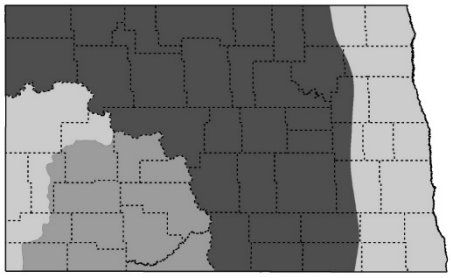
- Protect and conserve areas where complexes of high-density wetlands and large blocks of grassland remain intact.
- Reconstruct or restore grassland adjacent to existing tracts of grassland.
- Use tall, dense native grasses when replanting or restoring grassland.
- Graze or hay expired CRP. The density of Northern Harriers is 67% lower in CRP fields converted to cropland, but effects are less if expired CRP is converted to grazed grassland (-58%) or hayland (-29%).
- Delay mowing, haying or burning grasslands until after August 1.
- Periodically burn, mow, or graze to maintain an accumulation of residual vegetation.
- Minimize human disturbance near nests.
- Follow beneficial or best practices during the design, siting, construction, operation, and maintenance of tall structures (e.g. transmission lines, communication towers, wind turbines).

Northern Pintail *Anas acuta*

Description/Identification: L 21", WS 34", 1.8 lb. Long and slender throughout. Sports a distinctive pointed black tail, white breast, and brown head (male).

Status: Occurs in North Dakota from early March to mid-December. Peak breeding season early April to late May.

Reason for SGCN Designation: At-risk, ND range important (SGCN b. and c.). ND ranks 2nd out of 15 states for highest percent of the global population (2.55%) during the breeding season (eBird). The peak week for Northern Pintail migration in ND (~29-Mar) hosts nearly 10% (9.59) of the global population. Holarctic, large distribution. ND has high stewardship responsibility for this species.



Northern Pintail primary (dark gray), secondary (medium gray), and possible/uncommon (light gray) breeding range. Photo Credit: NDGF

Habitat: Native prairie of short or mid-height cover interspersed with seasonal or semi-permanent wetlands. CRP, hayfields, pastures, and weedy field borders are utilized. Temporary, seasonal, and semi-permanent wetlands, cropland ponds, shallow river impoundments, stock ponds, and dugouts are utilized for foraging. Feed on vegetation consisting of seeds of sedges, grasses, pondweeds, and smartweeds. Primarily feed on aquatic invertebrates during spring that are abundant in shallow temporary and seasonal ponds. Hens utilize aquatic invertebrates as an important food source during breeding, as well as ducklings until about 6 weeks of age.

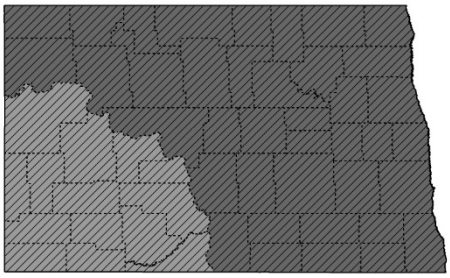
Threats: Loss of grassland/wetland complexes. Loss and degradation of wetlands, drainage and wetland consolidation. Hydrologic shifts in wetlands of the PPR due to wetland consolidation and drainage, climate and land use changes (i.e. lakeification). Increasing applications of agrochemicals and adverse impacts to water quality, the wetland vegetative community, and the aquatic invertebrate community. More frequent or intense harmful algal blooms. Aquatic nuisance species spreading and damaging wetland ecosystems. Stocking or movement of fish into wetlands alters the aquatic invertebrate and plant community. Nests initiated in cropland or previous year stubble fields often destroyed during regular farming operations. Collisions with overhead lines and wind turbines.

Research and Monitoring: Habitat requirements and demographics have been extensively researched on the breeding grounds. The Waterfowl Breeding Population and Habitat Survey (May Survey) is a long-standing survey conducted in the U.S. and Canada and provides annual breeding population estimates for most ducks in North America. The NDGF has also conducted an annual spring breeding duck survey since 1948.

Management Recommendations:

- Protect and conserve large, intact tracks of native prairie/unbroken grassland and wetland complexes.
- Reconstruct or restore grassland adjacent to existing tracts of native prairie/unbroken grassland.
- Use native grasses when replanting or restoring grassland.
- Prevent or remove shrubs and tall woody vegetation in grasslands, either mechanically or by prescribed fire.
- Conserve shallow, working wetlands in cropland.
- Restore hydrology and vegetation to degraded wetlands.
- Maintain or plant buffer strips around wetlands and waterways to prevent erosion and runoff into wetlands.
- Delay mowing or haying until after August 1.
- Stocking fish in shallow wetlands can be detrimental to waterfowl production.
- Follow aquatic nuisance species rules and regulations.
- Follow beneficial or best practices during the design, siting, construction, operation, and maintenance of tall structures (e.g. transmission lines, communication towers, wind turbines).

Pectoral Sandpiper *Calidris melanotos*



Pectoral Sandpiper primary (dark gray/hatch) and secondary (medium gray/hatch) migration range. Photo Credit: NDGF

Description/Identification: L 8.75", WS 18", 2.6 oz. Dense streaking on breast that abruptly ends at white belly, greenish legs, slightly decurved bill.

Status: Migrates through North Dakota in early April through early June, and early July through late October. Occurs in ND more frequently in late summer/fall stopover than spring.

Reason for SGCN Designation: At-risk based on expert review (SGCN c.). Holarctic, large population. ND hosts >5% (5.89) of global population in the post-breeding migration season. The peak week for Pectoral Sandpiper migration in ND (~26-July) hosts >15% (18.99) of the global population. The Pectoral Sandpiper trend is uncertain, but concern elevated for species in recent years.

Habitat: In the Western Hemisphere, Pectoral Sandpipers breed in the Arctic tundra of Alaska and Canada, and winter in the Pampas of southern South America. This shorebird is one of the longest-distance migrants in the Western hemisphere. During migration, they occur across North America, but the majority migrate through the Great Plains and Mississippi Flyway. Uses a variety of wetlands, lakes, cropland ponds, and mesic grasslands during migration. Feeds on a variety of aquatic and terrestrial invertebrates such as amphipods, flies, spiders, but also seeds and algae.

Threats: Loss and degradation of wetlands, drainage and wetland consolidation. Loss of habitat on the breeding and wintering grounds and amplified effects of climate change in arctic and coastal habitats. Hyperabundant geese populations alter tundra habitat and may limit the availability of nesting habitat for artic-breeding shorebirds. Loss and degradation of migratory stopover habitat and impacts of human activity at important stopover areas such as the Lower Mississippi Valley and Texas Gulf Coast. Increasing applications of agrochemicals and adverse impacts to water quality, the wetland vegetative community, and the aquatic invertebrate community. Pectoral Sandpipers may be exposed to high concentrations of synthetic insecticides in non-buffered cropland ponds during the spring migration. More frequent or intense harmful algal blooms. Aquatic nuisance species spreading and damaging wetland ecosystems.

Research and Monitoring: Habitat requirements and demographic studies have been broadly researched on the breeding grounds. Information lacking on migration strategies, stopover sites, and wintering behaviors. Multiple large-scale shorebird monitoring programs are key sources of information on distribution and population trends. However, minimal focus has been directed at research or monitoring migrant shorebirds in ND.

Management Recommendations:

- Maintain wetland complexes.
- Conserve shallow, working wetlands in cropland.
- Plant vegetative buffer strips around wetlands in cropland.
- Identify and target high priority landscapes, habitats, and stopover sites for protection.
- Conscientious and appropriate application of agrochemicals.

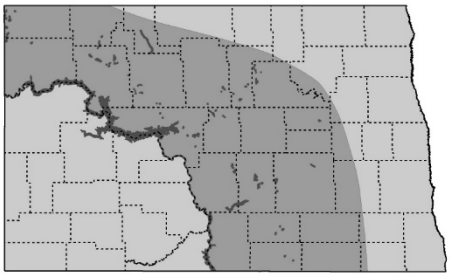
Piping Plover *Charadrius melodus*

Description/Identification: L 7.25", WS 19", 1.9 oz. White belly and single, narrow black breast band.

Status: Occurs in North Dakota from mid-April to August. Peak breeding season occurs from late May to mid-July.

Reason for SGCN Designation: Regionally and globally imperiled, ND range important (SGCN a., b.). ND ranks 3rd out of 20 states for highest percent of the global population (9.73%) during the breeding season (eBird). The Northern Great Plains population (*C. m. circumcinctus*) was listed as a Federal threatened species on 12/11/1985.

Habitat: Exposed, sparsely vegetated shores and islands of alkali lakes and rivers. Salt-encrusted, alkali, or sub-saline semi-permanent lakes, ponds, and rivers with wide shorelines of gravel, sand, or pebbles are preferred. Nest in slight hollow in the sand or shoreline, generally near an object such as a clump of grass, rock, or small log but never in heavy vegetation. Forage on fly larvae, beetles, crustaceans, mollusks, and other small animals near the shoreline or sometimes by the nest.



Piping Plover primary/critical habitat (dark gray), secondary (medium gray), and possible/uncommon (light gray) breeding range. Photo Credit: NDGF

Threats: Loss and degradation of wetlands, drainage and wetland consolidation. Hydrologic shifts in wetlands of the PPR due to wetland consolidation and drainage, climate and land use changes (i.e. lakeification). Classified as climate-endangered, Piping Plover is projected to lose more than half of its current distribution by 2050, with no net gains of new areas (Audubon). Channelization, irrigation, and dam construction along the Missouri River. High water releases during peak breeding season may flood nests. Encroachment of woody vegetation onto sandbars reduces nesting habitat availability. Increasing applications of agrochemicals and adverse impacts to water quality, the wetland vegetative community, and the aquatic invertebrate community. Human disturbance on sandbars or shorelines. Environmental contaminants from oil/gas or other environmental spills may enter the Missouri River System or alkali lakes. More frequent or intense harmful algal blooms. Aquatic nuisance species spreading and damaging wetland ecosystems. Nests may be destroyed by recreationists using sandbars or by the release of water during mid-summer when plovers are still on the nest. Mortality from collisions with overhead lines. Collisions or displacement from wind turbines is uncertain.

Research and Monitoring: Habitat requirements and demographics have been extensively researched on the breeding grounds. Information lacking on migration strategies, stopover sites, and wintering behaviors. The USFWS is the lead agency to work with partners and researchers to develop and ensure a scientifically sound and long-term monitoring plan for Piping Plovers is implemented.

Management Recommendations:

- Mimic natural flows on the Missouri River to create sandbar habitat.
- The creation of dredged islands or clearing of sandbar vegetation may provide new nesting habitat for plovers, but the productivity is presumed to be much less than for natural sites.
- Use mechanical and chemical applications to remove vegetation.
- Bury rock piles and remove old buildings to reduce predators.
- Exclusion fences or cages may be erected around nests to reduce nest predation or to exclude cattle.
- Use wildlife-friendly fencing to keep cattle off shorelines or delay grazing until late August.
- Raise awareness among boaters and outdoor enthusiasts to avoid approaching nesting sites, including keeping dogs on leashes, and limit human access to sandbars or sensitive areas where plovers are nesting.
- Follow aquatic nuisance species rules and regulations.

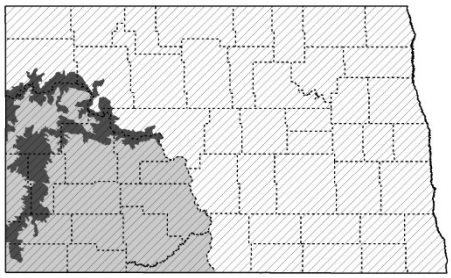
Prairie Falcon *Falco mexicanus*

Description/Identification: L 16”, WS 40”, 1.6lb. Brown overall, sports a thin dark “mustache” and a white breast speckled with brown spots.

Status: Year-round, some migratory. Peak breeding season April to July.

Reason for SGCN Designation: Regionally or globally imperiled (SGCN a.). ND ranks 14th out of 16 states for highest percent of the global population during the breeding season (eBird). The Prairie Falcon may be stable in ND but is slightly declining in other parts of the western range.

Habitat: Prairie Falcons use shortgrass prairie, shrub steppe, and agricultural habitats in generally arid landscapes. Nest primarily on cliffs, buttes, canyon walls, rock outcrops, and ridges. Aeries include depressions into the side of a cliff, horizontal ledges, or may use artificial cliff cavities created by humans. Aerie is usually located on the top two-thirds of the cliff. Prairie Falcons may, although rarely, also nest in trees, transmission line towers, or in abandoned nests of other birds. Nest sites tend to face south. Home ranges average around 70 km². Primary prey items include ground squirrels, passerines, lizards, and other small rodents.



Prairie Falcon primary (dark gray) and possible/uncommon (light gray) breeding range. Winter and migration range (hatch). Photo Credit: Adobe Stock

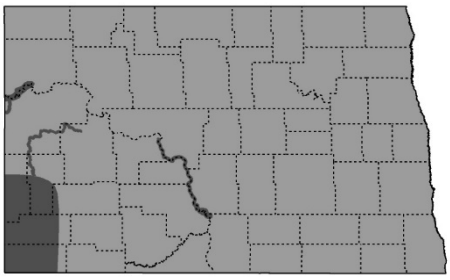
Threats: Loss of grasslands and shrubland, habitat modification. Destruction or degradation of native prairie resulting in the loss of foraging habitat or prey species may impact populations. Human disturbance may be a potential factor resulting in nest failure. Nests closer to roads and easily accessed or disturbed by human activities have resulted in less success. Classified as climate-endangered, Prairie Falcon is projected to lose more than half of its current distribution by 2050, with no net gains of new areas (Audubon). Collisions with vehicles, overhead lines, wind turbines or other structures, and electrocution. Poaching is rare but is a senseless cause of mortality.

Research and Monitoring: Habitat requirements and demographic studies have been broadly researched on the breeding grounds. Additional information is needed on migration and wintering behaviors. The Breeding Bird Survey, eBird and Partners in Flight Databases are key sources of information on distribution and population trends.

Management Recommendations:

- Protect and conserve intact tracks of native prairie/unbroken grassland.
- Preserve ground squirrel colonies and habitats near falcon nest sites.
- Minimize activity within 0.5 mile of active aeries from April through August.
- Follow beneficial or best practices during the design, siting, construction, operation, and maintenance of tall structures (e.g. transmission lines, communication towers, wind turbines).
- Use avian protection plans or guidance documents to minimize bird/powerline interactions.

Red-headed Woodpecker *Melanerpes erythrocephalus*



Red-headed Woodpecker primary (dark gray) and secondary (medium gray) breeding range. Photo Credit: NDGF

Description/Identification: L 9.25", WS 17", 2.5 oz. Red head, black upper back and tail, white on rear of wings and upper rump.

Status: Occurs in North Dakota from mid-April to October. Peak breeding season early June to early August.

Reason for SGCN Designation: At-risk based on expert review (SGCN c.). ND ranks 30th out of 35 states for highest percent of the global population during the breeding season (eBird). The Red-headed Woodpecker population has decreased 67% since 1970, but IMBCR and eBird indicate an increasing trend in recent years.

Habitat: Red-headed Woodpeckers can be found in deciduous woodland in the lowland or upland, along river bottoms, parks, shelterbelts, along roadsides, in open agricultural areas, or in cities. Some habitats it uses can be described as savannah-like. Nest 5-80 feet off the ground in the dead tops or stumps of oak, ash, maple, elm, cottonwood, willow or occasionally utility poles. Cavity is 8-24 inches deep. Breeding pairs may use the same nesting cavity for several years. Forages on the ground, in shrubs, or on mostly dead trees for insects such as ants, wasps, beetles; rarely drills into trees for insects. They will also feed on corn, nuts, berries, and eggs or young birds of passerines.

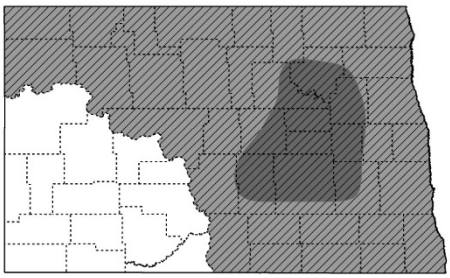
Threats: Loss and degradation of native riparian habitat and lack of riparian regeneration. Removal of dead trees or branches limits nest site availability. Susceptible to being hit by vehicles while plucking injured or dead insects from roads. Some mortality from collisions with communication towers. Other birds may compete with Red-headed Woodpeckers for nesting cavities.

Research and Monitoring: Habitat requirements are generally known. Little is known about reproductive success, annual adult survival, or fledgling survival. Additional information is needed on migration and wintering behaviors. The Breeding Bird Survey, eBird and Partners in Flight Databases are key sources of information on distribution and population trends.

Management Recommendations:

- Protect and restore native riparian habitats.
- Limit or exclude grazing in riparian areas.
- Protect riparian corridors.
- Leave snags and dead trees.
- Plant mast producing trees such as oak.
- Remove starlings if competition is present.
- Follow beneficial or best practices during the design, siting, construction, operation, and maintenance of tall structures (e.g. transmission lines, communication towers, wind turbines).

Ruddy Turnstone *Arenaria interpres*



Ruddy Turnstone primary (dark gray/hatch) and secondary (medium gray/hatch) migration range. Photo Credit: NDGF

Description/Identification: L 9.5", WS 21", 3.9 oz. Breeding/spring plumage: stocky body, upperparts rufous with black patches, bright orange legs. Fall/nonbreeding plumage: duller brown, orange legs.

Status: Migrates through North Dakota primarily in the spring, early May to early June. Limited occurrence in the fall, mid-July through August.

Reason for SGCN Designation: Regionally or globally imperiled, at-risk based on expert review (SGCN a., c.). The peak week for Ruddy Turnstone migration in ND (~24-May) hosts >10% (10.88) of the global population. Holarctic, large population and wide distribution. Concern for the species has been elevated in recent years.

Habitat: In the Western Hemisphere, Ruddy Turnstones breed in high-arctic coastal areas and tundra of Alaska, Canada and Greenland, and winter along the Pacific and Atlantic coasts of the U.S., Central America and South America. This shorebird is an intermediate to long-distance migrant. The Prairie Pothole Region is important spring stopover habitat, peaking in late May (~May 24-28). In North Dakota, the Devils Lake Region is a high-use migratory stopover site. Ruddy Turnstones primarily use stony or rocky shorelines, but also mudflats, sand or gravel beaches. Forage in on prey on or near the surface for a variety of invertebrates, amphipods or mollusks.

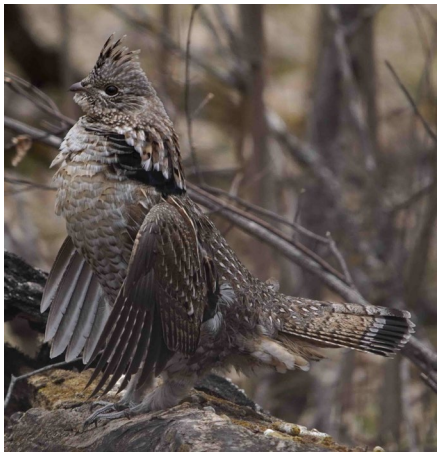
Threats: Loss and degradation of wetlands, drainage and wetland consolidation. Loss of habitat on the breeding and wintering grounds and amplified effects of climate change in arctic and coastal habitats. Classified as climate-endangered, Ruddy Turnstone is projected to lose more than half of its current distribution by 2050, with no net gains of new areas (Audubon). Hyperabundant geese populations alter tundra habitat and may limit the availability of nesting habitat for artic-breeding shorebirds. Coastal development (urban and industry sprawl), coastal erosion, storm surges, oil or industrial effluent spills, impaired water quality and microplastics are threats to wintering habitat. Increasing applications of agrochemicals and adverse impacts to water quality, the wetland vegetative community, and the aquatic invertebrate community. More frequent or intense harmful algal blooms. Aquatic nuisance species spreading and damaging wetland ecosystems.

Research and Monitoring: Habitat requirements and demographic studies have been broadly researched on the breeding grounds. Information lacking on migration strategies, stopover sites, and wintering behaviors. Multiple large-scale shorebird monitoring programs are key sources of information on distribution and population trends. However, minimal focus has been directed at research or monitoring migrant shorebirds in ND.

Management Recommendations:

- Maintain wetland complexes.
- Conserve shallow, working wetlands in cropland.
- Plant vegetative buffer strips around wetlands in cropland.
- Identify and target high priority landscapes, habitats, and stopover sites for protection.

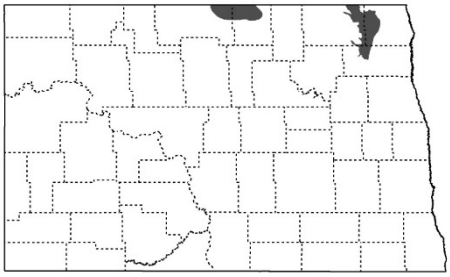
Ruffed Grouse *Bonasa umbellus*



Description/Identification: L 17", WS 22", 1.3 lb. Brownish-gray or reddish-brown, slightly rounded tail with a black or brown band.

Status: Year-round resident. Peak breeding season April to early July.

Reason for SGCN Designation: At-risk based on expert review (SGCN c.). Range limited to the Turtle Mountains, Pembina Hills, and occasionally in the aspen sandhills of Towner County. Ruffed Grouse populations usually go through to 9 to 10-year cycles of increasing and decreasing numbers. Because the habitat in North Dakota is so fragmented, a 10-year peak has not occurred since the late 1990's; however, populations have been increasing slightly since 2019.



Ruffed Grouse primary (dark gray) breeding range. Photo Credit: NDGF

Habitat: Primarily associated with aspen forests in North Dakota, including quaking aspen, paper birch, green ash, bur oak and balsam poplar. ruffed grouse seem to be tied to large expanses (over 640 acres) of aspen woodlands for both food and cover. Young aspen trees up to 10 years of age are used by broods; in these young forests, ground cover and associated insects are found in abundance. Middle-aged aspen stands (10-25 years) are used for food and winter cover. Older trees (60 years or older) are needed for resting, drumming and feeding. In these older areas, brushy undergrowth and the aspen produce good quantities of buds and catkins used as food. Chicks require a diet high in insects and other invertebrates for the first 7-10 days, after which they gradually shift to an adult diet of buds, catkins, fruits and berries. Adults continue to feed on buds and fruit in winter. Nest on the ground at the base of a tree, log or brush pile in middle-aged aspen stands.

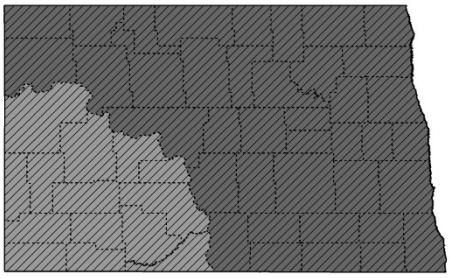
Threats: Loss of upland deciduous forest. Decadent aspen forest stands. Classified as climate-endangered, Ruffed Grouse is projected to lose more than half of its current distribution by 2050, with no net gains of new areas (Audubon).

Research and Monitoring: Habitat requirements and demographic studies have been broadly researched on the breeding grounds, but limited research efforts in North Dakota. The NDGF conducts annual drumming surveys on long-term routes in the Turtle Mountains and Pembina Hills.

Management Recommendations:

- Protect and restore native aspen forests.
- Aspen stands should be managed to provide a diversity of age classes within the normal home range of ruffed grouse.
- Avoid grazing in clear cut/managed stands until new trees are established (10 years and older).
- If grazing woodlands, a grazing plan should be implemented to protect a diversity of aspen age classes.
- Rejuvenate decadent stands by bulldozing or logging old trees (60 years and older)
- Reduce cropping/tillage along woodland edges to allow suckering of aspen.
- Control tall woody vegetation, including single trees that act as raptor perches and raptor nest sites.

Semipalmated Sandpiper *Calidris pusilla*



Semipalmated Sandpiper primary (dark gray/hatch) and secondary (medium gray/hatch) migration range. Photo Credit: Adobe Stock

Description/Identification: L 6.5", WS 14", 0.88 oz. Breeding/spring plumage: Plain gray-brown, short straight dark bill, black legs
Fall/nonbreeding plumage: pale gray, white belly.

Status: Migrates through North Dakota in mid-April through early June, and early July through mid-October.

Reason for SGCN Designation: At-risk based on expert review (SGCN c.). The peak week for Semipalmated Sandpiper migration in ND (~31-May) hosts >10% (12.21) of the global population. Substantial population-level declines in the eastern portion of the range, may be stable in the interior and western North America.

Habitat: Semipalmated Sandpipers breed in the low-arctic and subarctic areas of Alaska, northern Canada, and the Hudson Bay, and winter in coastal areas of Mexico, the Caribbean and South America. Central and western Arctic breeding birds primarily migrate through the interior of North America and use the Prairie Pothole Region extensively as stopover habitat. The eastern Arctic breeding birds primarily migrate along the U.S. Atlantic Coast, but some Semipalmated Sandpipers exhibit an elliptical migration, using both the Central Flyway and Atlantic Flyway. During migration, Semipalmated Sandpipers use a variety of shallow freshwater and brackish wetlands, typically with little vegetation, mudflats, and shorelines. Feed mostly on aquatic invertebrates such as amphipods and mollusks, but also terrestrial invertebrates such as insects and spiders.

Threats: Loss and degradation of wetlands, drainage and wetland consolidation. Loss of habitat on the breeding and wintering grounds. Classified as climate-stable, Semipalmated Sandpiper is projected to maintain more than half of its current distribution (Audubon). Hyperabundant geese populations alter tundra habitat and may limit the availability of nesting habitat for artic-breeding shorebirds. Increasing applications of agrochemicals and adverse impacts to water quality, the wetland vegetative community, and the aquatic invertebrate community. Semipalmated Sandpipers may be exposed to high concentrations of synthetic insecticides in non-buffered cropland ponds during the spring migration. More frequent or intense harmful algal blooms. Aquatic nuisance species spreading and damaging wetland ecosystems.

Research and Monitoring: Habitat and demographic studies have been conducted on breeding grounds. Information lacking on migration strategies, stopover sites, and wintering behaviors. Multiple large-scale shorebird monitoring programs are key sources of information on distribution and population trends. However, minimal focus has been directed at research or monitoring migrant shorebirds in ND.

Management Recommendations:

- Maintain wetland complexes.
- Conserve shallow, working wetlands in cropland.
- Plant vegetative buffer strips around wetlands in cropland.
- Identify and target high priority landscapes, habitats, and stopover sites for protection.
- Conscientious and appropriate application of agrochemicals.

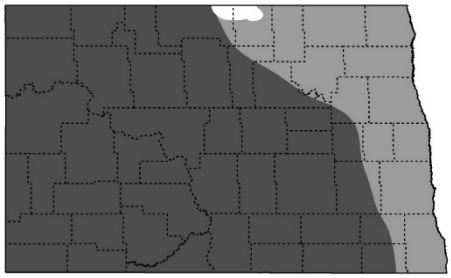
Sharp-tailed Grouse *Tympanuchus phasianellus*

Description/Identification: L 17", WS 25", 1.9lb. Light-colored overall with heavy dark barring on back, head, and wings. Pointed tail, yellow crest above the eye, and purple air sacs.

Status: Year-round resident. Peak breeding season late April to late July.

Reason for SGCN Designation: At-risk, ND range important (SGCN b.). ND ranks 2nd out of 14 states for highest percent of the global population (17.78%) during the breeding season (eBird). ND has high stewardship responsibility for this species.

Habitat: Sharp-tailed Grouse are most often found in mixed-grass prairie with patches of small trees and shrubs. CRP grasslands are also a very important habitat for this species. Leks, or the dancing grounds used during the breeding season to attract mates, are typically located on elevated areas and are often characterized by less vegetation than the surrounding area. Nests are located close, often within 0.5 miles, to the lek. Nest in lightly grazed native prairie, hayland, CRP, and may be located close to the margin of a thicket of shrubs or small trees. During winter, grouse will use wooded habitats. Feeds primarily on buds, seeds, insects, fruits, and forbs.



Sharp-tailed Grouse primary (dark gray) and secondary (medium gray) breeding range. Photo Credit: NDGF

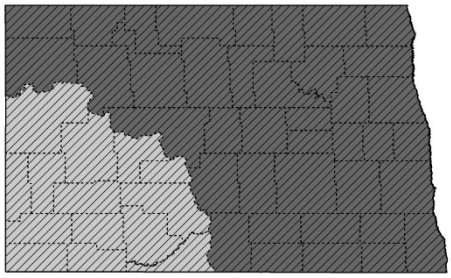
Threats: Loss of grassland. Degradation of grasslands from invasive plants, woody encroachment, succession, and loss of diversity. Loss of ranching heritage and grass-based operations, grazing is essential to grassland health and diversity. Classified as climate-endangered, Sharp-tailed Grouse is projected to lose more than half of its current distribution by 2050, with no net gains of new areas (Audubon). Increasing applications of agrochemicals and possible impacts to food availability for broods. Mortality from collisions with fences, utility wires, and vehicles. Viewing grouse dancing on leks during the spring is a popular activity but can cause disturbance. Males appear more tolerant of this disturbance than females.

Research and Monitoring: Habitat requirements and demographic studies have been broadly researched on the breeding grounds. The NDGF and cooperators conduct a complete census on long-term blocks to provide an index of Sharp-tailed Grouse. Late summer roadside counts for broods are also conducted.

Management Recommendations:

- Protect and conserve intact tracks of native prairie/unbroken grassland.
- Reconstruct or restore grassland adjacent to existing tracts of native prairie/unbroken grassland.
- Use native grasses and forbs when replanting or restoring grassland.
- Promote well-managed grazing lands and working grasslands for biodiversity, sustainability, and resiliency.
- Protect leks and the surrounding habitat from loss or destruction.
- Use rotational disturbance every 3-5 years, with prescribed burning as the preferred method.
- Develop grazing plans that provide residual vegetation for the following spring and eliminate over-utilization of woody draws, mesic swales and riparian areas.
- Control tall woody vegetation.
- Do not mow or hay from April 15 – August 1.
- Conscientious and appropriate application of agrochemicals.
- Avoid constructing fences through or near leks and install visibility markers to existing fences.
- Follow beneficial or best practices during the design, siting, construction, operation, and maintenance of tall structures (e.g. transmission lines, communication towers, wind turbines).

Short-billed Dowitcher *Limnodromus griseus*



Short-billed Dowitcher primary (dark gray/hatch) and possible/uncommon (light gray) migration range. Photo Credit: NDGF

Description/Identification: L 11", WS 19", 3.9 oz. Breeding/spring plumage: rufous, white belly, heavy barring. Fall/nonbreeding plumage: drab gray, barring absent.

Status: Migrates through North Dakota in early May through late May, and early July through mid-September.

Reason for SGCN Designation: Regionally or globally imperiled, at-risk based on expert review (SGCN a., c.). The peak week for Short-billed Dowitcher migration in ND (~26-July) hosts >5% (5.68) of the global population. The Short-billed Dowitcher is declining precipitously. Concern for species has elevated in recent years.

Habitat: Short-billed Dowitchers breed in the boreal and subarctic areas regions of southern Alaska and Canada, and winters in coastal mud flats areas of the southern U.S., Central America, and northern South America. This shorebird is an intermediate-distance migrant. During migration, they are found along the Atlantic and Pacific Coasts, the Midwest, and the Northern Great Plains. The Prairie Pothole Region is used extensively. Uses a variety of wetlands, lakes, and cropland ponds during migration. Prefers brackish water over freshwater. Feeds on a variety of aquatic and terrestrial invertebrates such as mollusks, spiders, insects, and occasionally seeds.

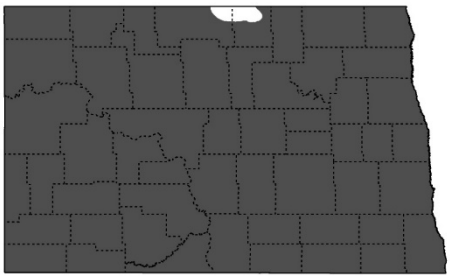
Threats: Loss and degradation of wetlands, drainage and wetland consolidation. Loss of habitat on the breeding and wintering grounds and amplified effects of climate change in arctic and coastal habitats. Classified as climate-endangered, Short-billed Dowitcher is projected to lose more than half of its current distribution by 2050, with no net gains of new areas (Audubon). Increasing applications of agrochemicals and adverse impacts to water quality, the wetland vegetative community, and the aquatic invertebrate community. Short-billed Dowitchers may be exposed to high concentrations of synthetic insecticides in non-buffered cropland ponds during the spring migration. More frequent or intense harmful algal blooms. Aquatic nuisance species spreading and damaging wetland ecosystems.

Research and Monitoring: Demographic studies are limited. Information lacking on migration strategies, stopover sites, and wintering behaviors. Multiple large-scale shorebird monitoring programs are key sources of information on distribution and population trends. However, minimal focus has been directed at research or monitoring migrant shorebirds in ND.

Management Recommendations:

- Maintain wetland complexes.
- Conserve shallow, working wetlands in cropland.
- Plant vegetative buffer strips around wetlands in cropland.
- Identify and target high priority landscapes, habitats, and stopover sites for protection.
- Conscientious and appropriate application of agrochemicals.

Short-eared Owl *Asio flammeus*



Short-eared Owl primary (dark gray) breeding, wintering, spring and fall migration range. Photo Credit: NDGF

Description/Identification: L 15", WS 38", 12 oz. Yellowish-brown, spotted back and subtle ear tufts on a large round head.

Status: Year-round. Some may be migratory or overwintering only. Peak breeding season early April to mid-August.

Reason for SGCN Designation: At-risk, recent regional or global assessments (SGCN c.). ND ranks 9th out of 12 states for highest percent of the global population (0.19%) during the breeding season (eBird). The peak week for Short-eared Owl migration in ND (~19-Apr) hosts >5% (6.1) of the global population. Holarctic, large distribution. The Short-eared Owl is declining, 65% population loss since 1970 (PIF).

Habitat: Short-eared Owls are found in large expanse of open grassland and wetlands. An area of >100 ha of grassland is likely required for successful production. Native prairie, hayland, retired cropland, small-grain stubble, shrub-steppe, mesic prairie, marshes and wet meadow zones of wetlands are utilized. CRP grassland is also important habitat for Short-eared Owls. Unlikely to use upland sites that are annually grazed, hayed or burned, but periodic disturbance is needed to maintain suitable nesting habitat. Nest on the ground in dry uplands. Nesting is in vegetation generally 30-60 cm high and has a deep litter layer. Populations fluctuate yearly due to variation in small mammal populations and the nomadic nature of the species. Primary prey includes small mammals, particularly *Microtus* voles.

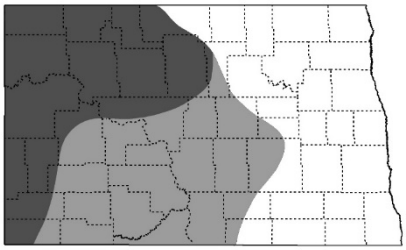
Threats: Loss of grassland and loss of grassland/wetland complexes. Loss and degradation of wetlands, drainage and wetland consolidation. Classified as climate-endangered, Short-eared Owl is projected to lose more than half of its current distribution by 2050, with no net gains of new areas (Audubon). Early cutting/mowing may destroy nests or young. Changes in the population size may be closely related to vole populations. The use of insecticides and rodenticides may reduce prey availability. Collisions with man-made structures and vehicles occur.

Research and Monitoring: Habitat requirements have been researched on the breeding grounds. Additional information is needed on migration and wintering behaviors. Monitoring the species population, habitat or response to management is challenging due to their nomadic nature and low site fidelity.

Management Recommendations:

- Protect areas where complexes of wetlands and large blocks of grassland remain intact.
- Reconstruct or restore grassland adjacent to existing tracts of grassland.
- Use tall, dense native grasses when replanting or restoring grassland.
- Periodically burn, mow, or graze to maintain an accumulation of residual vegetation.
- Delay mowing, haying or burning grasslands until after August 1.
- Minimize human disturbance near nests.
- Follow beneficial or best practices during the design, siting, construction, operation, and maintenance of tall structures (e.g. transmission lines, communication towers, wind turbines).

Sprague's Pipit *Anthus spragueii*



Sprague's Pipit primary (dark gray) and secondary (medium gray) breeding range. Photo Credit: NDGF

Description/Identification: L 6.5", WS 10", 0.88 oz. Slender, rather dull light brown, wears a "necklace" of fine streaks.

Status: Occurs in North Dakota from early April to mid-October. Two periods of breeding activity: 1) late April – early June; 2) mid-July to early September.

Reason for SGCN Designation: Regionally and globally imperiled, ND range important (SGCN a., b.). ND ranks 2nd out of 3 states for highest percent of population (7.65%) during the breeding season (eBird). The Sprague's Pipit is declining precipitously, and the population has decreased 75% since 1970. ND has high stewardship responsibility for this species.

Habitat: Sprague's Pipits require large (>470 acres) native prairie grasslands. Intermediate vegetation height (<49 cm) and sparse to intermediate vegetation density, low forb density, and little bare ground and low litter depth. Tame grasslands may be utilized, but to a much lesser extent. Hayland, undisturbed CRP, and cropland are rarely used. Sprague's Pipits are most abundant in idle grasslands but will use light to moderately grazed grasslands. Abundance positively correlated with percent clubmoss cover and dominated by native grass species. Negatively associated with vegetation height, high litter depth, low-growing shrubs, and plant communities dominated by shrubs and introduced grasses. Avoid areas with woody vegetation and deep litter. Nest on the ground in areas of taller and slightly denser vegetation. Forages on a wide variety of arthropods such as grasshoppers, crickets, beetles, ants, and caterpillars.

Threats: Loss of grassland. Degradation of grasslands from invasive plants, woody encroachment, succession, and loss of diversity. Loss of ranching heritage and grass-based operations, grazing is essential to grassland health and diversity. Loss of grassland on the wintering grounds in the Chihuahuan Desert. Classified as climate-endangered, Sprague's Pipit is projected to lose more than half of its current distribution by 2050, with no net gains of new areas (Audubon). Direct and indirect impacts from energy development.

Research and Monitoring: Habitat requirements and demographic studies have been broadly researched on the breeding grounds. Additional information is needed on migration and wintering behaviors. The Breeding Bird Survey, eBird and Partners in Flight Databases are key sources of information on distribution and population trends.

Management Recommendations:

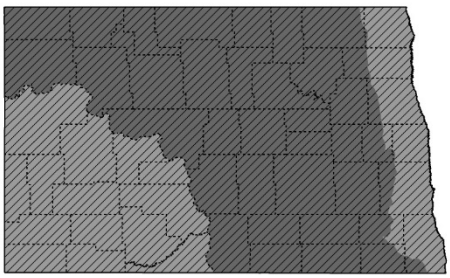
- Protect and conserve large, intact tracks of native prairie/unbroken grassland.
- Reconstruct or restore grassland adjacent to existing tracts of native prairie/unbroken grassland.
- Use native grasses when replanting or restoring grassland.
- Promote well-managed grazing lands and working grasslands for biodiversity, sustainability, and resiliency.
- Prevent or remove shrubs and tall woody vegetation in grasslands, either mechanically or by prescribed fire.
- Delay mowing or haying until August 1.
- Avoid or minimize placement of development (e.g. energy, housing, utility lines) or other human infrastructure in native prairie/unbroken grassland.
- Follow beneficial or best practices during the design, siting, construction, operation, and maintenance of tall structures (e.g. transmission lines, communication towers, wind turbines).

Stilt Sandpiper *Calidris himantopus*

Description/Identification: L 8.5”, WS 18”, 2 oz. Breeding/spring plumage: heavily barred chest and belly, long yellowish-green legs, heavy and slightly downcurved bill. Fall/nonbreeding plumage: pale gray, barring absent.

Status: Migrates through North Dakota in late April through early June, and early July through late October.

Reason for SGCN Designation: At-risk based on expert review (SGCN c.). ND hosts >5% (20.75) of the global population in the post-breeding migration season and >5% (6.05) in the pre-breeding migration season. The peak week for Stilt Sandpiper migration in ND (~26-July) hosts >40% (40.09) of the global population. The Stilt Sandpiper is declining precipitously.



Stilt Sandpiper primary (dark gray/hatch) and secondary (medium gray/hatch) migration range. Photo Credit: NDGF

Habitat: Stilt Sandpipers breed in the low-arctic and subarctic areas of Alaska, northern Canada, and Hudson Bay, and winters in freshwater wetlands, flooded fields and coastal areas of the southern U.S., Mexico and South America. During migration, they primarily migrate through the Central Flyway and use the Prairie Pothole Region extensively. Uses a variety of wetlands, lakes, and cropland ponds during migration. Feed on a variety of aquatic and terrestrial invertebrates such as midges, beetles, but also seeds.

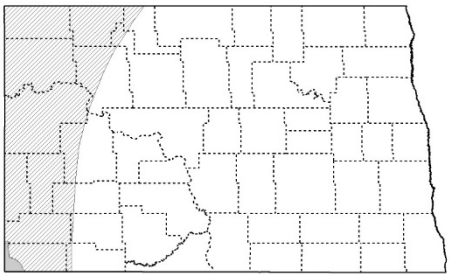
Threats: Loss and degradation of wetlands, drainage and wetland consolidation. Loss of habitat on the breeding and wintering grounds and amplified effects of climate change in arctic and coastal habitats. Classified as climate-threatened, Stilt Sandpiper is projected to lose more than half of its current distribution by 2080, with potential net gains of new areas (Audubon). Hyperabundant geese populations alter tundra habitat and may limit the availability of nesting habitat for artic-breeding shorebirds. Loss and degradation of migratory stopover habitat and impacts of human activity at important stopover areas such as the Texas Gulf Coast. Increasing applications of agrochemicals and adverse impacts to water quality, the wetland vegetative community, and the aquatic invertebrate community. Stilt Sandpiper may be exposed to high concentrations of synthetic insecticides in non-buffered cropland ponds during the spring migration. More frequent or intense harmful algal blooms. Aquatic nuisance species spreading and damaging wetland ecosystems. Collisions with overhead lines and wind turbines.

Research and Monitoring: Demographic studies are limited. Information lacking on migration strategies, stopover sites, and wintering behaviors. Multiple large-scale shorebird monitoring programs are key sources of information on distribution and population trends. However, minimal focus has been directed at research or monitoring migrant shorebirds in ND.

Management Recommendations:

- Maintain wetland complexes.
- Conserve shallow, working wetlands in cropland.
- Plant vegetative buffer strips around wetlands in cropland.
- Identify and target high priority landscapes, habitats, and stopover sites for protection.
- Conscientious and appropriate application of agrochemicals.

Thick-billed Longspur *Rhynchophanes mccownii*



Thick-billed Longspur possible/uncommon (light gray) and historical (black hatch) breeding range. Photo Credit: Adobe Stock

Description/Identification: L 6”, WS 11”, 0.81 oz. Male is gray overall with a white neck, crescent-shaped black patch on chest, and rufous shoulders. Female is light brown. Black “T” on white tail.

Status: Possibly extirpated. Occurs in North Dakota from mid-April to September. Peak breeding season late May to mid-July.

Reason for SGCN Designation: Regionally and globally imperiled (SGCN a.). The Thick-billed Longspur is declining precipitously, and the population has decreased 94% since 1970. Prior to European settlement of North Dakota, Thick-billed Longspur was rather common over the western half of the state. From 1905-1930, the species declined rapidly, and the breeding range constricted substantially. This species is at imminent risk of extirpation from North Dakota.

Habitat: Thick-billed Longspurs are found in open shortgrass or heavily grazed mixed-grass prairie with little litter and low vegetation cover. Small-grain stubble fields and summer fallow fields are occasionally used. Often breed on high, barren hillsides with a southern exposure. Associated vegetation includes blue grama and buffalo grass. Nests are often placed near a clump of grass, shrubs, plains prickly pear, or a cowpie. Pairs often nest near each other, and each territory requires 0.5-1.5 ha. Primary food includes seeds of grasses and forbs but also feeds on insects and other arthropods.

Threats: Loss of grassland. Specifically, the loss of expansive, native shortgrass prairie habitat. Loss of ranching heritage and grass-based operations, grazing is essential to grassland health and diversity. Classified as climate-endangered, Thick-billed Longspur is projected to lose more than half of its current distribution by 2050, with no net gains of new areas (Audubon).

Research and Monitoring: Habitat requirements and demographic studies have been broadly researched on the breeding grounds. Additional information is needed on migration and wintering behaviors. The Breeding Bird Survey, eBird and Partners in Flight Databases are key sources of information on distribution and population trends.

Management Recommendations:

- Protect and conserve large, intact tracks of native shortgrass prairie/unbroken grassland.
- Reconstruct or restore grassland adjacent to existing tracts of native prairie/unbroken grassland.
- Use native grasses when replanting or restoring grassland.
- Promote well-managed grazing lands and working grasslands for biodiversity, sustainability, and resiliency.
- Prevent or remove shrubs and tall woody vegetation in grasslands, either mechanically or by prescribed fire.
- Use prescribed burns in areas where fire has been suppressed.
- Avoid or minimize placement of development (e.g. energy, housing, utility lines) or other human infrastructure in native prairie/unbroken grassland.
- Follow beneficial or best practices during the design, siting, construction, operation, and maintenance of tall structures (e.g. transmission lines, communication towers, wind turbines).

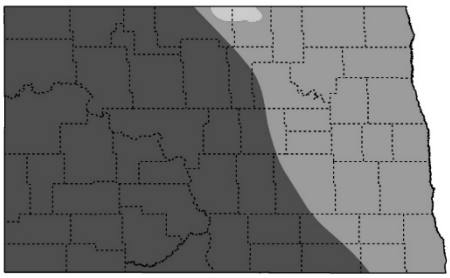
Upland Sandpiper *Bartramia longicauda*

Description/Identification: L 12”, WS 26”, 6 oz. A short yellow bill, long yellow legs, small head, slender neck, and a long tail.

Status: Occurs in North Dakota from mid-April to mid-September. Peak breeding season mid-May to mid-July.

Reason for SGCN Designation: At-risk, ND range important (SGCN b.). ND ranks 2nd out of 22 states for highest percent of the global population (15.5%) during the breeding season (eBird). The Upland Sandpiper is stable to declining, and ND has high stewardship responsibility for this species.

Habitat: Upland Sandpipers use native and tame grasslands, wet meadows, hayland, pastures, CRP, cropland, highway and railroad rights-of-way. Densities are highest in moderately grazed areas but will use shortgrass, mixed-grass and tall grass prairies that are idle, burned, hayed or grazed. Prefer grasslands with minimal woody vegetation, moderate litter cover, and little bare ground. Fence posts, rocks and other display perches are an important element. Forage in short vegetation (<10cm), including cropland, for small invertebrates which constitute over 95% of their diet. Nest and rear broods in taller vegetation (10 to 60 cm). Although the Upland Sandpiper is a shorebird, it is almost never seen by water.



Upland Sandpiper primary (dark gray), secondary (medium gray) and possible/uncommon (light gray) breeding range. Photo Credit: NDGF

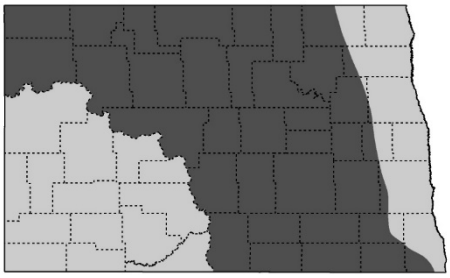
Threats: Loss of grassland. Degradation of grasslands from invasive plants, woody encroachment, succession, and loss of diversity. Loss of ranching heritage and grass-based operations, grazing is essential to grassland health and diversity. Lack of prescribed burns. Early mowing can destroy nests or kill the adult female on nest. Collisions with vehicles, overhead lines and other manmade structures occurs but is rare. Direct and indirect impacts from energy development, Upland Sandpipers exhibit displacement from areas within and surrounding wind turbines.

Research and Monitoring: Habitat requirements and effects of management practices such as grazing, burning and haying have been broadly researched on the breeding grounds. Little is known about reproductive success, annual adult survival, or fledgling survival. Additional information is needed on migration and wintering behaviors. The Breeding Bird Survey, eBird and Partners in Flight Databases are key sources of information on distribution and population trends.

Management Recommendations:

- Protect and conserve large, intact tracks of native prairie/unbroken grassland and tame grasslands.
- Reconstruct or restore grassland adjacent to existing tracts of native prairie/unbroken grassland.
- Use native grasses when replanting or restoring grassland.
- Burning is very beneficial. Upland Sandpipers forage in fields immediately following a burn and prefer nesting in fields 1 year after burning.
- Promote well-managed grazing lands and working grasslands for biodiversity, sustainability, and resiliency.
- Provide display perches such as wooden fence posts and replace rocks in restored/tame grasslands.
- Prevent or remove shrubs and tall woody vegetation in grasslands, either mechanically or by prescribed fire.
- Delay mowing or haying until August 1.
- Follow beneficial or best practices during the design, siting, construction, operation, and maintenance of tall structures (e.g. transmission lines, communication towers, wind turbines).

Western Grebe *Aechmophorus occidentalis*



Western Grebe primary (dark gray) and possible/uncommon (light gray) breeding range. Photo Credit: NDGF

Description/Identification: L 25", WS 24", 3.3 lb. Long white neck with dark stripe on the back of the neck, straight yellowish bill, red eye.

Status: Occurs in North Dakota from early April to mid-December. Peak breeding season late May to late August.

Reason for SGCN Designation: At-risk, ND range important (SGCN b.). ND ranks 1st out of 16 states for highest percent of global population (24.72%) during the breeding season (eBird). The Western Grebe is stable to declining and ND has high stewardship responsibility for this species in the Prairie Pothole Region.

Habitat: Western Grebes prefer medium to large freshwater marshes or lakes with beds of emergent vegetation, particularly sedges, rushes, and cattails, and substantial areas of open water. Slightly brackish/alkaline water is also suitable. Nest in colonies either as a single species or in mixed-species colonies, primarily with Eared Grebe. The number of nests in a colony may extend into into the hundreds. Nests are typically built over water on a floating platform of emergent vegetation. Occasionally nests are on the dry shorelines of islands. The presence of this species varies greatly dependent on water availability. Diet consists almost exclusively of fish, but also aquatic invertebrates, salamanders or crustaceans.

Threats: Loss and degradation of wetlands, drainage and wetland consolidation. Hydrologic shifts in wetlands of the PPR due to wetland consolidation and drainage, climate and land use changes (i.e. lakeification). Classified as climate-endangered, Western Grebe is projected to lose more than half of its current distribution by 2050, with no net gains of new areas (Audubon). Increasing applications of agrochemicals and adverse impacts to water quality, the wetland vegetative community, and the aquatic invertebrate community. More frequent or intense harmful algal blooms. Aquatic nuisance species spreading and damaging wetland ecosystems. Colonial waterbirds are highly susceptible to disease such as botulism or avian influenza. Western Grebes are sensitive to human disturbance at nest sites. Recreational boating may destroy nests or entire colonies.

Research and Monitoring: Habitat requirements and demographics have been broadly researched. Additional information is needed on migration and wintering behaviors. eBird and Partners in Flight Databases are key sources of information on distribution and population trends. Poor detection on the Breeding Bird Survey. The most recent colonial waterbird inventory in ND was conducted in 2014-2015. Seventy-five colonies were discovered in 30 counties; ~2,556 breeding pairs were estimated (mean colony size 34, range 1-270 pairs).

Management Recommendations:

- Preserve wetlands and wetland complexes.
- Restore hydrology and vegetation to degraded wetlands.
- Identify and target high priority landscapes, habitats, and staging areas for protection.
- Follow aquatic nuisance species rules and regulations.
- Follow beneficial or best practices during the design, siting, construction, operation, and maintenance of tall structures (e.g. transmission lines, communication towers, wind turbines).
- Raise awareness among boaters and outdoor enthusiasts to avoid approaching nesting sites.

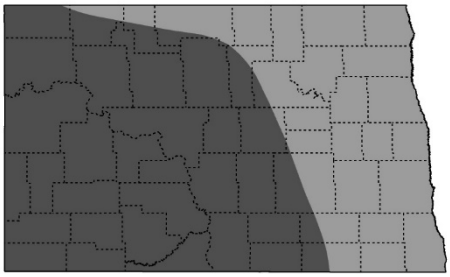
Western Meadowlark *Sturnella neglecta*

Description/Identification: L 9.5”, WS 14.5”, 3.4 oz. Medium-sized songbird, bright yellow belly and underparts with distinctive black “V”.

Status: Occurs in North Dakota primarily from March to early November. Rare in other months. Peak breeding season mid-April to late July.

Reason for SGCN Designation: Declining, ND range important (SGCN b.). ND ranks 6th out of 22 states for highest percent of the global population (7.3%) during the breeding season (eBird). The Western Meadowlark is declining, and the population has decreased 42% since 1970. ND has high stewardship responsibility for this species.

Habitat: Western Meadowlarks utilize a variety of grassland habitats but are most common in grazed native grasslands. Planted or tame grasslands, CRP, hayland, and field edges are also utilized. Less abundant in very tall and dense vegetation, areas of sparse vegetation or bare ground. Fence posts, large rocks, scattered shrubs or small trees, and stiff vegetation are favored perches for singing. Will tolerate some shrubs but negatively influenced by amount of woody vegetation in the landscape. Forages on the ground for grain and weed seeds and insects.



Western Meadowlark primary (dark gray) and secondary (medium gray) breeding range. Photo Credit: NDGF

Threats: Loss of grassland. Degradation of grasslands from invasive plants, woody encroachment, succession, and loss of diversity. Loss of ranching heritage and grass-based operations, grazing is essential to grassland health and diversity. Loss of perches in grassland habitat may inhibit use of those areas (e.g. fencing, rocks). Increasing applications of agrochemicals and possible exposure causing pesticide acute toxicity. Direct and indirect impacts from energy development, Western Meadowlarks exhibit displacement from areas within and surrounding wind turbines.

Research and Monitoring: Habitat requirements and demographic studies have been broadly researched on the breeding grounds. Post-fledgling survival, breeding site fidelity, nest success and adult survival is needed for Western Meadowlark. Additional information is needed on migration and wintering behaviors. The Breeding Bird Survey, eBird and Partners in Flight Databases are key sources of information on distribution and population trends.

Management Recommendations:

- Protect and conserve intact tracks of native prairie/unbroken grassland.
- Reconstruct or restore grassland adjacent to existing tracts of native prairie/unbroken grassland.
- Use native grasses when replanting or restoring grassland.
- Promote well-managed grazing lands and working grasslands for biodiversity, sustainability, and resiliency.
- Graze or hay expired CRP. The density of Western Meadowlarks is 61% lower in CRP fields converted to cropland, but density will increase if expired CRP is converted to grazed grassland (+26%) or hayland (+22%).
- Prevent or remove tall woody vegetation in grasslands, either mechanically or by prescribed fire.
- Provide display perches such as wooden fence posts and replace rocks in restored/tame grasslands.
- Delay mowing or haying until August 1.
- Conscientious and appropriate application of agrochemicals.
- Follow beneficial or best practices during the design, siting, construction, operation, and maintenance of tall structures (e.g. transmission lines, communication towers, wind turbines).

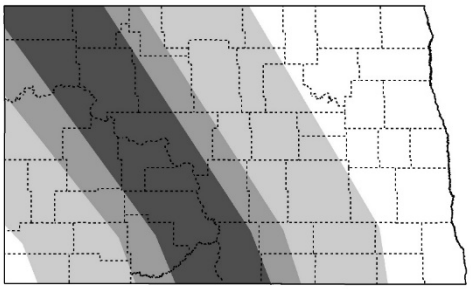
Whooping Crane *Grus americana*

Description/Identification: L 52", WS 87", 15 lb. All white except for black wing tips and a red crown, long black legs.

Status: Migrates through North Dakota in early April to mid-May and late September to mid-November.

Reason for SGCN Designation: Globally imperiled (SGCN a.). The Whooping Crane was listed as a Federal endangered species on 3/11/1967. The Whooping Crane population is increasing but it remains one of the rarest birds in the world.

Habitat: The only wild and self-sustaining Whooping Crane population migrates through North Dakota and nests in Wood Buffalo National Park in Northern Alberta and winters along the Gulf Coast and inland areas of Texas. During migration in North Dakota, Whooping Cranes feed primarily in croplands and roost in shallow, palustrine wetlands less than 4 ha (~10 acres). Seasonal, temporary and semi-permanent wetlands are the most used. Large, shallow wetlands are used for roosting and smaller wetlands for foraging. Forages for waste grains in harvested fields, frogs, fish, plant tubers, insects, and crayfish during migration.



Whooping Crane migration corridors: 50% core (dark gray), 75% core (medium gray) and 95% core (light gray). From Pearse et al. 2018 https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0192737
Photo Credit: NDGF

Threats: Loss and degradation of wetlands, drainage and wetland consolidation. Classified as climate-threatened, Whooping Crane is projected to lose more than half of its current distribution by 2080, with potential net gains of new areas (Audubon). Increasing applications of agrochemicals and adverse impacts to water quality, the wetland vegetative community, and the aquatic invertebrate community. Aquatic nuisance species spreading and damaging wetland ecosystems. Human disturbance such as recreational boaters or birders at staging and stopover sites may disrupt normal behaviors or interrupt feeding. Potential disturbance from oil and gas development and impact of environmental incidents (e.g. oil, produced water/brine) on wetlands or oiled birds. Coastal development (urban and industry sprawl), coastal erosion, storm surges, oil or industrial effluent spills, impaired water quality and microplastics are threats to wintering habitat. Climate change impacts, environmental contaminants from oil sands, hydropower, and commercial logging are threats to breeding habitat. Telemetry studies indicate avoidance of wind-energy infrastructure, but the long-term or lag effects of habitat loss are unknown. High risk for collisions with transmission and overhead lines. Poaching is rare but is a senseless cause of mortality.

Research and Monitoring: Habitat requirements and demographics have been extensively researched on the breeding grounds and throughout the full life cycle. Ongoing GPS telemetry projects to study migratory ecology, breeding and wintering behaviors. Continue outreach efforts to encourage the public to report Whooping Crane sightings in the spring and fall to appropriate key contacts. The winter survey, led by the U.S. Fish and Wildlife Service, is a crucial monitoring effort for the Aransas-Wood Buffalo population.

Management Recommendations:

- Refer to actions in the International Whooping Crane Recovery Plan.
- Protect and restore staging or stopover sites.
- Minimize or prevent human disturbance, such as educating the public about keeping safe distances.
- Use spatial models (e.g., Niemuth et al. 2018) to guide the siting of new wind, oil, and electrical transmission infrastructure to minimize potential conflicts with Whooping Cranes.
- Follow aquatic nuisance species rules and regulations.
- Follow beneficial or best practices during the design, siting, construction, operation, and maintenance of tall structures (e.g., transmission lines, communication towers, wind turbines).

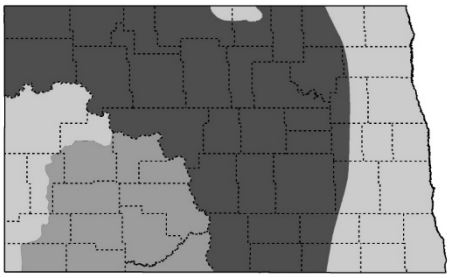
Willet *Tringa semipalmata*

Description/Identification: L 18”, WS 30”, 13 oz. L 15”, WS 26”, 8 oz. Gray overall except for striking black and white wings obvious in flight.

Status: Occurs in North Dakota from mid-April to late September. Peak breeding season mid-May to late June.

Reason for SGCN Designation: At-risk, ND range important (SGCN b.). ND ranks 4th out of 30 states for highest percent of the global population (6.47%) during the breeding season (eBird). The Willet is declining, and ND has high stewardship responsibility for the population breeding inland in the western states, *T. s. inornata.*

Habitat: Large expanses of short, sparse grasslands, particularly native grassland, are important for nesting and foraging. Prefer idle grassland during nesting over grazed pasture, compared to other land uses such as hayland and cropland. Nests in short grass, adults with broods will use taller, denser grass. A variety of wetland complexes of ephemeral, temporary, seasonal, semi-permanent, permanent wetlands, and intermittent streams used for foraging. Avoids wetlands with dense, emergent vegetation, and prefer shallow-water areas with sparse shoreline vegetation. Primary foods include insects, small crustaceans, mollusks, and occasionally small fish.



Willet primary (dark gray), secondary (medium gray) and possible/uncommon (light gray) breeding range. Photo Credit: NDGF

Threats: Loss of grassland and grassland/wetland complexes. Loss and degradation of wetlands, drainage and wetland consolidation. Hydrologic shifts in wetlands of the PPR due to wetland consolidation and drainage, climate and land use changes (i.e. lakeification). Classified as climate-endangered, Willet is projected to lose more than half of its current distribution by 2050, with no net gains of new areas (Audubon). Increasing applications of agrochemicals and adverse impacts to water quality, the wetland vegetative community, and the aquatic invertebrate community. Early mowing can destroy nests or kill the adult on the nest. Collisions with overhead lines and wind turbines.

Research and Monitoring: Habitat requirements and demographics have been broadly researched on the breeding grounds. Little known about annual adult survival or fledgling survival. Information lacking on migration strategies, stopover sites, and wintering behaviors. The Breeding Bird Survey, eBird and Partners in Flight Databases are key sources of information on distribution and population trends.

Management Recommendations:

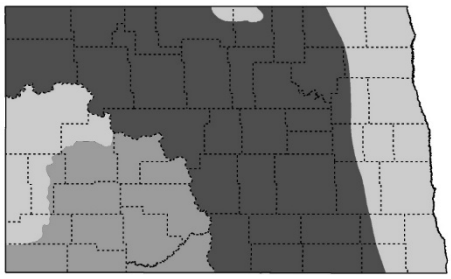
- Protect and conserve large, intact tracks of native prairie/unbroken grassland and wetland complexes.
- Reconstruct or restore grassland adjacent to existing tracts of native prairie/unbroken grassland.
- Restore hydrology and vegetation to degraded wetlands.
- Use native grasses when replanting or restoring grassland.
- Burn, mow, and graze grasslands to provide areas of shorter, sparser vegetation.
- Minimize pesticide and herbicide use on grasslands.
- Remove tall, dense vegetation in the fall by using haying and grazing.
- Prevent or remove shrubs and tall woody vegetation in grasslands, either mechanically or by prescribed fire.
- Follow beneficial or best practices during the design, siting, construction, operation, and maintenance of tall structures (e.g. transmission lines, communication towers, wind turbines).

Wilson's Phalarope *Phalaropus tricolor*

Description/Identification: L 9.25", WS 17", 2.1 oz. Females sport a brown-red and gray back, cinnamon neck, white throat and belly. Males are light gray and white.

Status: Occurs in North Dakota from mid-April to mid-October. Peak breeding season occurs late May to early July.

Reason for SGCN Designation: Regionally or globally imperiled, ND range important (SGCN a., b.). ND ranks 2nd out of 18 states for highest percent of the global population (1.71%) during the breeding season (eBird). ND has high stewardship responsibility. Although Wilson's Phalarope population is generally stable, recent concerns about the desiccation of saline lakes in the Great Basin, a major stopover site, have led to a petition for its listing under the ESA (March 2024).



Wilson's Phalarope primary (dark gray), secondary (medium gray) and possible/uncommon (light gray) breeding range. Photo Credit: NDGF

Habitat: Wilson's Phalaropes use fresh to alkaline wetlands with open water, emergent vegetation, and open shoreline for foraging, and wet meadows or upland grasslands for nesting. Typically, nest <100m from the shoreline, in the uplands early in the breeding season and in wet-meadow vegetation later in the season. Nests in grasses of various heights in idle, hayed, or grazed grasslands adjacent to wetlands. Also nest on islands. Cropped wetlands, temporary, seasonal, semi-permanent, fen, alkali, and permanent wetlands, in decreasing order, are utilized most frequently. Occur in the peripheral low-prairie and wet meadow areas of wetlands. Feeds on a variety of aquatic invertebrates.

Threats: Loss of grassland and grassland/wetland complexes. Loss and degradation of wetlands, drainage and wetland consolidation. Hydrologic shifts in wetlands of the PPR due to wetland consolidation and drainage, climate and land use changes (i.e. lakeification). Classified as climate-endangered, Wilson's Phalarope is projected to lose more than half of its current distribution by 2050, with no net gains of new areas (Audubon). Increasing applications of agrochemicals and adverse impacts to water quality, the wetland vegetative community, and the aquatic invertebrate community. Nest mortality may be higher than species utilizing similar habitat, possibly because of the phalarope's tendency to place nests in the margins of wetlands where they are more easily flooded. Collisions with overhead lines and wind turbines.

Research and Monitoring: Habitat requirements and demographics have been broadly researched on the breeding grounds. Little known about annual adult survival or fledgling survival. Information lacking on migration strategies, stopover sites, and wintering behaviors. Identify if there is a migratory connection of the PPR breeding population with stopover sites in the Great Basin. The Breeding Bird Survey, eBird and Partners in Flight Databases are key sources of information on distribution and population trends.

Management Recommendations:

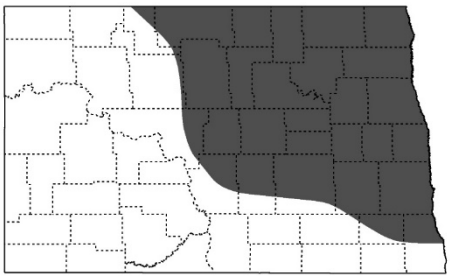
- Protect and conserve large, intact tracks of native prairie/unbroken grassland and wetland complexes.
- Restore hydrology and vegetation to degraded wetlands.
- Conserve shallow, working wetlands in cropland.
- Plant vegetative buffer strips around wetlands in cropland.
- Burn, mow, and graze grasslands to provide areas of shorter, sparser vegetation.
- Prevent or remove shrubs and tall woody vegetation in wetlands, either mechanically or by prescribed fire.
- Conscientious and appropriate application of agrochemicals.
- Follow beneficial or best practices during the design, siting, construction, operation, and maintenance of tall structures (e.g. transmission lines, communication towers, wind turbines).

Yellow Rail *Coturnicops noveboracensis*

No Image Available

Description/Identification: L 7.25", WS 11", 1.8 oz. A cryptic and secretive bird, it is yellow-buff overall, striped back, short tail and stubby yellow bill.

Status: Occurs in North Dakota from mid-May to mid-August. Peak breeding season early June to mid-July.



Yellow Rail primary (dark gray) breeding range.

Reason for SGCN Designation: Regionally or globally imperiled, ND range important (SGCN a., b.). ND ranks 1st out of 4 states for highest percent of population during the breeding season (eBird). Small population but large geographic range. The Yellow Rail is declining, and ND has high stewardship responsibility for this species in the Prairie Pothole Region.

Habitat: Yellow Rails prefer fens or wet meadows dominated by sedges, grasses, rushes, and bulrushes in fresh and brackish wetlands. Stands of common cattail may be present but will not use wetlands dominated by cattails. Uses small to large fens or ground water fed wetlands, with water depth of typically 0-46 cm. Rail presence is often associated with a high percentage of emergent vegetation. The presence of this species may vary greatly from year to year depending on water availability. Nest under a canopy of vegetation in areas with standing water or saturated ground. Primary food includes snails, aquatic insects, and seeds.

Threats: Loss and degradation of wetlands, drainage and wetland consolidation. Hydrologic shifts in wetlands of the PPR due to wetland consolidation and drainage, climate and land use changes (i.e. lakeification). Classified as climate-endangered, Yellow Rail is projected to lose more than half of its current distribution by 2050, with no net gains of new areas (Audubon). Increasing applications of agrochemicals and adverse impacts to water quality, the wetland vegetative community, and the aquatic invertebrate community. Aquatic nuisance species spreading and damaging wetland ecosystems. Yellow Rails use fens, which are rare and extremely vulnerable in North Dakota. Invasive hybrid cattails spread aggressively and can dominate sensitive fen habitats. Human disturbance from wildlife observers entering Yellow Rail habitat to view these difficult to observe birds could cause abandonment or destruction of nests. Yellow Rails may be killed from machinery during mowing or haying. Collisions with human-made structures (e.g. overhead lines).

Research and Monitoring: Habitat requirements and demographics have been researched, but little effort in North Dakota. Additional information is needed on breeding, migration and wintering behaviors. eBird and Partners in Flight Databases are key sources of information on distribution and population trends. Poor detection on the Breeding Bird Survey. Yellow Rails are secretive, and monitoring could involve targeted call-response surveys.

Management Recommendations:

- Preserve and maintain wetland complexes, particularly fen habitats.
- Restore hydrology and vegetation to degraded wetlands.
- Avoid water manipulation which creates a hemi-marsh or deep-water marsh.
- Prevent and remove encroachment of woody vegetation around wetlands.
- Conduct management to open cattail-choked wetlands.
- Delay haying or mowing until after August 1.
- Follow aquatic nuisance species rules and regulations.
- Follow beneficial or best practices during the design, siting, construction, operation, and maintenance of tall structures (e.g. transmission lines, communication towers, wind turbines).
- Raise awareness among wildlife observers to avoid approaching nesting sites.

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APPENDIX B
AMPHIBIAN AND REPTILE SGCN SPECIES ACCOUNTS

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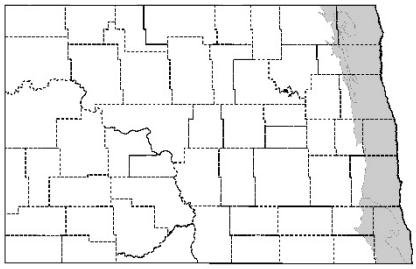
Amphibian and Reptile SGCN and SGIN categories.

	Species of Greatest Conservation Need			Species of Greatest Information Need			
Common Name	**SGCN a. Regionally or globally imperiled**	**SGCN b. At-risk or declining, ND important**	**SGCN c. At-risk, expert review**	**SGIN d. Scientific knowledge deficient**	**SGIN e. Potentially stable in ND, declining in range**	**SGIN f. Potentially stable but life history trait vulnerability**	**SGIN g. Declining, ND significance uncertain**
American Toad			X				
Northern Prairie Skink			X				
Plains Hog-nosed Snake			X				
Plains Spadefoot			X				
Smooth Green Snake			X				
Snapping Turtle			X				
Common Gartersnake						X	
Common Mudpuppy				X			
Cope's Gray Treefrog				X			
Eastern Gray Treefrog				X			
False Map Turtle						X	
Plains Gartersnake						X	
Red-bellied Snake						X	
Sagebrush Lizard						X	
Short-horned Lizard						X	
Smooth Softshell						X	
Spiny Softshell						X	
Wood Frog						X	

American Toad *Anaxyrus americanus*



American Toad potential range. Photo Credit: Don Becker

Description/Identification: Color varies from brown to brick red or olive green. A light stripe may be found along the middle of the back. No bump present on their snout. Easily mistaken with the Canadian toad.

Status: Year-round resident.

Reason for SGCN Designation: Becoming increasingly rare in the state. Recent surveys have not recorded this species. Potential to hybridize with the Canadian Toad. Identified as a regional Watchlist species by the Midwest Association of Fish and Wildlife Agencies.

Habitat: Considered a forest obligate species but can be found in most moist environments where plentiful insects, worms and snails are found for food.

Threats: Ephemeral wetlands in which the species naturally breed are at risk of destruction and/or degradation. However, they may be tolerant of a broad range of habitats, even laying eggs in non-native sites such as ditches or flooded agricultural fields. Forest habitat fragmentation. Use of pesticides and herbicides may impact populations locally. Disease such as ranavirus and chytrid fungus may be very detrimental to amphibian populations. Hybridization with Canadian toads.

Research and Monitoring:

- Currently research to evaluate their population on state Wildlife Management Areas in their range is on-going.
- Currently no dedicated monitoring is taking place. Possible monitoring options could include the general public through an application like Herpmapper, the NDGFD incidental reporting system, or national monitoring initiatives such as PARC. Monitoring should be directed at all herptile species.

Management Recommendations:

- Protect ephemeral wetland habitats from drainage or filling.
- Avoid artificially extending the naturally short hydroperiods of wetlands in arid regions of the state.
- Avoid creating permanent water sources in areas where they are naturally lacking (e.g. southwestern North Dakota In arid regions of the state, restore the natural hydroperiods of wetlands that have been altered to create permanent water sources.
- Encourage the use of alternative water sources for livestock in arid regions of the state.
- Encourage the restoration of grassland habitats that were converted to stock ponds or dugouts.

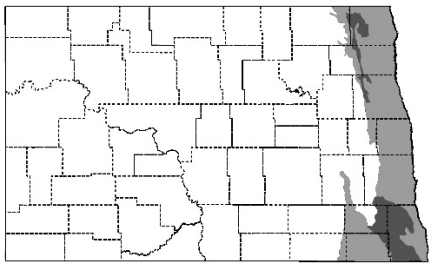
Northern Prairie Skink *Plestiodon septentrionalis*

Description/Identification: Length 5-8”. Light gray-brown with several dark bands extending the length of the body. The belly is pale blue-gray.

Status: Year-round resident.

Reason for SGCN Designation: Listed as Imperiled in Manitoba by NatureServe. This species has a rather small range in North America, limited to patchy segments of North Dakota, South Dakota, Minnesota, Wisconsin, Iowa, Nebraska, and Kansas. Little is known of this species in North Dakota.

Habitat: Prairie skinks use open areas with grassy hillsides of soft soil and small, flat rocks. Burrow under stones or other objects on the ground. The largest population most likely occurs in the southeastern grasslands of North Dakota, although records have come from the northern part of the state. Focus areas where this species occurs include the Sand Deltas and Beach Ridges. Diet consists of crickets, grasshoppers, beetles, caterpillars, spiders, and other small arthropods.



Northern Prairie Skink primary (dark gray) and secondary (light gray) range. Photo Credit: Don Becker

Threats: Fragile sand delta habitat is at risk of destruction and/or degradation. The fragmentation of suitable habitat may hinder interconnectivity of populations, as movement of individual skinks is usually less than 100 meters. It is unknown what effect pesticides, development, and other disturbance has on populations of prairie skinks.

Research and Monitoring:

- North Dakota State has surveyed eastern ND Wildlife Management Areas for Herptiles and their habitats from 2014-2016 and 2019-2021.
- Currently no dedicated monitoring is taking place. Possible monitoring options could include the general public through an application like Herpmapper, the NDGFD incidental reporting system, or national monitoring initiatives such as PARC. Monitoring should be directed at all herptile species.

Management Recommendations:

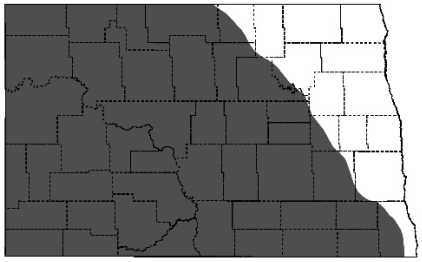
- Manage grasslands for multiple successional stages.
- Prevent overgrowth by shrubs and trees to maintain openness in sandy grassland habitats.
- Restrict off-road vehicle use to preselected, less sensitive/lower quality areas.

Plains Hog-nosed Snake *Heterodon nasicus*

Description/Identification: L 15-39”. Tan to yellowish-gray with dark blotches and a black belly with yellow or whitish squares. A unique upturned nose with keel on top sets this snake apart from the prairie rattlesnake.

Status: Year-round resident.

Reason for SGCN Designation: Identified as a Regional Species of Greatest Conservation Need by the Midwest Association of Fish and Wildlife Agencies.



Plains Hog-nosed Snake primary range. Photo Credit: Don Becker

Habitat: Prefer dry, sandy, or gravelly areas in grassland, open sand prairies, or sand dunes. Sometimes mixed forest habitats and cropland may be used. Burrow into the loose soil or may use mammal burrows for cover, but will not use artificial cover as much as other snakes. Primarily feeds on amphibians, lizards, snakes, reptile eggs, and small mammals.

Threats: Dry grasslands preferred by hog-nosed snakes are fragile habitats and may be easily degraded or destroyed.
Hog-nosed snakes may be intentionally killed if mistaken for a rattlesnake. It is unknown how pesticides, development, and other disturbance affect hog-nosed snakes.

Research and Monitoring:

- North Dakota State has surveyed eastern ND Wildlife Management Areas for Herptiles and their habitats from 2014-2016 and 2019-2021.
- Currently no dedicated monitoring is taking place. Possible monitoring options could include the general public through an application like Herpmapper, the NDGFD incidental reporting system, or national monitoring initiatives such as PARC. Monitoring should be directed at all herptile species.

Management Recommendations:

- Prevent overgrowth by shrubs and trees to maintain openness in grassland habitats.
- Restrict off-road vehicle use to preselected, less sensitive/lower quality areas.

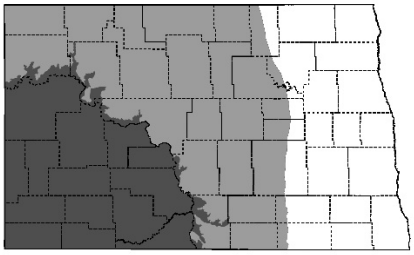
Plains Spadefoot *Spea bombifrons*

Description/Identification: L 1 ½ -2". Smooth grayish or brown skin with small red or orange tipped warts. A cat-like eye, pronounced boss between eyes, and short, rounded, wedge-shaped spade characterize this toad.

Status: Year-round resident.

Reason for SGCN Designation: Vulnerable throughout much of its northern range, including Montana. Its geographic range overlaps much of the Great Plains, perhaps one of the more vulnerable ecosystems in North America.

Habitat: Rather dry, open grasslands with sandy or otherwise loose soil are preferred. Typically avoid river bottoms and woodlands. Burrow into the ground until damp soil is reached, sometimes more than 2 feet. Emerge from the ground when heavy rains occur, creating small pools of water used for breeding. Temporary wetlands without heavy vegetation such as those found in agricultural fields are easily flooded and may provide tolerable spadefoot breeding habitat. Adults forage on small terrestrial arthropods/amphipods, snails, earthworms, centipedes; while tadpoles are both omnivorous and carnivorous, feeding on suspended matter, organic debris, algae, plant tissue, aquatic invertebrates and other amphibian larvae.



Plains Spadefoot primary (dark gray) and secondary (light gray) range. Photo Credit: NDGF

Threats: Ephemeral wetlands in which the species naturally breed are at risk of destruction and/or degradation. However, they may be tolerant of a broad range of habitats, even laying eggs in non-native sites such as ditches or flooded agricultural fields. Prairie habitat fragmentation may hinder movements. Use of pesticides and herbicides may impact populations locally. Disease such as ranavirus and chytrid fungus may be very detrimental to amphibian populations.

Research and Monitoring:

- North Dakota State has surveyed eastern ND Wildlife Management Areas for Herptiles and their habitats from 2014-2016 and 2019-2021.
- Currently no dedicated monitoring is taking place. Possible monitoring options could include the general public through an application like Herpmapper, the NDGFD incidental reporting system, or national monitoring initiatives such as PARC. Monitoring should be directed at all herptile species.

Management Recommendations:

- Protect ephemeral wetland habitats from drainage or filling.
- Avoid artificially extending the naturally short hydroperiods of wetlands in arid regions of the state.
- Avoid creating permanent water sources in areas where they are naturally lacking (e.g. southwestern North Dakota In arid regions of the state, restore the natural hydroperiods of wetlands that have been altered to create permanent water sources.
- Encourage the use of alternative water sources for livestock in arid regions of the state.
- Encourage the restoration of grassland habitats that were converted to stock ponds or dugouts.

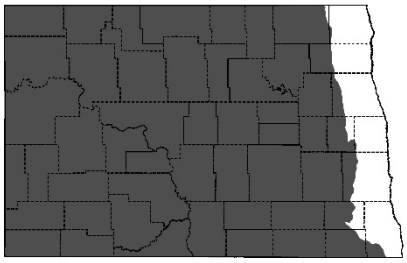
Smooth Green Snake *Opheodrys vernalis*

Description/Identification: L 12-22”. A fast moving and inconspicuous snake, it is bright green above and white to pale yellow below.

Status: Year-round resident

Reason for SGCN Designation: Identified as a Regional SGCN by the Midwest Association of Fish and Wildlife Agencies. Further evaluation is needed in ND.

Habitat: Smooth Green Snakes are found in grazed or ungrazed grassland, particularly the uplands of hills where grass is shorter. Moist meadows, native prairies, and occasionally woodland clearings are also used. It is rarely seen, other than in very short grass or perhaps crossing a road. Smooth Green Snakes hibernate in burrows, rock crevices, road embankments, and ant mounds. Prey primarily consists of invertebrates, including ants, maggots, grasshoppers, crickets, beetles, grubs, spiders, centipedes, millipedes, slugs, snails, salamanders, and small crayfish.



Smooth Green Snake primary range. Photo Credit: NDGF

Threats: Destruction and/or degradation of grassland habitat. It is unknown what effect pesticides, development, and other disturbance has on populations.

Research and Monitoring:

- North Dakota State has surveyed eastern ND Wildlife Management Areas for Herptiles and their habitats from 2014-2016 and 2019-2021.
- Currently no dedicated monitoring is taking place. Possible monitoring options could include the general public through an application like Herpmapper, the NDGFD incidental reporting system, or national monitoring initiatives such as PARC. Monitoring should be directed at all herptile species.

Management Recommendations:

- Maintain the open nature of habitat.
- Protect wetlands within grasslands and control livestock access.
- Avoid excessive grazing and off-road vehicle use.
- Leave logs, snags, and other woody debris on site, and replace if removed.

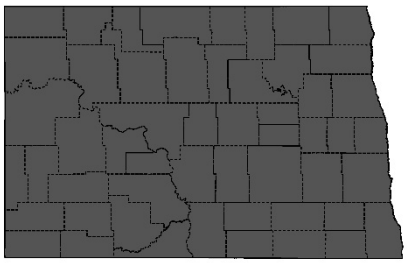
Snapping Turtle *Chelydra serpentina*

Description/Identification: L 8-30", 65lbs. Brown to gray turtle with undersides of light tan or gray. Snapping Turtles have a large head, hooked jaw, muscular limbs, webbed feet with long claws and a long, robust tail. Carapace often covered with green algae.

Status: Year-round resident.

Reason for SGCN Designation: Identified as a Regional SGCN by the Midwest Association of Fish and Wildlife Agencies. Among a list of turtle species vulnerable to turtle trade within the Midwest.

Habitat: Warm water in permanent lakes or rivers with a muddy bottom and plenty of aquatic vegetation. Snapping Turtles are found statewide. Recent work indicates that they prefer water bodies that are flowing or have access to flowing water. Snapping turtles are known to eat fish, amphibians, reptiles, aquatic birds, small mammals, invertebrates, various plants and algae, and carrion.



Snapping Turtle primary range. Photo Credit: NDGF

Threats: The loss or lack of aquatic vegetation, stumps, logs, and other debris could affect this species. Illegal take of snapping turtles. Road mortality may contribute to the decline. Contaminants have been linked to population decline or abnormal development in some areas. Snapping Turtles are sometimes deliberately killed because of perceived danger.

Research and Monitoring:

- North Dakota State has surveyed eastern ND Wildlife Management Areas for Herptiles and their habitats from 2014-2016 and 2019-2021.
- Currently no dedicated monitoring is taking place. Possible monitoring options could include the general public through an application like Herpmapper, the NDGFD incidental reporting system, or national monitoring initiatives such as PARC. Monitoring should be directed at all herptile species.

Management Recommendations:

- Develop a management plan for Snapping Turtles.
- Identify and protect nesting and over-wintering sites.
- Avoid clearing or replacing natural vegetation along wetland edges, providing at least 50-75 feet of undisturbed habitat to protect water quality and prevent erosion.
- Maintain the natural water level and fluctuations of wetlands.
- Leave logs, snags, and other woody debris on site and replace if removed.
- Erosion control structures such as retaining walls or rip-rap will limit or prevent access to the shoreline and adjacent habitat.
- Do not alter natural river undulations, backwater areas, or sand and gravel bars.
- When possible, keep cattle out of streams to reduce impacts on water quality and the streambed.
- Develop information to educate the public on the importance of Snapping Turtles.

APPENDIX C
MAMMAL SGCN SPECIES ACCOUNTS

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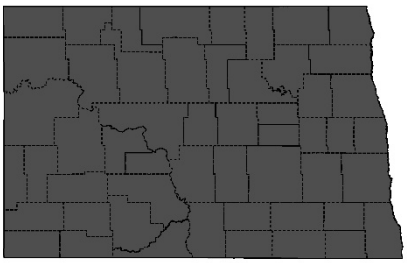
Mammal SGCN and SGIN categories.

	Species of Greatest Conservation Need			Species of Greatest Information Need			
Common Name	**SGCN a. Regionally or globally imperiled**	**SGCN b. At-risk or declining, ND important**	**SGCN c. At-risk, expert review**	**SGIN d. Scientific knowledge deficient**	**SGIN e. Potentially stable in ND, declining in range**	**SGIN f. Potentially stable but life history trait vulnerability**	**SGIN g. Declining, ND significance uncertain**
Big Brown Bat	X						
Black-footed Ferret	X						
Black-tailed Prairie Dog	X						
Eastern Red Bat			X				
Eastern Spotted Skunk	X						
Gray Fox	X						
Hoary Bat			X				
Little Brown Bat	X						
Northern Long-eared Bat	X						
Richardson's Ground Squirrel		X					
Silver-haired Bat			X				
Swift Fox			X				
Arctic Shrew				X			
Franklin's Ground Squirrel					X		
Fringed Myotis							X
Hispid Pocket Mouse				X			
Long-eared Bat				X			
Long-legged Bat				X			
Merriam's Shrew				X			
Northern Water Shrew				X			
Ord's Kangaroo Rat				X			
Plains Pocket Mouse				X			
Pygmy Shrew				X			
Sagebrush Vole				X			
Townsend's Big-eared bat							X
Western Small-footed Bat				X			

Big Brown Bat *Eptesicus fuscus*



Big Brown Bat primary range. Photo Credit: Adobe Stock

Description/Identification: Resembles the Little Brown Bat but for its larger size. An adult bat can reach 20 grams. Fur is dark brown in color, tragus and uropatigium lack hair.

Status: Year-round. Species documented as hibernating in North Dakota.

Reason for SGCN Designation: Although common in North Dakota species is threatened by a fungal disease known as white-nose syndrome in the eastern and Midwest portions of its range.

Habitat: Found in both urban and rural habitats. Insect availability tends to be the limiting factor versus a type of habitat. Commonly associated with trees. Forages over a wide variety of habitats. Small beetles dominate the diet, including a significant number of agricultural pests. Other prey includes flies, moths, wasps, and other insects

Threats: White-nose Syndrome is a threat to this species. North Dakota bat species are insectivores. The use of pesticides in the vicinity of a feeding ground would affect bat populations by killing prey. This species is known to store pesticides within fat reserves. Accumulation within body may cause negative reactions or death. Wind turbines have been identified as a source of mortality to bats. Indiscriminate killing due to a negative public perception has been identified as a possible threat to this species.

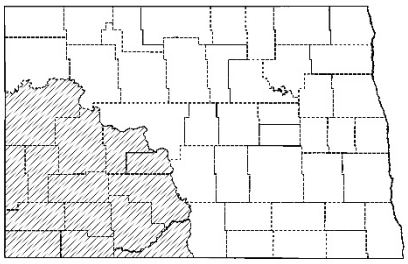
Research and Monitoring:

- Bat species are monitored acoustically using North American Bat monitoring protocol.
- Bats are also monitored with mist nets by a number of partners in the state.

Management Recommendations:

- Protection and restoration of riparian habitat.
- Manage riparian habitats to maintain snags, connecting corridors, and edges.
- Maintain and improve seeps, ponds, and other wet areas as water sources.
- Education on the benefits and misconceptions about bats.
- Determine and protect nursery and hibernation sites.
- Provide roosting sites in areas where natural sites have been destroyed or disturbed.
- Reduce use of pesticides near waterways where bats forage.

Black-footed Ferret *Mustela nigripes*



Black-footed Ferret historical range. Photo Credit: Adobe Stock

Description/Identification: A mink-sized member of the weasel family, up to 26 in. in length. Pelage is buff with the throat and belly generally whiter. The feet are black, as is the tip of the tail. A black band covers the eyes and is more prominent in younger individuals.

Status: Believed Extirpated.

Reason for SGCN Designation: Poisoning efforts directed toward the Black-tailed Prairie Dog in the early part of the century caused the decline and eventual loss of North Dakota's ferret population. Lack of suitably sized Black-tailed Prairie Dog colonies and disease are the major causes hampering its return.

Habitat: Black-footed Ferrets require large complexes of prairie dog colonies, 10,000 acres or more with towns no farther than three miles apart to sustain a viable population of 120 ferrets. Key Areas for Black-footed Ferret in North Dakota are the Little Missouri National Grasslands and lands within the Standing Rock reservation. Over 80% of their diet consists of prairie dogs, with the remainder including mice and other rodents, rabbits, birds, reptiles, and insects.

Threats:
Large prairie dog complexes needed to support a Black-footed Ferret population do not currently exist in North Dakota. With widespread negative sentiment toward prairie dogs within the state it is uncertain whether prairie dog complexes would be allowed to expand sufficiently to support ferret reintroduction. Poisoning of Black-tailed Prairie Dog colonies has resulted in loss of population. Poisoning is legal on private land in North Dakota. Many types of poisons are used, but zinc phosphide and Rosal are the most common. Conversion of rangeland for agricultural uses is decreasing Black-tailed Prairie Dog acres within the state, which in turn reduces potential Black-footed Ferret habitat.

Research and Monitoring:

- Prairie dog towns will be monitored for Black-footed Ferrets during Black-tailed Prairie Dog survey efforts.
- Observations are recorded by the NDGFD Online Furbearer Observation Report.

Management Recommendations:

- Management recommendations for the recovery of the Black-footed Ferret are outlined in the Black-footed Ferret Recovery Plan. http://www.fws.gov/mountainprairie/mammals/blackfooted ferret/2013DraftRevisedRecoverPlan.pdf
- Potential sites for Black-tailed Prairie Dog expansion need to be identified and private landowner partnerships would need to be developed before ferret reintroduction can be considered.

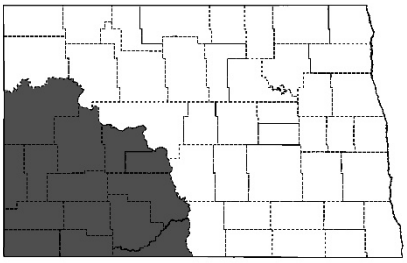
Black-tailed Prairie Dog *Cynomys ludovicianus*

Description/Identification: North Dakota's largest ground squirrel, it is yellowish tan on its back and lighter on the belly. It has a short tail with a black tip. Found in colonies of many individuals.

Status: Year-round resident.

Reason for SGCN Designation: Black-tailed Prairie Dog habitat has been reduced to 1% of its historic amount. The combination of grassland conversion and concentrated poisoning are the main causes of their population decline. Numerous grassland species depend on Black-tailed Prairie Dogs for habitat and food, including other species of conservation priority such as Burrowing Owl and Ferruginous Hawk.

Habitat: Black-tailed Prairie Dogs are confined to prairie communities with short vegetation and relatively flat topography. They are often found in relation to areas grazed by livestock. Black-tailed Prairie Dogs live in large colonies known as "towns." In North Dakota, Black-tailed Prairie Dogs occur in two distinct population complexes in ND; the Little Missouri National Grasslands complex and the Standing Rock complex which includes Sioux County and portions of Grant and Morton Counties. Diet (99%) primarily consists of grasses and forbs. Shrubs, seeds, and insects make up the remaining portion.



Black-tailed Prairie Dog primary range. Photo Credit: NDGF

Threats: Loss of suitable Black-tailed Prairie Dog habitat is a major problem. Habitat loss is attributed to conversion of grassland to agricultural land. Historically, Black-tailed Prairie Dog range encompassed 12 million acres, of which 10% was occupied at any one time. The most recent survey estimated the North Dakota has roughly 15,000 acres. Poisoning of Black-tailed Prairie Dog colonies has resulted in loss of local populations.

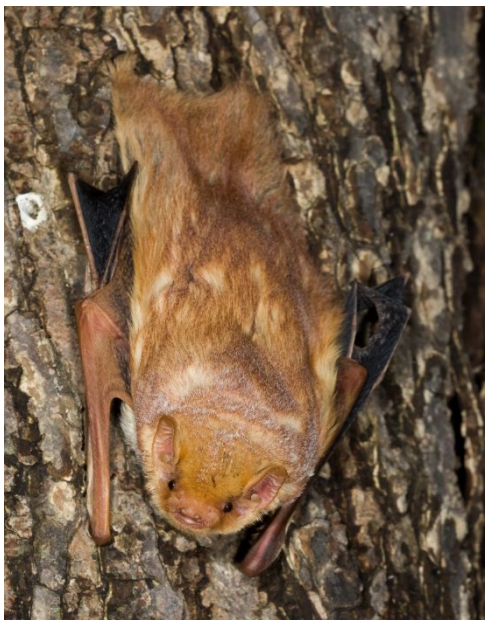
Research and Monitoring:

- WAFWA surveyed BTPDs in North Dakota in 2015 using a Balance Accepted Sampling (BAS) method. ND intends to continue this survey method. This methodology is used by many of the 13 states in the range of the Black-tailed Prairie Dog. This standardization will allow for better data for range wide assessments of population.

Management Recommendations:

- Work with private landowners to develop grazing management practices that consider the season, duration, distribution, frequency, and intensity of grazing use on areas to maintain vegetation on both upland and riparian sites.
- Where appropriate, incorporate the use of mechanical, chemical, and biological methods of weed control to manage noxious weeds.
- Work with private landowner to incorporate prescribed land treatments into livestock management practices to develop sustainability of biological diversity.
- Monitor the effects of shooting. The NDGFD has the authority to place restrictions on shooting if necessary.
- Monitor the effects of plague on populations. Implement plague management if necessary.

Eastern Red Bat *Lasiurus borealis*



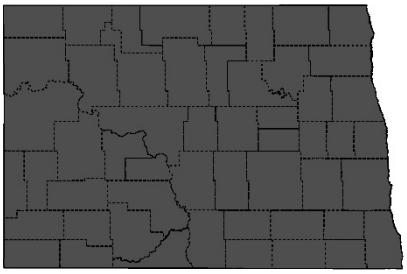
Description/Identification: Distinguishable from other North Dakota bats by its red pelage with buff shoulder patches. Triangular membrane between back legs is hair covered.

Status: Seasonal, Migratory.

Reason for SGCN Designation: Threatened by the emergence of wind energy development in ND. Identified as a Regional Species of Conservation Priority by the Midwest Association of Fish and Wildlife Agencies.

Habitat: Tree roosting bat species. Found predominantly in forests and woodlots in ND. Found state-wide in ND. Diet consists of a variety of insects, particularly moths.

Threats: The expansion of wind energy development is identified as an emerging threat to this species due to it migratory nature. North Dakota bat species are insectivores. The use of pesticides in the vicinity of a feeding ground would affect bat populations by killing prey. Also, bat species are known to store pesticides within fat reserves.



Eastern Red Bat primary range. Photo Credit: Adobe Stock

Research and Monitoring:

- Bat species are monitored acoustically using North American Bat monitoring protocol.
- Bats are also monitored with mist nets by a number of partners in the state.

Management Recommendations:

- Work with wind energy development companies on turbine siting to minimize impacts to migrating bats
- Protection and restoration of riparian habitat.
- Manage riparian habitats to maintain snags, connecting corridors, and edges.
- Maintain and improve seeps, ponds, and other wet areas as water sources.
- Education on the benefits and misconceptions about bats.
- Identify and protect maternity roosts.
- Provide roosting sites in areas where natural sites have been destroyed or disturbed.

Eastern Spotted Skunk *Spilogale putorius*

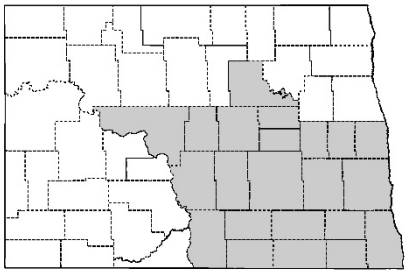
Description/Identification: Roughly the size of a small house cat, it is distinguishable from the more common striped skunk by six white spots running the length of its back, and a small white spot between its eyes. It also has an all-black tail with a white tip. Nocturnal and highly secretive.

Status: Rare, year-round resident.

Reason for SGCN Designation: Identified as a Regional Species of Conservation Priority by the Midwest Association of Fish and Wildlife Agencies. Little is known regarding the habitats of this secretive species in ND and is likely on the edge of its range.

Habitat: Brushy areas, forest edge, riparian areas, and upland prairie grassland if rock outcrops or shrubs are present. Forages on small rodents, birds, bird eggs, insects, fruits, seeds, agricultural grains, and carrion.

Threats: Loss of riparian habitat is a major concern for Eastern Spotted Skunk. It uses these areas to hunt, and also dens in logs and brush piles.



Eastern Spotted Skunk possible range. Photo Credit: Adobe Stock

Research and Monitoring:

- Eastern Spotted skunks and other rare carnivores are tracked with the NDGFD Online Furbearer Observation Report.

Management Recommendations:

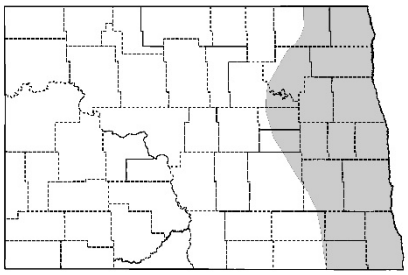
- Protect rivers, streams, and riparian areas where possible (i.e. conservation agreement and/or acquisition.
- Continue to use the Section 404 program to ensure affected rivers and riparian areas are mitigated to replace form and function.
- Continue to work with other federal agencies (i.e. FAA and FHWA) not covered by Section 404 or Swampbuster to ensure affected rivers and riparian areas are mitigated to replace form and function.
- Develop and promote incentive programs to restore riparian areas.

Gray Fox Urocyon cinereoargenteus

Description/Identification: Medium sized fox that has grizzled gray fur along its back with a light colored underside. Patches of red are found on its neck, belly and the inside of its legs. Its tail is black-tipped. It is generally smaller than the more common red fox.

Status: Resident.

Reason for SGCN Designation: Identified as a Regional Species of Conservation Priority by the Midwest Association of Fish and Wildlife Agencies. Petitioned for Listing Under the Endangered Species Act with a decision pending in 2028. It appears its population has decline within its range. A relative newcomer to the state, North Dakota appears to be the northwestern edge of its range.



Gray Fox possible range. Photo Credit: Adobe Stock

Habitat: Gray Fox prefer brushy/shrubby habitat often associated with forested habitats. Throughout their range they are found in agricultural landscapes and woodlots. They are often associated with riparian areas. Unique amongst canids, gray fox are well known for their ability to climb trees to forage, rest, or escape from predators. In North Dakota they are uncommon, but records of sightings are found in most counties in the eastern 2/3rds of the state. Riparian areas of the Red, James, Sheyenne, and Missouri rivers would be potentially key areas for the Gray Fox. Small rodents, squirrels, and rabbits compromise the greatest portion of their diet. Grasshoppers, beetles, fruits, and berries may also be consumed.

Threats: Loss of riparian areas is a concern for Gray Fox. It uses these areas to hunt, and also dens in logs and brush piles. Conversion of grassland/shrub habitats to other land uses.

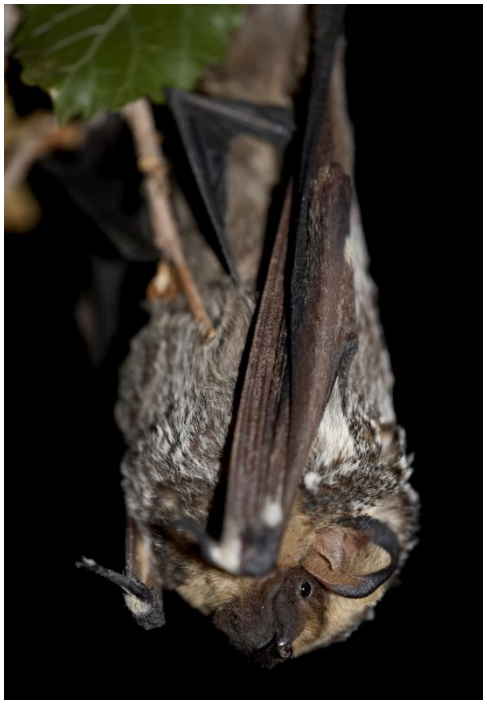
Research and Monitoring:

- Gray Fox are furbearer in North Dakota. The North Dakota Game and Fish Department with use fur harvest records and submissions to the Online Furbearer Observation Reporting system to track Gray Fox.

Management Recommendations:

- Protect riparian areas where possible with conservation agreements.
- Continue to use the Section 404 program to ensure affected rivers and riparian areas are mitigated to replace form and function.
- Develop and promote incentive programs to restore riparian areas.
- Continue to work with partners in promoting and distributing educational materials related to river, stream and riparian values and good stewardship.

Hoary Bat *Lasiurus cinereus*



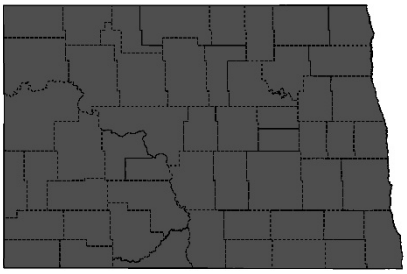
Description/Identification: Large bat identified by the white/yellow tipped hairs over brown pelage on its body. Yellow throat patch. Membrane between its back legs is covered in fur.

Status: Seasonal, Migratory.

Reason for SGCN Designation: Threatened by the emergence of wind energy development in ND. Identified as a Regional Species of Conservation Priority by the Midwest Association of Fish and Wildlife Agencies. Petitioned for Listing Under the Endangered Species Act with a decision pending in 2028.

Habitat: Tree roosting bat species. Found predominantly in forests and woodlots in ND. Found state-wide in ND. Prey preference is moths; however, a variety of larger insects may be consumed.

Threats: The expansion of wind energy development is identified as an emerging threat to this species due to it migratory nature. North Dakota bat species are insectivores. The use of pesticides in the vicinity of a feeding ground would affect bat populations by killing prey. Also, bat species are known to store pesticides within fat reserves.



Hoary Bat primary range. Photo Credit: Adobe Stock

Research and Monitoring:

- Bat species are monitored acoustically using North American Bat monitoring protocol.
- Bats are also monitored with mist nets by a number of partners in the state.

Management Recommendations:

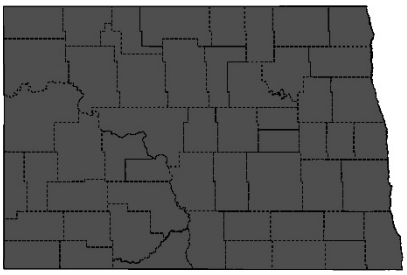
- Work with wind energy development companies on turbine siting to minimize impacts to migrating bats.
- Protection and restoration of riparian habitat.
- Manage riparian habitats to maintain snags, connecting corridors, and edges.
- Maintain and improve seeps, ponds, and other wet areas as water sources.
- Education on the benefits and misconceptions about bats.
- Identify and protect maternity roosts. Provide roosting sites in areas where natural sites have been destroyed or disturbed.

Little Brown Bat *Myotis lucifugus*

Description/Identification: As the name implies the fur of the Little Brown Bat is shade of brown with the top being darker than the underside. They also have a darker spot in the area of the shoulder. The wings and uropatigium are absent of hair.

Status: Seasonal as no known hibernacula have been identified.

Reason for SGCN Designation: Although common in North Dakota species is threatened by a fungal disease known as White-nose Syndrome throughout its range.



Little Brown Bat primary range. Photo Credit: Adobe Stock

Habitat: Roosts are established in structures in the summer months but also can be found in dead trees. Forages on a variety of flying insects, up to the equivalent of 1,200 mosquitos per hour.

Threats: White-nose Syndrome is a significant threat to this species. North Dakota bat species are insectivores. The use of pesticides in the vicinity of a feeding ground would affect bat populations by killing prey. Also, bat species are known to store pesticides within fat reserves. Wind turbines have been identified as a source of mortality to bats. Indiscriminate killing due to a negative public perception has been identified as a possible threat to this species.

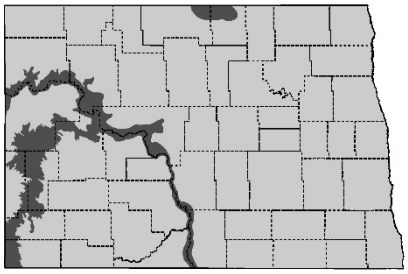
Research and Monitoring:

- Bat species are monitored acoustically using North American Bat monitoring protocol.
- Bats are also monitored with mist nets by a number of partners in the state.

Management Recommendations:

- Protection and restoration of riparian habitat.
- Manage riparian habitats to maintain snags, connecting corridors, and edges.
- Maintain and improve seeps, ponds, and other wet areas as water sources.
- Education on the benefits and misconceptions about bats.
- Determine and protect nursery and hibernation sites.
- Provide roosting sites in areas where natural sites have been destroyed or disturbed.

Northern Long-eared Bat *Myotis Septentrionalis*



Northern Long-eared Bat primary (dark gray) and possible (light gray) range. Photo Credit: Adobe Stock

Description/Identification: Small bat. Fur generally brown in color. Ears and tail are longer than other myotis species of its size. Tragus also longer than similar sized bats, such as the Little Brown Bat.

Status: Seasonal as no hibernacula have been identified for this species in the state.

Reason for SGCN Designation: Rare to the state. Listed as Endangered under the Endangered Species Act. A significant loss of individuals to White-nosed Syndrome in throughout its range is its greatest threat.

Habitat: Forest and Riparian Habitat. Has been identified in the riparian habitat near the confluence of the Yellowstone and Missouri rivers in North Dakota. Feeds on flying insects but also gleans them off of surfaces such as tree bark and leaves. A variety of insects are taken depending on location, season, and individual preferences.

Threats: White-nose Syndrome is a significant threat to this species. North Dakota bat species are insectivores. The use of pesticides in the vicinity of a feeding ground would affect bat populations by killing prey. Also, bat species are known to store pesticides within fat reserves. Wind turbines have been identified as a source of mortality to bats. Indiscriminate killing due to a negative public perception has been identified as a possible threat to this species.

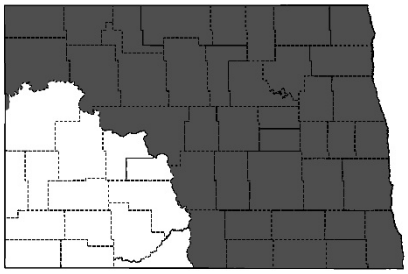
Research and Monitoring:

- Bat species are monitored acoustically using North American Bat monitoring protocol.
- Bats are also monitored with mist nets by a number of partners in the state.

Management Recommendations:

- Protection and restoration of riparian habitat.
- Manage riparian habitats to maintain snags, connecting corridors, and edges.
- Maintain and improve seeps, ponds, and other wet areas as water sources.
- Education on the benefits and misconceptions about bats.
- Determine and protect nursery and hibernation sites.
- Provide roosting sites in areas where natural sites have been destroyed or disturbed.

Richardson's Ground Squirrel *Urocitellus richardsonii*



Richardson's Ground Squirrel primary range. Photo Credit: NDGF

Description/Identification: Large colony-dwelling ground squirrel. Pelage is a mixture of buff and black hair on the back with a tan belly.

Status: Year-round resident

Reason for SGCN Designation: The Richardson's Ground Squirrel serves much the same role as the Black-tailed Prairie Dog does in the western half of the state. Many species, including other Species of Greatest Conservation Need rely on Richardson's Ground Squirrels for food and shelter. There is some indication of a decline within the state. This, coupled with a lack of information on the species, makes them a conservation priority.

Habitat: A colonial species, Richardson's Ground Squirrels prefer intact blocks of rangeland. Well grazed pastures of native or tame grass in areas of sandy loam or gravelly soils offer the best conditions for burrowing. Areas near agricultural fields are also preferred, as cereal grain is used as a food source. Key Areas for Richardson's Ground Squirrel in North Dakota are found only east of the Missouri River in North Dakota. Portions of Mclean, McHenry, Pierce, Eddy, and Foster counties are key areas for this species because of their larger tracts of intact prairie. Over 90% of their diet consists of flowers, leaves, seeds, and agriculture crops; with the remaining portion consisting of insects or other animal material.

Threats: Conversion of native prairie and rangeland to agricultural lands is the leading threat to the Richardson's Ground Squirrel. Poisoning to control and eradicate colonies is prevalent. Recreational shooting of Richardson's Ground Squirrels may affect populations.

Research and Monitoring:

- No survey effort is currently in place for this species.
- Surveys to establish baseline information on Richardson's Ground Squirrels need to be conducted.

Management Recommendations:

- Protect native prairie where possible.
- Consider removal of dilapidated shelterbelts or stands of trees within grassland, particularly within 50 meters of grassland patches >100 ha.
- Implement grazing systems to benefit grassland species.
- Work cooperatively with state and federal agencies to develop BMP's that promote use of fire.
- Control noxious weeds through biological and chemical methods.
- Use fire or other tools to prevent woody invasion of grassland.
- Work with state and federal agencies to enforce existing pesticide regulations.
- Coordinate with wind energy companies to minimize impacts to grasslands.

Silver-haired Bat *Lasionyteris noctivagans*

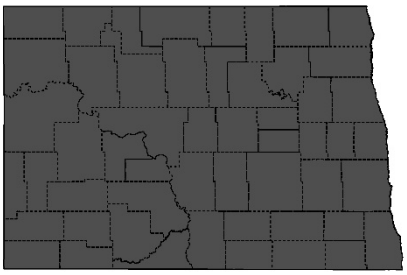
Description/Identification: Pelage is dark brown to black with silver tips. Membrane between its back legs is covered with hair on its underside.

Status: Seasonal, Migratory.

Reason for SGCN Designation: Threatened by the emergence of wind energy development in ND. Identified as a Regional Species of Conservation Priority by the Midwest Association of Fish and Wildlife Agencies.

Habitat: Tree roosting bat species. Found predominantly in forests and woodlots in ND. Found state-wide in ND. Feeds on a wide variety of insect prey.

Threats: The expansion of wind energy development is identified as an emerging threat to this species due to it migratory nature. North Dakota bat species are insectivores. The use of pesticides in the vicinity of a feeding ground would affect bat populations by killing prey. Also, bat species are known to store pesticides within fat reserves.



Silver-haired Bat primary range. Photo Credit: Adobe Stock

Research and Monitoring:

- Bat species are monitored acoustically using North American Bat monitoring protocol.
- Bats are also monitored with mist nets by a number of partners in the state.

Management Recommendations:

- Work with wind energy development companies on turbine siting to minimize impacts to migrating bats
- Protection and restoration of riparian habitat.
- Manage riparian habitats to maintain snags, connecting corridors, and edges.
- Maintain and improve seeps, ponds, and other wet areas as water sources.
- Education on the benefits and misconceptions about bats.
- Identify and protect maternity roosts.
- Provide roosting sites in areas where natural sites have been destroyed or disturbed.

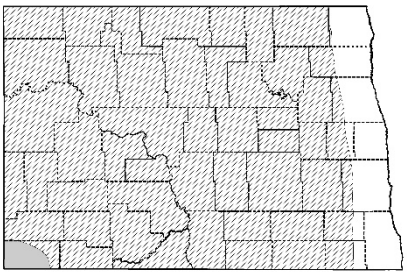
Swift Fox *Vulpes velox*

Description/Identification: Smallest member of the canine family. 2 ½ feet from snout to tip of tail. Yellowish tan coat with some gray along the back. Belly, throat, and chest are buff to white. Distinctly large ears for body size. Long bushy tail with a black tip.

Status: Resident species, potentially breeding population.

Reason for SGCN Designation: Loss of native prairie thought to be the cause of initial population decline. The species may have re-established in the state as a result of re-introductions in neighboring states.

Habitat: Found statewide at one time with the exception of the eastern tallgrass prairies. A majority of Swift Foxes were found in the shortgrass prairies of southwestern North Dakota. Swift Foxes prefer large tracts of native prairie, usually grazed, but will select dens sites near agricultural fields and human development. Shortgrass prairie in extreme western and southwestern North Dakota offers the most suitable habitat for Swift Fox populations in North Dakota. This region is also the closest in proximity to known breeding populations in South Dakota and Montana. Swift fox are opportunistic foragers, and consume a variety of mammals, birds, arthropods, plants, and carrion.



Swift Fox possible (light gray) and historic (hatched) range.
Photo Credit: Adobe Stock

Threats: Loss of suitable native short and mixed-grass prairie due to conversion to agricultural and development provide the largest threat to re-establishing populations. Connectivity to breeding populations in South Dakota and Montana is a threat to natural repopulation of suitable habitat in North Dakota. High red fox and coyote populations threaten Swift Fox populations due to predation.

Research and Monitoring:

- Evaluation of the need for range wide surveys is made on a 5-year basis due to the low number of individuals present in the state.
- Reports to Online Furbearer Observation Reporting system are also used to track Swift Fox.

Management Recommendations:

- Promote habitat conservation and habitat management in suitable Swift Fox habitat.
- Coordinate with federal and state agencies to evaluate current levels of protection of habitat.
- Identify habitat corridors and surrounding areas between habitat blocks for protection.
- Monitor existing and identify new threats to Swift Fox population expansion.
- Promote scientific Swift Fox management and a public education program.

APPENDIX D
FISH SGCN SPECIES ACCOUNTS

Contents

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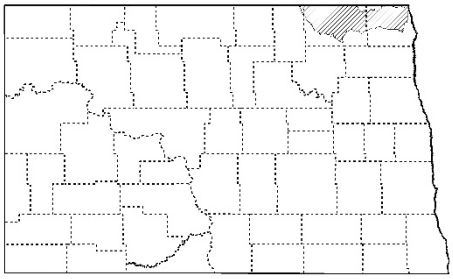
Fish SGCN and SGIN categories.

	Species of Greatest Conservation Need			Species of Greatest Information Need			
Common Name	**SGCN a. Regionally or globally imperiled**	**SGCN b. At-risk or declining, ND important**	**SGCN c. At-risk, expert review**	**SGIN d. Scientific knowledge deficient**	**SGIN e. Potentially stable in ND, declining in range**	**SGIN f. Potentially stable but life history trait vulnerability**	**SGIN g. Declining, ND significance uncertain**
Blacknose Shiner			X				
Blue Sucker		X					
Burbot			X				
Carmine Shiner			X				
Finescale Dace			X				
Flathead Chub			X				
Hornyhead Chub			X				
Lake Sturgeon	X						
Northern Pearl Dace			X				
Northern Redbelly Dace			X				
Paddlefish		X					
Pallid Sturgeon	X						
Pugnose Shiner			X				
Sicklefin Chub		X					
Sturgeon Chub		X					
Trout-perch			X				
Largescale Stoneroller				X			
Silver Chub				X			
silvery minnows *Hybognathus spp.*				X			

Blacknose Shiner *Notropis heterolepis*



Blacknose Shiner historical range. Photo Credit: Konrad Schmidt

Description/Identification: Grows to a length of 3 ½ inches. Compressed body. Black lateral line entire length of body with crescents within it. Olive to straw colored on top with lighter sides and belly. Scales outlined below lateral line.

Status: Resident.

Reason for SGCN Designation: Extirpated from much of its historic range in North Dakota. Populations confined to only a few sites.

Habitat: Primarily found in vegetated pools that are part of a stream system.

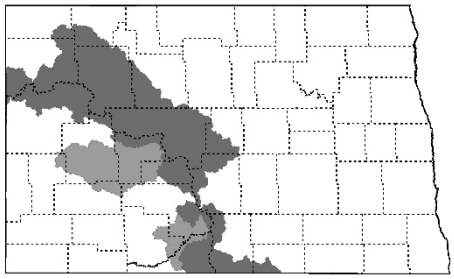
Threats: Degradation of quality habitat is recognized as the leading cause for decline in this species; specifically, loss and destruction of riparian habitat along waterways caused by current land use practices.

Research and Monitoring:
The states rivers and streams are surveyed for species on a 5-year rotating schedule. North Dakota DEQ staff survey rivers and streams through their Index of Biotic Integrity program.

Management Recommendations:

- Continue to use the Section 404 program to ensures affected rivers and riparian areas are mitigated to replace form and function.
- Continue to work with other federal agencies not covered by 404 to ensure affected rivers and riparian areas are mitigated to replace form and function.
- Continue to work with NDSWC to develop instream flow recommendations.
- Promote incentive programs to restore riparian areas.
- Continue to work with ND 319 Task Force in prioritizing projects within impaired watersheds and implementing BMPs.
- Implement intake conditions or recommendations.
- Cooperate with NDGFD Fisheries staff on state aquatic nuisance species plans.
- Removal of dams and other barriers.
- Retrofitting dams with fish passage structures.

Blue Sucker *Cycleptus elongatus*



Blue Sucker primary (dark gray) and secondary (light gray) range. Photo Credit: USFWS

Description/Identification: Body generally compressed and elongated. Head small for body size. Bluish gray in color. Dorsal fin long, falcated. Deeply forked caudal fin. Snout rounded with subterminal mouth. Papillae on lips.

Status: Resident.

Reason for SGCN Designation: Loss of free-flowing stretches of the Missouri River due to impoundment and channelization has reduced suitable habitat for this species.

Habitat: This species is well adapted to living in swift current of large turbid rivers. Found mostly in riffles or narrow chutes. Requires gravel bottoms free of sediment.

Threats: The loss of suitable habitat caused by a change in the riverine regime is the largest problem affecting this species. Historically, blue suckers were present throughout the entire Missouri River System. The construction of dams and channelization has largely changed the river system. Dams have reduced the sediment load, which in turn has lowered turbidity. The release of cold water from impoundments has lowered the overall temperature of the system making much of the Missouri River too cold for blue sucker. Dams also have fragmented populations by restricting movement throughout the system. The use of water for agricultural, industrial, and municipal purposes along the river may impact blue sucker populations by reducing water levels. Entrainment of fish in irrigation systems, and oil and gas development within the basin are also recognized as threats.

Research and Monitoring:

- The USFWS, USGS, and Montana Fish, Wildlife, and Parks currently track movements of tagged blue sucker in the Yellowstone and Missouri rivers.
- The states rivers and streams are surveyed for species on a 5-year rotating schedule.
- North Dakota DEQ staff survey rivers and streams through their Index of Biotic Integrity program.
- Locate key spawning areas in the Missouri River system.

Management Recommendations:

- Continue to use the Section 404 program to ensures affected rivers and riparian areas are mitigated to replace form and function.
- Continue to work with other federal agencies not covered by 404 to ensure affected rivers and riparian areas are mitigated to replace form and function.
- Continue to work with NDSWC to develop instream flow recommendations.
- Promote incentive programs to restore riparian areas.
- Continue to work with ND 319 Task Force in prioritizing projects within impaired watersheds and implementing BMPs.
- Implement intake conditions or recommendations.
- Cooperate with NDGFD Fisheries staff on state aquatic nuisance species plans.
- Removal of dams and other barriers.
- Retrofitting dams with fish passage structures.
- Protect key spawning areas within the Missouri River System when identified.

Burbot *Lota lota*

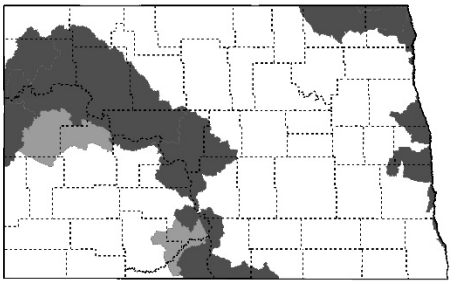
Description/Identification: The only freshwater member of the Cod family. The appearance is a is a cross between an eel and a catfish, with a flattened head and a single barbel on the underside of the jaw and a slender eel-like tail. The color ranges from a pale green with brown spots to a darker olive.

Status: No Federal Designation.

Reason for SGCN Designation: Biologist believe populations show some cause for concern. Continued data collection is needed to monitor the species.

Habitat: Burbot are found in large river systems and reservoirs.

Threats: Impoundments to the Missouri and Red River systems have impeded movement of fish throughout the systems, separating populations and preventing migration.



Burbot primary (dark gray) range and secondary (light gray) range. Photo Credit: NDGF

Research and Monitoring:

- The states rivers and streams are surveyed for species on a 5-year rotating schedule.
- North Dakota DEQ staff survey rivers and streams through their Index of Biotic Integrity program.

Management Recommendations:

- Continue to use the Section 404 program to ensures affected rivers and riparian areas are mitigated to replace form and function.
- Continue to work with other federal agencies not covered by 404 to ensure affected rivers and riparian areas are mitigated to replace form and function.
- Continue to work with NDSWC to develop instream flow recommendations.
- Promote incentive programs to restore riparian areas.
- Continue to work with ND 319 Task Force in prioritizing projects within impaired watersheds and implementing BMPs.
- Implement intake conditions or recommendations.
- Cooperate with NDGFD Fisheries staff on state aquatic nuisance species plans.
- Removal of dams and other barriers.
- Retrofitting dams with fish passage structures.

Carmine Shiner *Notropis percobromus*

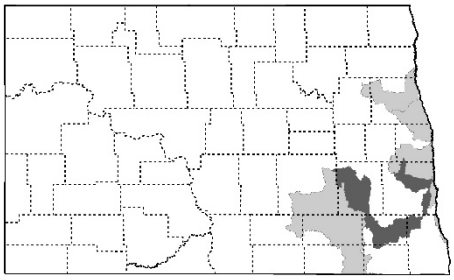
Description/Identification: Slender body shape with a sharply pointed head. Grows up to 3 ½ inches in length. Dark on top with a black streak on top of a silver stripe. Body is a bluish sheen. Faint red spot at the base of the dorsal fin. Breeding males have bright red heads.

Status: Resident.

Reason for SGCN Designation: Rare in the Red River drainage. Stream degradation and loss of suitable habitat within its range due to land use practices is the major concern for the decline of this species.

Habitat: Found in pools with some current, or more swiftly flowing stretches adjacent to pools.

Threats: Degradation of quality habitat is recognized as the leading cause for decline in this species; specifically, loss and destruction of riparian habitat along waterways caused by current land use practices. Additionally, the addition of dams to the Sheyenne River has fragmented habitat and blocked fish movement.



Carmine Shiner primary (dark gray) range and possible (light gray) range. Photo Credit: Konrad Schmidt

Research and Monitoring:

- The states rivers and streams are surveyed for species on a 5-year rotating schedule.
- North Dakota DEQ staff survey rivers and streams through their Index of Biotic Integrity program.

Management Recommendations:

- Continue to use the Section 404 program to ensures affected rivers and riparian areas are mitigated to replace form and function.
- Continue to work with other federal agencies not covered by 404 to ensure affected rivers and riparian areas are mitigated to replace form and function.
- Continue to work with NDSWC to develop instream flow recommendations.
- Promote incentive programs to restore riparian areas.
- Continue to work with ND 319 Task Force in prioritizing projects within impaired watersheds and implementing BMPs.
- Implement intake conditions or recommendations.
- Cooperate with NDGFD Fisheries staff on state aquatic nuisance species plans.
- Removal of dams and other barriers.
- Retrofitting dams with fish passage structures.

Finescale Dace *Phoxinus neogaeus*

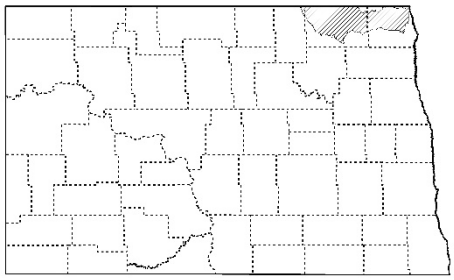
Description/Identification: Grows to 4 inches in length. Gray along top of body with olive sides above a gold stripe that runs the length of the body. White/silver belly. Entire body speckled in black.

Status: Resident.

Reason for SGCN Designation: Rare species. The only viable population is believed to be found in the Tongue River. Last documented in 1991.

Habitat: The Finescale dace usually occurs in cool, boggy waters of lakes and ponds, or streams which are 1-3 meters wide and 0.1-0.5 meters deep, with substrates of sand, gravel, or silt.

Threats: A decrease in water quality due to a number of land use practices in the Red River basin has contributed to the decline of this species. The addition of dams within the Red River drainage has changed the flow regime of the basin. Impoundments also fragment habitat and blocks migration of fish species.



Finescale Dace historical range. Photo Credit: Konrad Schmidt

Research and Monitoring:

- The states rivers and streams are surveyed for species on a 5-year rotating schedule.
- North Dakota DEQ staff survey rivers and streams through their Index of Biotic Integrity program.

Management Recommendations:

- Continue to use the Section 404 program to ensures affected rivers and riparian areas are mitigated to replace form and function.
- Continue to work with other federal agencies not covered by 404 to ensure affected rivers and riparian areas are mitigated to replace form and function.
- Continue to work with NDSWC to develop instream flow recommendations.
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- Continue to work with ND 319 Task Force in prioritizing projects within impaired watersheds and implementing BMPs.
- Implement intake conditions or recommendations.
- Cooperate with NDGFD Fisheries staff on state aquatic nuisance species plans.
- Removal of dams and other barriers.
- Retrofitting dams with fish passage structures.

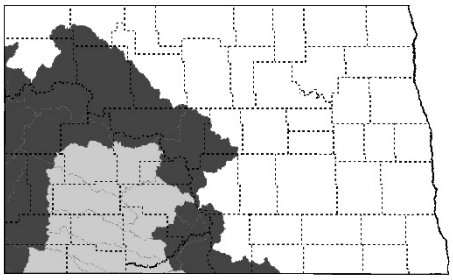
Flathead Chub *Platygobio gracilis*

Description/Identification: The flathead chub is a larger member of the Chub family, reaching a foot in length. It has a broad, flat head, tapering to a point. Its eye appears small compared to body size. Its color is dusky brown on top with silvery sides and has large sickle-shaped dorsal and pectoral fins. The first ray of the dorsal fin extends beyond last ray. It has a barbel in each corner of its mouth.

Status: Resident.

Reason for SGCN Designation: A native species to North Dakota. Major declines over much of its range have been documented. Habitat loss is the main reason for this designation. Impoundment and channelization of the Missouri river system has changed the slow moving, warm, turbid water to reservoir habitat.

Habitat: Found mostly in large turbid rivers with sand or gravel bottoms.



Flathead Chub primary (dark gray) range and possible (light gray) range. Photo Credit: Konrad Schmidt

Threats: The loss of habitat caused by a change in the riverine regime is the largest problem affecting this species. Historically, flathead chub were present throughout the entire Missouri River System. The construction of dams and channelization has largely changed the river system. Dams have reduced the sediment load, in turn lowering turbidity. The release of cold water from impoundments has lowered the overall temperature of the system, making much of the Missouri River too cold for flathead chub. Dams have fragment populations by restricting movement. Flathead chub now only occur in those areas that maintain qualities of the pre-impoundment system.

Research and Monitoring:

- The states rivers and streams are surveyed for species on a 5-year rotating schedule.
- North Dakota DEQ staff survey rivers and streams through their Index of Biotic Integrity program.

Management Recommendations:

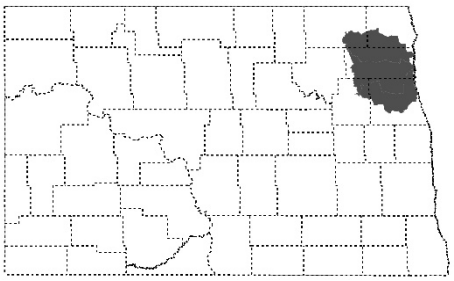
- Continue to use the Section 404 program to ensures affected rivers and riparian areas are mitigated to replace form and function.
- Continue to work with other federal agencies not covered by 404 to ensure affected rivers and riparian areas are mitigated to replace form and function.
- Continue to work with NDSWC to develop instream flow recommendations.
- Promote incentive programs to restore riparian areas.
- Continue to work with ND 319 Task Force in prioritizing projects within impaired watersheds and implementing BMPs.
- Implement intake conditions or recommendations.
- Cooperate with NDGFD Fisheries staff on state aquatic nuisance species plans.
- Removal of dams and other barriers.
- Retrofitting dams with fish passage structures.

Hornyhead Chub *Nocomis biguttatus*

Description/Identification: Member of the minnow family growing to 10 inches in length. Olive on top and grows lighter as you move down the body with an iridescent stripe along back. Belly pale yellow. Bright red spot behind eye on males, brassy in females. Males have many small bumps or tubercles on head.

Status: Year-round Resident

Reason for SGCN Designation: Only known to occur in the Forest and Park rivers in North Dakota. Water quality degradation is a concern for the rivers this species inhabits.



Hornyhead Chub primary range. Photo Credit: Konrad Schmidt

Habitat: Found in pools and slow runs of clear, small rivers. In North Dakota the Hornyhead Chub is presently found in the Forest and Park rivers. Historically it was also found in the Turtle, Sheyenne and Maple rivers but has not been documented there recently.

Threats: Degradation of quality habitat is recognized as the leading cause for decline of this species; specifically, loss and destruction of riparian habitat along waterways caused by current land use practices. Impaired water quality also contributed to the decline of this species.

Research and Monitoring:

- The states rivers and streams are surveyed for species on a 5-year rotating schedule.
- North Dakota DEQ staff survey rivers and streams through their Index of Biotic Integrity program.

Management Recommendations:

- Continue to use the Section 404 program to ensures affected rivers and riparian areas are mitigated to replace form and function.
- Continue to work with other federal agencies not covered by 404 to ensure affected rivers and riparian areas are mitigated to replace form and function.
- Continue to work with NDSWC to develop instream flow recommendations.
- Promote incentive programs to restore riparian areas.
- Continue to work with ND 319 Task Force in prioritizing projects within impaired watersheds and implementing BMPs.
- Implement intake conditions or recommendations.
- Cooperate with NDGFD Fisheries staff on state aquatic nuisance species plans.
- Removal of dams and other barriers.
- Retrofitting dams with fish passage structures.

Lake Sturgeon *Acipenser fulvescens*

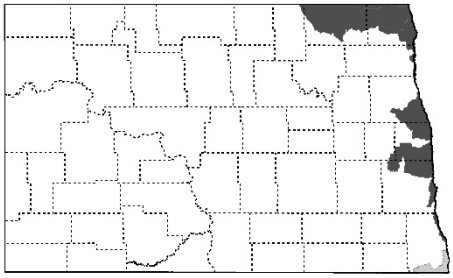
Description/Identification: The lake sturgeon is torpedo-shaped primitive fish with a cartilaginous skeleton. It has five rows of large bony plates called scutes on its body. It has a flattened snout with barbels and a protractive mouth. Typically, adult lake sturgeon grow to about 4-6 feet long, weigh 30-80 pounds, and live to be 50-100 years old.

Status: No federal Designation. Was petitioned but not warranted in 2023.

Reason for SGCN Designation: Regionally or Globally Imperiled. NDGF fisheries staff recently reintroduced lake sturgeon to the Pembina River.

Habitat: Large Freshwater Lakes and river ecosystems. They prefer moderately clear water over sand, gravel, or rubble bottoms. Spawning habitat is characterized by gravel, cobble and boulders with interstitial spaces.

Threats: River barriers reduce access to spawning and rearing habitat.



Lake Sturgeon primary (dark gray) and possible (light gray) range. Photo Credit: NDGF

Research and Monitoring:

- The states rivers and streams are surveyed for species on a 5-year rotating schedule.
- North Dakota DEQ staff survey rivers and streams through their Index of Biotic Integrity program.
- Lake Sturgeon were reintroduced into the Pembina River in 2023
- All reintroduced fish were marked with PIT tags for monitoring.
- The Pembina River is surveyed for all species 5-year rotation.
- MN DNR has been stocking Lake Sturgeon into the Red River of the North and its MN tributaries since 1997.

Management Recommendations:

- Continue to use the Section 404 program to ensures affected rivers and riparian areas are mitigated to replace form and function.
- Continue to work with other federal agencies not covered by 404 to ensure affected rivers and riparian areas are mitigated to replace form and function.
- Continue to work with NDSWC to develop instream flow recommendations.
- Promote incentive programs to restore riparian areas.
- Continue to work with ND 319 Task Force in prioritizing projects within impaired watersheds and implementing BMPs.
- Implement intake conditions or recommendations.
- Cooperate with NDGFD Fisheries staff on state aquatic nuisance species plans.
- Removal of dams and other barriers.
- Retrofitting dams with fish passage structures.
- Reintroduction into historic drainages of the Red River.
- Regulated Harvest.

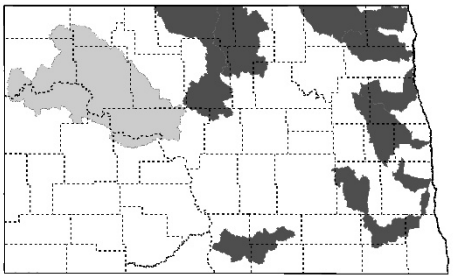
Northern Pearl Dace *Margariscus nachtriebi*

Description/Identification: Length up to 6 ½ in. Member of the minnow family. Body generally cylindrical in shape. Back olive in color with a black stripe running along the side. Faded in adults. Silver sides with black specks. Belly yellow, red, white, or a combination of the three.

Status: Year-round Resident.

Reason for SGCN Designation: Degradation of habitat is the main reason for the designation of the Northern Pearl Dace. Critical clear headwater streams used by this species are threatened by a change in land use practices.

Habitat: Found in pools of streams and small rivers, usually with sand or gravel bottom. They may also be found in ponds and lakes. Pearl Dace has not been recorded in many locations in North Dakota. The Tongue River, a small tributary of the Pembina River in northeastern North Dakota, has a population of Pearl Dace. They have also been recently recorded in Beaver and Spring Creek in the Missouri River drainage and Willow Creek in the Souris River drainage. Historically they were present in Goose River but have not been documented recently.



Northern Pearl Dace primary (dark gray) and possible (light gray) range. Photo Credit: Konrad Schmidt

Threats: Degradation of quality habitat is recognized as the leading cause for decline of this species; specifically, loss and destruction of riparian habitat along waterways caused by current land use practices. Impaired water quality also contributed to the decline of this species.

Research and Monitoring:

- The states rivers and streams are surveyed for species on a 5-year rotating schedule.
- North Dakota DEQ staff survey rivers and streams through their Index of Biotic Integrity program.

Management Recommendations:

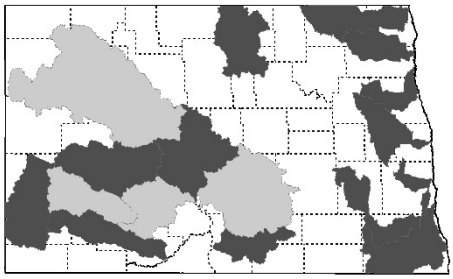
- Continue to use the Section 404 program to ensures affected rivers and riparian areas are mitigated to replace form and function.
- Continue to work with other federal agencies not covered by 404 to ensure affected rivers and riparian areas are mitigated to replace form and function.
- Continue to work with NDSWC to develop instream flow recommendations.
- Promote incentive programs to restore riparian areas.
- Continue to work with ND 319 Task Force in prioritizing projects within impaired watersheds and implementing BMPs.
- Implement intake conditions or recommendations.
- Cooperate with NDGFD Fisheries staff on state aquatic nuisance species plans.
- Removal of dams and other barriers.
- Retrofitting dams with fish passage structures.

Northern Redbelly Dace *Chrosomus eos*

Description/Identification: Member of the minnow family. Up to 3.5 inches in length. Dark dorsally, with two black lines that run along its side. The upper line is thin and breaks into spots at the tail. The lower line continues the length of the fish. Belly is red, white, yellow or a combination of the three.

Status: Year-round Resident.

Reason for SGCN Designation: Clear headwater streams used by this species are threatened by current land use practices.



Northern Redbelly Dace primary (dark gray) and possible (light gray) range. Photo Credit: Konrad Schmidt

Habitat: The Northern Redbelly Dace is reliant on cold, clear headwater streams and can be found in pools and behind dams in those streams. The bottom substrate is normally mud. Northern Redbelly Dace are associated with vegetation in these areas. In the Red River drainage, the Northern Redbelly Dace has been historically documented in the Rush, Green, Goose, Tongue, and Park rivers, and spring-fed pools in the Sheyenne River. A specific area of note is the stretch of Sheyenne River that runs through the Sheyenne National Grasslands and Mirror Pool Wildlife Management Area. This stretch has the only recent documentation in the Red River drainage. Populations have been historically found in the Missouri River drainage, specifically Brush, Apple, Beaver, and Antelope creeks, and the Cannonball, Knife, Heart, and Little Missouri Rivers. Recent surveys appear to show a decline in that distribution.

Threats: Degradation of quality habitat is recognized as the leading cause for decline in this species; specifically, loss and destruction of riparian habitat along waterways caused by a change in land use. This species requires clear water and is highly susceptible to increased sedimentation.

Research and Monitoring:

- The states rivers and streams are surveyed for species on a 5-year rotating schedule.
- North Dakota DEQ staff survey rivers and streams through their Index of Biotic Integrity program.

Management Recommendations:

- Continue to use the Section 404 program to ensures affected rivers and riparian areas are mitigated to replace form and function.
- Continue to work with other federal agencies not covered by 404 to ensure affected rivers and riparian areas are mitigated to replace form and function.
- Continue to work with NDSWC to develop instream flow recommendations.
- Promote incentive programs to restore riparian areas.
- Continue to work with ND 319 Task Force in prioritizing projects within impaired watersheds and implementing BMPs.
- Implement intake conditions or recommendations.
- Cooperate with NDGFD Fisheries staff on state aquatic nuisance species plans.
- Removal of dams and other barriers.
- Retrofitting dams with fish passage structures.

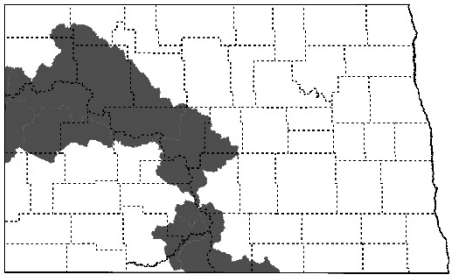
Paddlefish *Polyodon spathula*

Description/Identification: Can grow seven feet in length and weigh over 100 pounds. Large paddle-shaped snout. Smooth skin has no scales. Color ranges from blue gray to nearly black with a lighter underside. Long fleshy gill covers.

Status: Year-round resident.

Reason for SGCN Designation: Loss of river habitat due to channelization and impoundment has caused decline in this species with the state and range wide.

Habitat: In summer months, slack water areas of a river are a preferred habitat for Paddlefish. If this is not available, areas of low flow are sought such as behind sandbars, wing dams, or other structures. In winter Paddlefish move into the deeper water of Lake Sakakawea. Paddlefish spawn in the spring and lay their eggs over silt-free gravel beds. The two most important areas for Paddlefish in North Dakota are the Missouri River from upper Lake Sakakawea to the Montana border, and the Yellowstone River. These two river stretches are used by the Paddlefish as migration routes to their spawning areas.



Paddlefish range. Photo Credit: NDGF

Threats: Impoundments along the Missouri River System have changed the flow regime of the river and cover needed for spawning habitat. Slower flows have allowed silt to cover important gravel beds, making them unusable by spawning fish. As a result, reproduction only occurs in the wild when conditions are favorable in the Yellowstone River. Dams have also impeded the movement of fish throughout the system, separating populations. This brings up concerns about genetic integrity. Over-harvest for the fishes' valuable roe is a concern for this species. The North Dakota Game and Fish Department regulates a controlled harvest for Paddlefish as a sport fish.

Research and Monitoring:

- Currently populations within the Missouri River system are being monitored by use of information obtained from harvested fish and tagging studies. Age, growth rates, and sexual structure of the population are being documented.
- Young-of-the-year surveys are conducted annually on the upper end of Lake Sakakawea.

Management Recommendations:

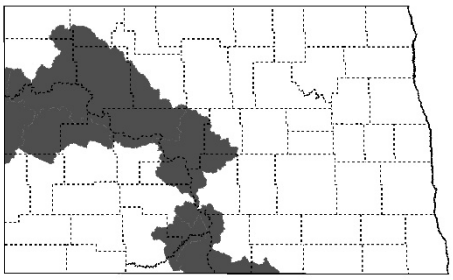
- Protect rivers, streams, and riparian areas where possible (i.e. easements and/or acquisition).
- Work with partners to ensure Swampbuster provisions are maintained.
- Continue to use the Section 404 program to ensure affected rivers and riparian areas are mitigated to replace form and function.
- Continue to work with other federal agencies (i.e. FAA and FHWA) not covered by Section 404 or Swampbuster to ensure affected rivers and riparian areas are mitigated to replace form and function.
- Continue to work with NDSWC to develop minimum in-stream flow recommendations.
- Develop and promote incentive programs to restore riparian areas.
- Continue to work with ND 319 Task Force in prioritizing projects within impaired watersheds and implementing BMP's.
- Develop and promote incentive programs for adjacent landowners to improve bank stability through land use changes (e.g. RRBRP).
- Promote non-traditional bank stabilization measures (i.e. root wads, willow waddles, vegetative slope).
- Implement intake conditions or recommendations (i.e. screening and velocity requirements).
- Work with the dam owners for potential removal or modification.
- Cooperate with Fisheries Division on state aquatic nuisance species plan.
- Survey areas of data gaps. Conduct research/surveys to establish baseline information on SCP.
- Continue to work with partners in promoting and distributing educational materials related to river, stream and riparian values and good stewardship.

Pallid Sturgeon *Scaphirhynchus albus*

Description/Identification: Grows up to seven feet in length. Light gray in color with a lighter underside. Small black eyes set on a shovel-shaped head. Four barbels on the underside of the head with the two inner barbels shorter than the outer two. This distinguishes it from the common shovelnose sturgeon. The top side of its body is covered in large scales called scutes.

Status: Year-round resident. Abundance: Rare.

Reason for SGCN Designation: Loss of river habitat due to channelization and impoundment has caused declines in this species within the state and range wide. Dams have also fragmented populations.



Pallid Sturgeon primary range. Photo Credit: NDGF

Habitat:
Pallid Sturgeon are well adapted for life on the bottom of a fast flowing, turbid river. Generally found in stretches of river with 40 to 90 cubic feet per second velocity. Areas at the end of chutes or sandbars are commonly used, most likely for energy conservation and feeding. The range of depths used varies seasonally, with most fish being found shallow in the spring and deeper in the fall. Pallid Sturgeons are most commonly found in the upper Missouri River upstream of Lake Sakakawea, and in the Yellowstone River near the confluence of the two rivers.

Threats:
Destruction and alteration of habitats by human modification of the river system is likely the primary cause of declines in reproduction, growth, and survival of Pallid Sturgeon (USFWS 1993). Much of the species' habitat was destroyed when a number of large dams were constructed on the Missouri River, producing a number of large reservoirs. These structures changed the velocity, volume and timing of flows in the river from pre-impoundment. In the system much of the remaining river has been channelized. This has changed the velocity, reduced the width of the river, and prevented water flow into backwater areas important to this species (USFWS 1993).

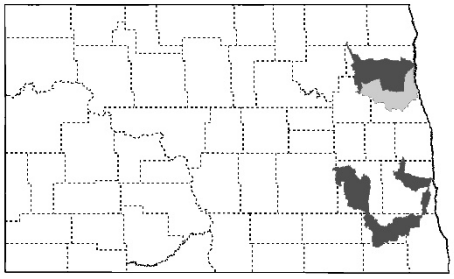
Research and Monitoring:

- Currently the USFWS tracks a number of fish with radio transmitters. Habitat use, seasonal movement and other information is obtained.
- Captive breeding and rearing of Pallid Sturgeon at Garrison Dam National Fish Hatchery.
- USFWS, USGS, and Montana FWP conduct population surveys of the Pallid Sturgeon in the Yellowstone River and Williston reach of the Missouri River.

Management Recommendations:

- Protect rivers, streams, and riparian areas where possible (i.e. easements and/or acquisition).
- Work with partners to ensure Swampbuster provisions are maintained.
- Continue to use the Section 404 program to ensure affected rivers and riparian areas are mitigated to replace form and function.
- Continue to work with other federal agencies (i.e. FAA and FHWA) not covered by Section 404 or Swampbuster to ensure affected rivers and riparian areas are mitigated to replace form and function.
- Continue to work with NDSWC to develop minimum in-stream flow recommendations.
- Develop and promote incentive programs to restore riparian areas.
- Continue to work with ND 319 Task Force in prioritizing projects within impaired watersheds and implementing BMP's.
- Develop and promote incentive programs for adjacent landowners to improve bank stability through land use changes (e.g. RRBRP).
- Promote non-traditional bank stabilization measures (i.e. root wads, willow waddles, vegetative slope).
- Implement intake conditions or recommendations (i.e. screening and velocity requirements).
- Work with the dam owners for potential removal or modification.
- Cooperate with Fisheries Division on state aquatic nuisance species plan.
- Survey areas of data gaps. Conduct research/surveys to establish baseline information on SCP.
- Continue to work with partners in promoting and distributing educational materials related to river, stream and riparian values and good stewardship.

Pugnose Shiner *Notropis anogenus*



Pugnose Shiner Primary (dark gray) range and Possible (light gray) range. Photo Credit: Konrad Schmidt

Description/Identification: Grows to 2 inches in length. Olive on top with a thin black line that runs along the upper back. Sides and belly silvery with a black outline around the edge of scales. Mouth on this species is sharply upturned.

Status: Year-round Resident.

Reason for SGCN Designation: Rare in the Red River, possibly extirpated. It has not been collected in 40 years in North Dakota but is present in Red River tributaries in Minnesota.

Habitat: Inhabits pools and small runs in clear streams. Prefers vegetated areas with a firm bottom. This species was last collected in the Forest River in 1964, but it is not known if it is still present. Historically found in the Red and Sheyenne rivers. No key areas have been identified for this species.

Threats: Degradation of quality habitat is recognized as the leading cause for decline in this species; specifically, loss and destruction of riparian habitat along waterways caused by a change in land use. This species requires clear water and is highly susceptible to increased sedimentation.

Research and Monitoring:

- The states rivers and streams are surveyed for species on a 5-year rotating schedule.
- North Dakota DEQ staff survey rivers and streams through their Index of Biotic Integrity program.

Management Recommendations:

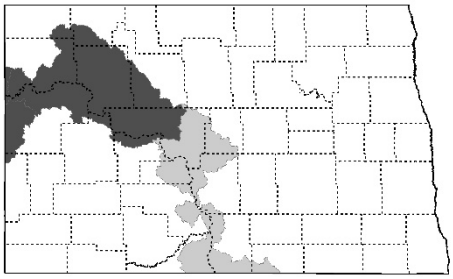
- Continue to use the Section 404 program to ensures affected rivers and riparian areas are mitigated to replace form and function.
- Continue to work with other federal agencies not covered by 404 to ensure affected rivers and riparian areas are mitigated to replace form and function.
- Continue to work with NDSWC to develop instream flow recommendations.
- Promote incentive programs to restore riparian areas.
- Continue to work with ND 319 Task Force in prioritizing projects within impaired watersheds and implementing BMPs.
- Implement intake conditions or recommendations.
- Cooperate with NDGFD Fisheries staff on state aquatic nuisance species plans.
- Removal of dams and other barriers.
- Retrofitting dams with fish passage structures.

Sicklefin Chub *Macrhybopsis meeki*

Description/Identification: Grows to a length of 4 inches. Member of the minnow family. Light green to brown on dorsal side with a lighter ventral region. Brown and silver spots cover its sides. The snout extends over the mouth, with a barbel in each corner. Similar to the Sturgeon Chub except the dorsal fin has a sickle-shaped edge

Status: Year-round resident

Reason for SGCN Designation: This native species has declined from its historic population numbers. Habitat loss is the main reason for this designation. Impoundment and channelization of the Missouri River System has converted it to a system of large reservoirs.



Sicklefin Chub primary (dark gray) range and possible (light gray) range. Photo Credit: Dave Ostendorf

Habitat: Prefer turbid water such as is present in the upper Missouri and Yellowstone rivers in North Dakota. Found mainly within the main channel of these systems. Prefer water with a turbidity of less than 500 NTU (nephelometric turbidity unit). Sicklefin Chub can be found at most depths within this habitat, but prefer depths between 2 and 5 meters with summer water temperatures in the range of 20°C to 24°C. In North Dakota, populations occur in the Yellowstone and upper Missouri rivers near the confluence of the two rivers.

Threats: The loss of suitable habitat caused by a change in the riverine regime is the largest problem affecting this species. Historically, Sicklefin Chub were present throughout the entire Missouri River system. The construction of dams and channelization has largely changed the river System. Dams have reduced the sediment load, in turn lowering turbidity. The release of cold water from impoundments has lowered the overall temperature of the system, making much of the Missouri River too cold for Sicklefin Chub. Dams also have fragmented populations by restriction movement throughout the system. Entrenchment due to regulated flow control of the Missouri River has increased the rate of flow through the system. Narrowing of the river channel has reduced habitat and changed the natural cycles of the river by reducing over-land flooding. Sicklefin Chub now only occur in those areas that maintain qualities of the pre-impoundment system.

Research and Monitoring:

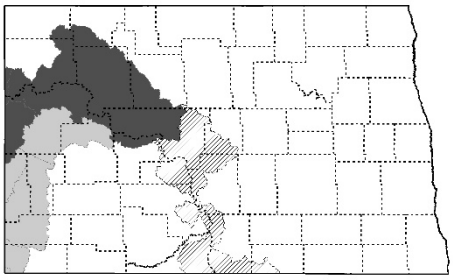
- Young of the year sturgeon chub are sampled as part of the Pallid sturgeon Population assessment program.
- No dedicated research and monitoring occur for this species.

Management Recommendations:

- Identify and protect important spawning and rearing areas.
- Continue to use the Section 404 program to ensures affected rivers and riparian areas are mitigated to replace form and function.
- Continue to work with other federal agencies not covered by 404 to ensure affected rivers and riparian areas are mitigated to replace form and function.
- Continue to work with NDSWC to develop instream flow recommendations.
- Promote incentive programs to restore riparian areas.
- Continue to work with ND 319 Task Force in prioritizing projects within impaired watersheds and implementing BMPs.
- Implement intake conditions or recommendations.
- Cooperate with NDGFD Fisheries staff on state aquatic nuisance species plans.
- Removal of dams and other barriers.
- Retrofitting dams with fish passage structures.

Sturgeon Chub *Macrhybopsis gelida*

Description/Identification: Grows to a length of 4 inches. Member of the minnow family. Light green to brown on dorsal side with a lighter ventral region. Brown and silver spots cover its sides. The snout extends over the mouth, with a barbel in each corner. Similar to the Sicklefin Chub except the dorsal fin has a straight edge.



Sturgeon Chub primary (dark gray) Possible (light gray) and historical (hatch) range. Photo Credit: Dave Ostendorf

Status: Year-round resident.

Reason for SGCN Designation: A native species, but found in lower numbers than historically. Habitat loss is the main reason for this designation. Impoundment and channelization of the Missouri River System has changed the slow-moving, warm, turbid water to fast, clear and cold.

Habitat: Prefer turbid water such as is present in the upper Missouri and Yellowstone rivers in North Dakota. Found mainly within the main channel of these systems. Prefer water with a turbidity of less than 500 NTU (nephelometric turbidity unit). Sicklefin Chub can be found at most depths within this habitat, but prefer depths between 2 and 5 meters with summer water temperatures in the range of 18°C to 24°C. In North Dakota, populations occur in the Yellowstone and upper Missouri rivers near the confluence of the two rivers.

Threats: The loss of suitable habitat caused by a change in the riverine regime is the largest problem affecting this species. Historically, Sicklefin Chub were present throughout the entire Missouri River system. The construction of dams and channelization has largely changed the river System. Dams have reduced the sediment load, in turn lowering turbidity. The release of cold water from impoundments has lowered the overall temperature of the system, making much of the Missouri River too cold for Sicklefin Chub. Dams also have fragmented populations by restriction movement throughout the system. Entrenchment due to regulated flow control of the Missouri River has increased the rate of flow through the system. Narrowing of the river channel has reduced habitat and changed the natural cycles of the river by reducing over-land flooding. Sicklefin Chub now only occur in those areas that maintain qualities of the pre-impoundment system.

Research and Monitoring:

- Young of the year sturgeon chub are sampled as part of the Pallid sturgeon Population assessment program.
- No dedicated research and monitoring occur for this species.

Management Recommendations:

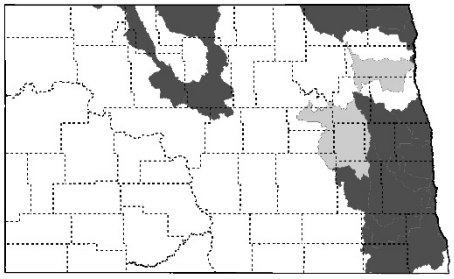
- Identify and protect important spawning and rearing areas.
- Continue to use the Section 404 program to ensures affected rivers and riparian areas are mitigated to replace form and function.
- Continue to work with other federal agencies not covered by 404 to ensure affected rivers and riparian areas are mitigated to replace form and function.
- Continue to work with NDSWC to develop instream flow recommendations.
- Promote incentive programs to restore riparian areas.
- Continue to work with ND 319 Task Force in prioritizing projects within impaired watersheds and implementing BMPs.
- Implement intake conditions or recommendations.
- Cooperate with NDGFD Fisheries staff on state aquatic nuisance species plans.
- Removal of dams and other barriers.
- Retrofitting dams with fish passage structures.

Trout-perch *Percopsis omiscomaycus*

Description/Identification: Grows to 7 inches. Light yellow in color with rows of dusky brown spots along the back. Top of head is unscaled. Pearly white spots on the underside of the head. Also has a small fleshy adipose fin near the tail.

Status: Year-round resident.

Reason for SGCN Designation: Imperiled in much of its northern range. Loss of suitable habitat seems to be the largest factor affecting this species.



Troutperch primary (dark gray) range and possible (light grey) range. Photo Credit: Konrad Schmidt

Habitat: Primarily found in lakes but may be found in deeper pools of rivers and streams. Bottoms substrate is normally sand. In North Dakota found in the Red River system including the Sheyenne River. Recent surveys appear to indicate some expansion from historic distribution. Records also exist from the Souris River.

Threats: Land uses, most notably agricultural practices have changed the landscape and reduced the habitat quality for this species. Specifically, the use of ditches to drain wetlands has drastically changed the flow regime and increased the levels of sediment and run-off that enter streams and rivers.

Research and Monitoring:

- The states rivers and streams are surveyed for species on a 5-year rotating schedule.
- North Dakota DEQ staff survey rivers and streams through their Index of Biotic Integrity program.

Management Recommendations:

- Continue to use the Section 404 program to ensures affected rivers and riparian areas are mitigated to replace form and function.
- Continue to work with other federal agencies not covered by 404 to ensure affected rivers and riparian areas are mitigated to replace form and function.
- Continue to work with NDSWC to develop instream flow recommendations.
- Promote incentive programs to restore riparian areas.
- Continue to work with ND 319 Task Force in prioritizing projects within impaired watersheds and implementing BMPs.
- Implement intake conditions or recommendations.
- Cooperate with NDGFD Fisheries staff on state aquatic nuisance species plans.
- Removal of dams and other barriers.
- Retrofitting dams with fish passage structures.

APPENDIX E
TERRESTRIAL INVERTEBRATE SGCN SPECIES ACCOUNTS

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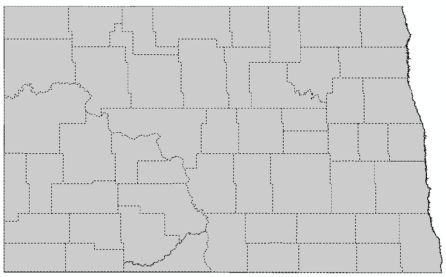
Terrestrial invertebrate SGCN and SGIN categories.

	Species of Greatest Conservation Need			Species of Greatest Information Need			
Common Name	**SGCN a. Regionally or globally imperiled**	**SGCN b. At-risk or declining, ND important**	**SGCN c. At-risk, expert review**	**SGIN d. Scientific knowledge deficient**	**SGIN e. Potentially stable in ND, declining in range**	**SGIN f. Potentially stable but life history trait vulnerability**	**SGIN g. Declining, ND significance uncertain**
Abbreviated Underwing			X				
Ainslie's Cuckoo Nomad Bee			X				
American Bumble Bee			X				
Badlands Tiger Beetle			X				
Broad-winged Skipper	X						
Dakota Skipper	X	X					
Dion Skipper	X						
Edwards' Hairstreak			X				
Ghost Tiger Beetle			X				
Hera Sheepmoth			X				
Hobomok Skipper			X				
Indiscriminate Cuckoo Bumble Bee			X				
Monarch Butterfly			X				
Mulberry Wing	X						
Northern Sandy Tiger Beetle			X				
Ottoe Skipper			X				
Poweshiek Skipperling	X						
Regal Fritillary		X	X				
Tawny Crescent			X				
Western Bumble Bee			X				
Whitney's Underwing	X		X				
Yellow Bumble Bee			X				
Yellow-banded Bumble Bee			X				
a crambid snout moth *Pyrausta pythialis*				X			
a leaf-cutter bee *Megachile dakotensis*							X
a mason bee *Osmia illinoensis*							X
a nomia bee *Nomia universitatis*							X
Apache Jumping Spider							X
Arogos Skipper							X
Ashton's Cuckoo Bumble Bee				X			X
Baird's Swallowtail				X			
Black-and-gold Bumble Bee				X			
Garita Skipperling				X			
Gray Copper					X		
Great Plains Tiger Beetle				X			

	Species of Greatest Conservation Need			Species of Greatest Information Need			
Common Name	**SGCN a. Regionally or globally imperiled**	**SGCN b. At-risk or declining, ND important**	**SGCN c. At-risk, expert review**	**SGIN d. Scientific knowledge deficient**	**SGIN e. Potentially stable in ND, declining in range**	**SGIN f. Potentially stable but life history trait vulnerability**	**SGIN g. Declining, ND significance uncertain**
Greenish Blue					X		
Greenish-white Grasshopper				X			
Juanita Sphinx Moth				X			
Large Marble							X
Leadplant Flower Moth				X			
Leonard's Skipper							X
Manitoba Oakworm Moth							X
Mead's Wood-Nymph				X			
Mormon Metalmark				X			
Nine-spotted Lady Beetle							X
Nude Yellow Loosestrife Bee							X
Pahaska Skipper							X
Persius Dusky Wing							X
Plains Branded Skipper				X			
Purplish Copper					X		
Rhesus Skipper							X
Ridings' Satyr				X			
Rusty-patched Bumble Bee							X
Sandy Tiger Beetle					X		
Silvery Blue					X		
Splendid Tiger Beetle							X
Strecker's Giant-skipper							X
Suckley's Cuckoo Bumble Bee							X
Susanna's Cellophane Bee				X			
Uncas Skipper							X

Abbreviated Underwing *Catocala abbreviatella*



Abbreviated Underwing possible range (light gray). Few state records. Specimen photo from University of Minnesota Insect Collection

Description/Identification: A medium-large moth with grayish/ brownish forewings and yellowish to orange hind wings. Both forewings and hind wings have dark markings. A thin straight line and a dark mark near the leading edge of the forewing and two transverse black bands on the hind wings.

Status: Resident.

Reason for SGCN Designation: SGCN (c). At-risk, expert review or recent assessment. Due to long-term and widespread habitat loss and fragmentation, the species has seen declines across its range.

Habitat: Typically found in dry prairies that includes its host plant, *Amorpha canescens* (leadplant).

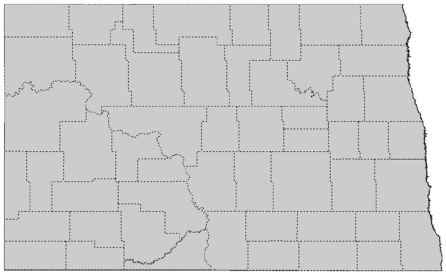
Threats: The loss of native prairies that contain leadplant is the primary cause for species decline. The species is also known for scattered and isolated populations across its range, leaving them more susceptible to extirpation due to catastrophic events such as wildfire and drought.

Research and Monitoring: Statewide pollinator surveys have been completed by the USFWS HAPET team and NDSU. Pollinator surveys should continue throughout the state to determine species range and population trends in ND.

Management Recommendations:

- Develop pollinator habitat.
- Protect and manage high quality native prairie.
- Develop connectivity between quality habitats.
- Include leadplant into plantings and restorations.

Ainslie's Cuckoo Nomad Bee *Epeolus ainsliei*



Ainslie's Cuckoo Nomad Bee possible range (light gray). No state records. Specimen photo from University of Minnesota Insect Collection

Description/Identification: A small bee with a black and white pattern on its abdomen and thorax. Because *e. ainsliei*, like all cuckoo bees, do not need to collect pollen for their young, they do not have hairy bodies.

Status: Possible resident.

Reason for SGCN Designation: SGCN (c). At-risk, expert review, or recent assessment. *E. ainsliei*, like all cuckoo bees, display kleptoparasitic behavior of laying their eggs in the nests of other bee species. So they are depending on healthy prairies that can support not only their species, but the species they nest parasitize as well.

Habitat: Typically found in drier prairies where its host species, *Colletes susannae* and *Colletes americanus* are found.

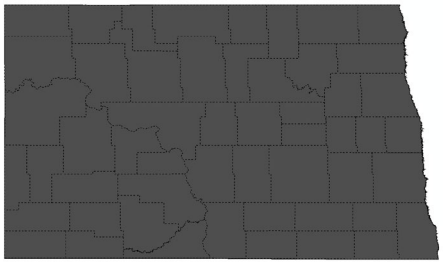
Threats: Cuckoo bees are kleptoparasitic and depend on other bee species to host their young. Declines of host species play a large role in the declines of cuckoo bees. The loss of foraging and nesting habitat, as well as the widespread use of pesticides, may also negatively impact the current populations. Other threats include habitat degradation and fragmentation, naturals pests and diseases, and climate change.

Research and Monitoring: Statewide pollinator surveys have been completed by the USFWS HAPET team and NDSU. Pollinator surveys should continue throughout the state to determine species presence in ND.

Management Recommendations:

- Develop pollinator habitat.
- Protect and manage high quality native prairie.
- Develop connectivity between quality habitats.
- Promote healthy grazing systems to fight mat forming grasses such as Kentucky Blue grass (as both of this species known hosts are ground nesting bees).

American Bumble Bee *Bombus pennsylvanicus*



American Bumble Bee primary range (dark gray)
Photo: American bumble bee, Judy Gallagher, CC 2.0
https://www.fws.gov/media/american-bumble-bee

Description/Identification: Relatively large. Queens are mostly black while worker bees have fuzzy yellow and black abdomens with a black tail. They also have long faces, with the hair on top of their heads being black.

Status: Resident.

Reason for SGCN Designation: SGCN (c). At-risk, expert review or recent assessment. Under review for federal protection through the Endangered Species Act. Due to threats such as habitat loss, pesticides, and disease, the species has seen sharp declines, which are most pronounced in the northern parts of its range.

Habitat: Typically found in prairies, occasionally forest edges or even urban areas. American Bumble Bees are associated with native prairies that include species such as milkvetches, prairie clovers, sunflowers, and goldenrods.

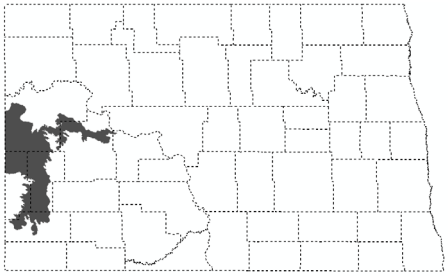
Threats: Bumble Bees face a number of threats, likely all of which have played a role in population declines. This species used to be common and widespread but the introduction of pathogens from introduced commercial bumble bees severely declined its population. The loss of foraging and nesting habitat, as well as the widespread use of pesticides, continues to negatively impact the current populations. Other threats include habitat degradation and fragmentation, naturals pests and diseases, and climate change.

Research and Monitoring: Statewide pollinator surveys have been completed by the USFWS HAPET team and NDSU. Pollinator surveys should continue throughout the state to determine species range and population trends in ND.

Management Recommendations:

- Develop pollinator habitat.
- Protect and manage high quality native prairie.
- Develop connectivity between quality habitats.
- Reduce pesticide use.
- Promote native forb plantings within both agricultural and urban landscapes.

Badlands Tiger Beetle *Cicindela decemnotata*



Badlands Tiger Beetle primary range (dark gray). Few state records. Specimen photo from University of Minnesota Insect Collection

Description/Identification: The Badlands tiger beetle is approximately 12-14 mm and most often a shade of metallic green. Occasionally it appears purple to reddish. Their wing casings have whiteish markings, with the middle one displaying as a line curving posteriorly at a sharp angle toward the midline. The underside is metallic green to blue-green.

Status: Resident.

Reason for SGCN Designation: SGCN (c). At-risk, expert review or recent assessment. This species is globally ranked G4, Apparently Secure; however, it is considered Vulnerable (S3) in North Dakota. Limited data has created difficulty in assessing the state's population and trends.

Habitat: These beetles live in soil burrows found in sparsely vegetated areas such as open ground, dunes, badlands, sagebrush steppe, dirt paths, and grasslands with minimal vegetation.

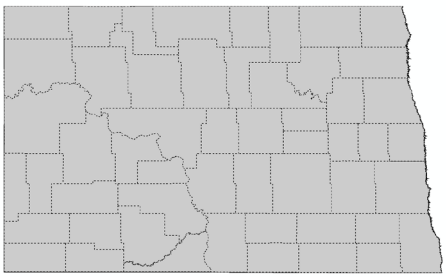
Threats: The species can be negatively impacted by overgrazing. The larvae take two years to develop to adults and larval burrows are particularly susceptible to trampling.

Research and Monitoring: A survey of the cicindelid species of Theodore Roosevelt National Park was conducted from 2001-2003. The only current state records come from these survey efforts. Increased survey efforts are needed to gain a better understanding of this species distribution and population trends.

Management Recommendations:

- Protect and manage healthy badlands habitats.
- Ensure occupied areas and areas of suitable habitat are managed with appropriate grazing times and stocking levels.

Broad-winged Skipper *Poanes viator*



Broad-winged Skipper possible range (light gray). Few possible state records. Specimen photo from University of Minnesota Insect Collection

Description/Identification: Small tan to orangish brown skipper. The underside of the hind wings has a thick pale (yellowish) streak in the center, a single spot above the streak and typically several spots below. Males typically have dark forewings with several orange marks. Female forewings are similar, but their marks are smaller and whitish.

Status: Possible resident.

Reason for SGCN Designation: SGCN (a). Regionally or globally imperiled. This species is thought to be imperiled in North Dakota, despite a global ranking of G5 (secure).

Habitat: Marshes, wet meadows, and wetlands that contain its host plants (sedges, common reed. The species may also be found visiting nearby grasslands, plantings/gardens for nectar.

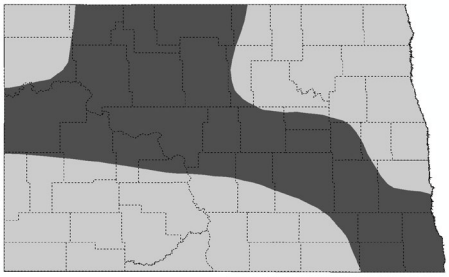
Threats: Loss of habitat by draining and cropping/developing wetlands is likely the key driver of population declines.

Research and Monitoring: Statewide pollinator surveys have been completed by the USFWS HAPET team and NDSU. Pollinator surveys should continue throughout the state to determine species presence in ND.

Management Recommendations:

- Protect and manage existing wetlands.
- Develop and pollinator habitat (floral resources) adjacent to wetlands.
- Restore wetlands and use known host plants in adjacent seedings.
- Reduce pesticide use.

Dakota Skipper *Hesperia dacotae*



Dakota Skipper primary (dark gray) and possible (light gray) range. Photo: Luke Toso/USFWS

Description/Identification: Small non-descript butterfly. Ventral wing ranges from a golden color in males to a darker brown in females with some light markings. Can be confused with the Ottoe skipper in which it shares habitat preferences.

Status: Resident.

Reason for SGCN Designation: SGCN (a). Regionally or globally imperiled. SGCN (b). At-risk or declining, ND important. Listed as Threatened by the USFWS. Loss of habitat is the driving concern. North Dakota plays an important role in recovery of the species.

Habitat: High quality, undisturbed native prairie. Dakota Skippers can be found in two types of habitats: One is a more mesic prairie consisting mostly of big and little bluestem and flowers such as wood lily, harebell, smooth camas, blazing star, and goldenrod. The second type is an upland prairie with vegetation that thrives in drier conditions such as needlegrasses (porcupine grass and needle-and-thread grass), side oats grama, and little bluestem with abundant purple coneflower, purple prairie clover, blazing star, and blanket flower.

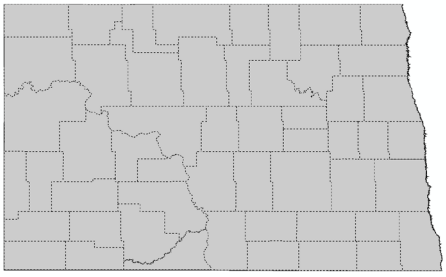
Threats: The loss of native prairie is the primary cause for this species decline. Dakota Skipper are also absent from native grasslands that are intensely grazed or often burned. Lack of management to suitable sites which allows encroachment of invasive species is also a problem. This species does not have the ability to move great distance so suitable sites may be absent of Dakota Skipper from lack of immigration from other populations. The use of herbicide for weed control at certain times of the year in native prairie tracts may be a detriment by reducing nectar sources for the butterfly. Insecticide use near populations may also a factor.

Research and Monitoring: A Conservation Status was developed by Royer and Marrone for North Dakota and South Dakota in 1992. Royer, USFWS, and the USFS all conducted early surveys in the late 90s and early 2000s. The USFWS and the USFS continue to monitor known populations. The ND Natural Resources Trust, in collaboration with the Dakota Skipper Recovery Council, has received multi-year funding to monitor known populations and survey for new populations. Survey efforts should continue, even increase, if recovery goals are going to be met.

Management Recommendations:

- Protect and manage high quality native prairie.
- Protect and manage known populations.
- Develop pollinator habitat.
- When using prescribed fire to manage do not burn entire area of know population. Use techniques to promote patchy burns. Burn prior to May 1 when possible.
- Delay haying of habitat until after end of adult flight. Leave 8 inches of structure to provide over-wintering cover. Do not hay entire occupied site each season when possible.
- Limit the duration and intensity of grazing in Dakota Skipper habitat. Do not graze habitat for entire season and manage for 8 inches of structure. Spring grazing is preferable. Avoid grazing of nectar sources during the flight period.
- Avoid broadcast spraying of pesticides and herbicides at known sites to minimize loss of adults and nectar sources.
- Monitor known inhabited sites.

Dion Skipper *Euphyes dion*



Dion Skipper possible range (light gray). Few possible state records. Specimen photo from University of Minnesota Insect Collection

Description/Identification: Males: The upperside of the forewing has a wide dark brown border with an orange area in the center and a black stigma. Females: The forewing is mostly dark brown with several light yellowish-orange spots.

Status: Possible resident.

Reason for SGCN Designation: SGCN (a). Regionally or globally imperiled.

Habitat: Marshes, wet meadows, swamps, wetlands, and mesic grasslands.

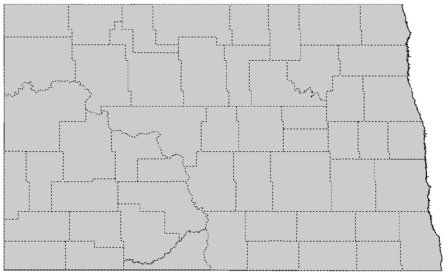
Threats: Loss of habitat by draining and cropping/developing wetlands is likely the key driver of population declines.

Research and Monitoring: Statewide pollinator surveys have been completed by the USFWS HAPET team and NDSU. Pollinator surveys should continue throughout the state to determine species presence in ND.

Management Recommendations:

- Protect and manage existing wetlands.
- Develop and pollinator habitat (floral resources) adjacent to wetlands.
- Restore wetlands and use known host plants in adjacent seedings.
- Reduce pesticide use.

Edwards' Hairstreak *Satyrium edwardsii*



Edwards/ Hairstreak possible range (light gray). Few state records. Photo: Barnes, Dr. Thomas G./USFWS

Description/Identification: The underside of the hindwings are mostly a pale gray-brown with a band of dark brown ovals outlined in white. There are submarginal orange crescents, a blue tailspot that does not tipped/outlined in orange, and a single tail.

Status: Resident.

Reason for SGCN Designation: SGCN (c). At-risk, expert review or recent assessment. This species has a global rank of G4 (apparently secure); however, it is vulnerable to possibly extirpated in the majority of its US range.

Habitat: Woodland edges, savannas, tree rows and other areas which offer both its host plant (oaks) and nectar resources.

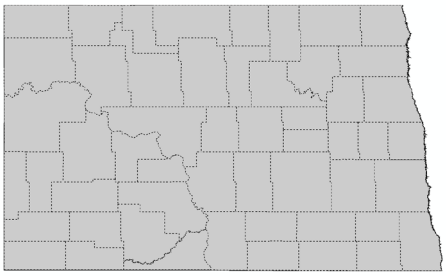
Threats: Loss of habitat and the use of pesticides are likely the main drivers of population declines.

Research and Monitoring: Statewide pollinator surveys have been completed by the USFWS HAPET team and NDSU. Pollinator surveys should continue throughout the state to determine species range and population trends in ND.

Management Recommendations:

- Develop pollinator habitat.
- Protect and manage high quality native prairie and oak woodlands.
- Develop connectivity between quality habitats.
- Reduce pesticide use.

Ghost Tiger Beetle *Cicindela lepida*



Ghost Tiger Beetle possible range (light gray). No state records. Specimen photo from University of Minnesota Insect Collection

Description/Identification: Small, mostly off-white in color, with brown markings at the center of the wing covers. The head and thorax are reddish-brown to greenish and the legs are a pale off-white to yellow color.

Status: Possible resident.

Reason for SGCN Designation: SGCN (c). At-risk, expert review or recent assessment. This species is ranked vulnerable at both the statewide and global scale.

Habitat: Sand dunes and sparsely vegetated areas with highly sanded soils.

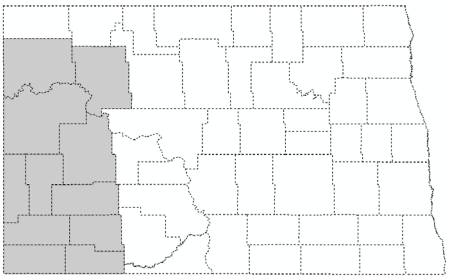
Threats: This is a strict specialist species, depending on sand dunes. The loss and degradation of these habitats is likely the primary driver of population declines.

Research and Monitoring: Minimal Cicindela surveys have been conducted throughout the state. Targeted surveys should be implemented throughout the state to determine species presence in ND.

Management Recommendations:

- Protect and manage sand dunes, sandy outcrops, and areas of suitable habitat.
- Limit grazing, driving, or other activities in areas where the species has been identified.

Hera Sheepmoth *Hemileuca hera*



Hera Sheepmoth possible range (light gray). Very few state records. Specimen photo from University of Minnesota Insect Collection

Description/Identification: White and black patterned wings, including a crescent to bean shaped spot on each wing. Head and thorax have orange hairs.

Status: Resident.

Reason for SGCN Designation: SGCN (c). At-risk, expert review or recent assessment. This species is ranked G5 (secure); however, 4 of the 5 states/provinces with a rank consider this species vulnerable or critically imperiled.

Habitat: Sagebrush steppe to shortgrass prairies that include its host plant (sagebrush).

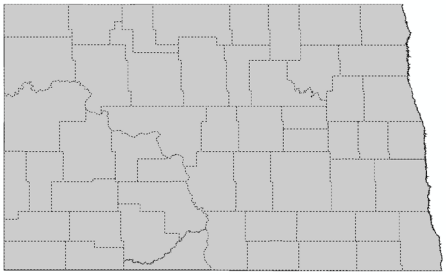
Threats: Habitat loss, degradation, and fragmentation are likely the primary drivers of population declines.

Research and Monitoring: Statewide pollinator surveys have been completed by the USFWS HAPET team and NDSU. Pollinator surveys should continue throughout the state to determine species range in ND.

Management Recommendations:

- Develop pollinator habitat.
- Protect and manage sagebrush habitat.
- Develop connectivity between quality habitats.
- Reduce pesticide use.

Hobomok Skipper *Lon hobomok*



Hobomok Skipper possible range (light gray). Few state records. Specimen photo from University of Minnesota Insect Collection

Description/Identification: The upperside of male skippers is mostly yellowish to orange with dark brown to black borders and no stigma. The underside of the hindwing has a grayish margin. Female is similar, with the upperside being a lighter/duller orange. A second variation of the female is mostly purple-black with dull white spots.

Status: Resident.

Reason for SGCN Designation: SGCN (c). At-risk, expert review or recent assessment.

Habitat: Grasslands, woodland edges, edges of bogs, wetlands, and streams, and areas where host plant and nectar resources are available, including parks and urban plantings.

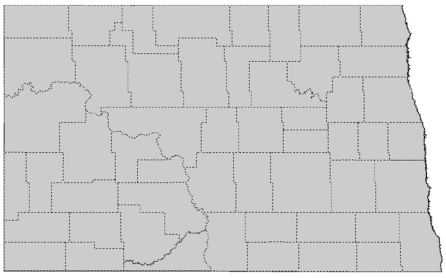
Threats: The loss and degradation of native prairie and habitat fragmentation are the primary causes for species decline.

Research and Monitoring: Statewide pollinator surveys have been completed by the USFWS HAPET team and NDSU. Pollinator surveys should continue throughout the state to determine species range and population trends in ND.

Management Recommendations:

- Develop pollinator habitat.
- Protect and manage high quality native prairie.
- Develop connectivity between quality habitats.
- Reduce pesticide use.

Indiscriminate Cuckoo Bumble Bee *Bombus insularis*



Indiscriminate Cuckoo Bumble Bee possible range (light gray). Very few state records. Specimen photo from Xerces Society, Rich Hatfield.

Description/Identification: Females have yellow faces and T3 and T4 with some yellow along the sides. Males are variable, often T1-T3 are yellow, with a little yellow on T4 and T5. Thorax has a black band between the wings.

Status: Possible resident.

Reason for SGCN Designation: SGCN (c). At-risk, expert review or recent assessment.

Habitat: Native prairie, sagebrush steppe and other shrublands, meadows, and woodland edges.

Threats: Cuckoo bees are kleptoparasitic and depend on other bee species to host their young. Declines of host species play a large role in the declines of cuckoo bees. The loss of foraging and nesting habitat, as well as the widespread use of pesticides, may also negatively impact the current populations. Other threats include habitat degradation and fragmentation, naturals pests and diseases, and climate change.

Research and Monitoring: Statewide pollinator surveys have been completed by the USFWS HAPET team and NDSU. Pollinator surveys should continue throughout the state to determine species range and abundance in ND.

Management Recommendations:

- Develop pollinator habitat.
- Protect and manage high quality native prairie.
- Develop connectivity between quality habitats.
- Reduce pesticide use.

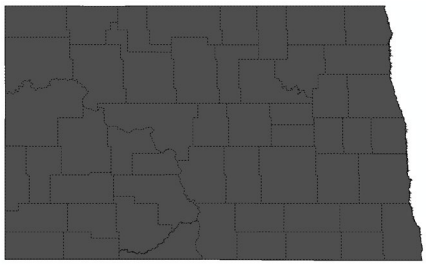
Monarch Butterfly *Danaus plexippus*

Description/Identification: Most recognizable by their orange wings with black and white markings. The outer edge of the wing is black with patterns of white spots.

Status: Summer resident, migratory.

Reason for SGCN Designation: SGCN (c). At-risk, expert review or recent assessment. Listed as Threatened by the USFWS. Loss of native prairie habitat containing milkweed (species host plant) is driving concern.

Habitat: Monarchs are typically found in areas with a high number of nectar sources. While domestic plants are used native flowers are preferred. Monarchs in the caterpillar stage rely exclusively on milkweed so areas with high density of milkweed will contain both caterpillars and adult Monarchs. Monarchs are found throughout North Dakota. Areas with a higher density of native prairie would be more likely to support Monarchs.



Monarch primary range (dark gray). Photo Credit: Elisha Mueller

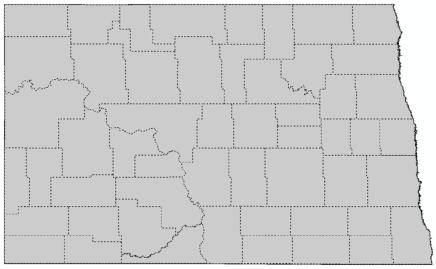
Threats: The loss of habitats that contain milkweed is the primary cause for this species decline. Loss of habitat with high quality nectar sources for adults, such as native prairie is also a concern. Because this species migrates great distances, connectivity between useable habitats is also a concern. The use of herbicide for weed control at certain times of the year in native prairie tracts may also be a detriment by reducing nectar sources for the butterfly. Insecticide use near populations may also be a factor.

Research and Monitoring: Statewide pollinator surveys have been completed by the USFWS HAPET team and NDSU. Both provided data on presence/distribution of Monarch butterflies across the state. Continued survey efforts to better understand population trends in ND should be pursued.

Management Recommendations:

- Develop pollinator habitat.
- Protect and manage high quality native prairie.
- Develop connectivity between quality habitats.
- Delay haying of habitat until after end of adult flight.
- Plant milkweed and native nectar plants to improve habitat.
- Avoid broadcast spraying of pesticides and herbicides at known sites to minimize loss of adults and nectar sources.

Mulberry Wing *Poanes massasoit*



Mulberry Wing possible range (light gray). Very few state records. Specimen photo from University of Minnesota Insect Collection

Description/Identification: A small skipper with dark brown to black rounded wings. Males usually have dark forewings without any lighter marks where females typically have yellowish spots. The hindwings have a large light yellow irregular pattern.

Status: Possible resident.

Reason for SGCN Designation: SGCN (a). Regionally or globally imperiled. Though this species has a global rank of Apparently Secure, it has been observed to be declining in the western edge of its range, including North Dakota. Though there are very few historical records in the state, it is considered Imperiled and a species of concern.

Habitat: The Mulberry Wing is associated with more mesic habitats, including wet meadows, bogs, marshes, wetland and small stream riparian areas, and wet roadsides.

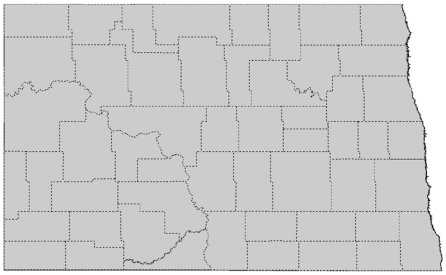
Threats: As a wetland specialist, this skipper is highly threatened by the drainage of wetlands and loss of wetland habitat across its range. The use of herbicide and pesticides may also be a factor in population declines.

Research and Monitoring: Statewide pollinator surveys have been completed by the USFWS HAPET team and NDSU. Pollinator surveys should continue throughout the state to determine species presence in ND.

Management Recommendations:

- Protect and manage native wetlands.
- Minimize draining and developing wetland habitats.
- Include its host plant, Carex stricta, and other Carex species in wetlands plantings.
- Include nectar rich plants in wetland plantings.

Northern Sandy Tiger Beetle *Cicindela limbata nympha*



Northern Sandy Tiger Beetle possible range (light gray). Very few state records. Specimen photo from University of Minnesota Insect Collection

Description/Identification: Small beetles that are mostly an off-white color with a dark reddish-brown head and thorax. Each wing cover also has a dark brown stripe along it.

Status: Possible resident.

Reason for SGCN Designation: SGCN (c). At-risk, expert review or recent assessment. This tiger beetle is ranked T4 (apparently secure subspecies); however, 3 of the 4 states/provinces with a rank consider this species vulnerable or critically imperiled.

Habitat: Sand dunes and sparsely vegetated areas with highly sanded soils

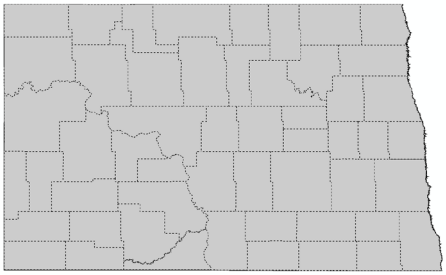
Threats: This is a strict specialist species, depending on sand dunes. The loss and degradation of these habitats is likely the primary driver of population declines.

Research and Monitoring: Minimal Cicindela surveys have been conducted throughout the state. Targeted surveys should be implemented throughout the state to determine species range and abundance in ND.

Management Recommendations:

- Protect and manage sand dunes, sandy outcrops, and areas of suitable habitat.
- Limit grazing, driving, or other activities in areas where the species has been identified.

Ottoe Skipper *Hesperia ottoe*



Ottoe Skipper possible range (light gray). Few state records. Specimen photo from University of Minnesota Insect Collection

Description/Identification: A larger skipper, with females being larger than males. The upper wings are a bright orangish brown. The males have a dark brown to black edging along the outer margins. They also have a narrow black band containing stigma (specialized scent scales used in courtship) on the center of the forewing. Both have a yellow (sometimes orange) lower wing surface with males being unmarked and females with faint spots.

Status: Resident.

Reason for SGCN Designation: SGCN (c). At-risk, expert review or recent assessment. Globally ranked G3 (vulnerable). Loss of prairie is the main driver for population declines. Most remaining populations are associated with small, isolated prairie fragments with a high risk of local extinction.

Habitat: The Ottoe skipper typically prefers dry-mesic mixed-grass prairies. Preferred habitat typically includes species such as little bluestem, side-oats grama, and prairie dropseed. This species is associated with non-degraded native grasslands.

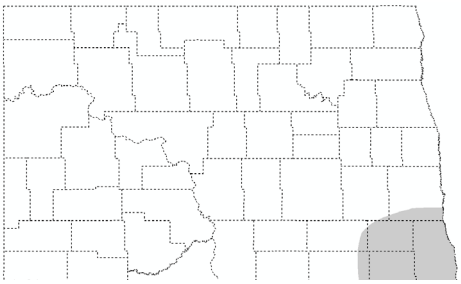
Threats: The loss and degradation of native prairies is the primary cause for species decline. However, some studies have indicated a sensitivity to grazing as well, and heavy grazing pressure can also lead to declines. The species is also known for scattered and isolated populations across its range, leaving them more susceptible to extirpation due to catastrophic events such as wildfire and drought.

Research and Monitoring: Statewide pollinator surveys have been completed by the USFWS HAPET team and NDSU. Pollinator surveys should continue throughout the state to determine species range and population trends in ND.

Management Recommendations:

- Protect and manage high quality native prairie.
- Protect and manage known populations.
- Develop pollinator habitat.
- Limit the duration and intensity of grazing in suitable habitat. Do not graze habitat for entire season.
- Avoid broadcast spraying of pesticides and herbicides at known sites to minimize loss of adults and nectar sources.

Poweshiek Skipperling *Oarisma poweshiek*



Poweshiek Skipperling possible/uncommon range (light gray).
Photo: Vince Cavalieri/USFWS

Description/Identification: Small butterfly measuring an inch in length. Its dorsal side is a dark brown with an orange head and wing margins. The undersides of the wings are lighter in color with prominent white veins.

Status: Possible resident.

Reason for SGCN Designation: SGCN (a). Regionally or globally imperiled. Listed as Endangered by the USFWS. Loss of habitat is the driving concern.

Habitat: Poweshiek Skipperling is found in high quality native tracts of tall and mixed grass prairie. Bluestem is indicative of the habitat. Purple Coneflower is often found in these sites as well. Preferred areas are considered wet-to-dry prairie with mesic hillsides near low moist areas within undisturbed habitat. The Poweshiek Skipperling is considered extirpated within North Dakota. Three sites have been proposed as critical habitat by the USFWS in Sargent and Richland counties.

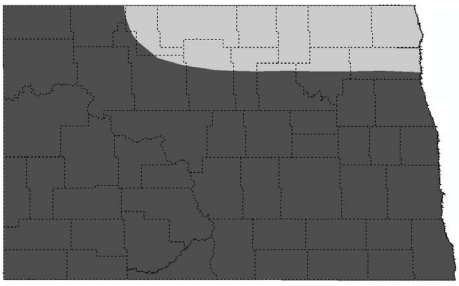
Threats: The loss of native prairie is the primary cause for this species decline. Poweshiek Skipperling are also absent from native grasslands that are intensely grazed or often burned. Lack of management to suitable sites which allows encroachment of invasive species is also a problem. This species does not have the ability to move great distance so suitable sites may be absent of Dakota Skipper from lack of immigration from other populations.
The use of herbicide for weed control at certain times of the year in native prairie tracts may also be a detriment by reducing nectar sources for the butterfly. Insecticide use near populations may also a factor.

Research and Monitoring: The USFWS will continue to monitor previously occupied sites in North Dakota. Previously, Royer surveyed 29 sites in North Dakota for Dakota Skipper and Poweshiek Skipperling. Royer and Marrone also developed a conservation status of the Poweshiek Skipperling for the USFWS in 1992. Continued monitoring of potential sites for presence of Poweshiek Skipperling is recommended.

Management Recommendations:

- Develop pollinator habitat.
- Protect and manage high quality native prairie.
- When using prescribed fire to manage do not burn entire area of know population. Use techniques to promote patchy burns. Burn prior to May 1 when possible.
- Delay haying of habitat until after end of adult flight. Leave 8 inches of structure to provide over-wintering cover. Do not hay entire occupied site each season when possible.
- Limit the duration and intensity of grazing in Dakota Skipper habitat. Do not graze habitat for entire season and manage for.

Regal Fritillary *Argynnis idalia*



Regal Fritillary primary (dark gray) and possible/uncommon (light gray) range. Photo: Regal fritillary butterfly on a common milkweed, Jill Haukos/Konza Prairie Biological Station, CC 4.0, https://www.fws.gov/media/regal-fritillary-butterfly-common-milkweed

Description/Identification: Forewings orange with black bars running between veins. Hind wings are darker orange to black with a pattern of white spots present.

Status: Resident.

Reason for SGCN Designation: SGCN (b). At-risk or declining, ND important. SGCN (c). At-risk, expert review or recent assessment. Loss and fragmentation of prairie habitat is the driving concern.

Habitat: Regal Fritillary is typically found in tall-grass prairie remnants and other native prairie habitats. Regal Fritillary larva relies exclusively on native violets as a food source. Areas with high density of violets will contain both caterpillars and adults. In North Dakota, the southeast quarter of the state provides the best habitat remaining for this species but may be encountered state- wide in patches of quality habitat.

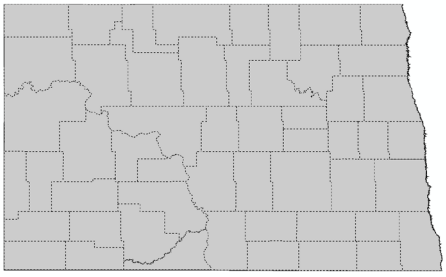
Threats: *Habitat:* The loss of native habitat especially those that contain violets is the primary cause for this species decline. Loss of habitat with high quality nectar sources for adults, such as native prairie is also a concern. Connectivity between useable habitats is a concern.
Other Natural or Manmade Factors: The use of herbicide for weed control at certain times of the year in native prairie tracts may be a detriment by reducing nectar sources for the butterfly. Insecticide use near populations may also a factor.

Research and Monitoring: Most recently, statewide pollinator surveys have been completed by the USFWS HAPET team and NDSU. Both provided data on presence/distribution of Regal Fritillary butterflies across the state. Royer also previously surveyed butterflies at a number of sites in North Dakota. Pollinator surveys should continue throughout the state to determine species range and population trends in ND.

Management Recommendations:

- Develop pollinator habitat.
- Protect and manage high quality native prairie.
- Develop connectivity between quality habitats.
- Delay haying of habitat until after end of adult flight.
- Plant native nectar plants to improve habitat.
- Include native violets in prairie restorations and seedings.
- Avoid broadcast spraying of pesticides and herbicides at known sites to minimize loss of adults and nectar sources.

Tawny Crescent *Phyciodes batesii*



Tawny Crescent possible range (light gray).No state records.
Specimen photo from University of Minnesota Insect Collection

Description/Identification: The Tawny Crescent looks similar to several other crescents. It has black and white antennal knobs, the upperside of the wings are dark brown with a pale orange to yellow postmedian band and an orange submarginal band on the forewing. The underside of the forewing is yellow with a black marking. The underside of the hindwing is yellow with light markings. The females also having black submarginal dots.

Status: Possible resident.

Reason for SGCN Designation: SGCN (c). At-risk, expert review or recent assessment. Considered Vulnerable both Globally (G3) and locally (statewide - S3).

Habitat: This species is found in a variety of habitats across its range. Moist meadows, mesic grasslands wetland complexes, and riparian areas to dry, sandy grasslands, woodland edges, and roadsides.

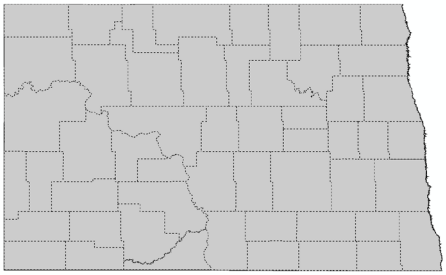
Threats: The loss, degradation, and fragmentation of native prairie is the primary cause for this species decline. This species may also be sensitive to overgrazing.

Research and Monitoring: Statewide pollinator surveys have been completed by the USFWS HAPET team and NDSU. Pollinator surveys should continue throughout the state to determine species presence in ND.

Management Recommendations:

- Develop pollinator habitat.
- Protect and manage high quality native prairie.
- Develop connectivity between quality habitats.
- Plant native nectar plants and host plants (asters).

Western Bumble Bee *Bombus occidentalis*



Western Bumble Bee possible range (light gray). Very few state records. Photo: Western bumblebee Bombus occidentalis on goldenrod in Wallowas_Rich Hatfield.JPG, Rich Hatfield/Xerces Society, Copyrighted, All Rights Reserved - Used by Permission, https://www.fws.gov/media/western-bumblebee-bombus-occidentalis-goldenrod-wallowasrich-hatfieldjpg

Description/Identification: Can be rather variable in appearance. Frequently, the front part of the thorax is yellow with the back part and the start of the thorax being black. In one variant, several T2 and T3 are yellow with reddish orange hairs on T5. In another, most of the tergums are black, with sparse white hairs at the end of T4 and T5 all white. In another, the front of the thorax and behind the wings is yellow while the abdomen may have a combination of yellow and white hairs.

Status: Possible resident.

Reason for SGCN Designation: SGCN (c). At-risk, expert review or recent assessment.

Habitat: This species can be found in native and planted grasslands, forest edges, along roadsides, and even suburban and agricultural areas where floral resources are available.

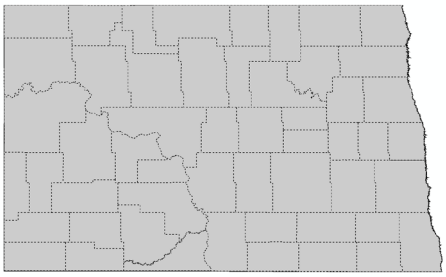
Threats: Bumble Bees face a number of threats, likely all of which have played a role in population declines. The introduction of pathogens from introduced commercial bumble bees, the loss of foraging and nesting habitat, and the widespread use of pesticides continue to negatively impact current populations. Other threats include habitat degradation and fragmentation, naturals pests and diseases, and climate change.

Research and Monitoring: Statewide pollinator surveys have been completed by the USFWS HAPET team and NDSU. Pollinator surveys should continue throughout the state to determine species range and abundance in ND.

Management Recommendations:

- Develop pollinator habitat.
- Protect and manage high quality native prairie.
- Develop connectivity between quality habitats.
- Plant native nectar plants to improve habitat.
- Avoid broadcast spraying of pesticides and herbicides at known sites to minimize loss of adults and nectar sources.

Whitney's Underwing *Catocala whitneyi*



Whitney's Underwing possible range (light gray). Few state records. Specimen photo from University of Minnesota Insect Collection

Description/Identification: A medium to large moth with gray forewings with brown shading and two distinct black markings. The hindwings are yellow with two black bands running down them.

Status: Possible resident.

Reason for SGCN Designation: SGCN (a). Regionally or globally imperiled.

Habitat: Dry-mesic prairies, woodland edges, savannas, shrublands and other habitats where its host plant is found (leadplant, *Amorpha canescens*).

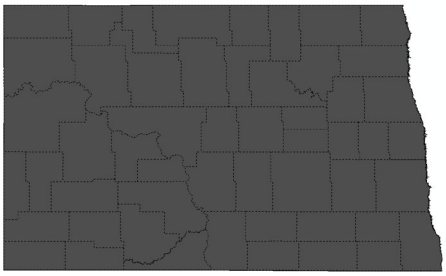
Threats: The loss and degradation of native grasslands and shrublands, as well as habitat fragmentation, are the primary causes for species decline.

Research and Monitoring: Statewide pollinator surveys have been completed by the USFWS HAPET team and NDSU. Pollinator surveys should continue throughout the state to determine species range and abundance in ND.

Management Recommendations:

- Develop pollinator habitat.
- Protect and manage high quality native prairie.
- Use host plant in native grass seedings where applicable.
- Plant native nectar plants to improve habitat.

Yellow Bumble Bee *Bombus fervidus*



Yellow Bumble Bee primary range (dark gray). Specimen photo from Xerces Society, Susan Crick.

Description/Identification: Most recognizable for often being almost entirely covered in yellow hairs except the last segments of the thorax. The thorax is mostly yellow with a thin black band across it and T1-T4 (and T5 in males) are yellow as well.

Status: Resident.

Reason for SGCN Designation: SGCN (c). At-risk, expert review or recent assessment. Globally ranked G3 (vulnerable).

Habitat: This species can be found in native and planted grasslands, forest edges, along roadsides, and even suburban and agricultural areas where floral resources are available.

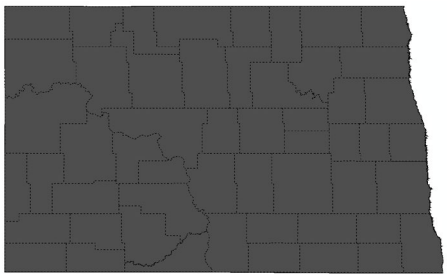
Threats: Bumble Bees face a number of threats, likely all of which have played a role in population declines. The introduction of pathogens from introduced commercial bumble bees, the loss of foraging and nesting habitat, and the widespread use of pesticides continue to negatively impact current populations. Other threats include habitat degradation and fragmentation, naturals pests and diseases, and climate change.

Research and Monitoring: Statewide pollinator surveys have been completed by the USFWS HAPET team and NDSU. Pollinator surveys should continue throughout the state to determine species range and population trends in ND.

Management Recommendations:

- Develop pollinator habitat.
- Protect and manage high quality native prairie.
- Develop connectivity between quality habitats.
- Plant native nectar plants to improve habitat.
- Avoid broadcast spraying of pesticides and herbicides at known sites to minimize loss of adults and nectar sources.

Yellow-banded Bumble Bee *Bombus terricola*



Yellow-banded Bumble Bee primary range (dark gray). Photo: Yellow-banded bumble bee, Thomas Wood, CC-NC 2.0, https://www.fws.gov/media/yellow-banded-bumble-bee

Description/Identification: These bumble bees often have very round bodies with short, broad abdomens. All adults have black yeads and yellow on the front part of the thorax. Males often have a yellow "mustache". T1 is black, T2 and T3 are yellow, and the rest are black, with T5 frequently having a light fringe of yellow as well.

Status: Resident.

Reason for SGCN Designation: SGCN (c). At-risk, expert review or recent assessment.

Habitat: This species prefers undisturbed grasslands, meadows, and woodland edges. They are often associated with landscapes that include an abundance of floral resources. Nest sites are located underground.

Threats: Bumble Bees face a number of threats, likely all of which have played a role in population declines. The introduction of pathogens from introduced commercial bumble bees, the loss of foraging and nesting habitat, and the widespread use of pesticides continue to negatively impact current populations. Other threats include habitat degradation and fragmentation, naturals pests and diseases, and climate change.

Research and Monitoring: Statewide pollinator surveys have been completed by the USFWS HAPET team and NDSU. Pollinator surveys should continue throughout the state to determine species range and population trends in ND.

Management Recommendations:

- Develop pollinator habitat.
- Protect and manage high quality native prairie.
- Develop connectivity between quality habitats.
- Plant native nectar plants to improve habitat.
- Avoid broadcast spraying of pesticides and herbicides at known sites to minimize loss of adults and nectar sources.

APPENDIX F
AQUATIC INVERTEBRATE SGCN SPECIES ACCOUNTS

Contents

Freshwater Mussels

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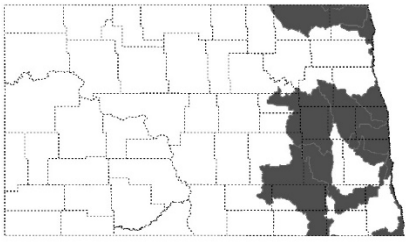
Aquatic invertebrate SGCN and SGIN categories.

	Species of Greatest Conservation Need			Species of Greatest Information Need			
Name	**SGCN a. Regionally or globally imperiled**	**SGCN b. At-risk or declining, ND important**	**SGCN c. At-risk, expert review**	**SGIN d. Scientific knowledge deficient**	**SGIN e. Potentially stable in ND, declining in range**	**SGIN f. Potentially stable but life history trait vulnerability**	**SGIN g. Declining, ND significance uncertain**
Black Sandshell	X						
Creek Heelsplitter		X					
Creeper			X				
Deertoe		X					
Fragile Papershell			X				
Mapleleaf			X				
Pink Heelsplitter			X				
Pink Papershell		X					
Threeridge			X				
Wabash Pigtoe	X						
a mayfly *Raptoheptagenia cruentata*			X				
a mayfly *Apobaetis lakota*			X				
a mayfly *Cercobrachys cree*			X				
a mayfly *Traverella lewisi*			X				
a sand-dwelling mayfly *Lachlania saskatchewanensis*		X					
Dakota Stonefly		X					
Pawnee Stonefly			X				
Plains Emerald			X				
Plains Stripetail			X				
Subarctic Darner			X				
a giant case maker *Ptilostomis angustipennis*				X			
a sand-dwelling mayfly *Analetris eximia*				X			
a small square-gilled mayfly *Sparbarus lacustris*				X			
a small square-gilled mayfly *Caenis youngi*				X			
a spiny-headed burrowing mayfly *Pentagenia vittigera*				X			
Boreal Whiteface				X			
clubtails *Stylurus spp.*				X			
Flat-headed Mayfly				X			
Footed Micro Caddisfly				X			
Long-horned Caddisfly				X			

	Species of Greatest Conservation Need			Species of Greatest Information Need			
Name	**SGCN a. Regionally or globally imperiled**	**SGCN b. At-risk or declining, ND important**	**SGCN c. At-risk, expert review**	**SGIN d. Scientific knowledge deficient**	**SGIN e. Potentially stable in ND, declining in range**	**SGIN f. Potentially stable but life history trait vulnerability**	**SGIN g. Declining, ND significance uncertain**
long-horned case makers *Ceraclea spp.*				X			
Net-spinning Caddisfly				X			
Northern Caddisfly				X			
Northern Case Maker				X			
Ornate Fairy Shrimp					X		
Paiute Dancer				X			
Saskatoon Willowfly (winter stonefly)				X			
small minnow mayflies Camelobaetidius spp.				X			
spinylegs *Dromogomphus spp.*				X			
sprites Promenetus spp.					X		
Water Scorpion				X			
White Sand-river Mayfly				X			

Black Sandshell *Ligumia recta*



Black sandshell range in North Dakota.

Description/Identification: Mussel with elongated shell and generally flattened. The Black Sandshell can reach up to 4 ½ inches in length with a smooth, shiny shell and generally dark in color. The nacre is pink, purple, or white in color.

Status: Year-round resident but rare in abundance.

Reason for SGCN Designation: This species is regionally at risk or declining and North Dakota represents an important portion of its range. Changes in land use in/around rivers including agriculture and impoundments have impacted this species, specifically related to their beds.

Habitat: Found in the in Red River north of the confluence with the Sheyenne River. Also found in the Sheyenne River from its confluence with the Red River to below Baldhill Dam.

Threats: Impoundments of the Red River and its tributaries have altered the flow regime creating unsuitable habitat for the Black Sandshell by increasing sediment deposition and blocking host fish movement. Agricultural practices, along with wetland drainage, continue to degrade water quality. Also, increased flow and altered water chemistry in the Sheyenne River from the Devils Lake outlet may pose additional threats.

Research and Monitoring: A monitoring protocol for mussels has been developed by the North Dakota Game and Fish Department (NDGF) under the State Wildlife Grant Program with increased implementation as a future goal. Additionally, the North Dakota Department of Environmental Quality (NDDEQ) conducts biological monitoring surveys on State waters as part of their Index of Biotic Integrity (IBI) development. Valley City State University (VCSU) conducted a two-phase population survey of mussels in 2008-2010 and began another evaluation in 2024.

Management Recommendations:

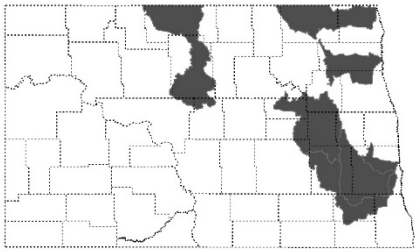
- Develop/maintain buffers along riparian areas.
- Partner with local, state, and federal entities to limit chemical use in/near aquatic habitats.
- Continue partnering with local, state, and federal entities to maintain instream flows.
- Continue partnering with local, state, and federal entities to reduce wetland drainage.
- Remove river impoundments where possible.
- Encourage efficient use of pesticides.

Creek Heelsplitter *Lasmigona compressa*

Description/Identification: Mussel with relatively thin shell, flattened, and elongated up to 3 inches in length. Typically, Creek Heelsplitters are yellow in color with green rays extending from the top. Larger shells are typically darker in color.

Status: Year-round resident but rare in abundance.

Reason for SGCN Designation: This species is regionally at risk or declining and North Dakota represents an important portion of its range. Changes in land use in/around rivers including agriculture and impoundments have impacted this species, specifically related to their beds.



Creek heelsplitter range in North Dakota.

Habitat: Creek Heelsplitters are found in the Pembina, Forest, Wintering and Sheyenne Rivers. Generally, they are found in headwater areas with sandy substrates.

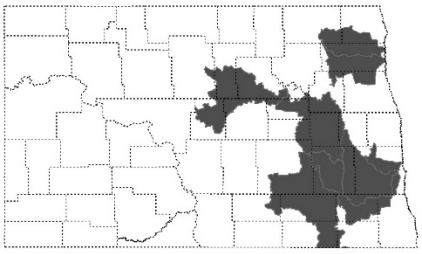
Threats: Impoundments of the Red River and its tributaries have altered the flow regime creating unsuitable habitat for Creek Heelsplitters by increasing sediment deposition and blocking host fish movement. Agricultural practices, along with wetland drainage, continue to degrade water quality. Also, increased flow and altered water chemistry in the Sheyenne River from the Devils Lake outlet may pose additional threats.

Research and Monitoring: A monitoring protocol for mussels has been developed by the North Dakota Game and Fish Department (NDGF) under the State Wildlife Grant Program with increased implementation as a future goal. Additionally, the North Dakota Department of Environmental Quality (NDDEQ) conducts biological monitoring surveys on State waters as part of their Index of Biotic Integrity (IBI) development. Valley City State University (VCSU) conducted a two-phase populations survey of mussels in 2008-2010 and began another evaluation in 2024.

Management Recommendations:

- Develop/maintain buffers along riparian areas.
- Partner with local, state, and federal entities to limit chemical use in/near aquatic habitats.
- Continue partnering with local, state, and federal entities to maintain instream flows.
- Continue partnering with local, state, and federal entities to reduce wetland drainage.
- Remove river impoundments where possible.
- Encourage efficient use of pesticides.

Creeper *Strophitus undulatus*



Creeper range in North Dakota. Photo courtesy of Valley City State University

Description/Identification: The Creeper has an elliptical shell and is slightly compressed. The anterior of the shell is rounded and the posterior is pointed. The shell is generally smooth and shiny. Juvenile color begins as green with rays and darkens with age to brown or black.

Status: Year-round resident but rare in abundance.

Reason for SGCN Designation: This species is regionally at risk or declining based on expert review and feedback. Changes in land use in/around rivers including agriculture and impoundments have impacted this species, specifically related to their beds.
Habitat: Creepers are found in the, Forest, South Branch of the Park, and Sheyenne Rivers. The Sheyenne River appears to have the largest population.

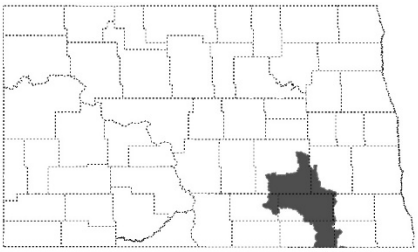
Threats: Impoundments of the Red River and its tributaries have altered the flow regime creating unsuitable habitat for Creepers by increasing sediment deposition and blocking host fish movement. Agricultural practices, along with wetland drainage, continue to degrade water quality. Also, increased flow and altered water chemistry in the Sheyenne River from the Devils Lake outlet may pose additional threats.

Research and Monitoring: A monitoring protocol for mussels has been developed by the North Dakota Game and Fish Department (NDGF) under the State Wildlife Grant Program with increased implementation as a future goal. Additionally, the North Dakota Department of Environmental Quality (NDDEQ) conducts biological monitoring surveys on State waters as part of their Index of Biotic Integrity (IBI) development. Valley City State University (VCSU) conducted a two-phase populations survey of mussels in 2008-2010 and began another evaluation in 2024.

Management Recommendations:

- Develop/maintain buffers along riparian areas.
- Partner with local, state, and federal entities to limit chemical use in/near aquatic habitats.
- Continue partnering with local, state, and federal entities to maintain instream flows.
- Continue partnering with local, state, and federal entities to reduce wetland drainage.
- Remove river impoundments where possible.
- Encourage efficient use of pesticides.

Deertoe *Truncilla truncata*



Deertoe range in North Dakota. Photo courtesy of Valley City State University

Description/Identification: The smallest mussel in North Dakota, the Deertoe has a triangular shaped shell with a rounded anterior and bluntly pointed posterior. Their color is variable, ranging from yellow-green to dark brown with green rays present of varying widths.

Status: Year-round resident but rare in abundance.

Reason for SGCN Designation: This species is regionally at risk or declining and North Dakota represents an important portion of its range. Changes in land use in/around rivers including agriculture and impoundments have impacted this species, specifically related to their beds.

Habitat: The Deertoe can be found in medium to large rivers with gravel, mud, or sand substrate. In North Dakota, the Deertoe is currently only found in the James River.

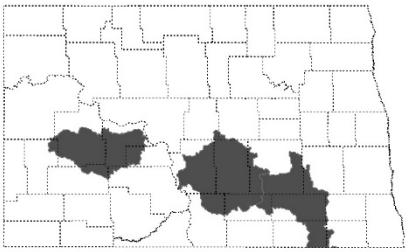
Threats: Impoundments of the James River has altered the flow regime creating unsuitable habitat for the Deertoe by increasing sediment deposition and blocking host fish movement. Agricultural practices, wetland drainage, and other land use practices continue to degrade water quality.

Research and Monitoring: A monitoring protocol for mussels has been developed by the North Dakota Game and Fish Department (NDGF) under the State Wildlife Grant Program with increased implementation as a future goal. Additionally, the North Dakota Department of Environmental Quality (NDDEQ) conducts biological monitoring surveys on State waters as part of their Index of Biotic Integrity (IBI) development. Valley City State University (VCSU) conducted a two-phase populations survey of mussels in 2008-2010 and began another evaluation in 2024.

Management Recommendations:

- Develop/maintain buffers along riparian areas.
- Partner with local, state, and federal entities to limit chemical use in/near aquatic habitats.
- Continue partnering with local, state, and federal entities to maintain instream flows.
- Continue partnering with local, state, and federal entities to reduce wetland drainage.
- Remove river impoundments where possible.
- Encourage efficient use of pesticides.

Fragile Papershell *Leptodea fragilis*



Fragile papershell range in North Dakota. Photo courtesy of Valley City State University

Description/Identification: Shell compressed and generally oblong. Both ends rounded except for females where posterior end is expanded. Shell is commonly yellow to yellow/green with light green rays.

Status: Year-round resident but rare in abundance.

Reason for SGCN Designation: This species is regionally at risk or declining based on expert review and feedback. Changes in land use in/around rivers including agriculture and impoundments have impacted this species.

Habitat: The Fragile Papershell can be found in medium to large rivers with gravel, mud, or sand substrate. In North Dakota, the Fragile Papershell is currently only found in the James River.

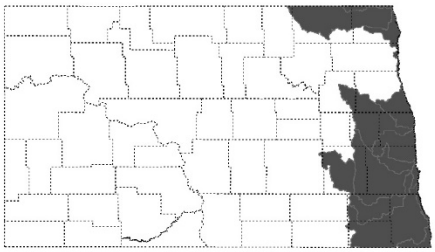
Threats: Impoundments of the James River has altered the flow regime creating unsuitable habitat for the Fragile Papershell by increasing sediment deposition and blocking host fish movement. Agricultural practices, wetland drainage, and other land use practices continue to degrade water quality.

Research and Monitoring: A monitoring protocol for mussels has been developed by the North Dakota Game and Fish Department (NDGF) under the State Wildlife Grant Program with increased implementation as a future goal. Additionally, the North Dakota Department of Environmental Quality (NDDEQ) conducts biological monitoring surveys on State waters as part of their Index of Biotic Integrity (IBI) development. Valley City State University (VCSU) conducted a two-phase populations survey of mussels in 2008-2010 and began another evaluation in 2024.

Management Recommendations:

- Develop/maintain buffers along riparian areas.
- Partner with local, state, and federal entities to limit chemical use in/near aquatic habitats.
- Continue partnering with local, state, and federal entities to maintain instream flows.
- Continue partnering with local, state, and federal entities to reduce wetland drainage.
- Remove river impoundments where possible.
- Encourage efficient use of pesticides.

Mapleleaf *Quadrula quadrula*



Mapleleaf range in North Dakota. Photo Credit: NDGF

Description/Identification: Shell up to 4 inches in length. This species is a thick-shelled mussel. Tooth is well developed. Anterior rounded and posterior generally square. Two rows of raised nodules extending from hinge.

Status: Year-round resident but rare in abundance.

Reason for SGCN Designation: This species is regionally at risk or declining based on expert review and feedback. Changes in land use in/around rivers including agriculture and impoundments have impacted this species.

Habitat: Primarily found in rivers/streams with mud, sand, or gravel bottoms. The Red River is the only place where this species has ever been documented alive and may also be found in parts of the Sheyenne River.

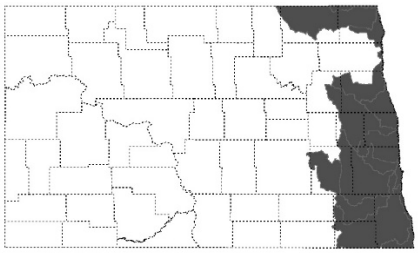
Threats: Impoundments of the Red River and its tributaries have altered the flow regime creating unsuitable habitat for the Black Sandshell by increasing sediment deposition and blocking host fish movement. Agricultural practices, along with wetland drainage, continue to degrade water quality. Also, increased flow and altered water chemistry in the Sheyenne River from the Devils Lake outlet may pose additional threats.

Research and Monitoring: A monitoring protocol for mussels has been developed by the North Dakota Game and Fish Department (NDGF) under the State Wildlife Grant Program with increased implementation as a future goal. Additionally, the North Dakota Department of Environmental Quality (NDDEQ) conducts biological monitoring surveys on State waters as part of their Index of Biotic Integrity (IBI) development. Valley City State University (VCSU) conducted a two-phase populations survey of mussels in 2008-2010 and began another evaluation in 2024.

Management Recommendations:

- Develop/maintain buffers along riparian areas.
- Partner with local, state, and federal entities to limit chemical use in/near aquatic habitats.
- Continue partnering with local, state, and federal entities to maintain instream flows.
- Continue partnering with local, state, and federal entities to reduce wetland drainage.
- Remove river impoundments where possible.
- Encourage efficient use of pesticides.

Pink Heelsplitter *Potamilus alatus*



Pink heelsplitter range in North Dakota. Photo Credit: NDGF

Description/Identification: Large shell, up to 8 inches. Generally rectangular in shape. Posterior end flat and anterior end rounded. Shell dark green to brown.

Status: Year-round resident and can be locally abundant.

Reason for SGCN Designation: This species is regionally at risk or declining based on expert review and feedback. Changes in land use in/around rivers including agriculture and impoundments have impacted this species.

Habitat: Primarily found in rivers/streams with mud and sand substrate. Pink Heelsplitters are found in the Red and Sheyenne Rivers with the highest concentrations in the Argusville area of the Red River.

Threats: Impoundments of the Red River and its tributaries have altered the flow regime creating unsuitable habitat for the Black Sandshell by increasing sediment deposition and blocking host fish movement. Agricultural practices, along with wetland drainage, continue to degrade water quality. Also, increased flow and altered water chemistry in the Sheyenne River from the Devils Lake outlet may pose additional threats.

Research and Monitoring: A monitoring protocol for mussels has been developed by the North Dakota Game and Fish Department (NDGF) under the State Wildlife Grant Program with increased implementation as a future goal. Additionally, the North Dakota Department of Environmental Quality (NDDEQ) conducts biological monitoring surveys on State waters as part of their Index of Biotic Integrity (IBI) development. Valley City State University (VCSU) conducted a two-phase population survey of mussels in 2008-2010 and began another evaluation in 2024.

Management Recommendations:

- Develop/maintain buffers along riparian areas.
- Partner with local, state, and federal entities to limit chemical use in/near aquatic habitats.
- Continue partnering with local, state, and federal entities to maintain instream flows.
- Continue partnering with local, state, and federal entities to reduce wetland drainage.
- Remove river impoundments where possible.
- Encourage efficient use of pesticides.

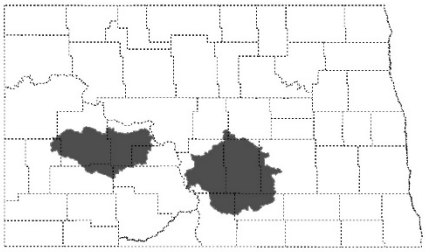
Pink Papershell *Potamilus ohiensis*

Description/Identification: Large mussel with a maximum length of 7 inches. Shell is elongated and generally rectangular. Wing present near the umbos. Shell dark green to brown. Nacre is pink.

Status: Year-round resident and rare.

Reason for SGCN Designation: This species is regionally at risk or declining and North Dakota represents an important portion of its range. Changes in land use in/around rivers including agriculture and impoundments have impacted this species.

Habitat: Primarily found in medium to large rivers/streams with mud and sand substrate. Pink Papershells are found only in the lower reaches of the Missouri River and tributaries below Garrison Dam in North Dakota.



Pink papershell range in North Dakota.

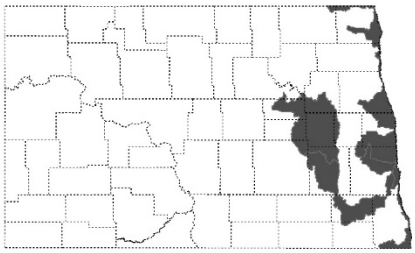
Threats: Impoundments built on the Missouri River System have changed the flow regime of the river. Water released from the dam is cooler, cleaner, and moving faster. This has changed the historic habitat conditions of the river system. Impoundments in the system block movement of fish species used by the Pink Papershell as hosts for young. In this case, the most common host is the freshwater drum.

Research and Monitoring: A monitoring protocol for mussels has been developed by the North Dakota Game and Fish Department (NDGF) under the State Wildlife Grant Program with increased implementation as a future goal. Additionally, the North Dakota Department of Environmental Quality (NDDEQ) conducts biological monitoring surveys on State waters as part of their Index of Biotic Integrity (IBI) development. Valley City State University (VCSU) conducted a two-phase population survey of mussels in 2008-2010 and began another evaluation in 2024.

Management Recommendations:

- Develop/maintain buffers along riparian areas.
- Partner with local, state, and federal entities to limit chemical use in/near aquatic habitats.
- Continue partnering with local, state, and federal entities to maintain instream flows.
- Continue partnering with local, state, and federal entities to reduce wetland drainage.
- Remove river impoundments where possible.
- Encourage efficient use of pesticides.

Threeridge *Amblema plicata*



Threeridge range in North Dakota. Photo Credit: NDGF

Description/Identification: Large mussel with a maximum length of 7 inches. Shell is elongated and generally rectangular. Wing present near the umbos. Shell dark green to brown. Nacre is pink.

Status: Year-round resident and can be locally common.

Reason for SGCN Designation: This species is regionally at risk or declining based on expert review and feedback. Changes in land use in/around rivers including agriculture and impoundments have impacted this species.

Habitat: Primarily found in medium to large rivers/streams with mud, sand, and gravel substrate. The Threeridge is Found only in the Red and Sheyenne rivers with the highest concentrations throughout the Sheyenne River in Ransom County.

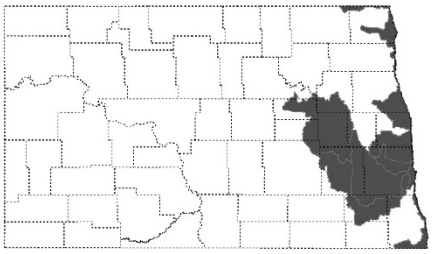
Threats: Impoundment of the Red River and its tributaries have changed the flow regime and increased sediment deposits making many areas in the river unsuitable for the Threeridge. Impoundments also block host fish movement necessary for this species' reproduction and dispersal. Agricultural practices within the basin have reduced suitable habitat in the river. Runoff from treated fields into the river decreases water quality. Ditches used to drain wetlands contribute agricultural run-off and sedimentation to the Red River and its tributaries. The Threeridge is considered a commercially valuable species. It is presently illegal to collect mussels for commercial use in North Dakota, but this practice may occur in parts of its range, which may contribute to an already declining population. The release of water from Devils Lake changing the water chemistry of the Sheyenne River is a potential threat.

Research and Monitoring: A monitoring protocol for mussels has been developed by the North Dakota Game and Fish Department (NDGF) under the State Wildlife Grant Program with increased implementation as a future goal. Additionally, the North Dakota Department of Environmental Quality (NDDEQ) conducts biological monitoring surveys on State waters as part of their Index of Biotic Integrity (IBI) development. Valley City State University (VCSU) conducted a two-phase population survey of mussels in 2008-2010 and began another evaluation in 2024.

Management Recommendations:

- Develop/maintain buffers along riparian areas.
- Partner with local, state, and federal entities to limit chemical use in/near aquatic habitats.
- Continue partnering with local, state, and federal entities to maintain instream flows.
- Continue partnering with local, state, and federal entities to reduce wetland drainage.
- Remove river impoundments where possible.
- Encourage efficient use of pesticides.

Wabash Pigtoe *Fusconaia flava*



Wabash pigtoe range in North Dakota. Photo Credit: NDGF

Description/Identification: The shell is up to 3 inches in length and the shape is variable, but generally thick, compressed, and triangular. Younger individuals are yellow in color with faint green rays, becoming dark brown with age.

Status: Year-round resident and can be locally common.

Reason for SGCN Designation: This species is regionally or globally imperiled. Changes in land use in/around rivers including agriculture and impoundments have impacted this species.

Habitat: Primarily found in medium to large rivers with gravel substrate. The Wabash Pigtoe is found only in the Red and Sheyenne River drainages with the highest concentrations throughout the Sheyenne River in Ransom County.

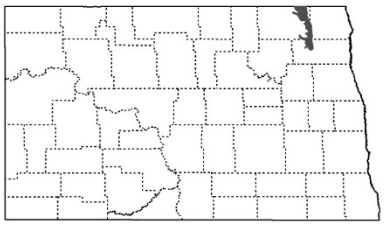
Threats: Impoundment of the Red River and its tributaries have changed the flow regime and increased sediment deposits making many areas in the river unsuitable for the Wabash Pigtoe. Impoundments also block host fish movement necessary for this species' reproduction and dispersal. Agricultural practices, wetland drainage, runoff, and erosion within the basin have reduced suitable habitat and degraded water quality. The Wabash Pigtoe is considered a commercially valuable species. It is presently illegal to collect mussels for commercial use in North Dakota, but this practice may occur in parts of its range, which may contribute to an already declining population. The release of water from Devils Lake changing the water chemistry of the Sheyenne River is a potential threat.

Research and Monitoring: A monitoring protocol for mussels has been developed by the North Dakota Game and Fish Department (NDGF) under the State Wildlife Grant Program with increased implementation as a future goal. Additionally, the North Dakota Department of Environmental Quality (NDDEQ) conducts biological monitoring surveys on State waters as part of their Index of Biotic Integrity (IBI) development. Valley City State University (VCSU) conducted a two-phase population survey of mussels in 2008-2010 and began another evaluation in 2024.

Management Recommendations:

- Develop/maintain buffers along riparian areas.
- Partner with local, state, and federal entities to limit chemical use in/near aquatic habitats.
- Continue partnering with local, state, and federal entities to maintain instream flows.
- Continue partnering with local, state, and federal entities to reduce wetland drainage.
- Remove river impoundments where possible.
- Encourage efficient use of pesticides.

A mayfly *Apobaetis lakota*



Apobaetis lakota potential range in North Dakota. Photo credit to Valley City State University

Description/Identification: A member of the family Baetidae, the small minnow mayflies. The larval stage is relatively small with long antenna. Typically, the lateral gills present on the abdomen are oval shaped. This species has very long claws on the ends of its legs compared to most other members of Baetidae. They are primarily found in the sand dominated (psammophilous) river and stream systems within the northern Red River drainage of eastern North Dakota. Larval stage present throughout the open water season but most abundant through July-August when they typically emerge into the adult stage, which is short-lived.

Status: Year-round resident of North Dakota waterbodies in the larval stage with a short-lived adult form following emergence.

Reason for SGCN Designation: A Midwest regional species of high concern with limited data in North Dakota and an at-risk species based on expert review (SGCN c), documented in Cavalier County. *Apobaetis* is thought to be rare throughout its range and is endemic to North Dakota. *Apobaetis lakota* is known to occur in North Dakota, Nebraska, and Kansas. According to NatureServe, it is considered imperiled in Kansas.

Habitat: Occurs in medium sized sand dominated river systems such as the Little South Pembina River. However, the potential exists for *Apobaetis lakota* to be present throughout the Red River drainage system.

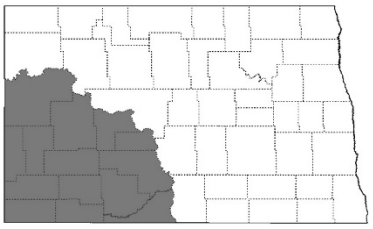
Threats: Limited habitat availability, land development, climate change, sedimentation, energy development, agricultural practices, habitat modification and inundation due to damming of river systems.

Research and Monitoring: Limited research has been conducted. The North Dakota Department of Environmental Quality (NDDEQ) conducts biological monitoring surveys on State waters as part of their Index of Biotic Integrity (IBI) development project. Additionally, a monitoring protocol for aquatic invertebrates is being developed by the North Dakota Game and Fish Department (NDGF) under the State Wildlife Grant Program with implementation as a future goal. Additionally, a survey of aquatic invertebrates in cooperation with Valley City State University is currently underway to gain additional baseline information on SGCN's.

Management Recommendations:

- Protect and conserve large, intact tracks of native/unbroken forested areas near waterbodies.
- Develop/maintain buffers along and within riparian areas.
- Partner with local, state, and federal entities to limit chemical use in/near aquatic habitats.
- Partner with local, state, and federal entities to remove dams where logically feasible.
- Encourage efficient use of pesticides.

A mayfly *Cercobrachys cree*



Cercobrachys cree potential range in North Dakota. Photo credit to Valley City State University

Description/Identification: A member of the family Caenidae, the square-gilled mayflies, named for the square shaped gills on their abdomen. Their short forelegs are a notable characteristic. Larval stage present throughout the open water season but most abundant through July-August when they typically emerge into the adult stage, which is short-lived.

Status: Year-round resident of North Dakota waterbodies in the larval stage with a short-lived adult form following emergence.

Reason for SGCN Designation: A Midwest regional species of very high concern with limited data in North Dakota and an at-risk species based on expert review (SGCN c). Documented records in western North Dakota. *Cercobrachys cree* is known to occur in eastern Montana, western North and South Dakota, Alberta and Saskatchewan.

Habitat: Occurs in medium to large, sand dominated river systems such as the Little Missouri, Cannonball and Heart Rivers.

Threats: Limited habitat availability, land development, climate change, sedimentation, energy development, agricultural practices, habitat modification and inundation due to damming of river systems.

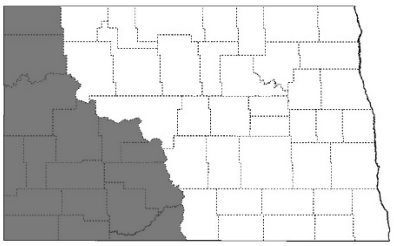
Research and Monitoring: Limited research has been conducted. The North Dakota Department of Environmental Quality (NDDEQ) conducts biological monitoring surveys on State waters as part of their Index of Biotic Integrity (IBI) development project. Additionally, a monitoring protocol for aquatic invertebrates is being developed by the North Dakota Game and Fish Department (NDGF) under the State Wildlife Grant Program with implementation as a future goal. Additionally, a survey of aquatic invertebrates in cooperation with Valley City State University is currently underway to gain additional baseline information on SGCN's.

Management Recommendations:

- Protect and conserve large, intact tracks of native/unbroken forested areas near waterbodies.
- Develop/maintain buffers along and within riparian areas.
- Partner with local, state, and federal entities to limit chemical use in/near aquatic habitats.
- Partner with local, state, and federal entities to remove dams where logically feasible.
- Encourage efficient use of pesticides.

A mayfly *Lachlania saskatchewanensis*

No Image Available



Lachlania saskatchewanensis potential range in North Dakota.

Description/Identification: A burrowing mayfly and member of the family Oligoneuriidae, the brush-legged mayflies. They are named for the brush-like hairs on their front legs. They are primarily found in the large, sand dominated (psammophilous), turbid river systems within the Missouri River drainage of western North Dakota. Larval stage present throughout the open water season but most abundant through July-August when they typically emerge into the adult stage, which is short-lived.

Status: Year-round resident of North Dakota waterbodies in the larval stage with a short-lived adult form following emergence.

Reason for SGCN Designation: A regional species of concern with limited species level data in North Dakota. Also, an at-risk or declining species with North Dakota representing and important portion of its habitat (SGCN b). Historic records in Montana and Saskatchewan are also limited indicating the rare presence of this sand-dwelling species. Also considered a species of concern in Montana. *Lachlania saskatchewanensis* is known to occur in North Dakota, Montana, and Saskatchewan and is rare throughout its range.

Habitat: Occurs in large, sand dominated river systems such as the Missouri River and Little Missouri River.

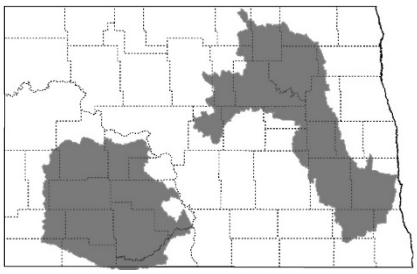
Threats: Limited habitat availability, land development, climate change, sedimentation, energy development, agricultural practices and habitat modification and inundation due to damming of river systems.

Research and Monitoring: Limited research has been conducted. The North Dakota Department of Environmental Quality (NDDEQ) conducts biological monitoring surveys on State waters as part of their Index of Biotic Integrity (IBI) development. Additionally, a monitoring protocol for aquatic invertebrates is being developed by the North Dakota Game and Fish Department (NDGF) under the State Wildlife Grant Program with implementation as a future goal. Additionally, a survey of aquatic invertebrates in cooperation with Valley City State University is currently underway to gain additional baseline information on SGCN's.

Management Recommendations:

- Protect and conserve large, intact tracks of native/unbroken forested areas.
- Develop/maintain buffers along riparian areas.
- Partner with local, state, and federal entities to limit chemical use in/near aquatic habitats.
- Partner with local, state, and federal entities to remove dams where logically feasible.
- Encourage efficient use of pesticides.

Dakota Stonefly *Perlesta dakota*



Perlesta dakota range in North Dakota. Photo of larval (top) and adult (bottom) life stages. Photo credit to Valley City State University

Description/Identification: A stonefly and member of the family Perlidae, the most common and species rich family of stoneflies which cling to rocks and other hard substrates in well oxygenated areas or rivers/streams such as riffles. The larval stage is relatively large but only have two tails (cerci). They are typically speckled throughout the body, with chewing mouthparts to suit their predatory diet. Larval stage present throughout the open water season with adults emerging in mid-July.

Status: Year-round resident of North Dakota waterbodies. Depending on environmental conditions, life cycle can take 1 to 3 years to complete.

Reason for SGCN Designation: A regional species of concern with limited data in North Dakota. Based on limited information in the northern great plains, *Perlesta dakota* is at-risk or declining and endemic to North and South Dakota (SGCN b). It's considered to be very rare throughout its range. The Dakota stonefly has a limited distribution in the state, with the only documented records occurring in the Cannonball, Heart, Green, and Sheyenne Rivers, along with Clausen Springs. However, the potential exists for this species to be present throughout the Missouri River and Red River drainages. *Perlesta dakota* is also considered a species of conservation need in South Dakota.

Habitat: Primarily located in low gradient, medium sized rivers in central North Dakota such as the Cannonball, Heart and Sheyenne Rivers.

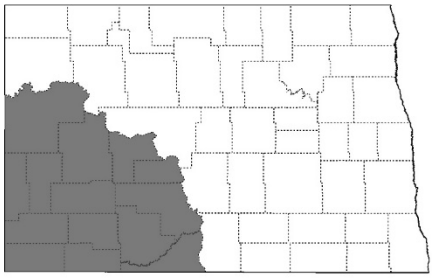
Threats: Limited habitat availability, land development, climate change, sedimentation, energy development, agricultural practices and habitat modification and inundation due to damming of river systems.

Research and Monitoring: Limited research has been conducted. The North Dakota Department of Environmental Quality (NDDEQ) conducts biological monitoring surveys on State waters as part of their Index of Biotic Integrity (IBI) development. Additionally, a monitoring protocol for aquatic invertebrates is being developed by the North Dakota Game and Fish Department (NDGF) under the State Wildlife Grant Program with implementation as a future goal. Additionally, a survey of aquatic invertebrates in cooperation with Valley City State University is currently underway to gain additional baseline information on SGCN's.

Management Recommendations:

- Protect and conserve large, intact tracks of native/unbroken forested areas.
- Develop/maintain buffers along riparian areas.
- Partner with local, state, and federal entities to limit chemical use in/near aquatic habitats.
- Partner with local, state, and federal entities to remove dams where logically feasible.
- Encourage efficient use of pesticides.

Deepwater Mayfly *Raptoheptagenia cruentata*



Deepwater mayfly potential range in North Dakota. Photo is not the species of interest but rather a representative specimen of the family Heptageniidae. Photo credit to Valley City State University

Description/Identification: A member of the family Heptageniidae, the flat headed mayflies. The larval stage has a flattened body shape and head. Typically, the lateral margin of the head is visible behind the eyes. They are primarily found in the sand dominated (psammophilous) river and stream systems within the Missouri River drainage of western North Dakota and eastern Montana. Larval stage present throughout the open water season but most abundant through July-August when they typically emerge into the adult stage

Status: Year-round resident of North Dakota waterbodies in the larval stage with a short-lived adult form following emergence.

Reason for SGCN Designation: A Midwest regional species of concern with limited data in North Dakota and an at-risk species based on expert review (SGCN c). Documented in Billings, Bowman, Dunn, McKenzie, Morton, and Slope counties but is likely present in other areas of western North Dakota. *Raptoheptagenia cruentata* is considered a species of concern in Montana. They can be locally abundant in suitable habitat, but limited or declining records create large-scale population concerns across much of its range.

Habitat: Occurs in large sand dominated river systems such as the Missouri River and Little Missouri River.

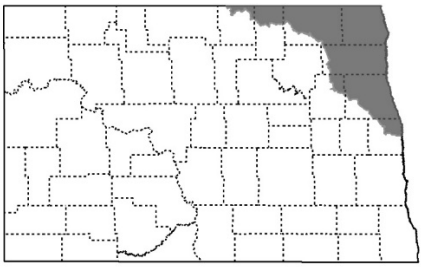
Threats: Limited habitat availability, land development, climate change, sedimentation, energy development, agricultural practices and habitat modification and inundation due to damming of river systems.

Research and Monitoring: Limited research has been conducted. The North Dakota Department of Environmental Quality (NDDEQ) conducts biological monitoring surveys on State waters as part of their Index of Biotic Integrity (IBI) development. Additionally, a monitoring protocol for aquatic invertebrates is being developed by the North Dakota Game and Fish Department (NDGF) under the State Wildlife Grant Program with implementation as a future goal. Additionally, a survey of aquatic invertebrates in cooperation with Valley City State University is currently underway to gain additional baseline information on SGCN's.

Management Recommendations:

- Protect and conserve large, intact tracks of native/unbroken forested areas.
- Develop/maintain buffers along riparian areas.
- Partner with local, state, and federal entities to limit chemical use in/near aquatic habitats.
- Partner with local, state, and federal entities to remove dams where logically feasible.
- Encourage efficient use of pesticides.

Pawnee Stonefly *Perlesta xube*



Perlesta xube potential range in North Dakota. Photo is not the species of interest but rather a representative specimen of the family Perlidae. Photo credit to Valley City State University

Description/Identification: A stonefly and member of the family Perlidae, the most common and species rich family of stoneflies which cling to rocks and other hard substrates in well oxygenated areas of rivers/streams such as riffles. The larval stage is relatively large and like mayflies but only have two tails (cerci) rather than three, are typically speckled throughout the body, with chewing mouthparts to suit their predatory diet. Larval stage present throughout the open water season with adults emerging in spring or early summer.

Status: Year-round resident of North Dakota waterbodies. Depending on environmental conditions, life cycle can take 1 to 3 years to complete.

Reason for SGCN Designation: A regional species of concern with limited data in North Dakota and an at-risk species based on expert review (SGCN c). It's considered to be rare throughout its range. The Pawnee stonefly has a limited distribution in the state, with the only documented records occurring in the Forest River. However, the potential exists for this species to be present throughout the Red River drainage.

Habitat: Primarily located in low gradient, medium sized rivers in northeast North Dakota such as the Forest River.

Threats: Limited habitat availability, land development, climate change, sedimentation, energy development, agricultural practices and habitat modification and inundation due to damming of river systems.

Research and Monitoring: Limited research has been conducted. The North Dakota Department of Environmental Quality (NDDEQ) conducts biological monitoring surveys on State waters as part of their Index of Biotic Integrity (IBI) development. Additionally, a monitoring protocol for aquatic invertebrates is being developed by the North Dakota Game and Fish Department (NDGF) under the State Wildlife Grant Program with implementation as a future goal. Additionally, a survey of aquatic invertebrates in cooperation with Valley City State University is currently underway to gain additional baseline information on SGCN's.

Management Recommendations:

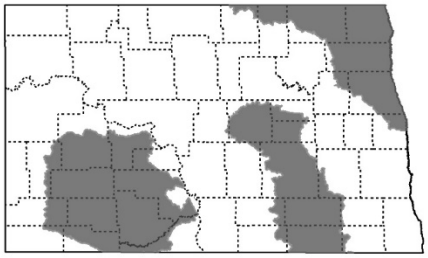
- Protect and conserve large, intact tracks of native/unbroken forested areas.
- Develop/maintain buffers along riparian areas.
- Partner with local, state, and federal entities to limit chemical use in/near aquatic habitats.
- Partner with local, state, and federal entities to remove dams where logically feasible.
- Encourage efficient use of pesticides.

Plains Emerald *Somatochlora ensigera*

Description/Identification: A dragonfly and member of the family Corduliidae. Larval stage has 5 short appendages on posterior, two pairs of wing pads, large eyes, and mouthparts in the shape of a spoon. Keying to the species level based on larval stage is very difficult. Larval stage present throughout the open water season but most abundant through July-August when they typically emerge into the adult stage.

Status: Year-round resident of North Dakota waterbodies as larvae. Larval stage can last 2-4 years with the adult stage typically lasting around one month.

Reason for SGCN Designation: A regional species of concern with limited data in North Dakota and an at-risk species based on expert review (SGCN c). This species has a spotty distribution across North Dakota with documented adults in Adams, Grand Forks, Lamoure, Logan, Sheridan, Stark and Walsh counties but could likely be present throughout the state.



Somatochlora ensigera potential range in North Dakota. Photo credit to Valley City State University

Habitat: Occurs in small rivers and streams with well defined, forested riparian zones such as the Tongue River and North Branch Park River.

Threats: Limited habitat availability, land development, climate change, sedimentation, energy development and agricultural practices.

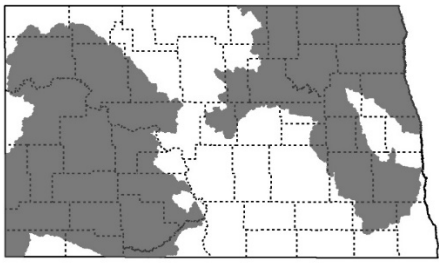
Research and Monitoring: Limited research has been conducted. The North Dakota Department of Environmental Quality (NDDEQ) conducts biological monitoring surveys on State waters as part of their Index of Biotic Integrity (IBI) development. Additionally, a monitoring protocol for aquatic invertebrates is being developed by the North Dakota Game and Fish Department (NDGF) under the State Wildlife Grant Program with implementation as a future goal. Additionally, a survey of aquatic invertebrates in cooperation with Valley City State University is currently underway to gain additional baseline information on SGCN's.

Management Recommendations:

- Protect and conserve large, intact tracks of native/unbroken forested areas.
- Develop/maintain buffers along riparian areas.
- Partner with local, state, and federal entities to limit chemical use in/near aquatic habitats.
- Partner with local, state, and federal entities to remove dams where logically feasible.
- Encourage efficient use of pesticides.

Plains Stripetail *Isoperla longiseta*

Description/Identification: A stonefly and member of the family Perlodidae. The larval stage at maturity is up to 16 mm with a long, cylindrical body. They are known as stripetails due to the distinctive coloration on the dorsal side of the abdomen. They are typically found in well-oxygenated areas, such as riffles, where they cling to smooth rocks and prey on other small invertebrates.



Isoperla longiseta potential range in North Dakota. Photo courtesy of Valley City State University

Status: Year-round resident of North Dakota waterbodies in the larval stage. Adults typically emerge in early summer.

Reason for SGCN Designation: A regional species of very high concern with limited species level data in North Dakota and an at-risk species based on expert review (SGCN c). The Plains stripetail is known to occur throughout much of the upper Midwest and Canada, but North Dakota data is not well understood. It's considered to be rare throughout its range. Their primary distribution across North Dakota includes the Sheyenne, Pembina Rivers. However, the potential exists for this species to be present throughout the Missouri River drainage as it has been documented in eastern Montana's prairie rivers.

Habitat: Occurs in large, cool, sand dominated river systems such as the Missouri, Pembina, and Sheyenne Rivers.

Threats: Limited habitat availability, land development, climate change, sedimentation, energy development, agricultural practices and habitat modification and inundation due to damming of river systems.

Research and Monitoring: Limited research has been conducted. The North Dakota Department of Environmental Quality (NDDEQ) conducts biological monitoring surveys on State waters as part of their Index of Biotic Integrity (IBI) development. Additionally, a monitoring protocol for aquatic invertebrates is being developed by the North Dakota Game and Fish Department (NDGF) under the State Wildlife Grant Program with implementation as a future goal. Additionally, a survey of aquatic invertebrates in cooperation with Valley City State University is currently underway to gain additional baseline information on SGCN's.

Management Recommendations:

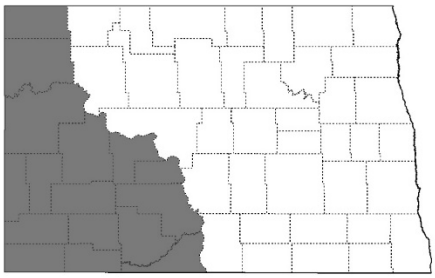
- Protect and conserve large, intact tracks of native/unbroken forested areas.
- Develop/maintain buffers along riparian areas.
- Partner with local, state, and federal entities to limit chemical use in/near aquatic habitats.
- Partner with local, state, and federal entities to remove dams where logically feasible.
- Encourage efficient use of pesticides.

Prong-gilled Mayfly *Traverella lewisi*

Description/Identification: A mayfly and member of the family Leptophlebiidae, the prong-gilled mayflies. The larval stage is a relatively small with a wide labrum and oval gills. They are primarily found in the large, sand dominated (psammophilous) river systems within the Missouri River drainage of western North Dakota. Larval stage present throughout the open water season but most abundant through July-August when they typically emerge into the adult stage.

Status: Year-round resident of North Dakota waterbodies in the larval stage with a short-lived adult form following emergence.

Reason for SGCN Designation: A regional species of concern with limited species level data in North Dakota and an at-risk species based on expert review (SGCN c). *Traverella lewisi* seems to have a limited distribution in the state, primarily found in the Little Missouri River system. However, the potential exists for this species to be present throughout the Missouri River drainage. It's considered to be rare throughout its range and is known to occur in North Dakota, Montana, and Saskatchewan.



Traverella lewisi potential range in North Dakota. Photo credit to Valley City State University

Habitat: Occurs in large, sand dominated river systems such as the Little Missouri River.

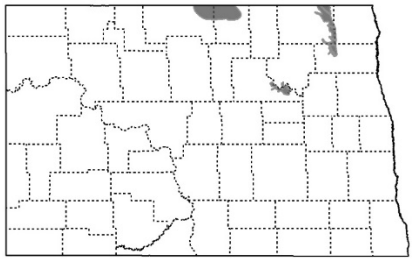
Threats: Limited habitat availability, land development, climate change, sedimentation, energy development, agricultural practices and habitat modification and inundation due to damming of river systems.

Research and Monitoring: Limited research has been conducted. The North Dakota Department of Environmental Quality (NDDEQ) conducts biological monitoring surveys on State waters as part of their Index of Biotic Integrity (IBI) development. Additionally, a monitoring protocol for aquatic invertebrates is being developed by the North Dakota Game and Fish Department (NDGF) under the State Wildlife Grant Program with implementation as a future goal. Additionally, a survey of aquatic invertebrates in cooperation with Valley City State University is currently underway to gain additional baseline information on SGCN's.

Management Recommendations:

- Protect and conserve large, intact tracks of native/unbroken forested areas.
- Develop/maintain buffers along riparian areas.
- Partner with local, state, and federal entities to limit chemical use in/near aquatic habitats.
- Partner with local, state, and federal entities to remove dams where logically feasible.
- Encourage efficient use of pesticides.

Subarctic Darner *Aeshna subarctica*



Aeshna subarctica potential range in North Dakota. Aeshna spp. photo credit to Valley City State University

Description/Identification: Larval stage has long abdomen, large eyes and mouthparts that lie flat under the head. The last four abdominal segments have spines. Larval stage present throughout the open water season but most abundant through July-August when they typically emerge into the adult stage.

Status: Year-round resident of North Dakota waterbodies as larvae. Nymphs become adults in late summer with the adult stage lasting a few weeks to months.

Reason for SGCN Designation: A regional species of concern with limited data in North Dakota but the most likely range includes the Turtle Mountains, Pembina Gorge, and Devils Lake Hills. Also, an at-risk species based on expert review (SGCN c). *Aeshna subarctica* has a sparse distribution across the United States but more discoveries due to increased survey effort in recent years have their range expanding.

Habitat: Occurs in swamps, fens, and bogs with a clearly defined vegetative boundary.

Threats: Extremely limited habitat availability, wetland drainage, land development, climate change, energy development, eutrophication, and agricultural practices.

Research and Monitoring: Limited research has been conducted. The North Dakota Department of Environmental Quality (NDDEQ) conducts biological monitoring surveys on State waters as part of their Index of Biotic Integrity (IBI) development. Additionally, a monitoring protocol for aquatic invertebrates is being developed by the North Dakota Game and Fish Department (NDGF) under the State Wildlife Grant Program with implementation as a future goal. Additionally, a survey of aquatic invertebrates in cooperation with Valley City State University is currently underway to gain additional baseline information on SGCN's.

Management Recommendations:

- Protect and conserve large, intact tracks of native/unbroken forested areas.
- Develop/maintain buffers along riparian areas.
- Partner with local, state, and federal entities to limit chemical use in/near aquatic habitats.
- Encourage efficient use of pesticides.