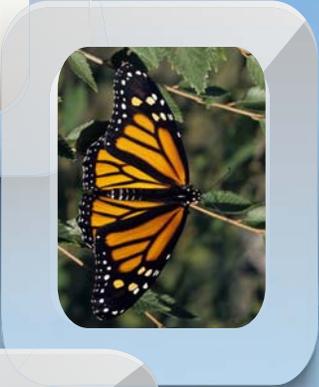


NORTH DAKOTA STATE WILDLIFE ACTION PLAN

2015



North Dakota State Wildlife Action Plan

July 1, 2015

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Recommended citation:

Dyke, Steve R., Sandra K. Johnson, and Patrick T. Isakson. 2015. North Dakota State Wildlife Action Plan. North Dakota Game and Fish Department, Bismarck, ND.

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LIST OF ACRONYMS

ACEP	Agricultural Conservation Easement Program
ALE	Agricultural Land Easement
CARA	Conservation and Reinvestment Act
CRP	Conservation Reserve Program
CWCS	Comprehensive Wildlife Conservation Strategy
FY	Fiscal Year
GSS	Grasslands of Special Environmental Significance
HAPET	Habitat and Population Evaluation Team
NDDH	North Dakota Department of Health
NDDTL	North Dakota Department of Trust Lands
NDFS	North Dakota Forest Service
NDGFD	North Dakota Game and Fish Department
NDPRD	North Dakota Parks and Recreation Department
NRCS	Natural Resources Conservation Service
SCP	Species of Conservation Priority
SWAP	State Wildlife Action Plan
SWG	State Wildlife Grant
USACE	US Army Corps of Engineers
USBLM	US Bureau of Land Management
USBR	US Bureau of Reclamation
USDA	US Department of Agriculture
USFS	US Forest Service
USNPS	US National Park Service
USFWS	US Fish and Wildlife Service
WCRP	Wildlife Conservation and Restoration Program

ACKNOWLEDGEMENTS

Many colleagues, state and federal agencies and organizations contributed to the development and review of this plan. Since the first iteration of the plan in 2005, existing partnerships have strengthened and new alliances formed. The list of those who knowingly or unknowingly provided their support and input is extensive. We are thankful to all of you. State Wildlife Grant funded projects have contributed immensely to the foundation of this plan and the tremendous amount of information gained on Species of Conservation Priority is because of excellent researchers, technicians, and students. Most of all, we are thankful to all the partners who implemented the plan and conserved, enhanced or restored habitat necessary to sustain fish and wildlife species. The Teaming With Wildlife coalition has persistently advocated for the State Wildlife Grants program and implementation of State Wildlife Action Plans, with the primary intent of preventing wildlife from becoming endangered. For this, we are grateful.

ROAD MAP TO THE EIGHT REQUIRED ELEMENTS

This section is provided for the Regional Review Team (RRT) to help identify each of the eight required elements within North Dakota’s State Wildlife Action Plan. Please refer to the following table for locating where each required element was addressed in the development of the State Wildlife Action Plan.

Required Element	Section , Page #	Table/Figure, Page #	Appendix, Page #
<u>Element 1:</u> Information on the distribution and abundance of species of wildlife, including low and declining populations as the state deems appropriate, that are indicative of the diversity and health of the state’s wildlife.	Sec. 3, pp. 15-22	Table 1, p. 19	Appendix A-F, pp. 141-411
<u>Element 2:</u> Descriptions of locations and relative condition of key habitats and community types essential to conservation of species identified in (1).	Sec. 2, pp. 7-13 Sec. 4, p. 23 Sec. 5, pp. 34-119	Table 2., p.35 Fig. 4, p. 11 Fig. 5, p. 14 Fig. 7, p. 27 Fig. 10-39, pp. 36-111 Fig. 42, p. 127	Appendix A-F, pp. 141-411.
<u>Element 3:</u> Descriptions of problems which may adversely affect species identified in (1) or their habitats, and priority research and survey efforts needed to identify factors which may assist in restoration and improved conservation of these species and habitats.	Sec. 4, pp. 23-33	Table 3., p. 54 Table 4., p. 63 Table 5., p. 66 Table 7., p. 97 Table 8., p. 112	Appendix A-F, pp. 141-411
<u>Element 4:</u> Descriptions of conservation actions determined to be necessary to conserve the identified species and habitats and priorities for implementing such actions.	Sec. 4, pp. 23-33	Table 3., p. 54 Table 4., p. 63 Table 5., p. 66 Table 7., p. 97 Table 8., p. 112	Appendix A-F, pp. 141-411
<u>Element 5:</u> Proposed plans for monitoring species identified in (1) and their habitats, for monitoring the effectiveness of the conservation actions proposed in (4), and for adapting these conservation actions to respond appropriately to new information or changing conditions.	Sec. 6, pp. 120-132	Fig. 40, p. 121 Fig. 41, p. 123 Fig. 42, p. 127	Appendix A-F, pp. 141-411.
<u>Element 6:</u> Descriptions of procedures to review the Comprehensive Wildlife Conservation Strategy at intervals not to exceed 10 years.	Sec. 7, p. 134	Fig. 40, p. 121 Fig. 41, p. 123	
<u>Element 7:</u> Plans for coordinating, to the extent feasible, 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.	Sec. 8, pp. 135-140	Fig. 8, P. 29	
<u>Element 8:</u> Provisions to ensure public participation in the development, revision, and implementation of projects and programs. Congress has affirmed that broad public participation is an essential element of this process.	Sec. 8, pp. 135-140	Table 9., p. 138 Table 10., P. 138 Table 11., p. 139	

SUMMARY OF SIGNIFICANT CHANGES

The revised North Dakota State Wildlife Action Plan is similar in layout to the 2005 Comprehensive Wildlife Conservation Strategy. Major changes are summarized as follows:

- The title of the document has been changed from “Comprehensive Wildlife Conservation Strategy” to “State Wildlife Action Plan.”
- Twenty species have been added to the list of Species of Conservation Priority, five were removed, and several insects have now been included.
- Focus Areas have been modified based on the latest spatial databases and analysis, to reflect current key habitats and community types.
- The “Conservation Problems and Conservation Action” tables have been modified to follow Salafsky et al. 2008, A Standard Lexicon for Biodiversity Conservation: Unified Classifications of Threats and Actions. Tables 3, 4, 5, 6, 7 and 8 represent a significant update and expansion of Direct Threats and Conservation Actions for key habitat types.
- Species of Conservation Priority accounts in Appendix A-F have been updated with recent information, including revisions to species range maps and current species research or habitat needs.
- A Climate Change addendum has been included.
- Although not included as an addendum in the State Wildlife Action Plan, a comprehensive list of plant Species of Conservation Priority was developed by a state partner and is referenced.
- Coordination with partners and the public has been merged into one section (Section 8).

EXECUTIVE SUMMARY

The 2015 North Dakota State Wildlife Action Plan (SWAP) replaces the 2005 North Dakota Comprehensive Wildlife Conservation Strategy as the principle document for safeguarding rare and declining fish and wildlife species in North Dakota. This newer second 'edition' not only has a different name but has been revised to include new information generated by State Wildlife Grant (SWG) studies that have been conducted over the past ten years. Examples include but are not limited to changes to the species of conservation priority list, focus areas, range/distribution maps, threats and management actions.

The SWAP represents a strategy rather than a detailed plan to guide the process of preserving the state's fish and wildlife resources for the foreseeable future. This document is not a compilation of specific management plans for all the species of fish and wildlife at risk in North Dakota. There is simply not the knowledge at this point to compile such a document. This document is also not an implementation plan but rather a strategic vision with the goal of preserving the state's wildlife diversity. North Dakota's SWAP is intended to identify species of greatest conservation priority, provide fundamental background information, strategic guidance, input from partners, and most importantly, a framework for developing and coordinating conservation actions to safeguard all fish and wildlife resources.

The SWAP is built upon eight essential elements, identified by Congress, with an overall focus on the "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.

The number of species of conservation priority increased from 100 under the old plan to 115 in the current SWAP. While twenty new species were added to the list, five species were removed. The current list includes 47 birds, 2 amphibians, 9 reptiles, 21 mammals, 22 fish, 10 freshwater mussels and 4 insects. Each species was also given a priority designation based on conservation need. Level I species are those having a high level of conservation priority because of declining status in North Dakota or across their range; or have a high rate of occurrence in North Dakota, constituting the core of the species breeding range, but may be at-risk range-wide. Level II species are those having a moderate level of conservation priority; or a high level of conservation priority but a substantial level of non-SWG funding is available to them. Level III species are those having a moderate level of conservation priority but are believed to be peripheral or non-breeding in North Dakota. There are 36 Level I species, 44 Level II species, and 35 Level III species. A sizeable portion of the SWAP provides pertinent biological and habitat information and addresses elements 1-5 for each individual species.

The SWAP is a habitat based, rather than species based approach. We retained the previous landscape classification system which divided North Dakota into nine primary landscape components, which are essentially the state's major habitat types. They include Tallgrass Prairie (Red River Valley); Eastern Mixed-grass Prairie (Drift Prairie); Mixed-grass Prairie (Missouri Coteau); Western Mixed-grass/Short-grass prairie (Missouri Slope); Planted or Tame Grassland; Wetlands and Lakes; Rivers, Streams, and Riparian; Badlands; and Upland Forest. Details for Elements 2-4 are provided on each of these landscape components (i.e. condition of the habitat, the major

problems affecting quality or quantity of it, and the conservation actions needed). It is important to recognize that species of conservation priority often depend on several habitat types or landscape components for survival. The key to ensuring their long-term survival is to maintain diverse grasslands, wetlands, woodlands, rivers and streams. These habitats cannot be reduced to certain isolated areas, but must occur over a broad landscape.

Current and desired monitoring efforts for species and habitats are addressed through Element 5. A flexible approach to monitoring yet conducting monitoring with performance measures in mind is needed. The NDGFD and its partners will attempt to continually evaluate conservation actions and treatments through various monitoring designs. New information will help guide and refine the process to allow for best management practices for species and habitat. If conservation actions are found to be ineffective in the management of the target species or habitat, steps will be taken to change the process.

When first developing the CWCS and later the SWAP, the NDGFD recognized the scope and magnitude of these endeavors and embraced the need to coordinate efforts with partners and solicit their input. We met individually with staff from all principle land management agencies in the state, universities, nongovernmental organizations, and the general public. The feedback we received from these groups and their willingness to participate in focus groups, provide comments on drafts of the CWCS, and their overall support was outstanding. Since these initial meetings we have continued coordinating aspects of the strategy with many of these partners to the point where we view them as integral to the implementation of the strategy. Element 7 continues to be one of the core strengths of North Dakota's SWAP.

The NDGFD is fortunate to have superb communication tools. From early on in the process, the public was informed of CARA, WCRP, SWG, the CWCS and now the SWAP via the NDGFD's monthly magazine, news releases, radio and television programs, website, and other media outlets throughout the state. A request for comments was sought after and welcomed if any was provided. The requirements of element 8 will be sustained throughout the future.

It's worth noting that the SWAP has added an important component, "Planning for Climate Change in North Dakota." The climate change addendum provides a spatial and temporal summary of temperature and precipitation changes for North Dakota and an assessment or prediction of how the state's species of conservation priority may be affected.

Completion of the SWAP marks the ten year anniversary of the first dedicated funding program for rare and declining fish and wildlife species in North Dakota. Although substantial progress was made in the past ten years considerable work remains. As North Dakota is experiencing widespread habitat threats and challenges, the SWAP will serve as an important tool in dealing with these issues.

SECTION 1

INTRODUCTION

This section provides an overview of the history of the State Wildlife Grant program, the State Wildlife Action Plan, and the purpose it serves for fish and wildlife in North Dakota.

HISTORY OF FUNDING SOURCES FOR RARE OR DECLINING SPECIES

In 1999, historic conservation legislation known as the Conservation and Reinvestment Act (CARA) was introduced in the US House of Representatives. CARA proposed to reinvest a portion of the revenue from federal offshore oil and natural gas leases into state, federal and local conservation programs such as wildlife restoration, parks and outdoor recreation, coastal conservation, and historic preservation. Since the mid-1950s, all the revenue (about \$4.5 billion annually) collected from oil and gas leases in the Outer Continental Shelf had been sent to the federal treasury. As currently written, CARA would guarantee \$3.1 billion annually for 15 years to be used nationwide for a variety of conservation purposes.

For a variety of reasons, Congress has not yet passed CARA. In its place, Congress provided 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 FY2001. This program, sometimes referred to as “CARA-lite,” provided \$50 million for distribution among states. In 2002, states received additional funding under a new program, State Wildlife Grants (SWG), for FY02 through the Department of Interior and Related Agencies Appropriations. The SWG program is similar to the WCRP but provided states with increased funding of \$85 million. Funding for FY03 through FY15 ranged from \$45 million to \$70 million per year.

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 percent or more than 5 percent of the total amount each year. Due to North Dakota’s sparse population in relation to its large size, it receives the minimum 1 percent of total funds. The annual federal apportionment the North Dakota Game and Fish Department has received ranges between \$400,000 and \$750,000. Fiscal years 01-15 provided North Dakota with more than \$7 million in federal funding. The SWG program is a matching grants program, meaning all federal dollars awarded must be matched with non-federal dollars. Although the match requirement has changed over the years the current requirement is that all projects require a 35 percent non-federal match for both implementation and planning purposes. SWG funding has decreased over the years, but the need for conservation of rare and declining species has only increased.

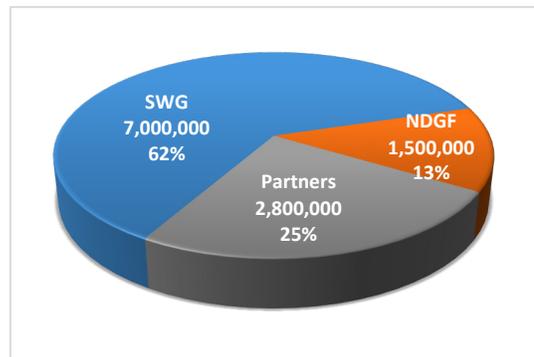


Figure 1. State Wildlife Grant, NDGFD and matching partner dollars spent on projects in North Dakota from 2001-2014.

THE CWCS AND SWAP

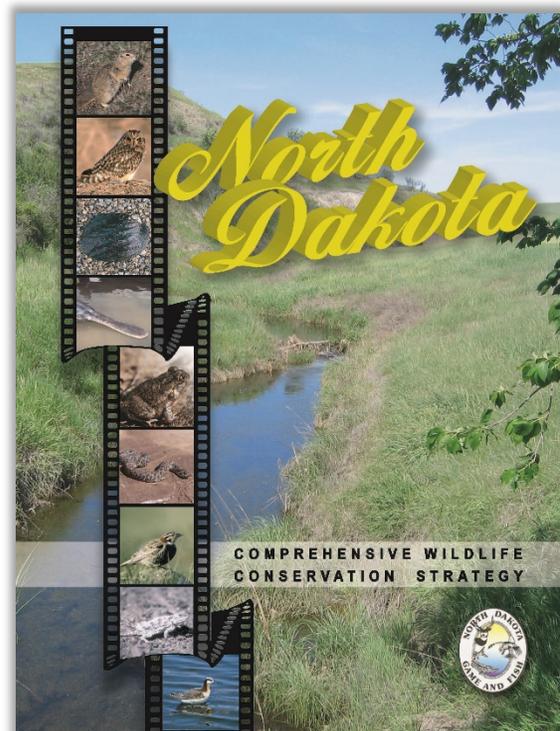
By accepting State Wildlife Grant funds, North Dakota and all other 49 states committed to completing a Comprehensive Wildlife Conservation Strategy (CWCS) by October 1, 2005. For guidance, congress identified eight required elements to be included in each state's CWCS.

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 Species of Conservation Priority (SCP) in North Dakota);
2. The location and relative condition of key habitats and community types essential to the conservation of each State's SCP;
3. The problems which may adversely affect SCP or their habitats, and priority research and surveys needed to identify factors which may assist in restoration and improved conservation of SCP and their habitats;
4. The actions necessary to conserve SCP and their habitats and priorities for implementing such conservation actions;
5. The provisions for periodic monitoring of SCP 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, and local agencies and Indian Tribes;
8. Provisions to provide necessary public participation in the development, revision, and implementation of the Strategy.

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

North Dakota's first CWCS was approved in October 2005. It is a 453 page document that 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.



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 states plan never changed, we nonetheless refer to it as a SWAP rather than a CWCS.

EFFECTIVENESS OF SWG AND SWAP

In the 13 or more years SWG has been in existence in North Dakota, nearly 60 individual projects with 26 different partners have been initiated. While the projects have been fairly wide ranging they can be generally described as falling into one of three categories: 1) research and monitoring; 2) habitat improvement; and 3) planning.

With limited funding resources and an overabundance of needs, the Department strives to balance the amount of survey and research projects while still contributing substantial efforts to improve fish and wildlife habitat. A total of 39 research projects have been conducted on dozens of different 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 occurrence have been documented in North Dakota as a result of these studies. Specifics of SWG projects on species and knowledge gained is provided in the SCP accounts.

For habitat related efforts, SWG has partnered on about a dozen projects. These projects include efforts to restore, enhance or maintain grassland, woodland and wetland habitat. To date our efforts have resulted in the following totals: 1) nearly 13,000 acres restored 2) 21,500 acres enhanced 3) 82,000 protected. It is important to note that these habitat accomplishments are the result of numerous partners and efforts. Recognition of habitat achievements is maintained by all.

While the 2005 CWCS 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 SWAP's not to exceed 10 years. The NDGFD's 10 year deadline for doing that is October of 2015. 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 2013 and has submitted a final draft to the United State Fish and Wildlife Service for consideration in July 2015. Similar to the effort that was used to create the states strategic plan in 2005, this effort will address the same 8 elements mentioned earlier.

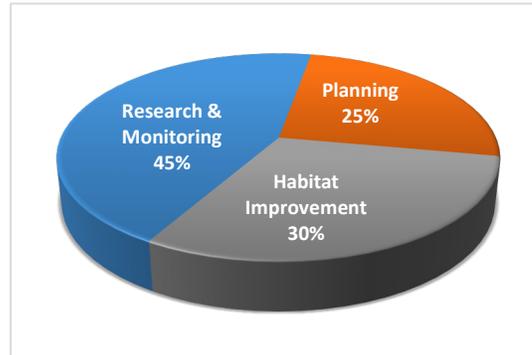


Figure 2. Percentage of SWG funds by project type.

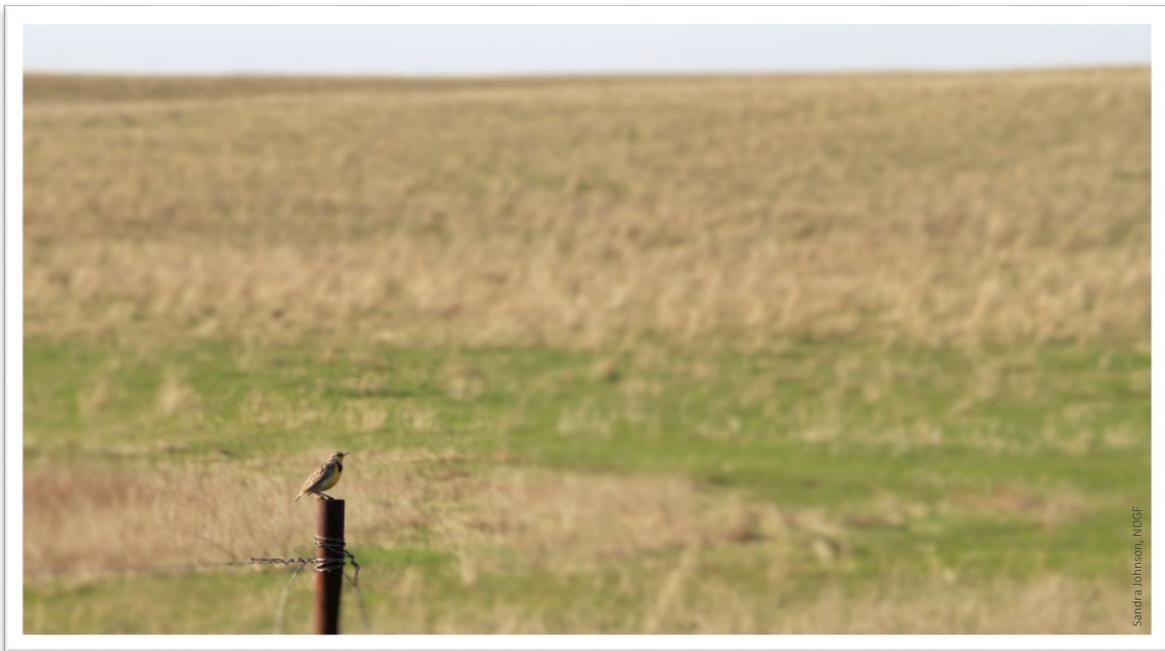


Figure 3. Acres of habitat improved as a result of SWG projects.

WHY NORTH DAKOTA NEEDS A STATE WILDLIFE ACTION PLAN

Why does North Dakota need a SWAP focused mainly on nongame species of conservation priority? In North Dakota, nongame wildlife represents more than 80 percent of the state's vertebrate fauna. Nearly 400 species of birds, roughly 80 species of mammals, about 75 fish, 15 reptiles, and 11 amphibians inhabit North Dakota. Freshwater mussels, crustaceans, and insects are also considered nongame. Often times nongame are the rarer and/or less studied species.

Nongame species are an integral component in the balance of nature. Populations for 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.



The Western Meadowlark has been added as a Species of Conservation Priority in the 2015 State Wildlife Action Plan. This iconic bird, listed as the North Dakota state bird in 1947, has declined precipitously over the past 50 years. This characteristic sight of a Meadowlark perched atop fence posts overlooking a stretch of grass has already been lost in some areas of the state.

SECTION 2

A LOOK AT NORTH DAKOTA

This section will give a brief description of common vegetation types and geology in North Dakota. Also included is a description of the Northern Great Plains climatology.

NATURAL VEGETATION

North Dakota is primarily a prairie state but there are a number of vegetation types unique to the Upper Midwest. This section describes the primary vegetative communities found in North Dakota.

Grasslands

Native prairie is generally divided into three main categories; tallgrass, mixed-grass, and shortgrass. Each of these prairie communities is comprised of a unique blend of grasses and forbs. North Dakota has all three grassland types though tallgrass prairie exists only in remnants of once vast acreage.

Tallgrass Prairie

Tallgrass prairie can include more than 200 plant species. The most common and dominant of these are big bluestem, switchgrass, indiangrass, and prairie dropseed. Other associated grasses include little bluestem, slender wheatgrass, porcupine grass, mat muhly, fescue sedge, and meadow sedge. Some common forbs include blue-eyed grass, meadow anemone, prairie cinquefoil, wild licorice, prairie blazing star, tall goldenrod, black-eyed susan, white sage, and prairie-fringed orchid. Tallgrass prairie once covered much of the central United States and Canada. It is estimated only 3 percent of it remains unplowed. North Dakota's remaining tallgrass prairie is found almost exclusively in the Red River Valley.



Mixed-grass Prairie

Mixed-grass prairie is a combination of tallgrass species found in eastern North Dakota and shortgrass species found farther west. It is dominated by warm and cool season grasses as well as sedges. Common grass species include prairie junegrass, Western wheatgrass, green needlegrass, needle-and-thread, blue grama, little bluestem, and needleleaf sedge. Other associated grasses include Canada wild-rye, spike oats, mat muhly, spikemoss, plains reedgrass, and buffalo grass. Mixed-grass prairie is also known for a rich variety of forbs such as pasque flower, western wall-flower, prairie smoke, Missouri milkvetch, lead plant, Indian breadroot, purple prairie clover, gaura, harebell, narrowleaf blazing star, ball cactus, purple coneflower, yarrow, and several species of goldenrods. Most of North Dakota is dominated by mixed-grass prairie. The



mixed-grass prairie can be further divided into the eastern (including the Drift Prairie and Missouri Coteau regions) and the western (Missouri Slope region).

Shortgrass Prairie

Found mostly in the elevated portions of the Missouri Slope region of North Dakota, this grassland habitat is dominated by warm season species that can survive on little rainfall. Grass species mature at 6 to 12 inches in height and include spikemoss, blue grama, needleleaf sedge, threadleaf sedge, buffalo grass, and needle-and-thread. Forbs include sandlily, white wild onion, death camas, buffalo-bean, purple loco, silverleaf, prickly pear, moss phlox, white beardtongue, and fringed sage.



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 that once existed. The highest wetland densities are in the Missouri Coteau and Drift Prairie, collectively known as the Prairie Potholes region. Wetland classifications vary slightly, but general definitions are as follows:

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.



Seasonal

Surface water is present for extended periods in spring and early summer, but usually disappears during late summer and fall.



Semi-permanent

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



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.



Alkali

Highly saline shallow water and alkali salt flats.



Farmed 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.

Forest

Forested habitats are found in only a few locations in North Dakota, and they do not cover large contiguous areas. A majority of the forest habitat is found in riparian zones. The Turtle Mountains and northeastern North Dakota contain some of the largest stands of aspen and bur oak. Small areas of Ponderosa pine and juniper forests occur in the southwest.

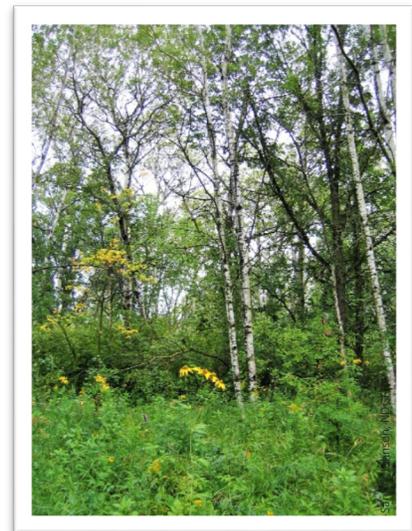
Riparian

A riparian zone is the area between a body of water and the adjacent upland, identified by soil characteristics and distinctive vegetation that requires an excess of water. It includes wetlands and those portions of the floodplain that support riparian vegetation. Generally it is comprised of trees and shrubs as well as understory vegetation, including a variety of grasses and forbs, but may be naturally devoid of trees. Eastern North Dakota riparian zones are dominated by green ash and elm trees where cottonwoods are prevalent in western zones of the state. Although this habitat type makes up a small area it is an important home to numerous wildlife species and is vital to stream health.



Aspen/Oak Forests

Aspen and oak make up 42 percent of North Dakota's forested lands. Aspen is dominant in these forest stands but bur oak, balsam poplar, box elder, green ash and paper birch are also present. Shrubs associated with this forest type are beaked hazel, highbush cranberry, Juneberry, chokecherry and raspberry. These stands are often found in association with lakes, wetlands, and grassy meadows.



Pine/Juniper Forests

This coniferous habitat is distributed throughout the North Dakota's badlands. Juniper or cedar trees, although native, are encroaching into areas not historically found. There is a small native stand of Ponderosa pine and a small stand of limber pine is located in Slope County.



GEOGRAPHY AND GEOLOGY

North Dakota sits geographically from longitude 97°W to 104° W and latitude 45° 55'N to 49°N and is the 19th largest state. It is 211 miles north to south and 340 miles east to west and for a total 70,704 square miles. Dependent upon weather conditions, 2 to 4 percent of that area may be covered by water. North Dakota is bordered by Minnesota on the east, Montana on the west, South Dakota to the south, and the Canadian provinces Manitoba and Saskatchewan to the north. The state's highest point is White Butte in the southwestern corner of the state, standing at 3,506 feet above sea level. The lowest point at 750 feet above sea level is in extreme northeastern North Dakota.



Figure 4. Ecoregions of North Dakota.

Geological Regions

Red River Valley

The Red River forms the eastern border of North Dakota. The Red River Valley extends 30 to 40 miles on either side of the river. This flat plain was once the bed of Glacial Lake Agassiz. Most of the region is covered by silt and clay deposits consistent with a lake bottom. Beach ridges scattered throughout the valley mark the former shoreline of the giant lake, at various periods of time. The valley rises 500 feet over a bedrock escarpment to mark the natural boundary of the Red River Valley.



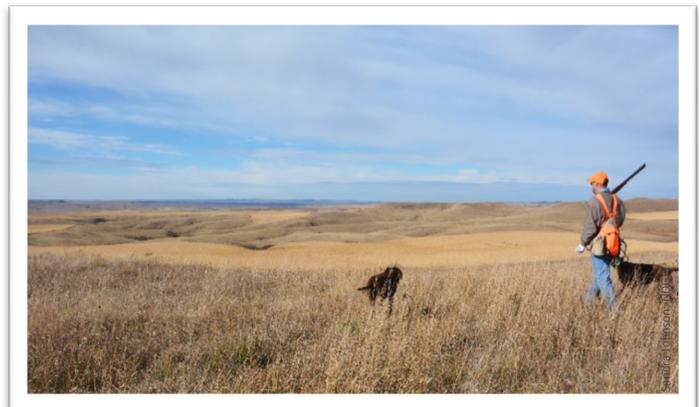
Drift Prairie

The Drift Prairie extends diagonally from northwestern to southeastern North Dakota. The land is glaciated, appearing generally flat with washboard like undulations. Soil and weather conditions promote a transition zone between short and tallgrass prairie species. High concentrations of seasonal and temporary wetlands are interspersed throughout the landscape. Grain farming is the major land use of this region, but also soybeans, dry beans, corn and canola.



Missouri Coteau

The Missouri Coteau extends east from the Missouri River to the western edge of the Drift Prairie. This marks the western edge of the glaciated land in North Dakota. Wetlands are numerous on the eastern edge of the Coteau, decreasing toward the Missouri River. Dominant land use is a mixture of small grain, corn, soybean and sunflower farming and livestock ranching.



Missouri Slope

The Missouri Slope's sandstone and shale layers were largely unaffected by glaciers that covered the eastern half of North Dakota. The area has an irregular topography with the occasional butte rising above the landscape. Complex drainage systems cut breaks through the topography. Livestock grazing is the predominant use, with some small grain farming mixed in.



Badlands

North Dakota's badlands are a series of buttes, rock outcrops, washouts, and hard wood draws along the banks of the Little Missouri River. The area is characterized by poor soil, steep slopes, high erosion, and shortgrass prairie.



Turtle Mountains

The Turtle Mountains are located in the extreme north central extent of the Drift Prairie. This land form is known as an erosional outlier and covers nearly 1,000 square miles and rises 800 feet above the surrounding landscape.



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

Annual precipitation ranges from 13 to 20 inches a year. 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 rainfalls than the surrounding plains, due to higher elevations.

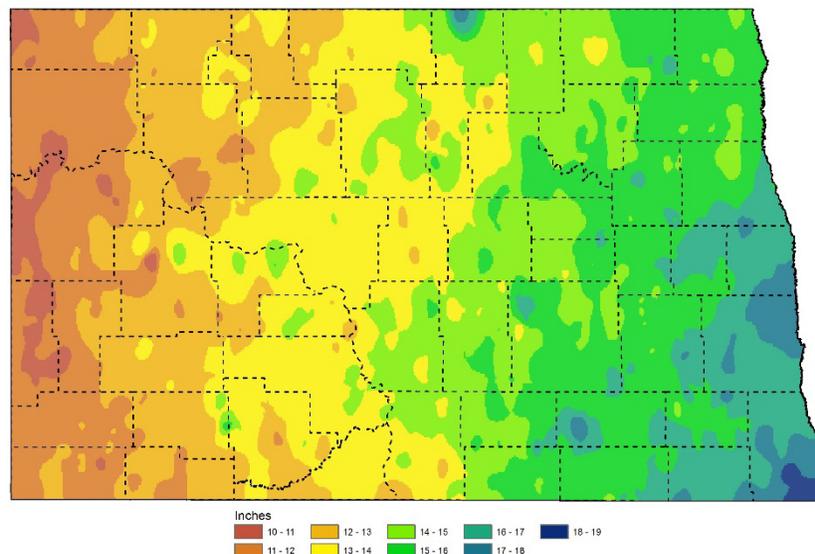


Figure 5. Average season (April – September) precipitation for 30 year period ending 2010. Data from State Water Commission.

SECTION 3

SPECIES OF CONSERVATION PRIORITY

This section includes information on the following required element:

Element 1: A primary requirement of the SWAP is to provide information on the distribution and abundance of wildlife species, including low and declining populations as the North Dakota Game and Fish Department deems appropriate, that are indicative of the diversity and health of the state's wildlife.

DEFINING SPECIES OF CONSERVATION PRIORITY

The original guidance for interpreting Element 1 and the species of conservation priority list was provided by the State Wildlife Grants FY 2002 program implementation guidance:

- The term wildlife means “any species of wild, free-ranging fauna including fish, and also fauna in captive breeding programs, the object of which is to reintroduce individuals of a depleted indigenous species in a previously occupied range.”
- Species must be fauna, not flora, and *may* include aquatic species and invertebrates. States have the option of choosing which taxonomic units to include.
- The list may include both hunted and non-hunted species. States have the option of whether or not to include game species on the list.
- The list may include current federally threatened or endangered species, state listed, or species of concern.
- The list is subject to change and reorganization as new information becomes available and as the status and conservation need of species changes.
- Species on the list may be prioritized for directing conservation efforts, monitoring, or research.
- The state is not obligated to implement conservation actions for all species immediately. Species needs vary and many may not be addressed for several years.

The Revision Process

The original species of conservation priority (SCP) list was developed for the first iteration of North Dakota's Wildlife Action Plan by using the most recent information available at the time as well as expert and public review. Its development was well described in North Dakota's 2005 Comprehensive Wildlife Conservation Strategy. The development of an updated SCP list followed much the same plan with the exception of having an existing list to work from. Once again Department staff compiled the most current information available, including watch lists, recent publications and research. One noted change from the original plan was that much of this information came from data collected from State Wildlife Grant (SWG) projects, giving the Department range specific information on many species.

After sorting through the feedback provided by experts and the like, a preliminary list of species was developed. This included species being removed, added, or changes to their level of priority. The draft list was then shared with Department staff for their recommendations. Once changes were incorporated, the draft list was sent to partners for input. A final list was developed from this information.

Species Considered

All members of the following taxonomic groups that inhabit North Dakota were considered in the SWAP: birds, mammals, reptiles, amphibians, fish, and freshwater mussels. Game species, extirpated, federal threatened or endangered and migratory species were considered as well. Non-native species were not considered unless presently designated as naturalized.

Outside of the previously listed taxa the NDGFD chose to include prairie butterflies in the process of revising the SCP list. Invertebrates as a whole offer a tremendous challenge due to the data gaps present currently within the state's knowledge, but it was decided that there was sufficient information available to include prairie butterflies as species under consideration.

Addressing Invertebrates in the Future

In 2010 the NDGFD funded a SWG project with the University of North Dakota to develop background information on invertebrates in North Dakota. The objectives were to compile presence/absence data from museum collections, collate species lists and distribution from published data, conduct field surveys in select areas and amalgamate data from all of the aforementioned efforts. Upon completion, distribution maps are now available for 12 orders of insects that have been surveyed in North Dakota. This effort provided a good starting point and one to build off of for insect distribution in the state. (see Goodwin June 2014).

Section 7 explains the process and timeline for reviewing and updating the SWAP. The NDGFD anticipates compiling a checklist of invertebrates over time. As sufficient information is obtained, attempts will be made to develop a SCP list and associated habitat for those orders of invertebrates for future revisions. The NDGFD has recently partnered on two efforts to continue that process. The first effort will attempt to model the preferred habitat of eight insects that are thought to have declining population or habitat loss and fragmentation. Results of the modeling effort will help target specific locations for survey and monitoring. The second effort will focus on surveys of aquatic invertebrates in select rivers of the state.

Addressing Plants

The inclusion of plant SCP is not a requirement of the SWAP and currently funds are not available for use on projects strictly for conservation of rare or at risk plants. That being said plants are an extremely important component of the landscape and conservation of North Dakota. A list of plant SCP of conservation priority was developed by the North Dakota Parks and Recreation Natural Heritage Program and may be used to complement the SWAP (see North Dakota Natural Heritage Program 2013 or access online at <http://gf.nd.gov/wildlife/programs-grants/wildlife-action-plan>).

Rationale

Original development of a species of conservation priority list was based on varying degrees of rarity, geographic range, breeding status, (e.g., watch, candidate, peripheral, extirpated, etc.), and others. However, having fewer categories became less confusing and more accurately represented the level of knowledge for a broad range of species. In addition, placing species into levels of conservation priority allowed us to focus on those species in greatest need of conservation.

Several species included on the list are considered common in North Dakota, or at least, not declining. These species were included because of the state's importance as a last stronghold for that particular population, or

because of their contribution to species diversity in North Dakota. These are “responsibility” species for which North Dakota has a long-term stewardship role, even if there is no immediate need for conservation here. For example, the American white pelican is found in great numbers in North Dakota, but is designated as vulnerable, imperiled, or critically imperiled in 27 states and provinces.

Process Used for Identifying Species of Conservation Priority

The methods for identifying avian SCP differed from those used to identify mammals, reptiles, amphibians, fish and freshwater mussels. This is in part due to a much greater amount of information available on birds and more intense, longer, and nationwide survey of bird status in North Dakota and North America.

Birds

There are numerous regional, national, and international planning efforts in place for conservation of birds. Perhaps the best recognized is the North American Waterfowl Management Plan and subsequent joint venture plans. Recently, additional efforts have focused on waterbirds, shorebirds, and landbirds. These initiatives include Waterbird Conservation for the Americas, US Shorebird Conservation Plan, and Partners in Flight North American Land Bird Conservation Plan. These plans provide a national or even international, very broad synopsis of topics such as populations, conservation goals and strategies, scientific and communication needs. Regional efforts such as the Northern Prairie and Parkland Waterbird Conservation Plan and the Northern Plains/Prairie Potholes Regional Shorebird Conservation Plan have provided further detailed and researched topics.

These bird planning efforts have also identified species of conservation concern or prioritized species in need of conservation. The designations from these efforts were of value in identifying species of conservation priority for North Dakota. The first iteration of identifying bird SCP for the CWCS in 2005 involved cataloging all bird priority lists, their rankings, and any other available information, such as other state and federal lists. For the 2015 SWAP, a similar effort was made with updated list information. Some bird priority lists have not been updated since the 2005 plan, and others have been updated as recently as January 2015. Or in the case of the Partners in Flight Species Assessment, which was used extensively in the 2005 plan, a revised assessment scheme was completed in 2012. See the species accounts (Appendix A) for further explanation of how bird SCP were selected.

Amphibians, Reptiles, Mammals, Fish and Freshwater Mussels

Originally little site-specific information was available for nongame species in North Dakota so regional information along with expert opinion was relied upon. Sources for most taxonomic groups included but were not limited to the Nongame Management Plan for North Dakota (1988), Endangered, Threatened, and Peripheral Wildlife of North Dakota (1979), and the North Dakota Natural Heritage Inventory. From those available sources, the NDGFD generated a working draft of species of conservation priority. The list was finalized after review by experts from within the Department, other natural resource agencies and organizations, universities and the general public.

Revising the list of SCP for amphibians, reptiles, mammals, fish and invertebrates changed a bit from the original process. Over the last decade funds from the SWG program have been used to gather and update information for numerous species. The process for updating the list relied heavily on that information. Using the original list as a starting point, new information was then used to make initial or draft changes (i.e. add or remove species) to the list. After developing a draft SCP list, it was sent to over 60 partners for review and comment. All input was considered prior to developing a final SCP list. As before a species automatically made the list if it was designated as federally threatened or endangered.

Species of Conservation Priority Level Definitions

Once a species was designated as a SCP they were placed in one of three Levels. The levels were designated as a way to prioritize funding for SWG projects. The levels are defined as follows:

Level I: These are species which are in decline and receive little or no monetary support or conservation efforts. North Dakota Game and Fish Department has a clear obligation to use SWG funding to implement conservation actions that directly benefit these species.

Level I species are those having a:

- high level of conservation priority because of declining status either here or across their range
- or -
- high rate of occurrence in North Dakota constituting the core of the species breeding range (i.e. “responsibility” species) but are at-risk range wide

Level II: North Dakota Game and Fish Department will use SWG funding to implement conservation actions to benefit these species if SWG funding for Level I species is sufficient or conservation needs have been met.

Level II species are those having a:

- moderate level of conservation priority
- or -
- high level of conservation priority but a substantial level of non-SWG funding is available to them

Level III: These are North Dakota’s species having a moderate level of conservation priority but are believed to be peripheral or non-breeding in North Dakota.

Note that federally threatened and endangered species are assigned a level II category because other non-SWG funding is available, such as the Cooperative Endangered Species Conservation Fund. The important message to remember is regardless of level assignment, all species on the list are of concern for various reasons and there is an urgency to sustain them on the North Dakota landscape.



The Baird's Sparrow is a grassland nesting bird of the northern Great Plains.

Table 1. North Dakota Species of Conservation Priority 2015.

Level I	
Horned Grebe	<i>Podiceps auritus</i>
American Bittern	<i>Botaurus lentiginosus</i>
Swainson's Hawk	<i>Buteo swainsoni</i>
Ferruginous Hawk	<i>Buteo regalis</i>
Greater Sage-Grouse	<i>Centrocercus urophasianus</i>
Yellow Rail	<i>Coturnicops noveboracensis</i>
Long-billed Curlew	<i>Numenius americanus</i>
Marbled Godwit	<i>Limosa fedoa</i>
Wilson's Phalarope	<i>Phalaropus tricolor</i>
Franklin's Gull	<i>Leucophaeus pipixcan</i>
Black Tern	<i>Chlidonias niger</i>
Black-billed Cuckoo	<i>Coccyzus erythrophthalmus</i>
Red-headed Woodpecker	<i>Melanerpes erythrocephalus</i>
Sprague's Pipit	<i>Anthus spragueii</i>
Grasshopper Sparrow	<i>Ammodramus savannarum</i>
Baird's Sparrow	<i>Ammodramus bairdii</i>
Nelson's Sparrow	<i>Ammodramus nelsoni</i>
Lark Bunting	<i>Calamospiza melanocorys</i>
Chestnut-collared Longspur	<i>Calcarius ornatus</i>
Canadian Toad	<i>Anaxyrus hemiophrys</i>
Plains Spadefoot	<i>Spea bombifrons</i>
Smooth Green Snake	<i>Opheodrys vernalis</i>
Plains Hog-nosed Snake	<i>Heterodon nasicus</i>
Townsend's Big-eared Bat	<i>Corynorhinus townsendii</i>
Big Brown Bat	<i>Eptesicus fuscus</i>
Little Brown Bat	<i>Myotis lucifugus</i>
Northern Long-eared Bat	<i>Myotis septentrionalis</i>
Black-tailed Prairie Dog	<i>Cynomys ludovicianus</i>
Sturgeon Chub	<i>Marcchybopsis gelida</i>
Sicklefin Chub	<i>Marcchybopsis meeki</i>
Northern Pearl Dace	<i>Margariscus nachtriebi</i>
Blue Sucker	<i>Cycleptus elongatus</i>
Creek Heelsplitter	<i>Lasmigona compressa</i>
Pink Papershell	<i>Potamilus ohioensis</i>
Monarch Butterfly	<i>Danaus plexippus</i>
Regal Fritillary	<i>Speyeria idalia</i>

Level II	
American White Pelican	<i>Pelecanus erythrorhynchos</i>
Northern Pintail	<i>Anas acuta</i>
Canvasback	<i>Aythya valisineria</i>
Lesser Scaup	<i>Aythya affinis</i>
Northern Harrier	<i>Circus cyaneus</i>
Golden Eagle	<i>Aquila chrysaetos</i>
Bald Eagle	<i>Haliaeetus leucocephalus</i>
American Kestrel	<i>Falco sparverius</i>
Prairie Falcon	<i>Falco mexicanus</i>
Sharp-tailed Grouse	<i>Tympanuchus phasianellus</i>
Greater Prairie-Chicken	<i>Tympanuchus cupido</i>
Piping Plover	<i>Charadrius melodus</i>
American Avocet	<i>Recurvirostra americana</i>
Willet	<i>Tringa semipalmatus</i>
Upland Sandpiper	<i>Bartramia longicauda</i>
Least Tern (Interior)	<i>Sterna antillarum athalassos</i>
Short-eared Owl	<i>Asio flammeus</i>
Burrowing Owl	<i>Athene cunicularia</i>
Loggerhead Shrike	<i>Lanius ludovicianus</i>
Dickcissel	<i>Spiza americana</i>
Le Conte's Sparrow	<i>Ammodramus leconteii</i>
Bobolink	<i>Dolichonyx oryzivorus</i>
Western Meadowlark	<i>Sturnella neglecta</i>
Snapping Turtle	<i>Chelydra serpentina</i>
Short-horned Lizard	<i>Phrynosoma hernandesi</i>
Pygmy Shrew	<i>Sorex hoyi</i>
Richardson's Ground Squirrel	<i>Urocyon richardsonii</i>
Swift Fox	<i>Vulpes velox</i>
River Otter	<i>Lontra canadensis</i>
American Marten	<i>Martes americana</i>
Black-footed Ferret	<i>Mustella nigripes</i>
Paddlefish	<i>Polyodon spathula</i>
Pallid Sturgeon	<i>Scaphirhynchus albus</i>
Burbot	<i>Lota lota</i>
Northern Redbelly Dace	<i>Chrosomus eos</i>
Silver Chub	<i>Marcchybopsis storeriana</i>
Flathead Chub	<i>Platyqobio gracilis</i>
Trout-perch	<i>Percopsis omiscomaycus</i>
Threeridge	<i>Amblema plicata</i>
Wabash Pigtoe	<i>Fusconaia flava</i>
Black Sandshell	<i>Ligumia recta</i>
Pink Heelsplitter	<i>Potamilus alatus</i>
Dakota Skipper	<i>Hesperia dactotae</i>
Poweshiek Skipperling	<i>Oarisma poweshiek</i>

Level III	
Whooping Crane	<i>Grus americana</i>
Red Knot (Rufa)	<i>Calidris canutus rufa</i>
Peregrine Falcon	<i>Falco peregrinus</i>
Brewer's Sparrow	<i>Spizella breweri</i>
McCown's Longspur	<i>Calcarius mccownii</i>
Smooth Softshell	<i>Apalone mutica</i>
Spiny Softshell	<i>Apalone spinifera</i>
False Map Turtle	<i>Graptemys pseudogeographica</i>
Sagebrush Lizard	<i>Sceloporus graciosus</i>
Northern Prairie Skink	<i>Plestiodon septentrionalis</i>
Arctic Shrew	<i>Sorex arcticus</i>
Merriam's Shrew	<i>Sorex merriami</i>
Western Small-footed Bat	<i>Myotis ciliolabrum</i>
Long-eared Bat	<i>Myotis evotis</i>
Long-legged Bat	<i>Myotis volans</i>
Hispid Pocket Mouse	<i>Chaetodipus hispidus</i>
Plains Pocket Mouse	<i>Peroquathus flavescens</i>
Sagebrush Vole	<i>Lemmyscus curtatus</i>
Eastern Spotted Skunk	<i>Spilogale putorius</i>
Gray Fox	<i>Urocyon cinereoargenteus</i>
Chestnut Lamprey	<i>Ichthyomyzon castaneus</i>
Silver Lamprey	<i>Ichthyomyzon unicuspis</i>
Largescale Stoneroller	<i>Campostoma oligolepis</i>
Hornyhead Chub	<i>Nocomis biguttatus</i>
Pugnose Shiner	<i>Notropis anogenus</i>
Blacknose Shiner	<i>Notropis heterolepis</i>
Carmine Shiner	<i>Notropis percobromis</i>
Finescale Dace	<i>Phoxinus neogaeus</i>
Yellow Bullhead	<i>Ameiurus natalis</i>
Logperch	<i>Percina caprodes</i>
River Darter	<i>Percina shumardi</i>
Mapleleaf	<i>Quadrula quadrula</i>
Fragile Papershell	<i>Leptodea fragilis</i>
Deertoe	<i>Truncilla truncata</i>
Creeper	<i>Strophitus undulatus</i>

Summary of Changes to the Species of Conservation Priority

The number of species on the list increased from 100 to 115.

There are 36 level I, 44 level II, and 35 level III species of conservation priority.

- 47 birds
- 2 amphibians
- 9 reptiles
- 21 mammals
- 22 fish
- 10 mussels
- 4 insects

Added

Lesser Scaup
Rufa Red Knot
American Kestrel
Western Meadowlark
Spiny Softshell
Townsend's Big-eared Bat
Big Brown Bat
Little Brown Bat
Northern Long-eared Bat
American Marten
Merriam's Shrew
Gray Fox
Burbot
Fragile Papershell
Deertoe
Creeper
Dakota Skipper
Poweshiek Skipperling
Monarch Butterfly
Regal Fritillary

Removed

Redhead
Sedge Wren
Redbelly Snake
Gray Wolf
Flathead Catfish

Moved from Level I to Level II

American White Pelican
Willet
Upland Sandpiper

Moved from Level II to Level III

Mapleleaf

Moved from Level II to Level I

Greater Sage-grouse
Red-headed Woodpecker
Creek Heelsplitter

Moved from Level III to Level I

Pink Papershell

Name Changes/Modifications

Nelson's Sharp-tailed Sparrow to Nelson's Sparrow
Western Hognose Snake to Plains Hog-nosed Snake
Northern Sagebrush Lizard to Sagebrush Lizard
Common Snapping Turtle to Snapping Turtle
Central Stoneroller to Large Scale Stoneroller
Rosyface Shiner to Carmine Shiner
Pearl Dace to Northern Pearl Dace

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SECTION 4

IDENTIFYING HABITAT, THREATS AND CONSERVATION ACTIONS

This section includes background information on how the following required elements were addressed and developed in the North Dakota State Wildlife Action Plan 2015:

Element 2: This element requires descriptions of locations and relative condition of key habitats and community types essential to species of conservation priority.

Element 3: This element requires descriptions of problems that may adversely affect species of conservation priority or their habitats.

Element 4: This element requires descriptions of conservation actions necessary to conserve the species of conservation priority, and habitats and priorities for implementing such actions.

OVERVIEW OF HABITAT AND COMMUNITY TYPES

North Dakota's natural habitat was predominantly prairie. Prior to settlement in the late 1800s, North Dakota was described as "great uninterrupted expanses of nearly treeless prairie...the only extensive tracts of forest were restricted to floodplains and east- or north-facing bluffs along rivers and large creeks to certain prominent hills or escarpments...and hundreds of thousands of shallow ponds and lakes in the glaciated regions" (Stewart, 1976). This wetland resource was thought to exceed 4 million acres.

Over the past 150+ years, the landscape has changed dramatically. Although tracts of native prairie still exist in many areas, they are traversed by a road nearly every mile. It is estimated that more than 50 percent of the prairie and wetlands have been plowed or drained. Numerous tree shelterbelts were planted to help reduce erosion and protect farmsteads, which provides habitat for some species but may interfere with the lifecycle of others, such as grassland nesting birds. Several large reservoirs were constructed including Lake Sakakawea which altered the natural flooding cycle of the Missouri River, North Dakota's largest riparian system. The landscape described by many early explorers and pioneers has changed considerably. North Dakota is not the vast expanse of treeless prairie it once was. There is, however, great potential to protect, conserve, and enhance what remains and what was lost. Figure 6 provides a breakdown of the major land classes present in North Dakota today.

Habitat or Community Types Considered in the State Wildlife Action Plan

North Dakota habitat is a dynamic ecosystem. Due to varying temperature and rainfall, one portion of the state can be experiencing drought while at the same time another could be enduring a flood. The changes can also be quite drastic from one year to the next. A good example of this is the wet/dry cycles of the wetland/prairie landscape. Prairie potholes can be overflowing one year and dry the next. This natural cycle of boom and bust can dramatically affect individual species presence/absence, range, distribution and relative abundance in a given area over time. Such change and variability can make identifying specific locations of key habitat somewhat difficult, particularly when population survey data is lacking. As a result, North Dakota's State Wildlife Action Plan emphasizes identifying important habitats and landscapes within geographic areas, rather than specific site

locations. Using this approach, species of conservation priority were combined into habitat guilds when describing essential habitats within a geographic area.

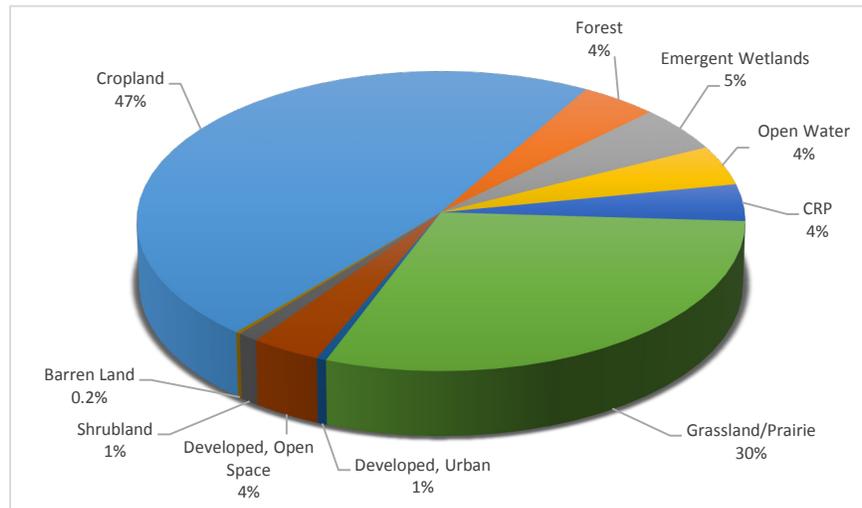


Figure 6. North Dakota land classes and percentage of land mass (70,762 mi²).

Identifying Key Habitats and Community Types

North Dakota is a fairly large state and complete ecological assessments have not been conducted for the majority of the state. Therefore, the relative condition of these habitat types is generally lacking and can be described only in broad terms. A landscape approach in conservation planning has numerous advantages. For example, it allows us to:

- Link a species of conservation priority to a key landscape/habitat, sometimes within a specific geographic area, or in some instances, multiple landscape components.
- Provide a listing of all other fish and wildlife using the landscape component (i.e. comprehensive).
- Provide relative condition applicable to that landscape component.
- Identify priority conservation problems (direct threats) in a landscape component.
- Identify corresponding conservation actions needed in the landscape component, and identify potential partners that are, or could be currently addressing them.
- Provide an objective for accomplishing a conservation goal within a landscape component.
- Identify research or survey efforts needed within a landscape to obtain information necessary to verify conservation problems and conservation actions needed.
- Provide information regarding ideal habitat/landscape characteristics in a given area, so as to provide a landscape goal to work toward.
- Provide information regarding management effects on species in a given area, as management practices can have varying effects geographically (see species accounts).

Resources Used for Delineating Habitat

This describes the information sources used for identifying key habitats and community types for the North Dakota State Wildlife Action Plan. For this purpose, these areas are defined as landscape components, since these are the principal habitats or community types in North Dakota. Three primary tools were used to identify landscape components: land cover information, existing spatial frameworks (i.e. ecoregions) and statistical models built from biological data or species observation data.

Land Cover

Land cover classifications are derived from remotely sensed imagery. Land cover depicts the physical land type such as wetlands, agriculture, or herbaceous types, and provides data and maps to better understand the physical features of a particular area, in this instance for the entire state of North Dakota. Several land cover classifications are available for North Dakota and recent datasets have been published since the first iteration of the CWCS in 2005. Land cover classifications vary by the developer and type of information sought. Accuracy of the data also is dependent on a variety of factors and no specific land cover is perfect. However, land covers provide the best available information on the physical features of the land. The following are key land covers used in delineating landscape components for the 2015 State Wildlife Action Plan:

- USGS GAP Land Cover Data Set 2010 - Satellite imagery used from 1999-2001 as its primary base, other datasets were also included such as digital elevation models and vegetation index. There are 53 land classes for North Dakota which may be displayed at varying levels of detail. The ground resolution is 30x30 meters. A defect of this land cover includes considerable misclassification of grassland as recently burned shrubland.
- National Land Cover Database 2011 – Sometimes referred to as the definitive Landsat-based land cover database for the entire nation. There are 16 land cover classifications that have been applied consistently across the United States in 2001, 2006 and now 2011. This allows for analysis of land cover changes and trends. The ground resolution is 30x30 meters. Planning is underway for a 2016 product. A limitation is lack of differentiating between grassland types.
- NASS (National Agricultural Statistics Service) Cropland Data Layer 2013 – The Cropland Data Layer (CDL) is produced annually to provide acreage estimates for major crop commodities. There are more than 100 land classifications, focused primarily on cropland types. The ground resolution is 30x30 meters. A limitation is lack of differentiating between grassland types.
 - National 2013 Cultivated Layer – NASS also produces a layer which identifies cultivated and non-cultivated land cover. This is useful for identifying potential native prairie, i.e. un-cultivated land.
- USFWS Land Cover Classification 2002 – The USFWS first developed a land classification for the Prairie Pothole Region in 1996 and updated the map in 2002. Imagery used dates from the late 1990's through 2002. There are 9 land classifications. The ground resolution is 28x28 meters. The major limitation is it only encompasses the portion of North Dakota north and east of the Missouri River, nearly 1/3 of the state is not represented in this land cover.

Extant Native Prairie

The North Dakota Game and Fish Department produced a dataset of native prairie habitat in North Dakota. The processes used to classify this data include various techniques combining a variety of resources. These resources include several landuse/landcover datasets each having their strengths in the classification of specific cover types. It was determined to combine some of these datasets to reduce chance of omitting these specific grassland cover types. To prevent an over classification of native prairie additional data were utilized to filter out these occurrences. The filter data consists of NASS CDL cropland classification, NASS cultivated layer, and USDA Farm Service Agency CRP data. As additional filter datasets become available improvements may be made to acquire a recent representation of native prairie habitat in North Dakota.

Ecoregions

There are several large scale ecoregion classification schemes commonly used for North America. Although small variations are present, most schemes essentially divide North Dakota into three or four large spatial areas or ecoregions. Ecoregions are determined based on general similarity of geology, physiography, vegetation, climate, soils, land use, wildlife, and hydrology. Because there are differences between classification schemes, the U.S. Environmental Protection Agency (EPA) undertook a collaborative effort to develop a common framework of

ecological regions for North Dakota in the mid-1990s. Using this approach North Dakota was divided into four level III ecoregions: the Lake Agassiz Plain, the Northern Glaciated Plains, the Northwestern Glaciated Plains, and the Northwestern Great Plains. These ecoregions are also commonly referred to as the Red River Valley, Drift Prairie, Missouri Coteau, and Missouri Slope (see Figure 4). Level III ecoregions were further delineated into finer level IV ecoregions by the EPA and are useful for state-level planning activities. These designations and the more detailed level IV ecoregions formed the framework for delineating geographic areas of similar habitat.

Spatial Planning Tools

Spatially explicit models use the best available science to produce tools for conservation planning. They allow for smaller or more precise geographic conservation planning, which is especially important in North Dakota's dynamic landscape. The USFWS Habitat and Population Evaluation Team (HAPET) has developed several models useful in predicting areas of bird conservation priority for grassland/wetland species in the Prairie Pothole Region of North Dakota. Perhaps the most recognized product is the duck priority map which is used by conservation partners to prioritize and target conservation and management efforts where there are high densities of nesting ducks. The Grassland Bird Conservation Areas (GBCA) model was designed for a suite of grassland nesting birds that depend on large areas of grassland with minimal edge and a set distance from trees. The GBCAs were used to help delineate large expanses of grassland important to SCP. Other models depicting species presence/absence based on Breeding Bird Survey information for other grassland/wetland associated species, such as upland-nesting shorebirds, have been developed and were used wherever possible.

The North Dakota Game and Fish Department maintains spatial databases of fish and wildlife species. For example, there are more than 40,000 records of fish occurrence from stream sampling efforts and more than 4,000 records of reptile and amphibian observations. The State of North Dakota maintains a GIS Hub, an infrastructure of geospatial data storage, data services, and applications. Countless spatial datasets, from roads to the most current aerial imagery, is available.

Process for Developing the State Wildlife Action Plan Landscape Components and Focus Areas

A total of nine Landscape Components encompassing the major habitat types of North Dakota were identified. The EPA's level III ecoregions provides an excellent framework for identifying the boundaries of major grassland landscapes in North Dakota. There are a variety of grassland habitat types, including native or un-cultivated land, and planted grasslands. Where these changes in grassland communities occur is an important factor in identifying the major landscapes. These major Grassland Landscape Components are **Tallgrass Prairie (Red River Valley), Eastern Mixed-grass Prairie (Drift Prairie), Mixed-grass Prairie (Missouri Coteau), and Western Mixed-grass/Short-grass Prairie (Missouri Slope)**. In addition, **Planted or Tame Grassland**, has been identified as a major Grassland Landscape Component. These grasslands are located across the state. The other major Landscape Components are **Wetlands and Lakes; Rivers, Streams and Riparian; Badlands; and Upland Forest**.

In some cases there was sufficient information or reason to identify Focus Areas within a particular Landscape Component. The EPA's level IV ecoregions provided the framework for identifying Focus Areas. Using a Geographic Information System (ESRI ArcGIS 10.2.2), Level IV Ecoregions were examined with the various land covers, NDGFD extant native prairie or woodland, and spatial biological planning tools including key sites for Species of Conservation Priority. Specific level IV ecoregions boundaries were chosen and modified (i.e. digitized) based on extant native vegetation and key biological information provided by the datasets outline those areas where the maximum number of SCP may occur. Focus Areas typically exhibited unique or easily identifiable differences in vegetation, soils, topography, hydrology or land use. Focus Areas are highly variable in size and often represent an area of native vegetation or a natural community type rare to North Dakota. A total of 21 Focus Areas were

identified. See Figure 7. Note that no specific Focus Areas were identified within the Wetlands and Lakes and Badlands landscapes. More than 1 million wetlands are scattered across North Dakota and all wetland types are important to wildlife and hydrophyte plants, water storage, and water quality. Wetlands are included as a key component within identified Focus Areas. The Badlands is a unique land feature and although Focus Areas are identified within its extent, they are included under other landscapes (i.e. Ponderosa Pines Focus Area is within Upland Forest).

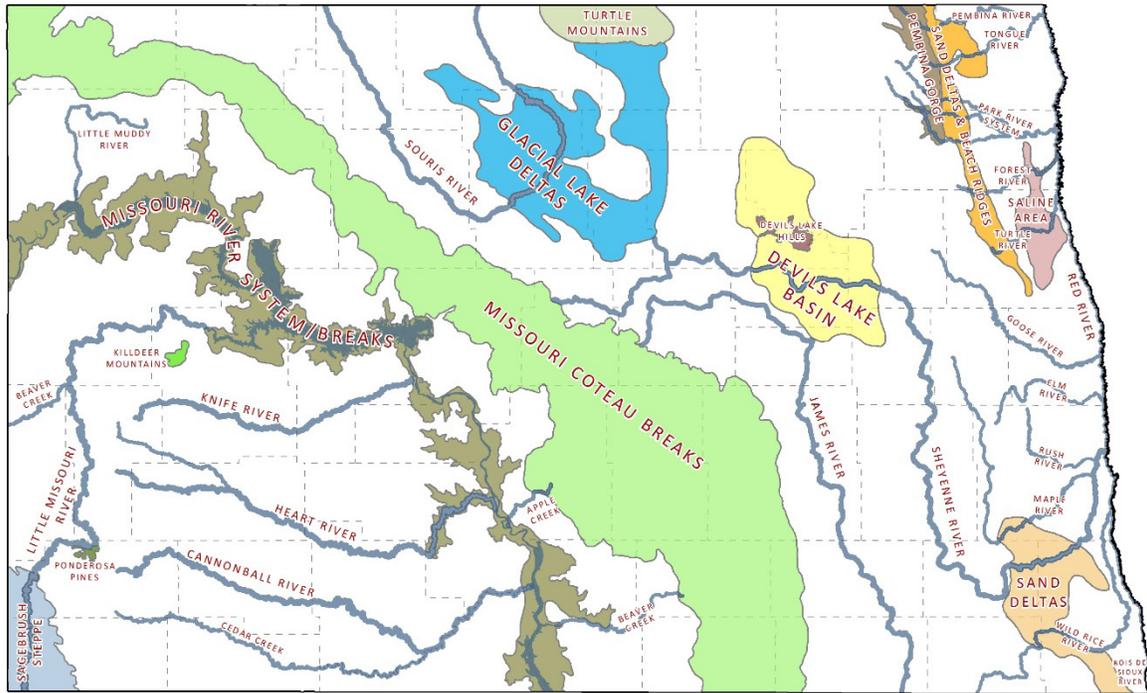


Figure 7. North Dakota State Wildlife Plan Focus Areas.

It is important to recognize that species often require a combination of habitat types or Landscape Components for survival. The key to ensuring their long-term survival is to maintain a diverse landscape including a mosaic of grasslands, wetlands, woodlands, rivers, streams, and cropland. This cannot be reduced to a few specific small sites, but requires instead a much broader landscape scale or view. It should also be noted that although cropland constitutes a large portion of North Dakota, it was not historically a habitat component of the Northern Great Plains. Consequently, many species do not depend solely upon cropland for their survival, so it is not identified as a key habitat type or landscape component. However, agricultural production is a major part of North Dakota’s past, present, and future and it can provide benefits such as nesting cover, migration stopover, and winter food sources.

IDENTIFYING THREATS AND CONSERVATION ACTIONS

In 2002, during development of the initial Comprehensive Wildlife Conservation Strategy, NDGFD staff met with numerous agencies and organizations to discuss various aspects of the CWCS. These meetings generated some general information with respect to threats and conservation actions but in-depth information was lacking. In an attempt to gain additional insight The NDGFD held scoping meetings with individuals having knowledge and expertise on specific taxa. A total of three scoping meetings were held: one addressing fish, one addressing birds, and a joint meeting addressing mammals and herptiles. Information identified through these meetings was recorded and added to a matrix of threats and conservation actions.

2015 SWAP Threats

For the 2015 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 SWAP's 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).

On April 2, 2014 the North Dakota Game and Fish Department hosted a State Wildlife Action Plan (SWAP) 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 break-out 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 and conservation actions 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. 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. Figures 8 depict participant response for the top 17 direct threats.

Section 5 describes all Landscape Components, Focus Areas, and detailed direct threats and conservation actions for the major landscapes: Grassland, Wetlands and Lakes, Rivers, Streams and Riparian, Badlands, and Upland Forest (see Tables 3, 5, 6, 7, and 8). The majority of direct threats were identified during the SWAP Summit. A NDGFD internal workgroup was also formed to identify any threats which may have been overlooked during the Summit. Appendices A-F address species specific threats and management recommendations. These were identified using recent literature and results of State Wildlife Grant funded research projects in North Dakota. Although climate change is addressed for each major landscape component, the potential effects of climate change needed much further analysis. See Addendum G for a synopsis of climate trends, climate change predictions, and developing climate adaptation strategies in North Dakota for SCP.

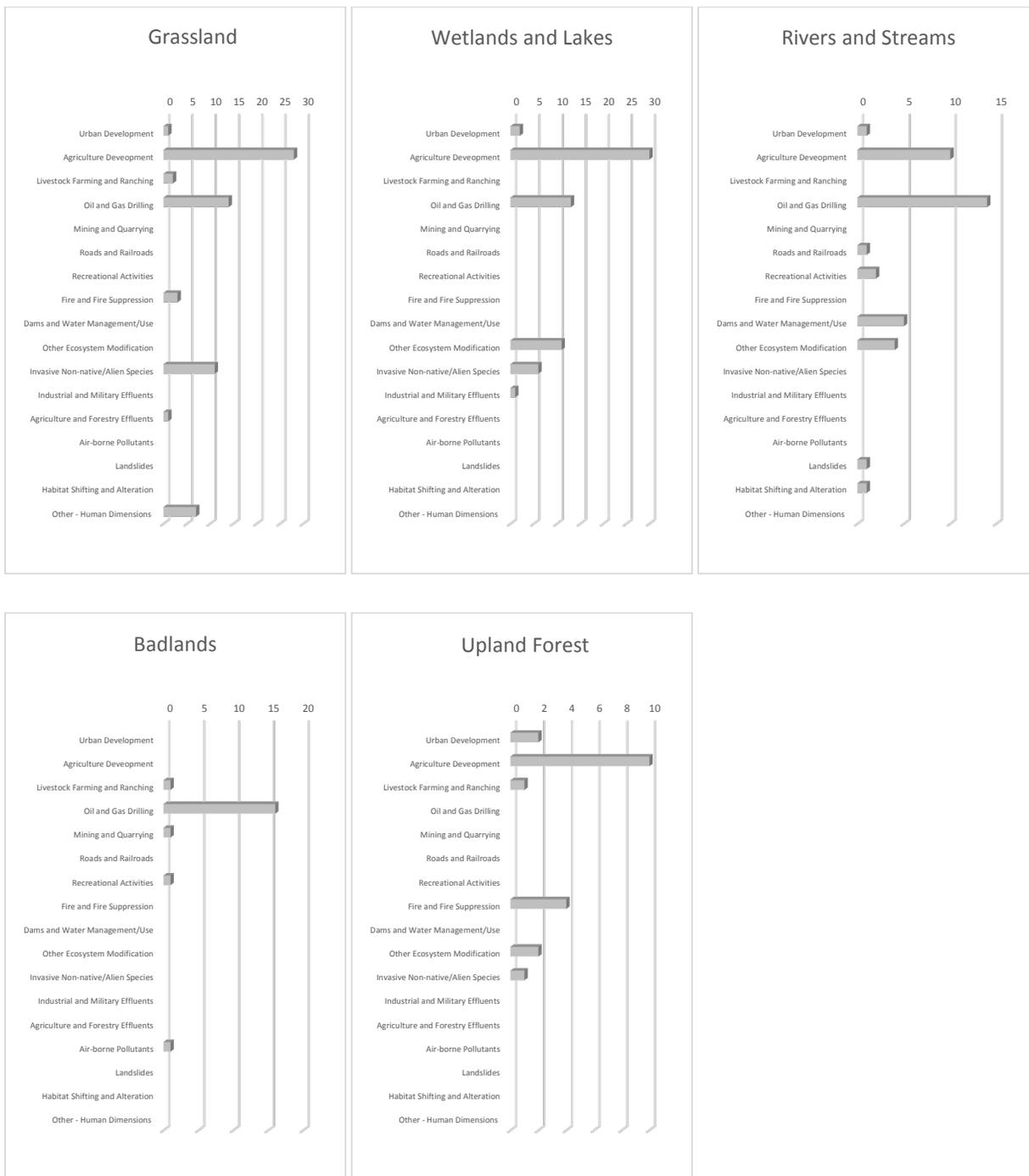


Figure 8. Results of North Dakota SWAP Summit 2014. Participant response of the greatest threats to five major habitat types, indicating the highest priority threats for each landscape component.

Conservation Successes and Challenges in North Dakota

North Dakota is a top producing agricultural state. The state ranks number 1 for spring wheat for grain, number 2 for all wheat production, 7th for soybeans and 9th for corn. North Dakota is now ranked number 2 for bee and honey production. There are approximately 30,300 active farms averaging nearly 1,300 acres in size. At one time, in 1935, the state had nearly 85,000 individual farms. While the number of farms has declined, the average farm size is increasing. Cattle production ranks number 15 in the nation with just under 2 million cattle raised in the state. The number of cattle operations has also declined, with a peak of 35,000 operations in 1965 to just under 10,000 in 2012. Agricultural producers supply the United States and other countries with the food, fiber and fuel commodities necessary to support the growing human population. Growing demand for these commodities, as well as fewer conservation options, increases the pressure to convert native prairies or planted herbaceous grassland, to production agriculture.

Nearly 89 percent of North Dakota is held in private ownership. Given that fact, there is a considerable opportunity to work with private landowners to conserve fish and wildlife resources. Cropland, rangeland, hayland, and various other components (i.e. wetlands, wooded areas, grassed waterways) that compose a farm or ranch constitutes the majority of habitat in North Dakota. Therefore, the quantity and quality of these components will influence how successful the SWAP and other conservation partners are in conserving fish and wildlife species in North Dakota. Although some land could be enhanced for wildlife, adequate wildlife habitat does exist due to good stewardship practices across the state. Private landowners and agricultural producers should be commended for their voluntary efforts to preserve a variety of fish and wildlife resources on their land. Landowners across the state have entered into conservation practices with the USDA, USFWS, NDGFD and others.

There is minimal land held in public ownership in North Dakota when compared to other western states. Much land that is held in public ownership is subject to multiple-use regulations, whereby fish and wildlife habitat is not top priority. Of the 45 million acres of land in the state, less than 3 million are owned in fee title by state and federal land management agencies. Most of these agencies work in cooperation with private producers in managing these lands. For example, the NDGFD leases certain tracts of wildlife management areas for grazing, haying, and food plots. The USFS manages for multiple uses and the sustained yield of renewable resources such as water, forage, wildlife, and recreation, as well as industry such as oil and gas development. There is some reprieve in knowing that most of the public land is safe from conversion to cropland. Also, much public land, such as ND Land Department school land, is native vegetation. The potential exists to work cooperatively with other state and federal land holders to alter management practices to benefit SCP and demonstrate the effectiveness of conservation tools to enhance wildlife habitat and populations.

Conservation Easements and Land Acquisition

A conservation easement is a legal agreement between a willing property owner and an interested conservation organization. It contains language to restrict surface use or development of the land in order to protect its conservation values. For

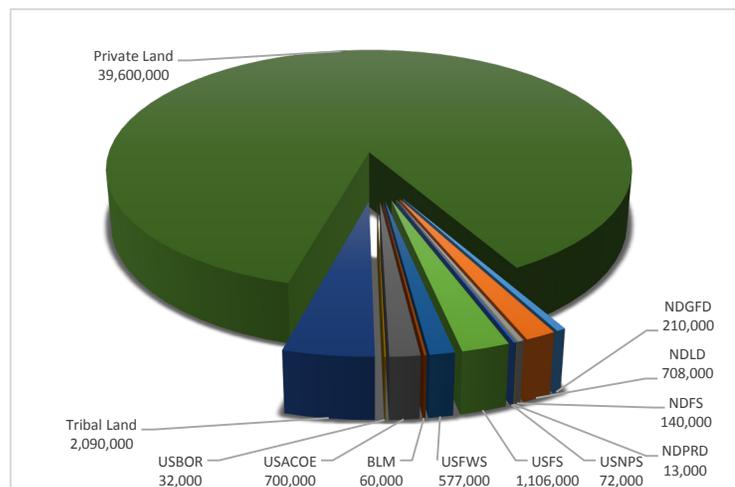


Figure 9. Land ownership in North Dakota, total acres.

example, a grassland easement between a landowner and the USFWS will prevent the grassland from being cultivated or otherwise changed from its indigenous condition. The land may still be utilized for livestock production and other non-destructive uses. The sale of a grassland easement may provide the landowner a payment of nearly one-quarter the value of the land. The land remains in private ownership and all property rights remain other than the current or future landowners may not take a plow to the land, keeping the “green side up.” Conservation easements are an effective tool for permanent conservation of endemic grassland birds and a variety of other grassland-dependent wildlife in North Dakota. They are designed to protect the conservation value of existing habitat and ensure the land stays in grazing/ranchland. Currently there is not enough funding to meet the demand for grassland easements.

Conservation easements can and do provide a win-win situation. Voluntary, incentive based programs like conservation easements have been well received by landowners and agriculture producers of the state and are endorsed by farm groups, particularly shorter term easements. Easements of 30 years or fewer implement conservation actions, yet provides the operator the opportunity to decide which management strategies to employ in the future. Land acquisition by non-profit organizations or the North Dakota Game and Fish Department is restricted by state law and a structured process by which approval of the county commission is needed, but ultimately the governor of North Dakota has final authority for approving or disapproving a land acquisition.

Numerous agencies or organizations have implemented conservation actions in North Dakota, particularly with respect to waterfowl and grassland nesting birds. The Prairie Pothole Joint Venture has secured thousands of acres of grassland and wetland easements. The Northern Great Plains Joint Venture has similar plans for the southwestern portion of the state. Ducks Unlimited, Delta Waterfowl, Pheasants Forever, The Nature Conservancy, and North Dakota Natural Resource Trust are examples of non-governmental organizations that currently commit substantial resources for habitat conservation. The Natural Resources Conservation Service also has numerous conservation programs for willing landowners as well as the USFWS and the NDGFD.

Although both long-term or perpetual conservation easements and land acquisition are important tools for long-term conservation of SCP, they are not widely utilized in North Dakota because of current limitations. However, a program that is a feasible option is the USDA Agricultural Conservation Easement Program (ACEP). ACEP provides financial and technical assistance to conserve agricultural lands and wetlands, prevents the conversion of working lands to non-agricultural uses, and will preserve wildlife habitat and other ecosystem services through Agricultural Land Easements (ALE). Furthermore, the Grasslands of Special Environment Significance (ALE-GSS) will protect long-term grazing on pasture land, a fundamental need to preserving grassland associated species of conservation priority. The grassland focus areas are prime candidates for GSS.

2015 SWAP Conservation Actions

The conservation actions identified in Tables 3, 5, 6, 7, and 8 in the following section were identified from the SWAP Summit of April 2014, an internal NDGFD working group, and institutional working knowledge. See Appendices A-F for species specific conservation actions or management recommendations. There are five recurrent conservation actions identified throughout all major landscape components:

1) Offer incentives and programs to protect, enhance, and restore habitat.

As previously discussed, the majority of land in North Dakota is held in private ownership. There are numerous federal, state and local programs to provide landowners with cost-sharing assistance to protect, enhance and restore wildlife habitat. This is the primary mechanism for ensuring long-term conservation of SCP and other wildlife in North Dakota. The NDGFD/SWAP staff will work with partners to ensure programs are fully

encompassing the needs to conserve SCP and expand programs where necessary, particularly Farm Bill programs such as ACEP, and pollinator habitat programs.

2) Urge ecologically responsible ordinances and suitable reclamation standards.

Increasing demand for urban, energy, and utility development is heightening the need to minimize impacts to SCP and other wildlife. Although environmental review is offered by federal and state agencies, the recommendations are often unheeded. Ecologically sound ordinances and reclamation standards must be strengthened.

3) Promote and support holistic grazing and work with grass-based agricultural groups.

The majority of the SCP are grassland dependent. The key to maintaining grassland as an integral part of the North Dakota landscape is to ensure grassland ranching persists. Furthermore, prairies evolved with grazing by large ungulates and cattle grazing is a beneficial tool to maintain native vegetation, particularly if applied in a holistic manner.

4) Use best management practices or ecological site descriptions.

Experts in various fields have developed best management practices for a particular habitat component. The Natural Resources Conservation Services have developed Ecological Site Descriptions which describe the composition and ecological function of a historic plant community, and use a state and transition model to help managers understand how plant communities will respond to changes in management. These valuable tools should be employed when restoring or managing native communities. Additionally, managers should consider implications of climate change when planning and implementing a management practice (see Addendum G).

5) Public education and outreach.

The key to successful implementation of wildlife conservation for public use and enjoyment depends upon their awareness, understanding and appreciation of these resources. Ecological services provide values to the public that they are likely unaware of in their daily lives.



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SECTION 5

LANDSCAPE COMPONENTS

This section includes information on the following required elements:

Element 2: This element requires descriptions of locations and relative condition of key habitats and community types essential to species of conservation priority.

Element 3: This element requires descriptions of problems which may adversely affect species of conservation priority 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: This element requires descriptions of conservation actions determined to be necessary to conserve the species of conservation priority and habitats and priorities for implementing such actions.

THE LANDSCAPES

This section is devoted to describing nine primary landscape components and 21 focus areas identified as key habitats or community types essential to species of conservation priority (see Table 2 and Figure 10).

Area: *the estimated acres of land included in the landscape component or focus area.*

Description and Overall Condition: *brief historical accounts of the area, current land uses, vegetation, and overall condition of the landscape or focus area as it relates to fish and wildlife habitat.*

Public Land Holdings: *if available, the acres of land held in state or federal ownership.*

Key Species of Conservation Priority: *the SCP known to occur or depend highly upon a focus area.*

Landscape Component Conservation Problems and Actions

For each major landscape component, a table is provided with information on required elements 3 and 4. The problems and conservation actions are not directed at specific species, but rather at the landscape component (i.e. habitat) the SCP depend upon for survival. Species specific problems and conservation actions or management recommendations are found in the species accounts. This list is not intended to be a comprehensive list of all threats affecting fish and wildlife resources or all possible conservation tools available, but rather those thought to be most important. In addition, potential partners for the conservation actions are identified.

Element 4 requires states to indicate the relative priority of conservation actions. This is difficult to gauge as species vary in their habitat requirements, changing the relative priority of conservation or management needed from one species to another, as well as across the landscape. Habitat loss, fragmentation, and degradation are identified by most conservation groups and partners as the greatest threat affecting fish and wildlife. The associated conservation actions identified are all of highest priority (e.g. protect native prairie from conversion). However, the relative priority of conservation actions may change as implementation occurs on the ground. For example, if a substantial area of native prairie is already retained under a conservation agreements or is held in state ownership, the highest priority conservation action may be to prevent woody invasion to benefit endemic grassland birds. The priority of a conservation action is relative to the area in question when it comes to implementation.

Major Landscape Components and Focus Areas

Table 2. Major landscape components and focus areas.

LANDSCAPE COMPONENTS	FOCUS AREA
<i>GRASSLANDS</i>	
I) Tallgrass Prairie (Red River Valley)	
	Saline Area
	Sand Deltas and Beach Ridges
II) Eastern Mixed-grass Prairie (Drift Prairie)	
	Glacial Lake Deltas
	Devils Lake Basin
III) Mixed-grass Prairie (Missouri Coteau)	
	Missouri Coteau Breaks
IV) Western Mixed-grass/Shortgrass Prairie (Missouri Slope)	
	Sagebrush Shrub-steppe
V) Planted or Tame Grassland	
	Conservation Reserve Program (CRP)
<i>WETLANDS</i>	
VI) Wetlands and Lakes	
<i>RIVERS</i>	
VII) Rivers, Streams and Riparian	
	Missouri River System/Breaks
	Little Missouri River
	Knife River
	Heart River
	Cannonball River
	Red River and Tributaries
	Sheyenne River
	James River
	Souris River
<i>BADLANDS</i>	
VIII) Badlands	
<i>FOREST</i>	
IX) Upland Forest	
	Pembina Gorge
	Turtle Mountains
	Devils Lake Hills
	Killdeer Mountains
	Ponderosa Pines

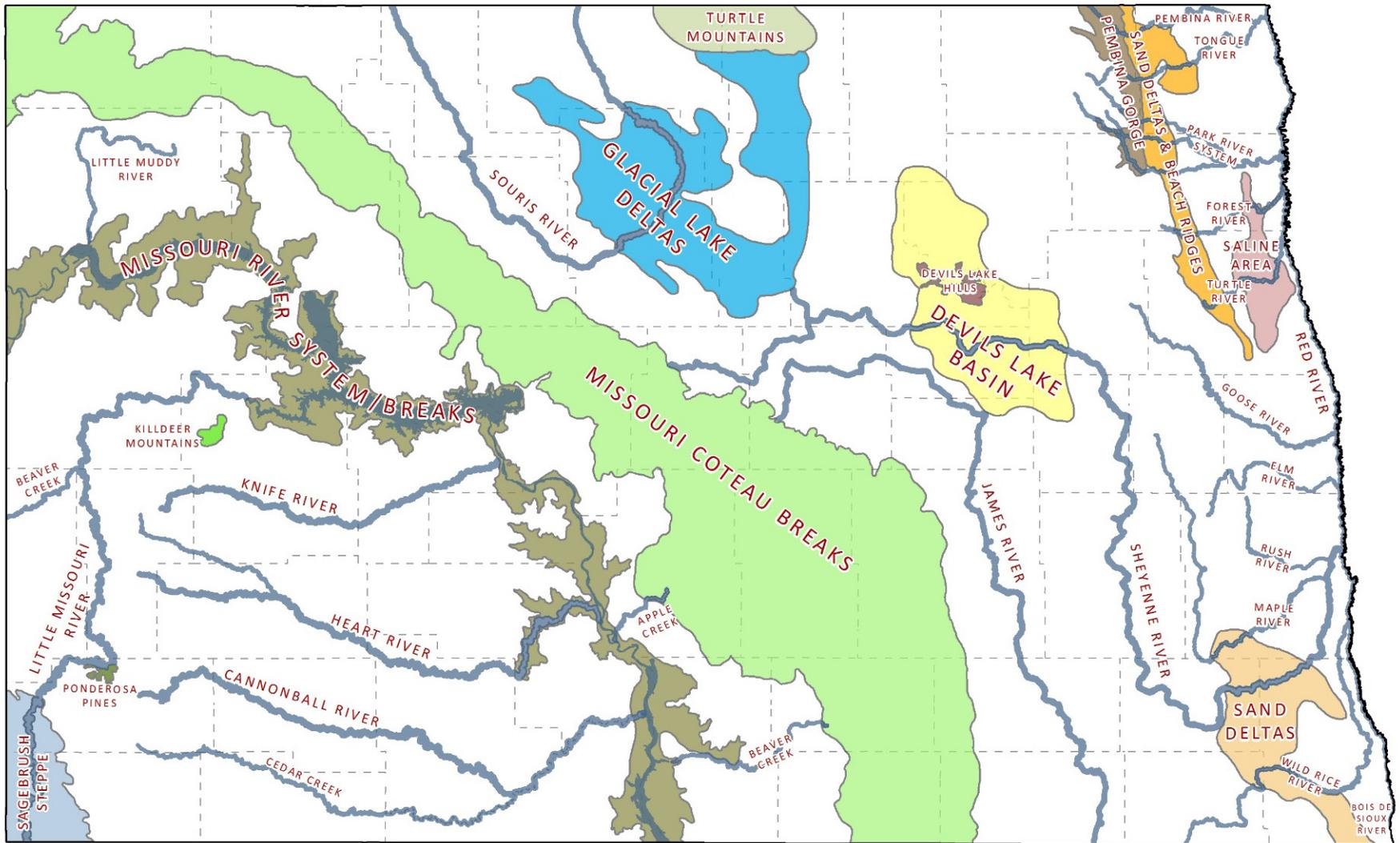
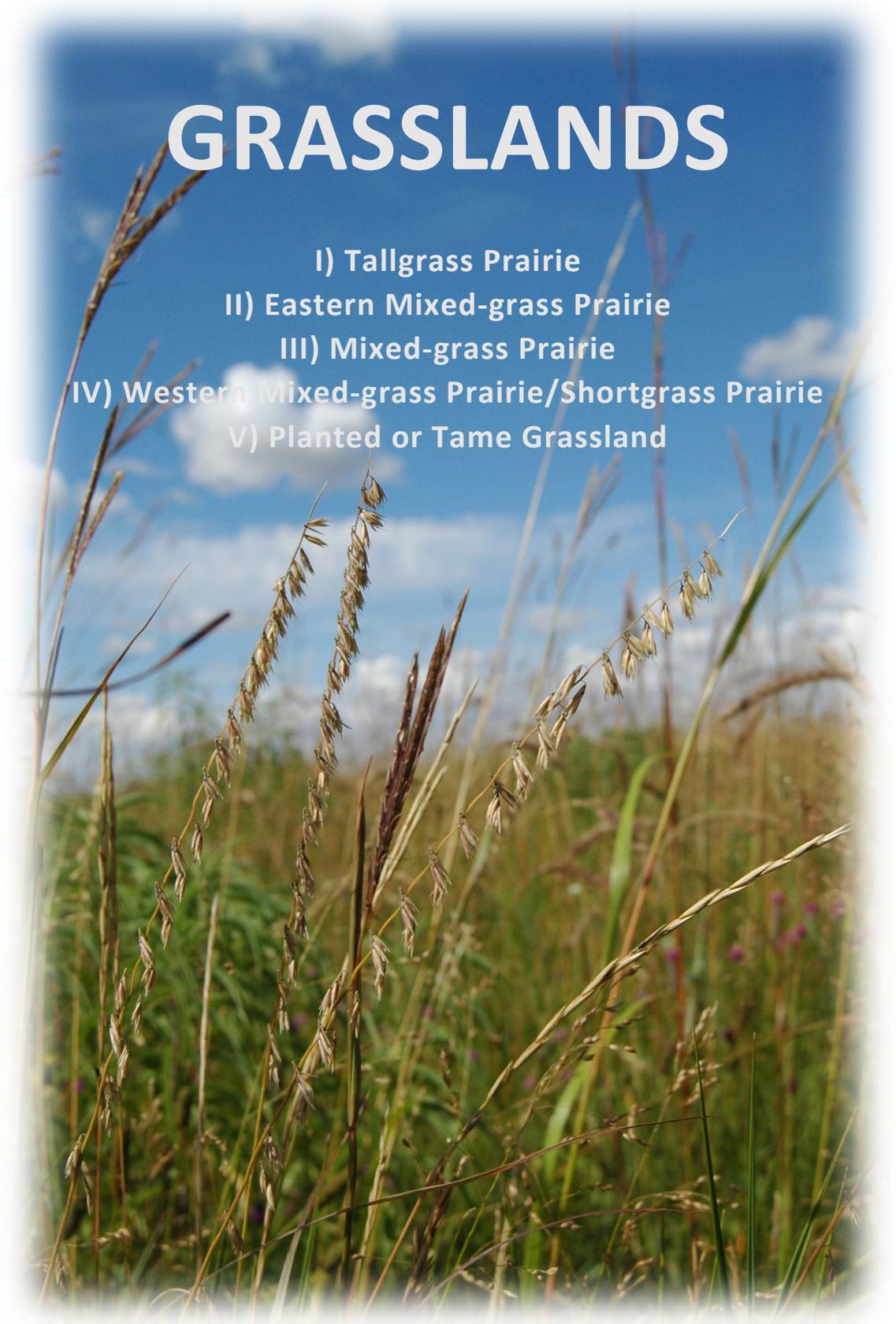


Figure 10. State Wildlife Action Plan Focus Areas. Note: Conservation Reserve Program grasslands are not depicted.



GRASSLANDS

- I) Tallgrass Prairie
- II) Eastern Mixed-grass Prairie
- III) Mixed-grass Prairie
- IV) Western Mixed-grass Prairie/Shortgrass Prairie
- V) Planted or Tame Grassland

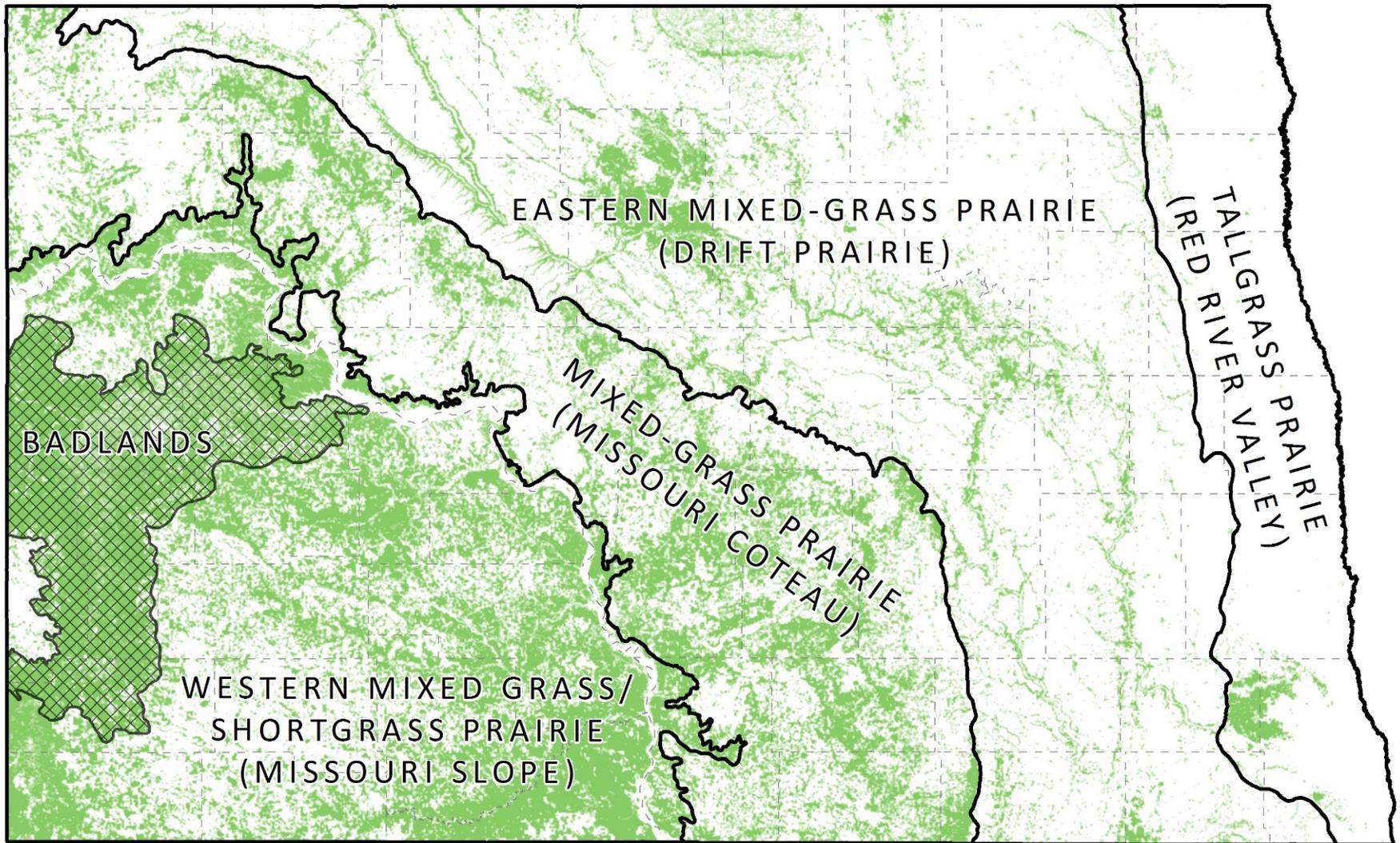


Figure 11. Major Grassland Landscape Components and extant native (uncultivated) prairie. Considerable native prairie exists in in the Badlands but it is addressed as a separate landscape due to its topography and habitat uniqueness. All others are combined as Grassland.

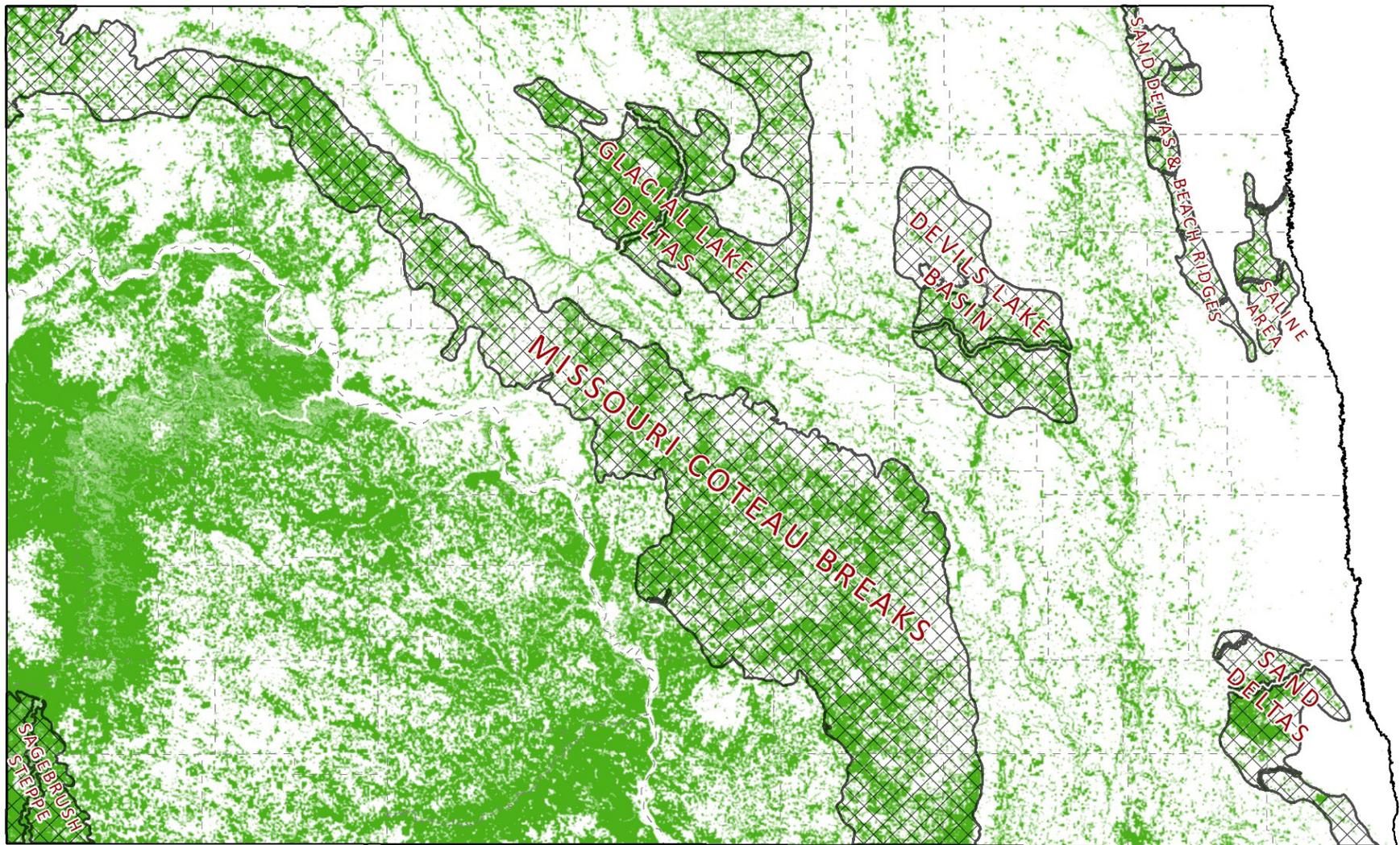


Figure 12. Grassland Focus Areas. All extant grass, including native (uncultivated) prairie and planted or tame grassland is shown.

I) TALLGRASS PRAIRE (RED RIVER VALLEY)

Area: 4,464,000 acres or 6,975 mi²

Description and Overall Condition: This landscape component consists of the tallgrass prairie historically found predominantly in the eastern one-fourth of North Dakota. The Red River of the North forms the state line between North Dakota and Minnesota. This region today is commonly referred to as the Red River Valley. 10,000 years ago, a large glacial lake named Lake Agassiz covered this region. The flat topography and rich soil of the glacial Lake Agassiz basin provides for excellent but intensive agricultural production including potatoes, beans, sugar beets, corn and wheat. By the 20th century, much of the tallgrass prairie had been converted to farmland. Few tracts of native vegetation remain in this region today. Places where small natural areas remain intact are remnants of Lake Agassiz. The shoreline of Lake



Agassiz created diagonal striations of sand and gravel a few feet high that are still visible in aerial and satellite imagery today. These beach ridges are one component of the focus area “Sand Deltas and Beach Ridges” in conjunction with several large fan-shaped deltas of sand formed from Agassiz. Saline areas of unsuitable farmland due to the high salt concentration of the soil remain intact. The largest continuous area just west of Grand Forks is also a focus area, the “Saline Area” or sometimes referred to as Grand Forks County Prairie. The Red River Valley has few wetlands compared to the mixed-grass prairie to the west. Farmland with woodlot and shelterbelt plantings is now prevalent throughout the region, however, advances in farming practices are resulting in the removal of shelterbelts. Several streams important to native fish meander across the Red River Valley, from west to east, draining into the Red River (see Figure 29).

SPECIES OF CONSERVATION PRIORITY

American Bittern
Northern Pintail
Northern Harrier
Swainson’s Hawk
American Kestrel
Sharp-tailed Grouse
Greater Prairie-chicken
Yellow Rail
Willet
Upland Sandpiper
Marbled Godwit
Wilson’s Phalarope
Short-eared Owl
Grasshopper Sparrow
Le Conte’s Sparrow
Nelson’s Sparrow
Dickcissel
Bobolink
Western Meadowlark

Pygmy Shrew
Arctic shrew
Plains Pocket Mouse
Richardson’ Ground Squirrel
Eastern Spotted Skunk
Gray Fox

Canadian Toad
Northern Prairie Skink
Plains Hog-nosed Snake

Dakota Skipper
Poweshiek Skipperling
Monarch Butterfly
Regal Fritillary

FOCUS AREA: SALINE AREA

Total Size: 190,000 acres, 297 mi²

Public Landholdings: 16,550 acres (NDGFD 4,500 acres; NDDTL 950 acres; UND 900 acres; USFWS 10,200 acres)

Description and Condition: This area is characterized by saline soil due to salty ground water flowing to the surface from underlying sandstone. This land is mostly unsuitable for crop farming and grazing occurs in most areas that are not cultivated. Salt-tolerant plants occur and many of the wetlands are brackish in nature. This area includes several larger tracts (>640 acres) of native tallgrass prairie. The majority of this area is not protected. Landowners appear willing to work with conservation agencies or groups to protect this rare area. The Grand Forks County Prairie Partners advocates preservation of this rare ecosystem. A threat includes urban expansion as most of this area is within 15 miles of Grand Forks.

Key Species of Conservation Priority

Birds: Greater Prairie-Chicken, Yellow Rail, Marbled Godwit, Short-eared Owl, Le Conte’s Sparrow

Insects: Regal Fritillary

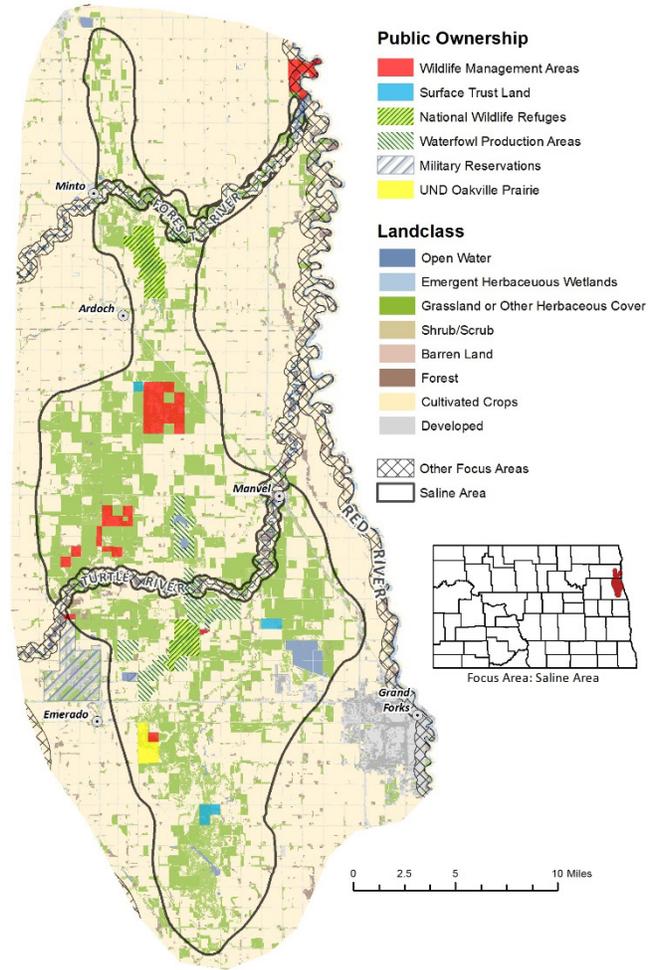


Figure 13. Saline Area Focus Area.

*“Grand Forks Prairie Project
North American Wetlands Conservation Act
(NAWCA) Proposal”*

**CONSERVATION PARTNER
SUCCESS STORY**

NAWCA provides matching grants for partnerships to carry out wetland conservation projects for the benefit of wetlands-associated birds and other wildlife in the United States, Canada and Mexico. In 2012, conservation partners submitted a NAWCA proposal to permanently protect more than 150 acres of grasslands and wetlands in the Grand Forks Prairie Project area. The proposal states “the project also provides habitat for forty-seven species listed as part of North Dakota’s 100 Species of Conservation Priority...the NDGFD has designated tallgrass prairie and associated wetlands as a focus area in the Comprehensive Wildlife Conservation Strategy.” The NDGFD contributed \$20,000 as match for this project from the Nongame Fund. This fund was established in 1987 to provide a source of revenue to promote and conserve species not typically hunted or fished and advocate for watching wildlife. The Grand Forks Prairie Project NAWCA proposal was approved in 2013 and more than 5 partners provided matching funds to conserve and protect rare tallgrass prairie, wetlands, and associated wildlife.



FOCUS AREA: SAND DELTAS AND BEACH RIDGES

Total Size: 914,000 acres, 1,428 mi²

Public Landholdings: 85,605 acres (NDGFD 7,920 acres; NDDTL 510 acres; NDFS 400 acres; NDPRD 1,445 acres; USFWS 4,930 acres; USFS 70,400 acres)

Description and Condition: Thick sand deposits from river sediments carried to glacial Lake Agassiz form windblown sand dunes, the largest being the Sheyenne Delta in the southern portion of the Red River Valley. The Beach Ridges form parallel lines of sand and gravel, along with a smaller delta east of the Pembina Gorge, which also supports areas of Upland Forest (see Figure 35). Some agriculture, including irrigation, is taking place in the deltas and around the beach ridges. The Sand Deltas focus area contains the Sheyenne National Grasslands managed by the US Forest Service, making this the largest publicly owned tallgrass prairie preserve in the United States. Oak savannah occurs in the delta areas. The Sheyenne River runs through the deltas (see Figure 30). Stands of privately owned native tallgrass prairie are adjacent to the Sheyenne National Grasslands.

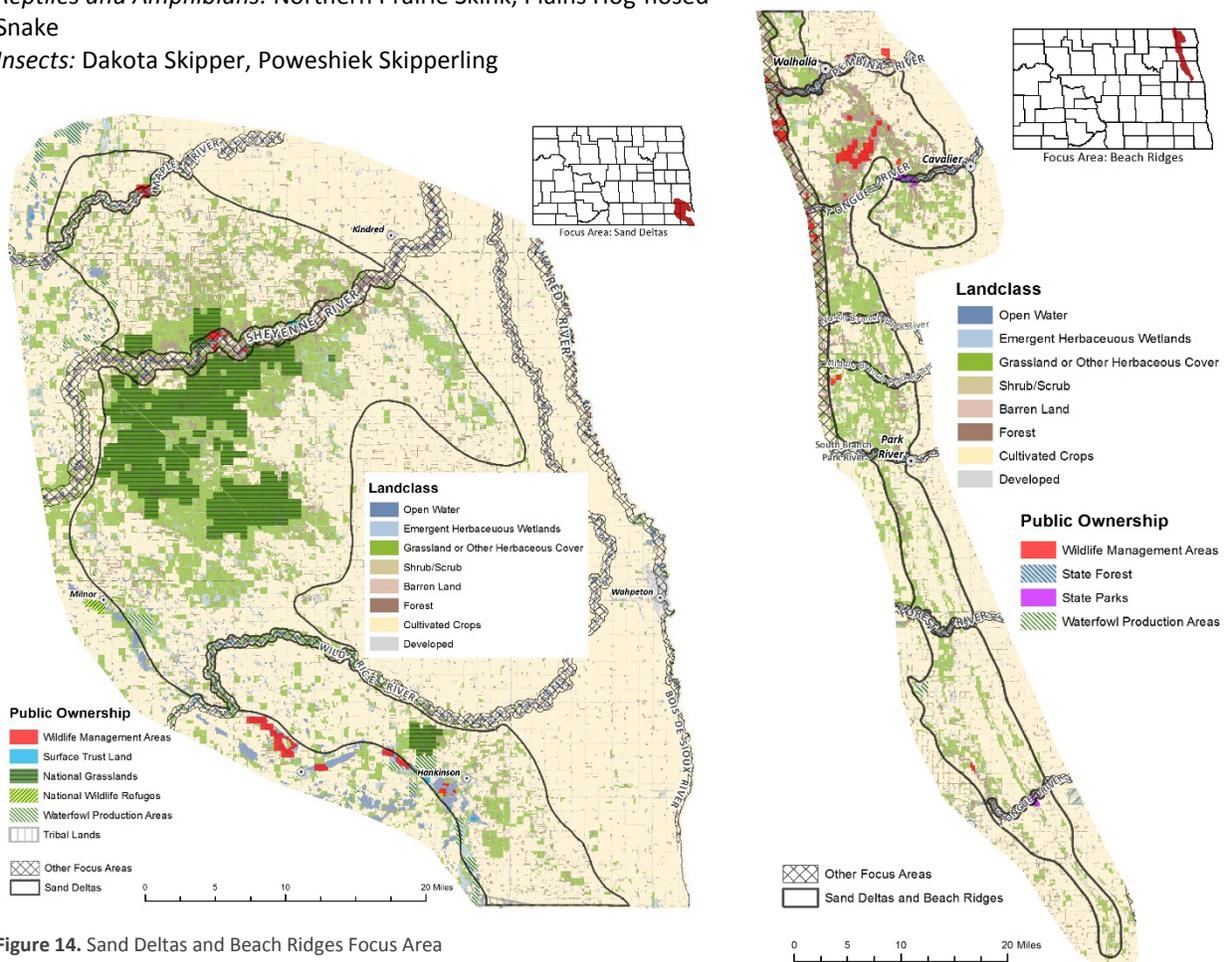
Key Species of Conservation Priority

Birds: American Kestrel, Greater Prairie-Chicken, Sharp-tailed Grouse, Short-eared Owl

Mammals: Plains Pocket Mouse

Reptiles and Amphibians: Northern Prairie Skink, Plains Hog-nosed Snake

Insects: Dakota Skipper, Poweshiek Skipperling



II) EASTERN MIXED-GRASS PRAIRIE (DRIFT PRAIRIE)

Area: 16,900,000 acres or 26,400 mi²

Description and Overall Condition: This landscape component consists of the Eastern mixed-grass prairie, or Drift Prairie. The Drift Prairie is the transition zone between the wetter tallgrass prairie to the east and drier shortgrass prairie to the west. A high concentration of temporary and seasonal wetlands occurred within the prairie before settlement. Approximately 1.4 million wetland basin acres are present although many have been drained, filled or consolidated. The Pembina Hills, Turtle Mountains, and Devils Lake are defining features within this region but are included under the landscape component of Upland Forest (see Figures 35, 36 and 37). A large area of untilled land due to its sandy, gravelly soil from a glacial lake delta exists in and around



McHenry County and south of the Turtle Mountains. This focus area, referred to as “Glacial Lake Deltas” is to a large extent native vegetation with many wetlands remaining. In more recent years, irrigation has allowed areas once unsuitable for cropland to be farmed for potatoes and other crops. The Souris River (see Figure 32) riparian area divides the Glacial Lake Deltas. Another focus area, the “Devils Lake Basin” is the result of glacial ice blockage and includes a high concentration of larger wetlands or lakes and slightly lesser amount of grassland than the Glacial Lake Deltas. This focus area is extremely important for migrating waterfowl and other waterbirds and shorebirds. The remainder of the Drift Prairie is generally flat land, much of which has been converted to cropland of spring wheat, durum, other small grains, canola, sunflowers, and alfalfa. The Sheyenne and James rivers meander through this region (see Figures 30 and 31).

SPECIES OF CONSERVATION PRIORITY

Horned Grebe
 American Bittern
 Northern Pintail
 Lesser Scaup
 Northern Harrier
 American Kestrel
 Swainson’s Hawk
 Ferruginous Hawk
 Sharp-tailed Grouse
 Yellow Rail
 Willet
 Upland Sandpiper
 Marbled Godwit
 Wilson’s Phalarope
 Franklin’s Gull
 Black Tern
 Short-eared Owl
 Loggerhead Shrike
 Sedge Wren
 Sprague’s Pipit
 Lark Bunting
 Grasshopper Sparrow
 Baird’s Sparrow
 Le Conte’s Sparrow
 Nelson’s Sparrow
 Chestnut-collared Longspur
 Dickcissel
 Bobolink
 Western Meadowlark

 Pygmy Shrew
 Arctic Shrew
 Plains Pocket Mouse
 Richardson’s Ground Squirrel
 Gray Fox

 Plains Spadefoot
 Canadian Toad
 Smooth Green Snake
 Plains Hog-nosed Snake

 Dakota Skipper
 Monarch Butterfly
 Regal Fritillary

FOCUS AREA: GLACIAL LAKE DELTAS

Area: 1,412,000 acres or 2,206 mi²

Public Landholdings: 100,170 acres (NDGFD 3,550 acres; NDDTL 32,620 acres; NDFS 650 acres; USFWS 64,000 acres)

Description and Condition: Glaciated flat sheets of sand and gravel or rolling sand dunes make this area rather unsuitable for cropland. The droughty soils are used primarily for cattle grazing; however, some cropland exists and irrigation is allowing once unsuitable land to be farmed. Very wet conditions in recent years have inundated some grassland and hayland. Tallgrass prairie communities also occur within this focus area. The vegetative cover is thin and dominated by Little Bluestem, Indiangrass, Prairie Sandreed, Switchgrass, and Sand Bluestem.

Key Species of Conservation Priority

Birds: American Kestrel, Yellow Rail, Sprague’s Pipit, Baird’s Sparrow, Le Conte’s Sparrow, Nelson’s Sparrow

Mammals: Richardson’s Ground Squirrel

Insects: Dakota Skipper

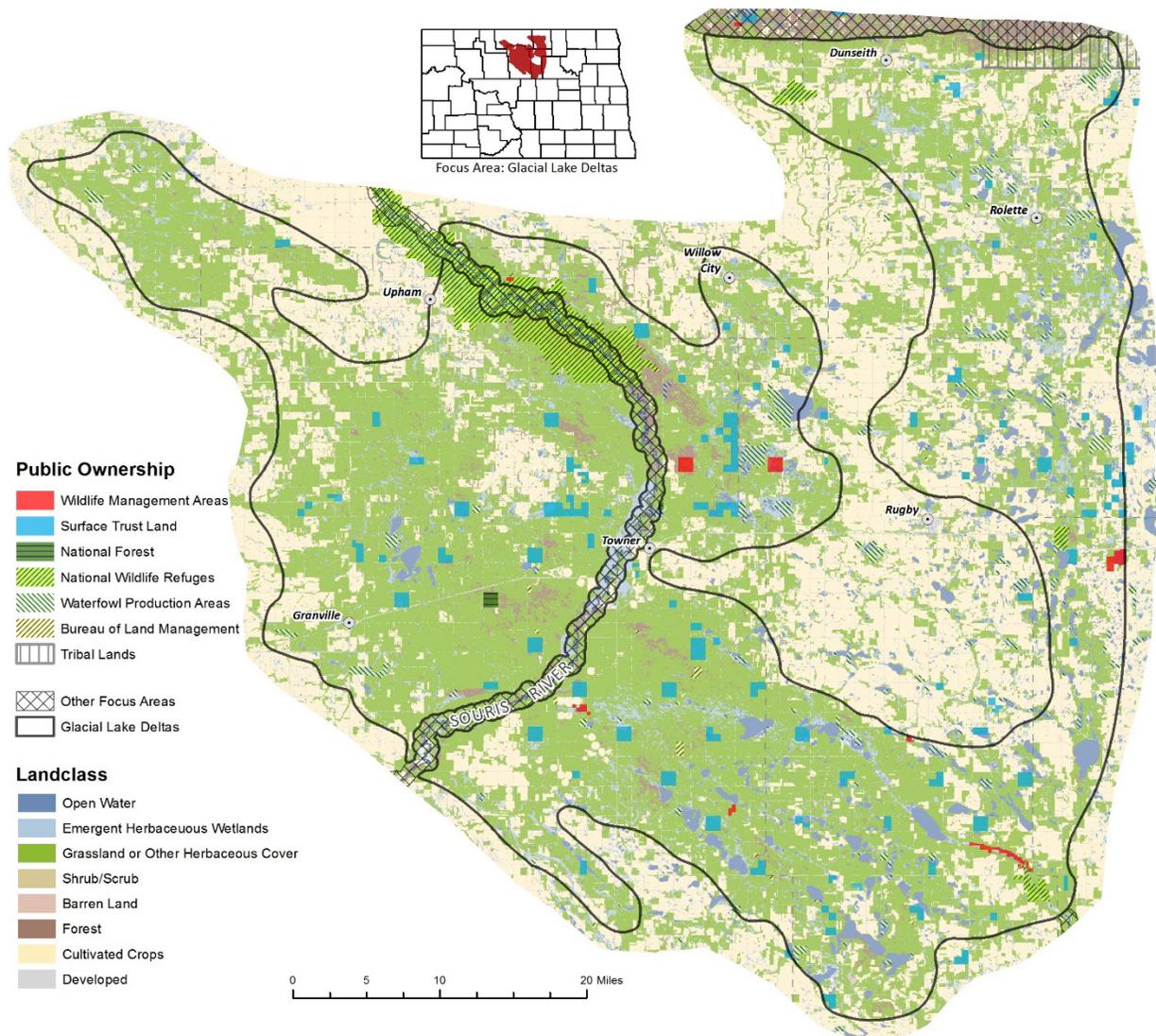


Figure 15. Glacial Lake Deltas Focus Area.

FOCUS AREA: DEVILS LAKE BASIN

Area: 951,765 acres or 1,487 mi²

Public Landholdings: 45,220 acres (NDGFD 3,500 acres; NDDTL 16,440 acres; NDPRD 20 acres; USFWS 25,260 acres)

Description and Condition: Extensive wetland drainage and intense farming is predominant in the northern part of the focus area due to the rich soil and relatively flat topography. A higher concentration of large wetlands and lakes exist, in part from the drainage of smaller, temporary and seasonal wetlands for farming. Due to climatic and anthropomorphic changes, water levels of Devils Lake have been rising at unprecedented levels since 1993, rising 31.68 feet to its record elevation of 1454.3 feet (above mean sea level) in June 2011. The rising lake levels have inundated 167,070 acres or 261 mi² of land since 1993. The James and Sheyenne rivers meander through the southern portion of the basin, with adjacent non-wooded uplands intact in many areas.

Key Species of Conservation Priority

Birds: American Bittern, Northern Pintail, Lesser Scaup, Northern Harrier, Willet, Franklin’s Gull, Black Tern

Reptiles and Amphibians: Canadian Toad

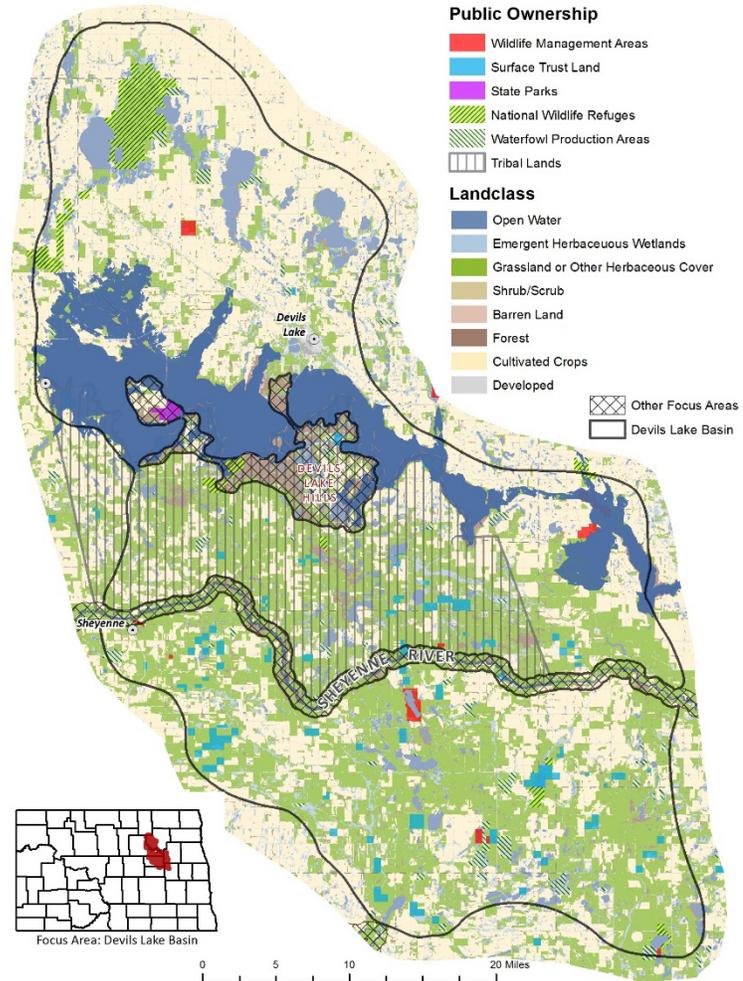


Figure 16. Devils Lake Basin Focus Area.

“Restoring Tall-grass and Mixed-grass Prairie in Cropland-dominated Landscapes of Northeastern North Dakota”

STATE WILDLIFE GRANT SUCCESS STORY

The goal of this project was to approximately re-create some of the native-dominated grassland habitat that formerly covered most of northeastern North Dakota in the mid-1800s. This was accomplished by seeding native perennial herbaceous mixtures on formerly cropped Waterfowl Production Areas in the Devils Lake Wetland Management District (DLWMD). Priority areas were selected that provide blocks of wetland and grassland habitat under perpetual protection. From 2007-2011, more than 27 sites totaling 2,074 acres were restored to diverse mixtures of native grasses and forbs, or prepared for future planting.



III) MIXED-GRASS PRAIRIE (MISSOURI COTEAU)

Area: 10,215,000 acres or 15,960 mi²

Description and Overall Condition: This landscape component includes the mixed-grass prairie of the Missouri Coteau and associated wetlands. This region marks the boundary of the western limits of glaciation in North Dakota. The hummocky, rolling hills of the Missouri Coteau dramatically rise 150 to 500 feet above the Drift Prairie. A high concentration of wetlands are present, roughly 800,000 basin acres. Alkaline lakes are also more prevalent here. Streams and rivers are nearly absent, as are upland deciduous forests but tracts of aspen parkland occur in the north. A considerable amount of native prairie remains and there is extensive cattle grazing. Areas of reduced slope, particularly the western edge, have been converted to cropland such as small grains, sunflowers, corn, and alfalfa hayland. The Coteau is known for supporting some of the highest numbers of breeding ducks in North America. Due to the large amount of grassland and wetlands



which remain or have been restored, this area is especially crucial to many species of grassland wildlife and constitutes the focus area “Missouri Coteau Breaks.” Much of the Coteau is classified as good to outstanding for wind energy potential, which could pose the threat of habitat fragmentation. Irrigation and new advances in cropland could allow for native prairie to be farmed. Oil and gas activity is established in the extreme northwest.

SPECIES OF CONSERVATION PRIORITY

- American Bittern
- Northern Pintail
- Lesser Scaup
- Northern Harrier
- American Kestrel
- Swainson’s Hawk
- Ferruginous Hawk
- Sharp-tailed Grouse
- Willet
- Upland Sandpiper
- Marbled Godwit
- Wilson’s Phalarope
- Franklin’s Gull
- Black Tern
- Short-eared Owl
- Loggerhead Shrike
- Sedge Wren
- Sprague’s Pipit
- Lark Bunting
- Grasshopper Sparrow
- Baird’s Sparrow
- Le Conte’s Sparrow
- Nelson’s Sparrow
- Chestnut-collared Longspur
- Dickcissel
- Bobolink
- Western Meadowlark

- Arctic Shrew
- Richardson’s Ground Squirrel

- Plains Spadefoot
- Canadian Toad
- Smooth Green Snake
- Plains Hog-nosed Snake

- Dakota Skipper
- Monarch Butterfly
- Regal Fritillary

FOCUS AREA: MISSOURI COTEAU BREAKS

Area: 6,110,750 acres or 9,550 mi²

Public Landholdings: 387,890 acres (NDGFD 18,660 acres; NDDTL 162,500 acres; NDPRD 150 acres; USFWS 201,000 acres; USBLM 540 acres; USBR 5,040 acres)

Description and Condition: Rolling, steep topography has spared much of this area from being farmed. A considerable amount of native prairie remains intact but conversion to agriculture and industrial development is occurring. Cattle grazing is the most common use. Abundant wetlands of all classes occur throughout. A great amount of conservation effort, including grassland preservation, has been directed to the Coteau especially within the last 15 years.

Key Species of Conservation Priority

Birds: American Bittern, Northern Pintail, Northern Harrier, Swainson's Hawk, Ferruginous Hawk, Sharp-tailed Grouse, Willet, Upland Sandpiper, Marbled Godwit, Wilson's Phalarope, Short-eared Owl, Sprague's Pipit, Grasshopper Sparrow, Baird's Sparrow, Le Conte's Sparrow, Nelson's Sparrow, Chestnut-collared Longspur, Dickcissel, Bobolink, Western Meadowlark

Mammals: Richardson's Ground Squirrel

Insects: Dakota Skipper, Monarch Butterfly, Regal Fritillary

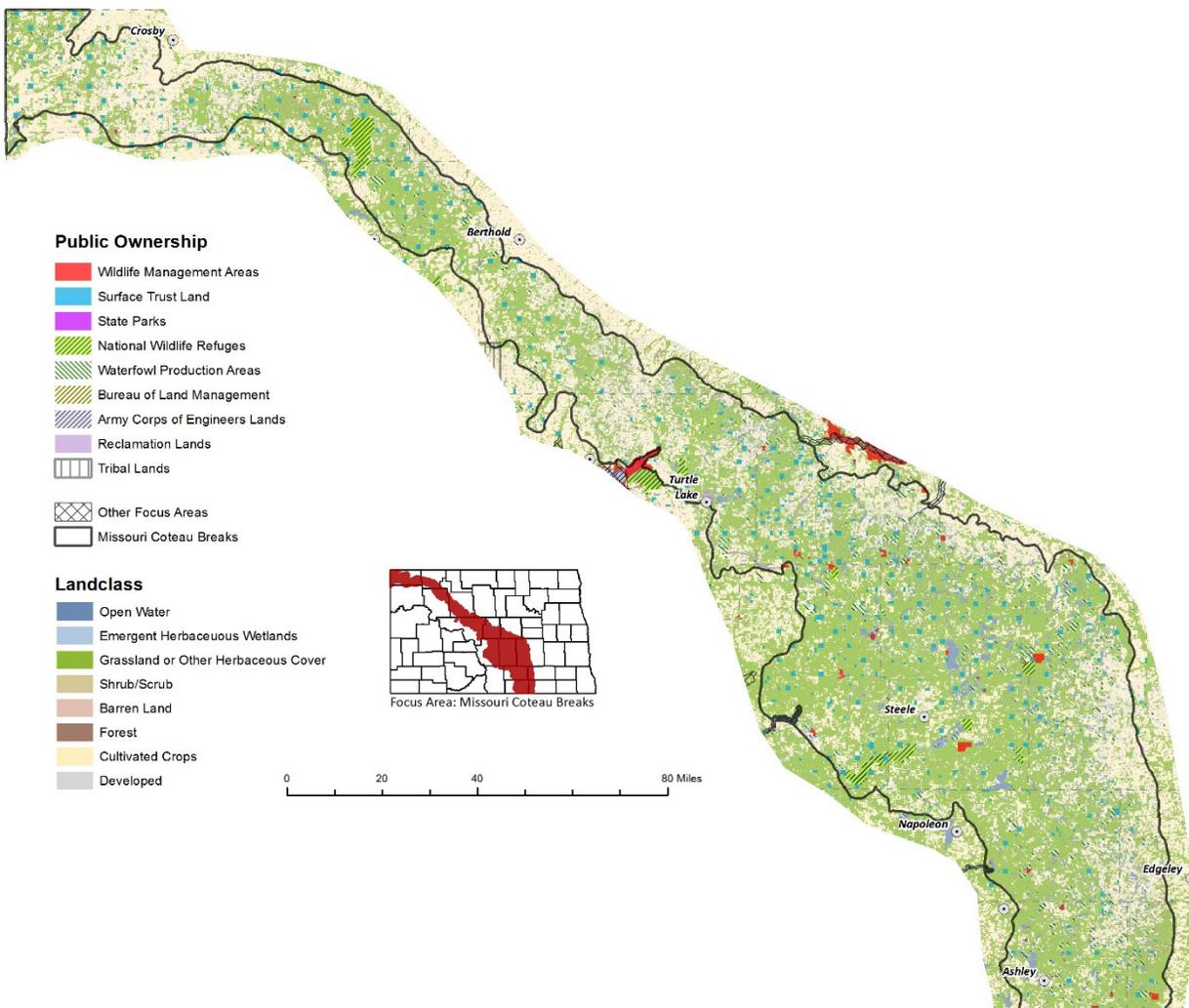


Figure 17. Missouri Coteau Breaks Focus Area.

“Restoration of Fire Regimes on the Missouri Coteau to Support Native Prairie and Prairie Obligate Species”

STATE WILDLIFE GRANT
SUCCESS STORY

Native prairies of the Missouri Coteau face significant threats from encroachment of invasive grasses and brush, particularly Smooth Brome, Kentucky Bluegrass and Western Snowberry. Some rangeland ecologists consider the encroachment of Kentucky Bluegrass as the second most serious threat to native prairie behind direct conversion. However, the traditional use of fire management in the spring may not always be the most beneficial time to suppress cool season invasive grasses. The use of late season fire followed by grazing over a 2-3 year period has been shown to more successfully control the spread of Kentucky Bluegrass compared to spring burns. There is interest and need for late-summer/fall burning among other natural resource management agencies, however, due to financial constraints, agency priorities, and logistical issues most agencies have not fully applied fire management in ways that replicate the historical role fire played in maintaining grasslands. Successful implementation and ecological response will serve as a catalyst to motivate other grassland managers to diversify current management practices. A North Dakota State Wildlife Grant was awarded to The Nature Conservancy to develop a late-summer/fall fire team to implement prescribed burning on the Missouri Coteau. From 2010-2012, more than 7,000 acres were burned in the project area.



IV) WESTERN MIXED-GRASS/SHORT-GRASS PRAIRIE (MISSOURI SLOPE)

Area: 10,768,000 acres or 16,825 mi²

Description and Overall Condition: This landscape component includes the Western mixed-grass prairie and short-grass prairie of the Missouri Slope. This semiarid, unglaciated region of North Dakota includes level to rolling plains topography with isolated sandstone buttes or badlands formations. Natural wetland basins are minimal, probably constituting only several hundred-thousand acres, but small creeks and streams are abundant. The Badlands of western North Dakota is described as a separate landscape (see Figure 33). The Missouri River System/Breaks is considered by some to be a



component of or the boundary between the Missouri Coteau and Missouri Slope, but is described within the Stream, Rivers, and Riparian landscape component (see Figure 24). Shrub-steppe, or prairie that has a large component of sagebrush, occurs scattered throughout. Land use is predominantly dryland farming of spring and winter wheat, barley, sunflowers and corn, interspersed with cattle grazing. However, landcover classifications indicate there is a considerable amount of native vegetation remaining. The oil and gas industry is expanding in the western portion of this region.

SPECIES OF CONSERVATION PRIORITY

- Northern Pintail
- Northern Harrier
- American Kestrel
- Ferruginous Hawk
- Swainson's Hawk
- Golden Eagle
- Prairie Falcon
- Sharp-tailed Grouse
- Greater Sage-Grouse
- Upland Sandpiper
- Marbled Godwit
- Long-billed Curlew
- Wilson's Phalarope
- Burrowing Owl
- Short-eared Owl
- Loggerhead Shrike
- Sprague's Pipit
- Brewer's Sparrow
- Lark Bunting
- Grasshopper Sparrow
- Baird's Sparrow
- Chestnut-collared Longspur
- McCown's Longspur
- Bobolink
- Western Meadowlark

- Merriam's Shrew
- Hispid Pocket Mouse
- Sagebrush Vole
- Black-tailed Prairie Dog
- Swift Fox
- Black-footed Ferret

- Plains Spadefoot
- Short-horned Lizard
- Sagebrush Lizard
- Smooth Green Snake
- Plains Hog-nosed Snake

- Dakota Skipper
- Monarch Butterfly
- Regal Fritillary

FOCUS AREA: SAGEBRUSH SHRUB-STEPPE

Area: 331,400 acres or 518 mi²

Public Landholdings: 69,000 acres (NDDTL 19,490 acres; USFS 58,090 acres; USBLM 32,920 acres)

Description and Condition: Eroded buttes, scoria mounds, and salt pans make this area similar to the badlands. This characteristic big sagebrush ecosystem has been altered by livestock grazing, conversion to cropland, and in more recent years, oil development. However, extensive conservation actions have been implemented over the past 10 years, focusing on improve Greater Sage-Grouse habitat. What remains of this fragile habitat is severely fragmented and faces a series of continual threats.

Key Species of Conservation Priority

Birds: Greater Sage-Grouse, Brewer’s Sparrow, McCown’s Longspur

Mammals: Sagebrush Vole, Swift Fox

Reptiles and Amphibians: Sagebrush Lizard

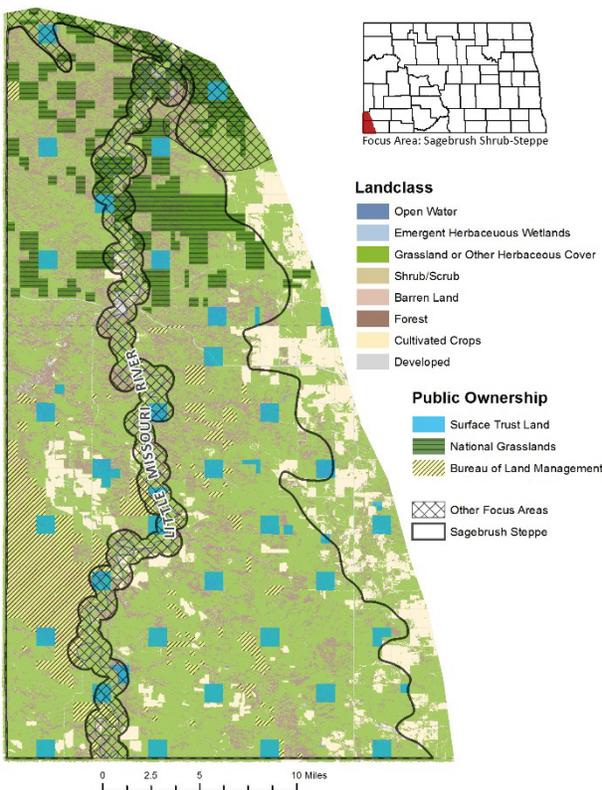


Figure 18. Sagebrush Shrub-steppe Focus Area.

“North Dakota State Acres for Wildlife Enhancement (SAFE) Sagebrush Restoration”

CONSERVATION PARTNER SUCCESS STORY

The SAFE initiative is a voluntary program available under the Conservation Reserve Program to address state or regional high-priority wildlife objectives. The goal of the North Dakota Sagebrush SAFE project is to enroll 2,000 acres to increase Greater Sage-Grouse populations by restoring cropland to sagebrush habitat. The SAFE Sagebrush proposal refers to the North Dakota CWCS and the Focus Area “Sagebrush Shrub-Steppe” and management recommendations for Greater Sage-Grouse. The North Dakota Sagebrush SAFE proposal was approved in 2008 and all acres have been enrolled.



V) PLANTED OR TAME GRASSLAND

Area: unknown, estimate 2-5 million acres

Description and Overall Condition: This landscape component includes land that had been converted to cropland and re-planted to hayland, tame or native grasses. Hayland constitutes approximately 5% of the state. Planted alfalfa is the most common hay crop. Hay may be cut up to four or five times throughout the growing season. Haying earlier than July 15, or before nesting birds have fledged, can result in bird mortality from the machinery. The Conservation Reserve Program (CRP) was established in the 1985 Farm Bill as a tool for producers to conserve marginal soil by retiring cropland from production for 10 to 15 years. The CRP program provides income for producers and delivers unprecedented landscape scale wildlife habitat and conservation of soil and water. Larger tracts of CRP, particularly in



juxtaposition with other existing native or planted grassland, are more attractive and more productive than smaller tracts of CRP. These larger tracts, in concert with surrounding landscape features, are a focus area of this landscape component. CRP is generally left idle although managed and emergency haying and grazing of CRP may be allowed. Producers can hay or graze CRP once every three years, keeping outside of the primary nesting season defined as April 15-August 1. The number of acres of hayed and grazed CRP has and continues to increase as a result, which can be beneficial to many wildlife species. More than half of the CRP contracts have expired since 2007 and obstacles for reauthorization of the program limits new contracts. The loss of CRP on the North Dakota landscape will be detrimental to wildlife populations. Tame grasslands are widespread throughout the state on wildlife management areas, waterfowl production areas, and other publicly owned land.

SPECIES OF CONSERVATION PRIORITY

American Bittern
Northern Pintail
Lesser Scaup
Northern Harrier
Swainson's Hawk
Sharp-tailed Grouse
Greater Prairie-Chicken
Willet
Upland Sandpiper
Marbled Godwit
Long-billed Curlew
Wilson's Phalarope
Short-eared Owl
Burrowing Owl
Loggerhead Shrike
Lark Bunting
Grasshopper Sparrow
Baird's Sparrow
Le Conte's Sparrow
Nelson's Sparrow
Chestnut-collared Longspur
Dickcissel
Bobolink
Western Meadowlark

Arctic shrew
Pygmy Shrew
Plains Pocket Mouse
Hispid Pocket Mouse
Richardson' Ground Squirrel

Plains Spadefoot
Canadian Toad
Smooth Green Snake
Plains Hog-nosed Snake

Monarch Butterfly
Regal Fritillary

FOCUS AREA: CONSERVATION RESERVE PROGRAM (CRP)

Area: 1,500,000 acres in 2015, projected to decline to less than 1,000,000 acres by 2020 from a high of nearly 3,500,000 acres in 2007.

Description and Condition: There are numerous CRP practices producers may enroll in, from native and introduced grass plantings to filter strips or specialized practices such as pollinator habitat. The CRP program and its positive effects on soil/water/habitat delivery is perhaps the greatest conservation and wildlife story in North Dakota. The positive results on wildlife such as increased waterfowl populations and grassland bird nesting is well documented. CRP grasslands are found in every county in the state. Condition of CRP ranges from near-pristine native grass plantings to nearly 100% invaded by Kentucky Bluegrass or Smooth Brome. Nonetheless, even CRP that has diminished in quality throughout the contract still provides important breeding or wintering habitat for many wildlife species. Existing CRP is a focus area, however, the continuation of the CRP program in North Dakota is crucial to Species of Conservation Priority. Refinement of CRP practices, such as State Acres For wildlife Enhancement (SAFE) to support Species of Conservation Priority must be implemented.

Key Species of Conservation Priority

Birds: Lesser Scaup, Northern Harrier, Sharp-tailed Grouse, Short-eared Owl, Upland Sandpiper, Lark Bunting, Grasshopper Sparrow, Baird’s Sparrow, Le Conte’s Sparrow, Bobolink, Dickcissel, Western Meadowlark

Insects: Monarch Butterfly

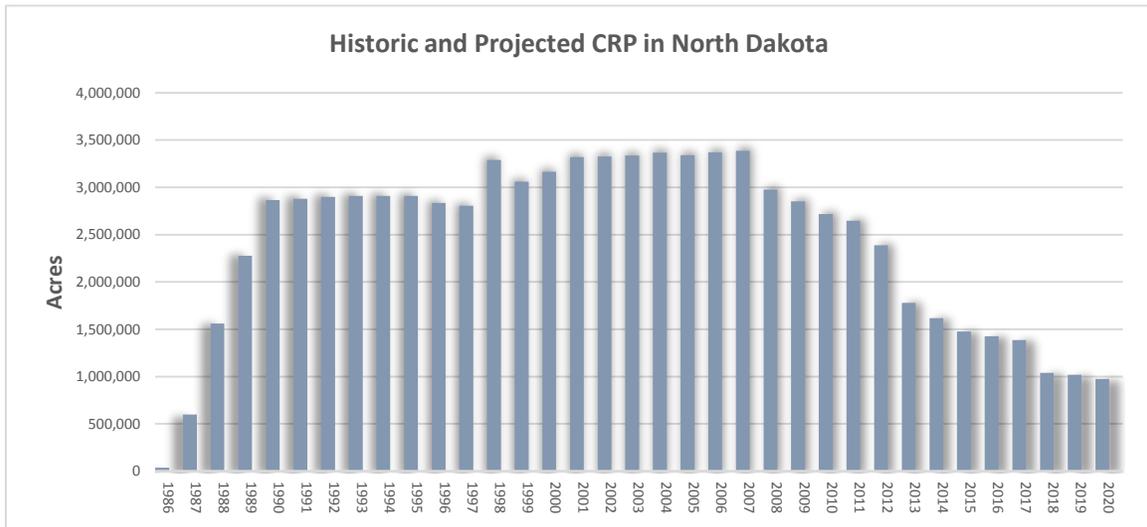


Figure 19. Historic and projected CRP in North Dakota.



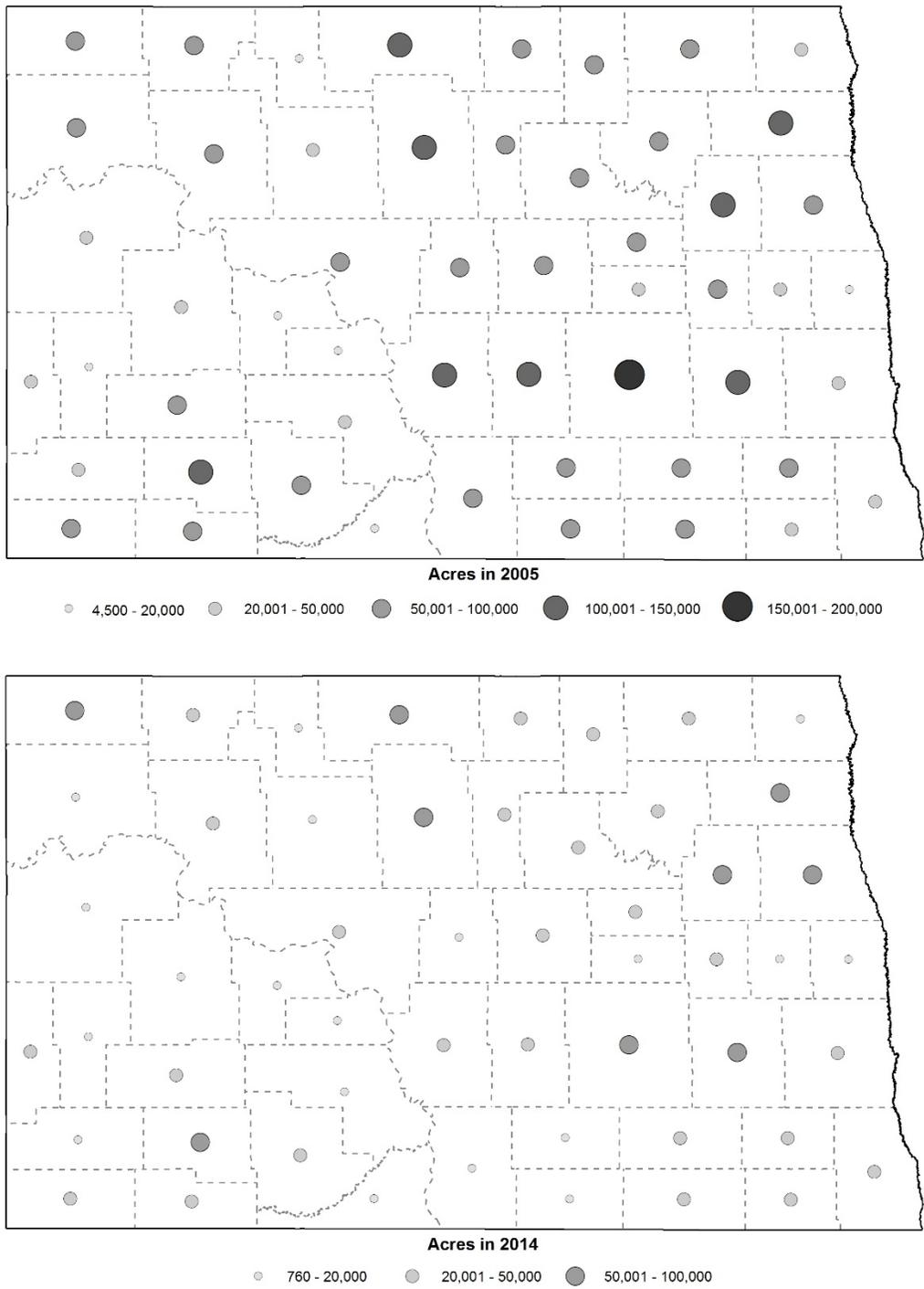


Figure 20. CRP acres per County in 2005 and 2014.

Table 3. Direct Threats and Conservation Actions for all grassland landscape components; Tallgrass Prairie, Eastern Mixed-grass Prairie, Mixed-Grass Prairie, Western Shortgrass/Mixed-grass Prairie, and Planted or Tame Grasslands.

CLASSIFICATION	DIRECT THREAT TO GRASSLAND	CONSERVATION ACTION
1. Residential and Commercial Development		
1.1 Housing and Urban Areas	<ul style="list-style-type: none"> 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/animal species composition g) loss of grazing and burning of grasslands near urban and recreational areas h) predation of grassland animals by domestic animals near urban areas i) direct mortality to wildlife species, particularly birds, from collisions with glass on buildings 	<ul style="list-style-type: none"> i. offer incentives and programs to protect, enhance, and restore grasslands ii. foster/develop entities to administer conservation easements 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
1.2 Commercial and Industrial Areas	<ul style="list-style-type: none"> a) conversion and disturbance of grassland 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, particularly birds, from collisions with glass on buildings 	<ul style="list-style-type: none"> i. foster/develop entities to administer conservation easements ii. urge ecologically responsible ordinances and suitable reclamation standards iii. bird-friendly building designs
1.3 Tourism and Recreational Areas	<ul style="list-style-type: none"> a) disturbance associated with recreational development can disperse noxious/invasive weeds b) pesticide/herbicide application and drift impacts adjacent plant/animal species composition c) unrestrained domestic animals can harass wildlife 	<ul style="list-style-type: none"> i. promote “Keep It Native” campaign for greenways, trails, recreational areas, and minimize project footprint ii. urge ecologically responsible ordinances iii. public education and outreach
2. Agriculture		
2.1 Annual and Perennial Non-Timber Crops	<ul style="list-style-type: none"> a) conversion of grassland to cropland development b) fragmentation of grassland due to cropland development c) disturbance of grassland wildlife during conversion process 	<ul style="list-style-type: none"> i. offer incentives and programs to protect, enhance, and restore grasslands

CLASSIFICATION	DIRECT THREAT TO GRASSLAND	CONSERVATION ACTION
	<ul style="list-style-type: none"> d) pesticide/herbicide application and drift impacts adjacent plant/animal species composition, effect on pollinators 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) farm demographics, loss of ecologically sustainable land management 	<ul style="list-style-type: none"> ii. foster/develop entities to administer conservation easements iii. strengthen Farm Bill regulatory provisions (i.e. swampbuster, sodbuster, sodsaver) iv. offer incentives for wildlife friendly farming, tax-based or direct payments v. promote and support holistic grazing, collaborate with grassland based agricultural groups vi. support demo projects and best management practices vii. promotion of cover crops and soil health viii. reevaluate laws pertaining to conservation easements in North Dakota
2.3 Livestock Farming and Ranching	<ul style="list-style-type: none"> a) lack of using grazing as a management tool to maintain/improve grassland vegetation, over-resting b) overutilization and/or overgrazing c) shift from ranching (pro-grass) lifestyle to large confined animal feeding operations d) disturbance, erosion, and decline in soil health in high livestock traffic areas e) opposing attitude of using prescribed fire as co-management tool f) non-traditional livestock farms may proliferate disease transmission, genetic mixing, escapees, to wild populations g) inappropriate fencing h) farm demographics, loss of ecologically sustainable land management 	<ul style="list-style-type: none"> i. encourage grazing as a grassland management tool to improve the land ii. foster/develop entities to administer conservation easements iii. provisions for Farm Bill disaster assistance for livestock producers iv. establish grassbanks between state/federal/non-governmental land and private ranches v. incentivize proper grazing management vi. promote and support holistic grazing, work with grass-based agricultural groups vii. build market and corporate support of grass-based livestock viii. support grazing lands coalitions 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 xii. encourage smooth wire, at least for bottom wire, and apply visibility markers
3. Energy Production and Mining		

CLASSIFICATION	DIRECT THREAT TO GRASSLAND	CONSERVATION ACTION
3.1 Oil and Gas Drilling	<ul style="list-style-type: none"> a) conversion of grassland to well pads, field or production facilities b) fragmentation of grassland to well pads, field or production facilities c) disturbance associated with oil and gas development can proliferate noxious/invasive weeds d) inadequate reclamation e) illegal dumping of materials and waste f) loss of grazing due to disturbance to livestock g) anthropogenic disturbance to grassland associated wildlife h) social apathy to negative ecological effects of oil and gas drilling 	<ul style="list-style-type: none"> i. well pad and facility consolidation ii. foster relationships with oil companies to stimulate ecologically sound development iii. engage in early consultation with the siting of well pads iv. develop crucial habitat maps or species avoidance areas v. develop best management practices vi. incentivize companies for implementing ecologically sound development vii. urge ecologically responsible ordinances and suitable reclamation standards viii. public education and outreach ix. public disclosure of impacts/footprint x. research the impacts of oil and gas drilling on grassland habitat and wildlife
3.2 Mining and Quarrying	<ul style="list-style-type: none"> a) conversion of grassland to mines or quarries b) anthropogenic disturbance to grassland associated wildlife c) inadequate reclamation 	<ul style="list-style-type: none"> i. minimize footprint of development ii. suitable reclamation standards
3.3 Renewable Energy	<ul style="list-style-type: none"> a) conversion of grassland to alternative fuel crops b) fragmentation of grassland by wind or solar facilities c) promotion of non-native, monotypical alternative fuel crops d) direct or indirect mortality of wildlife species from structures e) altered wildlife migrations f) anthropogenic disturbance to grassland associated wildlife, e.g. noise, light 	<ul style="list-style-type: none"> i. offer incentives and programs to protect, enhance, and restore grasslands ii. incentivize companies for implementing ecologically sound development iii. urge ecologically responsible ordinances and suitable reclamation standards iv. minimize footprint of development <ul style="list-style-type: none"> i. research to determine best areas for placement to minimize impacts to wildlife
4. Transportation & Service Corridors		
4.1 Roads and Railroads	<ul style="list-style-type: none"> 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 of wildlife species with vehicles or trains e) roads acting as migration barriers for terrestrial wildlife f) proliferate noxious/invasive weeds 	<ul style="list-style-type: none"> 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. timing restrictions for construction v. maintain natural corridors or construct wildlife crossings

CLASSIFICATION	DIRECT THREAT TO GRASSLAND	CONSERVATION ACTION
	g) road and railway incidents secondary effects, e.g. spills and explosions	
4.2 Utility and Service Lines	<ul style="list-style-type: none"> 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 right-of-ways f) direct mortality of wildlife species, particularly birds, by collision or electrocution 	<ul style="list-style-type: none"> 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 vi. timing restrictions for construction v. require line marking devices vi. use suggested practices for avian protection on power lines
5. Biological Resource Use		
5.1 Hunting and Collecting Terrestrial Animals	<ul style="list-style-type: none"> a) anthropogenic disturbance to grassland associated wildlife, e.g. off-road travel, dog training during nesting season b) disturbance/movement can proliferate noxious/invasive weeds c) wildlife value orientations or changing public attitudes towards animals, e.g. stimulate illegal hunting/collection of terrestrial animals, or promote the introduction of nonnative species for hunting d) insufficient laws protecting some terrestrial wildlife, e.g. reptiles e) poaching f) baiting g) conversion of native grassland to facilitate hunting desires, e.g. converting native to dense nesting cover or food plots 	<ul style="list-style-type: none"> i. urge ecologically responsible ordinances ii. increase enforcement and deterrents iii. reevaluate laws pertaining to terrestrial wildlife iv. public education and outreach
5.2 Gathering Terrestrial Plants	a) collection of Echinacea	<ul style="list-style-type: none"> i. increase enforcement and deterrents ii. public education and outreach
5.3 Logging and Wood Harvest	a) not a threat	i. use as a management tool to restore grassland
5.4 Fishing and Harvesting Aquatic Resources	<ul style="list-style-type: none"> a) anthropogenic disturbance to grassland associated wildlife, e.g. off-road travel b) disturbance/movement can proliferate noxious/invasive weeds c) poaching 	<ul style="list-style-type: none"> i. urge ecologically responsible ordinances ii. increase enforcement and deterrents iii. public education and outreach

CLASSIFICATION	DIRECT THREAT TO GRASSLAND	CONSERVATION ACTION
6. Human Intrusions & Disturbance		
6.1 Recreational Activities	<ul style="list-style-type: none"> a) damage to grassland habitat from off-road vehicles b) anthropogenic disturbance to grassland associated wildlife, e.g. off-road travel, geocaching, paintball, unauthorized camping c) littering 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> a) anthropogenic disturbance to grassland associated wildlife 	<ul style="list-style-type: none"> i. urge ecologically responsible ordinances
6.3 Work and Other Activities	<ul style="list-style-type: none"> a) anthropogenic disturbance to grassland associated wildlife 	<ul style="list-style-type: none"> i. urge ecologically responsible ordinances
7. Natural System Modification		
7.1 Fire and Fire Suppression	<ul style="list-style-type: none"> a) fire suppression results in woody encroachment, succession, loss of native diversity b) reduction in funding and staff support for fire management c) deficiency of experienced fire management staff d) fire management training obstacles, i.e. officialdom is disincentive to train staff e) social apathy to use of prescribed fire f) lack of science and social benefits of fire in the Northern Great Plains 	<ul style="list-style-type: none"> i. offer incentives and programs to implement prescribed fire ii. support fire coalitions and cooperative ventures iii. obtain funding for fire management programs iv. obtain funding for fire management staff and training v. public education and outreach vi. promote pro-fire campaign vii. research the effects of fire management
7.2 Dams and Water Management/Use	<ul style="list-style-type: none"> a) conversion of grassland to impoundment b) may proliferate concentration of salts, heavy metals, etc. c) addition of water may proliferate the spread of West Nile virus to grassland associated wildlife d) inappropriate movement of water as water management e) change in water infiltration rates 	<ul style="list-style-type: none"> i. offer incentives and programs for alternative water sources, e.g. wells, portable water ii. reclaim deteriorating dams and dugouts iii. education about dynamic water systems and water management iv. incentivize buffers
7.3 Other Ecosystem Modification	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> i. promote diversity ii. plant diverse grass and forb mixes and pollinator plantings iii. promote soil health iv. ecosystem education and awareness

CLASSIFICATION	DIRECT THREAT TO GRASSLAND	CONSERVATION ACTION
8. Invasive & Other Problematic Species		
8.1 Invasive non-native/alien Species	<ul style="list-style-type: none"> a) spread and proliferation of invasive or detrimental plants, e.g. Kentucky bluegrass, smooth brome b) spread and proliferation of noxious weeds, e.g. leafy spurge, wormwood c) spread and proliferation of woody vegetation, e.g. Russian olive d) feral cats (<i>Felis catus</i>) e) feral swine (<i>Sus scrofa</i>) 	<ul style="list-style-type: none"> 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 vi. engage the horticultural industry to educate and promote recommended plants and reduce use of problematic invasive or detrimental plants vii. public education and outreach viii. Keep Cats Indoors campaign ix. research control or reduction of invasive plants
8.2 Problematic Native Species	<ul style="list-style-type: none"> a) spread and proliferation of native woody vegetation, e.g. Eastern red cedar, Rocky Mountain juniper, aspen and Western snowberry 	<ul style="list-style-type: none"> i. removal or reduction of undesirable native plants using grazing, fire, chemical and mechanical treatments ii. promote natural control iii. public education and outreach
8.3 Introduced Genetic Material	<ul style="list-style-type: none"> a) genetically modified crops permit for use of myriad pesticides and herbicides b) increase of herbicide resistant plants c) neonicotinoids 	<ul style="list-style-type: none"> i. promote pragmatic use of herbicides and pesticides ii. evaluate impacts of neonicotinoids on wildlife resources
9. Pollution		
9.1 Domestic and Urban Waste Water	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> i. require pipeline warning system for leak detection ii. improve reporting and disclosure of incidents iii. increase enforcement and deterrents
9.2 Industrial and Military Effluents	<ul style="list-style-type: none"> a) pipeline leaks, e.g. oil and salt water b) oil and salt water spills at production or exploration facilities c) oil and salt water spills during transportation d) inappropriate disposal of salt water e) inappropriate disposal of radioactive waste f) coal mining and coal-fired power plant waste seepages 	<ul style="list-style-type: none"> 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

CLASSIFICATION	DIRECT THREAT TO GRASSLAND	CONSERVATION ACTION
9.3 Agriculture and Forestry Effluents	a) fertilizer and pesticide runoff from cropland b) runoff from improperly designed or sited feedlots	v. increase enforcement, deterrents and fines 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 and 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	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
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	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 Landslides	a) land sloughing	i. offer incentives or programs for sensitive or susceptible land
11. Climate Change & Severe Weather		
11.1 Habitat Shifting and Alteration	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 Droughts	a) proliferates invasive plants b) limits management actions c) loss of animal or plant production	i. establish grassbanks between state/federal/non-governmental land and private ranches ii. promotion of cover crops and soil health
11.3 Temperature Extremes	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

<i>CLASSIFICATION</i>	<i>DIRECT THREAT TO GRASSLAND</i>	<i>CONSERVATION ACTION</i>
11.4 Storms and Flooding	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"	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



WETLANDS

VI) Wetlands and Lakes



VI) WETLANDS AND LAKES

Number of Basins: ~1,500,000

Description and Overall Condition: This landscape component includes all wetlands and lakes distributed throughout the state. There are more than 1 million wetland and lake basins in North Dakota, with densities of more than 150 wetlands per square mile in some areas. The draining, filling, burning, farming, or the complete destruction and alteration of wetlands, especially small temporary wetlands, is widespread. From 1997 to 2009, more than 50,000 basins were lost, or -3.3% overall change. Wetlands located within cropland may be void of emergent vegetation, and those within pasture or range lands are often open to overuse by cattle use and degradation. Wetlands are dynamic and dependent on weather cycles may be in various stages of drought or deluge. The key to conservation of many SCP and other wetland associated wildlife is to provide a mosaic of wetlands and



grasslands. Lakes in North Dakota are particularly susceptible to non-point source pollution, in part due to the great amount of agriculture in the state. No specific focus areas have been identified but nearly all wetlands play a vital role in filtering clean water, storage of surface water, and crucial wildlife habitat.

SPECIES OF CONSERVATION PRIORITY

Horned Grebe
 American White Pelican
 American Bittern
 Northern Pintail
 Lesser Scaup
 Canvasback
 Bald Eagle
 Northern Harrier
 Yellow Rail
 Whooping Crane
 Piping Plover
 American Avocet
 Willet
 Upland Sandpiper
 Long-billed Curlew
 Marbled Godwit
 Red Knot
 Wilson's Phalarope
 Franklin's Gull
 Black Tern
 Short-eared Owl
 Le Conte's Sparrow
 Nelson's Sparrow

Arctic Shrew
 Pygmy Shrew
 River Otter

Plains Spadefoot
 Canadian Toad
 Snapping Turtle

Monarch Butterfly

Table 4. Number of wetland basins by wetland type in the Prairie Pothole Region of North Dakota, 2009. Source: Status and Trends of Prairie Wetlands in the United States 1997 to 2009.

Farmed Wetland	Temporary Emergent	Saturated Emergent	Seasonal Emergent	Semi-Permanent Emergent	Ponds	Shrub Wetland	Forested Wetland	Lakes
29,991	677,163	906	661,099	80,053	34,776	8,445	3,160	3,125

“Removing Sedimentation as a Technique for Restoring Palustrine Season and Temporary Wetlands”

STATE WILDLIFE GRANT
SUCCESS STORY

The Prairie Pothole Region (PPR) of North Dakota is characterized by a mosaic of small (<.01 ha.) to large (>30 ha.) wetlands in either a grassland or cropland dominated landscape. Conversion of grassland to cropland and drainage of wetlands across the entire PPR has resulted in wetland loss of up to 90% in some areas. To magnify the “dysfunction” of many Palustrine wetlands in the northeastern region, hybridization of invasive narrow-leaved cattails with the native broad-leaved (common) cattail has evolved the hybrid cattail. The hybrid cattail is ideally suited for the shallow water wetlands commonly found in the PPR in the northern Great Plains. Hybrid cattail expansion, first recognized during the mid-1950’s, is a symptom of the problem of excessive sedimentation of PPR wetlands. The unfortunate result is entire palustrine emergent temporary, seasonal and semi-permanent wetlands can become dominated by this invader. The ultimate goal of this project is to provide improved habitat conditions for wildlife species listed in the SCP predicated upon the following objectives; 1) to identify and restore at least 50 “cattail choked/sediment impacted” wetland basins totaling 30 surface acres on Federal, State and/or private lands (CRP primarily) within either the Drift Prairie or Red River Valley Geological areas; 2) to improve hydrophytic diversity from low diverse stands of cattails to diverse assemblages of hydrophytes that naturally occur in prairie pothole wetlands; 3) to measure these changes annually on 10 randomly selected restored wetland basins; 4) ultimately assess project success or failure based upon hydrophytic responses as measured in objective 3. A North Dakota State Wildlife Grant (T-27-H) was awarded to USFWS Private Land Biologists to implement the project. From 2008 to 2010, a total of 89 basins totaling 12.5 ha (31.1 acres) were restored. Monitoring of the sites continues to determine effectiveness of the conservation action.

Before and after photographs, from the final report.



Fall 2008 facing south



Fall 2008



Spring 2009 facing north



Spring 2009 – Ring-necked duck use



Summer 2010 facing north



Summer 2010

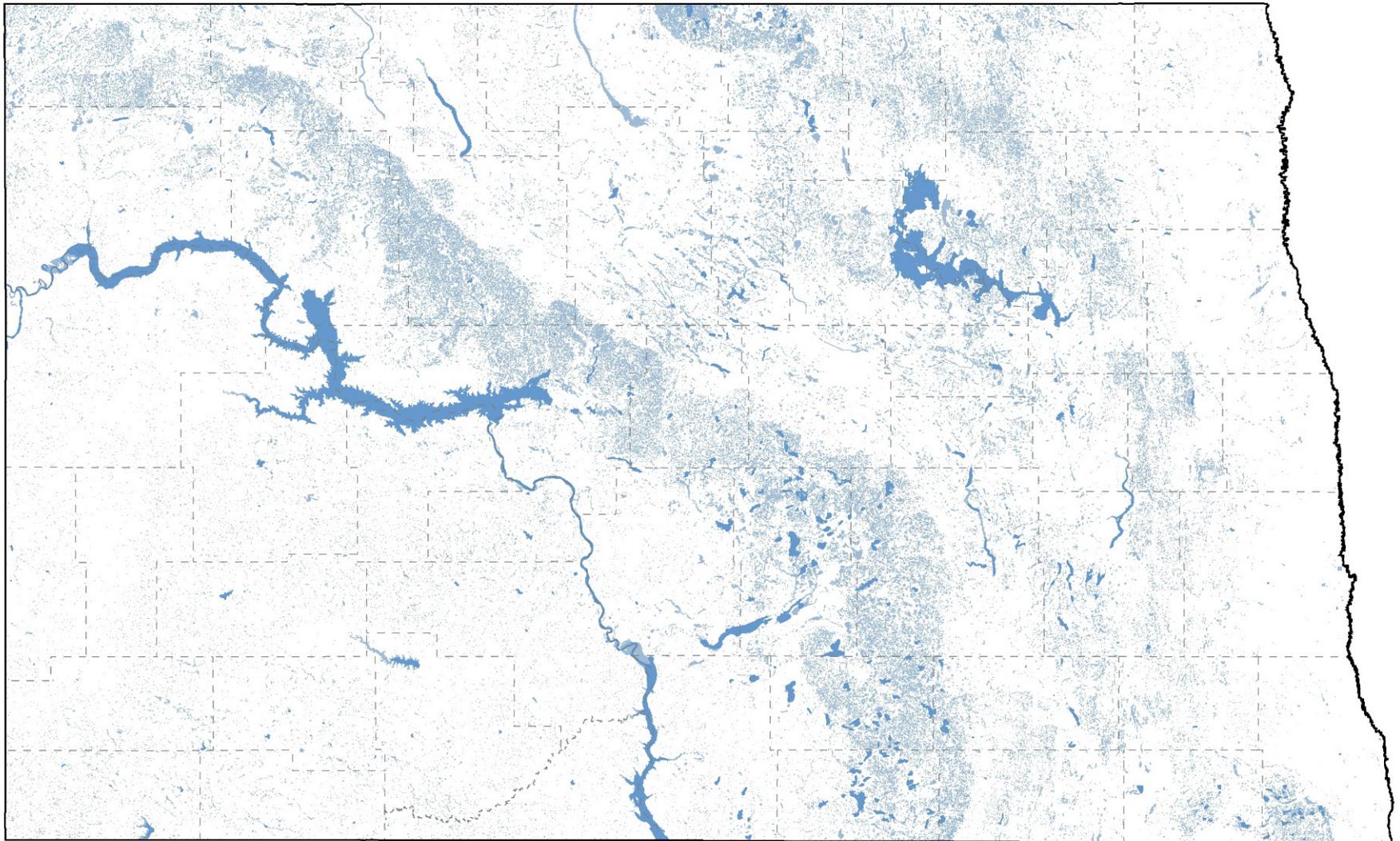


Figure 21. North Dakota wetlands and lakes.

Table 5. Direct Threats and Conservation Actions for wetlands and lakes.

CLASSIFICATION	DIRECT THREAT TO WETLANDS AND LAKES	CONSERVATION ACTION
1. Residential and Commercial Development		
1.1 Housing and Urban Areas	<ul style="list-style-type: none"> 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 wetland vegetation for ornamental grooming e) pesticide/herbicide application and drift impacts adjacent plant/animal species composition f) predation of wetland animals by domestic animals near urban areas 	<ul style="list-style-type: none"> i. offer incentives and programs to protect, enhance, and restore wetlands ii. foster/develop entities to administer conservation easements iii. avoid and minimize impacts to wetlands; mitigate unavoidable impacts iv. urge ecologically responsible urban planning and zoning v. urge 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
1.2 Commercial and Industrial Areas	<ul style="list-style-type: none"> a) conversion of wetlands to commercial and industrial development b) loss of federal jurisdiction of wetlands (i.e. Section 404) 	<ul style="list-style-type: none"> i. foster/develop entities to administer conservation easements ii. avoid and minimize impacts to wetlands; mitigate unavoidable impacts iii. urge ecologically responsible urban planning and zoning iv. urge ecologically responsible ordinances and suitable reclamation standards
1.3 Tourism and Recreational Areas	<ul style="list-style-type: none"> a) expanding lake cabin developments 	<ul style="list-style-type: none"> i. urge ecologically responsible ordinances
2. Agriculture		
2.1 Annual and Perennial Non-Timber Crops	<ul style="list-style-type: none"> a) conversion of wetlands to cropland development b) disturbance of wetland wildlife during conversion process c) pesticide/herbicide application and drift impacts adjacent plant/animal species composition d) increase in soil erosion and sedimentation into wetlands from lack of residual cover on cropland e) impacts to water table and water infiltration rates 	<ul style="list-style-type: none"> i. offer incentives and programs to protect, enhance, and restore wetlands ii. foster/develop entities to administer conservation easements iii. maintain Farm Bill regulatory provisions (i.e. swampbuster) iv. policy change, include isolated wetlands in Section 404 v. offer incentives for aquatic friendly farming, tax-based or direct payments vi. support demo projects and best management practices vii. promotion of cover crops and soil health

CLASSIFICATION	DIRECT THREAT TO WETLANDS AND LAKES	CONSERVATION ACTION
2.3 Livestock Farming and Ranching	<ul style="list-style-type: none"> 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 lifestyle to large confined animal feeding operations 	<ul style="list-style-type: none"> i. offer incentives and programs to protect, enhance, and restore wetlands ii. encourage grazing as a grassland management tool to improve the land iii. foster/develop entities to administer conservation easements iv. incentivize proper grazing management v. promote and support holistic grazing, work with grass-based agricultural groups vi. support grazing lands coalitions vii. use best management practices or ecological site descriptions viii. assessment of economic and ecological values of wetlands and associated wildlife, ecosystem services ix. promote carbon credits
3. Energy Production and Mining		
3.1 Oil and Gas Drilling	<ul style="list-style-type: none"> a) conversion of wetlands to well pads, field or production facilities b) fragmentation of wetlands from well pads, field or production facilities 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 reclamation g) illegal dumping of materials and waste h) illegal filling of wetlands i) anthropogenic disturbance to wetland associated wildlife j) social apathy to negative ecological effects of oil and gas drilling 	<ul style="list-style-type: none"> i. well pad and facility consolidation ii. foster relationships with oil companies to stimulate ecologically sound development iii. engage in early consultation with the siting of well pads iv. avoid and minimize impacts to wetlands; mitigate unavoidable impacts v. develop best management practices vi. incentivize companies for implementing ecologically sound development vii. urge ecologically responsible ordinances and suitable reclamation standards viii. public education and outreach ix. public disclosure of impacts/footprint x. research the impacts of oil and gas drilling on wetlands and wildlife
3.2 Mining and Quarrying	<ul style="list-style-type: none"> a) conversion of wetlands to mines or quarries b) anthropogenic disturbance to wetland associated wildlife c) inadequate reclamation d) creates wetlands that act as ecological sinks 	<ul style="list-style-type: none"> i. minimize footprint of development ii. avoid and minimize impacts to wetlands; mitigate unavoidable impacts iii. suitable reclamation standards

CLASSIFICATION	DIRECT THREAT TO WETLANDS AND LAKES	CONSERVATION ACTION
3.3 Renewable Energy	<ul style="list-style-type: none"> 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 e) altered wildlife migrations f) anthropogenic disturbance to wetland associated wildlife, e.g. noise, light 	<ul style="list-style-type: none"> i. offer incentives and programs to protect, enhance, and restore wetlands ii. incentivize companies for implementing ecologically sound development iii. avoid and minimize impacts to wetlands; mitigate unavoidable impacts iv. urge ecologically responsible ordinances and suitable reclamation standards v. minimize footprint of development ii. research to determine best areas for placement to minimize impacts to wildlife
4. Transportation & Service Corridors		
4.1 Roads and Railroads	<ul style="list-style-type: none"> a) conversion of wetlands to roads and railroads b) fragmentation of wetland complexes by roads and railroads c) roads functioning as dams d) anthropogenic disturbance to wetland associated wildlife, e.g. noise, dust e) proliferate noxious/invasive weeds f) road and railway incidents secondary effects, e.g. spills and explosions, run-off 	<ul style="list-style-type: none"> 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. timing restrictions for construction v. increase pipeline use for transportation
4.2 Utility and Service Lines	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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. avoid and minimize impacts to wetlands; mitigate unavoidable impacts vi. timing restrictions for construction vi. require line marking devices vii. use suggested practices for avian protection on power lines
5. Biological Resource Use		
5.1 Hunting and Collecting Terrestrial Animals	<ul style="list-style-type: none"> a) anthropogenic disturbance to wetland associated wildlife, e.g. off-road travel, dog training during nesting season 	<ul style="list-style-type: none"> i. urge ecologically responsible ordinances ii. increase enforcement and deterrents

CLASSIFICATION	DIRECT THREAT TO WETLANDS AND LAKES	CONSERVATION ACTION
	<ul style="list-style-type: none"> b) disturbance/movement can proliferate noxious/invasive weeds c) poaching 	<ul style="list-style-type: none"> iii. public education and outreach
5.2 Fishing and Harvesting Aquatic Resources	<ul style="list-style-type: none"> 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 animals, e.g. stimulate illegal fishing/collection of aquatic species, or promote the introduction of nonnative species for fishing d) insufficient laws protecting some wetland associated wildlife, e.g. amphibians e) unregulated commercial take of aquatic resources f) poaching 	<ul style="list-style-type: none"> i. urge ecologically responsible ordinances ii. increase enforcement, deterrents and fines iii. reevaluate laws pertaining to wetland associated wildlife iv. public education and outreach
6. Human Intrusions & Disturbance		
6.1 Recreational Activities	<ul style="list-style-type: none"> a) damage to wetland habitat from off-road vehicles b) anthropogenic disturbance to wetland or lake associated wildlife, e.g. boating c) littering 	<ul style="list-style-type: none"> i. restrict or eliminate off-road vehicle use in environmentally sensitive areas ii. increase enforcement, deterrents and fines iii. public education and outreach
6.2 Military Exercises	<ul style="list-style-type: none"> a) anthropogenic disturbance to wetland associated wildlife 	<ul style="list-style-type: none"> i. urge ecologically responsible ordinances
6.3 Work and Other Activities	<ul style="list-style-type: none"> a) anthropogenic disturbance to wetland associated wildlife 	<ul style="list-style-type: none"> i. urge ecologically responsible ordinances
7. Natural System Modification		
7.1 Fire and Fire Suppression	<ul style="list-style-type: none"> a) fire suppression results in woody encroachment or cattail invasion b) social apathy to use of prescribed fire c) lack of science and social benefits of fire in the Northern Great Plains d) improper timing or use of fire, e.g. burning wetlands in the fall for spring crop development 	<ul style="list-style-type: none"> i. offer incentives and programs to implement prescribed fire ii. public education and outreach iii. promote pro-fire campaign iv. research the effects of fire management
7.2 Dams and Water Management/Use	<ul style="list-style-type: none"> a) conversion of natural wetland or other existing habitat to impoundment b) wetland consolidation 	<ul style="list-style-type: none"> 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

CLASSIFICATION	DIRECT THREAT TO WETLANDS AND LAKES	CONSERVATION ACTION
	<ul style="list-style-type: none"> c) impoundments may proliferate concentration of salts, heavy metals, etc. d) addition of water may proliferate the spread of West Nile virus to wetland associated wildlife e) inappropriate movement of water as water management f) change in water infiltration rates g) inappropriate siting of impoundment 	<ul style="list-style-type: none"> iii. reclaim deteriorating dams and dugouts iv. education about dynamic water systems and water management v. incentivize buffers vi. exclude impoundments in ecologically sensitive or inappropriate areas vii. monitor and research water quality viii. construct fish passages on existing dams
7.3 Other Ecosystem Modification	<ul style="list-style-type: none"> a) loss of hygrophyte diversity b) diminishing soil health, e.g. compaction and loss of water infiltration c) changes in water systems d) tile drainage 	<ul style="list-style-type: none"> i. promote wetland plant diversity ii. promote soil health iii. ecosystem education and awareness iv. research impacts of tile drainage on wetland ecosystems
8. Invasive & Other Problematic Species		
8.1 Invasive non-native/alien Species	<ul style="list-style-type: none"> a) spread and proliferation of invasive or detrimental plants, e.g. hybrid cattail b) spread and proliferation of noxious weeds, e.g. purple loosestrife c) spread and proliferation of woody vegetation, e.g. Russian olive, salt cedar d) aquatic nuisance species e) feral cats (<i>Felis catus</i>) f) feral swine (<i>Sus scrofa</i>) g) fish stocking 	<ul style="list-style-type: none"> 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 iv. engage the horticultural industry to educate and promote recommended plants and reduce use of problematic invasive or detrimental plants v. public education and outreach vi. Keep Cats Indoors campaign vii. research control or reduction of invasive plants viii. evaluate impacts of fish stocking, decrease rates or do not stock fish in ecologically sensitive wetlands
8.2 Problematic Native Species	<ul style="list-style-type: none"> a) spread and proliferation of reed canarygrass 	<ul style="list-style-type: none"> i. removal or reduction of undesirable native plants using grazing, fire, chemical and mechanical treatments
8.3 Introduced Genetic Material	<ul style="list-style-type: none"> a) genetically modified crops permit for use of myriad pesticides and herbicides b) increase of herbicide resistant plants c) neonicotinoids 	<ul style="list-style-type: none"> i. promote pragmatic use of herbicides and pesticides ii. evaluate impacts of neonicotinoids on aquatic and wildlife resources
9. Pollution		

CLASSIFICATION	DIRECT THREAT TO WETLANDS AND LAKES	CONSERVATION ACTION
9.1 Domestic and Urban Waste Water	<ul style="list-style-type: none"> a) pipeline leaks b) inappropriate disposal of untreated sewage c) septic system drainage into wetlands and lakes d) nonpoint runoff from housing and urban areas, e.g. fertilizer and pesticides from lawns and golf courses 	<ul style="list-style-type: none"> 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 (minimum) feet of wetland or lake v. require septic setback, or lagoon septic systems vi. incentivize wetland buffers vii. discourage fertilizer use
9.2 Industrial and Military Effluents	<ul style="list-style-type: none"> a) pipeline leaks, e.g. oil and salt water b) oil and salt water spills at production or exploration facilities c) oil and salt water spills during transportation d) inappropriate disposal of salt water e) inappropriate disposal of radioactive waste f) coal mining and coal-fired power plant waste seepages g) nonpoint runoff from military bases 	<ul style="list-style-type: none"> 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 and Forestry Effluents	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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 holistic grazing vi. increase enforcement, deterrents and fines vii. develop best management practices
9.4 Garbage and Solid Waste	<ul style="list-style-type: none"> a) illegal waste sites b) litter 	<ul style="list-style-type: none"> i. improve reporting and disclosure of incidents ii. increase enforcement, deterrents and fines
9.5 Air-borne Pollutants	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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
9.6 Excess Energy	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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		

CLASSIFICATION	DIRECT THREAT TO WETLANDS AND LAKES	CONSERVATION ACTION
10.3 Landslides	a) land sloughing	i. offer incentives or programs for sensitive or susceptible land ii. incentivize wetland buffers
11. Climate Change & Severe Weather		
11.1 Habitat Shifting and Alteration	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 Droughts	a) proliferates invasive plants b) increased duration and frequency	i. alter management plans
11.3 Temperature Extremes	a) proliferates invasive plants b) limits management actions c) loss of animal or plant production d) increased mortality of animals	i. offer incentives and programs to protect, enhance, and restore wetlands
11.4 Storms and Flooding	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 they provide b) lack of knowledge of wetlands ecosystem c) view of wetlands as being of no significance, e.g. "wasteland"	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



RIVERS

VII) Rivers, Streams and Riparian



VII) RIVERS, STREAMS AND RIPARIAN

Total River and Stream Miles: 56,022

Description and Overall Condition: This landscape component includes all rivers, streams, and associated riparian areas which are distributed throughout the state. River floodplains and the associated riparian habitat represent narrow corridors of unique habitat in the state. Overuse of cattle grazing in some areas causes degradation to riparian habitat and is one factor relating to reduced water quality (i.e. fecal coliform bacteria and Escherichia coli impairment). Development such as increased housing along the Missouri River is disturbing to some wildlife species and destroys riparian habitat. Many small low-head dams have impeded fish movement. The creation of larger dams such as Garrison Dam resulted in numerous positive benefits, but is an obstruction in the natural cycle of cottonwood regeneration and fish



movement. The North Dakota 2014 Integrated Water Quality Report (NDDOH 2015) reported 47% of rivers and streams as fully supporting but threatened for aquatic life use, 28% are fully supporting the aquatic life, and 25% were assessed as not supporting aquatic life use. Non-point source pollution, or siltation/sedimentation and stream habitat loss, is a primary cause of aquatic life use impairment. Dissolved oxygen levels are depleted from organic enrichment and nuisance algae and plant growth is a result of excessive nutrient loading. See Figure 23.

SPECIES OF CONSERVATION PRIORITY

Golden Eagle
Bald Eagle
Red-headed Woodpecker
Black-billed Cuckoo
Whooping Crane
Piping Plover
Red Knot
Least Tern

Northern Long-eared Bat
Western Small-footed Bat
Long-legged Bat
Long-eared Bat
Big Brown Bat
Little Brown Bat
Pygmy Shrew
River Otter

False Map Turtle
Smooth Softshell
Spiny Softshell
Snapping Turtle

Chestnut Lamprey
Silver Lamprey
Pallid Sturgeon
Paddlefish
Sturgeon Chub
Sicklefin Chub
Silver Chub
Northern Pearl Dace
Hornyhead Chub
Pugnose Shiner
Blacknose Shiner
Carmine Shiner
Northern Redbelly Dace
Finescale Dace
Flathead Chub
Blue Sucker
Yellow Bullhead
Trout-perch
Logperch
River Darter
Largescale Stoneroller
Burbot

Threeridge
Wabash Pigtoe
Mapleleaf
Black Sandshell
Creek Heelsplitter
Pink Heelsplitter
Pink Papershell
Fragile Papershell
Deertoe
Creeper

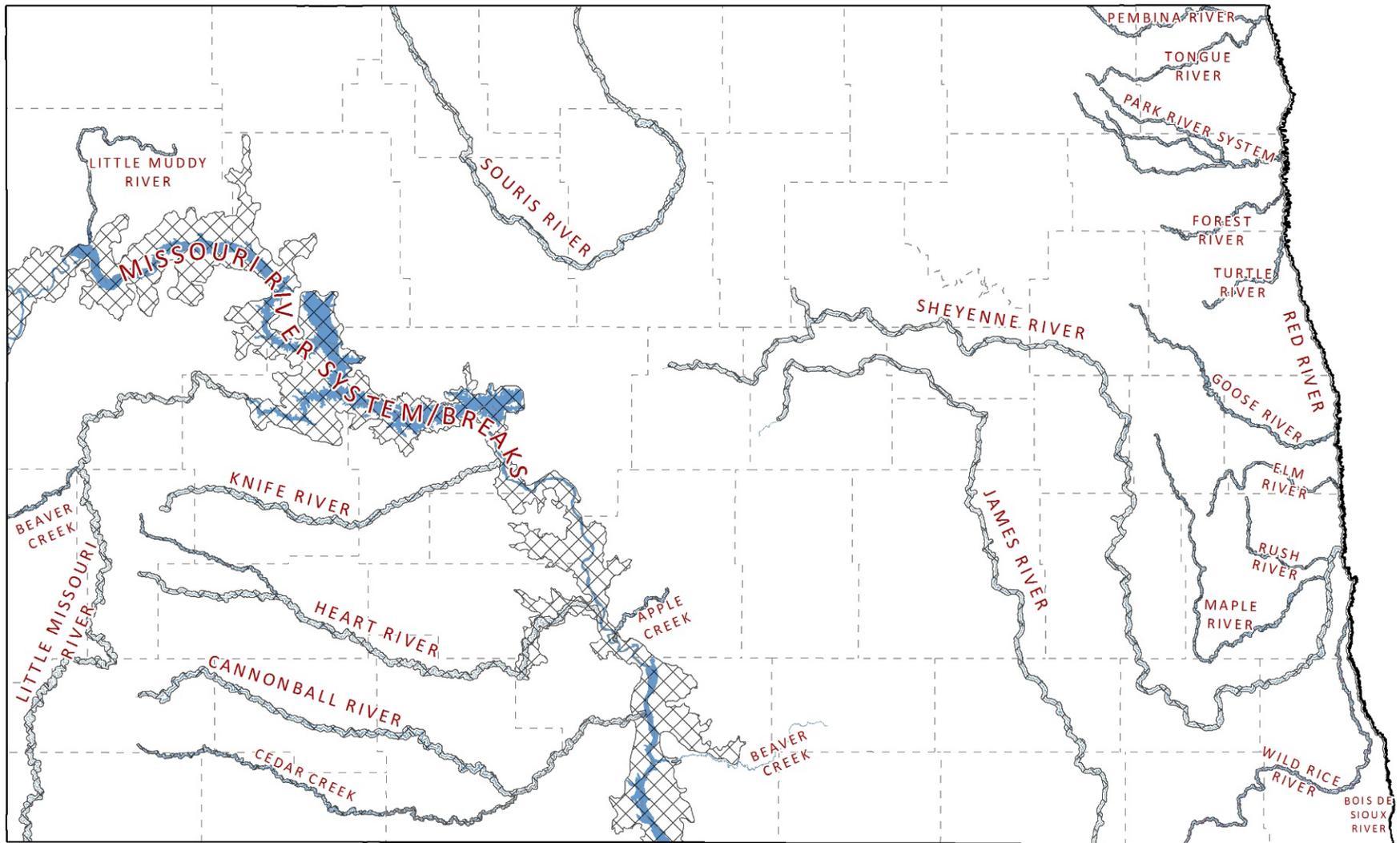


Figure 22. Rivers, Streams and Riparian Focus Areas.

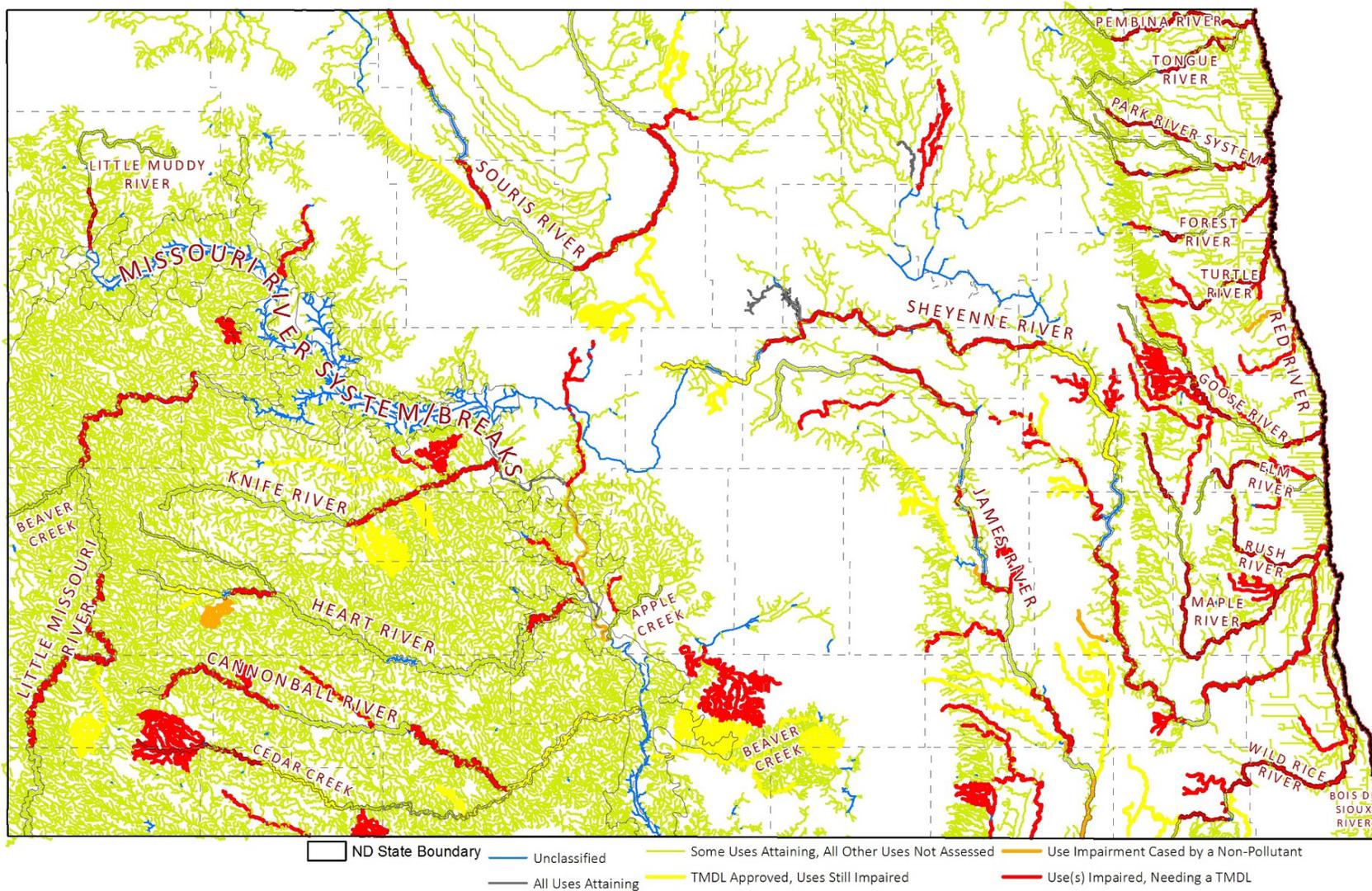


Figure 23. Streams and rivers assessed and categorized by ND Department of Health-Division of Water Quality in 2011 for the 2012 reporting cycle to the US Environmental Protection Agency. Updated and edited May 2014. Total Maximum Daily Load (TMDL).

FOCUS AREA: MISSOURI RIVER SYSTEM/BREAKS

Water Area: 436,500 acres

Upland Breaks: 1,876,000 acres or 2,930 mi²

Description and Condition: The longest river in the United States, the Missouri River begins in the Rocky Mountains of Montana and flows southeast to its confluence with the Mississippi River in Missouri. It is the largest river system in North Dakota. The entire system is now divided into the Upper Missouri River/Yellowstone River, Lake Sakakawea, the Missouri River below Garrison Dam, and Lake Oahe which begins just south of Bismarck/Mandan. The Yellowstone River, Little Muddy Creek, Apple Creek, and Beaver Creek (at Lake Oahe) are secondary rivers included in the Missouri River System/Breaks Focus Area. Other major tributaries, the Little Missouri River, Knife River, Heart River, and Cannonball River are separate Focus Areas. The natural river flow was altered by damming in the 1950s. The River Breaks are rather steep, dissected topography with woody draws, riparian forest, and uplands of shortgrass prairie. Cottonwood regeneration is inhibited due to loss of natural flooding events which stimulates new cottonwood growth. Human development and urban expansion is occurring in some areas, particularly around the Bismarck/Mandan and Williston cities.

Key Species of Conservation Priority

Birds: Bald Eagle, Golden Eagle, Piping Plover, Red Knot, Least Tern, Red-headed Woodpecker

Mammals: River Otter, Northern Long-eared Bat, Western Small-footed Bat, Long-legged Bat, Long-eared Bat, Little Brown Bat, Big Brown Bat

Reptiles and Amphibians: Smooth Softshell, Spiny Softshell, False Map Turtle

Fish: Sturgeon Chub, Sicklefin Chub, Northern Redbelly Dace, Flathead Chub, Blue Sucker, Paddlefish, Pallid Sturgeon, Burbot

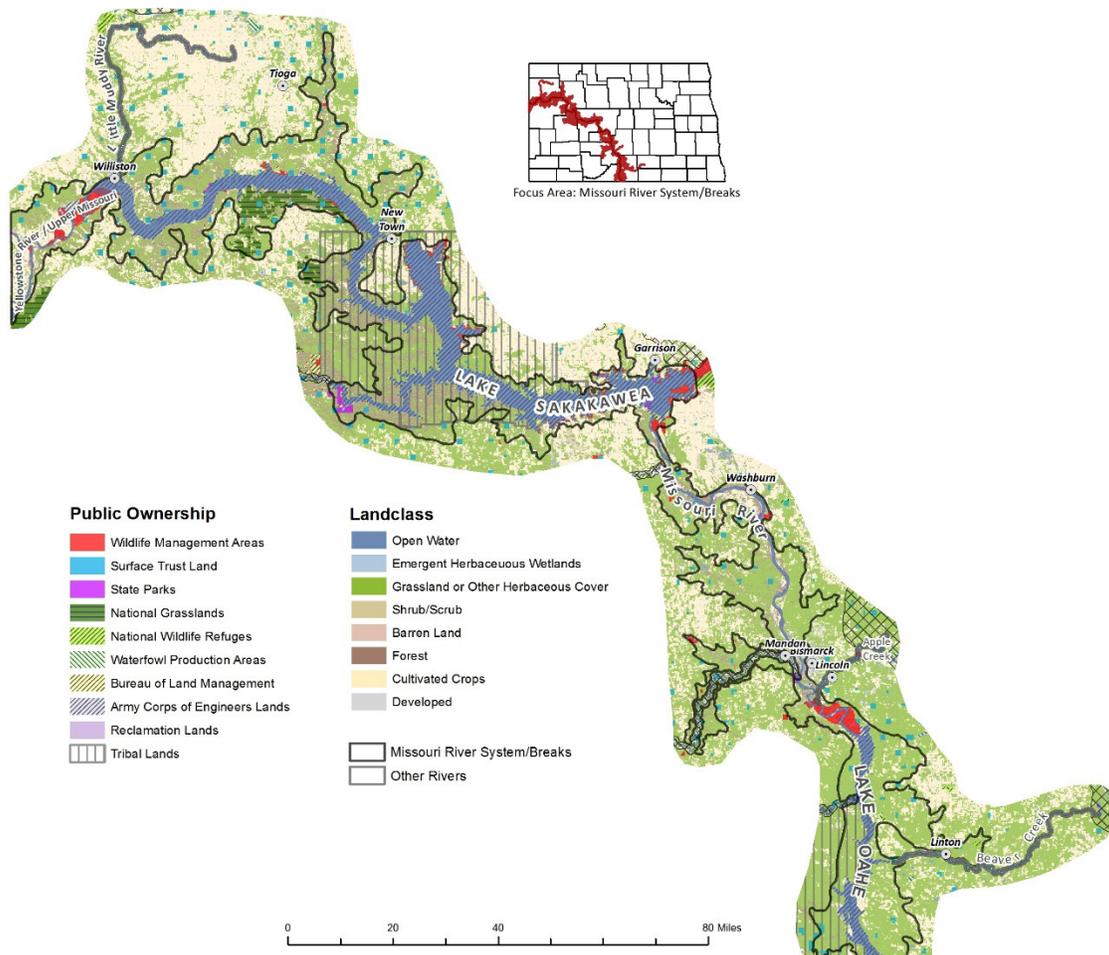


Figure 24. Missouri River Breaks/System Focus Area.

“Smith Grove Wildlife Management Area Land Acquisition”

STATE WILDLIFE GRANT SUCCESS STORY

In 2009, State Wildlife Grant funds (T-28-L) were used to acquire 208 acres of land adjacent to the existing 27 acre Smith Grove Wildlife Management Area (WMA). This area surrounding Smith Grove WMA contains some of the best remaining habitat in the Missouri River corridor. The acquisition site contains roughly 30 acres of river bottom woodlands and 45 acres of native mixed-grass/shortgrass prairie and prairie woodland thickets or woody draws. Native prairie is a declining habitat in North Dakota. Prairie continues to be converted for cropland and other development. The conjunction of prairie, woodland thickets of silver buffaloberry, choke cherry, Juneberry, and various other shrubs and small trees create a diverse habitat community. It is estimated that nearly 34% of the known nesting avifauna of North Dakota can be found in woody draws or its adjacent habitat. There is very late successional stage woodland habitat in the acquisition site, similar to that of Smith Grove WMA. River accretion has helped shape over 50 acres of land suitable for early successional cottonwood habitat.



“Riparian Restoration on Western Wildlife Management Areas”

STATE WILDLIFE GRANT SUCCESS STORY

Russian olive is a non-native, exotic, woody invader that out-competes native vegetation such as cottonwoods and willows, degrades wildlife habitat, and reduces recreational values. Russian olives have contributed to a change in the riverine habitat across the Western U.S. by shading river banks, by reducing available water resources, and by displacing native plant species, both herbaceous and woody. The goal of this habitat improvement project was to address habitat fragmentation by removing a non-native, invasive tree species (Russian olive) from a native ecosystem (riparian systems). The project helped to restore riverine systems to a more historical state and directly benefit species identified as SCP. The restoration efforts targeted Wildlife Management Areas around the Missouri-Yellowstone River confluence. A North Dakota State Wildlife Grant (T2-1-D) was awarded to the National Wild Turkey Federation to improve riparian areas. From 2009-2011, more than 1,850 acres were surveyed for Russian olive and all trees found were treated.



FOCUS AREA: LITTLE MISSOURI RIVER

Total Length: Little Missouri River 330 miles; Beaver Creek 72 miles

Description and Condition: The Little Missouri River originates in eastern Wyoming. The North Dakota portion of the river flows north through the badlands of western North Dakota. Beaver Creek is a secondary Focus Area, flowing into the Little Missouri River at It eventually flows into Lake Sakakawea at Little Missouri Bay. Areas of plains cottonwood forest along the river banks still occur, but have been reduced from historic levels. Encroachment of juniper trees is increasing in the cottonwood forest. Cattle grazing and unrestricted use along the majority of the river is a possible threat in North Dakota.

Key Species of Conservation Priority

- Birds:* Golden Eagle, Red-headed Woodpecker
- Mammals:* Northern Long-eared Bat, Western Small-footed Bat, Townsend’s Big-eared Bat, Long-legged Bat, Long-eared Bat
- Fish:* Sturgeon Chub, Sicklefin Chub, Northern Redbelly Dace, Flathead Chub

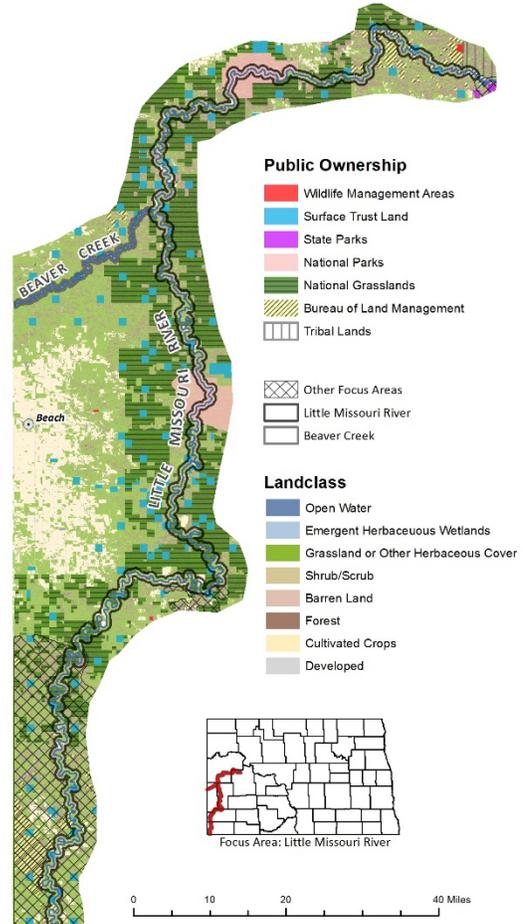


Figure 25. Little Missouri River Focus Area.

FOCUS AREA: KNIFE RIVER

Total Length: 228 miles

Description and Condition: The Knife River originates in the badlands area in west-central North Dakota and flows easterly 200 miles to its confluence with the Missouri River. Much of the watershed is threatened by poor land use practices. Increased erosion in the area has led to higher sediment loads. Run-off from area land into the watershed also causes impairment.

Key Species of Conservation Priority

- Fish:* Northern Redbelly Dace, Flathead Chub, Blue Sucker
- Mussels:* Fragile Papershell



Figure 26. Knife River Focus Area.

FOCUS AREA: HEART RIVER

Total Length: Heart River 290 miles; Green River 93 miles

Description and Condition: The Heart River crosses approximately 180 miles of western North Dakota. It begins in Billings County, in the Little Missouri National Grasslands. It flows east through the Patterson Reservoir near Dickinson. At Gladstone, it is joined by the Green River, a secondary focus area included with the Heart River, and flows through Lake Tschida which is formed by the Heart Butte Dam. It then turns northeast and flows into the Missouri River south of Mandan. The Heart River is threatened by various land use practices including reduced riparian width, lack of native riparian plant diversity, overgrazing of the riparian zone, stream bank erosion, channel and pool filling with sediments, and increased runoff from watershed. A few stretches, particularly east of Lake Tschida, appear in satisfactory condition.

Key Species of Conservation Priority

Fish: Northern Redbelly Dace, Flathead Chub

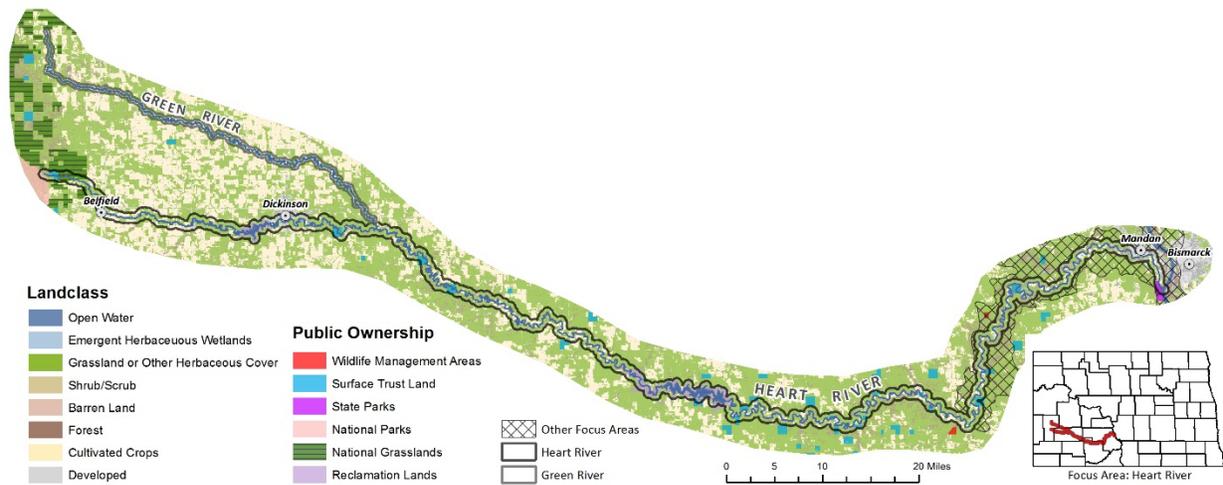


Figure 27. Heart River Focus Area.



FOCUS AREA: CANNONBALL RIVER

Total Length: Cannonball River 302 miles; Cedar Creek 287 miles

Description and Condition: The Cannonball River flows 135 miles, west to east across southwestern North Dakota before flowing into Lake Oahe. Instream flow can range from essentially none during dry years to 95,000 cubic feet per second during wet years. The Cannonball River and tributaries are threatened in both the upper and lower portions of its drainage by high nutrient levels and high sedimentation, most likely caused by land use practices in that watershed. Pathogens have also been cited as impairments to this river system. Cedar Creek is a secondary river included with this focus area.

Key Species of Conservation Priority

Reptiles and Amphibians: Spiny Softshell, Smooth Softshell

Fish: Northern Redbelly Dace, Flathead Chub, Blue Sucker

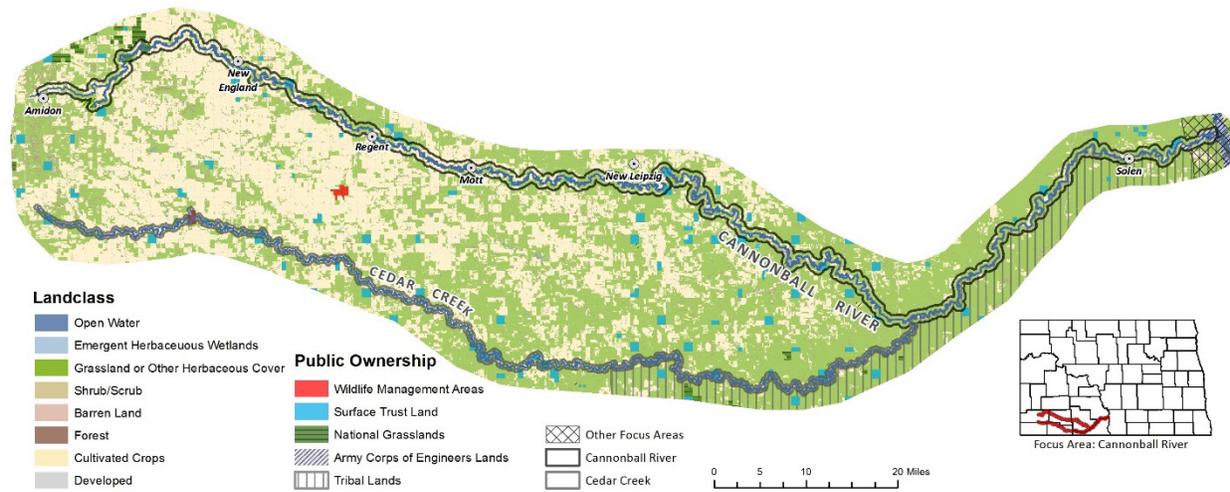


Figure 28. Cannonball River Focus Area.

“Implementation of North Dakota’s Wildlife Action Plan through the North Dakota Game and Fish Department’s Private Lands Initiative”

STATE WILDLIFE GRANT & CONSERVATION PARTNER SUCCESS STORY

The mission of the North Dakota Game and Fish Department is to protect, conserve and enhance fish and wildlife populations and their habitats for sustained public use consumptive and nonconsumptive use. The Private Lands Initiative (PLI) is the primary mechanism the NDGFD uses to accomplish this on private land. From 2007 to 2013, State Wildlife Grant dollars (T-22-HM) were matched with existing state funds to provide cost-share assistance to landowners to develop and protect habitat for Species of Conservation Priority on private land. Priority was given to programs performed in focus areas identified within the North Dakota Wildlife Action Plan and long-term agreements. Eighty landowners from 18 counties implemented conservation actions that benefit habitat for fish and wildlife on their lands totaling 13,162 acres. The PLI program continues to implement conservation on private land that benefits SCP, and link those programs to the SWAP, with other innovative funding sources such as the Outdoor Heritage Fund or State Acres for Wildlife Enhancement (SAFE).



FOCUS AREA: RED RIVER AND TRIBUTARIES

Total Length: Red River 400 miles; Bois de Sioux 32 miles; Wild Rice 235 miles; Elm 86 miles; Goose 166 miles; Turtle 69 miles; Forest 72 miles; Park River System 241 miles; Tongue 78 miles; and Pembina River 107 miles

Description and Condition: The Red River basin drains 39,300 square miles of the three-state region, including 21,000 acres of eastern North Dakota. Its largest North Dakota tributary is the Sheyenne River (see Figure 30), but secondary focus area rivers includes the Bois de Sioux, Wild Rice, Elm, Goose, Turtle, Forest, Park River System, and Tongue and Pembina Rivers. Many of these rivers are influenced by channelization and flood control impoundments implemented to control land drainage for agriculture. Extensive drainage ditch systems in the region also alter the natural hydrology of this basin. Agricultural run-off and wastewater inputs also impair the system.

Key Species of Conservation Priority

Birds: Bald Eagle, Red-headed Woodpecker, Black-billed Cuckoo

Mammals: River Otter, Northern Long-eared Bat, Little Brown Bat, Big Brown Bat, Gray Fox

Fish: Northern Pearl Dace, Silver Chub, Northern Redbelly Dace, Trout-perch, Chestnut Lamprey, Silver Lamprey, Largescale Stoneroller, Hornyhead Chub, Pugnose Shiner, Blacknose Shiner, Carmine Shiner, Finsecale Dace, Yellow Bullhead, Logperch, River Darter, Burbot

Mussels: Threeridge, Wabash Pigtoe, Mapleleaf, Black Sandshell, Creek Heelsplitter, Pink Heelsplitter, Creeper

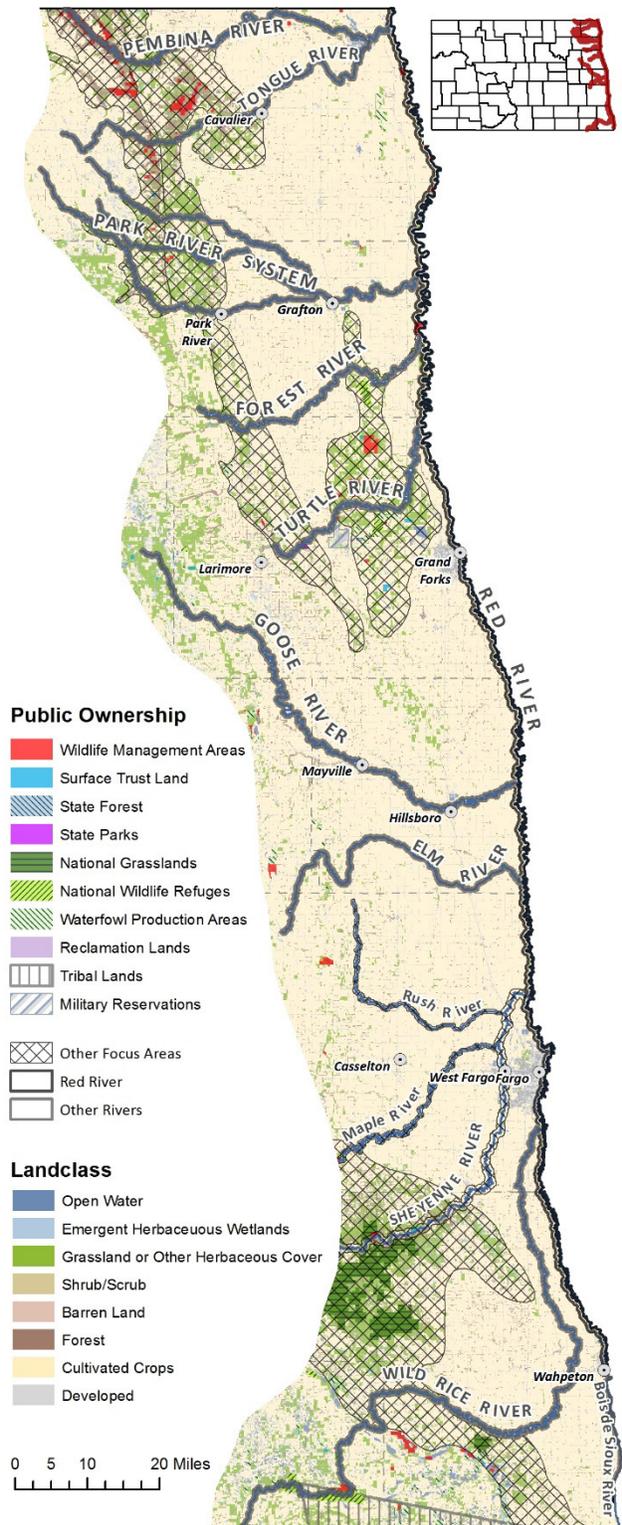
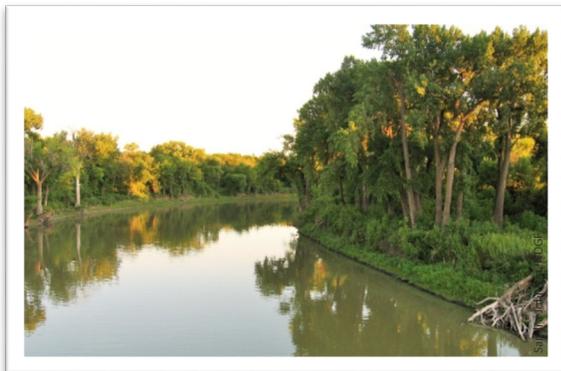


Figure 29. Red River and Tributaries Focus Area.

FOCUS AREA: SHEYENNE RIVER

Total Length: Sheyenne 593 miles; Rush 59 miles; and Maple River 193 miles

Description and Condition: The basin of the Sheyenne River covers 360,000 ha, making it the largest contributing tributary to the Red River in area. It originates in the mixed grass region of central North Dakota and flows southeasterly to its confluence with the Red River. Agricultural and ranching practices throughout the region along with wastewater discharge affect water quality in this drainage. The construction of an outlet from Devils Lake in to the Sheyenne River has affected the flow, elevation and water quality. The Maple and Rush Rivers are secondary Focus Areas, entering the Sheyenne River near confluence with the Red River.

Key Species of Conservation Priority

Birds: Black-billed Cuckoo, Red-headed Woodpecker

Mammals: River Otter, Northern Long-eared Bat, Little Brown Bat, Big Brown Bat, Gray Fox

Fish: Northern Redbelly Dace, Northern Pearl Dace, Pugnose Shiner, Blacknose Shiner, Carmine Shiner, River Darter, Silver Chub, Trout-perch, yellow bullhead

Mussels: Threeridge, Wabash Pigtoe, Mapleleaf, Black Sandshell, Creek Heelsplitter, Pink Heelsplitter, Creeper

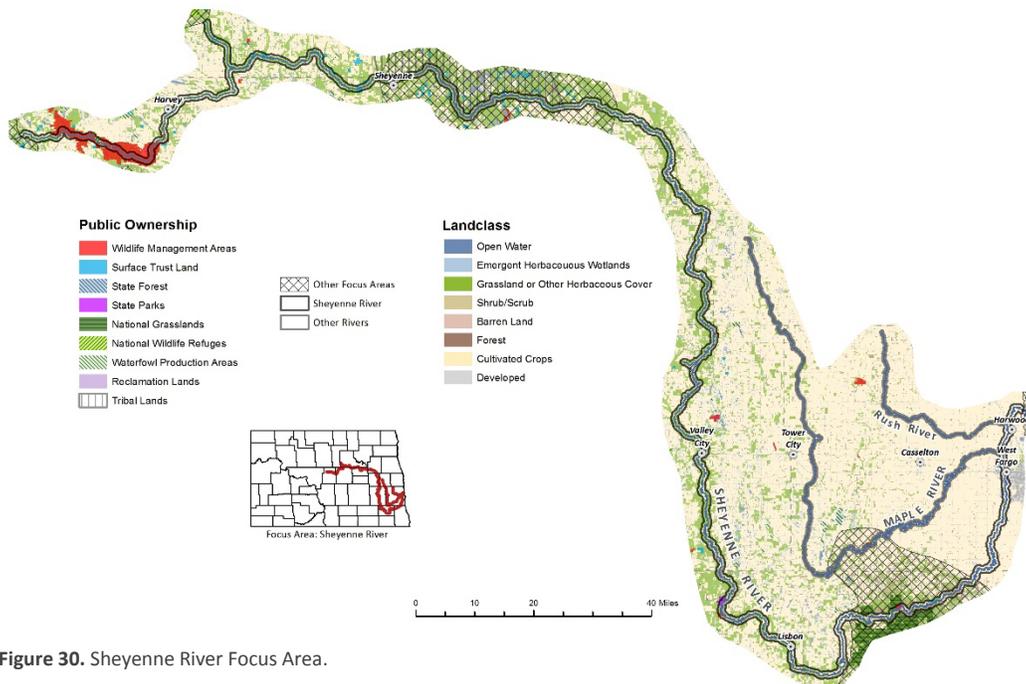


Figure 30. Sheyenne River Focus Area.

“A Two-Phase Population Survey of Mussels in North Dakota”

Mussels are one of the most threatened groups of animals in North America. An estimated 71.1% of the North American mussel fauna are endangered, threatened, or of special concern. This particular study involves rivers and streams in a primarily agricultural area, a perceived component of the loss in mussels is due in part to the agricultural practices. Since North Dakota is largely an agricultural state, it is important to document the current status of our mussel populations. In 2008 a State Wildlife Grant (T-24-R) was awarded to Valley City State University to survey mussels. Qualitative and quantitative sampling was completed on 28 rivers at more than 150 sites over three years. Two new species of mussels were documented; the Deer Toe and the Fragile Papershell. High numbers of mussels were found in the Sheyenne River. In one 100-meter stretch, it is estimated there were more than 100,000 mussels.

STATE WILDLIFE GRANT SUCCESS STORY



FOCUS AREA: JAMES RIVER

Total Length: 304 miles

Description and Condition: The James River begins in the Drift Prairie of central North Dakota and flows south into South Dakota. Land use of this area is predominantly agricultural. One large reservoir north of the town of Jamestown is used for flood control and municipal needs. Poor land use practices and water withdrawal are identified as threats to this system. Many stretches of this river are impaired by high nutrient loads and sedimentation.

Key Species of Conservation Priority

Birds: Black-billed Cuckoo

Fish: Blacknose Shiner, Carmine Shiner, Pugnose Shiner

Mussels: Black Sandshell, Creeper, Deertoe, Fragile Papershell

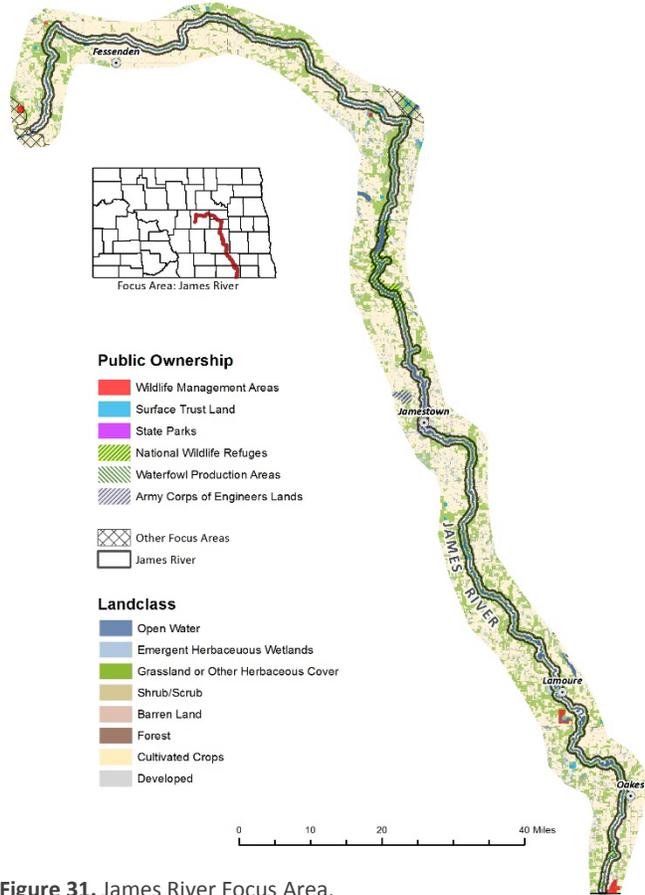


Figure 31. James River Focus Area.

FOCUS AREA: SOURIS RIVER

Total Length: 352 miles

Description and Condition: The Souris River begins in eastern Saskatchewan and flows south into northern North Dakota and then returns north into Canada. Water flows are controlled by two large reservoirs in Saskatchewan and a number of smaller dams in North Dakota. Land use in this drainage is prominently agricultural. A number of stretches of the river are impaired by high nutrient content, and sedimentation. Wastewater discharge also affects water quality in this region. Major flooding occurred in 2011.

Key Species of Conservation Priority

Birds: Black-billed Cuckoo

Mammals: Little Brown Bat, Big Brown Bat

Fish: Northern Pearl Dace, Trout-perch

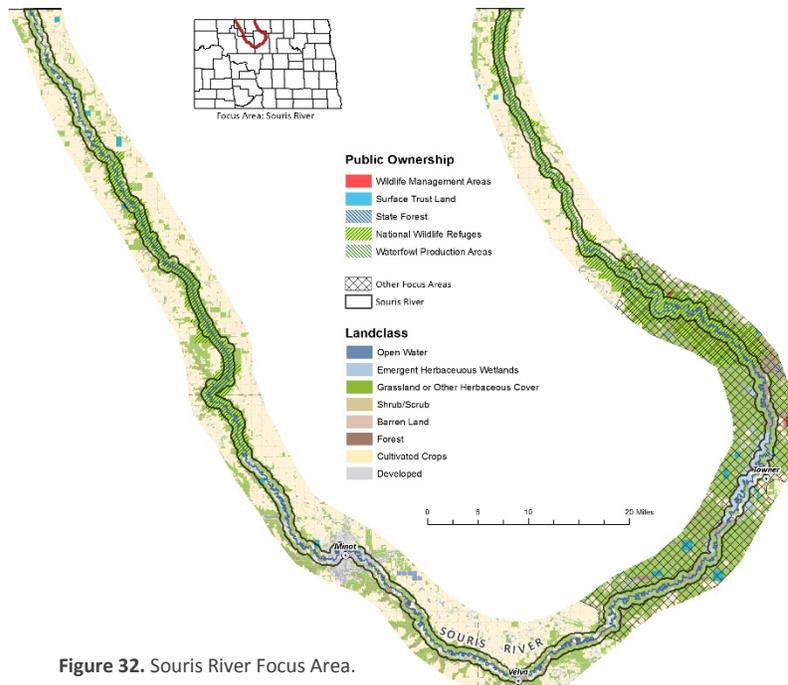


Figure 32. Souris River Focus Area.

Table 6. Direct Threats and Conservation Actions for rivers, streams and riparian.

CLASSIFICATION	DIRECT THREAT TO RIVERS, STREAMS AND RIPARIAN	CONSERVATION ACTION
1. Residential and Commercial Development		
1.1 Housing and Urban Areas	<ul style="list-style-type: none"> a) conversion of riparian to urban development b) streambank and shoreline stabilization c) channelization d) vegetation planted for ornamental purposes can invade adjacent aquatic system e) mowing of aquatic or riparian vegetation for ornamental grooming f) pesticide/herbicide application and drift impacts adjacent plant/animal species composition g) predation of aquatic and riparian animals by domestic animals near urban areas 	<ul style="list-style-type: none"> i. offer incentives and programs to protect, enhance, and restore rivers, streams and riparian ii. foster/develop entities to administer conservation easements iii. avoid and minimize impacts to aquatic systems; mitigate unavoidable impacts iv. implement soil bioengineering for streambank and shoreline stabilization v. protection of instream flows vi. urge ecologically responsible urban planning and zoning vii. urge ecologically responsible urban and county policies viii. public education and outreach for native landscaping and management ix. increase awareness, understanding, and appreciation of the river or stream ecosystem
1.2 Commercial and Industrial Areas	<ul style="list-style-type: none"> a) conversion of riparian to commercial and industrial development b) streambank and shoreline stabilization c) channelization d) water withdrawal and entrapment and impingement 	<ul style="list-style-type: none"> 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. urge ecologically responsible urban planning and zoning vi. urge ecologically responsible ordinances and suitable reclamation standards
1.3 Tourism and Recreational Areas	<ul style="list-style-type: none"> a) expanding cabin developments 	<ul style="list-style-type: none"> i. urge ecologically responsible ordinances
2. Agriculture		
2.1 Annual and Perennial Non-Timber Crops	<ul style="list-style-type: none"> a) conversion of riparian to cropland development b) disturbance of riparian associated wildlife during conversion process c) channelization 	<ul style="list-style-type: none"> i. offer incentives and programs to protect, enhance, and restore rivers, streams and riparian, and uplands, i.e. grasslands and wetlands ii. foster/develop entities to administer conservation easements

CLASSIFICATION	DIRECT THREAT TO RIVERS, STREAMS AND RIPARIAN	CONSERVATION ACTION
	<ul style="list-style-type: none"> d) pesticide/herbicide application and drift impacts adjacent plant/animal species composition e) increase in soil erosion and sedimentation into rivers and streams 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 	<ul style="list-style-type: none"> iii. protection of instream flows iv. maintain Farm Bill regulatory provisions v. offer incentives for aquatic friendly farming, tax-based or direct payments vi. support demo projects and best management practices vii. promotion of cover crops and soil health viii. implement entrainment and impingement reduction recommendations, best management practices ix. develop and implement watershed plans x. use forestry best management practices for wooded riparian
2.3 Livestock Farming and Ranching	<ul style="list-style-type: none"> 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 lifestyle to medium or large confined animal feeding operations 	<ul style="list-style-type: none"> i. offer incentives and programs to protect, enhance, and restore rivers, streams and riparian ii. foster/develop entities to administer conservation easements iii. incentivize proper 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 holistic grazing, work with grass-based agricultural groups vii. support grazing lands coalitions viii. use best management practices or ecological site descriptions ix. feedlot setbacks
2.4 Freshwater Aquaculture	<ul style="list-style-type: none"> a) illegal operations b) potential for disease transmission 	<ul style="list-style-type: none"> i. increase enforcement, deterrents and fines
3. Energy Production and Mining		
3.1 Oil and Gas Drilling	<ul style="list-style-type: none"> a) conversion of riparian to well pads, field or production facilities b) fragmentation of riparian from well pads, field or production facilities c) dewatering rivers and streams for frack water d) disturbance associated with oil and gas development can proliferate noxious/invasive weeds 	<ul style="list-style-type: none"> i. well pad and facility consolidation ii. foster relationships with oil companies to stimulate ecologically sound development iii. engage in early consultation with the siting of well pads iv. develop crucial habitat maps or species avoidance areas v. avoid and minimize impacts to aquatic systems; mitigate unavoidable impacts

CLASSIFICATION	DIRECT THREAT TO RIVERS, STREAMS AND RIPARIAN	CONSERVATION ACTION
	<ul style="list-style-type: none"> e) inadequate reclamation f) illegal dumping of materials and waste g) anthropogenic disturbance to aquatic system associated wildlife h) social apathy to negative ecological effects of oil and gas drilling 	<ul style="list-style-type: none"> vi. develop best management practices vii. incentivize companies for implementing ecologically sound development viii. urge ecologically responsible ordinances and suitable reclamation standards ix. public education and outreach x. public disclosure of impacts/footprint xi. research the impacts of oil and gas drilling on streams, rivers and riparian, and wildlife
3.2 Mining and Quarrying	<ul style="list-style-type: none"> 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 reclamation 	<ul style="list-style-type: none"> 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. suitable reclamation standards vi. setback
3.3 Renewable Energy	<ul style="list-style-type: none"> a) conversion of riparian to alternative fuel crops b) fragmentation of aquatic complexes by wind or solar facilities 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 of riparian associated wildlife, e.g. noise, light 	<ul style="list-style-type: none"> i. offer incentives and programs to protect, enhance, and restore rivers, streams and riparian ii. incentivize companies for implementing ecologically sound development iii. avoid and minimize impacts to aquatic systems; mitigate unavoidable impacts iv. urge ecologically responsible ordinances and suitable reclamation standards v. minimize footprint of development vi. dam removal or modification iii. research to determine best areas for placement to minimize impacts to wildlife
4. Transportation & Service Corridors		
4.1 Roads and Railroads	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> i. urge ecologically responsible ordinances and suitable reclamation standards ii. avoid and minimize impacts to aquatic systems; mitigate unavoidable impacts iii. best management practices to erosion and sediment control

CLASSIFICATION	DIRECT THREAT TO RIVERS, STREAMS AND RIPARIAN	CONSERVATION ACTION
	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> iv. appropriate road restrictions, including speed limits v. timing restrictions for construction vi. increase pipeline use for transportation vii. maintain natural corridors or construct wildlife crossings
4.2 Utility and Service Lines	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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. avoid and minimize impacts to aquatic systems; mitigate unavoidable impacts viii. timing restrictions for construction vi. require line marking devices vii. use suggested practices for avian protection on power lines
5. Biological Resource Use		
5.1 Hunting and Collecting Terrestrial Animals	<ul style="list-style-type: none"> a) anthropogenic disturbance to aquatic or riparian associated wildlife, e.g. off-road travel, dog training during nesting season b) disturbance/movement can proliferate noxious/invasive weeds c) wildlife value orientations or changing public attitudes towards animals, e.g. stimulate illegal hunting/collection of terrestrial animals, or promote the introduction of nonnative species for hunting d) insufficient laws protecting some terrestrial wildlife, e.g. reptiles e) poaching 	<ul style="list-style-type: none"> i. urge ecologically responsible ordinances ii. increase enforcement and deterrents iii. reevaluate laws pertaining to terrestrial associated wildlife iv. public education and outreach
5.2 Fishing and Harvesting Aquatic Resources	<ul style="list-style-type: none"> 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 animals, e.g. stimulate illegal fishing/collection of 	<ul style="list-style-type: none"> i. urge ecologically responsible ordinances ii. increase enforcement, deterrents and fines iii. reevaluate laws pertaining to wetland associated wildlife iv. public education and outreach

CLASSIFICATION	DIRECT THREAT TO RIVERS, STREAMS AND RIPARIAN	CONSERVATION ACTION
	<p>aquatic species, or promote the introduction of nonnative species for fishing</p> <p>d) insufficient laws protecting some aquatic associated wildlife, e.g. amphibians</p> <p>e) unregulated commercial take of aquatic resources</p> <p>f) poaching</p>	
6. Human Intrusions & Disturbance		
6.1 Recreational Activities	<p>a) damage to rivers, streams and riparian habitat from off-road vehicles</p> <p>b) anthropogenic disturbance to aquatic or riparian associated wildlife, e.g. boating, off-road travel, geocaching, paintball, unauthorized camping</p> <p>c) littering</p>	<p>i. increase enforcement, deterrents and fines</p> <p>ii. restrict or eliminate off-road vehicle use in environmentally sensitive areas</p> <p>iii. public education and outreach</p>
6.2 Military Exercises	a) anthropogenic disturbance to aquatic and riparian associated wildlife	ii. urge ecologically responsible ordinances
6.3 Work and Other Activities	a) anthropogenic disturbance to aquatic and riparian associated wildlife	ii. urge ecologically responsible ordinances
7. Natural System Modification		
7.1 Fire and Fire Suppression	a) wildfire in riparian habitat	i. public education and outreach
7.2 Dams and Water Management/Use	<p>a) conversion of natural stream, river or other existing habitat to impoundment</p> <p>b) impoundments may proliferate concentration of salts, heavy metals, etc.</p> <p>c) lowhead dams impeded fish passage</p> <p>d) addition of water may proliferate the spread of West Nile virus to wetland associated wildlife</p> <p>e) inappropriate movement of water as water management</p> <p>f) lack of cottonwood regeneration due to altered hydrology</p> <p>g) aggradation</p> <p>h) change in water infiltration rates</p> <p>i) inappropriate siting of impoundment</p> <p>j) dry dams or retention dams</p> <p>k) water supply projects</p>	<p>i. offer incentives and programs to protect, enhance, and restore river, streams and riparian</p> <p>ii. offer incentives and programs for alternative water sources, e.g. wells, portable water</p> <p>iii. reclaim deteriorating dams and dugouts</p> <p>iv. remove lowhead dams</p> <p>v. do not develop dry dams or retention dams</p> <p>vi. education about dynamic water systems and water management</p> <p>vii. incentivize buffers</p> <p>viii. exclude impoundments in ecologically sensitive or inappropriate areas</p> <p>ix. monitor and research water quality</p> <p>x. develop and implement watershed plans</p> <p>xi. implement best management practices upstream</p>

CLASSIFICATION	DIRECT THREAT TO RIVERS, STREAMS AND RIPARIAN	CONSERVATION ACTION
7.3 Other Ecosystem Modification	<ul style="list-style-type: none"> a) loss of hygrophyte diversity b) diminishing soil health, e.g. compaction and loss of water infiltration c) changes in water systems d) tile drainage e) dry dams and retention dams 	<ul style="list-style-type: none"> i. promote wetland plant diversity ii. promote soil health iii. ecosystem education and awareness iv. research impacts of tile drainage on aquatic ecosystems v. construct fish passages on existing dams
8. Invasive & Other Problematic Species		
8.1 Invasive non-native/alien Species	<ul style="list-style-type: none"> a) spread and proliferation of invasive or detrimental plants, e.g. hybrid cattail b) spread and proliferation of noxious weeds, e.g. purple loosestrife c) spread and proliferation of woody vegetation, e.g. Russian olive, salt cedar d) aquatic nuisance species e) feral cats (<i>Felis catus</i>) f) feral swine (<i>Sus scrofa</i>) g) fish stocking 	<ul style="list-style-type: none"> 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 iv. engage the horticultural industry to educate and promote recommended plants and reduce use of problematic invasive or detrimental plants v. public education and outreach vi. enforce aquatic nuisance species regulations vii. Keep Cats Indoors campaign viii. research control or reduction of invasive plants ix. evaluate impacts of fish stocking, decrease rates or do not stock fish in ecologically sensitive aquatic systems
8.2 Problematic Native Species	<ul style="list-style-type: none"> a) spread and proliferation of reed canarygrass 	<ul style="list-style-type: none"> i. removal or reduction of undesirable native plants using grazing, fire, chemical and mechanical treatments
8.3 Introduced Genetic Material	<ul style="list-style-type: none"> a) genetically modified crops permit for use of myriad pesticides and herbicides b) increase of herbicide resistant plants c) neonicotinoids 	<ul style="list-style-type: none"> i. promote pragmatic use of herbicides and pesticides ii. evaluate impacts of neonicotinoids on aquatic and wildlife resources
9. Pollution		
9.1 Domestic and Urban Waste Water	<ul style="list-style-type: none"> a) pipeline leaks b) inappropriate disposal of untreated sewage c) septic system drainage into rivers and streams d) nonpoint runoff from housing and urban areas, e.g. fertilizer and pesticides from lawns and golf courses 	<ul style="list-style-type: none"> 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 (minimum) feet of river or stream v. require septic setback, or lagoon septic systems vi. incentivize wetland buffers

CLASSIFICATION	DIRECT THREAT TO RIVERS, STREAMS AND RIPARIAN	CONSERVATION ACTION
		vii. discourage fertilizer use
9.2 Industrial and Military Effluents	<ul style="list-style-type: none"> a) pipeline leaks, e.g. oil and salt water b) oil and salt water spills at production or exploration facilities c) oil and salt water spills during transportation d) inappropriate disposal of salt 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 	<ul style="list-style-type: none"> 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 and Forestry Effluents	<ul style="list-style-type: none"> a) fertilizer and pesticide runoff from cropland b) runoff from improperly designed or sited feedlots c) livestock excrement and urine (fecal coliform), Escherichia coli, point source pollution d) tile drainage, nonpoint source pollution e) in-stream turbation 	<ul style="list-style-type: none"> 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 holistic grazing vi. increase enforcement, deterrents and fines vii. develop best management practices
9.4 Garbage and Solid Waste	<ul style="list-style-type: none"> a) illegal waste sites b) litter 	<ul style="list-style-type: none"> i. improve reporting and disclosure of incidents ii. increase enforcement, deterrents and fines
9.5 Air-borne Pollutants	<ul style="list-style-type: none"> 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) wind dispersion of nutrients, pollution, or sediments 	<ul style="list-style-type: none"> 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
9.6 Excess Energy	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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 Landslides	<ul style="list-style-type: none"> a) land sloughing b) anthropogenic causes to bank, destabilization 	<ul style="list-style-type: none"> i. offer incentives or programs for sensitive or susceptible land ii. implement soil bioengineering for streambank and shoreline stabilization iii. incentivize wetland buffers
11. Climate Change & Severe Weather		

CLASSIFICATION	DIRECT THREAT TO RIVERS, STREAMS AND RIPARIAN	CONSERVATION ACTION
11.1 Habitat Shifting and Alteration	<ul style="list-style-type: none"> a) changes in species composition b) changes in phenology c) changes in species life cycle requirements d) timing and intensity of weather events 	<ul style="list-style-type: none"> 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 Droughts	<ul style="list-style-type: none"> a) proliferates invasive plants b) increased duration and frequency c) lower oxygen d) reduced instream flows e) increased algae f) higher water temperatures 	<ul style="list-style-type: none"> i. alter management plans ii. protection of instream flows
11.3 Temperature Extremes	<ul style="list-style-type: none"> a) proliferates invasive plants b) limits management actions c) loss of animal or plant production d) increased mortality of animals 	<ul style="list-style-type: none"> i. offer incentives and programs to protect, enhance, and restore wetlands
11.4 Storms and Flooding	<ul style="list-style-type: none"> a) siltation, sedimentation and erosion b) proliferate invasive plants c) consequences of urban development in floodplain 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> a) social apathy of the value of healthy wetlands and ecosystem services they provide b) lack of knowledge of aquatic ecosystem 	<ul style="list-style-type: none"> i. increase awareness, understanding, and appreciation of the aquatic ecosystem and ecosystem services ii. public education and outreach iii. provide demonstration sites iv. incorporate aquatic education into K-12 classrooms v. human dimension research/surveys

BADLANDS

VIII) Badlands



VIII) BADLANDS

Area: 2,862,000 acres or 4,470 mi²

Public Landholdings: 838,670 acres (NDGFD 7,895 acres; NDDTL 126,790 acres; NDPRD 4,770 acres; USFWS 1,290 acres; USFS 602,535 acres; USNPS 69,770 acres; USBLM 17,780 acres; USACE 7,840 acres)

Description and Overall Condition: This landscape component includes the area associated with the Little Missouri River (see Figure 25) drainage and is commonly referred to as badlands. This highly dissected landscape was formed by water erosion of the soft silt or clay soil and collapse following lignite coal bed burnings. Badly eroded clay-scoria slopes, buttes, and steep canyons are common throughout. Thickets of small trees and shrubs or woody draws of cottonwood and green ash naturally occur on north or east facing escarpments. Bare



hills with scattered Rocky Mountain juniper, and shortgrass prairie in the bottomland and on top of buttes occur throughout. A few small, unique stands of native coniferous forest are present, specifically in Billings, Golden Valley, Slope and Bowman counties. The lack of fire has allowed the expansion and encroachment of juniper in some areas. Ephemeral or intermittent streams are common in steep valleys. Natural wetlands are rare but water impoundments are common. Cattle grazing is prevalent and the most common land use. Recreation, and oil and gas activity are intensifying. The badlands are becoming extremely fragmented with the escalating number of roads required for industrial development. The US Forest Services owns and manages about 1 million of acres as multiple-use in this landscape. The Killdeer Mountains and Ponderosa Pines Focus Areas are located within the exterior boundaries of the Badlands, but included in Upland Forest (see Figures 38 and 39). The Badlands are a fragile landscape harboring many unique wildlife species in addition to the SCP. The entire landscape could be considered a Focus Area.

SPECIES OF CONSERVATION PRIORITY

Ferruginous Hawk
Golden Eagle
*Peregrine Falcon
Prairie Falcon
Sharp-tailed Grouse
Long-billed Curlew
Burrowing Owl
Black-billed Cuckoo
Sprague's Pipit
Loggerhead Shrike
Lark Bunting
Grasshopper Sparrow
Baird's Sparrow
Chestnut-collared Longspur
Western Meadowlark

Merriam's Shrew
Northern Long-eared Bat
Western Small-footed Bat
Long-eared Bat
Long-legged Bat
Little Brown Bat
Big Brown Bat
Townsend's Big-eared Bat
Sagebrush Vole
Black-tailed Prairie Dog
*Black-footed Ferret
*Swift Fox

Plains Spadefoot
Short-horned Lizard
Sagebrush Lizard
Plains Hog-nosed Snake

Monarch Butterfly

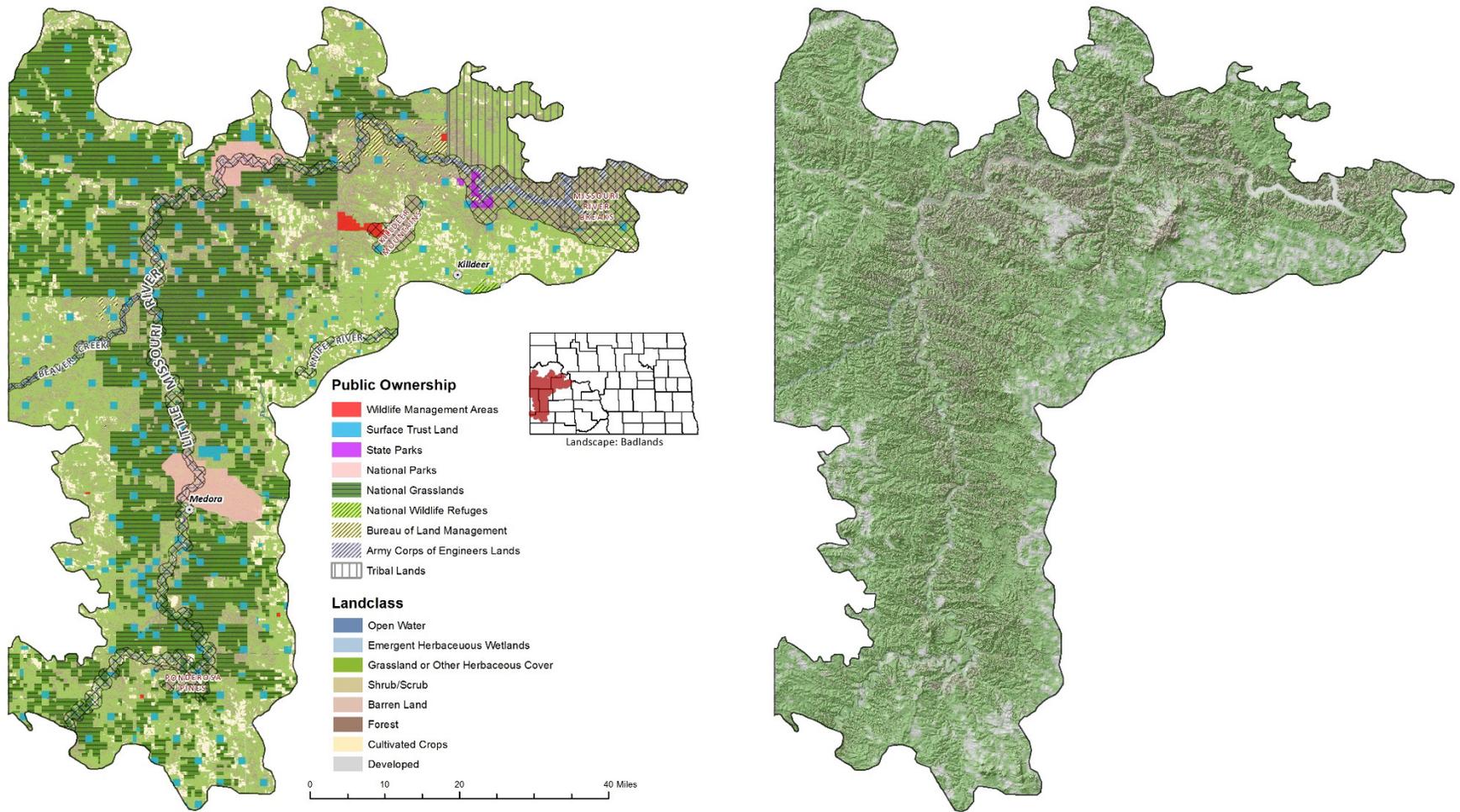


Figure 33. Badlands landscape component, including public ownership and shaded relief to show topography.

*“Recovery of Historic Badlands Browse Transect
Photo-Points in the North Dakota Badlands”*

STATE WILDLIFE GRANT
SUCCESS STORY

Changes in land management and fire suppression have influenced the landscape across the Great Plains; resulting in the expansion and invasion of the red cedar in Oklahoma and Rocky Mountain juniper stands in the North Dakota. These changes in habitat can reduce species diversity of small mammal and avian communities. Impacts on other taxa (amphibians, reptiles and fish) are unknown. In addition, juniper expansion has been shown to reduce ephemeral stream flows, reduce forage production for livestock, and increase fuel loads that may result in larger and hotter wild fires. Revisiting and updating photo points will allow agencies to assess how much of the habitat has changed over the past 50 years, assess what species of conservation priority (SCP) may be affected, and determine what on-the-ground management actions are warranted. This project would be the first in a multi-phased evaluation of habitat at and around these photo-points.

In the early 1960’s, eighty-five (85) clusters of browse intercept line transects were established on US Forest Service Little Missouri National Grasslands and US Bureau of Land Management land in western North Dakota. North Dakota Game and Fish Department (NDGF) big game biologists established these sites as part of a study to determine how many deer and how those deer were using the habitat of western North Dakota. There were several components to the study which was ceased in 1980. However, the NDGF maintained the data files, photographs, and general location maps of all 85 sites that were distributed across the badlands. Each individual site consists of three separate transects: one transect on top of a hill, one transect on a sidehill, and one transect at the bottom of a hill or in a low area. Sites were established between 1960 and 1963. They were revisited every 3 years in July or August to collect vegetation data and every 6 years photographs were taken. Photographs encompass four time periods: 1960-1963, 1967-1970, 1973-1976, and 1979-1981. A North Dakota State Wildlife Grant (T-34-R) was awarded to Montgomery Associates: Resource Solutions, LLC to locate and/or re-establish the browse transects in 2011. NDGF staff have located additional sites from 2012-2014. This project accomplishes efforts to monitor habitat change over time and effectiveness of conservation actions to reduce the threat of juniper expansion.

1962



1968



1980



2012



Table 7. Direct Threats and Conservation Actions for the Badlands.

CLASSIFICATION	DIRECT THREAT TO BADLANDS	CONSERVATION ACTION
1. Residential and Commercial Development		
1.1 Housing and Urban Areas	<ul style="list-style-type: none"> a) conversion of badlands habitats to urban development 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/animal species composition g) loss of grazing and burning of grasslands near urban and recreational areas h) predation of grassland animals by domestic animals near urban areas 	<ul style="list-style-type: none"> i. offer incentives and programs to protect, enhance, and restore badlands habitat ii. foster/develop entities to administer conservation easements 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
1.2 Commercial and Industrial Areas	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> i. foster/develop entities to administer conservation easements ii. urge ecologically responsible ordinances and suitable reclamation standards
1.3 Tourism and Recreational Areas	<ul style="list-style-type: none"> a) disturbance associated with recreational development can disperse noxious/invasive weeds b) pesticide/herbicide application and drift impacts adjacent plant/animal species composition c) unrestrained domestic animals can harass wildlife 	<ul style="list-style-type: none"> i. promote “Keep It Native” campaign for greenways, trails, recreational areas, and minimize project footprint ii. urge ecologically responsible ordinances iii. public education and outreach
2. Agriculture		
2.1 Annual and Perennial Non-Timber Crops	<ul style="list-style-type: none"> a) conversion of badlands habitats to cropland development b) fragmentation of badlands habitats due to cropland development c) disturbance of wildlife during conversion process d) pesticide/herbicide application and drift impacts adjacent plant/animal species composition e) increase in soil erosion from lack of residual cover on cropland 	<ul style="list-style-type: none"> i. offer incentives and programs to protect, enhance, and restore badlands habitat ii. foster/develop entities to administer conservation easements iii. strengthen Farm Bill regulatory provisions (i.e. swampbuster, sodbuster, sodsaver)

CLASSIFICATION	DIRECT THREAT TO BADLANDS	CONSERVATION ACTION
	<ul style="list-style-type: none"> f) decline in soil health g) impacts to water table and water infiltration rates h) farm demographics, loss of ecologically sustainable land management 	<ul style="list-style-type: none"> iv. offer incentives for wildlife friendly farming, tax-based or direct payments v. promote and support holistic grazing, collaborate with grassland based agricultural groups vi. support demo projects and best management practices vii. promotion of cover crops and soil health viii. reevaluate laws pertaining to conservation easements in North Dakota
2.3 Livestock Farming and Ranching	<ul style="list-style-type: none"> a) lack of using grazing as a management tool to maintain/improve grassland vegetation, over-resting b) overutilization and/or overgrazing c) shift from ranching (pro-grass) lifestyle to large confined animal feeding operations d) disturbance, erosion, and decline in soil health in high livestock traffic areas e) opposing attitude of using prescribed fire as co-management tool f) non-traditional livestock farms may proliferate disease transmission, genetic mixing, escapees, to wild populations g) inappropriate fencing h) farm demographics, loss of ecologically sustainable land management 	<ul style="list-style-type: none"> i. encourage grazing as a grassland management tool to improve the land ii. foster/develop entities to administer conservation easements iii. provisions for Farm Bill disaster assistance for livestock producers iv. establish grassbanks between state/federal/non-governmental land and private ranches v. incentivize proper grazing management vi. promote and support holistic grazing, work with grass-based agricultural groups vii. build market and corporate support of grass-based livestock viii. support grazing lands coalitions 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 xii. encourage smooth wire, at least for bottom wire, and apply visibility markers
3. Energy Production and Mining		
3.1 Oil and Gas Drilling	<ul style="list-style-type: none"> a) conversion of badlands habitats to well pads, field or production facilities b) fragmentation of badlands habitats to well pads, field or production facilities 	<ul style="list-style-type: none"> i. well pad and facility consolidation ii. foster relationships with oil companies to stimulate ecologically sound development iii. engage in early consultation with the siting of well pads iv. develop crucial habitat maps or species avoidance areas

CLASSIFICATION	DIRECT THREAT TO BADLANDS	CONSERVATION ACTION
	<ul style="list-style-type: none"> c) disturbance associated with oil and gas development can proliferate noxious/invasive weeds d) inadequate reclamation e) illegal dumping of materials and waste f) loss of grazing due to disturbance to livestock g) anthropogenic disturbance to badlands associated wildlife h) social apathy to negative ecological effects of oil and gas drilling 	<ul style="list-style-type: none"> v. develop best management practices vi. incentivize companies for implementing ecologically sound development vii. urge ecologically responsible ordinances and suitable reclamation standards viii. public education and outreach ix. public disclosure of impacts/footprint x. research the impacts of oil and gas drilling on badlands habitat and wildlife
3.2 Mining and Quarrying	<ul style="list-style-type: none"> a) conversion of badlands habitats to mines or quarries b) anthropogenic disturbance to badlands associated wildlife c) inadequate reclamation 	<ul style="list-style-type: none"> i. minimize footprint of development ii. suitable reclamation standards
3.3 Renewable Energy	<ul style="list-style-type: none"> a) fragmentation of badlands by wind or solar facilities b) direct or indirect mortality of wildlife species from structures c) anthropogenic disturbance to badlands associated wildlife, e.g. noise, light 	<ul style="list-style-type: none"> i. incentivize companies for implementing ecologically sound development ii. urge ecologically responsible ordinances and suitable reclamation standards iii. minimize footprint of development iv. research to determine best areas for placement to minimize impacts to wildlife
4. Transportation & Service Corridors		
4.1 Roads and Railroads	<ul style="list-style-type: none"> a) conversion of badlands habitat to roads and railroads b) fragmentation of badlands habitat by roads and railroads c) anthropogenic disturbance to badlands associated wildlife, e.g. noise, dust d) direct mortality 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 incidents secondary effects, e.g. spills and explosions 	<ul style="list-style-type: none"> 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. timing restrictions for construction v. maintain natural corridors or construct wildlife crossings
4.2 Utility and Service Lines	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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

CLASSIFICATION	DIRECT THREAT TO BADLANDS	CONSERVATION ACTION
	<ul style="list-style-type: none"> e) reduced management and flexibility in easement right-of-ways f) direct mortality of wildlife species, particularly birds, by collision or electrocution 	<ul style="list-style-type: none"> v. timing restrictions for construction vi. require line marking devices vii. use suggested practices for avian protection on power lines
5. Biological Resource Use		
5.1 Hunting and Collecting Terrestrial Animals	<ul style="list-style-type: none"> a) anthropogenic disturbance to badlands associated wildlife, e.g. off-road travel b) disturbance/movement can proliferate noxious/invasive weeds c) wildlife value orientations or changing public attitudes towards animals, e.g. stimulate illegal hunting/collection of terrestrial animals, or promote the introduction of nonnative species for hunting d) insufficient laws protecting some terrestrial wildlife, e.g. reptiles e) poaching f) baiting g) increased wildlife violations in western North Dakota 	<ul style="list-style-type: none"> i. urge ecologically responsible ordinances ii. increase enforcement and deterrents iii. reevaluate laws pertaining to terrestrial wildlife iv. public education and outreach
5.2 Gathering Terrestrial Plants	<ul style="list-style-type: none"> a) collection of Echinacea 	<ul style="list-style-type: none"> i. increase enforcement and deterrents ii. public education and outreach
5.3 Logging and Wood Harvest	<ul style="list-style-type: none"> a) not a threat 	<ul style="list-style-type: none"> ii. use as a management tool to restore grassland
5.4 Fishing and Harvesting Aquatic Resources	<ul style="list-style-type: none"> a) anthropogenic disturbance to badlands associated wildlife, e.g. off-road travel b) disturbance/movement can proliferate noxious/invasive weeds c) poaching d) increased wildlife violations in western North Dakota 	<ul style="list-style-type: none"> i. urge ecologically responsible ordinances ii. increase enforcement and deterrents iii. public education and outreach
6. Human Intrusions & Disturbance		
6.1 Recreational Activities	<ul style="list-style-type: none"> a) damage to badlands habitat from off-road vehicles b) anthropogenic disturbance to badlands associated wildlife, e.g. unauthorized camping, target shooting c) trail development through sensitive habitat or key wildlife areas d) littering 	<ul style="list-style-type: none"> i. restrict or eliminate off-road vehicle use in environmentally sensitive areas ii. engage in early consultation with the siting of recreational areas and trails iii. urge ecologically responsible ordinances iv. increase enforcement, deterrents and fines

CLASSIFICATION	DIRECT THREAT TO BADLANDS	CONSERVATION ACTION
	e) spelunking, spread of White-Nose Syndrome (WNS)	v. public education and outreach vi. utilize WNS prevention guidelines
6.2 Military Exercises	a) N/A	
6.3 Work and 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
7. Natural System Modification		
7.1 Fire and Fire Suppression	a) fire suppression results in woody encroachment, succession, loss of native diversity b) reduction in funding and staff support for fire management c) deficiency of experienced fire management staff d) fire management training obstacles, i.e. officialdom is disincentive to train staff e) social apathy to use of prescribed fire f) lack of science and social benefits of fire in the Northern Great Plains	i. offer incentives and programs to implement prescribed fire ii. support fire coalitions and cooperative ventures iii. obtain funding for fire management programs iv. obtain funding for fire management staff and training v. public education and outreach vi. promote pro-fire campaign vii. research the effects of fire management
7.2 Dams and Water Management/Use	a) conversion of badlands habitats, e.g. slope wetlands, to impoundment b) may proliferate concentration of salts, heavy metals, etc. c) addition of water may proliferate the spread of West Nile virus to badlands associated wildlife d) inappropriate movement of water as water management e) change in water infiltration rates	i. offer incentives and programs for alternative water sources, e.g. wells, portable water ii. reclaim deteriorating dams and dugouts iii. education about dynamic water systems and water management iv. incentivize buffers
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	i. promote diversity ii. plant diverse grass and forb mixes and pollinator plantings iii. promote soil health iv. ecosystem education and awareness
8. Invasive & Other Problematic Species		
8.1 Invasive non-native/alien Species	a) spread and proliferation of invasive or detrimental plants, e.g. Kentucky bluegrass, smooth brome, crested wheatgrass b) spread and proliferation of noxious weeds, e.g. leafy spurge, wormwood	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

CLASSIFICATION	DIRECT THREAT TO BADLANDS	CONSERVATION ACTION
	<ul style="list-style-type: none"> c) spread and proliferation of woody vegetation, e.g. Russian olive d) spread of invasive pests, e.g. emerald ash borer e) feral cats (<i>Felis catus</i>) f) feral swine (<i>Sus scrofa</i>) 	<ul style="list-style-type: none"> 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 vi. engage the horticultural industry to educate and promote recommended plants and reduce use of problematic invasive or detrimental plants vii. enforce emerald ash borer regulations viii. public education and outreach ix. Keep Cats Indoors campaign x. research control or reduction of invasive plants
8.2 Problematic Native Species	a) spread and proliferation of native woody vegetation, e.g. Eastern red cedar, Rocky Mountain juniper	<ul style="list-style-type: none"> i. removal or reduction of undesirable native plants using grazing, fire, chemical and mechanical treatments ii. promote natural control iii. public education and outreach
8.3 Introduced Genetic Material	<ul style="list-style-type: none"> a) genetically modified crops permit for use of myriad pesticides and herbicides b) increase of herbicide resistant plants 	<ul style="list-style-type: none"> i. promote pragmatic use of herbicides and pesticides
9. Pollution		
9.1 Domestic and Urban Waste Water	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> i. require pipeline warning system for leak detection ii. improve reporting and disclosure of incidents iii. increase enforcement and deterrents
9.2 Industrial and Military Effluents	<ul style="list-style-type: none"> a) pipeline leaks, e.g. oil and salt water b) oil and salt water spills at production or exploration facilities c) oil and salt water spills during transportation d) inappropriate disposal of salt water e) inappropriate disposal of radioactive waste 	<ul style="list-style-type: none"> 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 and Forestry Effluents	<ul style="list-style-type: none"> a) fertilizer and pesticide runoff from cropland b) runoff from improperly designed or sited feedlots 	<ul style="list-style-type: none"> 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

CLASSIFICATION	DIRECT THREAT TO BADLANDS	CONSERVATION ACTION
		v. increase enforcement, deterrents and fines
9.4 Garbage and 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	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
9.6 Excess Energy	a) light and thermal pollution causing disturbance to badlands associated wildlife, e.g. from natural gas flaring or urban areas b) noise pollution, e.g. from increased traffic, work sites	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 Landslides	a) land sloughing	i. offer incentives or programs for sensitive or susceptible land
11. Climate Change & Severe Weather		
11.1 Habitat Shifting and Alteration	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 Droughts	a) proliferates invasive plants b) limits management actions c) loss of animal or plant production	i. establish grassbanks between state/federal/non-governmental land and private ranches ii. promotion of cover crops and soil health
11.3 Temperature Extremes	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 Storms and Flooding	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		

CLASSIFICATION	DIRECT THREAT TO BADLANDS	CONSERVATION ACTION
12. 1 Human Dimensions	<ul style="list-style-type: none"> 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” 	<ul style="list-style-type: none"> i. increase awareness, understanding, and appreciation of the badlands ecosystem and ecosystem services ii. public education and outreach iii. support grassland coalitions iv. incorporate badlands education into K-12 classrooms v. human dimension research/surveys



FOREST

(X) Upland Forest



IX) UPLAND FOREST

Total Upland Forest: 1,958,000 acres

Description and Overall Condition: This landscape component includes the larger tracts of native upland deciduous forest which occur scattered throughout the state and unique natural stands of coniferous forest. Representative upland forest, including deciduous and coniferous forests, wooded shrubland, riparian forests, and rural tree plantings, constitutes approximately 4.4% of North Dakota. Ninety-eight percent of the states forestland is deciduous forest. The larger tracts of deciduous forest have been identified as Focus Areas and include the Pembina Gorge, Turtle Mountains, Devils Lake Hills, and the Killdeer Mountains. The Ponderosa Pines is a coniferous forest Focus Area. Smaller, scattered tracts of deciduous forest occur on the Sheyenne



SPECIES OF CONSERVATION PRIORITY

Horned Grebe
Golden Eagle
Bald Eagle
Swainson's Hawk
Black-billed Cuckoo
Red-headed Woodpecker

Arctic Shrew
Pygmy Shrew
Northern Long-eared Bat
Western Small-footed Bat
Long-eared Bat
Long-legged Bat
Little Brown Bat
Big Brown Bat
Townsend's Big-eared Bat
American Marten
Gray Fox

River (see Figure 30) bluffs and north- and east-facing slopes of the badlands (see Figure 33). These natural upland tracts of deciduous trees in North Dakota represent a unique community rare to the state. Most forested areas are under private ownership and are used primarily for cattle grazing. Over-harvest for wood products does not appear to be of concern but the lack of forest regeneration in some areas is of concern. Clearing of trees for farming or other development is ongoing.

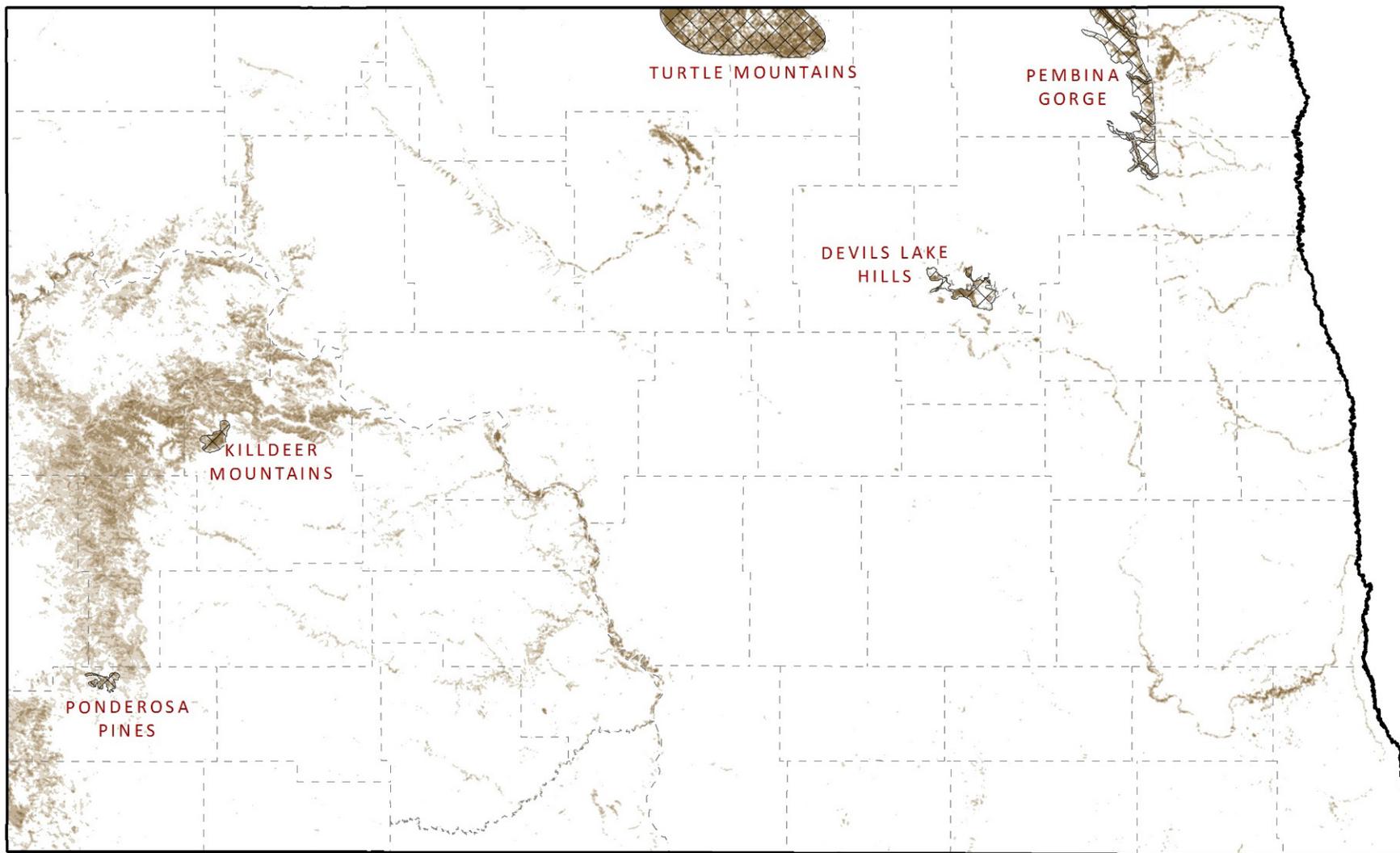


Figure 34. Upland Forest Focus Areas.

FOCUS AREA: PEMBINA GORGE

Area: 145,685 acres or 228 mi²

Public Landholdings: 8,705 acres (NDGFD 8,465 acres; NDDTL 240 acres)

Description and Condition: The Pembina Gorge is a rather small piece of steep, dissected escarpment on the edge of the Drift Prairie and bordering the Red River Valley and Canada. Bur Oak, Quaking Aspen, Green Ash, Cottonwood, and American Elm are the dominant deciduous forest components. The steep slopes maintain the natural woodland community. Flat areas have been cleared for cropland of small grains, sunflowers, and flax. Off-road vehicle trail systems have been developed and proponents continue to advocate for additional trails through the Gorge. High numbers of raptors migrating through the Canadian side of the Pembina Valley have been documented, thus Pembina Gorge on the North Dakota side is also likely a key migration corridor. The Pembina River, Tongue River, and Park River System run east-west through the Gorge. Upland Forest on flat land is east of the Gorge in the Beach Ridges Focus Area (see Figure 14).

Key Species of Conservation Priority

Birds: Black-billed Cuckoo

Mammals: Big Brown Bat, Little Brown Bat

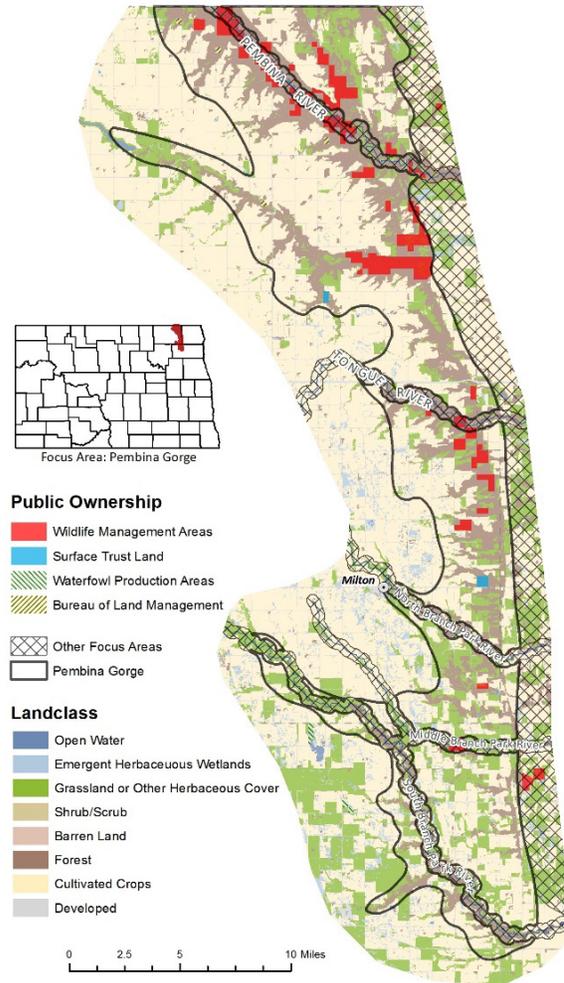
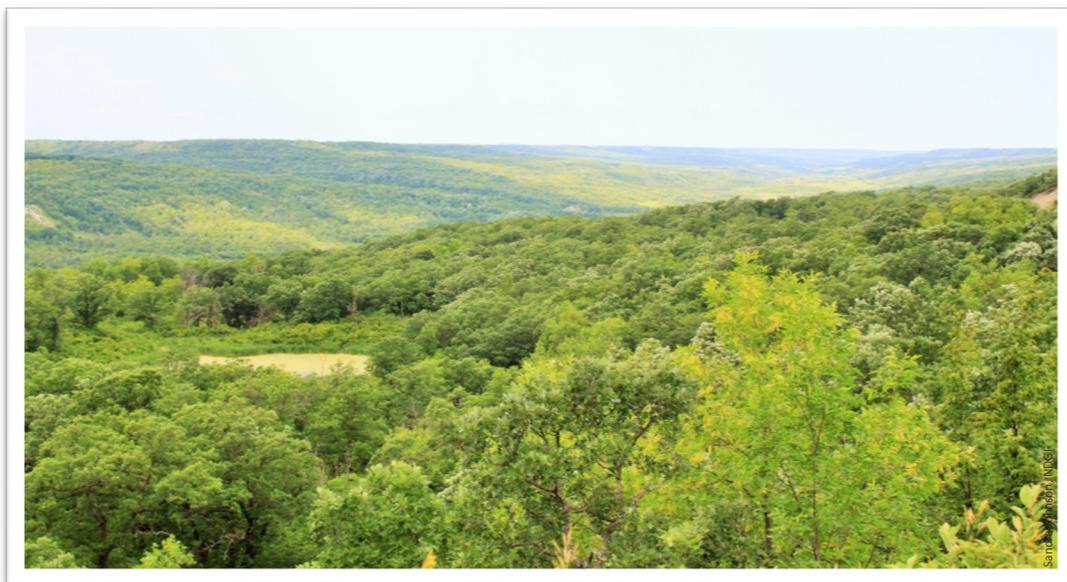


Figure 35. Pembina Gorge Focus Area.



FOCUS AREA: TURTLE MOUNTAINS

Area: 258,620 acres or 405 mi²

Public Landholdings: 31,045 acres (NDGFD 8,465 acres; NDDTL 3,535 acres; NDFS 12,430 acres; NDPRD 1,695 acres; USFWS 4,920 acres)

Description and Condition: Set in the northern Drift Prairie, the rolling topography and additional 10 inches of precipitation per year supports deciduous forest cover of Bur Oak, Aspen, Green Ash, Paper Birch, Boxelder, Sumac, Serviceberry, and Snowberry. The Turtle Mountains rise 600 to 800 feet above the surrounding prairie/wetland landscape.

The soil is rather erodible and poorly suited for farming, although some occurs. Native woodland clearings have made way for pastureland. Hundreds of large, deep ponds and lakes are present throughout.

Key Species of Conservation Priority

Birds: Horned Grebe

Mammals: American Marten, Northern Long-eared Bat, Big Brown Bat, Little Brown Bat, Townsend’s Big-eared Bat

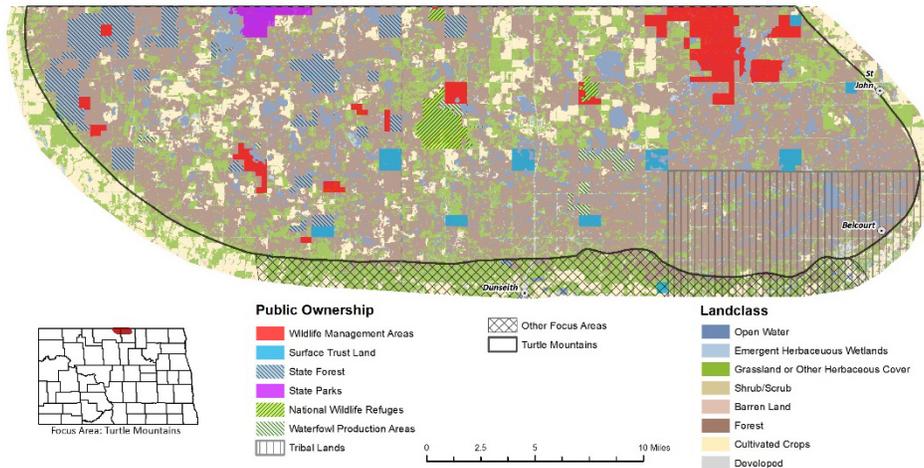


Figure 36. Turtle Mountains Focus Area.

“Distribution and Abundance of River Otters and Other Meso-carnivores in North Dakota”

In the early 2000’s, River Otters were thought to be re-colonizing portions of North Dakota. However, no formal research had been conducted to evaluate the actual status or distribution of River Otters and other rare meso-carnivores in the state. A State Wildlife Grant (T-12-R) was awarded to Frostburg State University to conduct a survey of meso-carnivores from 2005 to 2009. The primary methods included placement of track-plate stations and camera traps to detect meso-carnivores. The researchers not only found River Otters throughout the Red River Basin but widespread occurrence of Fishers as well. Another revelation was an established population of American Martens in the Turtle Mountains. This SWG project confirmed the presence of these once believed “rare” meso-carnivores as established populations in North Dakota.

STATE WILDLIFE GRANT SUCCESS STORY



FOCUS AREA: DEVILS LAKE HILLS

Area: 40,500 acres or 63 mi²

Public Landholdings: 3,955 acres (NDDTL 940 acres; NDPRD 985 acres; USFWS 2,030 acres)

Description and Condition: The deciduous forest bordering Devils Lake is similar to that of the Pembina Hills, including Bur Oak, Quacking Aspen, and Birch. Much of the natural forest along the shorelines of the lake has been inundated by recent rising water levels.

Key Species of Conservation Priority

Mammals: Big Brown Bat, Little Brown Bat

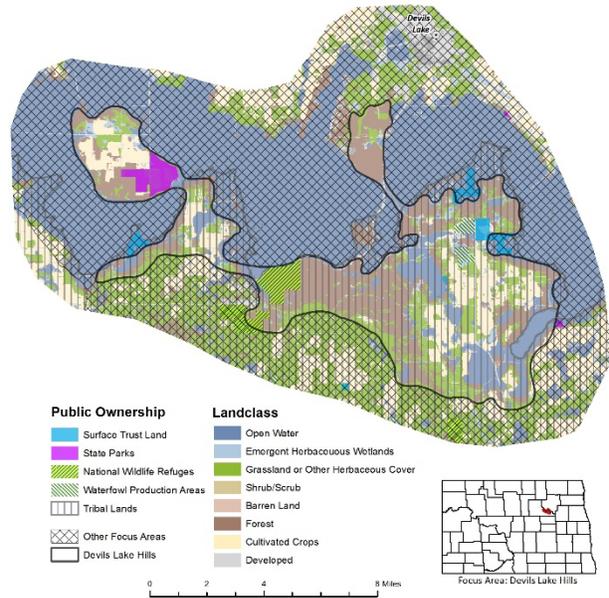


Figure 37. Devils Lake Hills Focus Area.

FOCUS AREA: KILLDEER MOUNTAINS

Area: 19,320 acres or 20 mi²

Public Landholdings: 3,470 acres (NDGFD 2,600 acres; NDDTL 870 acres)

Description and Condition: Set aside from the main stem of the badlands, the Killdeer Mountains rise 700-1,000 feet above the surrounding prairie landscape. The highest elevation is 3,314 feet, or about 200 feet lower than the highest point in the state, White Butte. Bur Oak, Quacking Aspen, Green Ash, Paper Birch, Western black Birch and American Elm are the dominant deciduous vegetation. Grazing occurs on private land. The Killdeer Wildlife Management Area straddles the Killdeer Mountains.

Key Species of Conservation Priority

Birds: Golden Eagle

Mammals: possibly the bat species

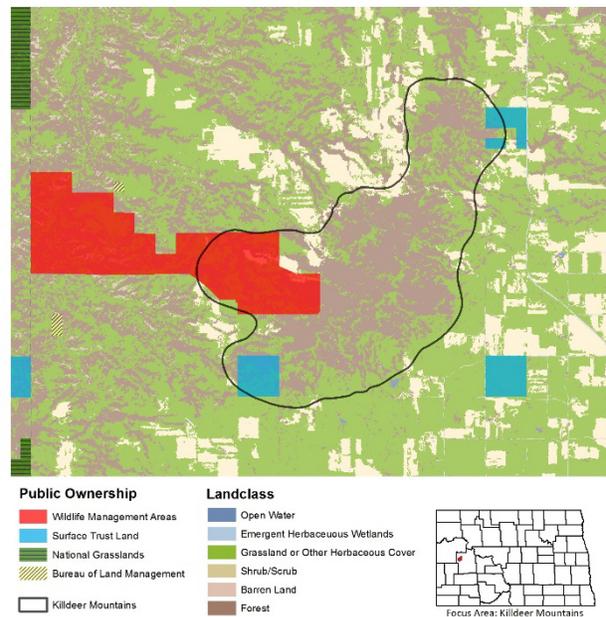


Figure 38. Killdeer Mountains Focus Area.

FOCUS AREA: PONDROSA PINES

Area: 12,435 acres or 19 mi²

Public Landholdings: 5,500 acres (NDDTL 1,000 acres; USFS 4,500)

Description and Condition: Coniferous forest is rare in North Dakota and this stand of Ponderosa Pine in southwest North Dakota is at the northeastern most edge of its overall range. This forest may be an outlier of pines of the Black Hills of South Dakota. In the summer of 2004, a fire swept through the region burning several hundred acres of pines. Occasional management may be needed to prevent the encroachment of pines into native prairie. However, this rare stand of coniferous forest provides habitat for unique species and should be maintained.

Key Species of Conservation Priority

Mammals: possibly the bat species

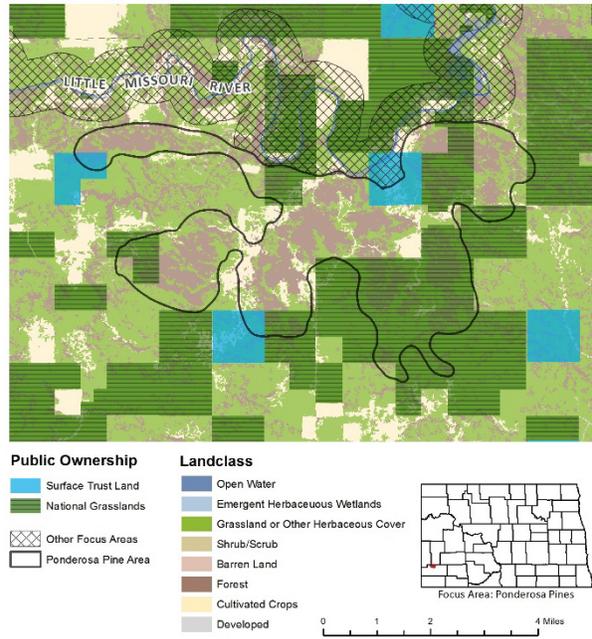


Figure 39. Ponderosa Pines Focus Area.



Table 8. Direct Threats and Conservation Actions for Upland Forest.

CLASSIFICATION	DIRECT THREAT TO UPLAND FOREST	CONSERVATION ACTION
1. Residential and Commercial Development		
1.1 Housing and Urban Areas	<ul style="list-style-type: none"> a) conversion of forest to urban development b) vegetation planted for ornamental purposes can invade adjacent forest c) pesticide/herbicide application and drift impacts adjacent plant/animal species composition d) predation of forest animals by domestic animals near urban areas 	<ul style="list-style-type: none"> i. offer incentives and programs to protect, enhance, and restore forest ii. foster/develop entities to administer conservation easements 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
1.2 Commercial and Industrial Areas	<ul style="list-style-type: none"> a) conversion of forest to commercial and industrial development 	<ul style="list-style-type: none"> i. urge ecologically responsible ordinances and suitable reclamation standards
1.3 Tourism and Recreational Areas	<ul style="list-style-type: none"> a) expanding cabin developments b) city campground expansion into forest 	<ul style="list-style-type: none"> i. urge ecologically responsible ordinances
2. Agriculture		
2.1 Annual and Perennial Non-Timber Crops	<ul style="list-style-type: none"> a) conversion of forest to cropland development b) fragmentation of forests due to cropland development c) removal of quality condition tree shelterbelts d) disturbance of forest associated wildlife during conversion process e) pesticide/herbicide application and drift impacts adjacent plant/animal species composition f) increase in soil erosion and sedimentation from removal of trees g) impacts to water table and water infiltration rates 	<ul style="list-style-type: none"> i. offer incentives and programs to protect, enhance, and restore forests ii. foster/develop entities to administer conservation easements iii. maintain Farm Bill regulatory provisions iv. offer incentives for wildlife friendly farming, tax-based or direct payments v. maintain and expand the Forest Stewardship Tax Law vi. use forestry best management practices
2.3 Livestock Farming and Ranching	<ul style="list-style-type: none"> 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) shift from ranching lifestyle to large confined animal feeding operations 	<ul style="list-style-type: none"> i. offer incentives and programs to protect, enhance, and restore forests ii. foster/develop entities to administer conservation easements iii. incentivize proper grazing management iv. maintain and expand the Forest Stewardship Tax Law v. fence livestock out of sensitive forest and woodland

CLASSIFICATION	DIRECT THREAT TO UPLAND FOREST	CONSERVATION ACTION
		<ul style="list-style-type: none"> vi. offer incentives and programs for alternative water sources, e.g. wells, portable water vii. promote and support holistic grazing viii. support grazing lands coalitions ix. use forestry best management practices x. feedlot setbacks
2.4 Freshwater Aquaculture	a) N/A	
3. Energy Production and Mining		
3.1 Oil and Gas Drilling	<ul style="list-style-type: none"> a) conversion of forest to well pads, field or production facilities b) fragmentation of forest from well pads, field or production facilities c) disturbance associated with oil and gas development can proliferate noxious/invasive weeds d) inadequate reclamation e) illegal dumping of materials and waste f) anthropogenic disturbance to forest associated wildlife g) social apathy to negative ecological effects of oil and gas drilling 	<ul style="list-style-type: none"> i. well pad and facility consolidation ii. foster relationships with oil companies to stimulate ecologically sound development iii. engage in early consultation with the siting of well pads iv. develop crucial habitat maps or species avoidance areas v. develop best management practices vi. incentivize companies for implementing ecologically sound development vii. urge ecologically responsible ordinances and suitable reclamation standards viii. public education and outreach ix. public disclosure of impacts/footprint x. research the impacts of oil and gas drilling on forests and associated wildlife
3.2 Mining and Quarrying	<ul style="list-style-type: none"> a) conversion of forest to mines or quarries, or for riprap b) anthropogenic disturbance to forest associated wildlife c) inadequate reclamation 	<ul style="list-style-type: none"> i. minimize footprint of development ii. suitable reclamation standards iii. tree mitigation
3.3 Renewable Energy	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> i. offer incentives and programs to protect, enhance, and restore forests ii. incentivize companies for implementing ecologically sound development iii. urge ecologically responsible ordinances and suitable reclamation standards iv. minimize footprint of development v. tree mitigation iv. research to determine best areas for placement to minimize impacts to wildlife

CLASSIFICATION	DIRECT THREAT TO UPLAND FOREST	CONSERVATION ACTION
4. Transportation & Service Corridors		
4.1 Roads and Railroads	<ul style="list-style-type: none"> 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. noise, dust d) direct mortality of wildlife species with vehicles or trains e) proliferate noxious/invasive weeds f) road and railway incidents secondary effects, e.g. spills and explosions, run-off 	<ul style="list-style-type: none"> i. urge ecologically responsible ordinances and suitable reclamation standards ii. appropriate road restrictions, including speed limits iii. timing restrictions for construction iv. increase pipeline use for transportation v. tree mitigation vi. maintain natural corridors or construct wildlife crossings vii. use forestry best management practices
4.2 Utility and Service Lines	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> i. consolidation corridors 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. timing restrictions for construction vi. require line marking devices vii. use suggested practices for avian protection on power lines
5. Biological Resource Use		
5.1 Hunting and Collecting Terrestrial Animals	<ul style="list-style-type: none"> a) anthropogenic disturbance to forest associated wildlife, e.g. off-road travel b) disturbance/movement can proliferate noxious/invasive weeds c) wildlife value orientations or changing public attitudes towards animals, e.g. stimulate illegal hunting/collection of terrestrial animals, or promote the introduction of nonnative species for hunting d) damage to trees from certain tree stands and clearing of trees for shooting lanes e) insufficient laws protecting some terrestrial wildlife, e.g. reptiles f) poaching 	<ul style="list-style-type: none"> i. urge ecologically responsible ordinances ii. increase enforcement and deterrents iii. reevaluate laws pertaining to terrestrial associated wildlife iv. encourage using portable tree stands, do not use screw-in steps v. public education and outreach

CLASSIFICATION	DIRECT THREAT TO UPLAND FOREST	CONSERVATION ACTION
5.2 Gathering Terrestrial Plants	a) N/A	
5.3 Logging and Wood harvest	a) unregulated logging	i. develop Forest Stewardship Management Plans, follow a silvicultural prescription ii. use forestry best management practices
5.4 Fishing and Harvesting Aquatic Resources	a) anthropogenic disturbance to forest 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, deterrents and fines iii. public education and outreach
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, paintball, unauthorized camping c) trail development through sensitive habitat or key wildlife areas d) littering	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 associated wildlife	i. urge ecologically responsible ordinances
6.3 Work and Other Activities	a) anthropogenic disturbance to forest associated wildlife	i. urge ecologically responsible ordinances
7. Natural System Modification		
7.1 Fire and Fire Suppression	a) fire suppression results in plant succession b) reduction in funding and staff support for fire management c) deficiency of experienced fire management staff d) fire management training obstacles, i.e. officialdom is disincentive to train staff e) social apathy to use of prescribed fire f) lack of science and social benefits of fire in the Northern Great Plains	i. offer incentives and programs to implement prescribed fire ii. support fire coalitions and cooperative ventures iii. obtain funding for fire management programs iv. obtain funding for fire management staff and training v. public education and outreach vi. promote pro-fire campaign vii. research the effects of fire management viii. use forestry best management practices
7.2 Dams and Water Management/Use	a) conversion of forest to impoundment b) impoundments may proliferate concentration of salts, heavy metals, etc. c) addition of water may proliferate the spread of West Nile virus to forest associated wildlife	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

CLASSIFICATION	DIRECT THREAT TO UPLAND FOREST	CONSERVATION ACTION
	d) lack of cottonwood regeneration due to altered hydrology e) inappropriate siting of impoundment f) dry dams or retention dams	iv. remove lowhead dams v. do not develop dry dams or retention dams vi. education about dynamic water systems and water management vii. incentivize buffers viii. exclude impoundments in ecologically sensitive or inappropriate areas ix. develop and implement watershed plans
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
8. Invasive & Other Problematic Species		
8.1 Invasive non-native/alien Species	a) spread and proliferation of invasive or detrimental plants, e.g. smooth brome, Kentucky bluegrass b) spread and proliferation of noxious weeds, e.g. purple loosestrife, salt cedar c) spread and proliferation of woody vegetation, e.g. Russian olive, salt cedar d) spread of invasive pests, e.g. emerald ash borer, Japanese beetle e) tree disease, e.g. Dutch elm disease f) feral cats (<i>Felis catus</i>) g) feral swine (<i>Sus scrofa</i>)	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 iv. engage the horticultural industry to educate and promote recommended plants and reduce use of problematic invasive or detrimental plants v. public education and outreach vi. enforce emerald ash borer regulations vii. Keep Cats Indoors campaign viii. research control or reduction of invasive plants ix. use forestry best management practices
8.2 Problematic Native Species	a) aspen decay b) damaging pests, e.g. forest tent caterpillar	i. use fire or mechanical disturbance to encourage aspen regeneration ii. encourage mechanical options for control of pests versus insecticides iii. maintain or improve forest stand health
8.3 Introduced Genetic Material	a) genetically modified crops permit for use of myriad pesticides and herbicides b) increase of herbicide resistant plants	i. promote pragmatic use of herbicides and pesticides
9. Pollution		
9.1 Domestic and Urban Waste Water	a) pipeline leaks b) inappropriate disposal of untreated sewage	i. require pipeline warning system for leak detection ii. improve reporting and disclosure of incidents

CLASSIFICATION	DIRECT THREAT TO UPLAND FOREST	CONSERVATION ACTION
	c) nonpoint runoff from housing and urban areas, e.g. fertilizer and pesticides from lawns and golf courses	iii. increase enforcement and deterrents iv. discourage fertilizer use
9.2 Industrial and Military Effluents	a) pipeline leaks, e.g. oil and salt water b) oil and salt water spills at production or exploration facilities c) oil and salt water spills during transportation d) inappropriate disposal of salt 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
9.3 Agriculture and 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 and 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) wind dispersion of nutrients, pollution, or sediments	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
9.6 Excess Energy	a) light and thermal pollution causing disturbance to forest or woodland associated wildlife, e.g. from natural gas flaring or urban areas b) noise pollution, e.g. from increased traffic, work sites	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 Landslides	a) land sloughing	i. offer incentives or programs for sensitive or susceptible land
11. Climate Change & Severe Weather		
11.1 Habitat Shifting and Alteration	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

CLASSIFICATION	DIRECT THREAT TO UPLAND FOREST	CONSERVATION ACTION
11.2 Droughts	<ul style="list-style-type: none"> a) proliferates invasive plants b) pests increase c) prolonged drought causes tree mortality d) increased duration and frequency 	<ul style="list-style-type: none"> i. alter management plans
11.3 Temperature Extremes	<ul style="list-style-type: none"> a) proliferates invasive plants b) proliferates tree disease c) limits management actions d) loss of animal or plant production e) increased mortality of animals 	<ul style="list-style-type: none"> i. offer incentives and programs to protect, enhance, and restore forests
11.4 Storms and Flooding	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> a) social apathy of the value of healthy forests and ecosystem services they provide b) lack of knowledge of the forest ecosystem 	<ul style="list-style-type: none"> 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



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SECTION 6

MONITORING

This section includes information on the following required element:

Element 5: This element requires descriptions of the proposed plans for monitoring species and their habitats identified in the 1st element, for monitoring the effectiveness of conservation actions proposed in the 4th element, and for adapting these conservation actions to respond appropriately to new information or changing conditions.

INTRODUCTION

This section 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 the majority of that monitoring are the NDGFD and the USFWS. The USFS, USACE, USNPS and various universities conduct lesser amounts.

A large number of the remaining 450 species receive considerably less monitoring. 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 USGS coordinates an 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 of the state's indigenous species and their habitats. Developing a monitoring plan for North Dakota's SCP and Landscape Components 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 conservation priority 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 general 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 to coordinate monitoring efforts.

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 making adjustments (if necessary).

Objectives: The objectives of the NDGFD 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.

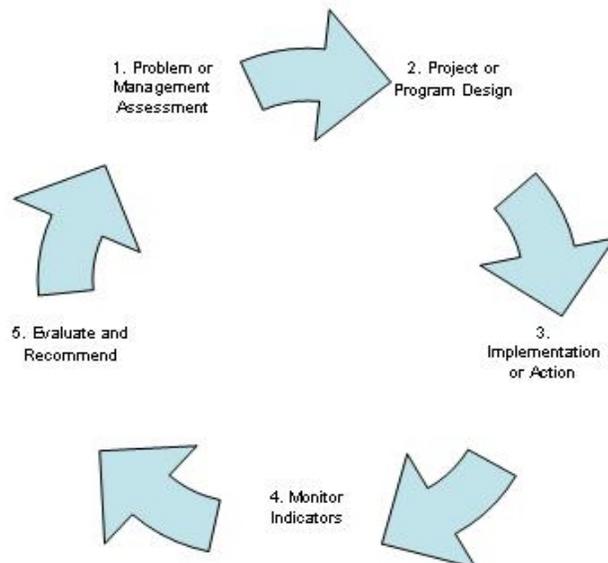


Figure 40. The Adaptive Management Process, conceptual view as described in Nyberg (1998).

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 NDGFD's SWAP. Functionally, managers have always adapted programs to better meet the department's objectives. NDGFD expects that use of an adaptive management system for monitoring species and their habitats will lead to more effective management of fish and wildlife resources. Figure 40 depicts the adaptive management conceptual process.

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 can happen at two levels, either species or habitat measurements. The monitoring focus is determined by objective, ability and practicality.

Planning

NDGFD has an array of resources to incorporate into the planning process. These include, but are not limited to, USGS research staff, USFWS Habitat and Population Evaluation Team scientists, private research foundations, university researchers, USFS staff, USNPS staff, and USFWS refuge staff, and others. 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. Experts were once again convened in the fall of 2014. Threats and conservation actions were re-assessed and emerging conservation issues were identified using Salafsky's Lexicon for Biodiversity as suggested in the Best Practices for State Wildlife Action Plans. NDGFD 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, NDGFD has amalgamated the information from all partners, as well as identified information that is lacking, and will begin to develop monitoring plans. 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, Step-wise, and Complete Enumeration or the Horse Race approach (see Figure 41). 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. Step-wise 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.

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 species of concern. Understanding habitat associations, and species response to habitat manipulation, becomes crucial to the evaluation of program delivery. As implementation actions are defined, so too must mechanisms for measuring habitat capacity and/or species response. The NDGFD 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, NDGFD 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. NDGFD takes the view that monitoring should be designed 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.

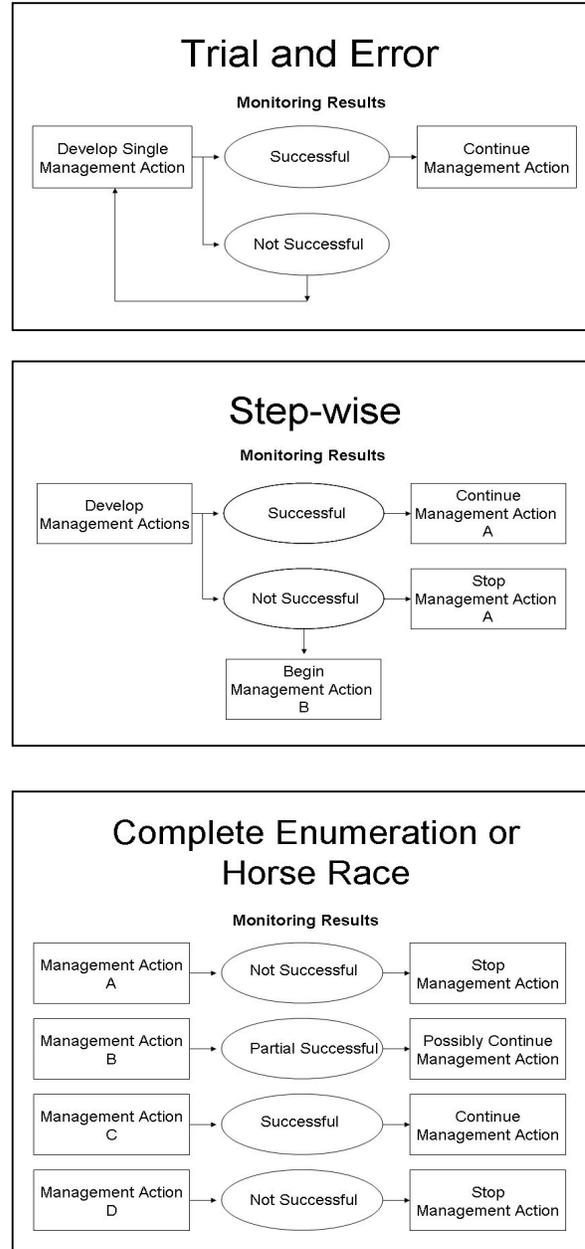


Figure 41. Visual depictions of Learning by Design.

HABITAT AND SPECIES MONITORING

Habitat Monitoring

Section 5 details nine major landscape components in North Dakota. Landscape Components are large scale ecological features. Habitats are unique areas or a particular environment where an organism prefers to live within the Landscape Components. 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. Various recent 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 NDGFD 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 four-square 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.
- Ducks Unlimited - Grassland Loss of the Missouri Coteau: Ducks Unlimited has collected satellite imagery over several time periods for the Missouri Coteau of North and South Dakota. Using GIS to analyze native prairie loss over time, Ducks Unlimited determined what makes a prairie more susceptible to conversion to cropland. This effort will quantitatively estimate the amount of native prairie remaining in the Missouri Coteau. It will provide a model to predict which native prairie tracts are most vulnerable to conversion and therefore of high priority for protection. This effort attains habitat quantity information. (see Stephens et al. 2008).
- 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, 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. 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 Statewide Assessment of Forest Resources and Forest Resource Strategy. This provides analysis of the forest condition, trend data, threats to the resource and opportunities for conservation. This effort attains habitat quality information. (see North Dakota Forest Service 2010).

- 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 unit is responsible for inventorying more than 174 million acres of forest land spread across 34 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 damages and stressors to assess the health, condition, and potential future risks to forests. The forest monitoring 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.
- Bioassessment Programs – ND Department of Health:
 - Red River Basin Bioassessment Project: The primary goals of the Red River Basin Bioassessment Project are to: 1) assess, using biological, physical, and chemical data, the current biological condition of perennial, wadeable rivers and streams; 2) assess the current status of aquatic life use attainment of the perennial, wadeable streams of the Red River basin; 3) develop and refine indices of biological integrity for the fish and macroinvertebrate communities; and 3) investigate potential stressors to impaired aquatic life uses. The North Dakota Department of Health will repeat this process for most of the wadeable streams statewide. This effort attains habitat quality information.
 - North Dakota Wetland Bioassessment Program: The primary purpose of North Dakota's wetland bioassessment program was to develop wetland water quality standards for North Dakota. This involved developing biological community metrics and an Index of Biological Integrity (IBI) for temporary and seasonal wetlands.
 - (see ND Department of Health 2015)
- NDGFD Wildlife Management Area Field Mapping: The NDGFD initiated the mapping of 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 NDGFD 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.
- 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. The NDGFD collaborated with the Natural Heritage Program to update databases to a GIS-based system. This will allow for easy data sharing, including species information and natural areas data, between the NDGFD and other agencies. This effort attains habitat quantity and quality information.

Habitat Monitoring Within Landscape Components

The following is a list of the identified habitat monitoring efforts occurring within each landscape:

Tallgrass Prairie (Red River Valley)

- Four-Square-Mile Survey
- Waterfowl Breeding Population and Habitat Survey
- USFS Land and Resource Monitoring (Sheyenne National Grasslands)
- NDGFD Wildlife Management Area Field Mapping
- Natural Heritage Inventory of Rare Communities

Eastern Mixed-grass Prairie (Drift Prairie)

- Four-Square-Mile Survey
- Waterfowl Breeding Population and Habitat Survey
- NDGFD Wildlife Management Area Field Mapping
- Natural Heritage Inventory of Rare Communities

Mixed-grass Prairie (Missouri Coteau)

- Four-Square-Mile Survey
- Waterfowl Breeding Population and Habitat Survey
- Ducks Unlimited - Grassland Loss of the Missouri Coteau
- NDGFD Wildlife Management Area Field Mapping
- Natural Heritage Inventory of Rare Communities

Western Mixed-grass/Shortgrass Prairie (Missouri Slope)

- Waterfowl Breeding Population and Habitat Survey
- USFS Land and Resource Monitoring (Little Missouri and Cedar River National Grasslands)
- NDGFD Wildlife Management Area Field Mapping
- Natural Heritage Inventory of Rare Communities

Planted or Tame Grassland

- Four-Square-Mile Survey
- Waterfowl Breeding Population and Habitat Survey
- NDGFD Wildlife Management Area Field Mapping
- Natural Heritage Inventory of Rare Communities

Wetlands and Lakes

- Four-Square-Mile Survey
- Waterfowl Breeding Population and Habitat Survey
- North Dakota Wetland Bioassessment Program
- NDGFD Wildlife Management Area Field Mapping
- Natural Heritage Inventory of Rare Communities

Rivers, Streams and Riparian

- Waterfowl Breeding Population and Habitat Survey
- ND Forest Service: North Dakota Forest Health
- North Central Research Station's Forest Inventory and Analysis (NCFIA)
- Red River Basin Bioassessment Project
- NDGFD Wildlife Management Area Field Mapping
- Natural Heritage Inventory of Rare Communities

Badlands

- Waterfowl Breeding Population and Habitat Survey
- USFS Land and Resource Monitoring (Little Missouri National Grasslands)
- Natural Heritage Inventory of Rare Communities

Upland Forest

- ND Forest Service: North Dakota Forest Health
- North Central Research Station's Forest Inventory and Analysis (NCFIA)
- NDGFD Wildlife Management Area Field Mapping
- Natural Heritage Inventory of Rare Communities

Monitoring for Statewide Changes in Habitat

The National Land Cover Database provides a seamless land cover for the entire United States for the years 2001, 2006 and 2011. A land cover product for 2016 is anticipated. 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. See Figure 42. This map depicts changes to/from herbaceous cover (i.e. grassland) and to/from cultivated cropland, and any cover to developed cover (i.e. urban development) from 2006 to 2011. Due to the time needed to process a land cover classification product, this is the most current information available.

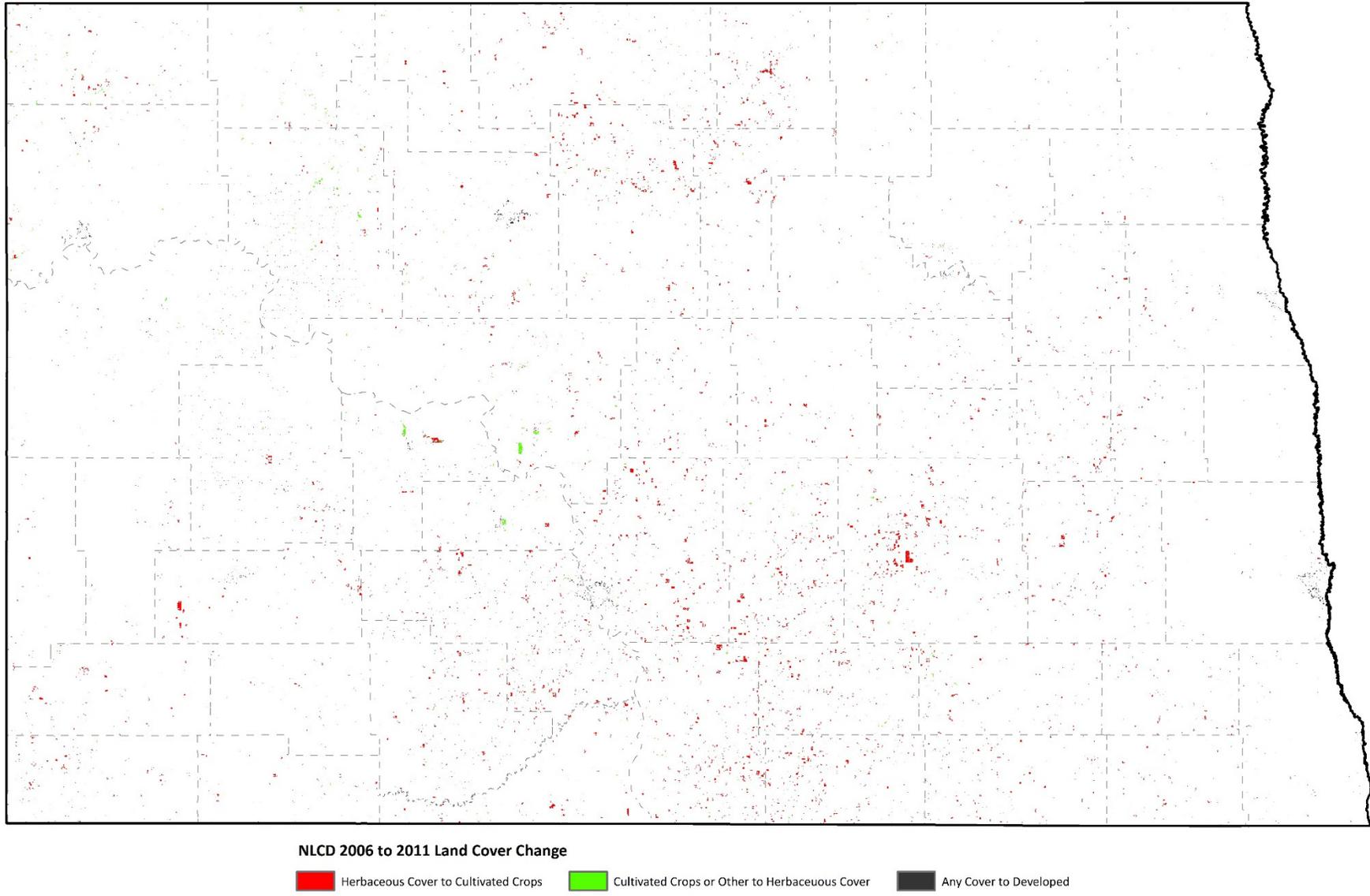


Figure 42. Statewide change in key land cover types from 2006 to 2011, National Land Cover Database.

Species Monitoring

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

Birds

Forty-seven avian species are represented on North Dakota's list of SCP. This represents the largest group of species on the list, and also some of the more commonly studied and/or monitored species. For many bird species, particularly game species, standardized monitoring has occurred for several decades. Breeding Bird Survey routes and data can be used for monitoring many SCP. See Appendix A for SCP specific monitoring efforts.

Existing Game Bird Surveys

All avian game species are currently monitored adequately for the purpose of game management. Annual surveys provide breeding population estimates and/or production. There is no need to expand or add new surveys for these species at this time. The following provides examples of ongoing surveys:

- Waterfowl (SCP include Northern Pintail, Canvasback, and Lesser Scaup):
 - Waterfowl Breeding Population and Habitat Survey, Four-square Mile Breeding Waterfowl Survey, Brood Counts, Nest Surveys (USFWS and NDGFD)
- Upland Game Birds (SCP include Sharp-tailed Grouse, Greater Prairie-Chicken and Greater Sage-Grouse):
 - Lek Surveys, Brood Runs, Incidental Brood Reports (NDGFD)

Breeding Bird Survey (BBS)

The BBS has been in place since 1966. There are 45 active BBS routes in North Dakota and nearly all are run annually. Although the BBS has limitations and is considered by some to have significant bias for certain species, it is nonetheless the best source of long-term data for the majority of avian SCP. There are only a handful of species for which the BBS has very poor detection, such as the Yellow Rail and other secretive birds. BBS data has been used by the HAPET office to develop detailed species presence/absence models in the Prairie Pothole Region of North Dakota and by Partners in Flight to assess landbird populations and conservation priorities at national and regional levels. See <http://www.pwrc.usgs.gov/bbs/> for more information on the BBS.

- The BBS is an important, if not the primary tool for monitoring population trends or indices of avian SCP.

Shorebirds

Breeding shorebird surveys in the Prairie Pothole Region have been developed and implemented by the HAPET office. These roadside surveys were designed to maximize detection of breeding shorebirds per unit effort, monitor population trends, and provide data suitable for development of spatial models that predict shorebird occurrence with landscape characteristics. Five of the shorebird SCP (American Avocet, Willet, Marbled Godwit, Wilson's Phalarope, and Upland Sandpiper) are surveyed in this effort. However, the survey is not conducted south and west of the Missouri River, although several of these species do occur there, albeit in lower frequencies. Long-billed Curlew routes in the Missouri Slope were established in 2005 but are not conducted annually.

- Breeding shorebird SCP are adequately monitored.
- Migrant shorebirds, including the *Rufa* Red Knot, are not monitored annually.

Waterbirds

Currently, waterbirds are monitored at local levels, such as within a national wildlife refuge complex. No statewide, annual survey of colonial or non-colonial nesters currently occurs. Two State Wildlife Grant projects have been awarded since 2005 to survey colonial and non-colonial waterbirds. See waterbird species accounts in Appendix A for more information.

Raptors

The NDGFD maintains a spatial database of raptor nests including SCP such as Bald Eagle, Golden Eagle and Ferruginous Hawk. The NDGFD conducts aerial surveys of traditional Bald Eagle nesting habitat on a rotational basis. Eagle nests reported by the public are verified by NDGFD staff.

Initial Avian Monitoring/Survey Goals

- Ensure all 45 BBS routes are run annually, and strategically create new routes where needed.
- Assist in providing qualified individuals to assist with the HAPET shorebird survey where needed.
- Consider migrant shorebird monitoring.
- Work with the NPPWCP for creation and implementation of colonial and non-colonial waterbird monitoring on a spatial and temporal scale.
- Work with partners to develop and implement migrant shorebird monitoring.
- Future monitoring should follow recommendations North American Bird Conservation Initiative 'Opportunities for Improving Avian Monitoring'.

Reptiles and Amphibians

There are two species of amphibians and nine reptiles listed as SCP. Little effort has been applied to survey reptiles and amphibians in North Dakota. What has been conducted occurs primarily at local levels. There is no statewide monitoring effort in place. A monitoring system using presence/absence data will produce distribution trends over time. Regional coverage or land occupancy trends may be achievable, but population trends may not. See Appendix B for species specific monitoring efforts.

Existing Surveys

Several small-scale surveys are ongoing or have occurred in the past several years. These include:

- USFS surveys on the Shyenene and Little Missouri National Grasslands for amphibians.
- Theodore Roosevelt National Park conducted upland wetland and river surveys for amphibians to gather baseline data for future monitoring efforts and to evaluate changes in the distribution of species.
- University research includes local level projects, typically on targeted species.

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 <http://www.pwrc.usgs.gov/naamp/>

Initial Amphibian and Reptile Monitoring/Survey Goal

- Work with universities, agencies, volunteers, schools, etc. to implement a standardized statewide amphibian and reptile monitoring network.

Mammals

North Dakota's SWAP includes 21 mammal species. Monitoring protocol for mammals, especially small mammals, has been identified as one of the greatest need 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 NDGFD has identified this as a major need in this SWAP and will continue to develop monitoring protocol. See Appendix C for species specific monitoring efforts.

Existing Surveys

- Swift fox will be monitored by the NDGFD.
- Black-tailed prairie dogs will be monitored as part of a range-wide survey as stated in the North Dakota Black-tailed Prairie Dog Management Plan.
- 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

- Implement a monitoring strategy for Richardson's ground squirrels.
- The NDGFD will partner and share information with various agencies where opportunities exist to best monitor mammal populations.
- The NDGFD incidental reporting system will be used to augment data on mammal populations.
- The NDGFD will continue work to develop a monitoring protocol to track species within the state.
- The NDGFD will develop 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 22 fish SCP. Many of these species can be monitored by group 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 NDGFD surveys select water bodies on a yearly basis.
- The NDDH 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.
- NDGFD conducts annual surveys for young-of-the-year paddlefish and also tags adult paddlefish.

Fish Monitoring/Survey Goals

- Use protocols developed by SWG project T-14-R "Status of selected fishes with immediate conservation need in North Dakota" and other efforts to develop monitoring plan for stream fish.

Freshwater Mussels

Ten species of mussels are listed as SCP. This represents two thirds of the species known to inhabit North Dakota. Freshwater mussels have recently been surveyed through SWG T-24-R "A Two Phase Population Survey of Mussels in North Dakota Rivers". A framework monitoring protocol was developed as a requirement of that study. See Appendix E for species specific monitoring efforts.

Existing Surveys

- No existing annual surveys are in place.

Freshwater Mussel Monitoring/Surveys Goals

- Implement a monitoring protocol to track freshwater mussel species within the state using the information gathered in T-24-R.

Insects: Prairie Butterflies

Three prairie butterfly species were added to the SCP list during the last revision. The Poweshiek Skipperling and Dakota Skipper were recently listed under the ESA. The Monarch is currently being evaluated by the USFWS for its inclusion. The NDGFD does not currently monitor prairie butterflies.

Existing Surveys

- Select prairie butterflies are monitored on an annual basis at known sites throughout the state.

Prairie Butterfly Monitoring/Survey Goals

- The NDGFD will work with partners to develop a monitoring protocol for prairie butterflies, including training new surveyors, and working on developing a model to predict important habitat.

Insects

Insects are the largest taxa group in North Dakota. The NDGFD does not monitor insect populations currently but understands the importance of gathering this information. That being said the lack of information on insect populations is a daunting task to overcome. The NDGFD has started to compile known information to identify where the most important data gaps are.

Existing Surveys

- No existing annual surveys are in place
- The NDGFD has worked with partners to collect information on the range and distribution of some species.
- The NDDH surveys aquatic insects as a part of an IBI for prairie streams.
- University research conducted surveys on a local level.

Insect Monitoring/Survey Goals

- Continue to collect insect data to develop range and distribution on as many species as possible.
- Develop monitoring protocols on species added to the SCP list.

Threatened and Endangered Species Monitoring

There are eight federal threatened or endangered species on the SCP list. These include Whooping Crane, Piping Plover, Red Knot, Least Tern, Pallid Sturgeon, Black-footed Ferret, Poweshiek Skipperling, and Dakota Skipper.

- Whooping Crane spring and fall migration sightings are reported to the USFWS or NDGFD Migratory Game Bird Biologists and are adequately monitored.
- Piping Plovers in the U.S. Alkali Lakes Core Area are monitored annually at some sites.
- 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.

- Both the Poweshiek Skipperling and Dakota Skipper are recently listed species. They are currently monitored closely at known sites currently. The USFWS is working on an expanded monitoring protocol for these species.

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 re-evaluated. In addition to SWG funded conservation actions, partners will be encouraged to monitor conservation actions affecting species of conservation priority and associated habitat.

Databases

The NDGFD must have an opportunity for storing and accessing information obtained from monitoring efforts. Databases of existing and newly obtained information allows the NDGFD 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.

NDGFD Spatial Database

The nongame database was developed to maintain spatial information on SCP and other nongame species. Data incorporated into the nongame database is derived from a number of sources including SWG projects, NDGFD survey efforts, Scientific Collection reports and the general public. This information is used to augment other monitoring efforts in an attempt to bolster knowledge of these species. The NDGFD also maintains an extensive database of fish and wildlife information which is available only to NDGFD 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 as a result of widespread demand from state agencies wanting a mechanism for sharing the great amount of GIS data useful to many agencies. The mission statement of the NDGH is "The State of North Dakota's GIS Hub will provide the essential infrastructure to share core geographic datasets through an accessible data warehouse among Stakeholders with browsing ability to the general public. The Hub will leverage the State's existing data, infrastructure and expertise to implement the core elements of this enterprise solution." The NDGH provides easy and quick access to a large amount of geographic information such as: 2003 color aerial 1-meter photographs of the entire state of North Dakota; USGS 24k, 100k, and 250k topography; multiple land classifications; National Wetlands Inventory; soil data – STATSGO and SSURGO; federal and state land ownership; and roads. All of this data is available for download and can be accessed directly by NDGFD staff into a GIS program. The ND GIS Hub may be found at <https://apps.nd.gov/hubdataportal/srv/en/main.home>

The North Dakota Natural Heritage Program

Within North Dakota, the 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. In an effort to improve that situation, the NDGFD 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 NDGFD 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 SCP document may be requested from NDGFD or NDPRD. (see North Dakota Natural Heritage Program 2013).

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SECTION 7

REVIEWING THE STATE WILDLIFE ACTION PLAN

This section includes information on the following required element:

Element 6: Each State's provisions to review its Strategy at intervals not to exceed ten years.

Each state is required by law to update their SWAP at least every 10 years. Aside from this requirement, states are left to their own volition (if approved by the USFWS) in determining how often they make changes to their SWAP.

Initially in the 2005 CWCS, the Department stated that going forward it would review its plan annually and the species list at 5 year intervals. While well intended, the Department quickly realized that with only two full time staff committed to the SWG program, their time could easily be consumed by this process. In hindsight, we simply did not anticipate how much time it takes to conduct a frequent systematic review of the plan nor the lack of benefit that is potentially derived in doing this task. As a result more time was spent stepping down and implementing the plan and little time was spent 'tweaking' the CWCS with edits and changes.

In order to meet the 2015 SWAP timeline, Department staff initiated the revision process in 2013. Over the next 18-20 months, substantial time was devoted to extensive scoping, communication with our partners and the public, amalgamating new information, reviewing documents and a host of other tasks associated with revising a large strategic level planning document. While the revised plan will no doubt yield positive benefits to SWG resources in North Dakota, it must be pointed out that the revision process taxed staff with a multitude of additional duties for an extended period of time. Further, based on our experience with this process, we do not believe that the benefits of reviewing the SWAP on a frequent basis (e.g. 3-5 year) are justified.

Upon completion of the 2015 SWAP, we do not anticipate reviewing the SWAP prior to the next 10 year interval in 2025.



SECTION 8

COORDINATION WITH PARTNERS AND THE PUBLIC

This section includes information on the following required elements:

Element 7: Descriptions of the plans for coordinating, to the extent feasible, the development, implementation, review, and revision of the Plan-Strategy 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 conservation of identified species and habitats.

Element 8: Congress has affirmed through WCRP and SWG, that 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 of Conservation Priority that Congress has indicated such programs and projects are intended to emphasize.

COORDINATING WITH PARTNERS

The original construction of the SWAP required the NDGFD to develop partnerships with interested groups to gather information on fish and wildlife within the state. This was done in two ways, group meetings and individual solicitation. First group meetings were held to discuss the newly implemented SWG program and gather broad knowledge about the resource from larger groups of experts. Once this information was synthesized experts in individual fields were sought out to refine ideas. This process not only laid the ground work for the original SWAP but opened up a line of communication between the NDGFD and its partners.

The success of those partnerships is evident in the work completed through the SWG program. Through the SWG program and outside of it great strides have been made in the conservation of SCP and their habitats. The last decade has produced 57 SWG partner projects. These projects have covered all taxa and provide both research information and implementation of conservation guided by the SWAP. The wide array of project and large number of partners shows the strength of the state's SWAP by demonstrating the buy-in by not only NDGFD staff but our partners across the fish and wildlife community. Its strength is also demonstrated by its integration into the daily workings of our partners. Randy Renner from the Ducks Unlimited Regional office said *"I reference the Plan in every NAWCA grant proposal I write for North Dakota...In total since 2005 I have referenced the Plan over a dozen times. I believe referencing the Plan helps the proposal score very well in this technical question."* Justin Parks of the North Dakota Parks and Recreation Department when asked how his agency incorporates the SWAP into their projects said *"We have incorporated the Species of Conservation levels when preparing biological assessments and writing site summaries for potential state nature preserves. Other uses would include referencing the SWAP when developing management practices for lands we manage such as state parks, state recreation areas, state natural areas, and state nature preserves."*

The exchange of information between our partners and the NDGFD 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 SCP and their habitats. Three such meetings were conducted to facilitate that information exchange, two SWG coordination meetings, one in 2006 and the second in 2010, and a SWAP Summit in 2014. The information gathered from those events was used as the backbone of the development of the new SWAP.

SWG Coordination Meeting 2006

The first SWG coordination meeting was held in January of 2006. This meeting brought together SWG partners from around the state and region with the opportunity to share research, hear about other projects in the area, and have a chance to shape the direction of the SWAP. The morning session featured fourteen researchers providing information on on-going SWG projects, while the afternoon was designated for NDGFD updates on the SWG program and an open discussion by partners on research and conservation needs. A questionnaire was sent to all attendees to gather information on how to make future meetings more productive. This coordination meeting was attended by 40 partners.

SWG Coordination Meeting 2010

Building on the success of the first SWG coordination meeting a second was facilitated in the spring of 2010. While the goals were the same the format of this meeting changed. Because of the large number of SWG projects that were underway partners were allotted the entire day for updates on their research. Question and answer periods for each of presentations allowed for the exchange of information that was the success of the first meeting. The 2010 coordination meeting was again well attended.



SWAP Summit 2014

NDGFD again brought its partners together in the spring of 2014 to draw on their knowledge and experience. The NDGFD had initiated the revision process of the original SWAP and looked to its partners for information on the threats wildlife and habitats and their associated conservation actions. The one day meeting took attendees through a decision making process to identify stresses, threats and conservation actions, and ask them to rank them as well. The meeting was successful in re-evaluating known issues and actions and identifying new ones on the changing landscape. The product of this meeting can be found in Sections 4 and 5 of the SWAP. The final product of the meeting was structured after Salafsky's *A Standard Lexicon for Biodiversity Conservation: Unified Classifications of Threats and Actions* as recommended by Best Practices for State Wildlife Action Plans. This allows for a more seamless connection between SWAPs nation-wide.



Partner Review of Revised SWAP

One of the reasons the SWAP has been successful through its first edition has been the contribution made to it by partners. The review process was no different. The first partner review was initiated for the list of SCP. Experts were polled to contribute comments on species to be included or removed from the list. This process was again used to review the draft SWAP. Once a draft of the revised SWAP was developed it was made available to partners for review and comment. Those comments were collected and incorporated into the final draft of the SWAP.

Coordination within the NDGFD

Within the NDGFD, there is excellent communication, coordination and consideration of SWG related issues. The Director is briefed on SWG issues at each weekly management level meeting by the Conservation and Communications Division Chief. Staff responsible for SWG issues are granted considerable latitude and encouraged to interact with all divisions (e.g. Wildlife, Fisheries, Enforcement, and Administration) in disseminating ideas, gathering input, cultivating potential projects and identifying funding sources. Updates of SWG projects and the SWAP revision are provided at the NDGFD annual staff meeting.

COORDINATION WITH THE PUBLIC

The mission of the North Dakota Game and Fish Department is to protect, conserve, and enhance fish and wildlife populations and their habitats for sustained public consumptive and nonconsumptive use. It is the NDGFD's responsibility to be the principle governmental proponent for fish and wildlife populations and their habitat by aggressively conserving and enhancing these resources and protecting them from irreversible harm to ensure their existence in perpetuity for the citizens of the state. With this responsibility, the NDGFD has an obvious need to keep the public informed on fish and wildlife issues within the state and from a national perspective as well.

The NDGFD uses numerous tools to inform the public on the SWG program and the work that the SWAP is accomplishing. First and foremost is the interaction of NDGFD biologists with the general public. Conservation division staff are well versed in the SWG message and are successful at providing that message to the public via media and in-person. Conservation staff do numerous interviews and public presentations throughout the year and have shown to be an effective conduit of information.

The communications division of the NDGFD also plays an important role in information exchange, by using a combination of digital media, video, and print media to convey that message. Over the last decade, numerous broadcast news features were produced on SWG funded research and/or species of conservation priority. These TV news stories are played state-wide on network television and community access cable channels. In addition, a weekly webcast is available on the NDGFD website for a viewer's convenience. The webcasts provide interviews with experts on various topics. The NDGFD also produces a monthly magazine, North Dakota Outdoors, which features many wildlife issues for the public to be aware of. The Outdoors magazine has included many feature articles on the SWG program, even dedicating an entire issue to the updated SCP list. All of above media options are available on demand at the NDGFD website. This has allowed the dissemination of the benefits of the SWG programs to as many constituents as possible. A list of SWG/SWAP related work can be found in Tables 9, 10 and 11.



Table 9. ND Outdoors Magazine articles pertaining to the SWAP, SWG, SCP or other nongame species.

<i>Title</i>	<i>Date</i>
Searching for Rare Carnivores	Nov 2008
Slow Journey Home (Kit Fox)	May 2008
Wolf Management in North Dakota: From Both Sides	May 2007
Keeping Common Species Common	Jun 2006
Nesting in Numbers - Active Bald Eagle Nests up in ND	Feb 2010
Piecing Together the Pelican Puzzle	May 2006
Radio Marked Scaup: Closer Look	Jan 2009
Russian Olives: From Both Sides	Feb 2008
Tigers in Our Wetlands	July 2007
Safeguarding Sage Grouse	May 2010
Tracking Sage Grouse Survival	Jun2 2010
Night Owls	Feb 2014
North Dakota Species of Conservation Priority	June 2014
Meadowlark Population Declining	June 2014
Matters of Opinion	June 2014
Restoring Sage Grouse Habitat	July 2014
Itinerant Birds Land in North Dakota	July 2014

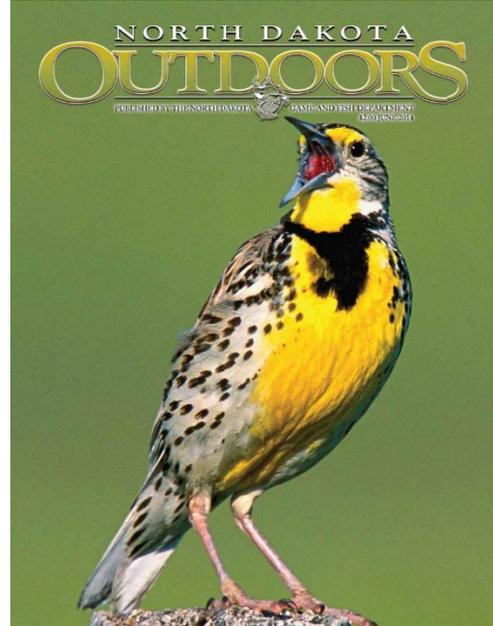


Table 10. NDGFD Outdoors Online weekly webcasts pertaining to the SWAP, SWG, SCP or other nongame species.

<i>Title</i>	<i>Date</i>
Bald Eagle Survey	1/24/2008
State Wildlife Grants	2/28/2008
State Wildlife Grants	2/12/2009
Baby Animals	6/5/2014
Baby Animals	6/11/2015



Table 11. NDGFD “North Dakota Outdoors” broadcast news feature pertaining to the SWAP, SWG, SCP or other nongame species.

<i>Title</i>	<i>Date</i>	<i>Title</i>	<i>Date</i>
State Wildlife Grants	12/21/2005	Watchable Wildlife	9/1/2009
Bald Eagle Survey	1/31/2006	Wetland Restoration	10/6/2009
Long Billed Curlew	5/23/2006	Bald Eagle Count	2/2/2010
Birding Tour	6/6/2006	Sage Grouse List	3/30/2010
River Otters	6/28/2006	Sharp-tailed Grouse Study	6/18/2010
Turtles	8/15/2006	State Wildlife Grants	12/21/2010
Mammal Study	8/29/2006	Tax Checkoff	3/15/2011
Bats in the Badlands	9/5/2006	Sage Grouse Initiative	5/24/2011
Birding Family	9/19/2006	Bat Man	8/23/2011
Hawks and Owls	10/10/2006	Kids Bird Count	12/20/2011
Conservation Practice 37	10/17/2006	Sage Grouse Hybrid	4/24/2012
Watchable Wildlife Photo Contest	11/21/2006	Sage Grouse Comeback	5/1/2012
Dakota Skippers	11/28/2006	Monarch Butterfly Tagging	9/18/2012
Burrowing Owls	6/12/2007	Mammal Book	12/18/2012
Chick Banding Least Terns and Piping Plovers	7/24/2007	Bald Eagle Survey	1/15/2012
Blue Heron Award	7/31/2007	Eagle Nests	3/19/2013
Otter Project	8/21/2007	Watchable Wildlife Contest	7/30/2013
Russian Olive Trees	11/6/2007	Browse Transects	9/17/2013
Christmas Bird Count	12/25/2007	Saw-Whet Owls	11/5/2013
Sage Grouse Study	4/15/2008	Tax Donation	1/14/2014
CP 38	6/3/2008	Northern Hawk Owl	3/14/2014
Pelicans	7/22/2008	Hawk Study	6/17/2014
Mussel Study	8/19/2008	Amphibian and Reptile Survey	8/19/2014
Bald Eagle Delisting	3/3/2009	Report Bald Eagle Nests	4/6/2015
Amphibian Study	6/16/2009	Leave Baby Animals Alone	6/15/2015
Smith Grove	6/23/2009	Waterbird Inventory	6/23/2015



SUMMARY OF PARTNER AND PUBLIC REVIEW PROCESS

The following summarizes the review process for the revised North Dakota State Wildlife Action Plan.

- March 23, 2015 – draft for internal NDGFD staff review
- March 30 and 31, April 6 and 7, 2015 – State Wildlife Action Plan update, including an informational brochure, provided to the public at the 2015 Spring District Advisory Board Meetings in Williston, Velva, Devils Lake, Grand Forks, Casselton, Valley City, Garrison and Dickinson.
- April 15, 2015 – letter from Director Terry Steinwand to 50 partner agencies/organizations, tribal chairmen, and congressional delegation, inviting them to review and comment on the draft plan available on the NDGFD website.
- April 16, 2015 – email from Chief of Conservation and Communications, Greg Link, to additional colleagues, inviting them to review and comment on the draft plan available on the NDGFD website.
- May 13, 2015 – public comment period opens.
 - News release <http://gf.nd.gov/news/state-wildlife-action-plan-open-comment>
 - North Dakota Outdoors TV <https://www.youtube.com/watch?v=4V6WK0HGtbs>
 - Outdoors Online Webcast <https://www.youtube.com/watch?v=6TSEEwcMZoE>
- Comment period closed June 8, 2015.

APPENDIX A. Birds

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AMERICAN AVOCET

Scientific Name: *Recurvirostra americana*

Species of Conservation Priority:
Level II

General Description: 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.

Abundance: Fairly common.

Primary Habitat: Wetlands or lakes with exposed, sparsely vegetated shorelines or islands.

Federal Status: Migratory Bird.

Reason for Designation: A high proportion of the population breeds in North Dakota. Listed as a U.S. Shorebird Conservation Plan Species of High Concern in the Prairie Pothole Region. Increased climate change vulnerability in Shorebirds of Conservation Concern 2015.



Lara Anderson

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

American Avocets are most commonly seen using exposed, sparsely vegetated salt flats, sandbars, peninsulas, mudflats, or islands with beaches. Generally use 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 favored large islands with beaches, located in shallow water, and islands constructed in wetlands. The nest is usually located on unvegetated ground or in areas with short, sparse vegetation. Nests may be slightly elevated, within about 60 m of water, and often near a clump of vegetation or debris. Most often nest in loose colonies, sometimes in association with terns, but never with gulls, pelicans, or cormorants. Avocets will also nest solitary. Foraging usually takes place in shallow water <20 cm deep for aquatic invertebrates, small fish, seeds, or terrestrial vertebrates on land.

Key Areas and Conditions for American Avocet in North Dakota

No specific sites have been identified.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Breeding density may be determined by availability of island nesting grounds. Avocets do not use islands used by breeding gulls; and ring-billed gulls have increased substantially in North Dakota over the past 40 years. High water years can limit nesting substrate.

Other Natural or Manmade Factors

Nest losses attributed to flooding and predation. An elevated level of selenium has been found in avocet eggs in other areas. Selenium is present in evaporation ponds that receive subsurface agricultural drainage, such as irrigated fields. Human presence at nesting site during early laying stages can cause abandonment. Collision with power lines over wetlands has been documented. Expanding oil and gas development in North Dakota increases risk of oilfield contamination of wetland habitat.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- Since 2004, the USFWS HAPET staff has coordinated a breeding shorebird survey in the Prairie Pothole Region of North and South Dakota. Surveys are conducted twice to correspond with the shorebird breeding season. Five grassland breeding shorebird species are targeted, including American Avocet. Results from these surveys help guide grassland and conservation efforts.
- Rocky Mountain Bird Observatory (ND SWG T-40-R) is conducting a statewide inventory of colonial and semi-colonial waterbird populations and identifying key sites for breeding colonies in North Dakota. The American Avocet is one of 29 target species. The project was initiated in March 2014.

Previous Research or Surveys

- Northern Prairie Wildlife Research Center (ND SWG T-3-1 and T-9-R) determined marsh bird distribution in relation to landscape composition in North Dakota. The project was initiated in 2004 and a final report provided 2008. American Avocets were one of

16 focal species. American Avocets were primarily observed on wetlands with cover classes of 3 or 4 and were treeless, and were on average 93% ±8 SE full (Sherfy and Anteau 2008).

- Avocet use of nesting islands in North Dakota was explored by Dahl (2003).
- Numerous published reports and gray literature throughout the species range and in North Dakota.

Additional Research or Surveys Needed

- Determine the effects of selenium or insecticides on wetland quality and prey species.

POPULATION AND TREND ESTIMATES

- North American Population Estimate 2012: 450,000
- North Dakota BBS Trend: see figure 1
- Survey-wide BBS Trend 1966-2012: -0.22

MANAGEMENT RECOMMENDATIONS

- Maintain wetland complexes and large wetlands or lakes.
- Manage vegetation on the periphery of islands for sparseness.
- Optimize invertebrate abundance in wetlands through timed drawdowns, disking and flooding.
- Conduct management control of gulls where impacting avocet nesting habitat.
- Utility development should follow the guidance of “Reducing Avian Collisions with Power Lines” including marking power lines and creating an Avian Protection Plan.

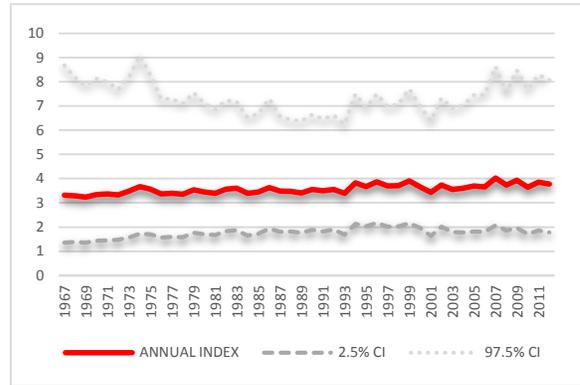


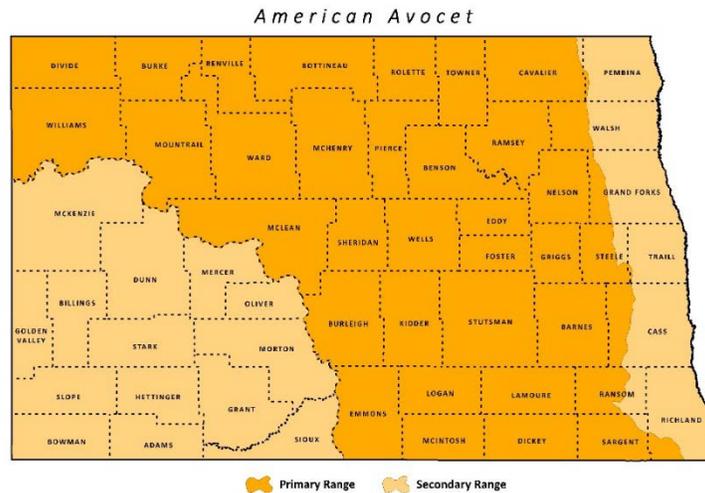
Figure 1. North Dakota Breeding Bird Survey Trend 1967-2012.

MONITORING PLANS

The Breeding Bird Survey continues to be a useful monitoring tool, however the annual surveys implemented by HAPET in 2004 are valuable. Ensuring all BBS routes are conducted annually is priority. A shorebird monitoring plan should follow The International Shorebird Survey (ISS) Program for Regional and International Shorebird Monitoring (PRISM) and “Guidance for Developing and Implementing Effective Shorebird Surveys.”

2005-2015 PROGRESS

The American Avocet remains a Level II Species of Conservation Priority. Several State Wildlife Grant Projects (T2-9-R, T2-11-HM, T-18-R, T-21-D, T-22-HM, T-23-HM, T-25-HM, T-27-HM, T-37-D) have contributed to habitat enhancement of wetlands and grasslands for Willet and other wetland/grassland dependent birds.



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AMERICAN BITTERN

Scientific Name: *Botaurus lentiginosus*

Species of Conservation Priority:
Level I

General Description: 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 October. Peak breeding season mid-June to late July.

Abundance: Fairly common.

Primary Habitat: Uses a variety of wetlands, but typically larger wetlands with tall emergent vegetation. Also will nest in tall, dense grasslands.

Federal Status: Migratory Bird.

Reason for Designation: The American Bittern is listed as Critically Imperiled or Vulnerable in several states and provinces. Designated as High Concern in the Northern Prairie & Parkland Waterbird Conservation Plan (NPPWCP) and High Concern by Waterbird Conservation for the Americas. It is a USFWS Bird of Conservation Concern in BCR 11 and added to the 2008 BCC list in Region 6 and BCR17.



Sandra Johnson

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

American Bitterns use a variety of freshwater wetlands including seasonal, semi-permanent, temporary, permanent, fens or restored wetlands. They tend to use wetlands which are > 3 ha in size with a large amount of tall, emergent vegetation present such as rushes, sedges, cattails, or common reed. Wetlands dominated by open water and alkali wetlands are generally avoided. Also are likely to occur in wetlands which are not isolated from other wetlands (i.e. prefer wetland complexes). 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, idle grasslands with moderate litter. The dominant grassland associated species include big bluestem, wheatgrass, smooth brome, switchgrass, and sweet clover. 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 to pass by.

Key Areas and Conditions for American Bitterns in North Dakota

No specific sites have been identified. Appear concentrated in central and southern portion of the Missouri Coteau. Also common in the Turtle Mountains, J. Clark Salyer NWR, and fairly common elsewhere east of the Missouri River in preferred habitat. The presence of this species may vary greatly from year to year dependent on water availability.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Wetland destruction and/or degradation and conversion of upland grassland for agricultural use negatively affect breeding populations. Habitat loss is believed the number one cause for decline of this species. 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.

Other Natural or Manmade Factors

Decline in the southern portion of the species range may be linked to declining amphibian populations. The bittern is at the top of the food chain, and its presence is a good indicator of environmental quality. Pesticides and contaminants pose a threat to wetland quality or primary prey species. Some mortality with communication towers.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- Rocky Mountain Bird Observatory (ND SWG T-40-R) is conducting a statewide inventory of colonial and semi-colonial waterbird populations and identifying key sites for breeding colonies in North Dakota. The American Bittern is one of 29 target species. The project was initiated in March 2014 and a final report will be completed in December 2015.

Previous Research or Surveys

- Northern Prairie Wildlife Research Center (ND SWG T-3-1 and T-9-R) determined marsh bird distribution in relation to landscape composition in North Dakota. The project was initiated in 2004

and a final report provided in 2008. American Bitterns were one of 16 focal species. American Bitterns were 8.2 times more likely to occur at wetlands in the Drift Prairie, and the probability that they would occur at a wetland were positively correlated with the percent of wetlands in the landscape (Sherfy and Anteau 2008).

Additional Research or Surveys Needed

- Develop/refine surveys to determine present distribution, population estimates, and identify key areas.
- Demographic or life history information is lacking.
- Determine the effects of contaminants or insecticides on wetland quality and prey species.

POPULATION AND TREND ESTIMATES

- Waterbird Conservation for the Americas Population Estimate: 2,976,000 individuals
- NPPWCP BCR11 Population Estimate: unknown
- North Dakota BBS Trend: see figure 2
- Survey-wide BBS Trend 1966-2012: -0.89

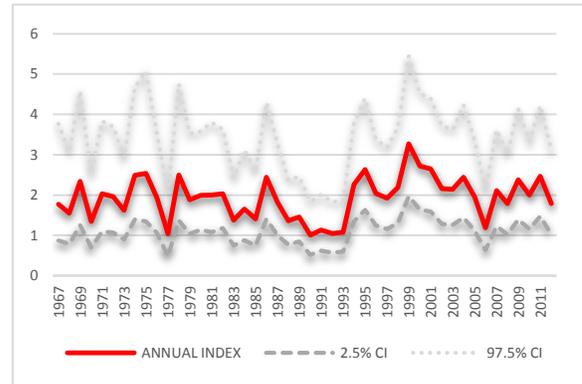


Figure 2. North Dakota Breeding Bird Survey Trend 1967-2012.

MANAGEMENT RECOMMENDATIONS

- Maintain wetland complexes of sufficient size (20 ha to 180 ha).
- Maintain water levels at <61 cm from April-August, avoid complete drawdowns before mid-August.
- Manage stock ponds for growth of emergent vegetation.
- Maintain a wide vegetative margin around wetlands.
- Disturbance to uplands (i.e. burning, mowing) should not occur more than every 2-5 years as bitterns prefer to nest in idle grasslands.
- Construction of communication towers should follow the guidance of “Service Interim Guidelines for Recommendations on Communications Tower Siting, Construction, Operation, and Decommissioning” and American Bird Conservancy Collision Program framework.

MONITORING PLANS

The NPPWCP has identified the basic elements of how a regional/continental waterbird monitoring program should be structured. Waterbird monitoring should follow recommendations of the Waterbird Conservation for the Americas and North American Bird Conservation Initiative ‘Opportunities for Improving Avian Monitoring’.

2005-2015 PROGRESS

The American Bittern remains a Level I Species of Conservation Priority. Efforts to identify key sites for breeding areas are underway. Several State Wildlife Grant Projects (T2-9-R, T-18-R, T-27-HM) have contributed to habitat enhancement of wetlands for American Bittern and other wetland dependent birds.



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AMERICAN KESTREL

Scientific Name: *Falco sparverius*

Species of Conservation Priority:
Level II

General Description: 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 from mid-March to October, but occasionally seen during winter. Peak breeding season mid-April to June.

Abundance: Fairly common to common.

Primary Habitat: Open to semi-open grasslands, agricultural fields, urban areas, with suitable trees for nest cavities.

Federal Status: Migratory Bird.

Reason for Designation: American Kestrels are experiencing long-term population declines across North America. The reason for the decline is unknown. Although the population appears stable in North Dakota, careful monitoring of the species status should occur.



USFWS

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

American Kestrels inhabit a variety of 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.

Key Areas and Conditions for American Kestrel in North Dakota

No specific sites have been identified.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Conversion of grassland to cropland, energy development and urban expansion. 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.

Other Natural or Manmade Factors

West Nile virus, increasing competition/depredation from Cooper's hawks, environmental contaminants, and pesticides have been suggested as possible reasons for the kestrel's population declines. Nest abandonment is greater in higher human disturbance areas. However, the exact cause of widespread decline has not been identified.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- Nothing specific to the species in North Dakota.

Previous Research or Surveys

- Nothing specific in North Dakota.
- Numerous published reports and gray literature on this species throughout its range.

Additional Research or Surveys Needed

- Determine the effects of contaminants or insecticides on prey species.

POPULATION AND TREND ESTIMATES

- PIF Global Population Estimate: 4,000,000
- PIF North American Population Estimate: 2,200,000
- PIF North Dakota Population Estimate: 20,000
- North Dakota BBS Trend: see figure 3
- Survey-wide BBS Trend 1966-2012: -1.56

MANAGEMENT RECOMMENDATIONS

- Preserve 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.

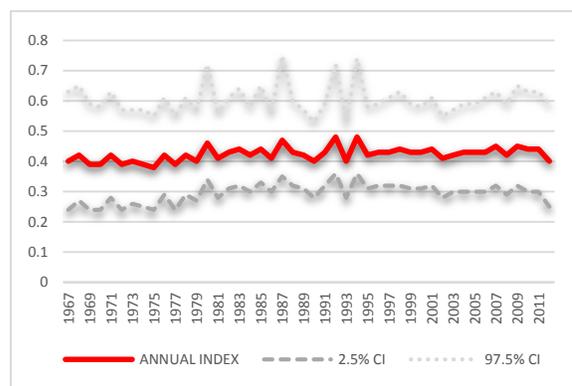


Figure 3. North Dakota Breeding Bird Survey Trend 1967-2012.

MONITORING PLANS

According to the Partners in Flight Landbird Conservation Plan, long-term population trend monitoring such as the Breeding Bird Survey is generally considered adequate. Ensuring all BBS routes are conducted annually is priority. Monitoring plans should follow recommendations of the North American Bird Conservation Initiative 'Opportunities for Improving Avian Monitoring'.

2005-2015 PROGRESS

The American Kestrel has been added as a Level II Species of Conservation Priority.



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AMERICAN WHITE PELICAN

Scientific Name: *Pelecanus erythrorhynchos*

Species of Conservation Priority:
Level II

General Description: L 62", WS 108", 16 lb. A very large white bird with black flight feathers, elongated orange-yellow bill and feet.

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

Abundance: Common.

Primary Habitat: Isolated, barren islands or peninsulas in large lakes or reservoirs for breeding; lakes and semi-permanent wetlands for foraging.

Federal Status: Migratory Bird.

Reason for Designation: Chase Lake National Wildlife Refuge hosts the largest colony of breeding white pelicans in North America with an estimated 1/3 to 1/2 of the entire population of pelicans nesting here. Since 2005, small colonies (<500 nests) have been documented at several other sites. A "responsibility" species. Moved from a level I to a level II because populations appear stable to increasing. Moderate Concern by Waterbird Conservation for the Americas.



Lara Anderson

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Pelicans nest in colonies on barren islands or peninsulas in large lakes or sometimes on rivers. Island substrate of gravel, sand, or soil is preferred, with little to no vegetation. Commonly nest with other colonial birds such as double-crested cormorant, gulls and terns. The areas on which they nest are often >50 km from where they forage. Primary prey items include fish (e.g. carp, chubs, shiners, and catfish), salamanders, frogs, or crayfish. Foraging occurs in shallow waters, 0.3-2.5 m., of marshes, lakes, and rivers. Sovada et al. 2013 found selection against temporary and seasonal wetlands and rivers for foraging. It is only during times of spawning that game fish species are suspected to be taken due to the pelican's shallow water foraging habit.

Key Areas and Conditions for American White Pelican in North Dakota

Chase Lake National Wildlife Refuge in western Stutsman County hosts the world's largest colony of breeding white pelicans. Other colonies are now located in the Van Hook Arm area of Lake Sakakawea, Willow Lake in Rolette County, Evankov WPA and Lake Nettie in McLean County, and Rosemount WPA in Ward County. Key foraging sites have not been identified.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

The destruction or degradation of key foraging wetlands and associated prey species could affect pelican populations.

Other Natural or Manmade Factors

The recent outbreak of West Nile virus (WNV) in North America may have negatively affected the pelican population in North Dakota. In 2003, half of the pre-fledged pelicans died from WNV. Mortality of pelican chicks from WNV appears to be an additive mortality factor. Other diseases that could potentially impact large colonies include Newcastle's disease and avian botulism. Perceived competition for fish resources with sport and commercial fisheries. Primary mammalian predators include fox and coyote, with coyote harassment being a potential cause of the recent pelican abandonment. Human disturbance or intrusion of the nesting colonies during the courtship period and initial incubation may cause abandonment. Expanding oil and gas development in North Dakota increases risk of oilfield contamination of wetland habitat. Some mortality from collisions with power lines and wind turbines.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- Rocky Mountain Bird Observatory (ND SWG T-40-R) is conducting a statewide inventory of colonial and semi-colonial waterbird populations and identifying key sites for breeding colonies in North Dakota. The American White Pelican is one of 29 target species. The project was initiated in March 2014.

Previous Research or Surveys

- Northern Prairie Wildlife Research Center (ND SWG T-7-R) explore factors that may lead to colony abandonment or reduced productivity. The project was initiated in 2005 and continued through 2007, and final report was provided in 2007.

In 2004 and 2005, adult pelicans in this and other colonies abandoned their nesting effort believably by 1) coyote depredation or disturbance, 2) anthropomorphic disturbance, 3) disease, 4) weather, 5) food resource shortage, or 6) a combination of factors. Pelicans at the Chase Lake colony may be experiencing effects from climate change causing earlier spring arrival and onset of breeding activity. Scientific Investigations Report 2013-5105 (Sovada 2013, Sovada et al. 2014).

- More than 2,000 young white pelicans are banded each year at Chase Lake NWR. In the 1970s, studies on food habits, production and survival, and movements and mortality were conducted.
- Numerous published reports and gray literature on this species throughout its range and in North Dakota.

Additional Research or Surveys Needed

- Continue to monitor the influence of WNV and other diseases on the population and colonies.

POPULATION AND TREND ESTIMATES

- North American Waterbird Conservation Plan Population Estimate: >120,000 breeders
- NPPWCP BCR11 Population Estimate: >32,203
- 10-year (2000-2009) average number of nests at Chase Lake NWR: 13,500
- North Dakota BBS Trend: see figure 4
- Survey-wide BBS Trend 1966-2012: 5.12

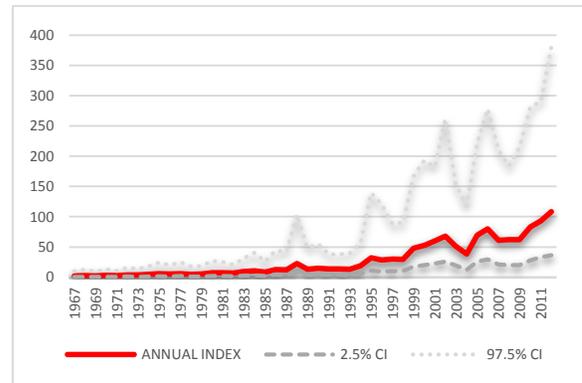


Figure 4. North Dakota Breeding Bird Survey Trend 1967-2012.

MANAGEMENT RECOMMENDATIONS

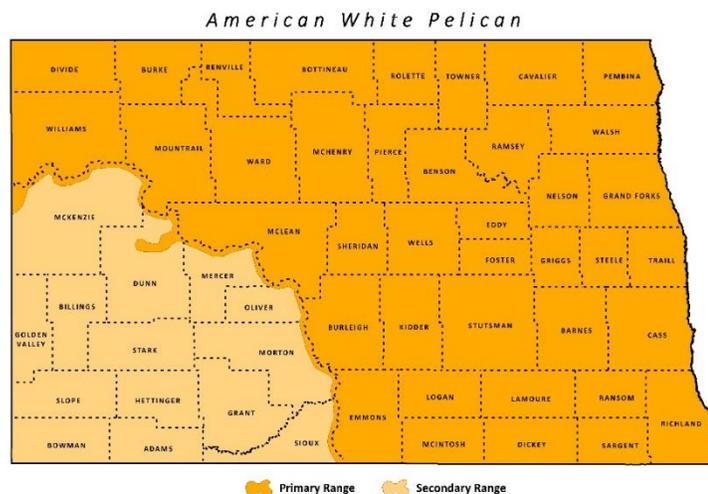
- Protect nesting colonies from human intrusion during courtship and initial incubation stages.
- Fence peninsulas if coyote predation becomes a problem.
- Utility development should follow the guidance of “Reducing Avian Collisions with Power Lines” including marking power lines and creating an Avian Protection Plan.
- Wind industry companies should collaborate with the American Wind and Wildlife Institute for responsible wind development.

MONITORING PLANS

Monitor new, existing, and historic colonies. The NPPWCP has identified the basic elements of how a regional/continental waterbird monitoring program should be structured. Waterbird monitoring should follow recommendations of the Waterbird Conservation for the Americas and North American Bird Conservation Initiative ‘Opportunities for Improving Avian Monitoring’.

2005-2015 PROGRESS

The American White Pelican was moved from a Level I to a Level II Species of Conservation Priority due to stable population and increasing breeding range. White pelicans are establishing small but new breeding colonies in North Dakota. Efforts to identify additional breeding colonies are underway. Although new colonies are forming, the white pelican remains at-risk primarily due to the overall limited number of colonies in North America (<50). Several State Wildlife Grant Projects (T2-9-R, T-18-R, T-27-HM) have contributed to habitat enhancement of wetlands for white pelicans and other wetland dependent birds.



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BAIRD'S SPARROW

Scientific Name: *Ammodramus bairdii*

Species of Conservation Priority:
Level I

General Description: L 5.5", WS 8.75", 0.6 oz. Brownish overall except for yellow-orange color on a flat head. A narrow band of fine dark streaks on the breast and broken eye-line also characterize this cryptic species.

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

Abundance: Fairly common to uncommon.

Primary Habitat: Extensive tracts of native mixed-grass prairie or lightly grazed pastures.

Federal Status: Migratory Bird.

Reason for Designation: The Baird's Sparrow was once abundant in North Dakota. This sparrow has a restricted breeding range limited to parts of Canada, Montana, South Dakota and the majority of North Dakota. It is included on the National USFWS Birds of Conservation Concern list, and also in Region 6, BCR 11 and 17. Partners in Flight (PIF) identifies the Baird's Sparrow as a Regional Concern and Stewardship Species, U.S.-Canada Concern and Stewardship Species, and a Tri-national Concern Species.



Sandra Johnson

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Baird's Sparrows prefer native prairie, but will also utilize idle, tame grasslands, and grazed pastures. CRP, wet meadows, or dense grass within hay land and cropland is utilized to a lesser extent.

Vegetative structure may influence use more so 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. Territory size in North Dakota ranges from .8 to 2.25 ha. Minimum area requirements for Baird's Sparrows are unknown, but it is presumed large, contiguous tracts of native prairie are required to maintain populations. Forages on the ground for insects and seeds.

Key Areas and Conditions for Baird's Sparrow in North Dakota

Highest densities of Baird's Sparrows are found in northwestern North Dakota, particularly in Divide, Williams, Burke, Mountrail and Ward counties. Much native prairie remains in McHenry and Kidder Counties and may also attract a high number of this species.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Conversion of grassland to cropland, energy development and urban expansion. Loss of native prairie in North Dakota has greatly affected this species. Degraded prairie habitat, particularly invasion of Kentucky bluegrass, threatens Baird's Sparrow populations. Deemed woodland-sensitive, occurrence declines with increasing tall shrub (>1m) cover. Increased woodland and brush cover also negatively affects this species. CRP can be beneficial to Baird's Sparrows dependent upon structure and native species composition, and by creating larger grassland patches. Increasing loss of grassland on the wintering grounds in the Chihuahuan Desert may be contributing to the decline of Baird's Sparrows.

Other Natural or Manmade Factors

Parasitism by brown-headed cowbirds may be greater than for other grassland birds. Nest depredation is the most important factor affecting nest success, followed by weather. Pesticide acute toxicity may be a potential contributor to declines of grassland birds. Grassland birds avoid habitat within 150 meters of roads and 350 meters of oilfield infrastructure, likely due to anthropogenic disturbance of heavy traffic and/or changes in habitat near oil development.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- Rocky Mountain Bird Observatory (ND SWG T-46-R) is estimating demographic rates of Baird's Sparrow and other grassland birds in western North Dakota. A final report is anticipated in 2018.

Previous Research or Surveys

- University of Montana (ND SWG T-1-R) developed breeding bird models which link population density to local and landscape

habitat features in the Prairie Pothole Region of North Dakota. Baird's Sparrow was one of 16 grassland bird focal species. The project was initiated in 2002, a final report was provided in 2004 (Naugle 2005), and dissertation in 2007 (Quamen 2007). Further analysis of the data was recently analyzed on 5 study species (Doherty et al. in press). Baird's Sparrows showed avoidance of cropland or selection for grassland at both the landscape and local scales, avoidance for exotic grasses, and showed negative relationship to visual obstruction.

- Fair number of published reports and gray literature on this species throughout its range.

Additional Research or Surveys Needed

- Determine the effect of Kentucky bluegrass invasion on Baird's Sparrow presence/abundance.

POPULATION AND TREND ESTIMATES

- PIF Global Population Estimate: 2,000,000
- PIF North American Population Estimate: 2,000,000
- PIF North Dakota Population Estimate: 400
- North Dakota BBS Trend: see figure 5
- Survey-wide BBS Trend 1966-2012: -2.96

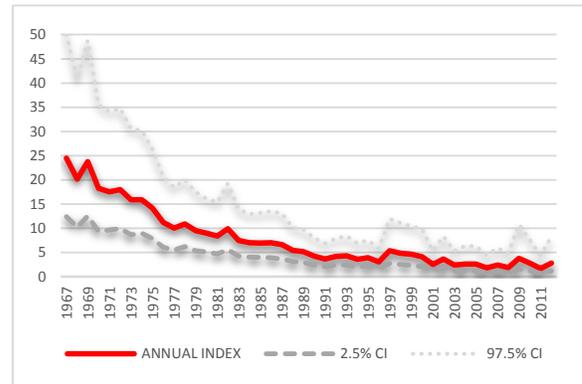


Figure 5. North Dakota Breeding Bird Survey Trend 1967-2012.

MANAGEMENT RECOMMENDATIONS

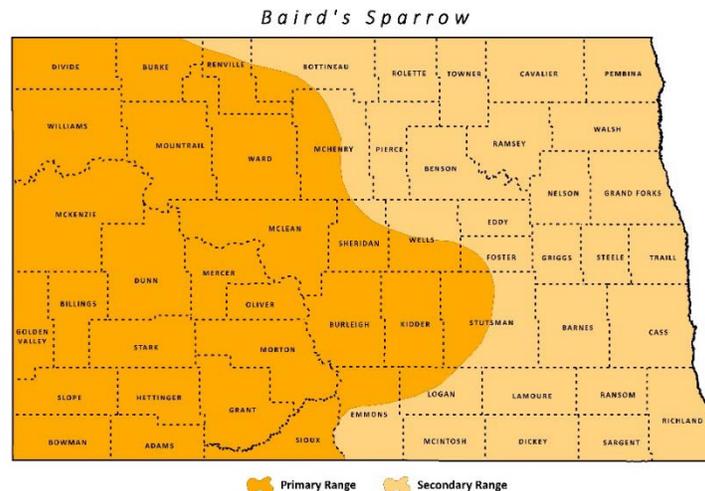
- Protect or create large tracts of grassland, particularly native prairie.
- Prevent encroachment of woody vegetation in grasslands.
- Encourage vegetative diversity.
- Practice rotational burning: intervals of 3-4 years in tallgrass prairie, 6 years in mixed-grass prairie, and 5-10 years in shortgrass prairie.
- Delay mowing until July 15.
- Use native grasses when replanting or restoring grassland.

MONITORING PLANS

According to the Partners in Flight Landbird Conservation Plan, long-term population trend monitoring such as the Breeding Bird Survey is generally considered adequate. Ensuring all BBS routes are conducted annually is priority. Future monitoring proposals should follow recommendations North American Bird Conservation Initiative 'Opportunities for Improving Avian Monitoring'.

2005-2015 PROGRESS

The Baird's Sparrow remains a Level I Species of Conservation Priority. Several State Wildlife Grant Projects (T2-11-HM, T-18-R, T-20-D, T-21-D, T-22-HM, T-23-HM, T-25-HM, T-28-L, T-37-D) have contributed to habitat enhancement grasslands for Baird's Sparrow and other grassland dependent birds.



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BALD EAGLE

Scientific Name: *Haliaeetus leucocephalus*

Species of Conservation Priority:
Level II

General Description: L 31", WS 80", 9.5 lb. Snow-white head and tail against a dark brown body.

Status: Both year-round and migratory. Peak breeding season early March to July.

Abundance: Fairly common to uncommon.

Primary Habitat: Large rivers and lakes or wetlands bordered by mature stands of trees such as cottonwood.

Federal Status: Migratory Bird. Additional protection under the Bald and Golden Eagle Protection Act.

Reason for Designation: The Bald Eagle was removed from the endangered species list on August 9, 2007. However, post-delisting monitoring must continue to ensure Bald Eagles are recovering. This is the primary reason why the species remains on the list. It is also a Partners in Flight (PIF) Stewardship species.



Lara Anderson

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Bald Eagles prefer large rivers and lakes or wetlands bordered with mature stands of trees, or a single large tree, such as cottonwood. Breeding habitat often includes some type of edge and relatively open canopy. The large nests are usually built within the top quarter of tall, living trees, with fewer nests in dead trees. Nests are relatively close to water, typically less than 2 km. Bald Eagles are opportunistic and feed on a variety of fish, mammals, birds, and carrion.

Key Areas and Conditions for Bald Eagle in North Dakota

The Missouri River system including Lake Sakakawea, the Heart River, Cannonball River, Sheyenne River, Red River, Souris River, and the Devils Lake basin are key nesting areas. However, Bald Eagles are initiating nests in areas not considered traditional nesting habitat such as small stands of large cottonwood trees completely surrounded by cropland or grassland.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Development along the Missouri River and other wooded areas could may result in the loss of nesting, roosting, and associated aquatic foraging habitat. The lack of riparian regeneration may limit number of mature cottonwoods in the future. Large shelterbelts are being removed for agricultural expansion.

Other Natural or Manmade Factors

The use of the pesticide DDT was detrimental to Bald Eagles, causing the thinning of eggshells. Since the ban of DDT, Bald Eagles and many other raptors have rebounded. Eagles are infrequently killed by humans and the illegal trade of eagle parts for Native American purposes is of some concern. Intentional or accidental poisoning is responsible for some mortality. Lead poisoning continues to be reported, indicating eagles may be obtaining lead via a non-waterfowl source. Collisions with vehicles due to eagles eating carrion along roadsides, flying into power lines or electrocution from power lines constitutes a substantial source of mortality. Collisions with wind turbines is of increasing concern. Human activity such as recreational viewing, research activities, noise, agricultural or construction activities, or the mere presence of humans may agitate nesting eagles if the disturbance is close (<330 ft.) and/or persistent. This may result in eagles being inadvertently flushed from the nest for extended periods of time and could result in the death of young or nest abandonment.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- The NDGF maintains the statewide database of known Bald Eagle nests in cooperation with the USFWS (USFWS March 2009). Potential nesting habitat is surveyed via fixed-wing aircraft in late April/early May on a rotational basis (i.e. a complete statewide aerial survey is not conducted annually). The NDGF requests the public to report nesting Bald Eagles. The majority of nests in non-traditional habitat are reported from the public.

Previous Research or Surveys

- The NDGF participated in the Midwinter Bald Eagle Survey from 1986-2013. The survey was flown around January 10 of each year from Bismarck to Garrison Dam. Anywhere from 2 to 108 Bald Eagles utilizing the Missouri River in winter have been counted in past years. The NDGF discontinued participation in the survey in 2014 due to stable and increasing numbers of Bald Eagles wintering across the state.
- Numerous published reports and gray literature throughout the species range, one of the most studied avian species.

Additional Research or Surveys Needed

- Since the Bald Eagle is increasing in North Dakota, there are no urgent research needs or additional surveys planned. However, demographic information is unknown such as nest success, food habits, or an analysis of non-traditional nesting habitat.

POPULATION AND TREND ESTIMATES

- PIF Global Population Estimate: 300,000
- North Dakota Population Estimate: unknown (total number of adults, sub-adults, and juveniles)
- North Dakota Number of Occupied Nests: ~165: see figure 6.

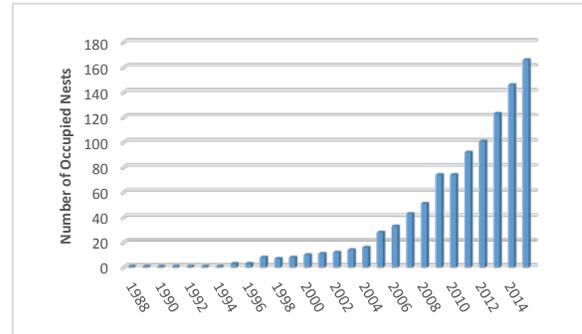


Figure 6. Estimated occupied Bald Eagle nests in North Dakota 1988-2015.

MANAGEMENT RECOMMENDATIONS

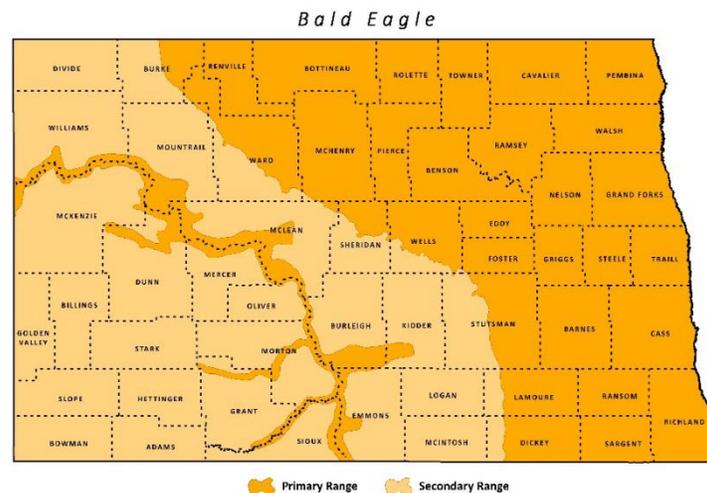
- Minimize impacts to nesting Bald Eagles from development activities (see USFWS 2007).
- Preserve mature stands of tall trees, but ensure regeneration of new trees.
- Utility development should follow the guidance of “Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006” and “Reducing Avian Collisions with Power Lines” including marking power lines and creating an Avian Protection Plan.
- Wind industry companies should collaborate with the American Wind and Wildlife Institute for responsible wind development and follow the USFWS “Eagle Conservation Plan Guidance.”

MONITORING PLANS

Continue to maintain a list and spatial database of known Bald Eagle nest sites.

2005-2015 PROGRESS

The Bald Eagle remains a Level II Species of Conservation Priority. The number of Bald Eagle nests have increased significantly over the past 10-15 years. The Bald Eagle population is currently secure in North Dakota.



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BLACK TERN

Scientific Name: *Chlidonias niger*

Species of Conservation Priority:
Level I

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

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

Abundance: Common to abundant.

Primary Habitat: Shallow wetlands surrounded by grassland.

Federal Status: Migratory Bird.

Reason for Designation: Black Terns are designated as High Concern in the Northern Prairie & Parkland Waterbird Conservation Plan (NPPWCP) and Moderate Concern by Waterbird Conservation for the Americas. Fifty percent of the population breeds in BCR11.



Sandra Johnson

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Black Terns use wetland complexes of shallow wetlands, typically >20 ha, 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 breeding season and abundant nest substrate is important. Large areas of open water used for foraging. Prefers wetlands surrounded by grassland rather than agricultural fields. Nests singly or semi-colonially 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. Or, will occasionally nest on abandoned muskrat houses, deserted nests of other wetland birds, mudflats, sandbars, or artificial platforms. Forage for insects over both land and water. Small fish are also consumed.

Key Areas and Conditions for Black Tern in North Dakota

No specific sites have been identified. Common throughout the Drift Prairie and Missouri Coteau but the presence of this species is highly dependent upon water availability. Wetland complexes are important.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Destruction and/or degradation of wetlands is the greatest threat to Black Terns in North Dakota. Woody vegetation around wetlands negatively affects tern presence.

Other Natural or Manmade Factors

This species is highly insectivorous and pesticides or contaminants may be an issue. Terns may be tolerant of human activity near nesting colonies, as long as colony is not entered. Mortality from collisions with power lines. Expanding oil and gas development in North Dakota increases risk of oilfield contamination of wetland habitat.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- Rocky Mountain Bird Observatory (ND SWG T-40-R) is conducting a statewide inventory of colonial and semi-colonial waterbird populations and identifying key sites for breeding colonies in North Dakota. The Black Tern is one of 29 target species. The project was initiated in March 2014.

Previous Research or Surveys

- Northern Prairie Wildlife Research Center (ND SWG T-3-1 and T-9-R) determined marsh bird distribution in relation to landscape composition in North Dakota. The project was initiated in 2004 and a final report provided in 2008. Black Terns were one of 16 focal species. Terns were 11.0 times more likely to occur at wetlands in the Drift Prairie and 7.6 more likely to occur at wetlands in the Missouri Coteau, than the Red River Valley. The probability that they would occur at a wetland were positively correlated with the percent of wetlands in the landscape and 2.7 more likely to occur on un-manipulated wetlands (Sherfy and Anteau 2008).

- Fair number of published reports and gray literature throughout the species range and in North Dakota.

Additional Research or Surveys Needed

- Determine habitat selection and the role of wetland complexes.
- Determine effective ways to control encroachment of cattails.
- Determine site fidelity and how it is influenced by water conditions.
- Determine the effects of contaminants or insecticides on wetland quality and prey species.

POPULATION AND TREND ESTIMATES

- North American Waterbird Conservation Plan Population Estimate: 100,000 – 500,000 breeders
- NPPWCP BCR11 Population Estimate: unknown
- North Dakota BBS Trend: see figure 7
- Survey-wide BBS Trend 1966-2012: -2.39

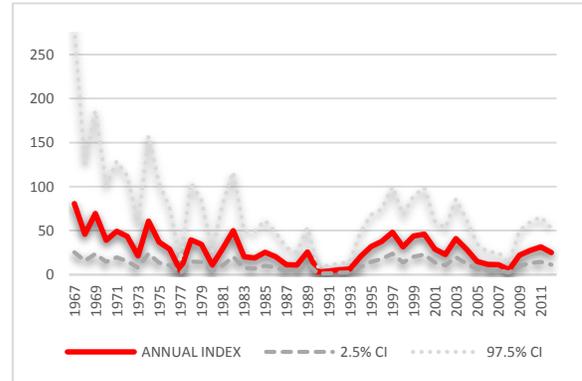


Figure 7. North Dakota Breeding Bird Survey Trend 1967-2012.

MANAGEMENT RECOMMENDATIONS

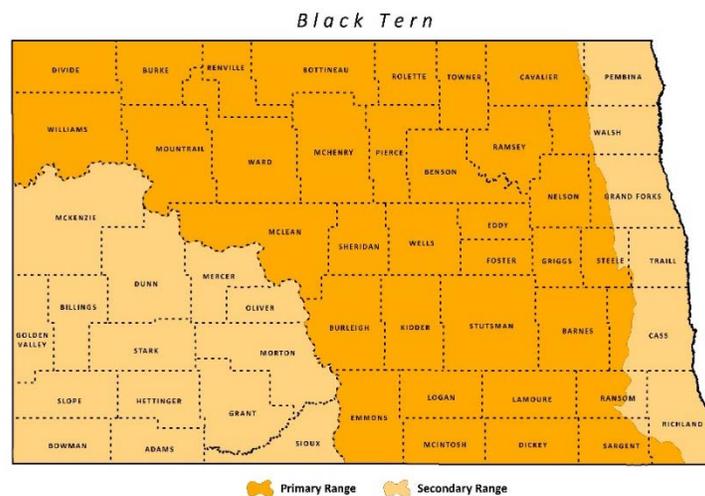
- Maintain wetland complexes.
- Provide wetland complexes with equal proportions of interspersed emergent vegetation and open water.
- Prevent encroachment of woody vegetation around wetlands.
- Conduct management to open cattail-choked wetlands.
- Utility development should follow the guidance of “Reducing Avian Collisions with Power Lines” including marking power lines and creating an Avian Protection Plan.

MONITORING PLANS

The NPPWCP has identified the basic elements of how a regional/continental waterbird monitoring program should be structured. Waterbird monitoring should follow recommendations of the Waterbird Conservation for the Americas and North American Bird Conservation Initiative ‘Opportunities for Improving Avian Monitoring’.

2005-2015 PROGRESS

The Black Tern remains a Level I Species of Conservation Priority. Efforts to identify key sites for breeding areas are underway. Several State Wildlife Grant Projects (T2-9-R, T-18-R, T-27-HM) have contributed to habitat enhancement of wetlands for Black Tern and other wetland dependent birds.



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BLACK-BILLED CUCKOO

Scientific Name: *Coccyzus erythrophthalmus*

Species of Conservation Priority:
Level I

General Description: 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 mid-September. Peak breeding season mid-June to late July.

Abundance: Fairly common to rare.

Primary Habitat: Brushy margins or woodland openings, thickets of small trees and prairie shrubs.

Federal Status: Migratory Bird.

Reason for Designation: Black-billed cuckoos are declining across North America. It is included on the USFWS Bird of Conservation Concern list in Region 6, BCR 11, and 17. Partners in Flight (PIF) identifies the Black-billed Cuckoo as a Regional Concern Species, U.S.-Canada Species of Concern, and a Common Bird in Steep Decline.



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LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

In North Dakota, cuckoos are most likely present in 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.

Key Areas and Conditions for Black-billed Cuckoos in North Dakota

Pembina Hills, Turtle Mountains, wooded hills in the Devils Lake area, wooded stream valleys in the Red River Valley, Sheyenne, James, Mouse, Souris, Knife, Cannonball and Missouri Rivers are probably the most frequented areas.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Destruction and/or degradation of native riparian habitat. Development in wooded areas along major rivers may be limiting cuckoo nesting habitat. Overgrazing of woody draws and other woodlands affects the vegetative structure and composition.

Other Natural or Manmade Factors

Black-billed Cuckoos rely heavily on caterpillars for food and can be especially gregarious during caterpillar outbreaks. Insecticides will reduce prey availability. Some mortality from collisions with structures and communication towers, probably in part due to nocturnal migration behavior.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- Nothing specific to the species in North Dakota.

Previous Research or Surveys

- Little effort has been directed to specific research or surveys for Black-billed Cuckoos in North Dakota.
- A few surveys focused on all woodland or woody draw associated birds in western North Dakota in the early to mid-1980's.
- Fair number of published reports and gray literature throughout the species range.

Additional Research or Surveys Needed

- A survey of the cuckoo along with other riparian or upland deciduous forest nesting species, similar in scope and location to the surveys of the early 1980's, to determine the status of the population and factors affecting the decline of the species.
- Demographic or life history information is lacking, such as spacing, site tenacity, fecundity and mortality, and population structure and regulation.
- Determine the effects of contaminants or pesticide use on prey.

POPULATION AND TREND ESTIMATES

- PIF Global Population Estimate: 870,000
- PIF North American Population Estimate: 870,000
- PIF North Dakota Population Estimate: 30,000
- North Dakota BBS Trend: see figure 8
- Survey-wide BBS Trend 1966-2012: -2.00

MANAGEMENT RECOMMENDATIONS

- Identify native riparian habitats at risk.
- Limit or exclude grazing in riparian areas.
- Choose insecticides with the lowest toxicity to non-target organisms.
- Construction of communication towers should follow the guidance of “Service Interim Guidelines for Recommendations on Communications Tower Siting, Construction, Operation, and Decommissioning” and American Bird Conservancy Collision Program framework.

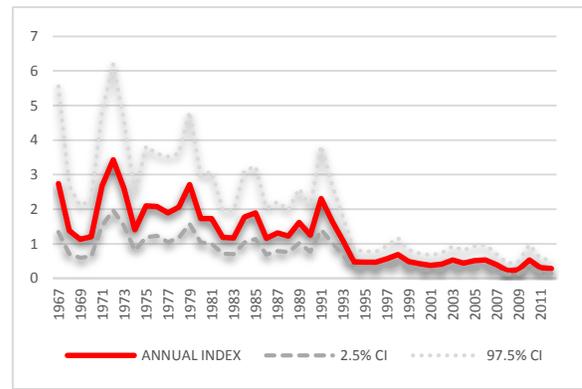


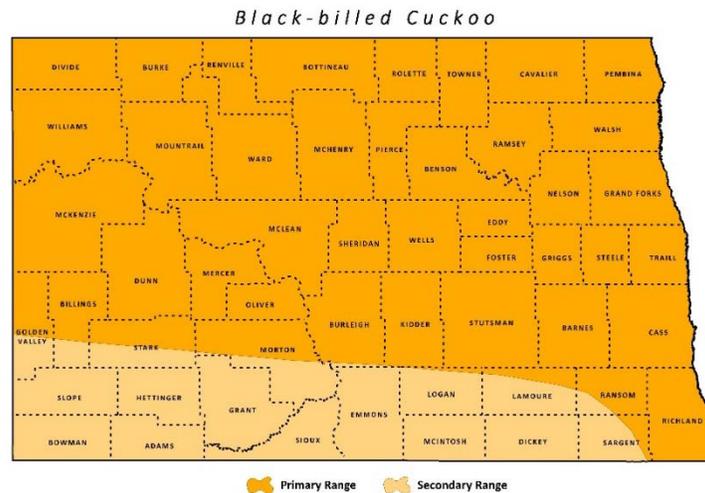
Figure 8. North Dakota Breeding Bird Survey Trend 1967-2012.

MONITORING PLANS

According to the Partners in Flight Landbird Conservation Plan, long-term population trend monitoring such as the Breeding Bird Survey is generally considered adequate, but may not account for some issues (e.g. bias). Ensuring all BBS routes are conducted annually is priority. A monitoring plan specific to Black-billed Cuckoos is not needed at this time, however, the NDGF will continue to monitor BBS trends and the species status.

2005-2015 PROGRESS

The Black-billed Cuckoo remains a Level I Species of Conservation Priority. Several State Wildlife Grant Projects (T2-1-D, T-20-D, and T-42-R) have contributed to habitat enhancement of riparian areas for Black-billed Cuckoo and other woodland dependent birds.



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BOBOLINK

Scientific Name: *Dolichonyx oryzivorus*

Species of Conservation Priority:
Level II

General Description: 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 May to mid-September. Peak breeding season early June to mid-July.

Abundance: Fairly common to abundant.

Primary Habitat: Tall and mixed-grass prairie, hayland, and planted grassland.

Federal Status: Migratory Bird.

Reason for Designation: The Bobolink is experiencing a range-wide decline, although apparently increasing or stable in North Dakota. However, loss of grassland and CRP may cause populations to decline. Partners in Flight (PIF) identifies the Bobolink as a Regional Concern and Stewardship Species, U.S.-Canada Concern and Stewardship Species, and a Common Bird in Steep Decline.



Lara Anderson

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Bobolinks use areas of moderate to tall and dense vegetation, and moderately deep litter. 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 used. In mixed-grass pastures, are positively correlated with percent grass cover, litter depth, density of low-growing shrubs such as snowberry, vegetation density, plant communities dominated by Kentucky bluegrass and native grass. Abundance is negatively correlated with percent clubmoss, bare ground, and communities dominated solely by native grass. Typically avoid areas with woody vegetation. Peak abundance of Bobolinks in a grassland is within 1-3 years post-burn, but decreases after 5 years post-burn. Will not use heavily grazed pastures, but high densities have been found in areas under short-duration grazing versus completely idle areas. May be area sensitive, requiring a minimum of 10-30 ha of prairie. Nest on the ground almost always beneath a large forb. Forages on a variety of seeds and insects.

Key Areas and Conditions for Bobolink in North Dakota

No specific sites have been identified.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Conversion of grassland to cropland, energy development and urban expansion. Degradation of grasslands from invasive plants, woody encroachment, succession, and loss of diversity. CRP provides important breeding habitat and is likely the reason for an increase in Bobolinks in North Dakota since the mid-1990s. It has been predicted if all CRP in North Dakota were converted back to cropland, the number of Bobolinks would be reduced by about 10%. Occurrence declines with increasing tall shrub cover and woodland cover. Open, treeless grasslands are required for maximum probability of occurrence.

Other Natural or Manmade Factors

Nests are occasionally parasitized by brown-headed cowbirds and nest predation is fairly high. Bobolinks may be killed on their wintering grounds where it is considered an agricultural pest. Mortality from collisions with communication towers. Grassland birds avoid habitat within 150 meters of roads and 350 meters of oilfield infrastructure, likely due to anthropogenic disturbance of heavy traffic and/or changes in habitat near oil development.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- Southern Illinois University (ND SWG T-43-R) is studying abundance, productivity and nest survival of grassland nesting birds in different vegetation types. A final report is anticipated in 2016.

Previous Research or Surveys

- University of Montana (ND SWG T-1-R) developed breeding bird models which link population density to local and landscape habitat features in the Prairie Pothole Region of North Dakota. Bobolink was one of 16 grassland bird focal species. The project was initiated in 2002, a final report was provided in 2004

(Naugle 2005), and dissertation in 2007 (Quamen 2007). Further analysis of the data was recently analyzed on 5 study species (Doherty et al. in press). Bobolinks showed avoidance of cropland or selection for grassland at both the landscape and local scales, had higher abundances in exotic grass, and showed positive relationship to visual obstruction.

- Numerous published reports and gray literature on this species throughout its range.

Additional Research or Surveys Needed

- Nothing specific at this time.

POPULATION AND TREND ESTIMATES

- PIF Global Population Estimate: 8,000,000
- PIF North American Population Estimate: 8,000,000
- PIF North Dakota Population Estimate: 1,800,00
- North Dakota BBS Trend: see figure 9
- Survey-wide BBS Trend 1966-2012: -2.17

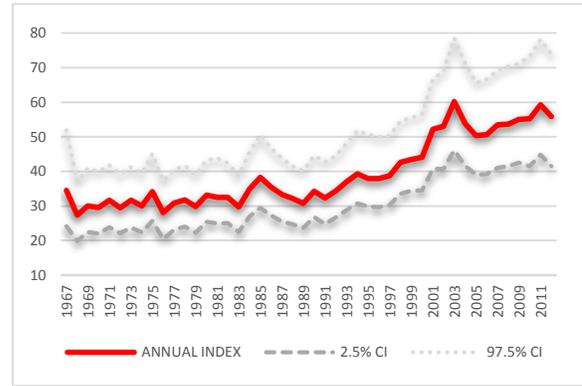


Figure 9. North Dakota Breeding Bird Survey Trend 1967-2012.

MANAGEMENT RECOMMENDATIONS

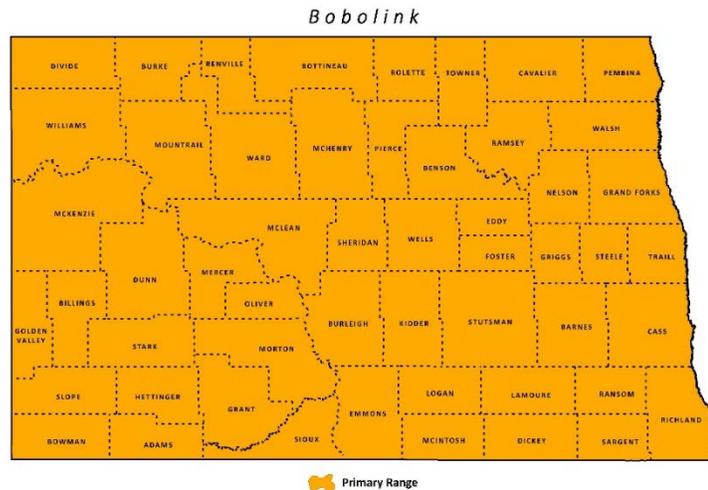
- Protect large tracts of grassland, particularly native prairie.
- Prevent encroachment of woody vegetation in grasslands.
- Burn grassland every 2-4 years to prevent encroachment of woody vegetation and remove deep litter.
- Encourage vegetative diversity.
- Delay mowing until July 15.
- Provide hayland areas and mow as late as possible. High densities of Bobolinks have been found using hayland mowed the previous year.
- Use native grasses when replanting or restoring grassland.
- Construction of communication towers should follow the guidance of “Service Interim Guidelines for Recommendations on Communications Tower Siting, Construction, Operation, and Decommissioning” and American Bird Conservancy Collision Program framework.

MONITORING PLANS

According to the Partners in Flight Landbird Conservation Plan, long-term population trend monitoring such as the Breeding Bird Survey is generally considered adequate, but may not account for some issues (e.g. bias). Ensuring all BBS routes are conducted annually is priority. Future monitoring proposals should follow recommendations North American Bird Conservation Initiative ‘Opportunities for Improving Avian Monitoring’.

2005-2015 PROGRESS

The Bobolink remains a Level II Species of Conservation Priority. Several State Wildlife Grant Projects (T2-11-HM, T-18-R, T-20-D, T-21-D, T-22-HM, T-23-HM, T-25-HM, T-28-L, T-37-D) have contributed to habitat enhancement grasslands for Bobolink and other grassland dependent birds.



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BREWER'S SPARROW

Scientific Name: *Spizella breweri*

Species of Conservation Priority:
Level III

General Description: 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 May to mid-September. Breeding season mid-May to late July.

Abundance: Uncommon.

Primary Habitat: Big sagebrush patches within shortgrass prairie.

Federal Status: Migratory Bird.

Reason for Designation: A sagebrush obligate species, Brewer's Sparrow is showing a survey-wide decline. It is included on the National USFWS Birds of Conservation Concern list and BCR 17. Partners in Flight (PIF) identifies the Brewer's Sparrow as a Regional Concern Species and a Common Bird in Steep Decline. It is a peripheral species in North Dakota.



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LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

A sagebrush obligate, Brewer's Sparrow is closely associated with shrub communities dominated by big sagebrush. Sagebrush grasslands with >10% average shrub cover and average shrub height of 0.5-1.5 m are preferred. Not present in areas where shrub cover decreases below 3-8% average. May also occasionally occur in juniper woodlands. The nest is located in sagebrush or other shrubs. 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.

Key Areas and Conditions for Brewer's Sparrow in North Dakota

No specific sites have been identified, but the species is likely to occur only in western Slope and Bowman counties.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Loss and/or 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.

Other Natural or Manmade Factors

Uncommon host of brown-headed cowbirds. No information available on the effect of pesticides. Brewer's Sparrow abundance decreased significantly with increasing well density/km² in Wyoming (Gilbert and Chalfoun 2011).

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- There is currently nothing specific to the species in North Dakota.

Previous Research or Surveys

- Research into sagebrush steppe habitats and associated bird species on the edge of the sagebrush ecosystem was completed in 2004. The study characterized the vegetation and avian associations in the transitional zones of North and South Dakota. A total of 15 Brewer's Sparrows were counted in North Dakota during two summers of field work, or were recorded in 7.4% of the sites surveyed. They were detected on sites with a higher percentage of sagebrush cover and shrub density (Lewis 2004).
- Little effort has been applied to research or surveys specifically for Brewer's Sparrow in North Dakota.
- Numerous published reports and gray literature on this species throughout its range.

Additional Research or Surveys Needed

- Periodic monitoring to gather vegetation and land use trends in the sagebrush transition zone may be needed to identify threats and prevent loss of habitat.

POPULATION AND TREND ESTIMATES

- PIF Global Population Estimate: 13,000,000
- PIF North American Population Estimate: 13,000,000
- PIF North Dakota Population Estimate: unknown, <1,000
- North Dakota BBS Trend: data insufficient
- Survey-wide BBS Trend 1966-2012: -0.95

MANAGEMENT RECOMMENDATIONS

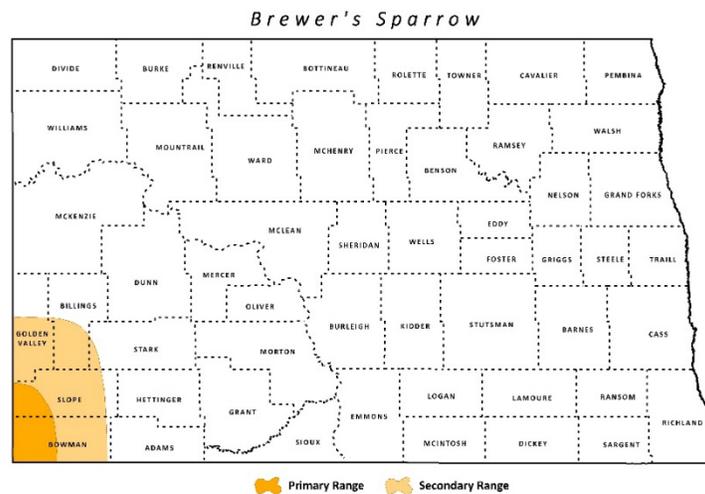
- Identify and protect remaining intact sagebrush habitats.
- Maintain sagebrush communities.
- Avoid complete removal of sagebrush, but extremely dense sagebrush stands (>50%) may need to be thinned.
- Avoid burning, as historically sagebrush (a slow regenerator) burned only every 60-100 years.
- Avoid pesticide use in sagebrush habitats, or delay spraying until September.

MONITORING PLANS

According to the Partners in Flight Landbird Conservation Plan, long-term population trend monitoring such as the Breeding Bird Survey is generally considered adequate, but may not account for some issues (e.g. bias). However, few BBS routes in North Dakota intersect with Brewer's Sparrow range. Future monitoring proposals should follow recommendations North American Bird Conservation Initiative 'Opportunities for Improving Avian Monitoring'.

2005-2015 PROGRESS

The Brewer's Sparrow remains a Level III Species of Conservation Priority.



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BURROWING OWL

Scientific Name: *Athene cunicularia*

Species of Conservation Priority:
Level II

General Description: 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.

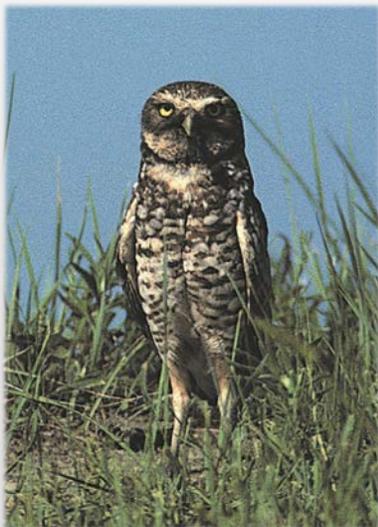
Status: Occurs in North Dakota from April to September. Peak breeding season early May to mid-August.

Abundance: Uncommon.

Primary Habitat: Shortgrass or grazed mixed-grass prairie with burrows dug by mammals present.

Federal Status: Migratory Bird.

Reason for Designation: Burrowing Owls once occurred nearly statewide. Currently are found primarily south and west of the Missouri River because of declines in burrowing mammal populations east of the Missouri River. It is included on the USFWS Bird of Conservation Concern list in Region 6 BCR and 17. Partners in Flight (PIF) identifies the Burrowing Owl as a Regional Concern Species.



NDGF

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred 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. Sometimes concentrate nests at the edge of colonies, presumably because of increased perch availability, high insect populations, and close proximity to foraging areas. Also may use badger, woodchuck, skunk, fox, and coyote burrows. Feed primarily on arthropods and small mammals such as voles.

Key Areas and Conditions for Burrowing Owl in North Dakota

No specific sites have been identified. Black-tailed prairie dog towns are key areas, which are concentrated in two populations; Sioux, southern Grant, and southern Morton counties (i.e. Standing Rock Reservation area), and the Little Missouri National Grasslands.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Destruction and/or degradation of native prairie. Removal of prairie dogs from colonies causes a deterioration of burrows and denser, taller vegetation. Burrowing Owls may discontinue use of abandoned towns due to the unsuitable habitat. Habitat fragmentation may also allow predators to more easily find nests and mortality is highest during the post fledgling period.

Other Natural or Manmade Factors

Burrowing Owls use shredded horse or cow manure to line nests. If this is not available, nest success has shown to be lower due to depredation of nests. The number of nonresidents coming to North Dakota to shoot prairie dogs is increasing, however, there is no data to suggest shooting has a significant impact on prairie dog populations or that a substantial number of Burrowing Owls are mistakenly or even deliberately being shot. The effects of pesticide use on prairie dog towns and the subsequent effect on owls is unclear, but believed to have negative impacts.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- Nothing specific to the species in North Dakota.

Previous Research or Surveys

- Northern Prairie Wildlife Research Center (ND SWG T-3-1) surveyed the distribution of Richardson's ground squirrel colonies and use by Burrowing Owls in North Dakota. The project was initiated in 2003 and a final report provided in 2005. Burrowing Owls were found in only 2 (1.7%) of townships surveyed (Sovada et al. 2005).
- Nest site selection, productivity, survival and movements of Burrowing Owls have been examined on the Little Missouri National Grasslands (Restani 2001, Davis and Restani 2006).
- From 1994-99, Burrowing Owls were searched for intensively and incidental sightings were collected. Results indicate the

Burrowing Owl range in North Dakota is contracting to south and west of the Missouri River.

- A few reports on the food habits or nesting ecology have been conducted in North Dakota.
- Numerous published reports and gray literature on this species throughout its range.

Additional Research or Surveys Needed

- Identify traditional and consistent nesting sites.
- Determine the effects of contaminants or insecticides on prey species.
- Further explore landscape features affecting nest site selection.

POPULATION AND TREND ESTIMATES

- PIF Global Population Estimate: 2,000,000
- PIF North American Population Estimate: 700,000
- PIF North Dakota Population Estimate: 5,000
- North Dakota BBS Trend: see figure 10
- Survey-wide BBS Trend 1966-2012: -1.11

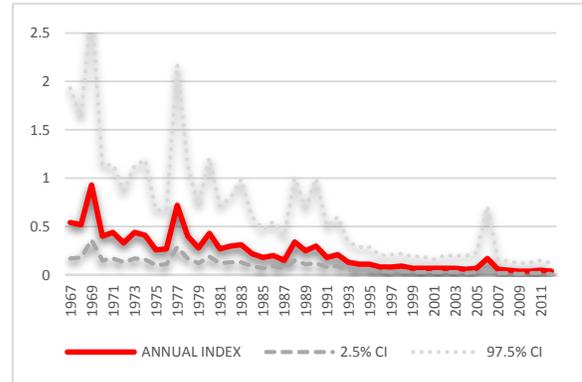


Figure 10. North Dakota Breeding Bird Survey Trend 1967-2012.

MANAGEMENT RECOMMENDATIONS

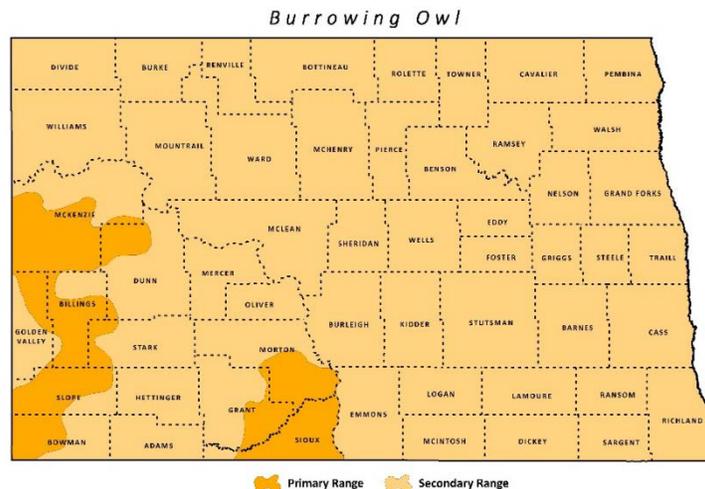
- Preserve traditional nesting sites.
- Maintain large, contiguous areas of native grassland and treeless plains.
- Provide a mosaic of tall grass for foraging, short grass for nesting and roosting.
- Artificial nest structures may be used where burrows are scarce.
- Allow moderate to intense grazing in areas that support tall vegetation.
- Choose insecticides with the lowest toxicity to non-target organisms.
- If necessary, restrict the timing of lethal control of burrowing mammals to avoid the period when Burrowing Owls are nesting.
- Maintain abandoned prairie dog colonies at short vegetation <8 cm with mowing or grazing.
- Implement rotational grazing to increase prey populations.

MONITORING PLANS

According to the Partners in Flight Landbird Conservation Plan, long-term population trend monitoring such as the Breeding Bird Survey is generally considered adequate, but may not account for some issues (e.g. bias). However, few BBS routes intersect with Burrowing Owl habitat. The NDGF will continue to maintain a list of known Burrowing Owl nest sites.

2005-2015 PROGRESS

The Burrowing Owl remains a Level II Species of Conservation Priority. A nest site spatial database has been developed and is being used to minimize impacts to nesting owls.



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CANVASBACK

Scientific Name: *Aythya valisineria*

Species of Conservation Priority:
Level II

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

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

Abundance: Fairly common to abundant.

Primary Habitat: Deep wetlands, particularly semi-permanent wetlands with emergent cover.

Federal Status: Migratory Bird.

Reason for Designation: Identified as a species of Moderately High Continental Priority in the North American Waterfowl Management Plan.



Lara Anderson

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred 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 wigeongrass are especially important as migration stopover sites in North Dakota.

Key Areas and Conditions for Canvasback in North Dakota

No specific sites have been identified at this time.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Wetland destruction and/or degradation reduces available nesting habitat and could result in increased predation.

Other Natural or Manmade Factors

The occurrence of lead poisoning in this species is reduced since the ban on lead shot for waterfowl. Nests are parasitized by redheads. Over harvest could reduce the population, but conservative hunting regulations are in place. Human disturbance (e.g. recreational boaters) can cause birds to unnecessarily disperse from resting grounds. Mortality from collisions with power lines and wind turbines. Expanding oil and gas development in North Dakota may impact Canvasback and there is increasing risk of oilfield contamination to wetlands.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- Traditional waterfowl survey efforts occur annually.
- The effects of oil and gas development on waterfowl and waterfowl production is being studied in North Dakota.
- There is currently nothing specific to the species in North Dakota.

Previous Research or Surveys

- The Canvasback is one of the most studied ducks in North America. Numerous published reports and gray literature on this species throughout its range and in North Dakota.

Additional Research or Surveys Needed

- Contact the North Dakota Game and Fish Department Waterfowl Biologists for most current information needs.

POPULATION AND TREND ESTIMATES

- 2014 Waterfowl Breeding Population: 700,000 ± 0.05 million, see figure 11
- North American Waterfowl Management Plan Objective : 540,000

MANAGEMENT RECOMMENDATIONS

- Preserve semi-permanent wetlands and wetland complexes.
- Restore hydrology and vegetation to degraded wetlands.
- Leave grassed buffer strips around wetlands and waterways to prevent erosion and runoff into wetlands.
- Stocking fish in shallow wetlands is detrimental to waterfowl production.
- Utility development should follow the guidance of “Reducing Avian Collisions with Power Lines” including marking power lines and creating an Avian Protection Plan.
- Wind industry companies should collaborate with the American Wind and Wildlife Institute for responsible wind development.

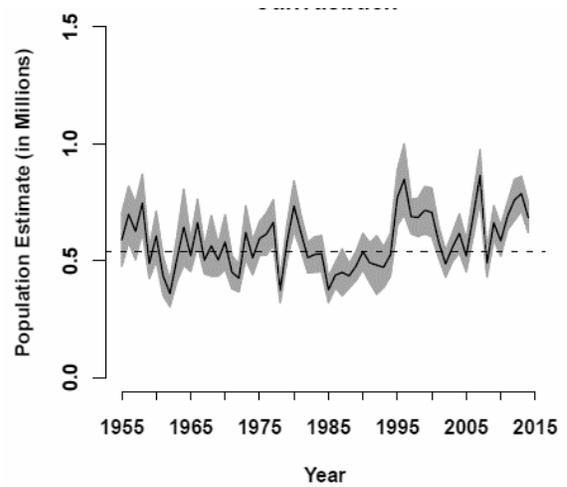


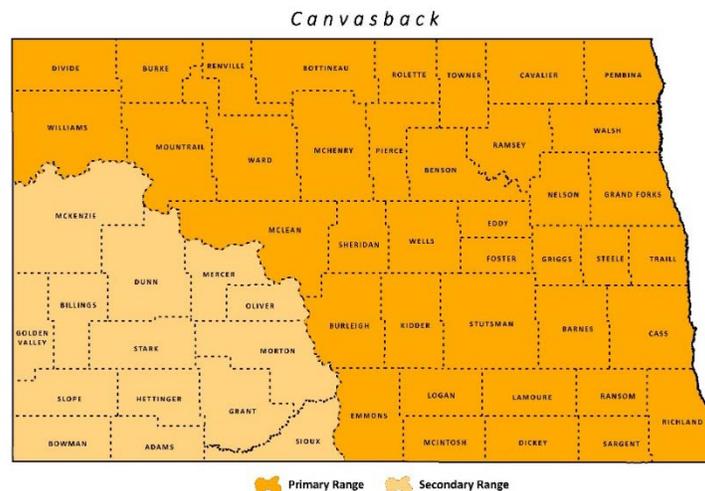
Figure 11. North American combined breeding population estimate of Canvasback, 90% confidence intervals, and NAWMP population goals (dashed line) 1967-2014. Data from the U.S. Fish and Wildlife Service waterfowl breeding population survey.

MONITORING PLANS

For nearly 50 years, the May Waterfowl Breeding Population and Habitat Survey have been in place. In addition, four-square mile and duck brood counts are conducted annually by the U.S. Fish and Wildlife Service. The North Dakota Game and Fish Department also conducts annual mid-July duck brood index surveys. At this time, there appears to be no additional monitoring needs.

2005-2015 PROGRESS

The Canvasback remains a Level II Species of Conservation Priority. Several State Wildlife Grant Projects (T2-9-R, T-18-R, T-27-HM) have contributed to habitat enhancement of wetlands for Canvasback and other wetland dependent birds.



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CHESTNUT-COLLARED LONGSPUR

Scientific Name: *Calcarius ornatus*

Species of Conservation Priority:
Level I

General Description: L 6", WS 10.5", .67 oz. Males have a chestnut collar, black belly, yellow throat, black and white on top of head, and conspicuous black triangle on a white tail. Females are grayish-buff overall with some streaking.

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

Abundance: Abundant to common.

Primary Habitat: Grazed or hayed mixed-grass prairie, shortgrass prairie.

Federal Status: Migratory Bird.

Reason for Designation: This species was very abundant in pre-settlement times. Although still rather common in North Dakota, loss of native prairie habitat continues to reduce once great numbers. It is included on the USFWS Birds of Conservation Concern list in Region 6, BCR 11 and 17 Partners in Flight (PIF) identifies the Chestnut-collared Longspur as a Regional Concern and Stewardship Species, U.S.-Canada Concern and Stewardship Species, and a Tri-national Concern Species.



Sandra Johnson

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Chestnut-collared Longspurs have been described as a native prairie specialist. Level to rolling, open, arid, mixed-grass and shortgrass prairie is utilized. They avoid very shrubby areas and areas of dense litter accumulation. Native pasture with <20-30 cm vegetation height is preferred, but hayland is also used. Idle grassland is rarely used. Positively associated with percent clubmoss cover, percent bare ground, and plant communities dominated by native grass. Negatively associated with vegetation density, litter depth, density of low-growing shrubs, and plant communities dominated by shrubs and introduced grass such as Kentucky bluegrass. Grazed or mowed areas are typically preferred over undisturbed because of the short grass it provides, but overgrazing can be detrimental. Nest on the ground, often by a cowpie or under a clump of grass. Forage on the ground for seeds, insects and spiders.

Key Areas and Conditions for Chestnut-collared Longspur in North Dakota

No specific sites have been identified. Once common throughout state except for Red River Valley.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Conversion of grassland to cropland, energy development and urban expansion. Degradation of grasslands from invasive plants, woody encroachment, succession, and loss of diversity. Grazing, burning, or mowing is needed to provide short grass and remove excess litter. Deemed woodland-sensitive, occurrence declines with increasing tall shrub (>1m) cover. Increased woodland cover and brush cover negatively affects this species. Increasing loss of grassland on the wintering grounds in the Chihuahuan Desert may be contributing to the decline of Chestnut-collared Longspurs.

Other Natural or Manmade Factors

Parasitism by brown-headed cowbirds occurs but at lower rates than other grassland birds. Nest depredation is the most important factor affecting nest success, followed by weather. Pesticide acute toxicity may be a potential contributor to declines of grassland birds. Grassland birds avoid habitat within 150 meters of roads and 350 meters of oilfield infrastructure, likely due to anthropogenic disturbance of heavy traffic and/or changes in habitat near oil development.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- Rocky Mountain Bird Observatory (ND SWG T-46-R) is estimating demographic rates of Chestnut-collared Longspur and other grassland birds in western North Dakota. A final report is anticipated in 2018.

Previous Research or Surveys

- University of Montana (ND SWG T-1-R) developed breeding bird models which link population density to local and landscape habitat features in the Prairie Pothole Region of North Dakota. Chestnut-collared Longspur was one of 16 grassland bird focal species. The project was initiated in 2002, a final report was

provided in 2004 (Naugle 2005), and dissertation in 2007 (Quamen 2007). Further analysis of the data was recently analyzed on 5 study species (Doherty et al. in press). Chestnut-collared Longspurs showed avoidance of cropland or selection for grassland at both the landscape and local scales, avoidance for exotic grasses, and showed negative relationship to visual obstruction.

- Little effort has been applied to research or surveys specifically for Chestnut-collared Longspurs in North Dakota. Several studies which include longspurs and other grassland associated species have taken place in North Dakota. Examples include the benefits of CRP to grassland nesting passerines and the effects of various management practices.
- Fair number of published reports and gray literature on this species throughout its range.

Additional Research or Surveys Needed

- Determine the effect of Kentucky bluegrass invasion on Chestnut-collared Longspur presence/abundance.

POPULATION AND TREND ESTIMATES

- PIF Global Population Estimate: 3,000,000
- PIF North American Population Estimate: 3,000,000
- PIF North Dakota Population Estimate: 900,000
- North Dakota BBS Trend: see figure 12
- Survey-wide BBS Trend 1966-2012: -4.23

MANAGEMENT RECOMMENDATIONS

- Protect or create large tracts of grassland, particularly native prairie.
- Prevent encroachment of woody vegetation in grasslands.
- Encourage vegetative diversity.
- Avoid managing for idle, dense vegetation.
- Practice rotational burning: intervals of 3-4 years in tallgrass prairie, 6 years in mixed-grass prairie, and 5-10 years in shortgrass prairie.
- Delay mowing until July 15.
- Use native grasses when replanting or restoring grassland.

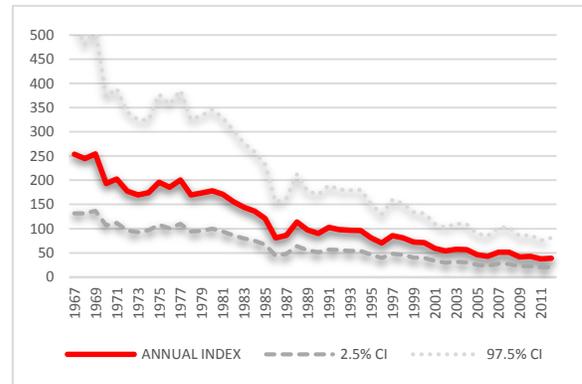


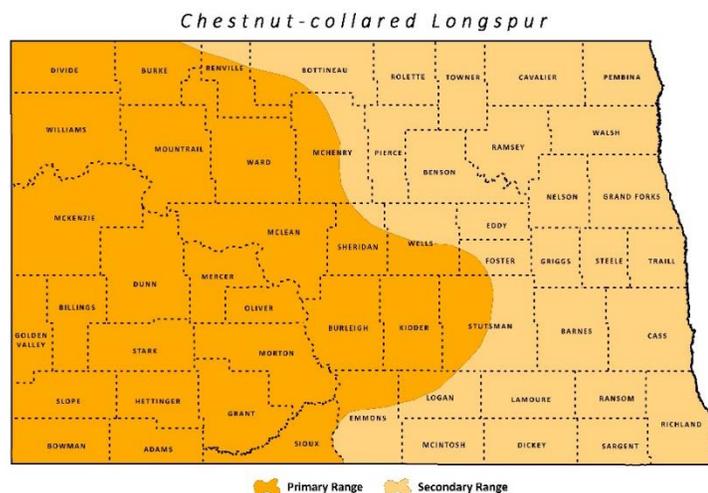
Figure 12. North Dakota Breeding Bird Survey Trend 1967-2012.

MONITORING PLANS

According to the Partners in Flight Landbird Conservation Plan, long-term population trend monitoring such as the Breeding Bird Survey is generally considered adequate, but may not account for some issues (e.g. bias). Ensuring all BBS routes are conducted annually is priority. Future monitoring proposals should follow recommendations North American Bird Conservation Initiative ‘Opportunities for Improving Avian Monitoring’.

2005-2015 PROGRESS

The Chestnut-collared Longspur remains a Level I Species of Conservation Priority. Several State Wildlife Grant Projects (T2-11-HM, T-18-R, T-20-D, T-21-D, T-22-HM, T-23-HM, T-25-HM, T-28-L, T-37-D) have contributed to habitat enhancement grasslands for Chestnut-collared Longspurs and other grassland dependent birds.



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DICKCISSEL

Scientific Name: *Spiza americana*

Species of Conservation Priority:
Level II

General Description: L 6.25", WS 9.75", 0.95 oz. Yellow breast, rufous shoulders, and a distinct black "V" on throat.

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

Abundance: Fairly common to uncommon.

Primary Habitat: Alfalfa, sweet clover, hayland and other brushy grasslands.

Federal Status: Migratory Bird.

Reason for Designation: Threats may occur primarily on wintering grounds in South America where millions of birds are thought to die each year due to poisoning on agricultural lands. It is included on the National USFWS Birds of Conservation Concern list, and also in BCR 11 and 17. Partners in Flight (PIF) identifies the Dickcissel as a Regional Concern Species.



USFWS

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Dickcissels use a variety of grassland habitats with dense, moderate to tall vegetation and moderate litter depth. Old fields, hayfields, fencerows, hedgerows, road rights-of-way, CRP, DNC, or moderately grazed and idle prairie are utilized. Forbs also required for perching, nesting cover, and possibly increased invertebrate abundance. Nests are most often built above ground in tall grasses, forbs, shrubs, or trees but may also nest on the ground. Forages on the ground for seeds and insects.

Key Areas and Conditions for Dickcissel in North Dakota

No specific sites have been identified. The Dickcissel is semi-nomadic and its distribution and abundance varies annually in North Dakota.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

The lack of burning, mowing, or grazing can affect suitable Dickcissel habitat by allowing for secondary succession. CRP is an important breeding habitat. It has been predicted if all CRP in North Dakota were converted to cropland, the number of Dickcissels would be reduced by about 17%.

Other Natural or Manmade Factors

Frequently and intensively parasitized by brown-headed cowbirds. In their wintering range of Venezuela, Dickcissels are poisoned when feeding on agricultural fields. Roosting birds are illegally sprayed with organophosphate and organochlorine pesticides, causing massive mortality. Some mortality from collisions with communication towers.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- Currently nothing specific to the species in North Dakota.

Previous Research or Surveys

- University of Montana (ND SWG T-1-R) developed breeding bird models which link population density to local and landscape habitat features in the Prairie Pothole Region of North Dakota. Dickcissel was one of 16 grassland bird focal species. The project was initiated in 2002, a final report was provided in 2004 and dissertation in 2007. Density of Dickcissels was 3-5 times greater in hayland than grassland, and Dickcissels increased in abundance following tree removal from grasslands. (Naugle 2005, Quamen 2007).
- Little effort has been applied to research or surveys specifically for Dickcissels in North Dakota. Several studies which include Dickcissels and other grassland or shrubland associated species have taken place in North Dakota. Examples include the benefits of CRP to grassland nesting passerines, and the effects of various management practices.
- Numerous published reports and gray literature on this species throughout its range.

Additional Research or Surveys Needed

- Determine the effects of contaminants or insecticides on prey species.

POPULATION AND TREND ESTIMATES

- PIF Global Population Estimate: 20,000,000
- PIF North American Population Estimate: 20,000,000
- PIF North Dakota Population Estimate: 170,000
- North Dakota BBS Trend: see figure 13
- Survey-wide BBS Trend 1966-2012: -0.55

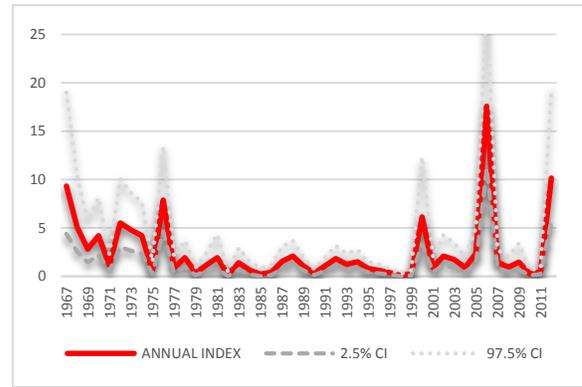


Figure 13. North Dakota Breeding Bird Survey Trend 1967-2012.

MANAGEMENT RECOMMENDATIONS

- Protect and maintain grasslands.
- Minimize disturbance to suitable habitat during nesting season.
- Allow litter to accumulate, for example, burn CRP fields less frequently (every 3 years).
- Avoid simultaneous disturbance at the same site (i.e. grazing and burning or grazing and haying during the same year).
- Establish grassy filter strips along fields and existing edges.
- Burn or mow grasslands on a 3-5 year rotational basis.
- Remove trees from grassland, do not establish shelterbelts in grassland.
- Delay mowing until after peak nesting period but do not mow later than mid-September so vegetation can recover.
- Allow retired agricultural fields to undergo secondary succession, however, when succession advances to the point unsuitable for Dickcissels, implement burning or grazing.
- Construction of communication towers should follow the guidance of “Service Interim Guidelines for Recommendations on Communications Tower Siting, Construction, Operation, and Decommissioning” and American Bird Conservancy Collision Program framework.

MONITORING PLANS

According to the Partners in Flight Landbird Conservation Plan, long-term population trend monitoring such as the Breeding Bird Survey is generally considered adequate, but may not account for some issues (e.g. bias). Ensuring all BBS routes are conducted annually is priority. Future monitoring proposals should follow recommendations North American Bird Conservation Initiative ‘Opportunities for Improving Avian Monitoring’.

2005-2015 PROGRESS

The Dickcissel remains a Level II Species of Conservation Priority. Several State Wildlife Grant Projects (T2-11-HM, T-18-R, T-20-D, T-21-D, T-22-HM, T-23-HM, T-25-HM, T-28-L, T-37-D) have contributed to habitat enhancement grasslands for Dickcissel and other grassland dependent birds.



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FERRUGINOUS HAWK

Scientific Name: *Buteo regalis*

Species of Conservation Priority:
Level I

General Description: 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.

Abundance: Fairly common to uncommon.

Primary Habitat: Large tracts of native prairie.

Federal Status: Migratory Bird.

Reason for Designation: Once the most common hawk in North Dakota, the Ferruginous Hawk is vanishing from historical nesting areas. It is included on the USFWS Birds of Conservation Concern list in Region 6 and BCR 17. Partners in Flight (PIF) identifies the Ferruginous Hawk as a Regional Concern and Stewardship Species, and a U.S.-Canada Stewardship Species.



Sandra Johnson

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred 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 located 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 black-tailed prairie dogs, Richardson's ground squirrels, and rabbits. Birds are a small percentage of their diet and are fed mostly to fledglings.

Key Areas and Conditions for Ferruginous Hawk in North Dakota

The Missouri Coteau and far southwestern North Dakota may hold the highest densities of Ferruginous Hawks. Kidder County contains key habitat and possibly the greatest population of Ferruginous Hawks in North Dakota. In western North Dakota, black-tailed prairie dog towns may also play a key role in maintaining a viable population of Ferruginous Hawks.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Conversion of grassland to cropland, energy development and urban expansion. Degradation of grasslands from invasive plants, woody encroachment, succession, and loss of diversity. Agricultural growth has limited Ferruginous Hawk distribution to areas of uncultivated land. The loss of prairie dog 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.

Other Natural or Manmade Factors

This species is extremely sensitive to human disturbance, will avoid nesting within 0.7 km of occupied buildings, and may occasionally be illegally killed. Disturbance of nest sites near energy development activities may reduce productivity or cause nest abandonment. Some mortality from collisions with power lines or wind turbines, or electrocution. Pesticides do not appear to be a serious threat, although illegal use of poison such as strychnine for control of ground squirrels or prairie dogs could pose a threat.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- South Dakota State University (ND SWG T-36-R) is determining breeding ecology of Ferruginous Hawks in south-central North Dakota (Grovenburg 2005).

Previous Research or Surveys

- University of Oklahoma (ND SWG T-30-R) documented breeding ecology of hawks in relation to energy extraction activities in western North Dakota. The project was initiated in 2011 and a final report was provided in 2012. The rate of nest re-use between years was 10%, although sample size was small (n=10 nests) (Wiggins et al. 2012).
- St. Cloud State University (ND SWG T-30-R) documented basic aspects of Ferruginous Hawk ecology in North Dakota. The

project was initiated in 2004 and a final report/thesis was provided in 2006. Ferruginous Hawks at the landscape scale were negatively associated with fragmentation, cropland, and woodland (McCarthy 2006).

- Gilmer and Stewart (1983) studied ferruginous populations and habitat use in North Dakota from 1977 to 1979. Of the 629 occupied nest sites visited, most (63.6%) were in trees and on the ground (20.9%). Nests on power line towers (8.0%) produced the highest nest success (86.7%). Richardson’s ground squirrel was the most common prey (65.9%). Mean number of young fledged per nest was highest in ground nests (2.8).
- Lokemoen and Duebbert (1976) studied Ferruginous Hawk nesting ecology and raptor populations in northern South Dakota in 1973 and 1974. Nests were found on the ground where there were large tracts of high quality prairie, on haystacks, and in trees of cultivated and prairie sites. The most common prey was Richardson’s ground squirrel (96%). Nest success was 63% and an average of 1.5 young was fledged.
- Numerous published reports and gray literature on this species throughout its range.

Additional Research or Surveys Needed

- Explore the role of jackrabbits or other primary prey species on population fluctuations of Ferruginous Hawks.

POPULATION AND TREND ESTIMATES

- PIF Global Population Estimate: 80,000
- PIF North American Population Estimate: 80,000
- PIF North Dakota Population Estimate: 5,000
- Survey-wide BBS Trend 1966-2012: 1.06

MANAGEMENT RECOMMENDATIONS

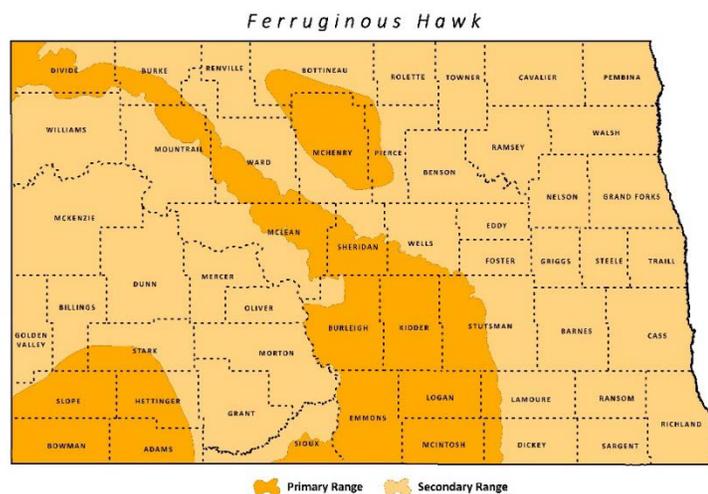
- Protect large tracts of native prairie.
- Do not disturb nests from 15 March to 15 July
- When converting tree communities to grassland, leave a few individual trees or mosaic of trees.
- Improve or maintain key prey species, i.e. Richardson’s ground squirrel abundance.
- Utility development should follow the guidance of “Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006” and “Reducing Avian Collisions with Power Lines” including marking power lines and creating an Avian Protection Plan.
- Wind industry companies should collaborate with the American Wind and Wildlife Institute for responsible wind development.

MONITORING PLANS

According to the Partners in Flight Landbird Conservation Plan, long-term population trend monitoring such as the Breeding Bird Survey is generally considered adequate, but some issues may not have been accounted for (e.g. bias). Ensuring all BBS routes are conducted annually is priority. Monitoring plans should follow recommendations of the North American Bird Conservation Initiative ‘Opportunities for Improving Avian Monitoring’.

2005-2015 PROGRESS

The Ferruginous Hawk remains a Level I Species of Conservation Priority. Several State Wildlife Grant Projects (T2-11-HM, T-18-R, T-20-D, T-21-D, T-22-HM, T-23-HM, T-25-HM, T-28-L, T-37-D) have contributed to habitat enhancement grasslands for Ferruginous Hawk and other grassland dependent birds. A nest site spatial database has been developed and is being used to minimize impacts to nesting hawks.



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FRANKLIN'S GULL

Scientific Name: *Leucophaeus pipixcan*

Species of Conservation Priority:
Level I

General Description: 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 April to October. Peak breeding season occurs from late May to mid-July.

Abundance: Common to abundant.

Primary Habitat: Large wetlands with semi-open emergent cover, often feeds in cultivated agricultural fields.

Federal Status: Migratory Bird.

Reason for Designation: North Dakota is host to several large colonies. Roughly 1/3 of the entire population nests in the Prairie Pothole Region. The species is designated as High Concern in the Northern Prairie & Parkland Waterbird Conservation Plan (NPPWCP) and Moderate Concern by Waterbird Conservation for the Americas.



Sandra Johnson

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Nesting colonies occur in extensive prairie wetlands with cattail, bulrush, or other emergent vegetation. 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. Forage over water or in agricultural fields for flying insects, grains/seeds, dragonflies, earthworms, grasshoppers, and other matter.

Key Areas and Conditions for Franklin's Gull in North Dakota

Lake Alice National Wildlife Refuge near Devils Lake in western Ramsey County hosted a colony of nearly 17,000 pairs in 1999 and 25,000 pairs in 2000 (Brice 2003). This refuge is one of four major reproduction sites for Franklin's Gull in North America; J. Clark Saylor NWR is another of the four. Other key breeding colonies in North Dakota include Beaver Lake Waterfowl Production Area, Burke County; Rush Lake Waterfowl Production Area, Pierce County; and McHugh Slough, Nelson County.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Destruction and/or degradation of wetlands are major factors affecting Franklin's Gulls.

Other Natural or Manmade Factors

Rather susceptible to botulism outbreaks. The effect of certain agricultural pesticides on this species is unknown. Franklin's Gulls are sensitive to human disturbance and could abandon a colony if excessive disturbance occurs, particularly during the pre-nesting period. High mortality from collisions power lines. Expanding oil and gas development in North Dakota increases risk of oilfield contamination of wetland habitat.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- Rocky Mountain Bird Observatory (ND SWG T-40-R) is conducting a statewide inventory of colonial and semi-colonial waterbird populations and identifying key sites for breeding colonies in North Dakota. The Franklin's Gull is one of 29 target species. The project was initiated in March 2014.

Previous Research or Surveys

- University of North Dakota and North Dakota State University (ND SWG T2-4-R) determined relationships among landscape composition, nesting density, chick condition, and adult condition and reproductive success in Franklin's Gull. The project was initiated in April 2009 and continued through June 2012.
 - Clark and Reed (2012) examined seasonal interactions between photoperiod and maternal effects determine offspring phenotype. They suggest "differences in photoperiod resulting from earlier nesting or from shifts in habitat across latitudes can alter avian embryonic development and size at hatching, which is an unexplored consequence of climate change."
 - Krmpotich (2012) completed a thesis on the phylogeography and habitat associations of Franklin's Gulls. Franklin's Gulls in the breeding range of the United States are a panmictic population because of high levels of genetic variation. Habitat use depends on multiple variables, suggesting wetland complexes are key to persistence of nesting colonies.
 - Weissenfluh (2011) completed a thesis on the seasonal variation in physiological condition of adult Franklin's Gull. Physiological condition declined across the breeding season and suggested two hypotheses 1) timing of nesting has significant impact on the physiological condition and 2) birds in poorer condition initiate breeding later in the season. Climate change may further affect the physiological condition of nesting adults.

- Brice (2003) conducted a study of 8 different colonial nesting waterbirds at Lake Alice NWR in western Ramsey County during 1999 and 2000. Franklin’s Gulls nested exclusively in cattails and in areas of greater water depth in comparison to past studies.
- Numerous published reports and gray literature throughout the species range.

Additional Research or Surveys Needed

- Determine influence of other gull species on Franklin’s Gull ecology.
- Develop better understanding of colony dynamics, including determinants of colony location and consistency of use of individual sites.
- More accurately estimate population size, distribution, and trend.
- Identify and target high priority landscapes and habitats, including staging areas.
- Determine the effects of contaminants or insecticides on wetland quality and prey species.

POPULATION AND TREND ESTIMATES

- North American Waterbird Conservation Plan Population Estimate: 315,608 – 990,864 breeders
- NPPWCP BCR11 Population Estimate: 183,600 – 689,400
- North Dakota BBS Trend: see figure 14
- Survey-wide BBS Trend 1966-2012: -3.95

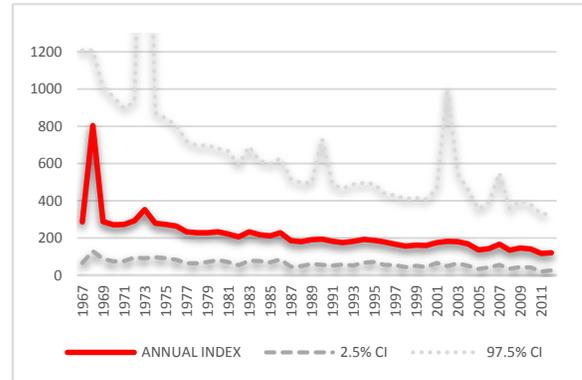


Figure 14. North Dakota Breeding Bird Survey Trend 1967-2012.

MANAGEMENT RECOMMENDATIONS

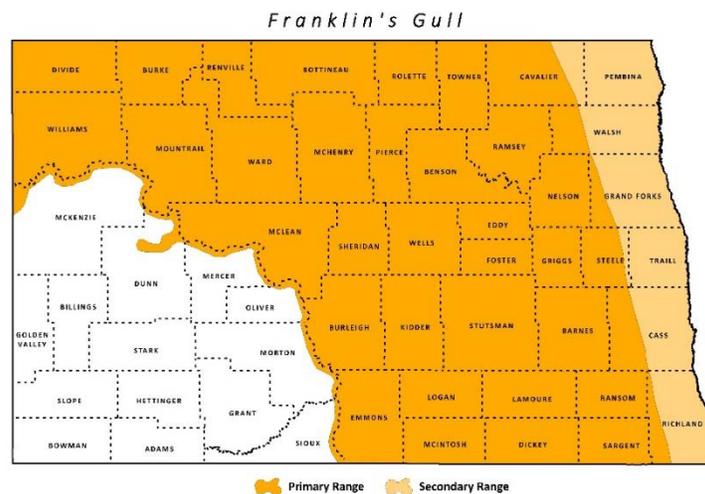
- Identify and target high priority landscapes, habitats, and staging areas for protection.
- If possible, maintain water levels during nesting.
- Utility development should follow the guidance of “Reducing Avian Collisions with Power Lines” including marking power lines and creating an Avian Protection Plan.

MONITORING PLANS

The NPPWCP has identified the basic elements of how a regional/continental waterbird monitoring program should be structured. Waterbird monitoring should follow recommendations of the Waterbird Conservation for the Americas and North American Bird Conservation Initiative ‘Opportunities for Improving Avian Monitoring’.

2005-2015 PROGRESS

The Franklin’s Gull remains a Level I Species of Conservation Priority. Efforts to identify additional breeding colonies are underway. The species remains at-risk primarily due to the overall limited number of colonies in North America (<50 total, <20 in the United States). Several State Wildlife Grant Projects (T2-9-R, T-18-R, T-27-HM) have contributed to habitat enhancement of wetlands for Franklin’s Gulls and other wetland dependent birds.



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GOLDEN EAGLE

Scientific Name: *Aquila chrysaetos*

Species of Conservation Priority:
Level II

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

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

Abundance: Uncommon.

Primary Habitat: Rugged portions of the badlands, buttes overlooking native prairie, large trees, and often found associated with prairie dog towns.

Federal Status: Migratory Bird. Additional protection under the Bald and Golden Eagle Protection Act.

Reason for Designation: Although recent research indicates Golden Eagles are not declining widely in the western United States, they may be susceptible to increasing unintentional lethal take and disturbance due to changes on the landscape at both state and national levels. It is included on the USFWS Bird of Conservation Concern list in Region 6 and BCR 17. Partners in Flight (PIF) identifies the Golden Eagle as a Regional Concern Species.



Sandra Johnson

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Open shrubland and grasslands of shortgrass, mixed-grass, and xeric grasslands are preferred by Golden Eagles. 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 turkey, coyote, antelope, porcupine, skunk, bighorn sheep lambs, great-horned owls, and waterfowl.

Key Areas and Conditions for Golden Eagle in North Dakota

The badlands and Lake Sakakawea breaks, are key areas for Golden Eagle nest site selection in North Dakota.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Eagles may be limited by the abundance of their primary prey, rabbits and ground squirrels. The effect of roads fragmenting the landscape, and oil and gas exploration, is unknown.

Other Natural or Manmade Factors

Collisions with vehicles, power lines, or other structures, and electrocution are the leading human-induced causes of death. Collisions with wind turbines is of increasing concern. Pesticides or contaminants are a threat when eagles consume poisoned prey. Golden Eagles are occasionally exposed to lead, possibly from consuming non-waterfowl prey. 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. This may result in eagles being inadvertently flushed from the nest for extended periods of time and could result in the death of the young or nest abandonment.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- The NDGF maintains the statewide database of known Golden Eagle nests in cooperation with the USFWS. In 2014, there were 600 known nest sites in the database: 139 active (eagle use documented in one or more years since 2000), 246 inactive (no eagle use documented since 2000), and 215 destroyed (Johnson 2015).
- Environmental consultants conduct nest surveys for energy or utility development.

Previous Research or Surveys

- University of North Dakota (ND SWG T-3-R) assessed the current status of Golden Eagle populations and evaluate the potential effects of disturbance, surveys were conducted of nesting Golden Eagles in and around the Little Missouri National Grasslands (LMNG). The project was initiated in 2002 and continued through 2006. A final report provided in 2007. Based on new nest surveys, 411 potential nest sites were estimated

with 63 being occupied (Coyle 2007). Movements of 17 juvenile Golden Eagles were monitored from July 2004 - March 2009 (Johnson 2014).

- For the past couple of decades, the U.S. Forest Service and the U.S. Fish and Wildlife Service have documented over 400 Golden Eagle nests in western North Dakota.
- Craig Knowles conducted a survey of 214 previously recorded Golden Eagle nests on the LMNG in 2001 (Knowles 2003).
- In the mid 1980's, Golden Eagles were resurveyed in the southwest and a population estimate of 95 ± 65 birds was determined (Allen 1985).
- Numerous published reports and gray literature on this species throughout its entire range.

Additional Research or Surveys Needed

- Identify nesting territories.
- Determine diet composition, conduct a prey population assessment, and how prey availability may impact the breeding population.

POPULATION AND TREND ESTIMATES

- PIF Global Population Estimate: 300,000
- PIF North American Population Estimate: 130,000
- PIF North Dakota Population Estimate: 400
- North Dakota Population Estimate: unknown (total number of adults, subadults, and juveniles)
- North Dakota Number of Occupied Nests: ~40-60

MANAGEMENT RECOMMENDATIONS

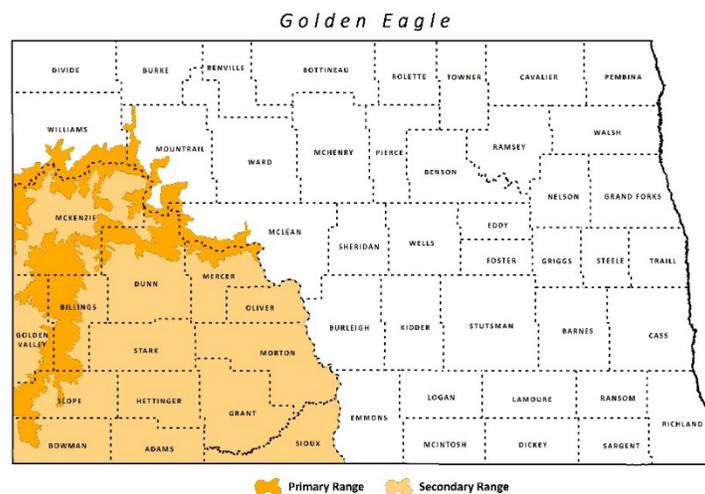
- Maintain a buffer zone of no disturbance around eagle nests (i.e. from roads, mining operations, energy development, etc.)
- Utility development should follow the guidance of "Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006" and "Reducing Avian Collisions with Power Lines" including marking power lines and creating an Avian Protection Plan.
- Wind industry companies should collaborate with the American Wind and Wildlife Institute for responsible wind development and follow the USFWS "Eagle Conservation Plan Guidance."

MONITORING PLANS

Continue to maintain a list and spatial database of known Golden Eagle nest sites. Considerations in Golden Eagle monitoring should refer to "Interim Golden Eagle Technical Guidance: Inventory and Monitoring Protocols; and Other Recommendations in Support of Golden Eagle Management and Permit Issuance."

2005-2015 PROGRESS

The Golden Eagle remains a Level II Species of Conservation Priority. A nest site spatial database has been developed and is being used to minimize impacts to nesting eagles.



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GRASSHOPPER SPARROW

Scientific Name: *Ammodramus savannarum*

Species of Conservation Priority:
Level I

General Description: L 5", WS 7.75", 0.6 oz. Short-tailed, flat-headed, yellowish with an unstreaked breast. Yellow spot between the eyes and bill.

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

Abundance: Common.

Primary Habitat: Idle or lightly grazed tall or mixed-grass prairie, shrub prairie meadows, and hayfields.

Federal Status: Migratory Bird.

Reason for Designation: Significantly declining nationwide. It is included on the USFWS Birds of Conservation Concern list in Region 6, BCR 11 and 17 Partners in Flight (PIF) identifies the Grasshopper Sparrow as a Regional Concern and Stewardship Species, U.S.-Canada Stewardship Species, and a Common Bird in Steep Decline.



Sandra Johnson

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred 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. Abundance positively correlated with percent grass cover, litter depth, visual obstruction, density of low-growing shrubs, and areas of shrubs and introduced grasses. Negatively correlated with percent clubmoss and areas dominated by solely native grass. Nest on the ground and well concealed by overhanging grasses. May be area sensitive and require large grasslands although territory size is small <2 ha. Forages on the ground for insects, including grasshoppers.

Key Areas and Conditions for Grasshopper Sparrow in North Dakota

No specific sites have been identified. Present statewide, but may be more abundant in the southern portion of the state.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Conversion of grassland to cropland, energy development and urban expansion. Degradation of grasslands from invasive plants, woody encroachment, succession, and loss of diversity. Grasshopper Sparrows respond positively to prescribe burns. The first year after a burn, densities are low but become most abundant 2-4 years post-fire. Lack of prescribed burns in grasslands could negatively affect this species. Deemed woodland-sensitive, occurrence declines with increasing tall shrub (>1m) cover. Increased woodland cover negatively affects this species, as maximum occurrence is in open, treeless grasslands. CRP has been very beneficial to the species, and loss of CRP would negatively affect the population.

Other Natural or Manmade Factors

Parasitism by brown-headed cowbirds may be higher than for other grassland birds. Nest depredation is the most important factor affecting nest success, followed by weather. Pesticide acute toxicity may be a potential contributor to declines of grassland birds. Mortality from collisions with communication towers. Grassland birds avoid habitat within 150 meters of roads and 350 meters of oilfield infrastructure, likely due to anthropogenic disturbance of heavy traffic and/or changes in habitat near oil development.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- Rocky Mountain Bird Observatory (ND SWG T-46-R) is estimating demographic rates of Grasshopper Sparrow and other grassland birds in western North Dakota. A final report is anticipated in 2018.

Previous Research or Surveys

- University of Montana (ND SWG T-1-R) developed breeding bird models which link population density to local and landscape habitat features in the Prairie Pothole Region of North Dakota. Grasshopper Sparrow was one of 16 grassland bird focal species. The project was initiated in 2002, a final report was provided in 2004 (Naugle 2005), and dissertation in 2007 (Quamen 2007). Further analysis of the data was recently

analyzed on 5 study species (Doherty et al. in press). Grasshopper Sparrows showed avoidance of cropland or selection for grassland at both the landscape and local scales and showed negative relationship to visual obstruction.

- University of North Dakota (ND SWG T2-8-R) determine grassland songbird response to landscape composition and vegetation. The project was initiated in 2010, a final report was provided in 2012 (Dixon and Goodwin 2013), and thesis in 2013 (VanThuyne 2013).
- The Nature Conservancy (T-23-R) implemented adaptive grassland management at Davis Ranch. The project was initiated in 2008, a final report was provided in 2010 (Rosenquist 2011), Grasshopper Sparrows are one of the most common grassland birds.
- Several studies which include Grasshopper Sparrow and multiple other grassland associated species have taken place in North Dakota. Examples include the benefits of CRP to grassland nesting passerines and the effects of various management practices.
- Numerous published reports and gray literature on this species throughout its range.

Additional Research or Surveys Needed

- Nothing identified at this time.

POPULATION AND TREND ESTIMATES

- PIF Global Population Estimate: 31,000,000
- PIF North American Population Estimate: 30,000,000
- PIF North Dakota Population Estimate: 4,000,000
- North Dakota BBS Trend: see figure 15
- Survey-wide BBS Trend 1966-2012: -2.86

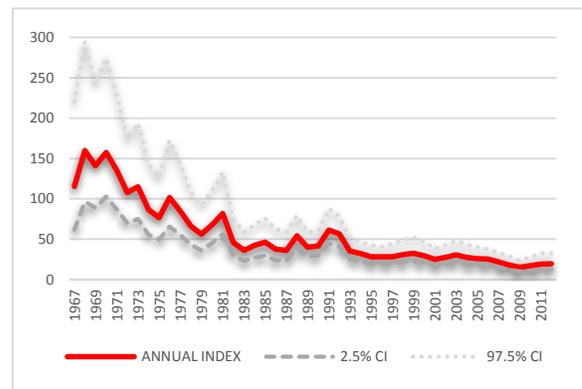


Figure 15. North Dakota Breeding Bird Survey Trend 1967-2012.

MANAGEMENT RECOMMENDATIONS

- Protect or create large tracts of grassland, particularly native prairie.
- Prevent encroachment of woody vegetation in grasslands.
- Burn, mow, or graze on a rotational schedule.
- Encourage no-till/minimum till when possible.
- Delay mowing until July 15.
- Construction of communication towers should follow the guidance of “Service Interim Guidelines for Recommendations on Communications Tower Siting, Construction, Operation, and Decommissioning” and American Bird Conservancy Collision Program framework.

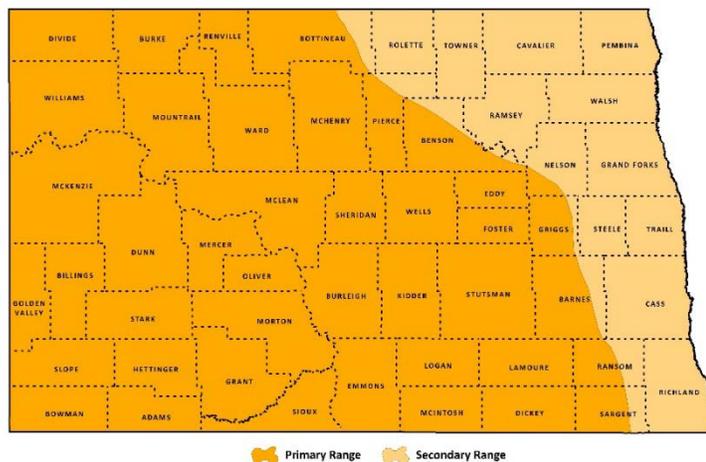
MONITORING PLANS

According to the Partners in Flight Landbird Conservation Plan, long-term population trend monitoring such as the Breeding Bird Survey is generally considered adequate, but may not account for some issues (e.g. bias). Ensuring all BBS routes are conducted annually is priority. Future monitoring proposals should follow recommendations North American Bird Conservation Initiative ‘Opportunities for Improving Avian Monitoring’.

2005-2015 PROGRESS

The Grasshopper Sparrow remains a Level I Species of Conservation Priority. Several State Wildlife Grant Projects (T2-11-HM, T-18-R, T-20-D, T-21-D, T-22-HM, T-23-HM, T-25-HM, T-28-L, T-37-D) have contributed to habitat enhancement grasslands for Grasshopper Sparrows and other grassland dependent birds.

Grasshopper Sparrow



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GREATER PRAIRIE-CHICKEN

Scientific Name: *Tympanuchus cupido*

Species of Conservation Priority:
Level II

General Description: 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 early July.

Abundance: Uncommon.

Primary Habitat: Relatively undisturbed, native tallgrass prairie in association with cropland.

Federal Status: None.

Reason for Designation: Prairie chicken presence in North Dakota prior to European settlement is unclear. Following the settler movement into North Dakota, populations were documented to have increased from 1880 to 1930, but current populations are unstable. Partners in Flight (PIF) identifies the Greater Prairie-Chicken as a Regional Concern Species, U.S.-Canada Concern Species, and a Tri-national Concern Species.



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LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Initially the Greater Prairie-Chicken was dependent upon tallgrass prairie oak woodland in central North America. As the birds migrated into North Dakota, tallgrass prairie interspersed with cropland became the preferred habitat. Now the presence of woody vegetation may actually 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. Winter cover should be at least 15 cm tall. Food items include leaves, seeds, buds, and insects but these birds rely primarily on agricultural crops for food through the winter.

Key Areas and Conditions for Greater Prairie-Chicken in North Dakota

Grand Forks County and the Sheyenne National Grasslands support the two primary breeding populations in North Dakota.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Trees can have negative impacts. Insects and grasshoppers are primary prey for young prairie chickens. Vegetation with multiple forbs contains more insects. Tallgrass prairies may benefit from prescribed fire, which is sometimes removed from management plans. A lack of habitat corridors between outlying populations prevents interconnectivity among populations.

Other Natural or Manmade Factors

Nests may be parasitized by ring-necked pheasants, or pheasants may be the source of interspecific competition with prairie chickens. Pesticides may reduce insect populations and therefore food availability for broods. Mortality such as birds flying into electric wires, fences, utility wires, and being hit by automobiles occur.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- The North Dakota Game and Fish Department and the U.S. Forest Service conduct annual lek surveys counting the number of birds present.

Previous Research or Surveys

- Numerous published reports and gray literature on the species throughout its range and in North Dakota.

Additional Research or Surveys Needed

- Explore strategic options for creating habitat corridors for interconnectivity between the Grand Forks and Sheyenne National Grasslands populations and other states.
- Contact the North Dakota Game and Fish Department Upland Game Biologists for most current information needs.

POPULATION AND TREND ESTIMATES

- PIF Global Population Estimate: 400,000
- PIF North American Population Estimate: 400,000
- North Dakota 2013 Census: 11 males on Sheyenne Grasslands and 63 males in Grand Forks County.
- Survey-wide BBS Trend 1966-2012: 2.53

MANAGEMENT RECOMMENDATIONS

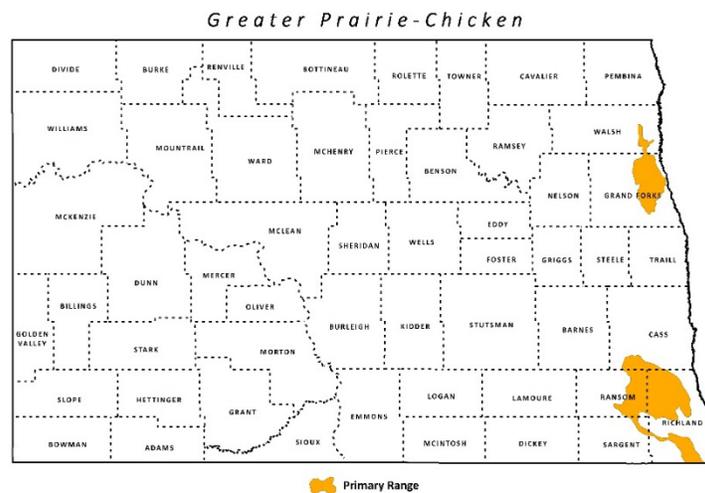
- Protect remaining tallgrass prairie remnants, particularly where leks have been identified.
- Plant a mixture of grasses and forbs when reclaiming cropland to grassland.
- Use rotational disturbance every 3-5 years, with prescribed burning as the preferred method.
- Minimize woody vegetation in priority management areas.
- Create habitat corridors to connect isolated populations.
- Delay cutting from April 15 – August 1, and use a stripper header and flushing bars. When cutting, leave the highest possible height (12-24 inches).
- Conscientious use of pesticides.
- Avoid constructing fences through or near leks and install visibility markers to existing fences.
- Utility development should follow the guidance of “Reducing Avian Collisions with Power Lines” including marking power lines and creating an Avian Protection Plan.

MONITORING PLANS

According to the Partners in Flight Landbird Conservation Plan, long-term population trend monitoring such as the Breeding Bird Survey produces imprecise trends for this species. No additional monitoring is needed at this time as the NDGFD will continue in the lead role of obtaining population data on Greater Prairie-Chicken.

2005-2015 PROGRESS

The Greater Prairie-Chicken remains a Level II Species of Conservation Priority. Several State Wildlife Grant Projects (T-25-HM) have contributed to habitat enhancement grasslands for Greater Prairie-Chicken and other grassland dependent birds.



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GREATER SAGE-GROUSE

Scientific Name: *Centrocercus urophasianus*

Species of Conservation Priority:
Level I

General Description: 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 late April to mid-July.

Abundance: Uncommon.

Primary Habitat: Big sagebrush ecosystem.

Federal Status: Candidate species under the Endangered Species Act.

Reason for Designation: This species range has contracted substantially in North Dakota. It once occurred east of the Little Missouri River, now believed vanished from there. This species is declining nationwide. Partners in Flight (PIF) identifies the Greater Sage-Grouse as a Regional Concern and Stewardship Species, U.S.-Canada Concern and Stewardship Species, and a Tri-national Concern Species.



Craig Bihrie

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Primarily associated with sagebrush, particularly big sagebrush. Silver sagebrush and rabbitbrush is utilized to a lesser extent. Riparian and 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.

Key Areas and Conditions for Greater Sage-Grouse in North Dakota

Most active and inactive leks have been identified and only occur in far southwestern North Dakota. These leks and the surrounding area (within 2 km) should be of top priority.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

The destruction and/or degradation of sagebrush throughout North America is negatively affecting this species and is the biggest threat. The quality of remaining sagebrush has declined due to grazing, fire suppression or excessive fire, invasion of exotic plants, and other human-related degradation.

Other Natural or Manmade Factors

Disturbance to leks and nesting sites from direct and indirect human activity is of great concern. Recent research in Wyoming indicates sage grouse may lack resistance to West Nile virus. Most, but not all, research suggests that hunting does not have an impact on sage grouse populations. Mortality such as birds flying into electric wires, fences, utility wires, and being hit by automobiles occur.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- The North Dakota Game and Fish Department conducts annual lek surveys counting the number of birds present.

Previous Research or Surveys

- Peripheral microhabitat and landscape characteristics were compared to identify possible reasons for lek abandonment in North Dakota in 2001 and 2002.
- Nesting and brood-rearing habitat selection of Greater Sage-Grouse, and associated survival of hens and broods, seasonal movements and autumn-winter habitat selection of Greater Sage-Grouse in North Dakota.
- Numerous published reports and gray literature throughout the species range.

Additional Research or Surveys Needed

- Contact the North Dakota Game and Fish Department Upland Game Biologists for most current information needs.

POPULATION AND TREND ESTIMATES

- PIF Global Population Estimate: 150,000
- North Dakota 2014 Census: 31 males
- North Dakota Male Population Goal: 250
- North Dakota Lek Survey Trend: see figure 16
- Survey-wide BBS Trend 1966-2012: -2.36

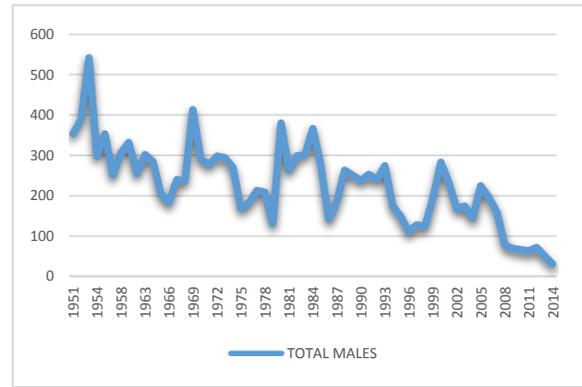


Figure 16. Number of males counted on leks in North Dakota 1951-2014.

MANAGEMENT RECOMMENDATIONS

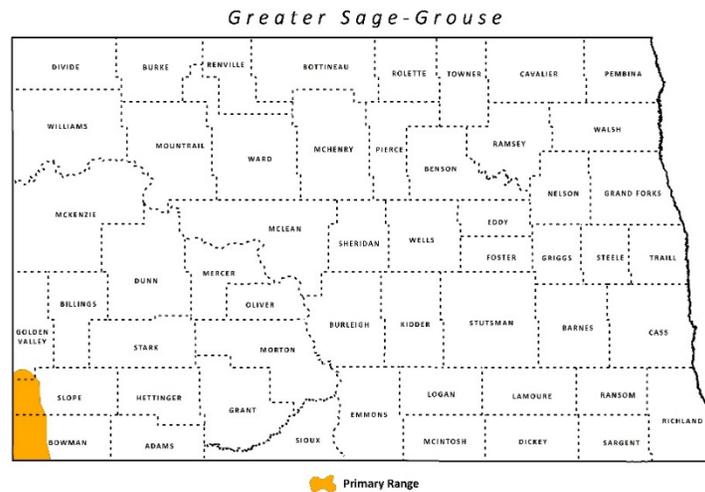
- Protect existing big sagebrush stands through easements or land acquisition.
- Include big sagebrush when reclaiming croplands and grassland restoration.
- Do not burn big sagebrush habitat, and rehabilitate previously burned sites.
- Encourage or provide incentives for land management practices that provide for maintaining or enhancing sage grouse habitat through livestock grazing management.
- Avoid constructing fences through or near leks and install visibility markers to existing fences.
- Remove single trees that serve as raptor perches.
- Utility development should follow the guidance of “Reducing Avian Collisions with Power Lines” including marking power lines and creating an Avian Protection Plan.

MONITORING PLANS

According to the Partners in Flight Landbird Conservation Plan, long-term population trend monitoring such as the Breeding Bird Survey produces imprecise trends for this species. No additional monitoring is needed at this time as the NDGFD will continue in the lead role of obtaining population data on Greater Sage-Grouse.

2005-2015 PROGRESS

The Greater Sage-Grouse remains a Level I Species of Conservation Priority. The species is in imminent danger of being extirpated from North Dakota.



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HORNED GREBE

Scientific Name: *Podiceps auritus*

Species of Conservation Priority:
Level I

General Description: 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 distinguish this grebe from the similar looking Eared Grebe.

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

Abundance: Uncommon to fairly common.

Primary Habitat: Ponds and wetlands with beds of emergent vegetation and substantial areas of open water.

Federal Status: Migratory Bird.

Reason for Designation: Early records indicate this species was once much more common in North Dakota, found nearly everywhere on prairie wetlands. Designated as High Concern in the Northern Prairie & Parkland Waterbird Conservation Plan (NPPWCP) and High Concern by Waterbird Conservation for the Americas. Added to the USFWS Birds of Conservation Concern 2008 in Region 6, BCR11 and BCR17. Although possibly secure in North Dakota, it appears the Horned Grebe is declining overall throughout the Prairie Pothole Region and elsewhere.



Lara Anderson

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Breeds in small (0.05 ha) to moderate-sized (1-10 ha), fairly shallow freshwater ponds and marshes with beds of emergent vegetation, particularly sedges, rushes, and cattails, and substantial areas of open water. Slightly brackish/alkaline water is also suitable. Nests are typically built over water on a floating platform of emergent vegetation. Artificial ponds and borrow pits may be used. Migration stopovers consist of mainly large-sized (1,000+ ha) bodies of water.

Key Areas and Conditions for Horned Grebe in North Dakota

Horned Grebes are fairly common in the Turtle Mountains and J. Clark Salyer, Upper Souris, and Des Lacs National Wildlife Refuges. The presence of this species varies greatly from year to year dependent on water availability.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Wetland destruction and/or degradation limits nesting habitat and food resources. The alteration of small wetlands to larger, more permanent wetlands could also impact this species.

Other Natural or Manmade Factors

Diet consists of primarily small fish (e.g. carp, darters, perch, and sticklebacks), but also aquatic invertebrates. Pollutants such as PCBs, mercury, and pesticides may limit the prey source or the bird itself directly. Collision with power lines over wetlands has been documented. Expanding oil and gas development in North Dakota increases risk of oilfield contamination of wetland habitat.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- Rocky Mountain Bird Observatory (ND SWG T-40-R) is conducting a statewide inventory of colonial and semi-colonial waterbird populations and identifying key sites for breeding colonies in North Dakota. The Horned Grebe is one of 29 target species. The project was initiated in March 2014.

Previous Research or Surveys

- Northern Prairie Wildlife Research Center (ND SWG T-3-1 and T-9-R) determined marsh bird distribution in relation to landscape composition in North Dakota. The project was initiated in 2004 and a final report provided in 2008. Horned Grebes were one of 16 focal species but were not detected during the surveys.

Additional Research or Surveys Needed

- More accurately estimate population distribution, size, and trend.
- Identify and target high priority habitats and landscapes or conservation action.
- Identify and protect key colonies and surrounding wetlands.

POPULATION AND TREND ESTIMATES

- Waterbird Conservation for the Americas Population Estimate: 100,000- 1,000,000 individuals
- NPPWCP BCR11 Population Estimate: unknown
- North Dakota BBS Trend: see figure 17
- Survey-wide BBS Trend 1966-2012: -1.84

MANAGEMENT RECOMMENDATIONS

- Protect and maintain wetland complexes.
- Prevent encroachment of woody vegetation around wetlands.
- Limit residential development around and recreational use of wetlands.
- Utility development should follow the guidance of “Reducing Avian Collisions with Power Lines” including marking power lines and creating an Avian Protection Plan.

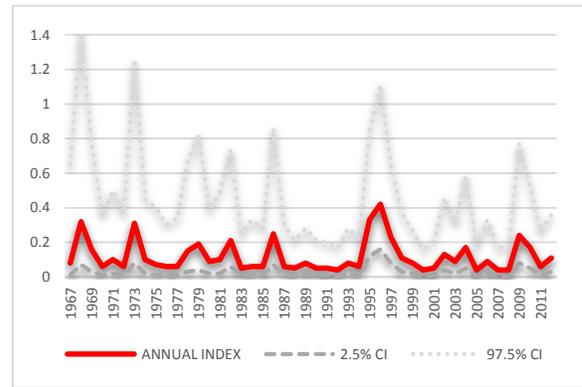


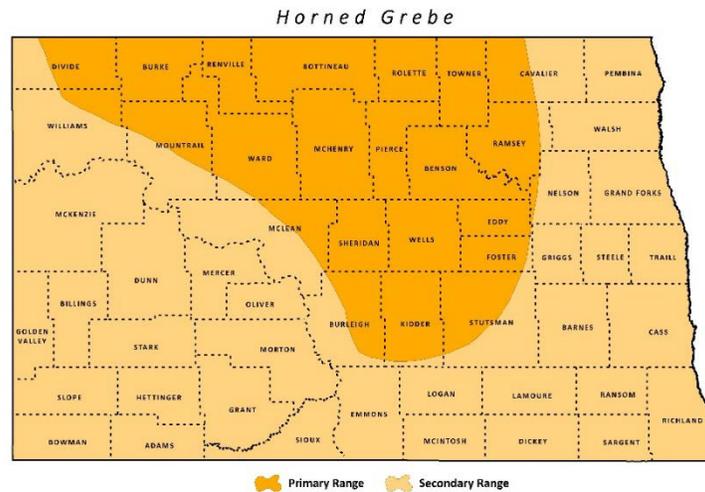
Figure 17. North Dakota Breeding Bird Survey Trend 1967-2012.

MONITORING PLANS

Horned Grebes are under-represented by the BBS roadside survey technique due to the inconspicuous behavior of breeding adults. Nest searches provide the most complete census of breeding birds, but targeted roadside transects before sunset during May or July may be the most efficient. The NPPWCP has identified the basic elements of how a regional/continental waterbird monitoring program should be structured. Waterbird monitoring should follow recommendations of the Waterbird Conservation for the Americas and North American Bird Conservation Initiative ‘Opportunities for Improving Avian Monitoring’.

2005-2015 PROGRESS

The Horned Grebe remains a Level I Species of Conservation Priority. Efforts to identify key sites for breeding areas are underway. Several State Wildlife Grant Projects (T2-9-R, T-18-R, T-27-HM) have contributed to habitat enhancement of wetlands for Horned Grebes and other wetland dependent birds.



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LARK BUNTING

Scientific Name: *Calamospiza melanocorys*

Species of Conservation Priority:
Level I

General Description: 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 May to August. Peak breeding season early June to early August.

Abundance: Abundant to common.

Primary Habitat: Sagebrush communities or mixed-grass prairie interspersed with shrubs, roadsides, and retired cropland.

Federal Status: Migratory Bird.

Reason for Designation: Although still rather common, this species has declined dramatically. Partners in Flight (PIF) identifies the Lark Bunting as a Regional Concern and Stewardship Species, U.S.-Canada Stewardship Species, and a Common Bird in Steep Decline.



Sandra Johnson

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Lark Buntings prefer grassland of low to moderate height with a component of shrubs such as sagebrush. Weedy cropland, no-till or minimum-till cropland, CRP, hayland, and pastures also are used. Abundance may be positively correlated with litter depth. 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.

Key Areas and Conditions for Lark Bunting in North Dakota

No specific sites have been identified. Once common throughout state except for Red River Valley, Lark Buntings are most abundant south and west of the Missouri River.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Destruction and/or degradation of prairie will negatively affect the population, although this species has shown some adaptability to nesting in agricultural fields. However, risk of nest destruction by farm machinery is probable. Burning removes shrub cover and Lark Buntings may avoid frequently burned grasslands. CRP benefits to Lark Buntings. It has been predicted if all CRP in North Dakota were converted back to cropland, the number of Lark Buntings would be reduced by about 17%.

Other Natural or Manmade Factors

Parasitism by brown-headed cowbirds is infrequent. Collisions with vehicles during the breeding season occur. Lark Buntings appear susceptible to drowning in stock water tanks, especially those containing mats of algae. It is presumed the birds are attracted to this water source, become entangled in the algae and drown.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- Rocky Mountain Bird Observatory (ND SWG T-XX-R) is estimating demographic rates of Lark Bunting and other grassland birds in western North Dakota. A final report is anticipated in 2018.

Previous Research or Surveys

- University of Montana (ND SWG T-1-R) developed breeding bird models which link population density to local and landscape habitat features in the Prairie Pothole Region of North Dakota. Grasshopper Sparrow was one of 16 grassland bird focal species. The project was initiated in 2002, a final report was provided in 2004 (Naugle 2005), and dissertation in 2007 (Quamen 2007).
- Little effort has been applied to research or surveys specifically for Lark Buntings in North Dakota. Several studies which include Lark Bunting and other grassland or shrubland associated species have taken place in North Dakota. Examples include the benefits of CRP to grassland nesting passerines and the effects of various management practices.
- Numerous published reports and gray literature on this species throughout its range.

Additional Research or Surveys Needed

- Nothing identified at this time.

POPULATION AND TREND ESTIMATES

- PIF Global Population Estimate: 9,100,000
- PIF North American Population Estimate: 9,100,000
- PIF North Dakota Population Estimate: 600,000
- North Dakota BBS Trend: see figure 18
- Survey-wide BBS Trend 1966-2012: -3.55

MANAGEMENT RECOMMENDATIONS

- Protect or create large tracts of grassland and shrubland.
- Do not remove all brush cover when burning.
- Delay mowing until after the breeding season.
- Heavily graze vegetation over 30 cm tall to produce shorter, sparser grass.
- Encourage no-till or minimum-till.
- Remove abandoned stock water tanks.

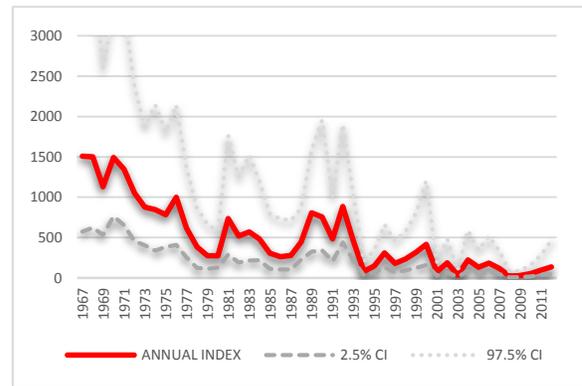


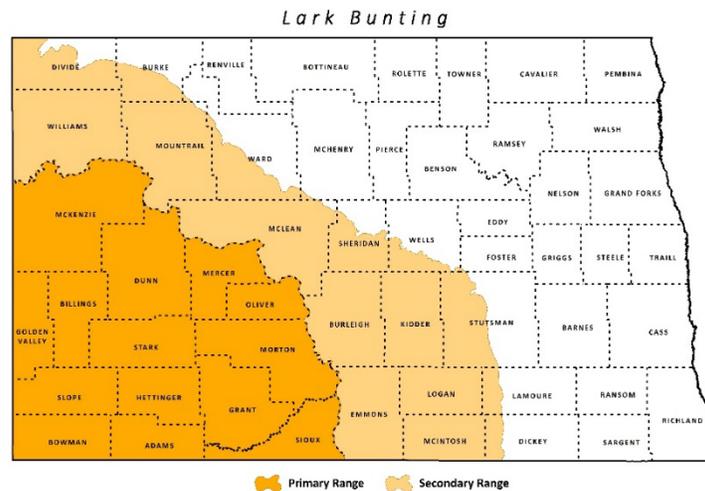
Figure 18. North Dakota Breeding Bird Survey Trend 1967-2012.

MONITORING PLANS

According to the Partners in Flight Landbird Conservation Plan, long-term population trend monitoring such as the Breeding Bird Survey is generally considered adequate, but may not account for some issues (e.g. bias). Ensuring all BBS routes are conducted annually is priority. Future monitoring proposals should follow recommendations North American Bird Conservation Initiative ‘Opportunities for Improving Avian Monitoring’.

2005-2015 PROGRESS

The Lark Bunting remains a Level I Species of Conservation Priority. Several State Wildlife Grant Projects (T2-11-HM, T-18-R, T-20-D, T-21-D, T-22-HM, T-23-HM, T-25-HM, T-28-L, T-37-D) have contributed to habitat enhancement grasslands for Lark Buntings and other grassland dependent birds.



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LE CONTE'S SPARROW

Scientific Name: *Ammodramus leconteii*

Species of Conservation Priority:
Level II

General Description: 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-August.

Abundance: Fairly common.

Primary Habitat: Fens, wet meadows, and marshes of sedge grasses.

Federal Status: Migratory Bird.

Reason for Designation: A fair portion of the species' range includes North Dakota. Partners in Flight (PIF) identifies the Le Conte's Sparrow as a Regional Stewardship Species and U.S.-Canada Stewardship Species.



Craig Bihrie

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Le Conte'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. Areas of tall, thick herbaceous vegetation and dense litter are used. Breed in hummocky alkali fens, tallgrass prairie, wet-meadow zones of wetlands, and tame hayfields. Appear to avoid areas of shrubs and other woody vegetation. Associated with a high amount of grass cover, particularly broad-leaved introduced grasses. Nest on or above the ground in dense vegetation. Usually forage on the ground for arthropods and seeds.

Key Areas and Conditions for Le Conte's Sparrow in North Dakota

No specific sites have been identified.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Presence of Le Conte's Sparrow is affected by the yearly moisture conditions. CRP has shown to be important breeding habitat for this species, but only under wet conditions. Deemed woodland-sensitive, increased woodland cover negatively affects this species. Annual grazing, mowing, and haying may negatively affect their presence, but periodic maintenance of grassland is needed to stimulate grass growth or prevent woody encroachment.

Other Natural or Manmade Factors

Nest parasitism is low. Some mortality from collisions with communication towers.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- There is currently nothing specific to the species in North Dakota.

Previous Research or Surveys

- University of Montana (ND SWG T-1-R) developed breeding bird models which link population density to local and landscape habitat features in the Prairie Pothole Region of North Dakota. Le Conte's Sparrow was one of 16 grassland bird focal species. The project was initiated in 2002, a final report was provided in 2004 (Naugle 2005), and dissertation in 2007 (Quamen 2007).
- From 1998-2002, Winter et al. (2005) examined Le Conte's Sparrow density based on year, region, climate, vegetation structure, grassland patch size, percent trees and shrubs in the landscape, rates of return of banded individuals, nest parasitism, nest success, and other basic nesting parameters in southeast North Dakota. Nesting success was highly variable among sites and years and increased slightly with distance from trees. One of only 93 banded individuals returned.
- Little effort has been applied to research or surveys specifically for Le Conte's Sparrow in North Dakota. Several studies which include Le Conte's Sparrow and other grassland associated species have taken place in North Dakota. Examples include the benefits of CRP to grassland nesting passerines and the effects of various management practices.
- Fair number of published reports and gray literature on this species throughout its range.

Additional Research or Surveys Needed

- Nothing identified at this time.

POPULATION AND TREND ESTIMATES

- PIF Global Population Estimate: 8,000,000
- PIF North American Population Estimate: 8,000,000
- PIF North Dakota Population Estimate: 300,000
- North Dakota BBS Trend: see figure 19
- Survey-wide BBS Trend 1966-2012: -1.75

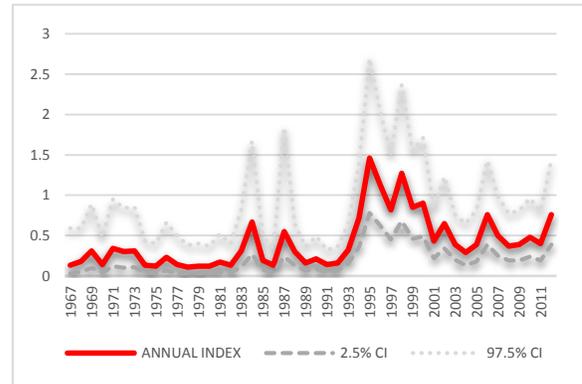


Figure 19. North Dakota Breeding Bird Survey Trend 1967-2012.

MANAGEMENT RECOMMENDATIONS

- Protect grassland and marshes.
- Burn every 2-4 years in mesic, mixed-grass prairie.
- Avoid annual mowing, delay mowing until after July 15.
- Discourage mowing or grazing of CRP during extremely wet years.
- Do not leave habitat idle for so long that litter becomes over-accumulated.
- Construction of communication towers should follow the guidance of “Service Interim Guidelines for Recommendations on Communications Tower Siting, Construction, Operation, and Decommissioning” and American Bird Conservancy Collision Program framework.

MONITORING PLANS

According to the Partners in Flight Landbird Conservation Plan, long-term population trend monitoring such as the Breeding Bird Survey is inadequate in the northern range for this species. Future monitoring proposals should follow recommendations North American Bird Conservation Initiative ‘Opportunities for Improving Avian Monitoring’.

2005-2015 PROGRESS

The Le Conte’s Sparrow remains a Level II Species of Conservation Priority. Several State Wildlife Grant Projects (T2-11-HM, T-18-R, T-20-D, T-21-D, T-22-HM, T-23-HM, T-25-HM, T-28-L, T-37-D) have contributed to habitat enhancement grasslands for Le Conte’s Sparrow and other grassland dependent birds.



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LEAST TERN (INTERIOR)

Scientific Name: *Sterna antillarum athalassos*

Species of Conservation Priority:
Level II

General Description: L 9", WS 20", 1.5 oz. The smallest of terns, it has a bright yellow bill with a black tip, yellow legs and white forehead.

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

Abundance: Rare.

Primary Habitat: Sparsely vegetated sandbars or shorelines.

Federal Status: Migratory Bird, Endangered Species.

Reason for Designation: Listed as endangered in 1985. The alteration of the natural Missouri River stream flow from dam construction and river channelization has destroyed or degraded sandbar habitat and altered tern prey.



Craig Bihrlé

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Least Terns use sparsely vegetated sandbars or shoreline salt flats of lakes along the Missouri River System in North Dakota. Usually nest 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.

Key Areas and Conditions for Least Tern in North Dakota

The Yellowstone River, Missouri River, Lake Sakakawea, and Lake Oahe are the only areas in the state where Least Terns reside.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

As a result of channelization, irrigation, and dam construction along the Missouri River, the sandbar habitat has been drastically altered, and cold, deep water has changed the forage fish. Encroachment of woody vegetation onto sandbars reduces nesting habitat availability.

Other Natural or Manmade Factors

Nests may be destroyed by recreationists using sandbars or by the release of water during mid-summer when terns are still on the nest. The effect of bio-accumulation of contaminants in fish prey base is unknown.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- The U.S. Army Corps of Engineers annually surveys Least Terns along the Missouri River system. The program was initiated in 1993. The number of nests, nest success, destroyed nest fate, the number of chicks fledged, and the fledge ratio are calculated.
- Northern Prairie Wildlife Research Center is conducting comprehensive surveys and research on various aspects of Least Tern and piping plover habitat, demographics, population dynamics, foraging ecology, and monitoring in the entire Missouri River system.
- The University of North Dakota is using miniature surveillance cameras at Least Tern and piping plover nests to provide information about predators and behavior.

Previous Research or Surveys

- Numerous published reports and gray literature for the species throughout its range.

Additional Research or Surveys Needed

- Nothing at this time specific to North Dakota.

POPULATION AND TREND ESTIMATES

- North American Waterbird Conservation Plan Population Estimate: 60,000-100,000 total breeders with 8,000 in the interior population
- NPPWCP BCR11 Population Estimate: ~680
- North Dakota Population Estimate: ~100 breeding pairs

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.
- Manage sandbar habitat by removing features that terns avoid (e.g. vegetation, silt).
- If needed, limit human access to sandbars or sensitive areas where terns are nesting.
- The 1990 Recovery Plan may no longer reflect the best available information, use more recent published reports and the 5-year Review for management goals.

MONITORING PLANS

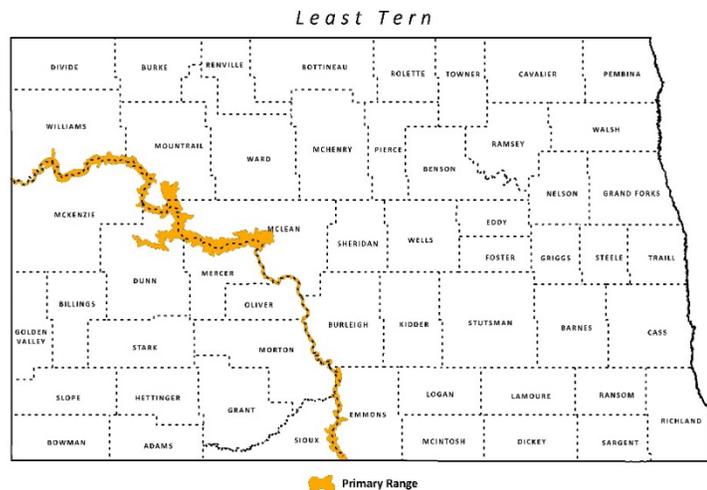
Continue to work with the U.S. Army Corps of Engineers and the U.S. Fish and Wildlife Service on long-term monitoring of Least Terns along the Missouri River System. Northern Prairie Wildlife Research Center staff have identified a proposed revision of the monitoring program (see Shaffer et al. 2013). If delisted, a post-delisting monitoring strategy and plan must be developed.

2005-2015 PROGRESS

The Least Tern remains a Level II Species of Conservation Priority. The 5-year review concludes the Interior population of Least Terns is recovered and recommends the species be considered for delisting.

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LESSER SCAUP

Scientific Name: *Aythya affinis*

Species of Conservation Priority:
Level II

General Description: L 16.5", WS 25", 1.8lb. Medium-sized diving duck, mostly black and white, with purple and green iridescence on the head, blue bill.

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

Abundance: Common.

Primary Habitat: Seasonal and semi-permanent wetlands and associated uplands.

Federal Status: Migratory Bird.

Reason for Designation: Population declines began in the early 1980's and has not rebounded even during times of improved habitat conditions. The exact cause of decline remains uncertain. Identified as a species of Moderately High Continental Priority in the North American Waterfowl Management Plan.



Lara Anderson

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Lesser Scaup use 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 the addition of CRP on the landscape. Feed on aquatic invertebrates, especially chironomids and amphipods, crustaceans and mollusks.

Key Areas and Conditions for Lesser Scaup in North Dakota

No specific sites have been identified at this time. Medium-large semi-permanent wetlands in grassland dominated landscapes.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Conversion of grassland to cropland, energy development and urban expansion. Degradation of grasslands from invasive plants, woody encroachment, succession, and loss of diversity. Loss and degradation of wetlands and wetland consolidation limit nesting habitat and food resources.

Other Natural or Manmade Factors

Female scaup body condition has declined since the 1980's, resulting in reduced reproductive success and population decline (Anteau and Afton 2004). Nests are parasitized by redheads and other waterfowl. Mortality from collisions with power lines and wind turbines. Expanding oil and gas development in North Dakota may impact Lesser Scaup and there is increasing risk of oilfield contamination to wetlands. Introduction of fish into wetlands alters the aquatic invertebrate and plant community.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- Traditional waterfowl survey efforts occur annually.
- The effects of oil and gas development on waterfowl and waterfowl production is being studied in North Dakota.
- There is currently nothing specific to the species in North Dakota.

Previous Research or Surveys

- Numerous published reports and gray literature on this species throughout its range and in North Dakota. For a comprehensive list of efforts see the "Bibliography for Lesser Scaup."

Additional Research or Surveys Needed

- Effect of drought conditions on nutrient reserves, migration, and annual recruitment.
- Determine the effects of contaminants or insecticides on wetland quality and prey species
- Contact the North Dakota Game and Fish Department Waterfowl Biologists for most current information needs.

POPULATION AND TREND ESTIMATES

- 2014 Waterfowl Breeding Population: 4,100,000 (greater scaup too?>), see figure 20
- North American Waterfowl Management Plan Objective : 6,300,000

MANAGEMENT RECOMMENDATIONS

- Preserve large tracts of grasslands and wetland complexes.
- Maintain a diversity of planted grassland on the landscape, including DNC 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 cutting from April 15 – August 1, and use a stripper header and flushing bars. When cutting, leave the highest possible height (12-24 inches).
- Stocking fish in shallow wetlands is detrimental to waterfowl production.
- Utility development should follow the guidance of “Reducing Avian Collisions with Power Lines” including marking power lines and creating an Avian Protection Plan.
- Wind industry companies should collaborate with the American Wind and Wildlife Institute for responsible wind development.

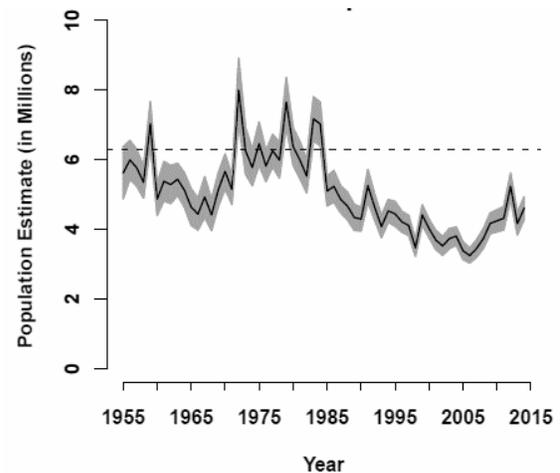


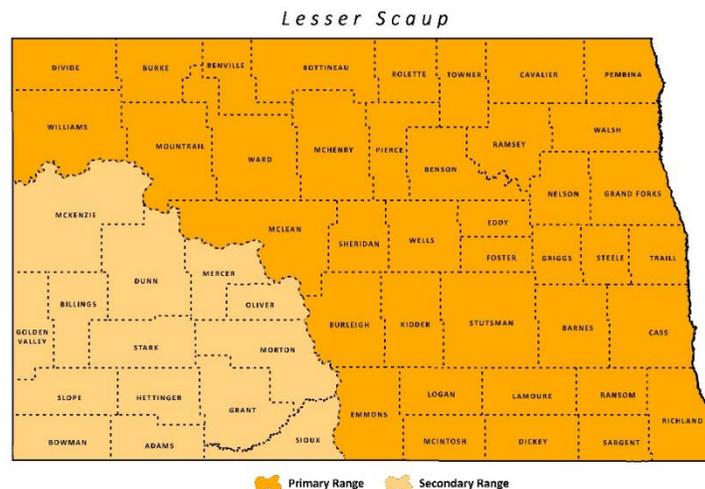
Figure 20. North American combined breeding population estimate of greater and Lesser Scaup, 90% confidence intervals, and NAWMP population goals (dashed line) 1967-2014. Data from the U.S. Fish and Wildlife Service waterfowl breeding population survey.

MONITORING PLANS

For nearly 50 years, the May Waterfowl Breeding Population and Habitat Survey have been in place. In addition, four-square mile and duck brood counts are conducted annually by the U.S. Fish and Wildlife Service. The North Dakota Game and Fish Department also conducts annual mid-July duck brood index surveys. At this time, there appears to be no additional monitoring needs.

2005-2015 PROGRESS

The Lesser Scaup has been added as a Level II Species of Conservation Priority.



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LOGGERHEAD SHRIKE

Scientific Name: *Lanius ludovicianus*

Species of Conservation Priority:
Level II

General Description: 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 October. Peak breeding season early May to mid-July.

Abundance: Fairly common to uncommon.

Primary Habitat: Open country with thickets of small trees, shrubs, and shelterbelts.

Federal Status: Migratory Bird.

Reason for Designation: The cause for significant range-wide declines is unclear. It is included on the National USFWS Birds of Conservation Concern list, and also in Region 6 and BCR 17. Partners in Flight (PIF) identifies the Loggerhead Shrike as a Common Bird in Steep Decline.



NDGFD

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Loggerhead Shrikes use open habitat of short grass interspersed with bare ground and shrubs or low trees. 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. 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. 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. Average territory is 6-9 ha.

Key Areas and Conditions for Loggerhead Shrike in North Dakota

No specific sites have been identified. Most abundant west of the Missouri River, less common in the Red River Valley and Drift Prairie.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Conversion of grassland to cropland, energy development and urban expansion. Degradation of grasslands from invasive plants, succession, and loss of diversity. Excessive tree encroachment into prairie can have negative impacts. However, removal of all small trees and shrubs will limit nesting sites.

Other Natural or Manmade Factors

A number may be killed by automobiles when plucking injured or dead insects from roads. Brown-headed cowbird parasitism occurs but at low rates. The effect of contaminants is unclear but some data suggests the species decline coincides with the increased use of organochlorines in the 1940s-70s. Pesticides can limit prey abundance.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- There is currently nothing specific to the species in North Dakota.

Previous Research or Surveys

- Long-term monitoring of shelterbelts in Sioux County for Loggerhead Shrike nests occurred from 1984 to 2010. The number of breeding pairs fluctuates but no consistent trend over time has been shown. Fledging success is high but return rate is low with the low return rate attributed to low site fidelity.
- Numerous published reports and gray literature on this species throughout its range.

Additional Research or Surveys Needed

- Explore possible sources of Loggerhead Shrike population declines.
- Determine the effects of pesticides on prey species.

POPULATION AND TREND ESTIMATES

- PIF Global Population Estimate: 5,800,000
- PIF North American Population Estimate: 4,900,000
- PIF North Dakota Population Estimate: 100,000
- North Dakota BBS Trend: see figure 21
- Survey-wide BBS Trend 1966-2012: -3.18

MANAGEMENT RECOMMENDATIONS

- 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, or honey locust and plant a 2-4 meter strip of grass around shelterbelts.
- Use light grazing to reduce vegetation height, but keep a few areas of tall grass for small mammal prey.
- Protect old shelterbelts and nesting bushes from cattle grazing and rubbing.

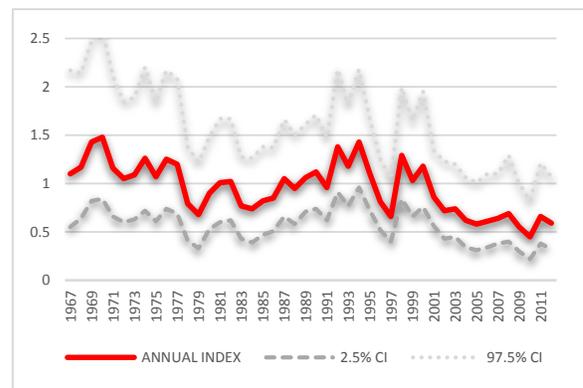


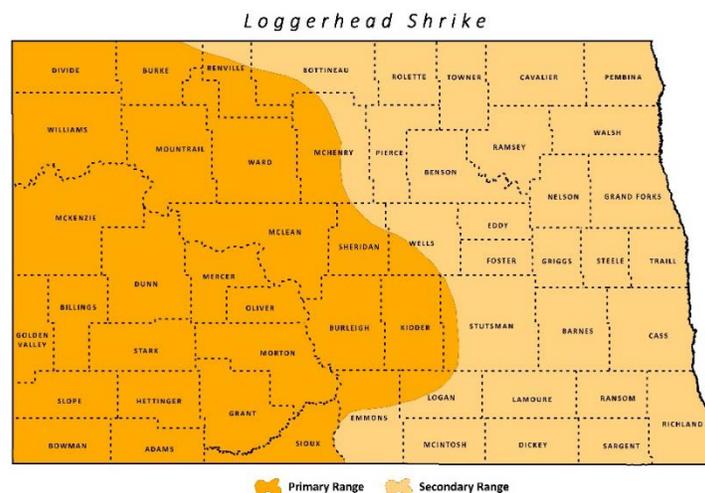
Figure 21. North Dakota Breeding Bird Survey Trend 1967-2012.

MONITORING PLANS

According to the Partners in Flight Landbird Conservation Plan, long-term population trend monitoring such as the Breeding Bird Survey is generally considered adequate, but may not account for some issues (e.g. bias). Ensuring all BBS routes are conducted annually is priority. Future monitoring proposals should follow recommendations North American Bird Conservation Initiative 'Opportunities for Improving Avian Monitoring'.

2005-2015 PROGRESS

The Loggerhead Shrike remains a Level II Species of Conservation Priority. Several State Wildlife Grant Projects (T2-11-HM, T-18-R, T-20-D, T-21-D, T-22-HM, T-23-HM, T-25-HM, T-28-L, T-37-D) have contributed to habitat enhancement grasslands for Loggerhead Shrike and other grassland dependent birds.



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LONG-BILLED CURLEW

Scientific Name: *Numenius americanus*

Species of Conservation Priority:
Level I

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

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

Abundance: Uncommon to rare.

Primary Habitat: Short-grass prairie or shrub steppe prairie on gently rolling terrain.

Federal Status: Migratory Bird.

Reason for Designation: Curlews numbered much higher during the 1800s and were more widely distributed, but the population appears to be more stable in recent years. It is included on the National USFWS Birds of Conservation Concern list, and also in Region 6, BCR 11 and 17. Watch List species in need of Management Attention in Shorebirds of Conservation Concern 2015.



Sandra Johnson

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

For breeding, 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. Areas where the majority of the vegetation height is <10 cm are preferred. Proximity to water is possibly an important factor in habitat selection. Nest in the dry uplands near wet areas such as wet meadows, which 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. Nests are usually located near cowpies or other conspicuous objects for concealment and are often on hummocks for improved visibility.

Key Areas and Conditions for Long-billed Curlew in North Dakota

No specific sites have been identified. Recent sightings come primarily from Slope, Bowman, southern Billings, southern Golden Valley, and western Stark counties.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Destruction and/or degradation of grassland habitat is the greatest threat to Long-billed Curlews in North Dakota.

Other Natural or Manmade Factors

Curlews are sensitive to disturbance from human activities, especially during the nesting and brood-rearing periods. Abandonment of breeding sites due to human disturbance has been documented. Expanding oil and gas development in North Dakota may impact Long-billed Curlews.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- There is currently nothing specific to the species in North Dakota.

Previous Research or Surveys

- University of North Dakota (ND SWG T-6-R) determined the distribution and abundance of the Long-billed Curlew in southwestern North Dakota. The project was initiated in 2005 and continued through 2007. The researchers conducted the range-wide and intensive census surveys within the Long-billed Curlew range. Almost all curlew observations were concentrated in extreme southwest North Dakota (Ackerman 2007).
- A two-year, range-wide survey to determine curlew distribution and population was completed in 2004 and 2005.

Additional Research or Surveys Needed

- Ackerman 2007 recommended Long-billed Curlews should be fitted with radio/GPS transmitters to determine approximate home-range sizes, the importance of water within a breeding territory, migratory routes, and crucial stopover sites.
- The Status Assessment and Conservation Action Plan for the Long-billed Curlew contains a comprehensive list of potential action items.

POPULATION AND TREND ESTIMATES

- North American Population Estimate 2012: 140,000
- 2005 and 2006 North Dakota estimate: 518 breeding Long-billed Curlews in 2005 and 2,074 breeding individuals in 2006.
- Survey-wide BBS Trend 1966-2012: 0.20

MANAGEMENT RECOMMENDATIONS

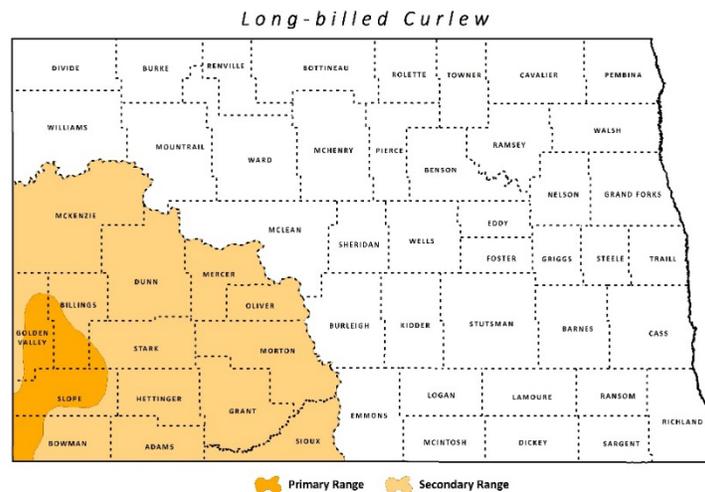
- Prevent conversion of native grassland.
- Remove tall, dense vegetation before nesting period by using haying and grazing.
- Use fire to remove shrub coverage and increase habitat openness.
- Do not drag hayfields to break up cowpies.
- Curlews have been documented successfully using fall-seed crops (i.e. winter wheat). Encourage producers to incorporate fall-seed crops into their rotations if within the Long-billed Curlew range.
- Reduce pesticide use on grasslands.

MONITORING PLANS

Few BBS routes in North Dakota intersect with Long-billed Curlew range. The project described above included recommendations for long-term monitoring of Long-billed Curlews in North Dakota. Statewide and intensive census routes were established and may be revisited in future years. A shorebird monitoring plan should follow The International Shorebird Survey (ISS) Program for Regional and International Shorebird Monitoring (PRISM) and "Guidance for Developing and Implementing Effective Shorebird Surveys."

2005-2015 PROGRESS

The Long-billed Curlew remains a Level I Species of Conservation Priority. The Natural Resources Conservation Service has implemented Greater Sage-Grouse habitat restoration programs within areas of the Long-billed Curlew breeding range. The curlew is benefiting from these conservation efforts. The American Bird Conservancy is focusing on shortgrass prairie grassland conservation, including implementing fencing and native seed plantings on private lands in southwest North Dakota.



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MARbled GODWIT

Scientific Name: *Limosa fedoa*

Species of Conservation Priority:
Level I

General Description: 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 mid-April to August. Peak breeding season occurs from early May to late June.

Abundance: Fairly common.

Primary Habitat: Forage in a variety of wetlands, nest frequently on grazed native prairie.

Federal Status: Migratory Bird.

Reason for Designation: It is estimated 70% of this species population breeds in the Prairie Pothole Region. It is included on the National USFWS Birds of Conservation Concern list, and also in Region 6, BCR 11 and 17. Watch List species in need of Management Attention in Shorebirds of Conservation Concern 2015.



Sandra Johnson

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Marbled Godwits require large expanses of short, sparse to moderately vegetated uplands for nesting. A high percentage of grass cover and a high number of wetlands is needed for high nest success. Prefer native grassland over tame, but will also use pastures, idle grasslands, and haylands. Nests in short grassy cover, so short they are usually not well concealed when sitting on the nest. 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 roadside ditches. Primary prey items include insects, aquatic tubers, leeches, and small fish. Godwits are area sensitive, requiring blocks of grassland of at least 100 ha. Grazed or recently grazed uplands are often more attractive.

Key Areas and Conditions for Marbled Godwit in North Dakota

No specific sites have been identified. Most common in the Missouri Coteau and fairly common in the Drift Prairie and Missouri Slope, less common in the Red River Valley.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Conversion of grassland to cropland, energy development and urban expansion. Degradation of grasslands from invasive plants, woody encroachment, succession, and loss of diversity. Specifically, the loss of native prairie and associated wetlands is the greatest threat to Marbled Godwits in North Dakota.

Other Natural or Manmade Factors

Insecticides may decrease food availability. Mortality from vehicle and power line collisions. Early mowing can destroy nests or kill the adult on the nest. Expanding oil and gas development in North Dakota increases risk of oilfield contamination of wetland habitat.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- Since 2004, the USFWS HAPET staff has coordinated a breeding shorebird survey in the Prairie Pothole Region of North and South Dakota. Surveys are conducted twice to correspond with the shorebird breeding season. Five grassland breeding shorebird species are targeted, including Marbled Godwit. Results from these surveys help guide grassland and conservation efforts.

Previous Research or Surveys

- The Nature Conservancy (ND SWG T-31-R) determined grassland bird response to decreased in grazing pressure in the Sheyenne River Delta area. The project was initiated in April 2011 and a final report provided in 2014. Marbled Godwit abundance was higher in recently burned areas, greater visual obstruction reading, and greater litter depth variability (Ahlering 2014).
- Ducks Unlimited (ND SWG T2-2-R) determined wetland occupancy by shorebirds in wind energy developments in the Prairie Pothole Region of North Dakota. The project was

initiated in 2009 and a final report provided in 2011. Results indicate wind energy was probably not causing substantial reductions in shorebird occupancy, including Marbled Godwits. However, apparent presence of shorebirds was low and potential effects of wind development on shorebird populations needs further research and monitoring (Walker and Gleason 2011, Niemuth et al. 2013).

- Delta Waterfowl (ND SWG T-13-R) determined shorebird nest success and nest-site selection in northeast North Dakota. The project was initiated in 2005 and a final report provided in 2007. Vegetation surrounding shorebird nests was relatively short, sparse, native grass species. Shorebirds avoided sites dominated by invasive plants (e.g. leafy spurge, Canada thistle, Kentucky bluegrass, smooth brome, stinging nettle, and wormwood.) Habitat has a stronger impact on shorebird nest success than predator removal (Wiens 2007).
- Ducks Unlimited (ND SWG T-3-1 and T-8-R) determined demographic performance of prairie-nesting shorebirds in North Dakota. The project was initiated in 2004 and a final report provided in 2007. The highest reproductive success for shorebirds was in those areas with high amounts of grassland, low levels of edge between cropland and grassland, and high amount of wetland area. Preserving large intact grassland/wetland landscapes are key to safeguarding populations of Marbled Godwits (Stephens and Walker 2007).
- Fair number of published reports and gray literature on this species throughout its range.

Additional Research or Surveys Needed

- Determine the effects of contaminants or insecticides on wetland quality and prey species.

POPULATION AND TREND ESTIMATES

- North American Population Estimate 2012: 170,000
- North Dakota BBS Trend: see figure 22
- Survey-wide BBS Trend 1966-2012: -0.23

MANAGEMENT RECOMMENDATIONS

- Protect grassland/wetland complexes.
- Burn, mow, and graze grasslands to provide areas of shorter, sparser vegetation.
- Use rotational grazing rather than season-long, and avoid grazing until late May or late June.
- Remove trees from grasslands.
- On existing cropland, no-tillage and minimum-tillage processes can be less harmful to nesting godwits.
- Utility development should follow the guidance of “Reducing Avian Collisions with Power Lines” including marking power lines and creating an Avian Protection Plan.

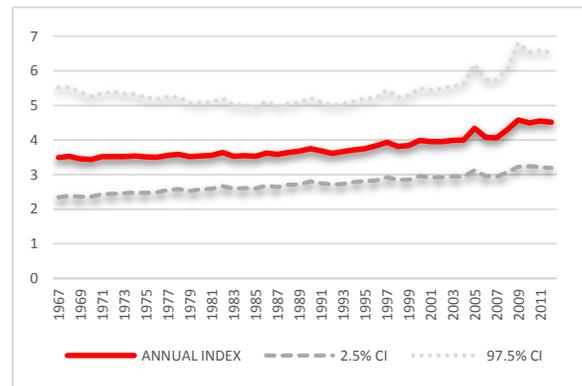


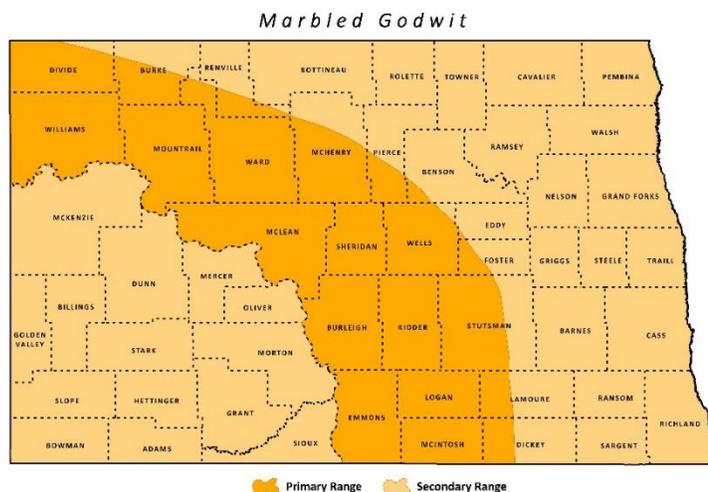
Figure 22. North Dakota Breeding Bird Survey Trend 1967-2012.

MONITORING PLANS

The Breeding Bird Survey continues to be a useful monitoring tool, however the annual surveys implemented by HAPET in 2004 are valuable. Ensuring all BBS routes are conducted annually is priority. A shorebird monitoring plan should follow The International Shorebird Survey (ISS) Program for Regional and International Shorebird Monitoring (PRISM) and “Guidance for Developing and Implementing Effective Shorebird Surveys.”

2005-2015 PROGRESS

The Marbled Godwit remains a Level I Species of Conservation Priority. Several State Wildlife Grant Projects (T2-9-R, T2-11-HM, T-18-R, T-21-D, T-22-HM, T-23-HM, T-25-HM, T-27-HM, T-37-D) have contributed to habitat enhancement of wetlands and grasslands for Marbled Godwit and other wetland/grassland dependent birds.



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MCCOWN'S LONGSPUR

Scientific Name: *Rhynchophanes mccownii*

Species of Conservation Priority:
Level III

General Description: 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: Occurs in North Dakota from mid-April to September. Peak breeding season late May to mid-July.

Abundance: Rare.

Primary Habitat: Arid, shortgrass prairie or heavily grazed mixed-grass prairie.

Federal Status: Migratory Bird.

Reason for Designation: Former records indicate this species was once much more common in North Dakota, possibly as abundant as Chestnut-collared Longspurs, and had nested throughout much of the state. Since the mid-1960s, this species has presumably only nested in Bowman County. It is included on the National USFWS Birds of Conservation Concern list, and also in Region 6, BCR 11 and 17. Partners in Flight (PIF) identifies the McCown's Longspur as a Regional Concern and Stewardship Species, and a U.S.-Canada Stewardship Species.



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LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

McCown's Longspurs should be 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 feed on insects and other arthropods.

Key Areas and Conditions for McCown's Longspur in North Dakota

The known tract of prairie used by breeding McCown's Longspurs is a section of state school land in Bowman County. It is also referred to as the Rhame Prairie.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Conversion of grassland to cropland, energy development and urban expansion. Degradation of grasslands from invasive plants, woody encroachment, succession, and loss of diversity. Specifically, the loss of expansive tracts of native shortgrass prairie habitat has resulted in the near extirpation of the species in North Dakota.

Other Natural or Manmade Factors

Rate or effect of brown-headed cowbird parasitism is not known. The application of some pesticides has been directly linked to the death of nestlings. The effect of human disturbance on nesting birds is unclear.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- There is currently nothing specific to the species in North Dakota.

Previous Research or Surveys

- Little, if any, research or surveys specifically for McCown's Longspur in North Dakota.
- Numerous published reports and gray literature on this species throughout its range.

Additional Research or Surveys Needed

- Determine the breeding status or occurrence of McCown's Longspurs in North Dakota. Population estimates likely overestimate the population size.

POPULATION AND TREND ESTIMATES

- PIF Global Population Estimate: 600,000
- PIF North American Population Estimate: 600,000
- PIF North Dakota Population Estimate: unknown, estimated <500
- Survey-wide BBS Trend 1966-2012: -4.24

MANAGEMENT RECOMMENDATIONS

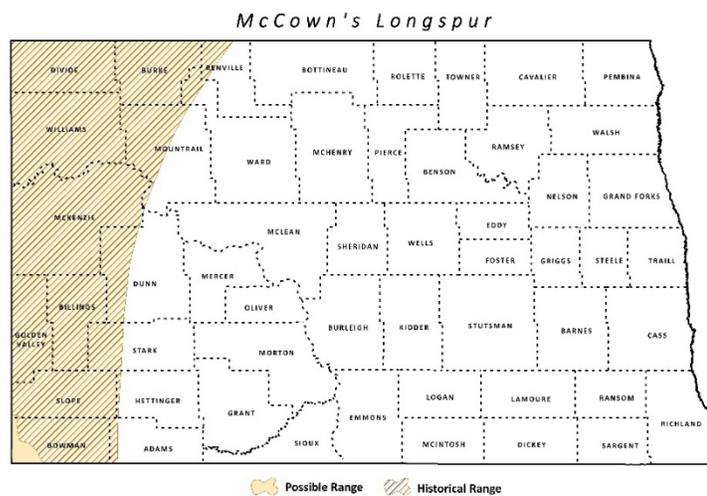
- Protect known breeding sites from agricultural and urban development.
- Provide areas with little litter, low forb cover, and short, sparse vegetation.
- Graze areas where grass is too tall and thick.
- Use prescribed burns in areas where fire has been suppressed.

MONITORING PLANS

According to the Partners in Flight Landbird Conservation Plan, long-term population trend monitoring such as the Breeding Bird Survey is generally considered adequate, but may not account for some issues (e.g. bias). However, few BBS routes in North Dakota intersect with McCown's Longspur possible range. Future monitoring proposals should follow recommendations North American Bird Conservation Initiative 'Opportunities for Improving Avian Monitoring'.

2005-2015 PROGRESS

The McCown's Longspur remains a Level III Species of Conservation Priority. The species is in imminent danger of being extirpated from North Dakota.



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NELSON'S SPARROW

Scientific Name: *Ammodramus nelsoni*

Species of Conservation Priority:
Level I

General Description: 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-September. Peak breeding season mid-June to early August.

Abundance: Uncommon.

Primary Habitat: Fens, shallow-marsh and wet meadow zones of wetlands.

Federal Status: Migratory Bird.

Reason for Designation: This sparrow has a restricted breeding range limited to North Dakota, parts of Minnesota, South Dakota, and central Canada. It included on the National USFWS Birds of Conservation Concern list, and also in Region 6 and BCR 11. Partners in Flight (PIF) identifies the Nelson's Sparrow as a Regional Stewardship Species and U.S.-Canada Stewardship Species.



Sandra Johnson

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Nelson's Sparrows in North Dakota use freshwater wetlands with dense, emergent vegetation or damp areas with dense grass. Also use fens, wet meadows, lake margins, emergent cattails, native prairie, idle fields, CRP and DNC. Cordgrass, squirreltail, whitetop, and phragmites are usually the most commonly associated plants. Nest on the ground or slightly above in shallow-marsh and deep-marsh zones of wetlands in dry years and the wet-meadow zone of wetlands in wet years. A rather deep, persistent litter level is preferred. Forage on the ground for insects and seeds.

Key Areas and Conditions for Nelson's Sparrows in North Dakota

No specific sites have been identified.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Destruction and/or degradation of grasslands and wet meadows. Presence of sharp-tailed sparrows may be affected by the yearly moisture conditions. Annual grazing, mowing, and haying may negatively affect their presence, but periodic maintenance of grassland is needed to stimulate grass growth or prevent woody encroachment.

Other Natural or Manmade Factors

Recently a relatively high level of mercury level has been detected in Nelson's Sparrows in North Dakota. Some mortality from collisions with communication towers.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- Currently nothing specific to the species in North Dakota.

Previous Research or Surveys

- Little effort has been applied to research or surveys specifically for Nelson's sharp-tailed sparrow in North Dakota. Several studies which include sharp-tailed sparrow and other grassland associated species have taken place in North Dakota. Examples include the benefits of CRP to grassland nesting passerines and the effects of various management practices.
- Fair number of published reports and gray literature on this species throughout its range.

Additional Research or Surveys Needed

- Little is known on area requirements and other basic habitat needs.
- Determine efficacy of BBS for detecting Nelson's Sparrows and potential factors for increasing trend in North Dakota.

POPULATION AND TREND ESTIMATES

- PIF Global Population Estimate: 1,100,000
- PIF North American Population Estimate: 1,100,000
- PIF North Dakota Population Estimate: 150,000
- North Dakota BBS Trend: see figure 23
- Survey-wide BBS Trend 1966-2012: 1.60

MANAGEMENT RECOMMENDATIONS

- Removal of vegetation by burning or mowing may cause negative effects.
- Increase ground cover in areas where short grasses prevail.
- Construction of communication towers should follow the guidance of “Service Interim Guidelines for Recommendations on Communications Tower Siting, Construction, Operation, and Decommissioning” and American Bird Conservancy Collision Program framework.

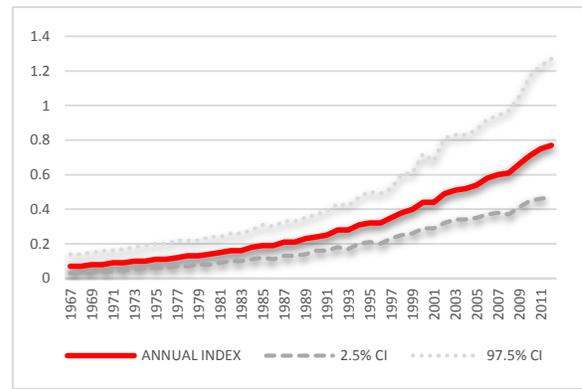


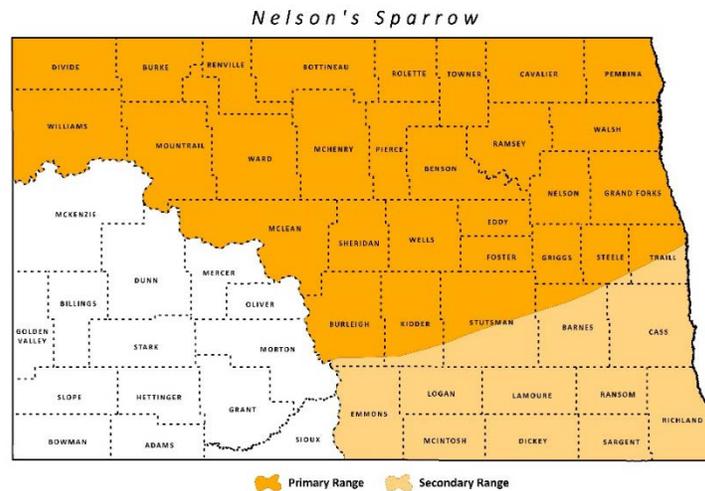
Figure 23. North Dakota Breeding Bird Survey Trend 1967-2012.

MONITORING PLANS

According to the Partners in Flight Landbird Conservation Plan, long-term population trend monitoring such as the Breeding Bird Survey generally produces imprecise trends at the continental scale. Ensuring all BBS routes are conducted annually is priority. Future monitoring proposals should follow recommendations North American Bird Conservation Initiative ‘Opportunities for Improving Avian Monitoring’.

2005-2015 PROGRESS

The Nelson’s Sparrow remains a Level I Species of Conservation Priority. Several State Wildlife Grant Projects (T2-9-R, T2-11-HM, T-18-R, T-21-D, T-22-HM, T-23-HM, T-25-HM, T-27-HM, T-37-D) have contributed to habitat enhancement of wetlands and grasslands for Nelson’s Sparrow and other wetland/grassland dependent birds.



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NORTHERN HARRIER

Scientific Name: *Circus cyaneus*

Species of Conservation Priority:
Level II

General Description: 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 early May to mid-July.

Abundance: Fairly common.

Primary Habitat: Open grasslands, wet meadows, marshes, and areas not heavily grazed.

Federal Status: Migratory Bird.

Reason for Designation: Northern Harriers are showing a slow range-wide decline but appear stable to increasing in North Dakota. However, loss of grassland and CRP in North Dakota may cause populations to decline. Partners in Flight (PIF) identifies the Northern Harrier as a Regional Concern and Stewardship Species and U.S.-Canada Stewardship Species.



Kevin Anderson

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Harriers use relatively open, undisturbed 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, lightly grazed pastures, croplands, shrubby fields and fallow fields are utilized. Nest primarily on the ground in upland grassland in North Dakota, but have been observed using platforms of vegetation over water in other states. Nesting sites selected may be dictated by vole populations, their primary prey. Requires generally large tracts of contiguous grassland <100 ha, but can be found in grassland ranging from 8 to 120 ha. 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.

Key Areas and Conditions for Northern Harrier in North Dakota

No specific sites have been identified.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Conversion of grassland to cropland, energy development and urban expansion. Degradation of grasslands from invasive plants, woody encroachment, succession, and loss of diversity. Loss and degradation of wetlands. In hayfields, early cutting may destroy nests or young. Heavily and moderately grazed grassland or pastures are generally avoided by harriers.

Other Natural or Manmade Factors

Changes in the harrier population size may be closely related to vole populations. A decline in the population between 1947 and 1969 could be attributed to the use of DDT or DDE which caused the thinning of egg shells. The use of insecticides and rodenticides may reduce prey availability. Nest predation is a key source of mortality.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- South Dakota State University (ND SWG T-36-R) is determining breeding ecology of Northern Harriers in south-central North Dakota.

Previous Research or Surveys

- Ducks Unlimited (ND SWG T-3-1 and T-8-R) determined demographic performance of prairie-nesting shorebirds and raptors in North Dakota. The project was initiated in 2004 and a final report provided in 2007. The highest reproductive success for Northern Harrier was in those areas with large amount of wetland area and native grassland, and wetland habitat that has dense nesting cover. Preserving large intact grassland/wetland landscapes are key to safeguarding populations of Northern Harrier (Stephens and Walker 2007).

Additional Research or Surveys Needed

- Nothing identified at this time.

POPULATION AND TREND ESTIMATES

- PIF Global Population Estimate: 1,400,000
- PIF North American Population Estimate: 700,000
- PIF North Dakota Population Estimate: 62,000
- North Dakota BBS Trend: see figure 24
- Survey-wide BBS Trend 1966-2012: -1.03

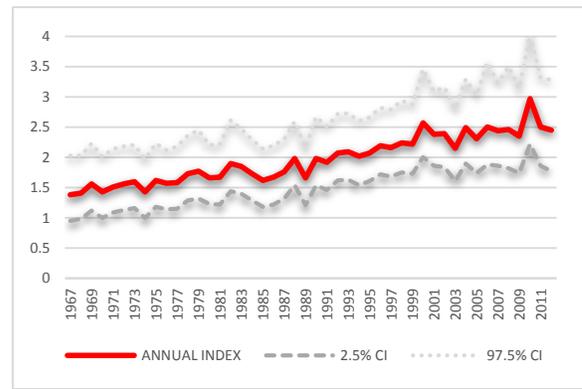


Figure 24. North Dakota Breeding Bird Survey Trend 1967-2012.

MANAGEMENT RECOMMENDATIONS

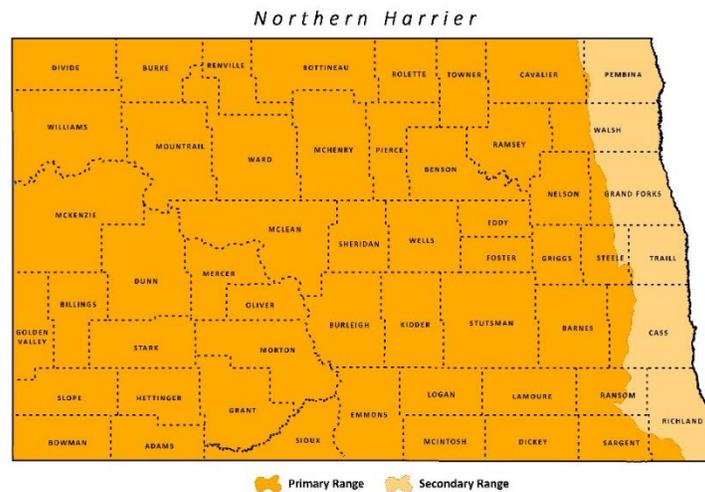
- Protect areas where complexes of high density wetlands and large blocks of grassland remain intact.
- Continue to promote reenrollment of the Conservation Reserve Program.
- Discourage wetland tillage and protect from drainage.
- Mow, burn, or graze grasslands every 2-5 years to maintain tall, dense, upland vegetation.
- Avoid disturbing nesting areas from April through July.
- Minimize human disturbance near nests.
- Do not use chemical pesticides where harriers occur.

MONITORING PLANS

According to the Partners in Flight Landbird Conservation Plan, long-term population trend monitoring such as the Breeding Bird Survey is inadequate in the northern range for this species. Monitoring plans should follow recommendations of the North American Bird Conservation Initiative ‘Opportunities for Improving Avian Monitoring’.

2005-2015 PROGRESS

The Northern Harrier remains a Level II Species of Conservation Priority. Several State Wildlife Grant Projects (T2-9-R, T2-11-HM, T-18-R, T-21-D, T-22-HM, T-23-HM, T-25-HM, T-27-HM, T-37-D) have contributed to habitat enhancement of wetlands and grasslands for Northern Harrier and other wetland/grassland dependent birds.



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NORTHERN PINTAIL

Scientific Name: *Anas acuta*

Species of Conservation Priority:
Level II

General Description: L 21", WS 34", 1.8 lb. Long and slender throughout. Sports a distinctive pointed black tail, white breast, and brown head.

Status: Occurs in North Dakota from March to November. Peak breeding season from early April to early May.

Abundance: Common to abundant.

Primary Habitat: Wetland complexes of open water and associated upland prairie.

Federal Status: Migratory Bird.

Reason for Designation: Identified as a species of High Continental Priority in the North American Waterfowl Management Plan.



Lara Anderson

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Ideal nesting habitat for Northern Pintails is native prairie of low cover interspersed with seasonal or semi-permanent wetlands. CRP, hayfields, pastures, and weedy field borders are utilized. Temporary, seasonal, and semi-permanent wetlands, 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 in particular utilize aquatic invertebrates as an important food source during breeding, as do ducklings until about 6 weeks of age. Pintails may also use cropland ponds with basins of tilled bottom soil; however, nests initiated in croplands are prone to high failure rates. Annual nest success and productivity vary with water conditions, predation, and weather.

Key Areas and Conditions for Northern Pintail in North Dakota
The USFWS Habitat Population Evaluation Team has built spatially explicit models to depict highest densities of breeding pairs of ducks for targeting conservation.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Conversion of grassland to cropland, energy development and wetland drainage. Degradation of grasslands from invasive plants, woody encroachment, succession, and loss of diversity. Wetland loss and/or degradation limit nesting habitat and food resources.

Other Natural or Manmade Factors

The occurrence of lead poisoning in this species is reduced since the ban on lead shot for waterfowl. Destruction of nests initiated in cropland by farm machinery. Predation by mammal species reduces nest success. Mortality from collisions with power lines and wind turbines. Expanding oil and gas development in North Dakota may impact Northern Pintails and there is increasing risk of oilfield contamination to wetlands.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- Traditional waterfowl survey efforts occur annually.
- The effects of oil and gas development on waterfowl and waterfowl production is being studied in North Dakota.
- Southern Illinois University (ND SWG T-43-R) is studying abundance, productivity and nest survival of grassland nesting birds in different vegetation types. A final report is anticipated in 2016.

Previous Research or Surveys

- The U.S. Fish and Wildlife Service (ND SWG T2-10-R) studied waterfowl use of varying habitat types, including dense nesting cover and restored multi-species native plantings. The project was initiated in 2010, a final report was provided in 2014 (Fisher 2014), and thesis in 2012 (Haffele 2012).
- Numerous published reports and gray literature on this species throughout its range and in North Dakota. For a comprehensive list of efforts see the "Bibliography for Northern Pintails."

Additional Research or Surveys Needed

- Contact the North Dakota Game and Fish Department Waterfowl Biologists for most current information needs.

POPULATION AND TREND ESTIMATES

- 2014 Waterfowl Breeding Population: 3,200,000 ± 0.2 million, see figure 25
- North American Waterfowl Management Plan Objective : 5,600,000

MANAGEMENT RECOMMENDATIONS

- Preserve large tracts of grasslands and wetland complexes.
- Maintain a diversity of planted grassland on the landscape, including DNC and multi-species native grassland restoration.
- Maintain grasslands free of or with little woody vegetation.
- Restore hydrology and vegetation to degraded wetlands.
- Include winter cereal crops in crop rotations.
- Leave grassed buffer strips around wetlands and waterways to prevent erosion and runoff into wetlands.
- Delay cutting from April 15 – August 1, and use a stripper header and flushing bars. When cutting, leave the highest possible height (12-24 inches).
- Stocking fish in shallow wetlands is detrimental to waterfowl production.
- Utility development should follow the guidance of “Reducing Avian Collisions with Power Lines” including marking power lines and creating an Avian Protection Plan.
- Wind industry companies should collaborate with the American Wind and Wildlife Institute for responsible wind development.

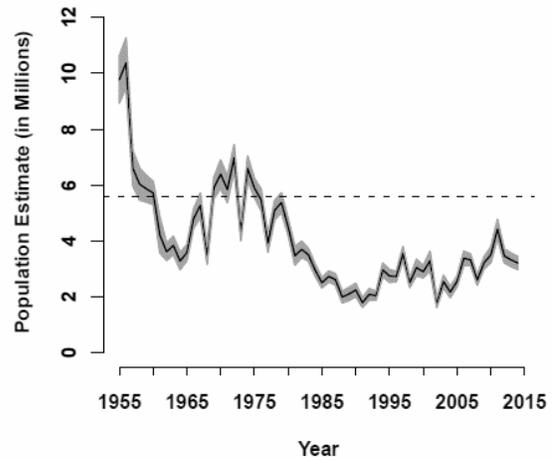


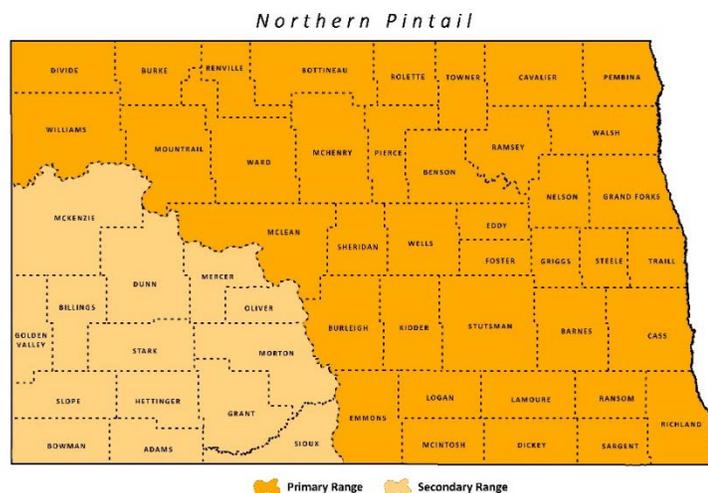
Figure 25. North American combined breeding population estimate of Northern Pintail, 90% confidence intervals, and NAWMP population goals (dashed line) 1967-2014. Data from the U.S. Fish and Wildlife Service waterfowl breeding population survey.

MONITORING PLANS

For nearly 50 years, the May Waterfowl Breeding Population and Habitat Survey have been in place. In addition, four-square mile and duck brood counts are conducted annually by the U.S. Fish and Wildlife Service. The North Dakota Game and Fish Department also conducts annual mid-July duck brood index surveys. At this time, there appears to be no additional monitoring needs.

2005-2015 PROGRESS

The Northern Pintail remains a Level II Species of Conservation Priority. Several State Wildlife Grant Projects (T2-9-R, T-18-R, T-27-HM) have contributed to habitat enhancement of wetlands for Northern Pintail and other wetland dependent birds.



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PEREGRINE FALCON

Scientific Name: *Falco peregrinus*

Species of Conservation Priority:
Level III

General Description: L 16", WS 41", 1.6 lb. Dark, slate gray back and sports an obvious black "mustache."

Status: Most often seen mid-April through May and September through mid-November. Peak breeding season early May to late July.

Abundance: Rare.

Primary Habitat: Expanses of native prairie, badland complexes, and open waterways.

Federal Status: Migratory Bird.

Reason for Designation: Peregrine Falcons are nearly recovered from steep population declines. Removed from the endangered species list on August 25, 1999. It is included on the National USFWS Birds of Conservation Concern list, and also in Region 6, BCR 11 and 17.



Sandra Johnson

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Peregrine Falcons may be observed using open expanses of native prairie, badland complexes, rocky cliffs overlooking rivers, lakes, or other water in North Dakota. They do not build their own nest, but instead nests in a scraped out hollow on ledges, in crevices of steep sides of buttes, on tall buildings, or other high structures. Prey upon pigeons, grebes, ducks, and a variety of other small to medium sized birds.

Key Areas and Conditions for Peregrine Falcon in North Dakota

No specific sites have been identified. The most recently confirmed naturally occurring nest was in 1954 on Bullion Butte in Billings County.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Loss of nesting sites such as cliffs, ledges, or trees, are often irreplaceable and may be the primary habitat factor limiting peregrines. Peregrines may become comfortable with human activities, hence their tolerance for nesting within city limits.

Other Natural or Manmade Factors

Illegal shooting and the effects of DDT on reproductive success were also to blame for decline of the species; however, since the ban of DDT and stricter enforcement, peregrines have been increasing. The falcons may become infected with trichomoniasis from eating infected doves and pigeons.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- Nothing specific to the species in North Dakota.

Previous Research or Surveys

- Little effort has been directed to specific research or surveys for Peregrine Falcons in North Dakota, other than historical notes on species occurrence or breeding.
- Numerous published reports and gray literature throughout the species range, one of the most studied avian species.

Additional Research or Surveys Needed

- Survey historic or potential nesting sites.

POPULATION AND TREND ESTIMATES

- PIF Global Population Estimate: 140,000
- North Dakota Number of Occupied Nests: 2 on artificial structures

MANAGEMENT RECOMMENDATIONS

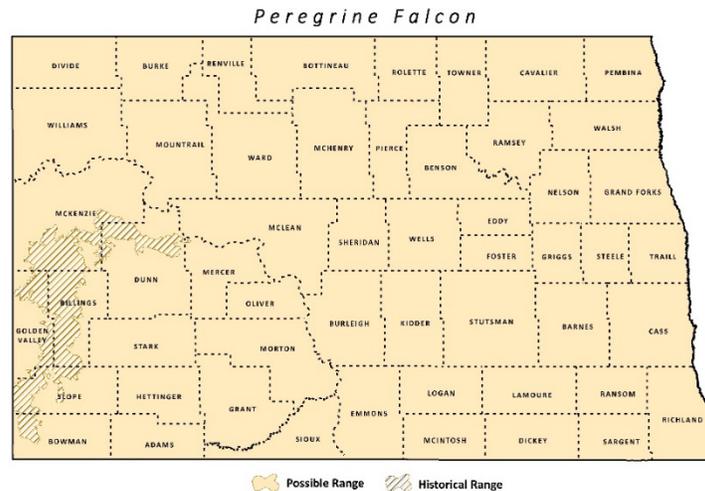
- Maintain a buffer zone of no disturbance around aeries if found (i.e. from roads, mining operations).
- Utility development should follow the guidance of "Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006" and "Reducing Avian Collisions with Power Lines" including marking power lines and creating an Avian Protection Plan.

MONITORING PLANS

According to the Partners in Flight Landbird Conservation Plan, long-term population trend monitoring such as the Breeding Bird Survey produces imprecise trends for this species and is inadequate in the northern range. Most Peregrine Falcons are observed during spring and fall migration. A monitoring plan specific to Peregrine Falcons is not needed, the NDGF will monitor if any potential breeding observations are reported.

2005-2015 PROGRESS

The Peregrine Falcon remains a Level III Species of Conservation Priority.



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PIPING PLOVER

Scientific Name: *Charadrius melodus circumcinctus*

Species of Conservation Priority:
Level II

General Description: 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.

Abundance: Uncommon.

Primary Habitat: Sandy or gravelly beaches and sandbars or alkaline wetlands.

Federal Status: Migratory Bird, Endangered Species.

Reason for Designation: Listed as threatened in 1985. The number of pairs in North Dakota has increased since listing but recovery plan goals have not been met. It is a USFWS Bird of Conservation Concern in Region 6, BCR 11 and 17. Endangered Species Act Listed in Shorebirds of Conservation Concern 2015.



Lara Anderson

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Generally characterized as using exposed, sparsely vegetated shores and islands of shallow, alkali lakes and impoundments for breeding. 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.

Key Areas and Conditions for Piping Plover in North Dakota

The Alkali Lakes Core Area. Critical Habitat has also been designated by the USFWS. Many plovers also nest on sandbars of the Missouri River.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

As a result of channelization, irrigation, and dam construction along the Missouri River, the sandbar habitat for nesting has been drastically altered. Current river flows do not mimic the natural river flows instrumental in forming sandbar habitat. High water releases during peak breeding season may flood nests. Encroachment of woody vegetation onto sandbars reduces nesting habitat availability. A wet cycle in North Dakota, beginning in 1993, has resulted in high water levels on alkali lakes and inundating breeding habitat.

Other Natural or Manmade Factors

Predation by several species of avian and mammalian predators is of concern. Mortality from collisions with power lines and collisions with wind turbines is of increasing concern. Intensifying oil and gas development in North Dakota overlaps with much of the breeding range of Piping Plovers and there is increasing risk of oilfield contamination to alkali lakes and the Missouri River system.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- The U.S. Army Corps of Engineers annually surveys Piping Plovers along the Missouri River system. The program was initiated in 1993. The number of nests, nest success, destroyed nest fate, the number of chicks fledged, and the fledge ratio are calculated.
- The USFWS and The Nature Conservancy monitor Piping Plovers on alkali lakes.
- Northern Prairie Wildlife Research Center is conducting comprehensive surveys and research on various aspects of least tern and Piping Plover habitat, demographics, population dynamics, foraging ecology, and monitoring in the entire Missouri River system.
- The University of North Dakota is using miniature surveillance cameras at least tern and Piping Plover nests to provide information about predators and behavior.

Previous Research or Surveys

- Foraging ecology of Northern Great Plains Piping Plovers, habitat use and reproductive success, breeding density, and

breeding success on engineered sandbars are just some examples of studies on Piping Plovers in North Dakota.

- Numerous published reports and gray literature for the species throughout its range.

Additional Research or Surveys Needed

- Nothing at this time specific to North Dakota.

POPULATION AND TREND ESTIMATES

- Northern Great Plains Population Estimate: 4,662 individuals
- North Dakota Population Estimate: ~300-400 breeding pairs on Missouri River System and ~200-300 breeding pairs on the alkali lakes.
- Northern Great Plains Recover Plan Goal: 650 breeding pairs; 100 on the Missouri River system and 550 pairs on the alkali lakes. See Figure 26. (Note: at time of SWAP review, the NGP Recovery Plan is also being updated and goals may change or the approach may vary)

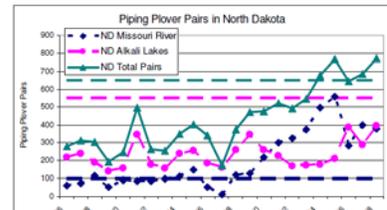


Figure 26. Source: 5-year Review. Number of Piping Plover pairs surveyed in 1986-2008. Dashed lines indicate 1988 recovery plan goals. The Missouri River goals have been exceeded since 1998, but the goal for the alkali lakes has not yet been achieved.

MANAGEMENT RECOMMENDATIONS

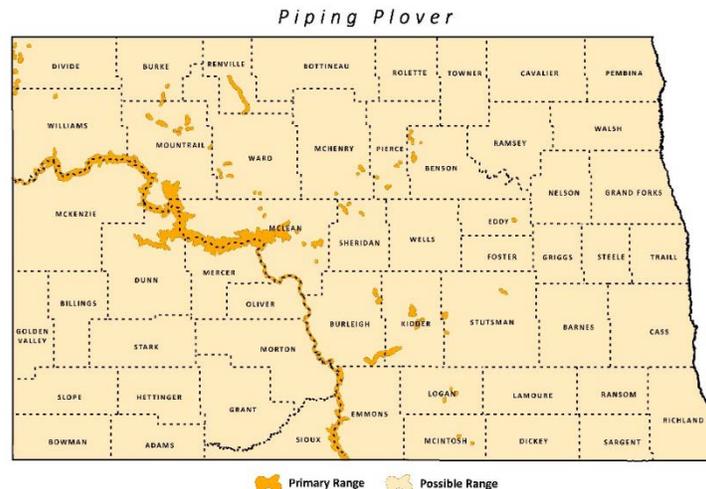
- Continue to implement the recovery plan.
- Mimic natural flows on the Missouri River to create sandbar habitat.
- The creation of dredged islands or clearing of sandbar vegetation may provide new nesting habitat for plovers, but the productivity is presumed to be much less than for natural sites.
- Use mechanical and chemical applications to remove vegetation.
- If needed, limit human access to sandbars or sensitive areas where plovers are nesting.
- 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.
- Provide alternate sources for cattle to reduce cattle use of shorelines.
- Utility development should follow the guidance of “Reducing Avian Collisions with Power Lines” including marking power lines and creating an Avian Protection Plan.
- Wind industry companies should collaborate with the American Wind and Wildlife Institute for responsible wind development.

MONITORING PLANS

Continue to work with the U.S. Army Corps of Engineers and the U.S. Fish and Wildlife Service on long-term monitoring of Piping Plovers along the Missouri River System. Northern Prairie Wildlife Research Center staff have identified a proposed revision of the monitoring program (see Shaffer et al. 2013).

2005-2015 PROGRESS

The Piping Plover remains a Level II Species of Conservation Priority. The 5-year review concludes the Northern Great Plains Piping Plover population remains likely to become endangered, although not in current danger of extinction.



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PRAIRIE FALCON

Scientific Name: *Falco mexicanus*

Species of Conservation Priority:
Level II

General Description: L 16", WS 40", 1.6lb. Brown overall, sports a thin "mustache" and a white breast speckled with brown spots.

Status: Year-round, some migratory. Peak breeding season April to July.

Abundance: Uncommon.

Primary Habitat: Expanses of native prairie, the badlands, and high cliffs along stream valleys or isolate buttes.

Federal Status: Migratory Bird.

Reason for Designation: The status of Prairie Falcons in North Dakota is unclear. It is on the USFWS Bird of Conservation Concern list in Region 6 and BCR 17. Partners in Flight (PIF) identifies the Prairie Falcon as a Regional Concern Species.



Sandra Johnson

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Shortgrass prairie, shrubsteppe, 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 usually located in 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 (particularly horned larks), lizards, and other small rodents.

Key Areas and Conditions for Prairie Falcon in North Dakota

No specific sites have been identified. However, many current and former aeries are known.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Destruction or degradation of native prairie resulting in the loss of foraging habitat or prey species may impact populations. Grazing does not appear to affect falcons.

Other Natural or Manmade Factors

Illegal shooting may be a cause of mortality. Prairie Falcons were sensitive to pesticides such as DDT which resulted in lost productivity. Oil and gas development does not appear to significantly impact breeding falcons, but too much blasting close to the nest may have minor ramifications. 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. Mortality from collisions with fences occurs.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- Nothing specific to the species in North Dakota.

Previous Research or Surveys

- A survey of Prairie Falcons in parts of southwest North Dakota in 1976 and 1977 resulted in 27 active aeries (Postovit 1979).
- In the mid 1980s, Prairie Falcons were resurveyed in the southwest and a population estimate of 107±77 birds was determined (Allen 1985).
- Prairie Falcon aeries within the administrative boundaries of the Little Missouri National Grasslands were surveyed in 2002. At least 7 of 88 surveyed nest sites were found to be active (Knowles 2002).

Additional Research or Surveys Needed

- Survey historic or potential nesting sites. Resurvey all known aeries and conduct a comprehensive review of the previous survey and research efforts in the southwest. Prairie Falcons have been surveyed several times in the past 25 years but the study areas, timing, and methods have varied greatly. A comprehensive and precise survey should be conducted for the entire southwest to determine the actual distribution and abundance of Prairie Falcons.
- Explore the effects of management practices on Prairie Falcons and associated prey species.

POPULATION AND TREND ESTIMATES

- PIF Global Population Estimate: 80,000
- PIF North American Population Estimate: 70,000
- PIF North Dakota Population Estimate: 700

MANAGEMENT RECOMMENDATIONS

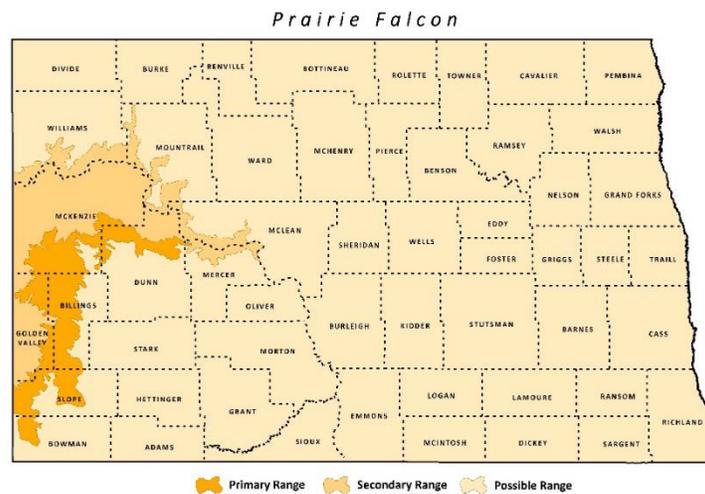
- Ensure new power lines are constructed to specifications that prevent raptor electrocutions.
- Maintain grasslands complexes including CRP.
- Preserve ground squirrel colonies and habitats near falcon nest sites.
- Maintain buffer zones around aeries.
- Mining operations should not be conducted within 0.8-1.6 km of nest sites, blasting should not occur within 125 m, and no more than three blasts per day.
- Artificial aeries may be created on southwest-facing slopes of non-eroding rock, at least 14m tall, about two-thirds the height of the nest cliff, and floor should be about 7,000 cm².

MONITORING PLANS

According to the Partners in Flight Landbird Conservation Plan, long-term population trend monitoring such as the Breeding Bird Survey produces imprecise trends for this species. Continue to maintain a list of known Prairie Falcon nest sites. Monitoring plans should follow recommendations of the North American Bird Conservation Initiative 'Opportunities for Improving Avian Monitoring'.

2005-2015 PROGRESS

The Prairie Falcon remains a Level I Species of Conservation Priority. A nest site spatial database has been developed and is being used to minimize impacts to nesting falcons.



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RED KNOT (RUFA)

Scientific Name: *Calidris canutus rufa*

Species of Conservation Priority:
Level III

General Description: L 10.5", WS 23", 4.7 oz. Red or dull gray belly, olive-yellow legs.

Status: Migrates through North Dakota in mid-May and mid-September to October.

Abundance: Rare.

Primary Habitat: Sandy or gravelly beaches and sandbars or alkaline wetlands.

Federal Status: Migratory Bird, Endangered Species.

Reason for Designation: Listed as federally threatened in December 2014. The species may occur annually in the state although in extremely low numbers. It is included on the National USFWS Birds of Conservation Concern list. Endangered Species Act Listed in Shorebirds of Conservation Concern 2015.



U.S. Fish and Wildlife Service

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Although Red Knots use primarily marine habitats on their breeding and wintering grounds, both alkaline and freshwater lakes have been used in North Dakota during migration. Red Knots have been observed in the Missouri River system as well as sewage lagoons and large permanent freshwater wetlands.

Key Areas and Conditions for Red Knot in North Dakota

The observations of Red Knots in North Dakota are scattered throughout the state. There are no stopover sites consistently used by Red Knots.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Degradation of large wetlands.

Other Natural or Manmade Factors

Expanding oil and gas development in North Dakota overlaps with migration range and there is increasing risk of oilfield contamination to alkali lakes and the Missouri River system.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- Nothing specific to the species in North Dakota.
- Geolocator results indicate use of the central flyway for birds wintering in Texas, but also some switching between the central and Atlantic flyway.

Previous Research or Surveys

- Shorebird migration survey and observation data (1999).
- Numerous published reports and gray literature for the species in the Atlantic Coast range.

Additional Research or Surveys Needed

- Determine the extent of Red Knot migration stopover use in North Dakota.

POPULATION AND TREND ESTIMATES

- North American Population Estimate 2012: 42,000
- North Dakota Migration Estimate: <100

MANAGEMENT RECOMMENDATIONS

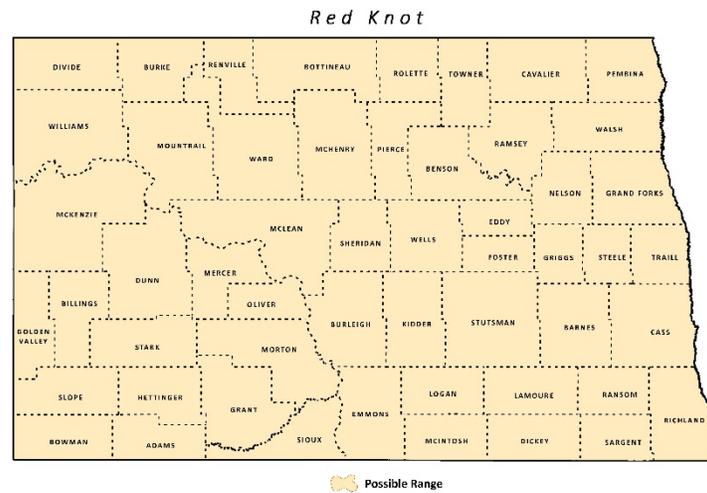
- Mimic natural flows on the Missouri River to create sandbar habitat.

MONITORING PLANS

A monitoring plan specific to Red Knots is unlikely, however, implementation of an all shorebird monitoring program could be considered. A shorebird monitoring plan should follow The International Shorebird Survey (ISS) Program for Regional and International Shorebird Monitoring (PRISM) and "Guidance for Developing and Implementing Effective Shorebird Surveys."

2005-2015 PROGRESS

The Red Knot has been added as a Level III Species of Conservation Priority.



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RED-HEADED WOODPECKER

Scientific Name: *Melanerpes erythrocephalus*

Species of Conservation Priority:
Level I

General Description: 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.

Abundance: Fairly common to rare.

Primary Habitat: Natural stands of mature deciduous trees along river bottoms, shelterbelts, wooded areas of towns.

Federal Status: Migratory Bird.

Reason for Designation: Red-headed Woodpeckers have experienced a significant population decline in North Dakota and throughout their range. It is included on the National USFWS Birds of Conservation Concern list, and also in Region 6, BCR 11 and 17 Partners in Flight (PIF) identifies the Red-headed Woodpecker as a Regional Concern Species, U.S.-Canada Concern Species, and a Common Species in Steep Decline.



NDGFD

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred 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.

Key Areas and Conditions for Red-headed Woodpecker in North Dakota

No specific sites have been identified. The upper portion of the Little Missouri River, the lower Missouri River Valley, and the southern portion of the Red River Valley appears to have supported the highest population.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Destruction and/or degradation of riparian habitat and lack of riparian regeneration are primary limiting factors. Removal of dead trees or branches limits nest site availability.

Other Natural or Manmade Factors

Red-headed Woodpeckers were once a popular target for hunters and a bounty was even offered for each head because of the belief they were major agricultural pests. May be killed by automobiles 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 SURVEY EFFORTS

Current Research or Surveys

- Nothing specific to the species in North Dakota.

Previous Research or Surveys

- Little effort has been applied to research or surveys specifically for Red-headed Woodpeckers in North Dakota.
- Fair number of published reports and gray literature in other areas of the species range, but no in-depth study of this species has been conducted.

Additional Research or Surveys Needed

- The status of the Red-headed Woodpecker in North Dakota is largely unknown. A survey should be conducted to determine the occurrence of this bird in North Dakota.
- Explore basic demographic information, ecological relations with other organisms that use nest and roost holes created by the woodpeckers, or the relationship with mast producing trees in North Dakota.
- Explore changes in land use patterns and the effect on Red-headed Woodpeckers.

POPULATION AND TREND ESTIMATES

- PIF Global Population Estimate: 1,200,000
- PIF North American Population Estimate: 1,200,000
- PIF North Dakota Population Estimate: 7,000
- North Dakota BBS Trend: see figure 27
- Survey-wide BBS Trend 1966-2012: -2.59

MANAGEMENT RECOMMENDATIONS

- Protect riparian corridors.
- Leave snags and dead trees.
- Plant mast producing trees such as oak.
- Remove starlings if competition is present.
- Construction of communication towers should follow the guidance of “Service Interim Guidelines for Recommendations on Communications Tower Siting, Construction, Operation, and Decommissioning” and American Bird Conservancy Collision Program framework.

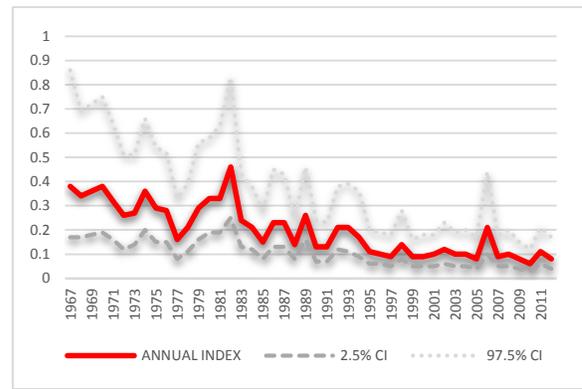


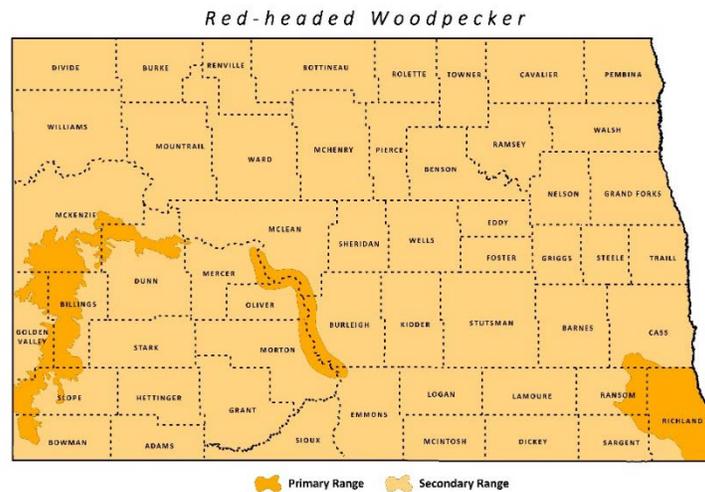
Figure 27. North Dakota Breeding Bird Survey Trend 1967-2012.

MONITORING PLANS

According to the Partners in Flight Landbird Conservation Plan, long-term population trend monitoring such as the Breeding Bird Survey is generally considered adequate, but may not account for some issues (e.g. bias). Ensuring all BBS routes are conducted annually is priority.

2005-2015 PROGRESS

The Red-headed Woodpecker has moved from a Level II to a Level I Species of Conservation Priority.



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SHARP-TAILED GROUSE

Scientific Name: *Tympanuchus phasianellus*

Species of Conservation Priority:
Level II

General Description: L 17", WS 25", 1.9lb. Light-colored overall with heavy dark barring on back, head, and wings. Also sports a pointed tail, yellow crest above the eye, and purple air sacs.

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

Abundance: Fairly common.

Primary Habitat: Mixed-grass prairie interspersed with shrubs.

Federal Status: None.

Reason for Designation: Although rather common in North Dakota, this species is showing a slight decrease in population rangewide. It is estimated as much as 1/3 of the entire population resides in the state, making North Dakota part of its core range. Partners in Flight (PIF) identifies the Sharp-tailed Grouse as a Regional Stewardship Species and a U.S.-Canada Stewardship Species.



Craig Bihrie

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Sharp-tailed Grouse are most often found in relatively undisturbed mixed-grass prairie with patches of small trees and shrubs. CRP grasslands are also 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 fairly close, often within 0.5 mile, to then lek. Nest in lightly grazed native prairie, haylands, CRP, and may be located close to the margin of a thicket of shrubs or small trees.

Switchgrass has been shown to provide an important habitat component in southeastern North Dakota. During winter grouse depend more on forested habitats, particularly during harsher winters. Feed primarily on buds, seeds, insects, fruits, and forbs.

Key Areas and Conditions for Sharp-tailed Grouse in North Dakota

Most common in the Missouri Slope region. Many leks have been identified throughout the state. These and the surrounding area (at a minimum, within 1 mile) should be of top priority for conservation.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Conversion of grassland to cropland, energy development and urban expansion. Degradation of grasslands from invasive plants, woody encroachment, succession, and loss of diversity. The expiration of CRP grasslands is also of concern and will result in population declines. Degradation due to livestock overuse can also reduce habitat quality.

Other Natural or Manmade Factors

Mortality such as birds flying into electric wires, fences, utility wires, and being hit by automobiles occur. Viewing grouse dancing on leks during the spring is a popular activity. Males appear more tolerant of this disturbance than females.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- The North Dakota Game and Fish Department and several other federal and non-governmental organizations conduct annual lek surveys counting the number of birds present during the breeding season.
- The North Dakota Game and Fish Department and the University of North Dakota are evaluating the impacts of oil and gas development on Sharp-tailed Grouse.

Previous Research or Surveys

- Fair number of published reports and gray literature on the species throughout its range and in North Dakota.

Additional Research or Surveys Needed

- Contact the North Dakota Game and Fish Department Upland Game Biologists for most current information needs.

POPULATION AND TREND ESTIMATES

- PIF Global Population Estimate: 600,000
- PIF North American Population Estimate: 600,000
- PIF North Dakota Population Estimate: 170,000
- North Dakota BBS Trend: see figure 28
- Survey-wide BBS Trend 1966-2012: 0.33

MANAGEMENT RECOMMENDATIONS

- Protect leks and the surrounding habitat from loss or destruction.
- Plant a mixture of grasses and forbs when reclaiming cropland to grassland.
- 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.
- Delay cutting from April 15 – August 1, and use a stripper header and flushing bars. When cutting, leave the highest possible height (12-24 inches).
- Conscientious use of pesticides.
- Avoid constructing fences through or near leks and install visibility markers to existing fences.
- Utility development should follow the guidance of “Reducing Avian Collisions with Power Lines” including marking power lines and creating an Avian Protection Plan.

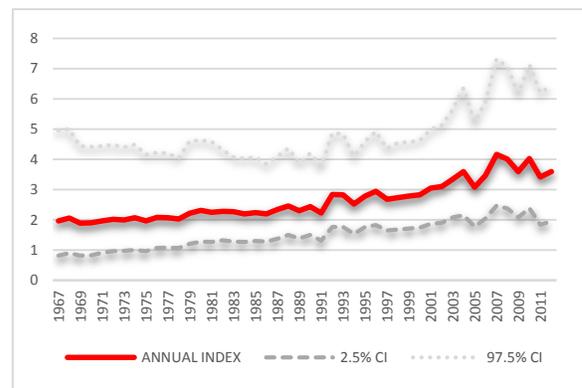


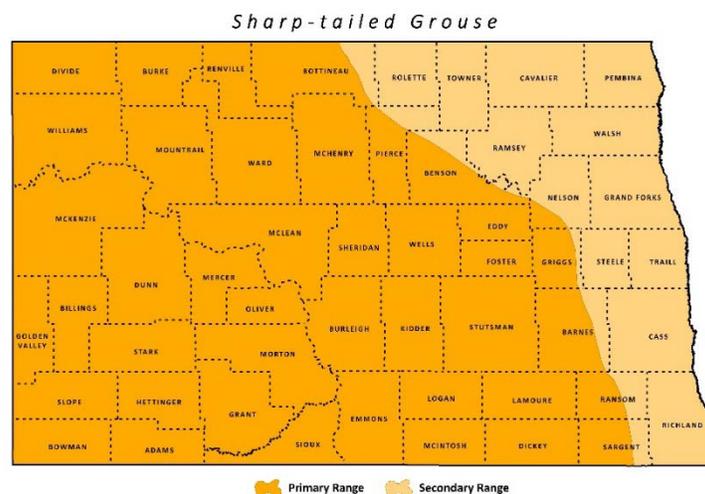
Figure 28. North Dakota Breeding Bird Survey Trend 1967-2012.

MONITORING PLANS

According to the Partners in Flight Landbird Conservation Plan, long-term population trend monitoring such as the Breeding Bird Survey produces imprecise trends for this species. No additional monitoring is needed at this time as the NDGFD will continue in the lead role of obtaining population data on Sharp-tailed Grouse.

2005-2015 PROGRESS

The Sharp-tailed Grouse remains a Level I Species of Conservation Priority. Several State Wildlife Grant Projects (T2-11-HM, T-18-R, T-20-D, T-21-D, T-22-HM, T-23-HM, T-25-HM, T-28-L, T-37-D) have contributed to habitat enhancement grasslands for Sharp-tailed Grouse and other grassland dependent birds.



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SHORT-EARED OWL

Scientific Name: *Asio flammeus*

Species of Conservation Priority:
Level II

General Description: L 15", WS 38", 12 oz. Yellowish-brown, spotted back and subtle ear tufts on a large round head.

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

Abundance: Fairly common to uncommon.

Primary Habitat: Open grasslands, native prairie, wet meadows, or hayfields.

Federal Status: Migratory Bird.

Reason for Designation: Long-term, range-wide declining trend. It is included on the National USFWS Birds of Conservation Concern list, and also in Region 6, BCR 11 and 17, Partners in Flight (PIF) identifies the Short-eared Owl as a Regional Concern Species and a Common Bird in Steep Decline.



Chris Grondahl

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Short-eared Owls are found in large expanse of open grassland and wetland areas. An area of >100 ha of grassland is likely required for successful production. Native prairie, hayland, retired cropland, small-grain stubble, shrub-steppe, and wet meadow zones of wetlands are utilized. Nest on the ground in dry uplands. Nesting vegetation is generally 30-60 cm high with 2-8 years of accumulated residual vegetation. Primary prey includes small mammals, particularly *Microtus* voles.

Key Areas and Conditions for Short-eared Owl in North Dakota

No specific sites have been identified. CRP grassland is important habitat for Short-eared Owls. Populations fluctuate yearly due to variation in small mammal populations and the nomadic nature of the species.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Conversion of grassland to cropland, energy development and urban expansion. Degradation of grasslands from invasive plants, woody encroachment, succession, and loss of diversity. The loss of CRP in particular will limit nesting habitat.

Other Natural or Manmade Factors

Human induced declines of prey abundance. Illegal killing by poachers may occur. Early haying or mowing could destroy nest or young birds. Collisions with man-made structures and vehicles occur.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- Nothing at this time.

Previous Research or Surveys

- Ducks Unlimited (ND SWG T-3-1 and T-8-R) determined demographic performance of prairie-nesting shorebirds and raptors in North Dakota. The project was initiated in 2004 and a final report provided in 2007. The highest reproductive success for Short-eared Owl was in those areas with large amount of wetland area and native grassland, and wetland habitat that has dense nesting cover. Preserving large intact grassland/wetland landscapes are key to safeguarding populations of Short-eared Owls (Stephens and Walker 2007).

Additional Research or Surveys Needed

- Further explore demographic parameters between landscapes.
- Lack of adequate understanding of small mammal population dynamics and management strategies for them, and how this affects owl populations.
- Temporal and spatial variation in owl movements.

POPULATION AND TREND ESTIMATES

- PIF Global Population Estimate: 3,000,000
- PIF North American Population Estimate: 600,000
- PIF North Dakota Population Estimate: 19,000
- North Dakota BBS Trend: see figure 29
- Survey-wide BBS Trend 1966-2012: -2.48

MANAGEMENT RECOMMENDATIONS

- Create and protect large, open areas of a mosaic of grasslands and wetlands.
- Periodically burn, mow, or graze to maintain 2-8 year old accumulations of residual vegetation.
- In tallgrass prairie, burn, mow, or graze every 2-5 years to maintain habitat for small mammal prey.

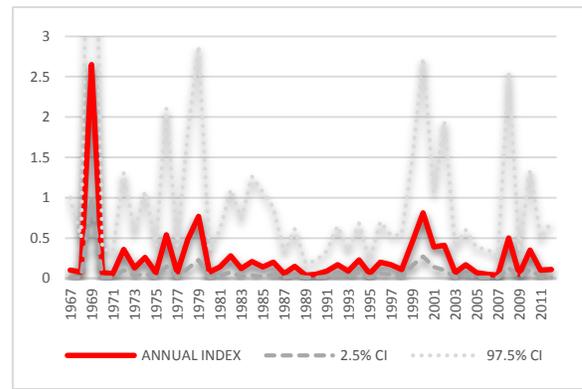


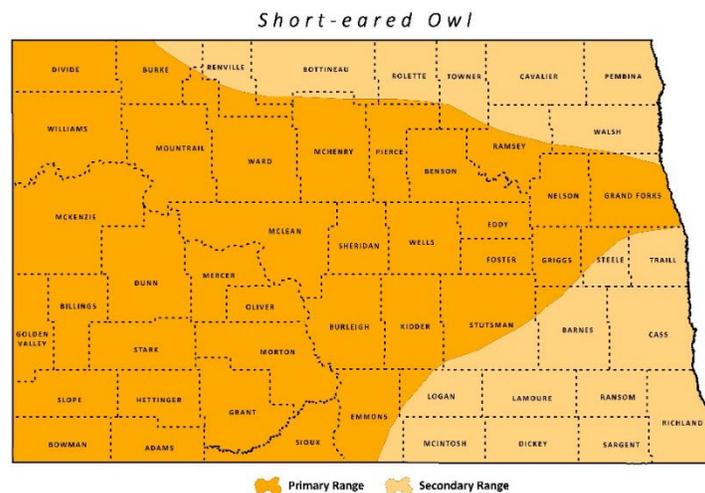
Figure 29. North Dakota Breeding Bird Survey Trend 1967-2012.

MONITORING PLANS

According to the Partners in Flight Landbird Conservation Plan, long-term population trend monitoring such as the Breeding Bird Survey is inadequate in the northern range for this species. A coordinated approach should be adopted for long-term monitoring of the Short-eared Owl. Monitoring plans should follow recommendations of the North American Bird Conservation Initiative ‘Opportunities for Improving Avian Monitoring’.

2005-2015 PROGRESS

The Short-eared Owl remains a Level II Species of Conservation Priority. Several State Wildlife Grant Projects (T2-9-R, T2-11-HM, T-18-R, T-21-D, T-22-HM, T-23-HM, T-25-HM, T-27-HM, T-37-D) have contributed to habitat enhancement of wetlands and grasslands for Short-eared Owls and other wetland/grassland dependent birds.



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SPRAGUE'S PIPIT

Scientific Name: *Anthus spragueii*

Species of Conservation Priority:
Level I

General Description: 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 mid-April to mid-October. Peak breeding season early May to mid-August.

Abundance: Uncommon.

Primary Habitat: Extensive tracts of native mixed-grass prairie, ungrazed or lightly grazed prairie.

Federal Status: Migratory Bird.
Candidate species.

Reason for Designation: Declining due to loss and degradation of prairie habitat. Has a restricted breeding range in North America, limited primarily to Montana, North Dakota, and central Canada. It is included on the National USFWS Birds of Conservation Concern list, and also in Region 6, BCR 11 and 17. Partners in Flight (PIF) identifies the Sprague's Pipit as a Regional Concern and Stewardship Species, U.S.-Canada Concern and Stewardship Species, and a Tri-national Concern Species.



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LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Sprague's Pipits require native grasslands of intermediate height and sparse to intermediate vegetation density, low forb density, and little bare ground but low litter depth. Introduced grasslands may be utilized, but to a much lesser extent. Pipits are most abundant in idle grasslands, but are tolerant of light to moderate grazing. Abundance positively correlated with percent clubmoss cover and dominated by native grass species. Negatively correlated with high percent grass cover, litter depth, low-growing shrubs, and plant communities of Kentucky bluegrass. Avoid areas with woody vegetation and deep litter. The species appears area sensitive, requiring large grasslands of at least 190 ha. Forages primarily on arthropods.

Key Areas and Conditions for Sprague's Pipit in North Dakota

No specific sites have been identified. Highest density of this species occurs in northwestern and north central North Dakota, particularly McHenry County.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Conversion of grassland to cropland, energy development and urban expansion. Degradation of grasslands from invasive plants, woody encroachment, succession, and loss of diversity. Loss of native prairie in North Dakota has greatly affected this species. Overgrazing can cause unfavorable breeding conditions. Encroachment of woody vegetation will also cause negative impacts. Occurrence declines with increasing tall shrub (>1m) cover and by increasing brush (<1m) cover.

Other Natural or Manmade Factors

Rates of brood parasitism by brown-headed cowbirds is low. There is no information on the effects of pesticides or other human induced factors. Grassland birds avoid habitat within 150 meters of roads and 350 meters of oilfield infrastructure, likely due to anthropogenic disturbance of heavy traffic and/or changes in habitat near oil development.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- Rocky Mountain Bird Observatory (ND SWG T-XX-R) is estimating demographic rates of Sprague's Pipit and other grassland birds in western North Dakota. A final report is anticipated in 2018.

Previous Research or Surveys

- University of Montana (ND SWG T-1-R) developed breeding bird models which link population density to local and landscape habitat features in the Prairie Pothole Region of North Dakota. Sprague's Pipit was one of 16 grassland bird focal species. The project was initiated in 2002, a final report was provided in 2004 (Naugle 2005), and dissertation in 2007 (Quamen 2007). Further analysis of the data was recently analyzed on 5 study species (Doherty et al. in press). Sprague's Pipit showed avoidance of cropland or selection for grassland at both the landscape and local scales, avoidance for exotic grasses, and showed negative relationship to visual obstruction.

- Fair number of published reports and gray literature on this species throughout its range.

Additional Research or Surveys Needed

- Determine the effect of Kentucky bluegrass invasion on Sprague’s Pipit presence/abundance.

POPULATION AND TREND ESTIMATES

- PIF Global Population Estimate: 900,000
- PIF North American Population Estimate: 900,000
- PIF North Dakota Population Estimate: 60,000
- North Dakota BBS Trend: see figure 30
- Survey-wide BBS Trend 1966-2012: -3.47

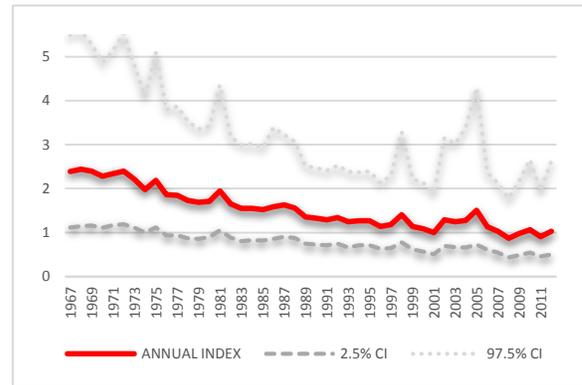


Figure 30. North Dakota Breeding Bird Survey Trend 1967-2012.

MANAGEMENT RECOMMENDATIONS

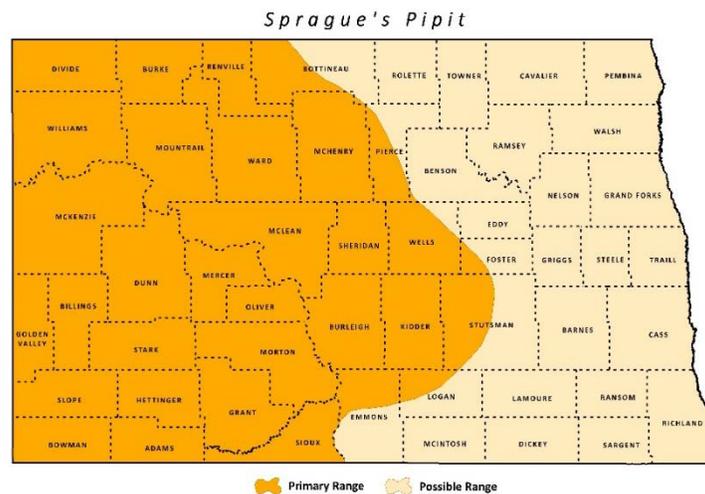
- Protect or create large tracts of grassland, particularly native prairie.
- Maintain grasslands free of woody vegetation.
- Burn grassland every 2-4 years.
- Mow hayland using a rotational schedule of every other year.
- Delay mowing until after 15 July.
- Restore cropland to native vegetation.

MONITORING PLANS

According to the Partners in Flight Landbird Conservation Plan, long-term population trend monitoring such as the Breeding Bird Survey is generally considered adequate, but may not account for some issues (e.g. bias). Ensuring all BBS routes are conducted annually is priority. Future monitoring proposals should follow recommendations North American Bird Conservation Initiative ‘Opportunities for Improving Avian Monitoring’.

2005-2015 PROGRESS

The Sprague’s Pipit remains a Level I Species of Conservation Priority. Several State Wildlife Grant Projects (T2-11-HM, T-18-R, T-20-D, T-21-D, T-22-HM, T-23-HM, T-25-HM, T-28-L, T-37-D) have contributed to habitat enhancement grasslands for Sprague’s Pipit and other grassland dependent birds.



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SWAINSON'S HAWK

Scientific Name: *Buteo swainsoni*

Species of Conservation Priority:
Level I

General Description: L 19", WS 51", 1.9 lb. A large hawk with variable plumage. Most sport a white face and a dark brown "bib."

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

Abundance: Common.

Primary Habitat: Mix of grassland and cropland with thickets of trees.

Federal Status: Migratory Bird.

Reason for Designation: Reduced in relative abundance compared to 1800's. It is included on the National USFWS Birds of Conservation Concern list, and also in Region 6 and BCR 11.



Lara Anderson

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Swainson's Hawks are frequently associated with open grasslands interspersed with scattered trees or shrubs. Uses shortgrass, mixed-grass, tallgrass prairie, riparian areas, isolated trees, shelterbelts, pasture, hayland, cropland, and wetland borders. Most often nest in trees and shrubs that are isolated, clumped, or in a shelterbelt but will occasionally nest on the ground. Primary prey includes small mammals, Richardson's ground squirrels, black-tailed prairie dogs, and insects such as grasshoppers and dragonflies, particularly during migration and on wintering grounds of South America.

Key Areas and Conditions for Swainson's Hawk in North Dakota

Fairly common throughout much of North Dakota except for the Red River Valley.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Human activities since settlement may have increased the availability of nest sites in some areas, e.g. planting shelterbelts. However, the destruction of native prairie could affect Richardson's ground squirrel population in North Dakota, resulting in decreased food availability for Swainson's Hawks.

Other Natural or Manmade Factors

Nest disturbance, depending on timing during incubation, may result in desertion. Nests near roads or land easily accessed by people are less successful than nests away from well-traveled areas. Pesticide contamination does not appear to be a noteworthy factor for reduced nest production from eggshell thinning. Swainson's Hawks are sometimes shot by humans who consider them a pest, or fear they are preying upon game birds. Some mortality from collisions with power lines, wind turbines, vehicles, or electrocution, or getting caught in fences.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- South Dakota State University (ND SWG T-36-R) is determining breeding ecology of Swainson's Hawks in south-central North Dakota (Grovenburg 2015).

Previous Research or Surveys

- University of Oklahoma (ND SWG T-30-R) documented breeding ecology of hawks in relation to energy extraction activities in western North Dakota. The project was initiated in 2011 and a final report was provided in 2012. Nest success for Swainson's Hawks was relatively high, 78% (Wiggins et al. 2012).
- St. Cloud State University (ND SWG T-30-R) documented basic aspects of Swainson's Hawk ecology in North Dakota. The project was initiated in 2004 and a final report/thesis was provided in 2006. Swainson's Hawks were detected with increasing planted grassland and decreasing woodland cover (McCarthy 2006).
- Gilmer and Stewart (1984) studied Swainson's Hawk nesting ecology in North Dakota from 1977 to 1979. Of the 270 occupied nest sites visited, most (43%) were in shelterbelts. Cottonwood trees were the most frequently used (44%) nesting

tree. Wind and hail accounted for nearly 1/3 of the nest failures. Northern pocket gophers (*Thomomys talpoides*) were the most common prey. Nest success was 64% and mean number of young fledged per nest was 1.5.

- Numerous published reports and gray literature on this species throughout its range.

Additional Research or Surveys Needed

- Investigate why populations and productivity continues to decline although suitable habitat remains intact or unoccupied.
- Ecology during migration is unknown.

POPULATION AND TREND ESTIMATES

- PIF Global Population Estimate: 580,000
- PIF North American Population Estimate: 540,000
- PIF North Dakota Population Estimate: 30,000
- North Dakota BBS Trend: see figure 31
- Survey-wide BBS Trend 1966-2012: 0.75

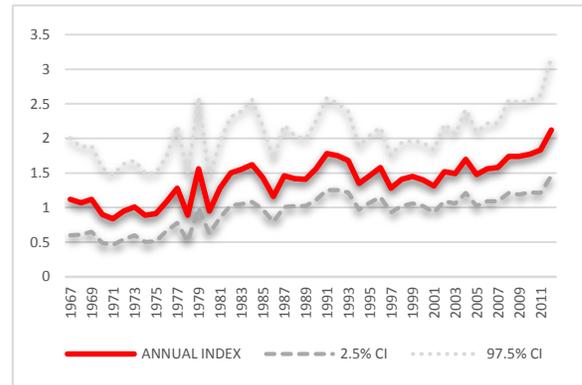


Figure 31. North Dakota Breeding Bird Survey Trend 1967-2012.

MANAGEMENT RECOMMENDATIONS

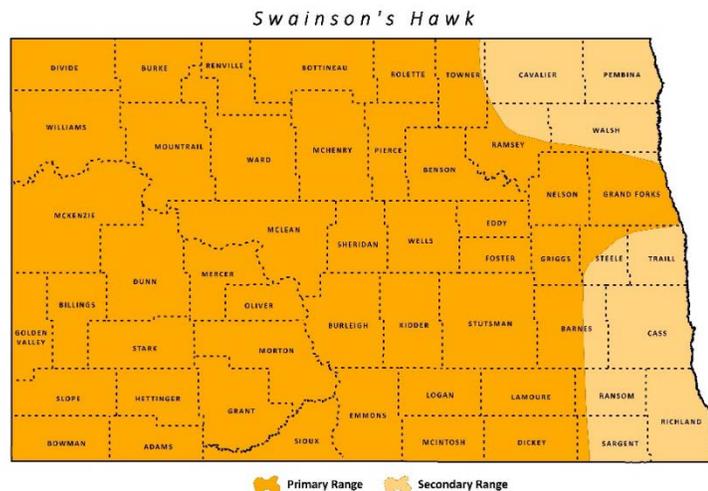
- Protect large tracts of native prairie or grassland.
- Protect existing stands of trees identified as important to Swainson’s Hawks, particularly known nesting sites.
- Do not disturb nests from 1 April to 1 August.
- When converting tree communities to grassland, leave a few individual trees or mosaic of trees.
- Utility development should follow the guidance of “Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006” and “Reducing Avian Collisions with Power Lines” including marking power lines and creating an Avian Protection Plan.
- Wind industry companies should collaborate with the American Wind and Wildlife Institute for responsible wind development.

MONITORING PLANS

According to the Partners in Flight Landbird Conservation Plan, long-term population trend monitoring such as the Breeding Bird Survey is generally considered adequate, but some issues may not have been accounted for (e.g. bias). Monitoring plans should follow recommendations of the North American Bird Conservation Initiative ‘Opportunities for Improving Avian Monitoring’.

2005-2015 PROGRESS

The Swainson’s Hawk remains a Level I Species of Conservation Priority. Several State Wildlife Grant Projects (T2-11-HM, T-18-R, T-20-D, T-21-D, T-22-HM, T-23-HM, T-25-HM, T-28-L, T-37-D) have contributed to habitat enhancement grasslands for Swainson’s Hawk and other grassland dependent birds. A nest site spatial database has been developed and is being used to minimize impacts to nesting hawks.



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UPLAND SANDPIPER

Scientific Name: *Bartramia longicauda*

Species of Conservation Priority:
Level II

General Description: L 12", WS 26", 6 oz. A short yellow bill, long yellow legs, small head, slender neck, and a long tail characterize this shorebird.

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

Abundance: Common.

Primary Habitat: Dry, open mixed-grass prairie. Often uses wooden fence posts for viewing.

Federal Status: Migratory Bird.

Reason for Designation: One-quarter of this species population breeds in the Prairie Pothole Region. Moved from a level I to a level II because populations appear stable to increasing. However, loss of grassland and CRP in North Dakota may cause populations to decline. It is included on the National USFWS Birds of Conservation Concern list, and also in Region 6, BCR 11 and 17. Least Concern in Shorebirds of Conservation Concern 2015.



Lara Anderson

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Upland Sandpipers use native and tame grassland, wet meadows, hayland, pastures, CRP, cropland, highway and railroad rights-of-way. Densities may be highest in moderately grazed areas. Prefer predominantly mixed-grass cover, low to moderate forb cover, moderate litter cover, and little bare ground. Associated vegetation includes wheatgrass, Kentucky bluegrass, green needlegrass, needle-and-thread, buffalo grass, and smooth brome. Forage in short vegetation (<10cm) 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.

Key Areas and Conditions for Upland Sandpiper in North Dakota

No specific sites have been identified. Upland Sandpipers are locally common throughout Prairie Pothole Region and rarer in the Missouri Slope.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Conversion of grassland to cropland, energy development and urban expansion. Degradation of grasslands from invasive plants, woody encroachment, succession, and loss of diversity. Deemed woodland-sensitive, occurrence declines with increasing tall shrub (>1m) cover.

Other Natural or Manmade Factors

Prior to the Migratory Bird Treaty Act, Upland Sandpipers were heavily harvested and nearly extirpated. Shooting may still be a problem in South America, as well as use of insecticides and other agrochemicals. Early mowing can destroy nests or kill the adult female on nest. Death from collisions with vehicles or power lines occurs, but is rare.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- Since 2004, the USFWS HAPET staff has coordinated a breeding shorebird survey in the Prairie Pothole Region of North and South Dakota. Surveys are conducted twice to correspond with the shorebird breeding season. Five grassland breeding shorebird species are targeted, including Upland Sandpiper. Results from these surveys help guide grassland and conservation efforts.

Previous Research or Surveys

- The Nature Conservancy (ND SWG T-31-R) determined grassland bird response to decreased in grazing pressure in the Sheyenne River Delta area. The project was initiated in April 2011 and a final report provided in 2014. Upland Sandpiper abundance was higher in areas with more open, sparse vegetation. They but had a positive relationship with burning, grazing intensity and variability in litter depth but avoided recently burned areas (Ahlering 2014).
- Ducks Unlimited (ND SWG T2-2-R) determined wetland occupancy by shorebirds in wind energy developments in the Prairie Pothole Region of North Dakota. The project was

initiated in 2009 and a final report provided in 2011. Results indicate wind energy was probably not causing substantial reductions in shorebird occupancy, including Marbled Godwits. However, apparent presence of shorebirds was low and potential effects of wind development on shorebird populations needs further research and monitoring (Walker and Gleason 2011).

- Delta Waterfowl (ND SWG T-13-R) determined shorebird nest success and nest-site selection in northeast North Dakota. The project was initiated in 2005 and a final report provided in 2007. Vegetation surrounding shorebird nests was relatively short, sparse, native grass species. Shorebirds avoided sites dominated by invasive plants (e.g. leafy spurge, Canada thistle, Kentucky bluegrass, smooth brome, stinging nettle, and wormwood.) Habitat has a stronger impact on shorebird nest success than predator removal (Wiens 2007).
- Ducks Unlimited (ND SWG T-3-1 and T-8-R) determined demographic performance of prairie-nesting shorebirds in North Dakota. The project was initiated in 2004 and a final report provided in 2007. The highest reproductive success for shorebirds was in those areas with high amounts of grassland, low levels of edge between cropland and grassland, and high amount of wetland area. Preserving large intact grassland/wetland landscapes are key to safeguarding populations of Upland Sandpipers (Stephens and Walker 2007).
- Numerous published reports and gray literature on this species throughout its range.

Additional Research or Surveys Needed

- Demographic information.

POPULATION AND TREND ESTIMATES

- North American Population Estimate 2012: 750,000
- North Dakota BBS Trend: see figure 32
- Survey-wide BBS Trend 1966-2012: -0.23

MANAGEMENT RECOMMENDATIONS

- Maintain large (>100 ha) contiguous blocks of native prairie or grassland.
- Allow some blocks of grassland to be undisturbed during the nesting season.
- Avoid burning and mowing during the nesting season and delay spraying and mowing until July 15.
- Provide display perches such as wooden fence posts.
- Prevent encroachment of or remove woody vegetation.
- Moderate grazing provide diverse grass heights. Delay grazing until late May to early June.

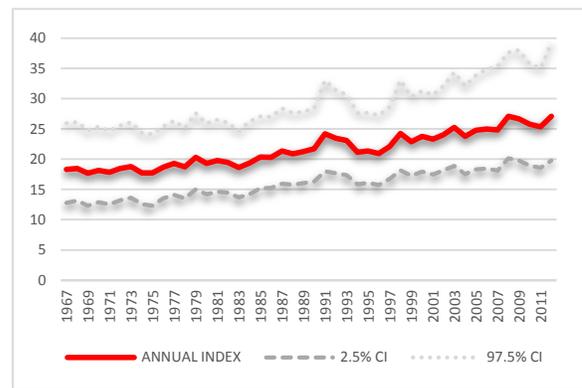


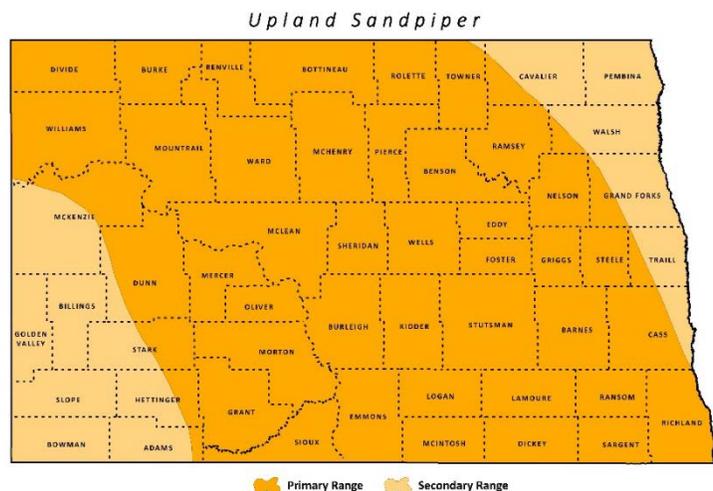
Figure 32. North Dakota Breeding Bird Survey Trend 1967-2012.

MONITORING PLANS

The Breeding Bird Survey continues to be a useful monitoring tool, however the annual surveys implemented by HAPET in 2004 are valuable. Ensuring all BBS routes are conducted annually is priority. A shorebird monitoring plan should follow The International Shorebird Survey (ISS) Program for Regional and International Shorebird Monitoring (PRISM) and “Guidance for Developing and Implementing Effective Shorebird Surveys.”

2005-2015 PROGRESS

The Upland Sandpiper was reassigned from a Level I to a Level II Species of Conservation Priority due to stable population trends. Several State Wildlife Grant Projects (T2-9-R, T2-11-HM, T-18-R, T-21-D, T-22-HM, T-23-HM, T-25-HM, T-27-HM, T-37-D) have contributed to habitat enhancement of wetlands and grasslands for Upland Sandpiper and other wetland/grassland dependent birds.



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WESTERN MEADOWLARK

Scientific Name: *Sturnella neglecta*

Species of Conservation Priority:
Level II

General Description: 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 from March to October. Peak breeding season early May to mid-July.

Abundance: Common to uncommon.

Primary Habitat: Grassland with few or no trees. Perches such as fence posts are used extensively.

Federal Status: Migratory Bird.

Reason for Designation: Although still fairly common in the western 2/3 of North Dakota, the Western Meadowlark is much less common in the eastern 1/3 of the state compared to historical records. The species is showing a steady population decline.



Lara Anderson

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Native and planted grassland are primary habitat. Also occur in roadsides, weedy field borders, and hayland. Avoid very sparse grassland or tall cover. Fence posts are favored perches for singing. Will tolerate some shrubs but less tolerant of higher amount of trees in grassland. Territory size ranges from 3-13 ha. Forages on the ground for grain and weed seeds and insects.

Key Areas and Conditions for Western Meadowlark in North Dakota

No specific areas have been identified.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Conversion of grassland to cropland, energy development and urban expansion. Degradation of grasslands from invasive plants, woody encroachment, succession, and loss of diversity. Loss of tall perches, such as fencing, around grassland habitat may limit use.

Other Natural or Manmade Factors

Brown-headed cowbird parasitism is variable but may be of concern. Confirmed deaths from consuming poisoned grain. Pesticide acute toxicity may be a potential contributor to declines of grassland birds. Grassland birds avoid habitat within 150 meters of roads and 350 meters of oilfield infrastructure, likely due to anthropogenic disturbance of heavy traffic and/or changes in habitat near oil development.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- Southern Illinois University (ND SWG T-43-R) is studying abundance, productivity and nest survival of grassland nesting birds in different vegetation types. A final report is anticipated in 2016.

Previous Research or Surveys

- University of Montana (ND SWG T-1-R) developed breeding bird models which link population density to local and landscape habitat features in the Prairie Pothole Region of North Dakota. Western Meadowlark was one of 16 grassland bird focal species. The project was initiated in 2002, a final report was provided in 2004 (Naugle 2005), and dissertation in 2007 (Quamen 2007).
- Numerous published reports and gray literature on this species throughout its range.

Additional Research or Surveys Needed

- Post-fledgling survival, breeding site fidelity, nest success and adult survival is lacking for Western Meadowlark.

POPULATION AND TREND ESTIMATES

- PIF Global Population Estimate: 85,000,000
- PIF North American Population Estimate: 79,000,000
- PIF North Dakota Population Estimate: 5,600,000
- North Dakota BBS Trend: see figure 33
- Survey-wide BBS Trend 1966-2012: -1.39

MANAGEMENT RECOMMENDATIONS

- Protect or create large tracts of grassland, particularly native prairie.
- Prevent encroachment of woody vegetation in grasslands.
- Encourage vegetative diversity.
- Conduct prescribed burns at varying intervals.
- Delay mowing until July 15.
- Use native grasses when replanting or restoring grassland.

MONITORING PLANS

According to the Partners in Flight Landbird Conservation Plan, long-term population trend monitoring such as the Breeding Bird Survey is generally considered adequate. Ensuring all BBS routes are conducted annually is priority.

2005-2015 PROGRESS

The Western Meadowlark has been added as a Level II Species of Conservation Priority.

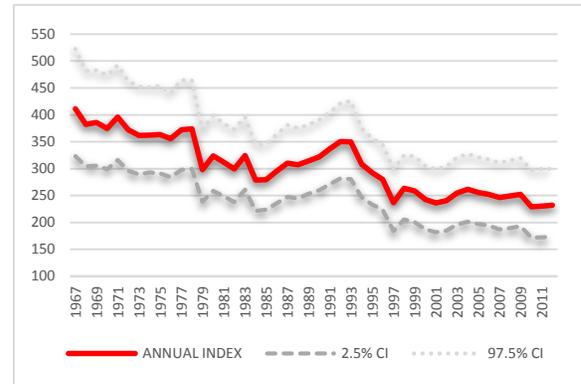
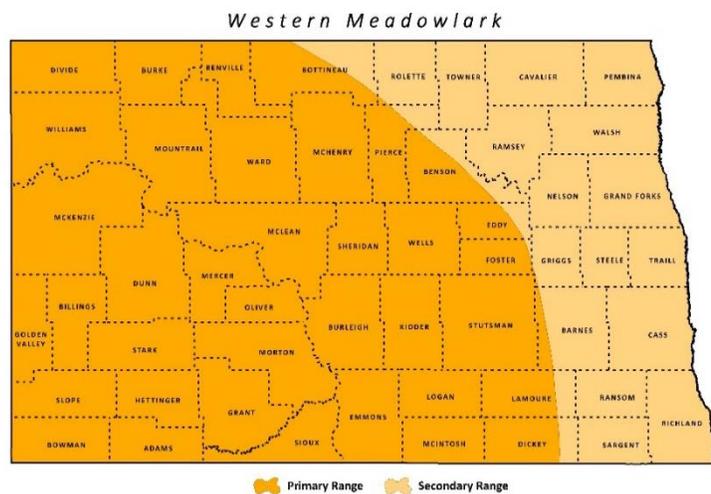


Figure 33. North Dakota Breeding Bird Survey Trend 1967-2012.



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WHOOPING CRANE

Scientific Name: *Grus americana*

Species of Conservation Priority:
Level III

General Description: L 52", WS 87", 15 lb. All white except for black wing tips and a red crown. Long black legs set it apart from white pelicans which are sometimes confused for whoopers.

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

Abundance: Rare.

Primary Habitat: Palustrine wetlands and cropland ponds.

Federal Status: Migratory Bird, Endangered Species.

Reason for Designation: Listed as threatened in 1967 and endangered in 1970. Whooping Cranes formerly nested in North Dakota, but no nests have been recorded for more than 100 years. North Dakota provides important stopover habitat as the few birds left in the wild migrate through during both spring and fall. Listed as High Concern by Waterbird Conservation for the Americas.



Sandra Johnson

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

During migration, use primarily wetlands and cropland ponds for roosting, feeding, or both. Seasonal, temporary and semi-permanent wetlands are the most commonly used. Large, shallow wetlands are used for roosting and smaller wetlands for foraging. Feed mostly on frogs, fish, plant tubers, insects, crayfish, and waste grains during migration.

Key Areas and Conditions for Whooping Crane in North Dakota

A complete listing of named rivers, lakes, and reservoirs where Whooping Cranes have been sighted is in Austin and Richert, 2001. However, key stopover sites may be located anywhere throughout the migration corridor. HAPET has produced spatial models to depict areas important to Whooping Cranes.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Conversion of prairie breeding habitat for agriculture during settlement times, along with unregulated shooting in the late 19th and early 20th century resulted in the survival of only one relic breeding population in the Woods Buffalo National Park in Canada. Wetlands used as stopover habitat by Whooping Cranes remain at risk of destruction.

Other Natural or Manmade Factors

Delayed sexual maturity, small clutch size, and low recruitment rate has precluded a rapid recovery. Whooping Cranes may be easily disturbed, particularly on the breeding grounds. The wintering population along the Gulf Coast in Texas is at risk from contaminant spills, although the probability of a spill is low. Several accidental shootings have occurred in the last few years. Power line collisions are the most common cause of Whooping Crane mortalities in the last 50 years. Collisions with wind turbines is of increasing concern. Loss of genetic diversity. Intensifying oil and gas development in North Dakota overlaps with the migratory corridor of Whooping Cranes and there is increasing risk of oilfield contamination of stopover habitat.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- Since 1975, the public has been asked to provide sightings of Whooping Cranes in North Dakota and in other states.
- Beginning in 2008, the Whooping Crane Tracking Partnership marked wild Whooping Cranes with GPS technology to better understand the migration pathways and wintering ecology of the Aransas-Wood Buffalo Whooping Cranes.

Previous Research or Surveys

- In 2001, a comprehensive review of migration site data was conducted. This includes information for North Dakota.
- Numerous published reports and gray literature.

Additional Research or Surveys Needed

- Nothing at this time specific to North Dakota.

POPULATION AND TREND ESTIMATES

- Continental Population Estimate: 419 (300 wild, 119 captive)
- Whooping Crane Recovery Plan Goal: for downlisting, the Aransas-Wood Buffalo population must be self-sustaining and remain above 1,000 individuals and 250 reproductive pairs.

MANAGEMENT RECOMMENDATIONS

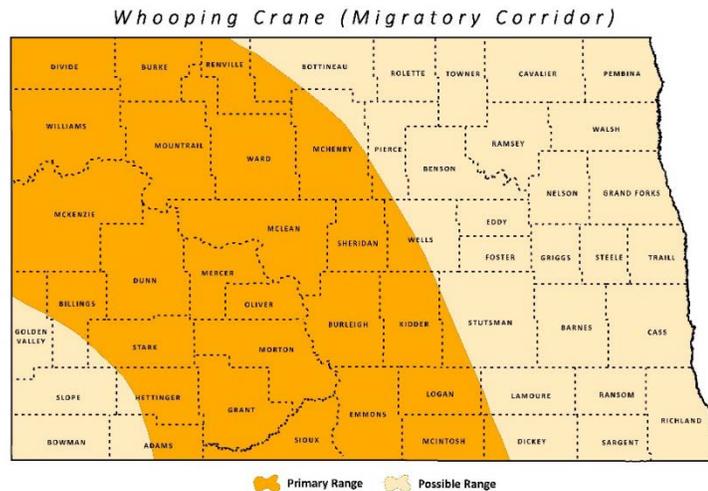
- Continue to implement the recovery plan.
- Safeguard Whooping Cranes as they migrate through North Dakota, i.e. minimize human disturbance.
- Utility development should follow the guidance of “Reducing Avian Collisions with Power Lines” including marking power lines and creating an Avian Protection Plan.
- Wind industry companies should collaborate with the American Wind and Wildlife Institute for responsible wind development.

MONITORING PLANS

Continue to report Whooping Crane sightings in the spring and fall in North Dakota to appropriate key contacts. The Aransas National Wildlife Refuge conducts an annual Whooping Crane census on the wintering grounds in Texas. The Central Flyway Technical Committees work with the U.S. Fish and Wildlife Service to update and develop survey protocol.

2005-2015 PROGRESS

The Whooping Crane is a migrant in North Dakota and therefore remains a Level III Species of Conservation Priority.



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WILLET

Scientific Name: *Tringa semipalmatus*

Species of Conservation Priority:
Level II

General Description: 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 September. Peak breeding season occurs from late May to mid-July.

Abundance: Fairly common.

Primary Habitat: Variety of wetlands associated with upland native grassland.

Federal Status: Migratory Bird.

Reason for Designation: Nearly 50% of this species population, which is showing a moderate decline regionally and nationally, breeds in the Prairie Pothole Region. It has been removed from the USFWS Birds of Conservation Concern list, but the species shows a slight population decline. Watch List species in need of Management Attention in Shorebirds of Conservation Concern 2015.



Sandra Johnson

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Large expanses of short, sparse grasslands, particularly native grassland, are important for nesting and foraging. Prefer idle grassland during nesting, and to a lesser extent grazed pasture, compared to other land uses such as hayland and cropland. 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. Avoid wetlands with dense, emergent vegetation, and prefer shallow-water areas with sparse shoreline vegetation. Nests are located in short grass. Mean territory size is 44.3 ha. Primary foods include insects, small crustaceans, mollusks, and occasionally small fish.

Key Areas and Conditions for Willet in North Dakota

No specific sites have been identified. Densities appear highest in central North Dakota although they are fairly common throughout the Missouri Coteau and Drift Prairie.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Conversion of grassland to cropland, energy development and urban expansion. Degradation of grasslands from invasive plants, woody encroachment, succession, and loss of diversity. Specifically, the loss of native prairie and associated wetlands is the greatest threat to Willets in North Dakota. Over-grazed pastures which are grazed season-long are less attractive to Willets.

Other Natural or Manmade Factors

Insecticides may decrease food availability. Vehicle and power line collisions are one cause of direct mortality. Early mowing can destroy nests or kill the adult on the nest. Nest predation is a key mortality factor.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- Since 2004, the USFWS HAPET staff has coordinated a breeding shorebird survey in the Prairie Pothole Region of North and South Dakota. Surveys are conducted twice to correspond with the shorebird breeding season. Five grassland breeding shorebird species are targeted, including Willet. Results from these surveys help guide grassland and conservation efforts.

Previous Research or Surveys

- Ducks Unlimited (ND SWG T2-2-R) determined wetland occupancy by shorebirds in wind energy developments in the Prairie Pothole Region of North Dakota. The project was initiated in 2009 and a final report provided in 2011. Results indicate wind energy was probably not causing substantial reduction in shorebird occupancy, including Willet. However, apparent presence of shorebirds was low and potential effects of wind development on shorebird populations needs further research and monitoring (Walker and Gleason 2011, Niemuth et al. 2013).
- Delta Waterfowl (ND SWG T-13-R) determined shorebird nest success and nest-site selection in northeast North Dakota. The project was initiated in 2005 and a final report provided in

2007. Vegetation surrounding shorebird nests was relatively short, sparse, native grass species. Shorebirds avoided sites dominated by invasive plants (e.g. leafy spurge, Canada thistle, Kentucky bluegrass, smooth brome, stinging nettle, and wormwood.) Habitat has a stronger impact on shorebird nest success than predator removal (Wiens 2007).

- Ducks Unlimited (ND SWG T-3-1 and T-8-R) determined demographic performance of prairie-nesting shorebirds in North Dakota. The project was initiated in 2004 and a final report provided in 2007. The highest reproductive success for shorebirds was in those areas with high amounts of grassland, low levels of edge between cropland and grassland, and high amount of wetland area. Preserving large intact grassland/wetland landscapes are key to safeguarding populations of Willet (Stephens and Walker 2007).

Additional Research or Surveys Needed

- Demographic information, including fled

POPULATION AND TREND ESTIMATES

- North American Population Estimate 2012: 160,000
- North Dakota BBS Trend: see figure 34
- Survey-wide BBS Trend 1966-2012: -0.50

MANAGEMENT RECOMMENDATIONS

- Provide a diversity of wetlands of varying types and salinity.
- Protect large tracts of native prairie.
- Burning, mowing, and grazing removes litter accumulation and provide shorter, sparser vegetation preferred by Willets.
- Use rotational grazing, delay grazing until late May/early June.

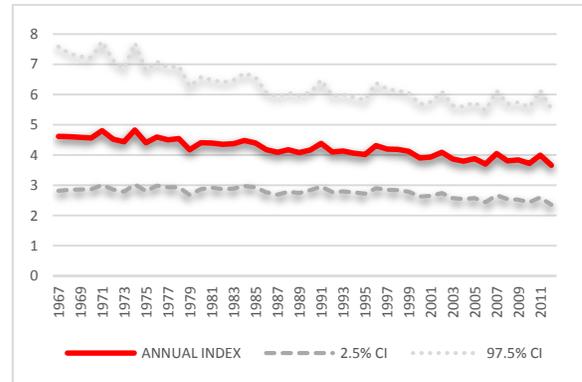


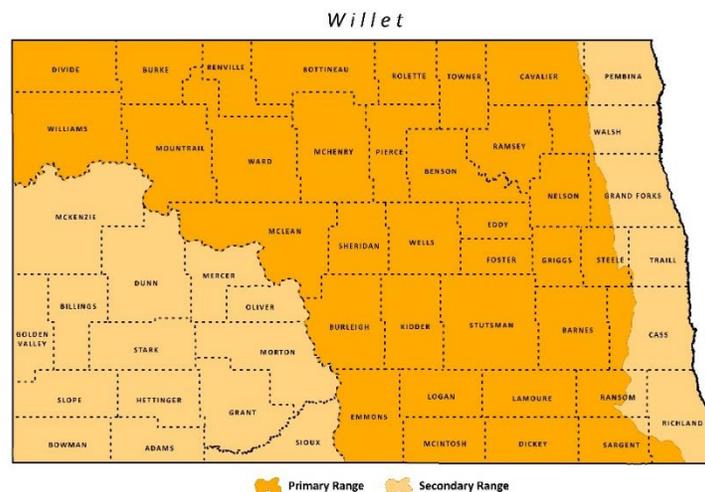
Figure 34. North Dakota Breeding Bird Survey Trend 1967-2012.

MONITORING PLANS

The Breeding Bird Survey continues to be a useful monitoring tool, however the annual surveys implemented by HAPET in 2004 are valuable. Ensuring all BBS routes are conducted annually is priority. A shorebird monitoring plan should follow The International Shorebird Survey (ISS) Program for Regional and International Shorebird Monitoring (PRISM) and “Guidance for Developing and Implementing Effective Shorebird Surveys.”

2005-2015 PROGRESS

The Willet was reassigned from a Level I to a Level II Species of Conservation Priority due to stable to slightly declining population trends. Several State Wildlife Grant Projects (T2-9-R, T2-11-HM, T-18-R, T-21-D, T-22-HM, T-23-HM, T-25-HM, T-27-HM, T-37-D) have contributed to habitat enhancement of wetlands and grasslands for Willet and other wetland/grassland dependent birds.



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WILSON'S PHALAROPE

Scientific Name: *Phalaropus tricolor*

Species of Conservation Priority:
Level I

General Description: 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 September. Peak breeding season occurs from late May to early July.

Abundance: Common to abundant.

Primary Habitat: Shallow wetlands and mudflats, nest in the margins of wetlands.

Federal Status: Migratory Bird.

Reason for Designation: An estimated 1/3 of this species' population breeds in the Prairie Pothole Region. There is uncertainty regarding if the population is indeed declining, some evidence indicates a more stable trend over the short-term, therefore it has been removed from the USFWS Birds of Conservation Concern. Least Concern in Shorebirds of Conservation Concern 2015.



Lara Anderson

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Wetlands with open water, emergent vegetation, and open shoreline are used for foraging, and wet meadows or upland grasslands are used 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 are located in grasses of various heights in idle, hayed, or grazed grasslands adjacent to wetlands. Also nest on islands. Tilled 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. Primary food items include a variety of aquatic invertebrates.

Key Areas and Conditions for Wilson's Phalarope in North Dakota

No specific sites have been identified. Fairly common throughout Missouri Coteau and Drift Plains, particularly the southern portions.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Conversion of grassland to cropland, energy development and urban expansion. Degradation of grasslands from invasive plants, woody encroachment, succession, and loss of diversity. Loss or degradation of wetlands.

Other Natural or Manmade Factors

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. Exposure to agrochemicals is also a concern. Mortality from collisions with power lines. Expanding oil and gas development in North Dakota increases risk of oilfield contamination of wetland habitat.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- Since 2004, the USFWS HAPET staff has coordinated a breeding shorebird survey in the Prairie Pothole Region of North and South Dakota. Surveys are conducted twice to correspond with the shorebird breeding season. Five grassland breeding shorebird species are targeted, including Wilson's Phalarope. Results from these surveys help guide grassland and conservation efforts.

Previous Research or Surveys

- Ducks Unlimited (ND SWG T2-2-R) determined wetland occupancy by shorebirds in wind energy developments in the Prairie Pothole Region of North Dakota. The project was initiated in 2009 and a final report provided in 2011. Results indicate wind energy was probably not causing substantial reductions in shorebird occupancy, including Wilson's Phalarope. However, apparent presence of shorebirds was low and potential effects of wind development on shorebird populations needs further research and monitoring (Walker and Gleason 2011, Niemuth et al. 2013).
- Delta Waterfowl (ND SWG T-13-R) determined shorebird nest success and nest-site selection in northeast North Dakota. The project was initiated in 2005 and a final report provided in

2007. Vegetation surrounding shorebird nests was relatively short, sparse, native grass species. Shorebirds avoided sites dominated by invasive plants (e.g. leafy spurge, Canada thistle, Kentucky bluegrass, smooth brome, stinging nettle, and wormwood.) Habitat has a stronger impact on shorebird nest success than predator removal (Wiens 2007).

- Ducks Unlimited (ND SWG T-3-1 and T-8-R) determined demographic performance of prairie-nesting shorebirds in North Dakota. The project was initiated in 2004 and a final report provided in 2007. The highest reproductive success for shorebirds was in those areas with high amounts of grassland, low levels of edge between cropland and grassland, and high amount of wetland area. Preserving large intact grassland/wetland landscapes are key to safeguarding populations of Wilson’s Phalarope (Stephens and Walker 2007).

- Numerous published reports and gray literature on this species throughout its range and in North Dakota.

Additional Research or Surveys Needed

- Identify key staging areas.

POPULATION AND TREND ESTIMATES

- North American Population Estimate 2012: 150,000
- North Dakota BBS Trend: see figure 35
- Survey-wide BBS Trend 1966-2012: -0.64

MANAGEMENT RECOMMENDATIONS

- Preserve grasslands, wetlands, and wetland complexes.
- Protect wet-meadow areas from cultivation.
- Do not mow, burn, or heavily graze nesting habitat during breeding season.
- Utility development should follow the guidance of “Reducing Avian Collisions with Power Lines” including marking power lines and creating an Avian Protection Plan.

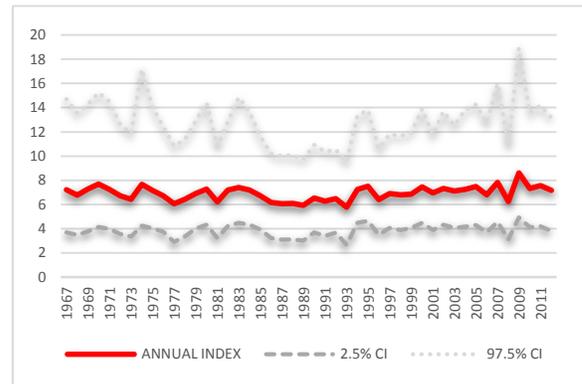


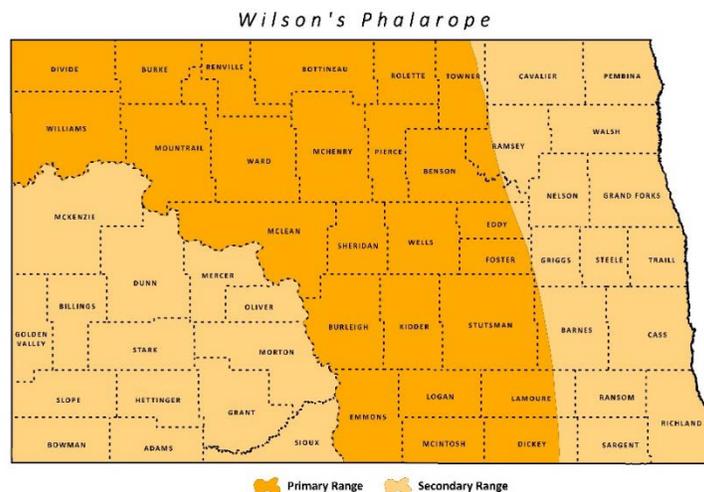
Figure 35. North Dakota Breeding Bird Survey Trend 1967-2012.

MONITORING PLANS

The Breeding Bird Survey continues to be a useful monitoring tool, however the annual surveys implemented by HAPET in 2004 are valuable. Ensuring all BBS routes are conducted annually is priority. A shorebird monitoring plan should follow The International Shorebird Survey (ISS) Program for Regional and International Shorebird Monitoring (PRISM) and “Guidance for Developing and Implementing Effective Shorebird Surveys.”

2005-2015 PROGRESS

The Wilson’s Phalarope remains a Level I Species of Conservation Priority. Several State Wildlife Grant Projects (T2-9-R, T2-11-HM, T-18-R, T-21-D, T-22-HM, T-23-HM, T-25-HM, T-27-HM, T-37-D) have contributed to habitat enhancement of wetlands and grasslands for Wilson’s Phalarope and other wetland/grassland dependent birds.



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YELLOW RAIL

Scientific Name: *Coturnicops noveboracensis*

Species of Conservation Priority:
Level I

General Description: 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 July. Peak breeding season occurs from early June to mid-July.

Abundance: Rare.

Primary Habitat: Fens or wet meadows with emergent vegetation, shallow water, and moist soil.

Federal Status: Migratory Bird.

Reason for Designation: Little is known about the Yellow Rail in North Dakota as it is an extremely shy, secretive bird and it is difficult to survey. Designated as High Concern in the Northern Prairie & Parkland Waterbird Conservation Plan (NPPWCP) and High Concern by Waterbird Conservation for the Americas. It is included on the National USFWS Birds of Conservation Concern list, and also in Region 6 and BCR 11 and added to the 2008 BCC list in BCR17.



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LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Yellow Rails prefer fens or wet meadows dominated by sedges, grasses, rushes, and bulrushes in fresh and brackish wetlands. Wetland water depth of typically 0-46 cm. Rail presence is often associated with a high percentage of emergent vegetation. Nest under a canopy of vegetation in areas with standing water or saturated ground. Have been observed using wetlands as small as 0.5 ha, but will use wetlands up to 1,000 ha. Primary food includes snails, aquatic insects, and seeds.

Key Areas and Conditions for Yellow Rail in North Dakota

No specific sites have been identified. Yellow Rails are primarily found in the northern half of North Dakota. Possibly established populations in southwestern Benson County. The presence of this species may vary greatly from year to year depending on water availability.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Wetland destruction and/or degradation and conversion of upland Fens are rare and extremely vulnerable in North Dakota. Processes used to alter fens to create deeper, more permanent water are a threat to natural fens. Drainage of wetlands is another concern. The wetlands of North Dakota are extremely dynamic in nature. Fens that hold water one year may be dry the next. Invasion of hybrid cattails into these wetlands with little or no cattails is a concern.

Other Natural or Manmade Factors

Pesticide runoff from agricultural practices may affect wetland communities. Human disturbance from wildlife observers entering Yellow Rail habitat to get a glimpse of the rare birds could cause abandonment or destruction of nests. Yellow Rails may be killed from machinery during mowing or haying. Mortality from collisions with communication towers and power lines. Expanding oil and gas development in North Dakota increases risk of oilfield contamination of wetland habitat.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- Rocky Mountain Bird Observatory (ND SWG T-40-R) is conducting a statewide inventory of colonial and semi-colonial waterbird populations and identifying key sites for breeding colonies in North Dakota. The Yellow Rail is one of 29 target species. The project was initiated in March 2014.

Previous Research or Surveys

- Northern Prairie Wildlife Research Center (ND SWG T-3-1 and T-9-R) determined marsh bird distribution in relation to landscape composition in North Dakota. The project was initiated in 2004 and a final report provided in 2008. Yellow Rails were one of 16 focal species. Yellow Rails were primarily observed in the Drift Prairie (Sherfy and Anteau 2008).

Additional Research or Surveys Needed

- Development of effort-efficient survey techniques.

- Identify key sites and establish population monitoring at selected sites, determine site fidelity and breeding success. This could include re-surveying sight locations identified by Berkey.
- Develop better understanding of habitat selection and population size as they relate to wetland size, wetland characteristics, and wetland vegetation.
- Fair number of published reports and gray literature throughout the species range and in North Dakota.

POPULATION AND TREND ESTIMATES

- Waterbird Conservation for the Americas Population Estimate: 10,000 – 25,000 individuals
- NPPWCP BCR11 Population Estimate: unknown

MANAGEMENT RECOMMENDATIONS

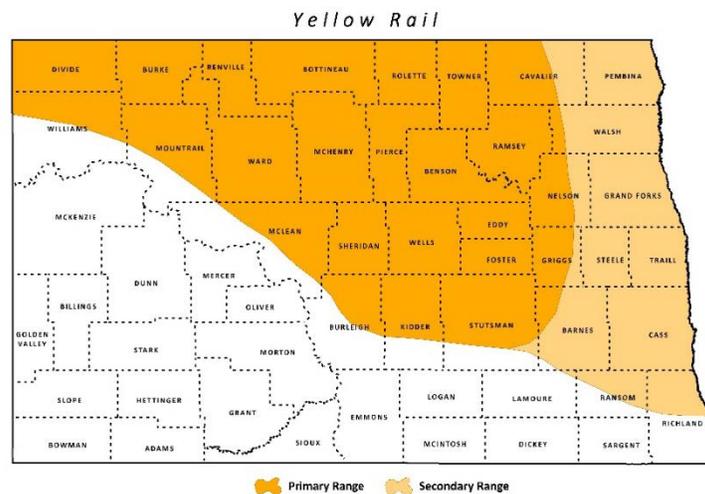
- Avoid water manipulation which creates a hemi-marsh or deep-water marsh.
- Maximize the coverage of emergent perennial vegetation.
- Use controlled burns to discourage woody encroachment.
- Discourage people (i.e. bird watchers) from entering known Yellow Rail nesting habitat, to reduce trampled vegetation and possible destruction of nests.
- Construction of communication towers should follow the guidance of “Service Interim Guidelines for Recommendations on Communications Tower Siting, Construction, Operation, and Decommissioning” and American Bird Conservancy Collision Program framework.
- Utility development should follow the guidance of “Reducing Avian Collisions with Power Lines” including marking power lines and creating an Avian Protection Plan.

MONITORING PLANS

The NPPWCP has identified the basic elements of how a regional/continental waterbird monitoring program should be structured. Waterbird monitoring should follow recommendations of the Waterbird Conservation for the Americas and North American Bird Conservation Initiative ‘Opportunities for Improving Avian Monitoring’.

2005-2015 PROGRESS

The Yellow Rail remains a Level I Species of Conservation Priority. Efforts to identify key sites for breeding areas are underway. Several State Wildlife Grant Projects (T2-9-R, T-18-R, T-27-HM) have contributed to habitat enhancement of wetlands for Yellow Rail and other wetland dependent birds.



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Process for Identifying Bird Species of Conservation Priority

All landbirds, shorebirds, waterbirds and waterfowl (known to occur in North Dakota) were evaluated if they met at least one of the following criteria:

- 1) Identified on one or more USFWS Birds of Conservation Concern (BCC) 2008 list; National, Region 6, BCR 11 or BCR 17.
- 2) Breeding shorebirds on any conservation category of Shorebirds of Conservation Concern in the United States of America.
- 3) Breeding waterbirds on any conservation category of Conservation Status and Distribution of Colonial Waterbird or Solitary-Nesting Waterbird Species, Waterbird Conservation for the Americas.
- 4) Breeding waterfowl of conservation priority in the North American Waterfowl Management Plan.
- 5) Breeding landbirds with a PIF Regional Concern Score of >12 for BCR 11 and/or BCR 17.
- 6) Identified as a PIF Common Bird in Steep Decline.
- 7) Identified as a PIF Tri-national Concern Species.
- 8) Any species listed as endangered, threatened, or a candidate under the Endangered Species Act.
- 9) Other criteria as it pertains to the SCP levels or known species in decline but not yet identified on other bird lists.

The Department drafted a proposed list from species that met the criteria and was finalized after review by experts from within the Department, other natural resource agencies and organizations, universities and the general public. The following is the final list and the criteria those species met.

Name	USFWS BCC National	USFWS BCC Region 6	USFWS BCC BCR 11	USFWS BCC BCR 17	Shorebirds of Conservation Concern	Waterbird Conservation Status	NAWMP	PIF Regional Concern Score is >12 in BCR 11	PIF Regional Concern Score is >12 in BCR 17	PIF Common Bird in Steep Decline	PIF Tri-National Concern Species	ESA Listed	Other
American Avocet					Climate Change								
American Bittern		X	X	X		High							
American Kestrel													significant long-term range-wide decline
American White Pelican						Moderate							
Baird's Sparrow	X	X	X	X				X	X		X		core breeding range
Bald Eagle	X	X	X	X									recently delisted
Black Tern			X			Moderate							core breeding range
Black-billed Cuckoo		X	X	X				X	X	X			
Bobolink								X		X			
Brewer's Sparrow	X			X					X	X			
Burrowing Owl		X		X				X	X				
Canvasback							Mod-High						core breeding range
Chestnut-collared Longspur		X	X	X				X	X		X		core breeding range
Dickcissel	X		X	X				X	X				
Ferruginous Hawk		X		X				X	X				
Franklin's Gull						Moderate							core breeding range
Golden Eagle		X		X				X	X				
Grasshopper Sparrow		X	X	X				X	X	X			
Greater Prairie-Chicken								X	X		X		
Greater Sage-Grouse								X	X		X		
Horned Grebe		X	X	X		High							
Lark Bunting								X	X	X			
Le Conte's Sparrow													core breeding range
Least Tern (Interior)												Endangered	
Lesser Scaup							Mod-High						core breeding range
Loggerhead Shrike	X	X		X						X			
Long-billed Curlew	X	X	X	X	Watch List								
Marbled Godwit	X	X	X	X	Watch List								core breeding range
McCown's Longspur	X	X	X	X				X	X				
Nelson's Sparrow	X	X	X										core breeding range
Northern Harrier								X	X				
Northern Pintail							High						core breeding range
Peregrine Falcon	X	X	X	X									
Piping Plover					ESA							Threatened	
Prairie Falcon		X		X				X					
Red-headed Woodpecker	X	X	X	X				X	X	X			
Red Knot (Rufa)	X				ESA							Threatened	
Sharp-tailed Grouse								X					core breeding range
Short-eared Owl	X	X	X	X					X	X			
Sprague's Pipit	X	X	X	X				X	X		X	Candidate	core breeding range
Swainson's Hawk	X		X					X					
Upland Sandpiper	X	X	X	X	Least Concern								core breeding range
Western Meadowlark													significant long-term range-wide decline
Whooping Crane						High						Endangered	
Willet					Watch List								
Wilson's Phalarope					Least Concern								core breeding range
Yellow Rail	X	X	X	X		High							

APPENDIX B. Amphibians and Reptiles

Contents

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CANADIAN TOAD

Scientific Name: *Anaxyrus hemiophrys*

Species of Conservation Priority:
Level I

General Description: L 2-3". Green to brown-red body with brown or red warts. A light line runs down center of back and a large raised bump, or boss, is present between the eyes.

Status: Year-round resident.

Abundance: Fairly common.

Primary Habitat: Margins of lakes, ponds, and a variety of wetlands.

Federal Status: No federal status.

Reason for Designation: North Dakota comprises the southern portion of the species' rather limited range, which includes much of North Dakota, parts of Minnesota, South Dakota, Montana, and through central Canada. Vulnerable in the United States although apparently secure across the border in Canada.



Ted Hoberg and Cully Gause

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

The margin of lakes, ponds, and wetlands, particularly permanent water, are the Canadian's toads preferred habitat. Considerably more aquatic than most toads, they will swim far into water for refuge. Burrows into the ground using its hind feet.

Key Areas for Canadian Toad in North Dakota

Most commonly found in permanent water east of the Missouri River, although they do occur west of the Missouri. No key areas have been identified.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Wetland destruction and/or degradation. Lack of vegetation buffer around wetlands in agricultural fields may limit use.

Other Natural or Manmade Factors

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 SURVEY EFFORTS

Current Research and Survey Efforts

- North Dakota State University is surveying reptiles and amphibians in SE North Dakota.
- The University of North Dakota is currently studying diseases and parasites in amphibians.

Previous Research and Survey Efforts

- Leonhart studied the effects of climate change on small mammals and herptiles in SW North Dakota in 2006.
- Shaunessy surveyed amphibians as part of a black-tailed Prairie Dog study in 2011.
- Cabarle and Beachy established population levels of amphibians at a number of sites in northern North Dakota in 2011.
- Wheeler and Wheeler (1966) conducted a statewide survey of all amphibians and reptiles, as well as compiled existing records. The toads were found east of the Missouri River and in reasonable numbers.
- The REAP program (1978) found two Canadian Toads in the ponderosa pines, the only records ever found west of the Missouri River.
- Hoberg and Gause (1992) recorded personal observations of Canadian Toads in North Dakota.
- A survey of calling amphibians conducted by Johnson and Batie (1996) found the toads only in the northeastern portion of the known range in North Dakota.
- A compilation of all records in North Dakota by Jundt (2000) listed roughly 60 documentations of the Canadian Toad in the state.

Additional Research and Survey Efforts Needed

- Visual encounter surveys appear to work well with this species and should continue in the future.
- Disease monitoring as part of a larger monitoring protocol when feasible.

MANAGEMENT RECOMMENDATIONS

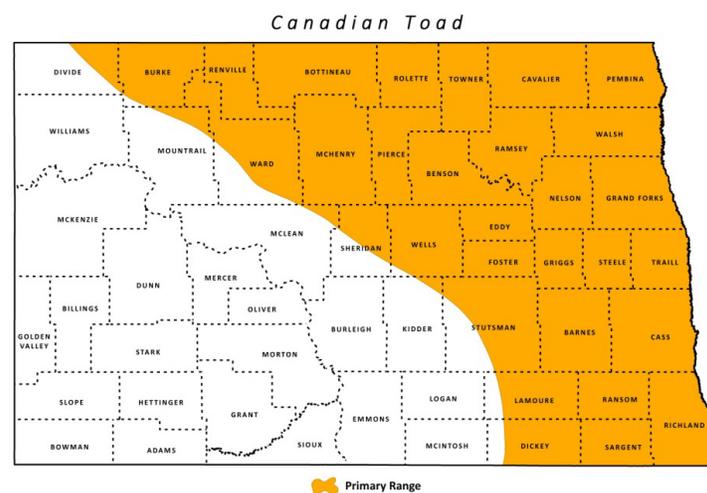
- Provide a buffer strip of natural vegetation between wetlands and agricultural areas of at least 50-60 feet.
- Provide adjacent upland habitat to wetlands of at least 500 feet.
- Leave logs, snags, and other coarse woody debris in place.

MONITORING PLANS

There currently is no monitoring protocol in place. Monitoring tools could include school classes/programs, the general public, or national monitoring initiatives such as ARMI, NAAMP, or PARC. Amphibian monitoring can and should be directed at several species

2005-2015 PROGRESS

The Canadian Toad maintains its Level I Species of Conservation Priority ranking. Sampling of amphibians has been conducted as part of number of SWG projects. A larger scale survey is currently underway (T-44-R Amphibian and reptile surveys of southeastern North Dakota). Work towards a monitoring protocol is needed.



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FALSE MAP TURTLE

Scientific Name: *Graptemys pseudogeographica*

Species of Conservation Priority:
Level III

General Description: L 10" for females and 5" for males. This is a rather small, brown-shelled turtle with conspicuous knobs in the middle of the shell. A yellow spot behind eye, light yellow stripes, and no red/orange markings distinguish this species from the painted turtle.

Status: Year-round resident.

Abundance: Rare.

Primary Habitat: Large rivers with or without submerged vegetation. Generally found associated with sandbars in river system.

Federal Status: No federal status.

Reason for Designation: Listed as Vulnerable in South Dakota by NatureServe. It was once a federal candidate species. Only a few records have been verified of this species in North Dakota.



Ted Hoberg and Cully Gause

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

False Map Turtles prefer large rivers or streams. A highly aquatic species which rarely emerges from the water except to lay a clutch of 6-13 eggs in the spring. May bask on slippery snags rising at steep angles from the water, but flees quickly if disturbed. Feeds on aquatic vegetation, insects, worms, crustaceans, minnows, and mollusks.

Key Areas for False Map Turtle in North Dakota

The free-flowing Missouri River System below Garrison Dam is the only stretch of river where the turtles have been verified.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Habitat alteration from the impoundment of the Missouri River has affected the distribution of this species. Availability and quality or the alteration/destruction of sandbars in the lower Missouri River stretch could affect nesting

Other Natural or Manmade Factors

Nesting turtles may be disturbed by human recreation on sandbars.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- North Dakota State University is surveying reptiles and amphibians in SE North Dakota. This includes the Missouri River.

Previous Research and Survey Efforts

- The North Dakota Game and Fish Department sampled turtles in the Missouri River. 2005-2007.
- Wheeler and Wheeler (1966) conducted a statewide survey of all amphibians and reptiles, as well as compiled existing records. The turtles were found statewide in permanent water.
- Hoberg and Gause (1992) recorded personal observations of Snapping Turtles in North Dakota.
- A compilation of all records in North Dakota by Jundt (2000) listed 3 documentations of the False Map Turtle in the state.

Additional Research and Survey Efforts Needed

- Future survey efforts could include additional trapping efforts along the Missouri River and in smaller streams leading into the Missouri.

MANAGEMENT RECOMMENDATIONS

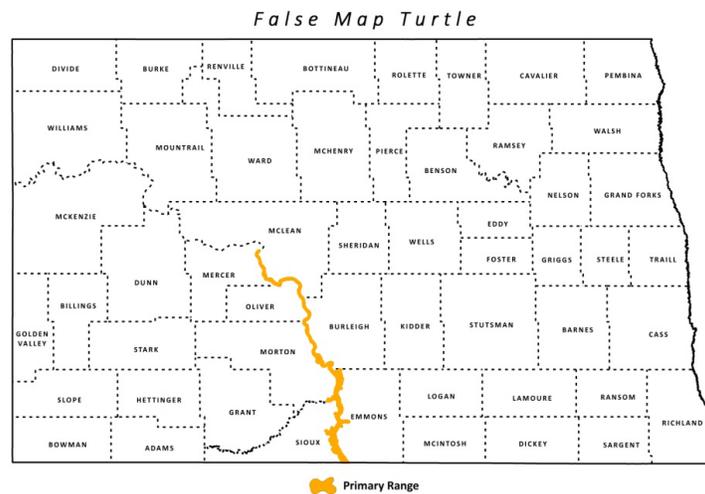
- Avoid clearing or replacing natural vegetation along shoreline, providing at least 50-75 feet of undisturbed habitat to protect water quality and prevent erosion.
- Leave logs, snags, and other woody debris on site, or replace if removed.
- Limit erosion control structures such as retaining walls or rip-rap that 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.

MONITORING PLANS

Currently no monitoring is taking place. Possible monitoring options could include school classes/programs including universities, the general public through the NDGFD incidental reporting system, or national monitoring initiatives such as PARC. Monitoring should be directed at all turtle species.

2005-2015 PROGRESS

The False Map Turtle maintains its Level III Species of Conservation Priority ranking. Turtle surveys of the Missouri river from 2007 to 2009 provided more confirmed sightings, but little is still known of this species life history details in the state.



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NORTHERN PRAIRIE SKINK

Scientific Name: *Plestiodon septentrionalis*

Species of Conservation Priority:
Level III

General Description: L 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.

Abundance: Rare.

Primary Habitat: Sand dunes in grasslands.

Federal Status: No federal status.

Reason for 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.



Ted Hoberg and Cully Gause

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred 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. Skinks may increase in density as field age increases, as many as 200 adults per ha. Feed on grasshoppers, crickets, beetles, caterpillars, and spiders.

Key Areas for Northern Prairie Skink in North Dakota

The largest population most likely occurs in the extreme 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.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Fragile sand 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.

Other Natural or Manmade Factors

It is unknown what effect pesticides, development, and other disturbance has on populations of prairie skinks.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- North Dakota State University is surveying reptiles and amphibians in SE North Dakota.

Previous Research and Survey Efforts

- Wheeler and Wheeler (1966) conducted a statewide survey of all amphibians and reptiles, as well as compiled existing records. The skinks were only found in the southeastern corner of the state.
- Hoberg and Gause (1992) recorded personal observations of prairie skinks in North Dakota.
- A compilation of all records in North Dakota by Jundt (2000) listed roughly 15 documentations of the prairie skink in the state.

Additional Research and Survey Efforts Needed

- Future efforts could include visual encounter surveys, but trapping may be the most productive method for determining presence.

MANAGEMENT RECOMMENDATIONS

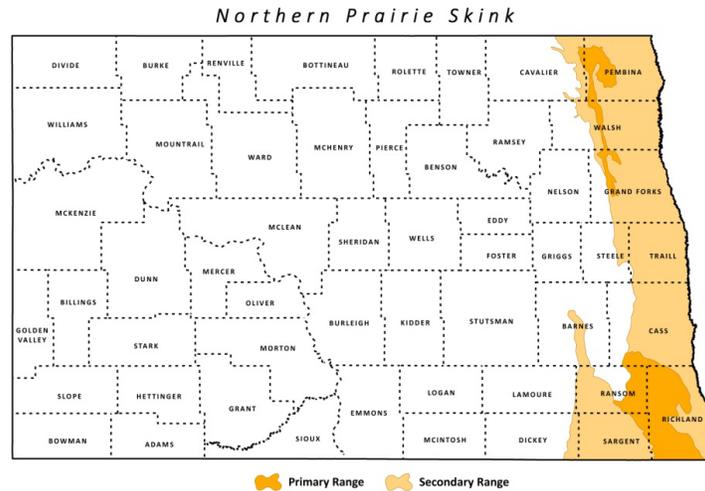
- Prevent overgrowth by shrubs and trees to maintain openness in sand habitats.
- Restrict off-road vehicle use to preselected, less sensitive/lower quality areas.

MONITORING PLANS

Currently no monitoring is taking place. Possible monitoring options could include school classes/programs including universities, the general public through the NDGFD incidental reporting system, or national monitoring initiatives such as PARC. Monitoring should be directed at all herptile species.

2005-2015 PROGRESS

The Northern Prairie Skink maintains a level III Species of Conservation Priority. More information is needed to understand the status of this species in North Dakota. SWG T-44-R **Amphibian and reptile surveys of southeastern North Dakota** will provide more information on this species.



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PLAINS HOG-NOSED SNAKE

Scientific Name: *Heterodon nasicus*

Species of Conservation Priority:
Level I

General Description: 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.

Abundance: Uncommon.

Primary Habitat: Dry grasslands with sandy or gravelly soil.

Federal Status: No federal status.

Reason for Designation: Listed as Vulnerable in Montana, Minnesota and Saskatchewan, and Imperiled in Manitoba by NatureServe.



NDGFD

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred 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. Most active in mornings and evenings, will estivate in very hot weather. Feed on a variety of prey such as toads, lizards, snakes, reptile eggs, small birds, and rodents, which they swallow whole and alive.

Key Areas for Plains Hog-nosed Snake in North Dakota

No specific sites have been identified.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Sandy areas preferred by hog-nosed snakes are fragile habitats and may be easily degraded or destroyed.

Other Natural or Manmade Factors

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 SURVEY EFFORTS

Current Research and Survey Efforts

- North Dakota State University is currently surveying reptiles and amphibians in SE North Dakota.

Previous Research and Survey Efforts

- University of North Dakota studied Climate Change and Land use Effects on Small Mammal Communities in a Northern Great Plains Landscape. This work included herptile surveys.
- Wheeler and Wheeler (1966) conducted a statewide survey of all amphibians and reptiles, as well as compiled existing records. The skins were only found in the southeastern corner of the state.
- The REAP program (1978) found few records of the Smooth Green Snake in the southwest.
- Hoberg and Gause (1992) recorded personal observations of prairie skinks in North Dakota.
- A compilation of all records in North Dakota by Jundt (2000) listed roughly 35 documentations of the Plains Hog-nosed Snake in the state.

Additional Research and Survey Efforts Needed

- Future recommended survey methods would include trapping for this species.

MANAGEMENT RECOMMENDATIONS

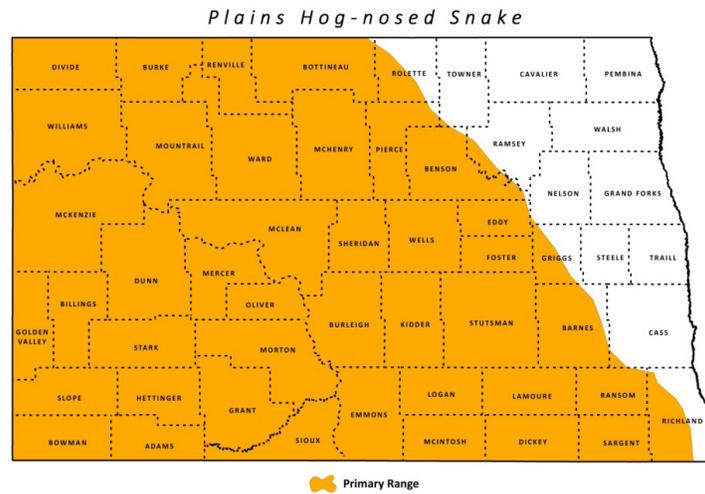
- Maintain the open nature of habitat.
- Avoid excessive grazing and off-road vehicle use.

MONITORING PLANS

Currently no monitoring is taking place. Possible monitoring options could include school classes/programs including universities, the general public through the NDGFD incidental reporting system, or national monitoring initiatives such as PARC. Monitoring should be directed at several species

2005-2015 PROGRESS

The Plains Hog-nosed Snake maintains a level I Species of Conservation Priority. More information is needed to understand the status of this species in North Dakota. Work toward a monitoring plan is needed.



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PLAINS SPADEFOOT

Scientific Name: *Spea bombifrons*

Species of Conservation Priority:
Level I

General Description: 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.

Abundance: Uncommon to locally abundant.

Primary Habitat: Dry grasslands with sandy or gravelly soil.

Federal Status: No federal status.

Reason for 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.



Ron Wilson

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred 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. Prolific breeders which rarely emerge from the ground except 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. Spadefoot's may also emerge from the ground during very humid nights. Tadpoles may be omnivorous or sometimes even cannibalistic. Adults eat small invertebrates.

Key Areas for Plains Spadefoot in North Dakota

Spadefoots were seen for many years on the eastern edge of Carrington. Focus areas where this species may occur include the Glacial Lake Deltas.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

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.

Other Natural or Manmade Factors

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 SURVEY EFFORTS

Current Research and Survey Efforts

- North Dakota State University is surveying reptiles and amphibians in SE North Dakota.
- The University of North Dakota is currently studying diseases and parasites in amphibians.

Previous Research and Survey Efforts

- Leonhart studied the effects of climate change on small mammals and herptiles in SW North Dakota in 2006.
- Shaunessy surveyed amphibians as part of a black-tailed Prairie Dog study in 2011.
- Cabarle and Beachy established population levels of amphibians at a number of sites in northern North Dakota in 2011.
- Wheeler and Wheeler (1966) conducted a statewide survey of all amphibians and reptiles, as well as compiled existing records. The toads were found east of the Missouri River and in reasonable numbers.
- The REAP program (1978) found two Canadian Toads in the ponderosa pines, the only records ever found west of the Missouri River.
- Hoberg and Gause (1992) recorded personal observations of Canadian Toads in North Dakota.
- A survey of calling amphibians conducted by Johnson and Batie (1996) found the toads only in the northeastern portion of the known range in North Dakota.

- A compilation of all records in North Dakota by Jundt (2000) listed roughly 60 documentations of the Canadian Toad in the state.

Additional Research and Survey Efforts Needed

- Future surveys could include visual encounter surveys or using auto recorders, which turn on to record audio when the humidity or other environmental cues occur at a certain level.

MANAGEMENT RECOMMENDATIONS

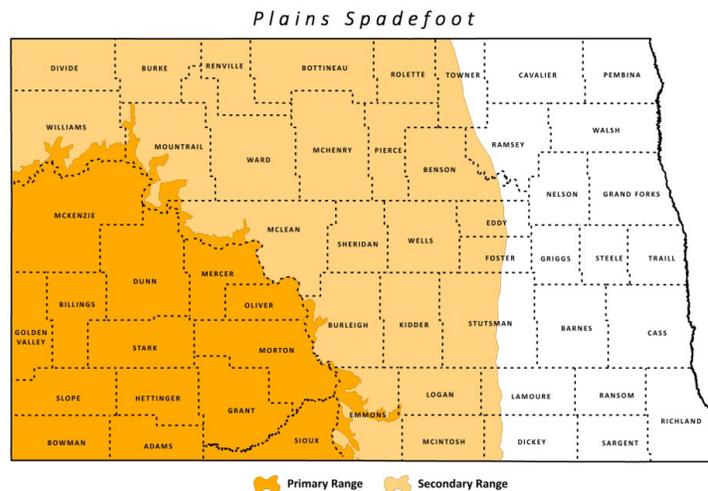
- Protect ephemeral wetland habitats from drainage or filling.
- Avoid artificially extending the naturally short hydroperiods of wetlands in arid regions of the state.
- Avoid creating permanent water sources in areas where they are naturally lacking (e.g. southwestern North Dakota). In arid regions 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.

MONITORING PLANS

There currently is no monitoring protocol in place. Monitoring tools could include school classes/programs, the general public, or national monitoring initiatives such as ARMI, NAAMP, or PARC. Amphibian monitoring can and should be directed at several species

2005-2015 PROGRESS

The Canadian Toad maintains its Level I Species of Conservation Priority ranking. Sampling of amphibians has been conducted as part of number of SWG projects. A larger scale survey is currently underway (T-44-R Amphibian and reptile surveys of southeastern North Dakota). Work towards a monitoring protocol is needed.



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SAGEBRUSH LIZARD

Scientific Name: *Sceloporus graciosus*

Species of Conservation Priority:
Level III

General Description: L 4-6". This inconspicuous lizard is pale brown or green with four longitudinal rows of dark brown spots. Elongated blue patches on each side of belly are visible in most specimens.

Status: Year-round resident.

Abundance: Rare.

Primary Habitat: Sagebrush and rocky areas near water.

Federal Status: No federal status.

Reason for Designation: Listed as Imperiled in South Dakota, Vulnerable in Montana, and Critically Imperiled in Nebraska according to NatureServe. Once listed as a federal candidate species.



Sandra Johnson

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Sagebrush Lizards can be found in association with sagebrush, rocky areas near water, and adjacent areas of fine gravel, sandy, or rocky soil. Areas with boulders, forested slopes, and open flat land with rock crevices or mammal holes will also be used. Although somewhat docile, they will hide under rocks, twigs, or brush piles if alarmed and may occasionally climb trees or bushes. Feed on a variety of insects, spiders, ticks, mites, and aphids.

Key Areas for Sagebrush Lizard in North Dakota

Known populations occur in the north unit of Theodore Roosevelt National Park and the badlands near Medora and southward.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Destruction and/or degradation of sagebrush habitat.

Other Natural or Manmade Factors

It is unknown what effect pesticides, development, and other disturbance has on populations of Sagebrush Lizards.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- There is currently nothing specific to the species in North Dakota

Previous Research and Survey Efforts

- University of North Dakota studied Climate Change and Land use Effects on Small Mammal Communities in a Northern Great Plains Landscape. This work included herptile surveys.
- Wheeler and Wheeler (1966) conducted a statewide survey of all amphibians and reptiles, as well as compiled existing records. The skins were only found in the southeastern corner of the state.
- Hoberg and Gause (1992) recorded personal observations of prairie skins in North Dakota.
- A compilation of all records in North Dakota by Jundt (2000) listed roughly 10 documentations of the Sagebrush Lizard in the state.

Additional Research and Survey Efforts Needed

- Future efforts could include visual encounter surveys as the most productive method for determining presence.

MANAGEMENT RECOMMENDATIONS

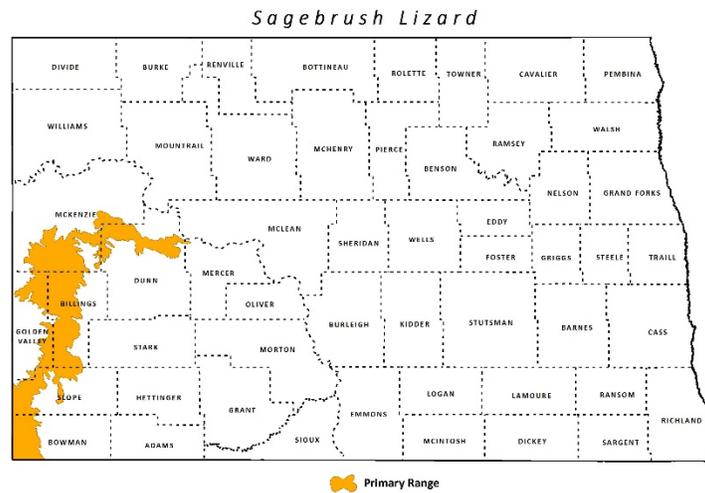
- Prevent overgrowth by shrubs and trees to maintain openness in sand habitats.
- Restrict off-road vehicle use to preselected, less sensitive/lower quality areas.

MONITORING PLANS

Currently no monitoring is taking place. Possible monitoring options could include school classes/programs including universities, the general public through the NDGFD incidental reporting system, or national monitoring initiatives such as PARC. Monitoring should be directed at a number of herptile species.

2005-2015 PROGRESS

The Sagebrush Lizard maintains a level III Species of Conservation Priority. More information is needed to understand the status of this species in North Dakota. Work toward a monitoring plan is needed.



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SHORT-HORNED LIZARD

Scientific Name: *Phrynosoma douglassi*

Species of Conservation Priority:
Level II

General Description: L 2 ½ -4". A flat, grayish body covered with numerous horns and spikes. Gives birth to 5-30 live young.

Status: Year-round resident.

Abundance: Uncommon, locally abundant.

Primary Habitat: Semi-arid, shortgrass prairie in rough terrain.

Federal Status: No federal status.

Reason for Designation: Listed as Imperiled in South Dakota and Saskatchewan and Vulnerable in Montana by NatureServe. Once listed as a federal candidate species, little is known of this species in North Dakota.



Sandra Johnson

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Arid landscapes, shortgrass prairie, and rough terrain are the primary habitats of the Short-horned Lizard. Open areas, shrubby, or open woody areas with sparse ground vegetation are also used. The lizards burrow into the ground in sandy soils and will also occupy abandoned rodent burrows. Feed on small insects, ants, and spiders.

Key Areas for Short-horned Lizard in North Dakota

Most specimens have been encountered in the badlands and surrounding breaks.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Destruction and/or degradation of grassland and shrubland habitat.

Other Natural or Manmade Factors

It is unknown what effect pesticides, development, and other disturbance has on populations of Short-horned Lizards.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- There is currently nothing specific to the species in North Dakota

Previous Research and Survey Efforts

- University of North Dakota studied Climate Change and Land use Effects on Small Mammal Communities in a Northern Great Plains Landscape. This work included herptile surveys.
- Wheeler and Wheeler (1966) conducted a statewide survey of all amphibians and reptiles, as well as compiled existing records. The skins were only found in the southeastern corner of the state.
- Hoberg and Gause (1992) recorded personal observations of prairie skins in North Dakota.
- A compilation of all records in North Dakota by Jundt (2000) listed roughly 20 documentations of the Short-horned Lizard in the state.

Additional Research and Survey Efforts Needed

- Future efforts could include visual encounter surveys as the most productive method for determining presence.

MANAGEMENT RECOMMENDATIONS

- Prevent overgrowth by shrubs and trees to maintain openness in sand habitats.
- Restrict off-road vehicle use to preselected, less sensitive/lower quality areas.

MONITORING PLANS

Currently no monitoring is taking place. Possible monitoring options could include school classes/programs including universities, the general public through the NDGFD incidental reporting system, or national monitoring initiatives such as PARC. Monitoring should be directed at a number herptile species.

SMOOTH GREEN SNAKE

Scientific Name: *Opheodrys vernalis*

Species of Conservation Priority:
Level I

General Description: L 12-22". A fast moving and inconspicuous snake, it is bright green above and white to pale yellow below.

Status: Year-round resident.

Abundance: Uncommon.

Primary Habitat: Grassland, upland hills.

Federal Status: No federal status.

Reason for Designation: Listed as Vulnerable in Manitoba and Saskatchewan, and Imperiled in Montana by NatureServe. It is also a species of concern in several other states.



Fred Ryckman

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred 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. They are entirely insectivorous, feeding on grasshoppers, crickets and caterpillars.

Key Areas for Smooth Green Snake in North Dakota

No specific sites have been identified.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Destruction and/or degradation of grassland habitat.

Other Natural or Manmade Factors

It is unknown what effect pesticides, development, and other disturbance has on populations of Short-horned Lizards.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- North Dakota State University is currently surveying reptiles and amphibians in SE North Dakota.

Previous Research and Survey Efforts

- University of North Dakota studied Climate Change and Land use Effects on Small Mammal Communities in a Northern Great Plains Landscape. This work included herptile surveys.
- Wheeler and Wheeler (1966) conducted a statewide survey of all amphibians and reptiles, as well as compiled existing records. The skins were only found in the southeastern corner of the state.
- The REAP program (1978) found few records of the Smooth Green Snake in the southwest.
- Hoberg and Gause (1992) recorded personal observations of prairie skinks in North Dakota.
- A compilation of all records in North Dakota by Jundt (2000) listed roughly 65 documentations of the Smooth Green Snake in the state.

Additional Research and Survey Efforts Needed

- Future recommended survey methods would include trapping for this 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.

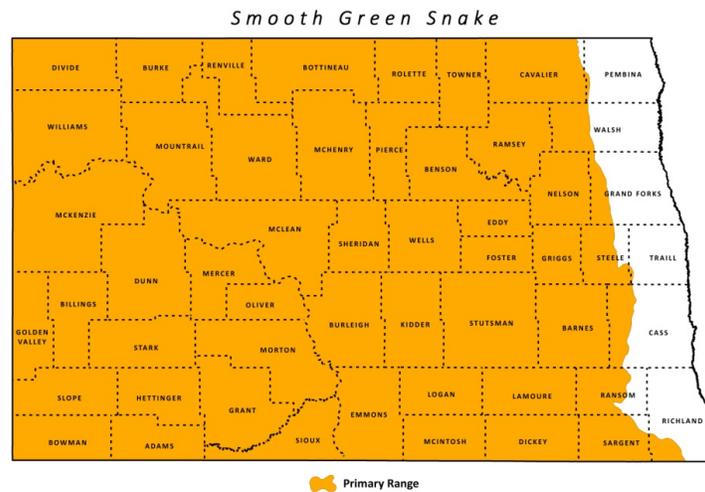
MONITORING PLANS

Currently no monitoring is taking place. Possible monitoring options could include school classes/programs including universities, the

general public through the NDGFD incidental reporting system, or national monitoring initiatives such as PARC. Monitoring should be directed at several species

2005-2015 PROGRESS

The Smooth Green Snake maintains a level I Species of Conservation Priority. More information is needed to understand the status of this species in North Dakota. Work toward a monitoring plan is needed.



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SMOOTH SOFTSHELL

Scientific Name: *Apalone mutica*

Species of Conservation Priority:
Level III

General Description: L 14" for females and 7" for males. The carapace is circular in shape, olive-gray to orange-brown, smooth, flat, and leathery-like.

Status: Year-round resident.

Abundance: Rare.

Primary Habitat: Large rivers and streams with sandy beaches or sandbars.

Federal Status: No federal status.

Reason for Designation: Documented at only a few locations in the Missouri River. Habitat alteration has greatly impacted this species.



Chris Grondahl

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Softshells prefer permanent streams or creeks with a sandy or muddy bottom and sandy beaches. They may burrow into the sand under shallow water for a long period of time. Frequently bask on river banks and logs, but flee quickly if disturbed. Females do not mature until around 9 years of age, when they lay one to three clutches of 4-33 hard-shelled eggs on sandbars. Feed primarily on crayfish, small invertebrates, frogs, and small fish.

Key Areas for Smooth Softshell in North Dakota

The extreme lower portion of the Missouri River System is the only stretch of river where the turtles have been verified. There are unverified reports of softshells in the Missouri River near the Montana border.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Habitat alteration from the impoundment of the Missouri River has affected the distribution of this species.

Availability and quality or the alteration/destruction of sandbars in the lower Missouri River stretch could affect nesting

Other Natural or Manmade Factors

Nesting turtles may be disturbed by human recreation on sandbars.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- North Dakota State University is surveying reptiles and amphibians in SE North Dakota. This includes the Missouri River.

Previous Research and Survey Efforts

- The North Dakota Game and Fish Department sampled turtles in the Missouri River. 2005-2007.
- Wheeler and Wheeler (1966) conducted a statewide survey of all amphibians and reptiles, as well as compiled existing records. The turtles were found statewide in permanent water.
- Hoberg and Gause (1992) recorded personal observations of Snapping Turtles in North Dakota.
- A compilation of all records in North Dakota by Jundt (2000) listed 3 documentations of the False Map Turtle in the state.

Additional Research and Survey Efforts Needed

- Future survey efforts could include additional trapping efforts along the Missouri River and in smaller streams leading into the Missouri.

MANAGEMENT RECOMMENDATIONS

- Avoid clearing or replacing natural vegetation along shoreline, providing at least 50-75 feet of undisturbed habitat to protect water quality and prevent erosion.
- Leave logs, snags, and other woody debris on site, or replace if removed.
- Limit erosion control structures such as retaining walls or rip-rap that will limit or prevent access to the shoreline and adjacent habitat.

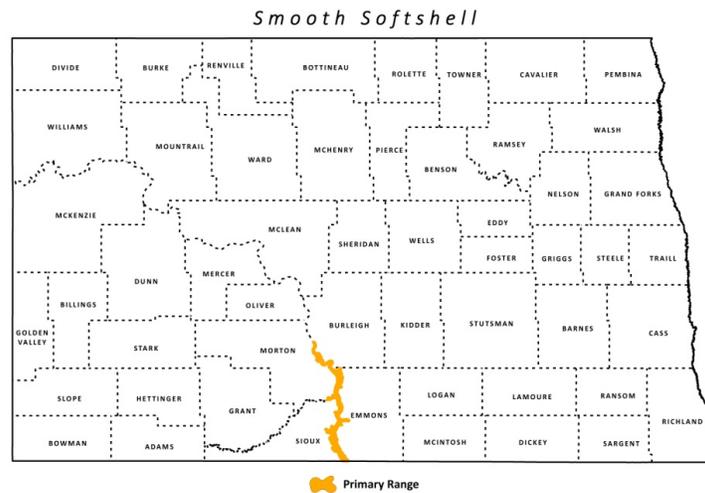
- Do not alter natural river undulations, backwater areas, or sand and gravel bars.
- When possible, keep cattle out of streams to reduce impacts on water quality and the streambed.

MONITORING PLANS

Currently no monitoring is taking place. Possible monitoring options could include school classes/programs including universities, the general public through the NDGFD incidental reporting system, or national monitoring initiatives such as PARC. Monitoring should be directed at all turtle species

2005-2015 PROGRESS

The Smooth Softshell turtle maintains its Level III Species of Conservation Priority ranking. Turtle surveys of the Missouri river from 2007 to 2009 provided more confirmed sightings, but little is still known of this species life history details in the state.



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SNAPPING TURTLE

Scientific Name: *Chelydra serpentina*

Species of Conservation Priority:
Level II

General Description: 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.

Abundance: Fairly Common.

Primary Habitat: Warm water in permanent lakes or rivers with a muddy bottom and plenty of aquatic vegetation.

Federal Status: No federal status.

Reason for Designation: Listed as vulnerable in Montana, Minnesota, Saskatchewan and Manitoba by NatureServe. Although found statewide a recent study indicates that they may not be as abundant as originally thought.



Craig Bihrie

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Snapping Turtles can be found in slow-moving rivers and streams carrying a high sediment load, or large permanent or semi-permanent bodies of water with a muddy bottom and warm water. Often reside in the margins of ponds, buried in the mud with only eyes exposed. Feed on invertebrates, carrion, aquatic plants, fish, amphibians, other turtles, small mammals, or baby birds.

Key Areas for Snapping Turtle in North Dakota

Snapping Turtles are found statewide. Recent work indicates that they prefer water bodies that are flowing or have access to flowing water.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

The loss or lack of aquatic vegetation, stumps, logs, and other debris could affect this species.

Other Natural or Manmade Factors

Road mortality may contribute to the decline.

Harvest of Snapping Turtles for their meat is largely unregulated and may be a factor in some areas..

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 SURVEY EFFORTS

Current Research and Survey Efforts

- North Dakota State University is surveying reptiles and amphibians in SE North Dakota.

Previous Research and Survey Efforts

- The University of Idaho did a population and status assessment of Snapping Turtles in North Dakota. 2012.
- The North Dakota Game and Fish Department sampled turtles in the Missouri River. 2005-2007.
- Wheeler and Wheeler (1966) conducted a statewide survey of all amphibians and reptiles, as well as compiled existing records. The turtles were found statewide in permanent water.
- The REAP program (1978) rarely observed Snapping Turtles, but indicated they are abundant in permanent bodies of water.
- Hoberg and Gause (1992) recorded personal observations of Snapping Turtles in North Dakota.
- A compilation of all records in North Dakota by Jundt (2000) listed around 35 documentations of the Snapping Turtle in the state.

Additional Research and Survey Efforts Needed

- Identify important nesting and over-wintering habitat
- Develop a management plan for Snapping Turtles
- Monitor more closely the harvest of Snapping Turtles

MANAGEMENT RECOMMENDATIONS

- Develop a management plan for Snapping Turtles
- Identify and Protect nesting and over-wintering sites
- Develop harvest guidelines where populations are sustainable.

- 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

MONITORING PLANS

There currently is no monitoring protocol in place.

2005-2015 PROGRESS

The Snapping Turtle maintains its Level II Species of Conservation Priority ranking. The University of Idaho conducted state-wide surveys as well as collected important life history information. (T-29-R Population and Status Assessment Strategies Applied to a Management Plan for the Snapping Turtle *Chelydra serpentina* in North Dakota). A number of management recommendations from this study will direct future work on this species.



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SPINY SOFTSHELL

Scientific Name: *Apalone spinifera*

Species of Conservation Priority:
Level III

General Description: Very similar to the Smooth Softshell turtle. L 19" for females and 9" for males.

The carapace is circular in shape, olive-gray to orange-brown, smooth, flat, and leathery-like. Major distinguishing characteristic is the row of fleshy "spines" along the front edge of its shell.

Status: Year-round resident.

Abundance: Rare.

Primary Habitat: Large rivers and streams with sandy beaches or sandbars.

Federal Status: No federal status.

Reason for Designation: Although more common than its smooth counterpart, the Spiny Softshell is found only in the southern Missouri River and tributaries, a habitat that has been impacted significantly by impoundment.



Chris Grondahl

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Softshells prefer permanent streams or creeks with a sandy or muddy bottom and sandy beaches. They may burrow into the sand under shallow water for a long period of time. Frequently bask on river banks and logs, but flee quickly if disturbed. Females do not mature until around 9 years of age, when they lay one to three clutches of 4-33 hard-shelled eggs on sandbars. Feed primarily on crayfish, small invertebrates, frogs, and small fish.

Key Areas for Spiny Softshell in North Dakota

Spiny Softshell turtles have been documented in the tributaries of the Missouri River below Garrison Dam and the head waters of Lake Oahe.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Habitat alteration from the impoundment of the Missouri River has affected the distribution of this species.

Availability and quality or the alteration/destruction of sandbars in the lower Missouri River stretch could affect nesting

Other Natural or Manmade Factors

Nesting turtles may be disturbed by human recreation on sandbars.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- North Dakota State University is surveying reptiles and amphibians in SE North Dakota. This includes the Missouri River.

Previous Research and Survey Efforts

- The North Dakota Game and Fish Department sampled turtles in the Missouri River. 2005-2007.
- Wheeler and Wheeler (1966) conducted a statewide survey of all amphibians and reptiles, as well as compiled existing records. The turtles were found statewide in permanent water.
- Hoberg and Gause (1992) recorded personal observations of Snapping Turtles in North Dakota.
- A compilation of all records in North Dakota by Jundt (2000) listed 3 documentations of the False Map Turtle in the state.

Additional Research and Survey Efforts Needed

- Future survey efforts could include additional trapping efforts along the Missouri River and in smaller streams leading into the Missouri.

MANAGEMENT RECOMMENDATIONS

- Avoid clearing or replacing natural vegetation along shoreline, providing at least 50-75 feet of undisturbed habitat to protect water quality and prevent erosion.
- Leave logs, snags, and other woody debris on site, or replace if removed.
- Limit erosion control structures such as retaining walls or rip-rap that will limit or prevent access to the shoreline and adjacent habitat.
- Do not alter natural river undulations, backwater areas, or sand and gravel bars.

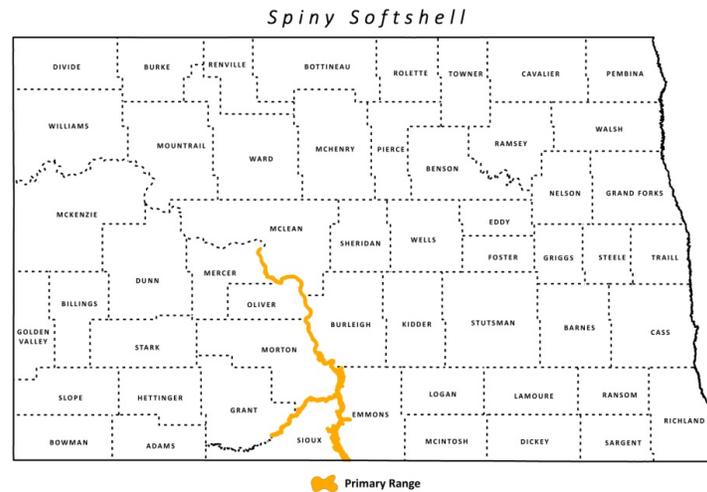
- When possible, keep cattle out of streams to reduce impacts on water quality and the streambed.

MONITORING PLANS

Currently no monitoring is taking place. Possible monitoring options could include school classes/programs including universities, the general public through the NDGFD incidental reporting system, or national monitoring initiatives such as PARC. Monitoring should be directed at all turtle species

2005-2015 PROGRESS

The spiny softshell turtle was added to the Species of Conservation Priority list with a level III ranking. Turtle surveys of the Missouri river from 2007 to 2009 provided the first confirmed sightings of this species. Little is known of this species life history details in the state, so more investigation is needed.



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APPENDIX C. Mammals

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AMERICAN MARTEN

Scientific Name: *Martes Americana*

Species of Conservation Priority:
Level II

General Description: Member of the weasel family, characterized by long slender body with a bushy tail. Similar in size to the mink. Tail roughly a third of the total length. Fur is a range of reddish to brown with a buffy to pale orange patch on the throat and chest.

Status: Year-round resident.

Abundance: Uncommon within its range in North Dakota.

Primary Habitat: Conifer and mixed forests with dense canopy cover.

Federal Status: Furbearer with a closed season.

Reason for Designation: Species with a unique habitat type found only in a small portion of the state.



USFWS

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Found in conifer and mixed forests with a high canopy cover. Also the presence of structure along the ground in form of downed trees and stumps are preferred.

Key Areas and Conditions for American Marten in North Dakota

Small population found in the Turtle Mountains region of Rolette and Bottineau counties.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Loss and degradation of mix deciduous forest in the Turtle Mountains region of North Dakota.

Other Natural or Manmade Factors

Population encroachment by fisher maybe a future concern.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- There are no current research projects or survey efforts for American Marten underway.

Previous Research or Surveys

- Frostburg State University conducted survey efforts for River Otter and other meso-carnivores from 2006-2009 where the initial discovery of a marten population was made.
- The marten populations was studied as part of a master's thesis by Penn St. University.

Additional Research or Surveys Needed

- Continued monitoring of the population.

MANAGEMENT RECOMMENDATIONS

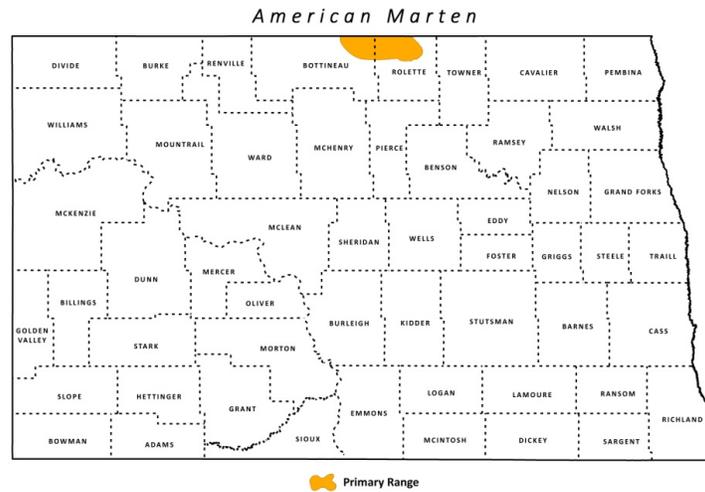
- Maintain American Marten as a furbearer with a closed season until it is determined by NDGFD biologists that the population can sustain harvest.
- Protect suitable habitat with land easement and acquisition where feasible.
- Work with the North Dakota Forest Service and private landowners to use to implement marten friendly guidelines for land management activities.
- Protect riparian corridors for movement and dispersal of populations.
- Avoid clear cutting forested areas.
- Preserve large diameter trees used for denning and resting sites.
- Preserve a woody understory component for denning and resting sites.

MONITORING PLANS

The NDGFD uses a sighting reporting system to monitor trends of American Marten. If a more detailed survey is needed the NDGFD could repeat techniques produced in **"Evaluating the Distribution and Abundance of River Otters and Other Meso-carnivores in Eastern North Dakota Drainage: Applications of GIS, Genetic and Digital Technologies for Conservation Planning."**

2005-2015 PROGRESS

The American Marten was added to the Species of Conservation Priority list in the 2015 Update of the Wildlife Action Plan. The population was discovered as part of SWG T-12-R Evaluating the Distribution and Abundance of River Otters and Other Meso-carnivores in Eastern North Dakota Drainage: Applications of GIS, Genetic and Digital Technologies for Conservation Planning. Continued funding through that grant developed information on distribution and habitat use.



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ARCTIC SHREW

Scientific Name: *Sorex arcticus*

Species of Conservation Priority:
Level III

General Description: A medium sized shrew, 4 inches in length with the tail approximately one third of the total length. The pelage is tri-colored with a dark brown to black back. Brown sides, and light brown to gray belly. The top side of the tail is darker than the underside.

Status: Year-round resident.

Abundance: Uncommon.

Primary Habitat: This species is associated with grass-sedge marshes and wet meadows in North Dakota.

Federal Status: None.

Reason for Designation: The status of this small, secretive mammal is relatively unknown within North Dakota. There are concerns that it may be threatened in the southern part of its range. Information needs to be gathered to assess its condition.



LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Found in counties along the Canadian border and extending down into the eastern third of the state. Absent south and west of the Missouri River. A boreal forest species in the northern latitude it is associated with grass-sedge marshes and wet meadows in North Dakota. This species is associated with mesic habitats in other parts of its range.

Key Areas and Conditions for Arctic Shrew in North Dakota

No specific areas have been identified. The eastern half of the state does offer the most potential habitat for this species. Also the Turtle Mountains and the Pembina Gorge have habitat similar to the types of lands that this species inhabits in the northern reaches of its range.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

The draining of wetlands would pose the largest threat to the types of habitat preferred by the Arctic Shrew. The loss of surrounding vegetation and associated uplands to conversion would also impact this species.

Other Natural or Manmade Factors

The use of pesticides on agricultural land in is a threat due to the impact on the shrew's food base.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- Small mammal surveys are conducted by a number of entities within the range of the Arctic Shrew.
- No specific research targeting the Arctic Shrew is in progress.

Previous Research and Survey Efforts

- Baird et al. (1983) studied reproduction in the state.
- Iverson et al. (1967) documented Arctic Shrew distribution in the prairie-forest transition zone.
- A species account for the Arctic Shrew was compiled in 1996.

Additional Research and Survey Efforts Needed

- Develop a protocol to monitor small mammals within the state on a long-term basis.

MANAGEMENT RECOMMENDATIONS

- Use existing programs to protect wetlands especially those associated with native prairie.
- Work with partners to protect wetlands from drainage.
- Promote wetland buffers.
- 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 wetlands.
- Survey areas of data gaps. Conduct research/surveys to establish baseline information on SCP.

MONITORING PLANS

No monitoring plan has yet been developed for small mammals within the state.

2005-2015 PROGRESS

The Arctic Shrew is maintained as a Level III Species of Conservation Priority. No specific SWG's have been directed as this species although it has been documented as a part of other studies. Implementing a monitoring protocol for small mammals will provide more information in the future.



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BIG BROWN BAT

Scientific Name: *Eptesicus fuscus*

Species of Conservation Priority:
Level I

General Description: 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. One of two species documented as hibernating in North Dakota.

Abundance: Common.

Primary 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.

Federal Status: None.

Reason for 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.



BCI

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Species does not require a specific habitat. If water and food (hard bodied insects) are available Big Brown Bats can be found. Will use buildings, bridges, and dead trees as roosting habitat.

Key Areas for Big Brown Bat in North Dakota

Big Brown Bats are found throughout the state.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Loss and disturbance of roost habitat is a threat to this species.

Other Natural or Manmade Factors

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. 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 and several turbine “farms” are under construction in parts of North Dakota. Indiscriminate killing due to a negative public perception has been identified as a possible threat to this species.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- North Dakota State University is currently trying to identify potential roosting and hibernacula habitat in western North Dakota.
- North Dakota State University is currently developing a Bat Management/White-nose Syndrome Response plan.

Previous Research and Survey Efforts

- A survey of bat species in the state was conducted by North Dakota State University (SWG T2-5-R).
- Northern Prairie Wildlife Research Center identified previous work for mammals in North Dakota.
- A number of agencies have surveyed for small mammals in the southwestern part of the state, including REAP, Theodore Roosevelt National Park, the U.S. Forest Service, and U.S. Bureau of Land Management.

Additional Research and Survey Efforts Needed

- Implement a protocol to monitor bats within the state on a long-term basis.
- Research to address primary threats to this species.

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.

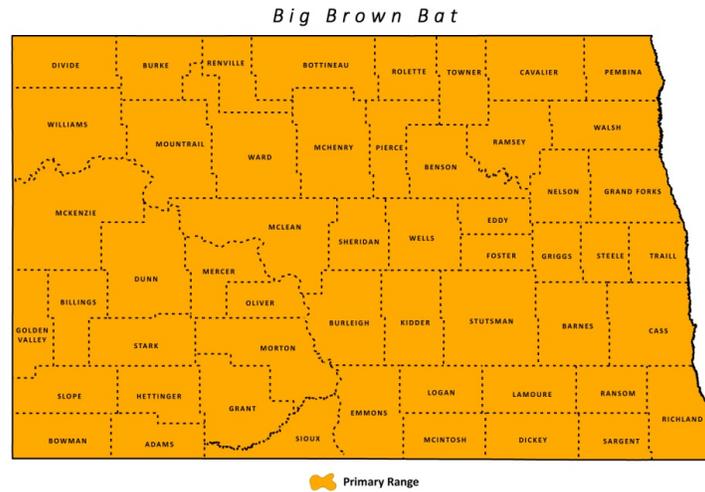
- Protect roosting habitat by easement or land acquisition where possible

MONITORING PLANS

A monitoring protocol will be addressed in the Bat Management Plan currently under development.

2005-2015 PROGRESS

The Big Brown Bat was added to the Species of Conservation Priority list during the revision of the Wildlife Action Plan in 2015.



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BLACK-FOOTED FERRET

Scientific Name: *Mustela nigripes*

Species of Conservation Priority:
Level II

General Description: 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.

Abundance: Rare.

Primary Habitat: Associated exclusively with prairie dog towns. Use burrows for shelter and feeds on prairie dogs and other species that live within the town.

Federal Status: Endangered.

Reason for Designation: Extirpated from North Dakota in the early 1950s. Records of sightings continued until the 1970s. 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.



USFWS

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred 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

The Little Missouri National Grasslands and the Standing Rock reservation may be suitable areas if Black-tailed Prairie Dog populations were to expand.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

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.

Other Natural or Manmade Factors

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 SURVEY EFFORTS

Current Research and Survey Efforts

- A fringe mammal study is being conducted by Northeastern State University. Black-footed Ferret is included in this study.

Previous Research and Survey Efforts

- Black-tailed Prairie Dog colonies are surveyed every six years by the North Dakota Game and Fish Department to estimated population status.
- The U. S. Forest Service Dakota Prairie Grasslands office conducts surveys every three years on Forest Service land in its region.
- Theodore Roosevelt National Park surveys towns within their lands yearly.

Additional Research and Survey Efforts Needed

- Potential sites for Black-tailed Prairie Dog expansion need to be identified before ferret reintroduction can be considered.

MANAGEMENT RECOMMENDATIONS

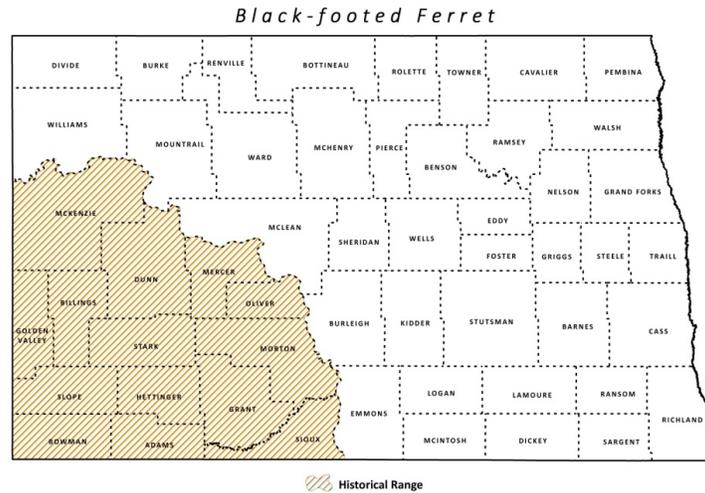
- Management recommendations for the recovery of the Black-footed Ferret are outlined in the Black-footed Ferret Recovery Plan.
<http://www.fws.gov/mountainprairie/mammals/blackfootedferret/2013DraftRevisedRecoverPlan.pdf>

MONITORING PLANS

Prairie dog towns will be monitored for Black-footed Ferrets during Black-tailed Prairie Dog survey efforts.

2005-2015 PROGRESS

The Black-footed Ferret continues to be a Level I Species of Conservation Priority. It is still considered extirpated from the state. Reintroductions in neighboring states may provide a conduit for re-colonization outside of re-introduction.



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BLACK-TAILED PRAIRIE DOG

Scientific Name: *Cynomys ludovicianus*

Species of Conservation Priority:
Level I

General Description: 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.

Abundance: Locally Common.

Primary Habitat: Short and mixed grasslands, usually well grazed lands.

Federal Status: None.

Reason for 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.



NDGFD

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred 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."

Key Areas for Black-tailed Prairie Dog 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.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

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 20,000 acres.

Other Natural or Manmade Factors

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.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- Black-tailed Prairie Dog colonies are surveyed every six years by the North Dakota Game and Fish Department to estimated population status.
- The U. S. Forest Service Dakota Prairie Grasslands office conducts surveys every three years on Forest Service land in its region.
- Theodore Roosevelt National Park surveys towns within their lands yearly.

Previous Research and Survey Efforts

- The North Dakota Game and Fish Department surveyed nonfederal lands in 2006 and 2012.
- Reid documented the distribution of Black-tailed Prairie Dogs in southwestern North Dakota in 1954.
- A status of the Black-tailed Prairie Dog and Black-footed Ferret was conducted by Grondahl in 1973.
- Bishop and Culbertson studied prairie dog town declines in southwestern North Dakota in 1976.
- John Sidle conducted aerial surveys in 2001 to estimate acreages in North Dakota.
- A Black-tailed Prairie Dog population viability assessment was performed by Knowles in 2001.
- Knowles also completed a status of the Black-tailed Prairie Dog in 2003.
- Black-tailed Prairie Dog colony expansion was studied by Milne in 2002-03.

Additional Research and Survey Efforts Needed

- Evaluate changes in distribution and population densities at sites prior to, during, and after oil and gas development.
- Determine the effects of fragmentation and development of barriers due to urbanization and agricultural development on dispersal and maintenance of colonies.
- Determine the effects of timing and intensity of grazing regimes on the use of habitats by BTPDs.
- Investigate the presence of sylvatic plague in North Dakota colonies.

MANAGEMENT RECOMMENDATIONS

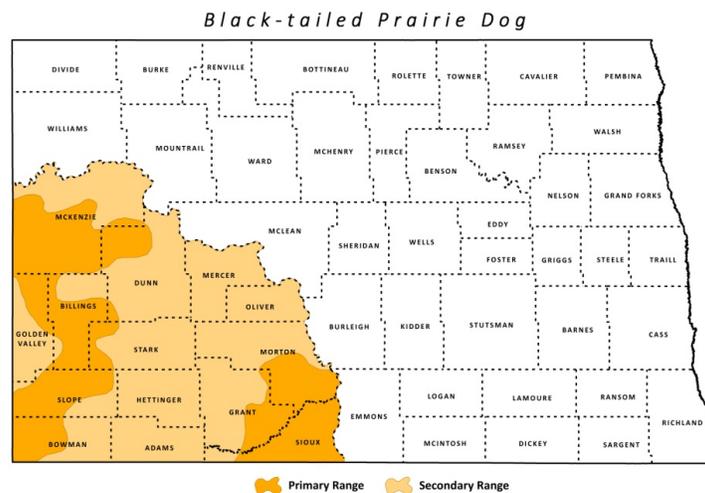
- Work with private landowners to develop grazing management practices that consider the season, duration, distribution, frequency, and intensity of grazing use on areas to maintain vegetation on both upland and riparian sites.
- Where appropriate, incorporate the use of mechanical, chemical, and biological 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.

MONITORING PLANS

The North Dakota Game and Fish Department will work towards implementing a new survey technique using NAIP imagery. This methodology will be used by all 13 states in the range of the Black-tailed Prairie Dog. This standardization will allow for better data for range wide assessments of population.

2005-2015 PROGRESS

The Black-tailed Prairie Dog continues to be a Level I Species of Conservation Priority. Population has held steady at roughly 20,000 acres. The addition and loss of small “towns” appears common. The NDGFD is working toward a standardized method of survey used by all states in the Black-tailed Prairie Dogs range.



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EASTERN SPOTTED SKUNK

Scientific Name: *Spilogale putorius*

Species of Conservation Priority:
Level III

General Description: 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: Potential year-round resident. Has not been documented recently in the state.

Abundance: Rare.

Primary Habitat: Found in riparian areas and vegetated fence lines along agricultural fields. Den in dark, dry burrows dug themselves or by other mammals. May also den in haystacks, rock piles or abandoned buildings.

Federal Status: Currently under petition for protection under the threatened and endangered species act.

Reason for Designation: Little is known regarding the habitats of this secretive species. Riparian habitat it uses is threatened by agricultural practices and overgrazing. This species is likely on the edge of its range in North Dakota.



Bob Gress

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

In prairie habitats this species can be found in wooded riparian areas or vegetation and fence rows along agricultural fields. Found hunting small mammals, reptiles, and amphibians at night in crop fields.

Key Areas for Eastern Spotted Skunk in North Dakota

No specific focus areas have been identified. Was not documented in recent meso-carnivore surveys so its presence in North Dakota is unclear.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Loss of riparian areas is a major concern for Eastern Spotted Skunk. It uses these areas to hunt, and also dens in logs and brush piles.

Other Natural or Manmade Factors

In other parts of its range, automobile collisions and poisoning are known threats to this species.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- Northeastern State University and Dickinson State University are currently studying “Fringe Mammals” in western North Dakota. This includes Eastern Spotted Skunk.

Previous Research and Survey Efforts

- Frostburg State University conducted meso-carnivore surveys within the believed range of the Eastern Spotted Skunk.

Additional Research and Survey Efforts Needed

- Determine presence of Eastern Spotted Skunk in the state.
- Develop a protocol to monitor the Eastern Spotted Skunk in the state.
- Develop research to define ecology, resource needs, and population dynamics of this species in the state if found to be present.

MANAGEMENT RECOMMENDATIONS

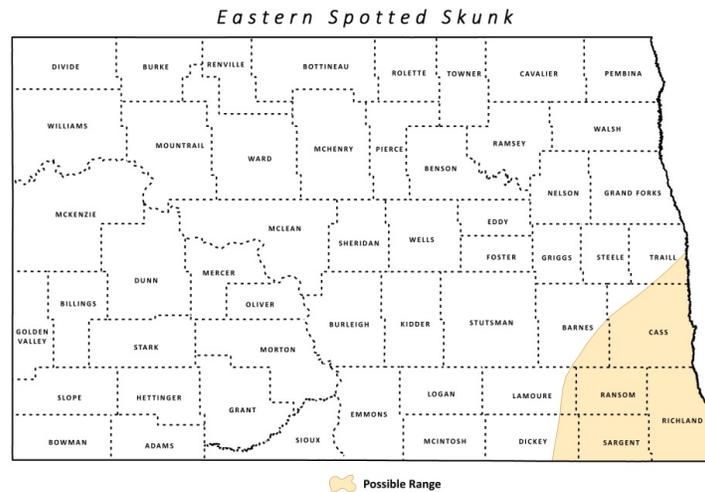
- Protect rivers, streams, and riparian areas where possible (i.e. easements and/or acquisition).
- Continue to use the Section 404 program to ensure affected rivers and riparian areas are mitigated to replace form and function.
- Continue to work with other federal agencies (i.e. FAA and FHWA) not covered 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.

MONITORING PLANS

No monitoring plan has been developed for this species.

2005-2015 PROGRESS

The Eastern Spotted Skunk remains a Level III Species of Conservation Priority. Efforts to document the species in SWG T-12-R Evaluating the Distribution and Abundance of River Otters and Other Meso-carnivores in Eastern North Dakota Drainage: Applications of GIS, Genetic and Digital Technologies for Conservation Planning were unsuccessful. It has recently been petitioned for protection under the Endangered Species Act and North Dakota is considered within its range.



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GRAY FOX

Scientific Name: *Urocyon cinereoargenteus*

Species of Conservation Priority:
Level III

General Description: 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.

Abundance: Uncommon.

Primary Habitat: This fox is found mostly in brushy or wooded habitat, generally along riparian areas. In North Dakota it is an uncommon species with most reports from the eastern side of the state.

Federal Status: No current federal status. Under consideration for listing under the threatened and endangered species act.

Reason for Designation: Recently petitioned for listing under the Endangered Species Act. 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.



Bob Gress

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred 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.

Key Areas for Gray Fox in North Dakota

Uncommon in the state 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.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

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.

Other Natural or Manmade Factors

No other problems have been identified.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- Northeastern State University and Dickinson State University are currently studying "Fringe Mammals" in western North Dakota. This includes Gray Fox.

Previous Research and Survey Efforts

- Frostburg State University conducted meso-carnivore surveys within the believed range of the Eastern Spotted Skunk.

Additional Research and Survey Efforts Needed

- No additional research needs have been identified.

MANAGEMENT RECOMMENDATIONS

- Protect riparian areas where possible (i.e. easements and/or acquisition).
- 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

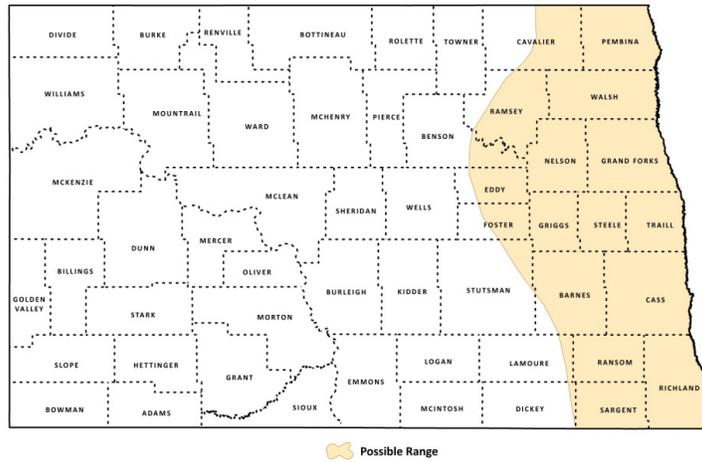
MONITORING PLANS

Gray Fox are furbearer in North Dakota. The North Dakota Game and Fish Department with use fur harvest records and reports to the rare furbearer recording system to track Gray Fox.

2005-2015 PROGRESS

The Gray Fox was added to the Species of Conservation Priority list in the 2015 revision of the Wildlife Action Plan due to its potential listing under the Endangered Species Act. Although uncommon its range does include eastern North Dakota.

Gray Fox



WORKS CONSULTED

Stern, C. et al. 2010. Evaluating the Distribution and Abundance of River Otters and Other Meso-carnivores in Eastern North Dakota Drainage: Applications of GIS, Genetic and Digital Technologies for Conservation Planning, Final Report to the North Dakota Game and Fish Department, Frostburg State University, Pp 219.

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HISPID POCKET MOUSE

Scientific Name: *Chaetodipus hispidus*

Species of Conservation Priority:
Level III

General Description: A medium sized mouse with large back feet, whose tail is roughly the same length as its body. The fur on its back is a mix of black and tan with an orange stripe separating it from the white belly.

Status: Resident.

Abundance: Locally common.

Primary Habitat: Short and mixed-grass prairie tracts. Found predominantly in southern North Dakota west of the Missouri River.

Federal Status: No current federal status.

Reason for Designation: Little is known of the habits and status of this rodent. Only small pockets of this species' habitat occur within the state, and loss of native prairie is a concern. North Dakota is considered at the northern edge of the Hispid Pocket Mouse range.



Bob Gress

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Hispid pocket mice prefer short and mixed-grass prairie tracts. Predominantly grainivores, they eat seeds from native grasses for food, and may also feed in grain fields.

Key Areas for Hispid Pocket Mouse in North Dakota

No key areas have been identified for this species. Species has been documented in Morton, Grant, Sioux, Hettinger, Adams, Bowman, and Slope Counties.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Conversion of native and tame grass tracts from grazing and hay land to crop land is the greatest threat for this rodent. This action reduces food sources and removes critical cover for nesting and protection.

Other Natural or Manmade Factors

Disease may be factor for this species.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- Northeastern State University and Dickinson State University are currently studying "Fringe Mammals" in western North Dakota. This includes Hispid Pocket Mouse.

Previous Research and Survey Efforts

- A number of agencies have surveyed for small mammals in the southwestern part of the state, including REAP, Theodore Roosevelt National Park, the U.S. Forest Service, and U.S. Bureau of Land Management.
- Northern Prairie Wildlife Research Center has developed an annotated bibliography for mammals in North Dakota.
- The University of North Dakota conducted small mammal and herptile surveys in Southwestern North Dakota in 2006.
- Dickinson State University surveyed small mammals in western North Dakota as part of a Black-tailed Prairie Dog survey.

Additional Research and Survey Efforts Needed

- All aspects of this species ecology need to be examined, including abundance, reproduction, habitat requirements, and threats.
- Develop a monitoring protocol for small mammals in North Dakota.

MANAGEMENT RECOMMENDATIONS

- Protect native prairie where possible.
- Work with city planners to conserve existing native prairie.
- 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.

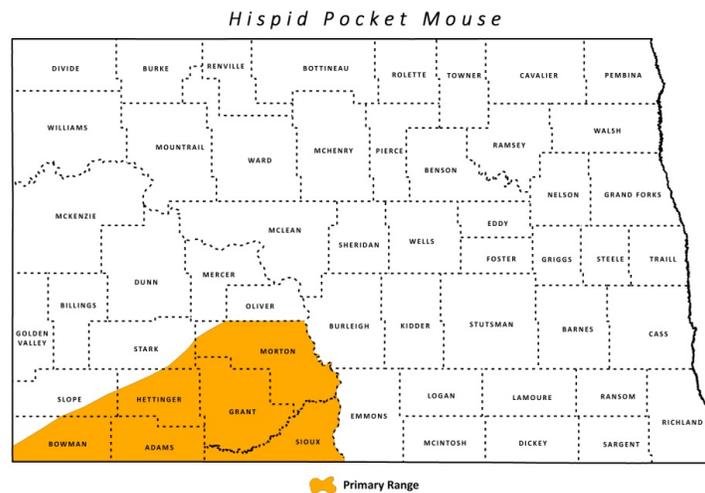
- Work with state and federal agencies to enforce existing pesticide regulations.
- Coordinate with wind energy companies to minimize impacts.
- Survey areas of data gaps. Continue to conduct research/surveys to establish baseline information on Hispid Pocket Mouse.

MONITORING PLANS

No monitoring plan has yet been developed.

2005-2015 PROGRESS

The Hispid Pocket Mouse maintains a Level III on the Species of Conservation Priority list. A better understanding of this species historic distribution has been developed, but information on life history is still lacking. A Fringe Mammal Surveys (SWG T-39-R) will gather data on the Hispid Pocket Mouse.



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LITTLE BROWN BAT

Scientific Name: *Myotis lucifugus*

Species of Conservation Priority:
Level I

General Description: 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.

Abundance: Common.

Primary Habitat: Roosts are established in structures in the summer months but also can be found in dead trees.

Federal Status: No current federal status.

Reason for 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.



BCI

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Little Brown Bats are generally associated with buildings which they use as roosts. Roosts are generally near feeding areas where they can access flying insects for food. Hibernacula are generally caves, mines and rock crevices in which the temperature does not fall below freezing and has high humidity. No hibernacula have been identified in the state.

Key Areas for Little Brown Bat in North Dakota

Little Brown Bats are found throughout the state.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Loss and disturbance of roost habitat is a threat to this species.

Other Natural or Manmade Factors

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 and several turbine “farms” are under construction in parts of North Dakota. Indiscriminate killing due to a negative public perception has been identified as a possible threat to this species.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- North Dakota State University is currently trying to identify potential roosting and hibernacula habitat in western North Dakota.
- North Dakota State University is currently developing a Bat Management/White-nose Syndrome Response plan.

Previous Research and Survey Efforts

- A survey of bat species in the state was conducted by North Dakota State University.
- Northern Prairie Wildlife Research Center is in the process of identifying previous work for mammals of southwestern North Dakota.
- A number of agencies have surveyed small mammals in the southwestern part of the state, including REAP, Theodore Roosevelt National Park, the U.S. Forest Service, and U.S. Bureau of Land Management.

Additional Research and Survey Efforts Needed

- Research to assess primary threats to this species.

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.

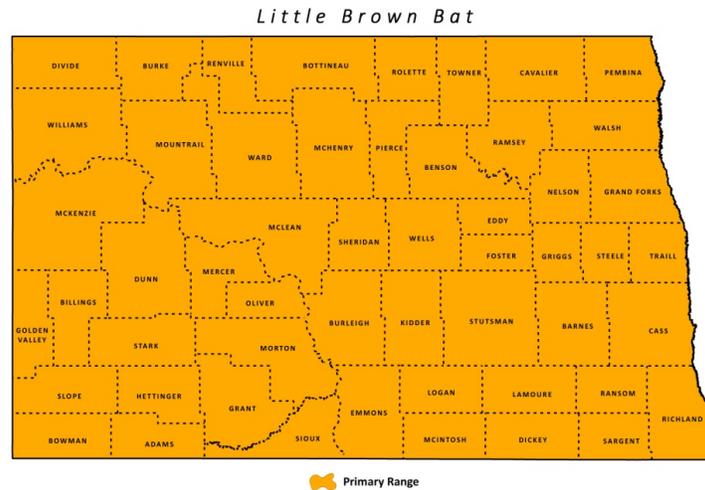
- Reduce use of pesticides near waterways where bats forage.

MONITORING PLANS

- A monitoring protocol will be addressed in the North Dakota Bat Management Plan currently under development.

2005-2015 PROGRESS

The Little Brown Bat was added to the Species of Conservation Priority list during the revision of the Wildlife Action Plan in 2015. Although currently secure in North Dakota, White-nose Syndrome threatens this species in much of its eastern range.



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LONG-EARED BAT

Scientific Name: *Myotis evotis*

Species of Conservation Priority:
Level III

General Description: Large bat, 3 to 4 inches in length. Its fur can range from a dark brown to pale yellow. Most striking feature is its large, hairless, black ears that extend well above its head. Lacks hair on the fringe of uropatagium.

Status: Possible year-round resident. May migrate short distances to find suitable hibernacula in winter.

Abundance: Rare.

Primary Habitat: Found in extreme western North Dakota. Normally found in rugged terrain they roost alone or in small groups in rock crevices and under tree bark. This species has a strong association with coniferous trees. Hibernates in caves and abandoned mines.

Federal Status: No current federal status.

Reason for Designation: Little is known about this species in North Dakota. Although rare to the state there are some indications that it is declining range-wide.



BCI

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Found in western North Dakota's badlands. Prefers broken rock outcrops and cliffs for roosting sites. Associated with conifer stands, but may use deciduous stands and sagebrush flats if roosting sites are available.

Key Areas for Long-eared Bat in North Dakota

The ponderosa pines of the badlands are identified as a key area for this species.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

This and other bat species in the state rely on caves and crevices for hibernacula and maternal grounds. These sites are susceptible to human and other types of disturbance. Frequent disturbance may cause females to drop young in the rearing process or abandon the area.

Other Natural or Manmade Factors

Long-eared Bat and other bats in North Dakota are insectivores. Pesticides used in the vicinity of feeding grounds would affect bat populations by killing prey. Also, bats are known to store pesticides within fat reserves. Loss of water sources for drinking is also a potential threat. When natural water sources are dry, bats may resort to drinking from stock tanks. These can be potential bat traps. Wind turbines have been identified as a source of mortality to bats and several turbine "farms" are under construction in parts of North Dakota. Indiscriminate killing due to a negative public perception has been identified as a possible threat to this species.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- Identification of hibernacula in western North Dakota as well as their susceptibility to White-nose Syndrome is being conducted by North Dakota State University.
- North Dakota State University is currently developing a North Dakota Bat Management Plan.

Previous Research and Survey Efforts

- A survey of bat species in the state was conducted by North Dakota State University.
- A number of agencies have surveyed for small mammals in the southwestern part of the state including, REAP, Theodore Roosevelt National Park, the U.S. Forest Service, and U.S. Bureau of Land Management.

Additional Research and Survey Efforts Needed

- Research to assess primary threats to this species.

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.

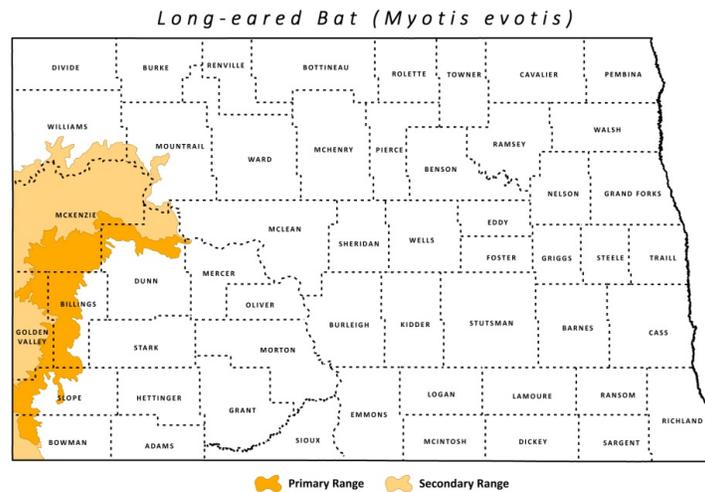
- Provide roosting sites in areas where natural sites have been destroyed or disturbed.
- Reduce use of pesticides near waterways where bats forage.

MONITORING PLANS

- A monitoring protocol will be addressed in the North Dakota Bat Management Plan currently under development.

2005-2015 PROGRESS

The Long-eared Bat maintains its Level III Species of Conservation Priority ranking due to its fringe species status. SWG T2-5-R **Distribution and Habitat Use of the Bats of North Dakota** increased the information known for this species. Continued work is needed to address threats to this species and implementation of a monitoring plan.



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LONG-LEGGED BAT

Scientific Name: *Myotis volans*

Species of Conservation Priority:
Level III

General Description: A large western bat growing to 4 inches with a wingspan of 10-12 inches. Pelage is dark brown and extends out along the underside of the wings. Wings and short, round ears are black.

Status: Possible year-round resident. May migrate short distances to find suitable hibernacula in winter.

Abundance: Rare.

Primary Habitat: Found in the badlands of western North Dakota and along the Missouri River. Normally found in rugged terrain, they roost alone or in small groups in rock crevices and under tree bark. This species has a strong association with coniferous trees.

Federal Status: No current federal status.

Reason for Designation: Little is known about this species in North Dakota. Although rare to the state there are some indications that it is declining range-wide.



BCI

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

This species is found mostly in close relation to conifer stands. Uses tree snags, crevices, buildings and cliffs for roosting.

Key Areas for Long-legged Bat in North Dakota

The ponderosa pine area of the badlands has been identified as a key area for the long-legged bat. This species has also been documented along the Missouri River in Central North Dakota.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

This and other bat species in the state rely on caves and crevices for hibernacula and maternal grounds. These sites are susceptible to human and other types of disturbance. Frequent disturbance may cause females to drop young in the rearing process or abandon the area.

Other Natural or Manmade Factors

Long-legged bat and other bats in North Dakota are insectivores. Pesticides used in the vicinity of feeding grounds would affect bat populations by killing prey. Also, bats are known to store pesticides within fat reserves. Loss of water sources for drinking is also a potential threat. When natural water sources are dry, bats may resort to drinking from stock tanks. These can be potential bat traps. Wind turbines have been identified as a source of mortality to bats and several turbine "farms" are under construction in parts of North Dakota. Indiscriminate killing due to a negative public perception has been identified as a possible threat to this species.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- Identification of hibernacula in western North Dakota as well as their susceptibility to White-nose Syndrome is being conducted by North Dakota State University.
- North Dakota State University is currently developing a North Dakota Bat Management Plan.

Previous Research and Survey Efforts

- A survey of bat species in the state was conducted by North Dakota State University
- A number of agencies have surveyed for small mammals in the southwestern part of the state including, REAP, Theodore Roosevelt National Park, the U.S. Forest Service, and U.S. Bureau of Land Management.

Additional Research and Survey Efforts Needed

- Research to assess primary threats to this species.

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.

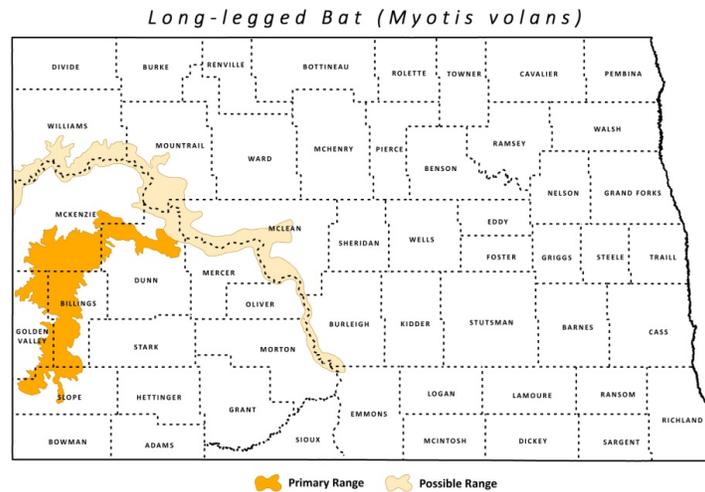
- Provide roosting sites in areas where natural sites have been destroyed or disturbed.
- Reduce use of pesticides near waterways where bats forage.

MONITORING PLANS

A monitoring protocol will be addressed in the North Dakota Bat Management Plan currently under development.

2005-2015 PROGRESS

The Long-legged bat maintains its Level III Species of Conservation Priority ranking due to its fringe species status. SWG T2-5-R Distribution and Habitat Use of the Bats of North Dakota increased the information known for this



species including a range expansion. Continued work is need to address threats to this species and implementation of a monitoring plan.

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MERRIAM'S SHREW

Scientific Name: *Sorex merriami*

Species of Conservation Priority:
Level III

General Description: A medium sized shrew approximately 4 inches in total length. Pelage gray above with a lighter buff or white underside.

Status: Resident.

Abundance: Rare.

Primary Habitat: Found in dry short-grass prairie or sage steppe habitats.

Federal Status: No federal status.

Reason for Designation: Rare to North Dakota. Maybe on the fringe of its range but recent surveys may be showing some range expansion.



LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Currently it has been documented in extreme western North Dakota. Its preference for arid grasslands and sage-steppe habitat would make it possible in counties on the western and southwestern edge of North Dakota. Literature shows an association with sage-brush vole populations although it has not been documented in North Dakota.

Key Areas for Merriam's Shrew in North Dakota

Merriam's Shrews have been documented in Billings and McKenzie counties in the state. Recent records have come from Black-tailed Prairie Dog colonies. This may show a potential preference for this species. Also literature shows an association with sage-brush vole populations although it has not been documented in North Dakota.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Loss of native mixed grass prairie and sage-steppe habitat.

Other Natural or Manmade Factors

Loss and fragmentation of habitat due to energy development. Over-grazing of mixed grass and sage-steppe habitat.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- Northeastern State University is currently surveying "fringe" mammals in southwestern ND of which the Merriam's Shrew is included.

Previous Research and Survey Efforts

- Northern Prairie Wildlife Research Center has developed an annotated bibliography for mammals of North Dakota
- University of North Dakota Climate Change and Land use Effects on Small Mammal Communities in a Northern Great Plains Landscape.

Additional Research and Survey Efforts Needed

- Research and survey efforts are needed to identify target areas and possible threats for this species.
- Develop a monitoring protocol for small mammals.

MANAGEMENT RECOMMENDATIONS

- Work with partners to implement easements or land acquisition.
- Work with the oil industry to minimize impacts to grassland habitats.
- Implement restoration projects where possible.
- Implement grazing systems to benefit shortgrass prairie residual cover, forb species, and woody draws.
- Control noxious weeds through biological and chemical methods.
- Work with oil industry to minimize impacts to short-grass habitats.
- Look to exchange and consolidate mineral rights, particularly within focus areas.
- Continue to provide public land management agencies with mitigation recommendations in respect to species of concern.

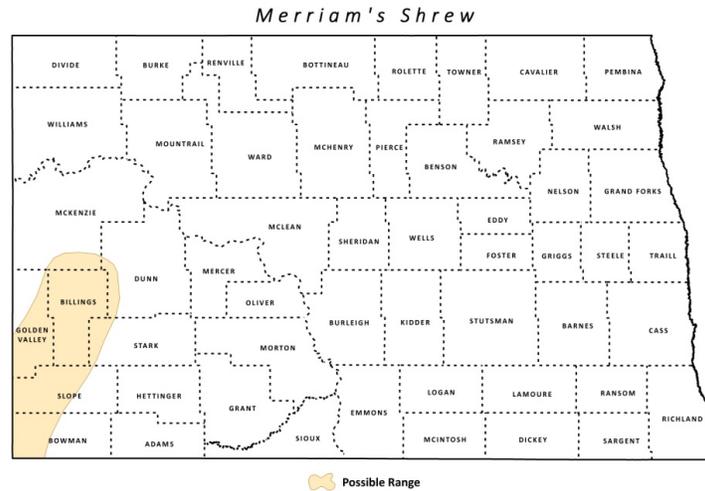
- Survey areas of data gaps. Conduct research/surveys to establish baseline information on SCP.

Monitoring Plans

No monitoring plan for this species has been developed.

2005-2015 PROGRESS

The Merriam's Shrew was added as a Level III Species of Conservation Priority in the 2015 revision of the Wildlife Action Plan. Individuals documented in the recent Black-tailed Prairie Dog survey (SWG T-32-R) were only 2nd and 3rd recorded for the state. SWG T39-R **Survey of "Fringe Mammals"** will investigate this species status in the state further.



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NORTHERN LONG-EARED BAT

Scientific Name: *Myotis septentrionalis*

Species of Conservation Priority:
Level I

General Description: 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.

Abundance: Rare.

Primary Habitat: Primarily found in woodlands within its range.

Federal Status: Threatened.

Reason for Designation: Rare to the state. Listed as Threatened under the Endangered Species Act. Listed as a state species of concern in Minnesota. A significant loss of individuals to White-nosed Syndrome in eastern and Midwestern United States has caused a population concern range wide.



BCI

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Prefers wooded habitat. Generally roosts in trees under loose bark or within holes. Hibernates within caves and mine shafts.

Key Areas for Northern Long-eared Bat in North Dakota

This species has only been identified in a few locations in North Dakota. It has been documented in forested habitat in the Turtle Mountains, and the riparian corridors of the Little Missouri and Missouri rivers.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

This and other bat species in the state rely on caves and crevices for hibernacula and maternal grounds. These sites are susceptible to human and other types of disturbance. Frequent disturbance may cause females to drop young in the rearing process or abandon the area.

Other Natural or Manmade Factors

Northern Long-eared Bat and other bats in North Dakota are insectivores. Pesticides used in the vicinity of feeding grounds would affect bat populations by killing prey. Also, bats are known to store pesticides within fat reserves. Loss of water sources for drinking is also a potential threat. When natural water sources are dry, bats may resort to drinking from stock tanks. These can be potential bat traps. Wind turbines have been identified as a source of mortality to bats and several turbine “farms” are under construction in parts of North Dakota. Indiscriminate killing due to a negative public perception has been identified as a possible threat to this species.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- Identification of hibernacula in western North Dakota as well as their susceptibility to White-nose Syndrome is being conducted by North Dakota State University.
- North Dakota State University is currently developing a North Dakota Bat Management Plan.

Previous Research and Survey Efforts

- A survey of bat species in the state was conducted by North Dakota State University.
- A number of agencies have surveyed for small mammals in the southwestern part of the state including, REAP, Theodore Roosevelt National Park, the U.S. Forest Service, and U.S. Bureau of Land Management.

Additional Research and Survey Efforts Needed

- Research to assess primary threats to this species.
- Life History requirements for this species specific to North Dakota should be investigated.

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.

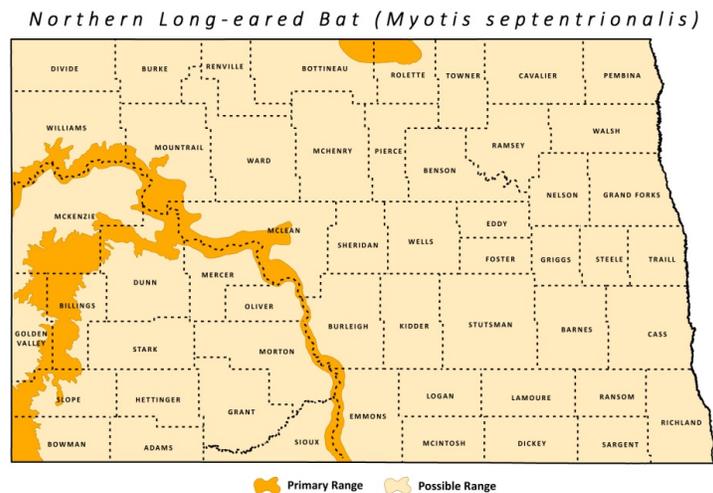
- Education on the benefits and misconceptions about bats.
- Determine and protect nursery and hibernation sites.
- Provide roosting sites in areas where natural sites have been destroyed or disturbed.
- Reduce use of pesticides near waterways where bats forage.

MONITORING PLANS

A monitoring protocol will be addressed in the North Dakota Bat Management Plan currently under development.

2005-2015 PROGRESS

The Northern Long-eared Bat was added to the Species of Conservation Priority list during the revision of the Wildlife Action Plan in 2015. Listed as Threatened by the USFWS in April of 2015. Rare to North Dakota, White-nose Syndrome threatens this species in much of its eastern range.



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PLAINS POCKET MOUSE

Scientific Name: *Perognathus flavescens*

Species of Conservation Priority:
Level III

General Description: A medium-sized mouse of 5 inches in length, including tail. Its tail is roughly the same length as its body and has pale black stripe on top. Its fur is a buff gray on top with a lighter underside. A distinct light patch is visible behind each ear. Its hind feet are distinctly larger than its front feet.

Status: Year-round resident.

Abundance: Rare.

Primary Habitat: Found in eastern North Dakota in areas with exposed sand dunes or sandy soils covered with grass. Can also be found feeding in crop fields.

Federal Status: No federal status.

Reason for Designation: Little is known of the habits and status of this rodent. Only small pockets of this species' habitat occur within the state.



LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Found in prairie tracts with sand dunes or stabilized sandy soils. Plains pocket mice dig their burrows in loose soils under vegetation. Burrows consist of one tunnel with expanded areas to store seeds. May also be found feeding in grain fields.

Key Areas for Plains Pocket Mouse in North Dakota

Plains pocket mice are confined to the southeast part of North Dakota. Part of the Sheyenne National Grasslands in Ransom County contains Plains Pocket Mouse habitat.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Conversion of sandy soil habitat for agricultural use is the greatest threat to this species. Already rare, the loss of remaining sandy soil habitat would be detrimental to the Plains Pocket Mouse.

Other Natural or Manmade Factors

Herbicide and pesticide use on agricultural land may be a threat to this species.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- North Dakota State University is conducting small mammal surveys on the Sheyenne National Grasslands in SE North Dakota.

Previous Research and Survey Efforts

- The University of North Dakota conducted diversity and abundance work of terrestrial vertebrates in tall grass prairies.
- Small mammal inventories have been conducted on Sand Lake NWR, Sheyenne National Grasslands, and Tawaukon NWR.

Additional Research and Survey Efforts Needed

- Information on all aspects of this species' ecology needs to be examined, including abundance, reproduction, habitat requirements and threats.
- Document remaining sand dune habitat used by this species.
- Develop a monitoring protocol for small mammals.

MANAGEMENT RECOMMENDATIONS

- Work with partners to minimize impacts to grassland habitats.
- Implement restoration projects 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 grassland habitats.

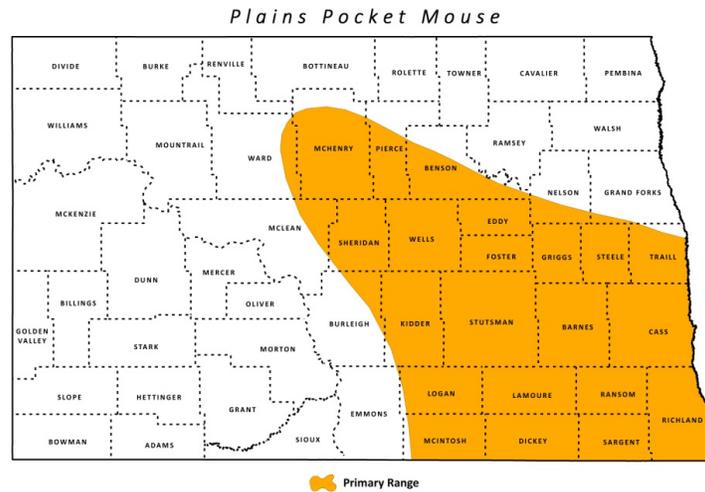
- Survey areas of data gaps. Conduct research/surveys to establish baseline information on Plains Pocket Mouse.

MONITORING PLANS

No monitoring plan for this species has been developed.

2005-2015 PROGRESS

The Plains Pocket Mouse maintains a Level III on the Species of Conservation Priority list. A better understanding of this species historic distribution has been developed, but information on life history is still lacking.



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PYGMY SHREW

Scientific Name: *Sorex hoyi*

Species of Conservation Priority:
Level II

General Description: North Dakota's smallest mammal. Four inches in length, of which one third is tail. It has a reddish brown to gray coat with an underside somewhat lighter. The tail is dark brown on top and lighter underneath. Pygmy Shrews have small black eyes and stiff hairs called vibrissae along their nose.

Status: Year-round resident.

Abundance: Rare.

Primary Habitat: Found in eastern North Dakota in areas with exposed sand dunes or sandy soils covered with grass. Can also be found feeding in crop fields.

Federal Status: No federal status.

Reason for Designation: Little is known about this tiny mammal within the state. Its population is considered vulnerable in this part of the country.



LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Range-wide, Pygmy Shrew occupy numerous habitat types, including mesic mountainous areas, dry sandy ridges, forests and woodlands, grazed pastures, sagebrush grasslands, lowland marshes, and edges of sphagnum bogs. In this region they seem to favor wetlands and riparian woodlands associated with mixed and tall grass prairies.

Key Areas for Pygmy Shrew in North Dakota

In North Dakota this Pygmy Shrew appears to be associated with grassland/wetland complexes. Wetland complexes of Ransom and Benson counties have known populations. Forested areas in the Turtle Mountains and Pembina Gorge may also hold populations.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

The conversion of native grasslands wetlands, and riparian areas is a major threat facing this species.

Other Natural or Manmade Factors

Use of pesticides may threaten this species' food base.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- Currently there is no research or survey effort in progress.

Previous Research and Survey Efforts

- A survey and relationship study of wetlands in the Pygmy Shrew range was conducted by the USFWS (1989).
- Small mammal surveys have been conducted on Upper Souris NWR, Des Lacs NWR, and J. Clark Salyer NWR, all within the possible range of the Pygmy Shrew.

Additional Research and Survey Efforts Needed

- Develop a monitoring protocol for small mammals in North Dakota.

MANAGEMENT RECOMMENDATIONS

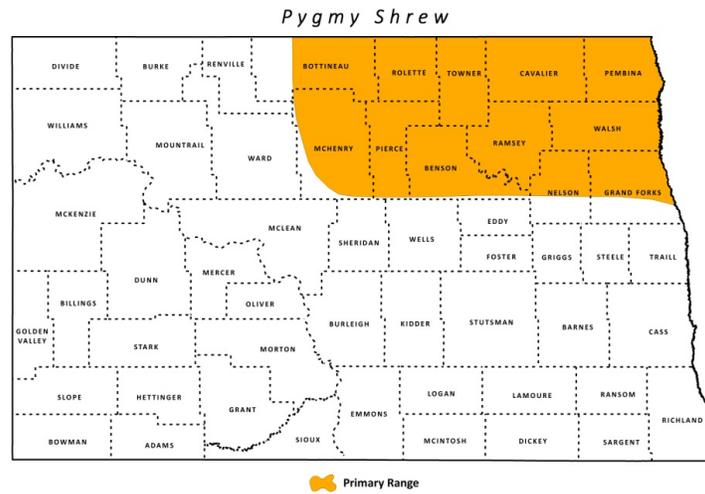
- Work with partners to minimize impacts to grassland habitats.
- Implement restoration projects where possible.
- Implement grazing systems to benefit grassland/wetland species.
- Work with partners to ensure Swampbuster provisions are maintained.
- Control noxious weeds through biological and chemical methods.
- Work with state and federal agencies to enforce existing pesticide regulations.
- Coordinate with wind energy companies to minimize impacts to grassland habitats.
- Survey areas of data gaps. Conduct research/surveys to establish baseline information on Pygmy Shrew

MONITORING PLANS

No monitoring plan for this species has been developed.

2005-2015 PROGRESS

The Plains Pocket Mouse maintains a Level I on the Species of Conservation Priority list. A better understanding of this species historic distribution has been developed, but information on life history is still lacking.



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RICHARDSON'S GROUND SQUIRREL

Scientific Name: *Urocitellus richardsonii*

Species of Conservation Priority:
Level II

General Description: 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.

Abundance: Locally Common.

Primary Habitat: Prefers native mixed-grass prairie. Commonly found in areas that are heavily grazed.

Federal Status: No federal status.

Reason for 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 conservation priority 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.



NDGFD

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred 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

Richardson's Ground Squirrels 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.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Conversion of native prairie and rangeland to agricultural lands is the leading threat to the Richardson's Ground Squirrel.

Other Natural or Manmade Factors

Poisoning to control and eradicate colonies is prevalent. Recreational shooting of Richardson's Ground Squirrels may affect populations. Colonial mammals are susceptible to plague, although no documented cases are known in North Dakota.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- No current research for this species is ongoing.

Previous Research and Survey Efforts

- A distribution study was conducted by the Northern Prairie Wildlife Research Center in 2005.
- The U.S. Forest Service mapped Richardson's Ground Squirrel colonies on the Sheyenne National Grasslands in 2002.
- Colonies were mapped by the USFS on the Sheyenne Grasslands in 2005-06.
- A reproduction study was conducted by the University of North Dakota in 1975.

Additional Research and Survey Efforts Needed

- Utilize developed monitoring protocol for this species.

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.

- Surveys to establish baseline information on Richardson’s Ground Squirrels.

MONITORING PLANS

No monitoring plan is in place for Richardson’s Ground Squirrel. A random township survey method developed in a previous study could be used to accomplish this.

2005-2015 PROGRESS

The Richardson’s Ground Squirrel maintains a Level II on the Species of Conservation Priority list. Initial surveys were done in SWG T-3-1 **Distribution of Richardson’s Ground Squirrel Colonies in North Dakota and Burrowing Owl Use of the Ground Squirrel Colonies**. Follow-up work is needed to monitor this species.



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RIVER OTTER

Scientific Name: *Lontra canadensis*

Species of Conservation Priority:
Level II

General Description: The River Otter is a large, semi-aquatic member of the weasel family weighing from 9 - 41 pounds. Total body length of adult otters ranges from 35 - 54 inches, with long muscular tails accounting for 35 to 40% of the total length. Fur coloration usually is dark brown on the back with a lighter belly and throat. Otters are good swimmers, having a long streamlined body, short powerful legs and webbed feet.

Status: Year-round resident.

Abundance: Uncommon.

Primary Habitat: River Otters are found in a variety of aquatic habitats, including rivers, streams, backwater sloughs, wetlands, lakes and ponds. Key factors that determine habitat use include food availability (primarily fish and crustaceans), year-round water supplies and adequate cover.

Federal Status: No federal status.

Reason for Designation: Historically, River Otters occurred in aquatic habitats throughout North Dakota, but had declined or disappeared. A study of otters in eastern North Dakota resulted in documentation of a population. More information is needed to re-evaluate their status.



USFWS

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

In Midwestern states, landscapes that characterize high-quality River Otter habitat include a relatively high number of wetlands and high percentage of woodland or riparian habitat within about 300 yards of a river or stream. Otters often are found in aquatic habitats associated with beaver activity and in shallow pools or below small dams where fish are concentrated. Habitats that retain open water in winter are important to otters for acquiring food. Otters den in riparian vegetation, undercut banks, abandoned beaver bank dens and lodges, rock cavities, log jams, and tree root structures.

Key Areas for River Otter in North Dakota

The Red River of the North and its tributaries are important waterways for this species. Otters will also use adjacent wetlands and lakes. Reports of otters in the Missouri River do occur but a population has not been identified to date.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

The greatest threat to River Otters is destruction or modification of riparian habitat for the purposes of economic or housing developments, recreation, or for conversion to cropland.

Other Natural or Manmade Factors

Aquatic habitats where River Otters have been sighted and other water bodies throughout North Dakota have documented pollution issues (i.e., dissolved oxygen, sediment, nutrient and heavy metal levels) that could impact survival of otters by reducing prey availability or impairing reproduction. River Otters are susceptible to human-caused mortality, including incidental trapping and collisions with vehicles.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- Currently there is no research targeting River Otters within the state.

Previous Research and Survey Efforts

- Frostburg State University studied otters and other meso-carnivores in eastern North Dakota from 2008 to 2012.
- Frostburg State University surveyed otters in western North Dakota tributaries in 2012.
- Sightings are recorded by NDGFD staff. Necropsies are performed on incidental catches or vehicle-hit otters.

Additional Research and Survey Efforts Needed

- No additional research has been identified.

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.

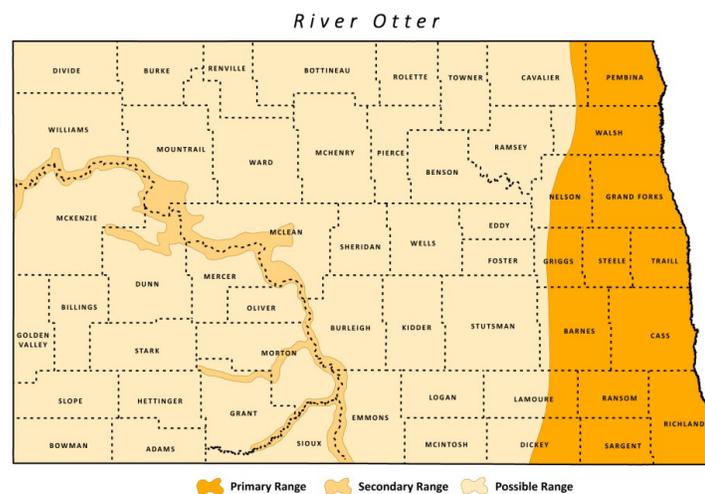
- Continue to work with NDSWC to develop minimum in-stream flow recommendations.
- Develop and promote incentive programs to restore riparian areas.
- Develop and promote incentive programs to enhance or restore riparian areas.
- Continue to work with ND 319 Task Force in prioritizing projects within impaired watersheds and implementing BMP's.
- Work to modify dam operation regimes.
- Develop and promote incentive programs for adjacent landowners to improve bank stability through land use changes (e.g. RRBPR).
- Promote non-traditional bank stabilization measures (i.e. root wads, willow waddles, vegetative slope)
- Control noxious weeds through biological and chemical methods.
- Cooperate with Fisheries Division on state aquatic nuisance species plan.
- Continue to work with partners in promoting and distributing educational materials related to river, stream and riparian values and good stewardship.

MONITORING PLANS

The NDGFD rare furbearer reporting system along with information obtained from incidental trapping is being used to monitor River Otter. A standardized survey method such as the one developed by Frostburg State University could be used to gather more information if needed.

2005-2015 PROGRESS

The River Otter maintains a level II Species of Conservation Priority ranking. SWG's T-12-R **Evaluating the Distribution and Abundance of River Otters and Other Meso-carnivores in Eastern North Dakota Drainage: Applications of GIS, Genetic and Digital Technologies for Conservation Planning** and T2-6-R **Evaluating the Distribution of River Otters and Beavers throughout the Missouri and Souris River Drainages in North Dakota** have provided much needed information on the species distribution within the state as well as food habits and habitat preferences. The framework for monitoring this species was also developed if additional monitoring is necessary.



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SAGEBRUSH VOLE

Scientific Name: *Lemmiscus curtatus*

Species of Conservation Priority:
Level III

General Description: This rodent has a gray, bushy coat, small rounded ears and a very short tail. Unlike other voles it is usually found living in small colonies consisting of shallow burrows.

Status: Year-round resident.

Abundance: Rare.

Primary Habitat: Semi-arid areas with loose soil; usually a combination of grass and sagebrush.

Federal Status: No federal status.

Reason for Designation: Sagebrush habitat this species inhabits is threatened by conversion and other land use practices.



LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Found in semi-arid lands. Soil normally loose and well drained. Vegetation is normally sagebrush or rabbit brush with a grass component.

Key Areas for Sagebrush Vole in North Dakota

Sagebrush Voles are found in southwestern North Dakota. Sagebrush habitat in that portion of the state would be a key area identified for this species.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

The health of North Dakota sagebrush habitat is the greatest concern for this species. Much of the states sagebrush habitat has been disturbed and is in poor condition.

Other Natural or Manmade Factors

No other threats have yet been identified for this species.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- Northeastern State University is currently surveying “fringe” mammals in southwestern ND of which the Sagebrush Vole is included.

Previous Research and Survey Efforts

- Northern Prairie Wildlife Research Center developed an annotated bibliography for mammals of North Dakota.
- University of North Dakota studied Climate Change and Land use Effects on Small Mammal Communities in a Northern Great Plans Landscape.
- Dickinson State University surveyed small mammals in western North Dakota as part of a Black-tailed Prairie Dog survey.
- A number of agencies have surveyed for small mammals in the southwestern part of the state, including REAP, Theodore Roosevelt National Park, the U.S. Forest Service, and U.S. Bureau of Land Management.

Additional Research and Survey Efforts Needed

- Research and survey efforts are needed to identify target areas and possible threats for this species.
- Develop a monitoring protocol for small mammals.

MANAGEMENT RECOMMENDATIONS

- Work with partners to implement easements or land acquisition.
- Communicate with the oil industry to minimize impacts to sagebrush habitats.
- Implement restoration projects where possible.
- Implement grazing systems to benefit shortgrass prairie residual cover, forb species, and woody draws (i.e. participate in revision of USFS Allotment Management Plans or AMP's).
- Control noxious weeds through biological and chemical methods.
- Coordinate with wind energy companies to minimize impacts.
- Look to exchange and consolidate mineral rights, particularly within focus areas.

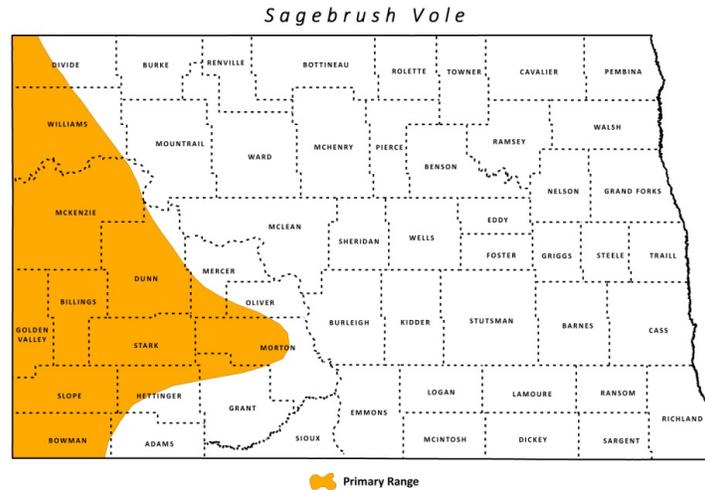
- Continue to provide public land management agencies with mitigation recommendations in respect to species of concern.
- Survey areas of data gaps. Conduct research/surveys to establish baseline information on sage brush voles.

MONITORING PLANS

No monitoring plan for this species has been developed.

2005-2015 PROGRESS

The Sagebrush Vole maintains a level III Species of Conservation Priority ranking. Little is still known of this species. A current study T-39-R-1 **Survey of 'fringe' mammals in western North Dakota** hopes to provide much needed information on this species.



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SWIFT FOX

Scientific Name: *Vulpes velox*

Species of Conservation Priority:
Level II

General Description: 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: Believed to be a resident species, potentially breeding.

Abundance: Rare.

Primary Habitat: Large tracts of short and mixed-grass prairie.

Federal Status: No federal status.

Reason for Designation: A combination of loss of native prairie and poisoning efforts aimed at wolves and coyotes are 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.



Craig Bihrie

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred 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.

Key Areas for Swift Fox in North Dakota

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 breeding populations in South Dakota and Montana.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Loss of suitable native short and mixed-grass prairie due to conversion to agricultural and development provide the largest threat to re-establishing populations.

Other Natural or Manmade Factors

High red fox and coyote populations threaten Swift Fox populations due to predation. Distance to breeding populations in South Dakota and Montana is a threat to natural repopulation of suitable habitat in North Dakota.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- The North Dakota Game and Fish Department will begin a survey to evaluate population status in SW North Dakota in 2015.
- Population status of a re-introduced population at Badlands National Park is ongoing.

Previous Research and Survey Efforts

- World Wildlife Fund conducted modeling of potential habitat in SE Montana. Included areas in North Dakota.
- A diet study was performed in Montana on a reintroduced population.
- Prey density studies have been conducted throughout the Swift Fox range with SD, MT, and SK being the closest to North Dakota.
- Denning site selections have been studied in southwestern South Dakota.
- Reintroductions have occurred in parts of Montana, South Dakota and Saskatchewan.

Additional Research and Survey Efforts Needed

- Determine presence of Swift Fox in North Dakota
- Identify existing native shortgrass/mixed-grass prairie ecosystem and other suitable Swift Fox habitats.

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.

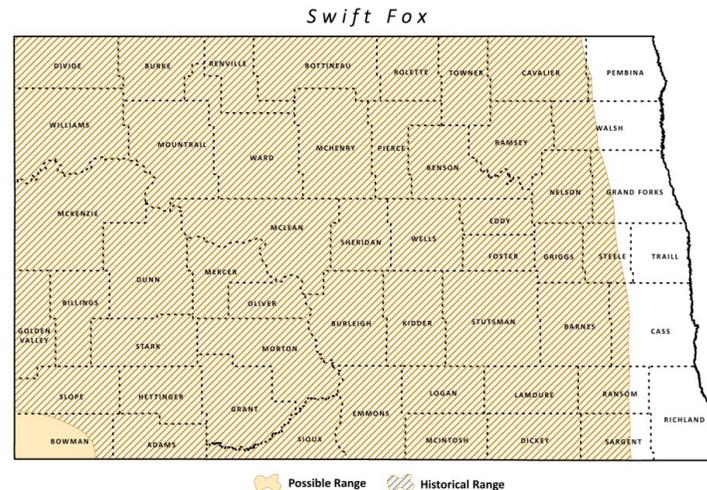
- Identify habitat corridors and surrounding areas between habitat blocks for protection.
- Monitor existing and identify new threats to Swift Fox population expansion.
- Promote scientific Swift Fox management and a public education program.

MONITORING PLANS

No monitoring plan currently in place. The North Dakota Game and Fish will begin surveys of potential habitat to monitor species re-establishment in the state.

2005-2015 PROGRESS

The Swift Fox maintains a level II ranking. Re-introductions into Montana and South Dakota appear to have paved the way for natural re-establishment of the species in extreme southwestern North Dakota. An effort to monitor that re-establishment will begin in the summer of 2015.



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TOWNSEND'S BIG-EARED BAT

Scientific Name: *Corynorhinus townsendii*

Species of Conservation Priority:
Level I

General Description: Distinguishable from other North Dakota bats by its oversized ears. The large fleshy ears are half the length of the body and connected to one another just about the eyes. Fur color ranges from brown to a dark gray.

Status: Seasonal as no hibernacula have been identified for this species in the state.

Abundance: Rare.

Primary Habitat Can be found in a number of types of habitat in the summer months but most commonly around forest and riparian areas. Winter hibernacula is found in caves and mines with cool stable temperatures. This habitat has not been identified in North Dakota to date for this species.

Federal Status: No federal status.

Reason for Designation: Newly documented in the state. Listed as a state species of concern throughout the western United States.



BCI

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Habitat generalist, but mostly commonly associated with forest and riparian areas in the summer months. Winter hibernacula include caves and mines throughout its range. A hibernacula has not been documented to date in North Dakota

Key Areas for Townsend's Big-eared Bat in North Dakota

In North Dakota Townsend's Big-eared Bats are found within the badlands of the Little Missouri River. Also recently they have been documented in the Turtle Mountains region of the state.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

This and other bat species in the state rely on caves and crevices for hibernacula and maternal grounds. These sites are susceptible to human and other types of disturbance. Frequent disturbance may cause females to drop young in the rearing process or abandon the area. Loss and disturbance of roost habitat is a primary threat.

Other Natural or Manmade Factors

Townsend's Big-eared Bat and other bats in North Dakota are insectivores. Pesticides used in the vicinity of feeding grounds would affect bat populations by killing prey. Also, bats are known to store pesticides within fat reserves. Loss of water sources for drinking is also a potential threat. When natural water sources are dry, bats may resort to drinking from stock tanks. These can be potential bat traps. Wind turbines have been identified as a source of mortality to bats and several turbine "farms" are under construction in parts of North Dakota. Indiscriminate killing due to a negative public perception has been identified as a possible threat to this species. Loss of genetic diversity due to non-connectivity of populations.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- Identification of hibernacula in western North Dakota as well as their susceptibility to White-nose Syndrome is being conducted by North Dakota State University.
- North Dakota State University is currently developing a North Dakota Bat Management Plan.

Previous Research and Survey Efforts

- A survey of bat species in the state was conducted by North Dakota State University.
- A number of agencies have surveyed for small mammals in the southwestern part of the state including, REAP, Theodore Roosevelt National Park, the U.S. Forest Service, and U.S. Bureau of Land Management.

Additional Research and Survey Efforts Needed

- Research to assess primary threats to this species.
- Life History requirements for this species specific to North Dakota should be investigated.
- Document the effects of energy development on western bat species.

MANAGEMENT RECOMMENDATIONS

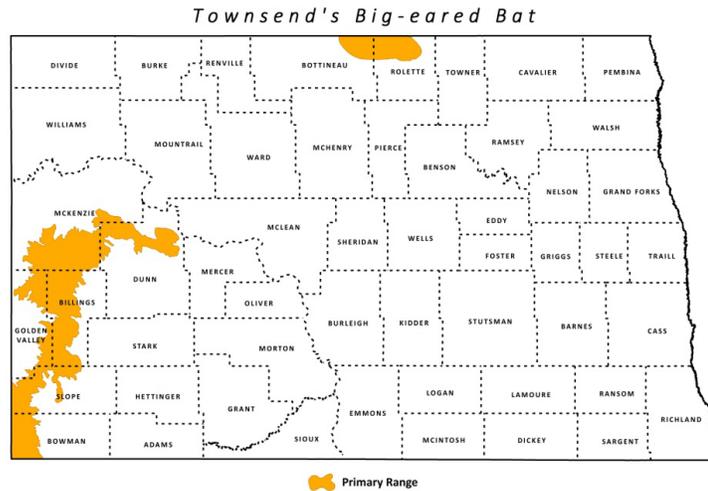
- Protection and restoration of riparian habitat.
- Manage riparian habitats to maintain snags, connecting corridors, and edges.
- Maintain and improve seeps, ponds, and other wet areas as water sources.
- Education on the benefits and misconceptions about bats.
- Determine and protect nursery and hibernation sites.
- Provide roosting sites in areas where natural sites have been destroyed or disturbed.
- Reduce use of pesticides near waterways where bats forage.

MONITORING PLANS

A monitoring protocol will be addressed in the North Dakota Bat Management Plan currently under development.

2005-2015 PROGRESS

Townsend's Big-eared Bat was added to the Species of Conservation Priority list during the revision of the Wildlife Action Plan in 2015. It is a state species of concern in many western states. SWG T2-5-R Distribution and Habitat Use of the Bats of North Dakota documented Townsend's Big-eared Bats including a potential range expansion.



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WESTERN SMALL-FOOTED BAT

Scientific Name: *Myotis ciliolabrum*

Species of Conservation Priority:
Level III

General Description: 4 inches from nose to tail and weighing .1-.2 ounces. Its pelage is pale yellowish brown and its ears and wing membranes are black. A black band of hair runs across both eyes, giving the appearance of a mask.

Status: Year-round, one of two species documented as hibernating in North Dakota.

Abundance: Rare.

Primary Habitat: Documented in the riparian corridors of the Little Missouri and Missouri rivers. Normally found in rugged terrain they roost alone or in small groups in rock crevices and under tree bark. This species has a strong association with coniferous trees.

Federal Status: No federal status.

Reason for Designation: Little is known about this species in North Dakota. Although rare to the state there are some indications that it is declining range wide.



BCI

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Western Small-footed Bat are found in areas with rock cliffs, clay buttes and steep slopes. Conifer trees are also associated with this species. Deep crevices are needed for hibernation.

Key Areas for Western Small-footed Bat in North Dakota

Has been documented in the riparian corridors of the Little Missouri and Missouri rivers.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

This and other bat species in the state rely on caves and crevices for hibernacula and maternal grounds. These sites are susceptible to human and other types of disturbance. Frequent disturbance may cause females to drop young in the rearing process or abandon the area. Loss and disturbance of roost habitat is a primary threat.

Other Natural or Manmade Factors

Western Small-footed Bat and other 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. Loss of water sources is also a potential threat to this species. When natural water sources are dry, bats may resort to drinking from stock tanks, which can potentially trap bats. Wind turbines have been identified as a source of mortality to bats and several turbine “farms” are under construction in parts of North Dakota. Indiscriminate killing due to a negative public perception has been identified as a possible threat to this species.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- Identification of hibernacula in western North Dakota as well as their susceptibility to White-nose Syndrome is being conducted by North Dakota State University.
- North Dakota State University is currently developing a North Dakota Bat Management Plan.

Previous Research and Survey Efforts

- A survey of bat species in the state was conducted by North Dakota State University.
- A number of agencies have surveyed for small mammals in the southwestern part of the state including, REAP, Theodore Roosevelt National Park, the U.S. Forest Service, and U.S. Bureau of Land Management.

Additional Research and Survey Efforts Needed

- Research to assess primary threats to this species.
- Life History requirements for this species specific to North Dakota should be investigated.
- Document the effects of energy development on western bat species.

MANAGEMENT RECOMMENDATIONS

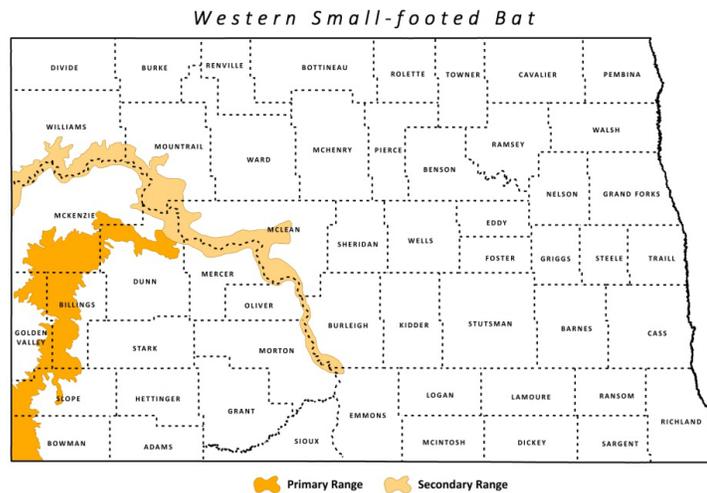
- Protection and restoration of riparian habitat.
- Manage riparian habitats to maintain snags, connecting corridors, and edges.
- Maintain and improve seeps, ponds, and other wet areas as water sources.
- Education on the benefits and misconceptions about bats.
- Determine and protect nursery and hibernation sites.
- Provide roosting sites in areas where natural sites have been destroyed or disturbed.
- Reduce use of pesticides near waterways where bats forage.

MONITORING PLANS

A monitoring protocol will be addressed in the North Dakota Bat Management Plan currently under development.

2005-2015 PROGRESS

The Western Small-footed *Myotis* maintains its Level III Species of Conservation Priority ranking due to lack of information known about this species. SWG T2-5-R Distribution and Habitat Use of the Bats of North Dakota increased the information known for this species. Continued work is needed to address threats to this species and implementation of a monitoring plan.



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APPENDIX D. Fish

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BLACKNOSE SHINER

Scientific Name: *Notropis heterolepis*

Species of Conservation Priority:
Level III

General Description: 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: Year-round resident.

Abundance: Rare.

Primary Habitat: Primarily found in vegetated pools that are part of a stream system.

Federal Status: None.

Reason for Designation: Extirpated from much of its historic range in North Dakota. Populations may be confined to only a few sites.



Konrad Schmidt

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Prefer clear, vegetated pools within a stream system.

Key Areas for Blacknose Shiner in North Dakota

The Blacknose Shiner was last documented in spring-fed pools in a stretch of the Sheyenne River in Ransom County, although no individuals were found during the last survey. Historically, this species was also documented in the Forest and Maple rivers.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

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.

Other Natural or Manmade Factors

The addition of dams to the Red River drainage has changed the flow regime and segmented populations. Poor water quality, due to runoff and sedimentation in many stretches of the Red River basin has contributed to the decline of this species.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- There is no current research targeting this species.
- The North Dakota Department of Health conducts Index of Biotic Integrity (IBI) for all North Dakota's watersheds. This will document all species encountered.

Previous Research and Survey Efforts

- Red River basin streams were surveyed during the 1960s by the University of North Dakota (UND).
- In the late 1970s, Red River basin stream surveys were conducted by the Minnesota Department of Natural Resources, Ecological Services Section (MDNR ECO).
- A survey was conducted on the Red River during 1983 and 1984.
- Investigations of stream fishes in the Red River basin occurred during 1993 and 1994 as a part of two major studies.
- Several sites throughout the basin have been sampled for fishes using electro-fishing gear by the MDNR, Minnesota Pollution Control Agency (MPCA), North Dakota Department of Health (NDDH), U.S. Environmental Protection Agency (EPA), and the U.S. Geological Survey (USGS). These studies are a part of the USGS National Water Quality Assessment program (Stoner et al. 1993) and the development of an index of biotic integrity for fishes in the basin (Goldstein et al. 1994).
- A survey of the Sheyenne River and its tributaries within the Sheyenne National Grasslands was conducted by Brooks in 2000.
- South Dakota State University surveyed the stream fish of the Red River and its drainages in 2008.
- South Dakota State University surveyed western North Dakota streams in 2010.
- A survey effort was conducted in the Sheyenne River by Valley City State University in 2012.
- A survey effort was conducted in Baldhill Creek by Valley City State University in 2013.

Additional Research and Survey Efforts Needed

- Develop a protocol to monitor stream fish.

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.

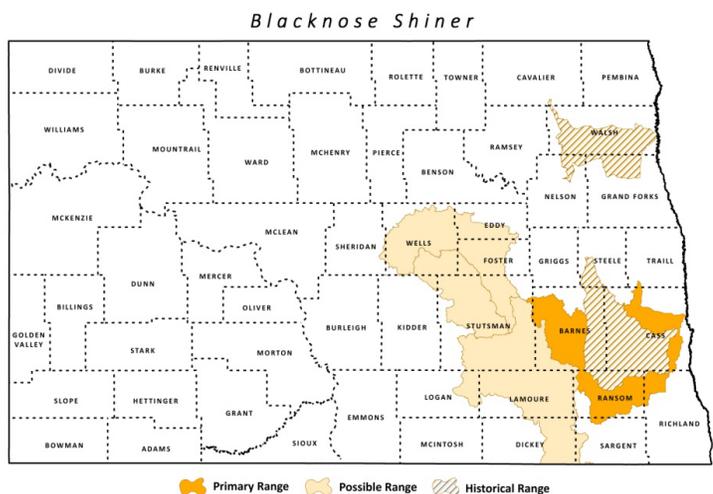
- Continue to use the Section 404 program to ensure affected rivers and riparian areas are mitigated to replace form and function.
- Continue to work with other federal agencies (i.e. FAA and FHWA) not covered by Section 404 or Swampbuster to ensure affected rivers and riparian areas are mitigated to 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.
- Work with county zoning planning officials to designate areas in need of protective covenants
- 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.
- Control noxious weeds through biological and chemical methods.
- 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.

MONITORING PLANS

No monitoring plan has been identified for this species. The USFS monitors Iron Springs Creek for Blacknose Shiner. The North Dakota Department of Health conducts Index of Biotic Integrity (IBI) for all North Dakota's watersheds. This will document all species encountered.

2005-2015 PROGRESS

The Blacknose Shiner maintains its Level III Species of Conservation Priority ranking. SWG T-14-R **Status of selected fishes with immediate conservation need in North Dakota** provided the important information for this species. Follow up surveys to assess this species status are needed.



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BLUE SUCKER

Scientific Name: *Cypleptus elongatus*

Species of Conservation Priority:
Level I

General Description: 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: Year-round resident.

Abundance: Rare.

Primary Habitat: Deep areas with swift current on medium to large turbid rivers. Bottom normally sand or gravel. Use confluence areas of larger tributaries for spawning.

Federal Status: None presently.
Former candidate species.

Reason for Designation: Loss of free-flowing stretches of the Missouri River due to impoundment and channelization has reduced suitable habitat for this species.



David Ostendorf

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred 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.

Key Areas for Blue Sucker in North Dakota

Blue Suckers occur at highest frequency in the Missouri River's free-flowing stretches above Lake Sakakawea and Lake Oahe. The confluence areas of larger tributaries such as the Knife and Cannonball rivers are likely key areas for spawning.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

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.

Other Natural or Manmade Factors

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 SURVEY EFFORTS

Current Research and Survey Efforts

- The USFWS, USGS, and Montana Fish, Wildlife, and Parks currently track movements of tagged Blue Sucker in the Yellowstone and Missouri rivers.

Previous Research and Survey Efforts

- A status report for the Blue Sucker was conducted in 1993.

Additional Research and Survey Efforts Needed

- Locate and protect key spawning areas along the Missouri River System.

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.

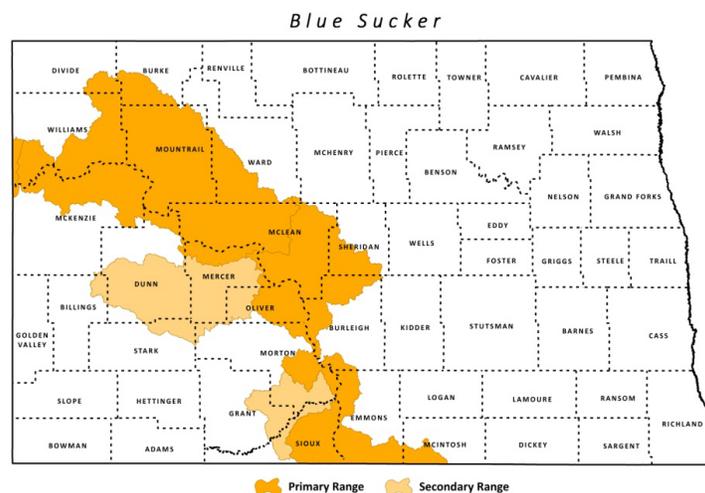
- Develop and promote incentive programs to restore riparian areas.
- Work with county zoning planning officials to designate areas in need of protective covenants
- Continue to work with ND 319 Task Force in prioritizing projects within impaired watersheds and implementing BMP's.
- Develop and promote 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.
- Control noxious weeds through biological and chemical methods.
- 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.

MONITORING PLANS

Present surveys will be maintained to monitor this species.

2005-2015 PROGRESS

The Blue Sucker maintains its Level I Species of Conservation Priority ranking. Currently a project to identify this species important spawning areas is under development.



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BURBOT

Scientific Name: *Lota lota*

Species of Conservation Priority:
Level II

General Description: Only freshwater member of the cod family. The appearance is a cross between a catfish and an eel, with a flattened head and single barbel on the bottom side of the jaw and a slender eel-like tail. The color is varied ranging from a pale green with brown spots to a darker olive.

Status: Year-round resident.

Abundance: Uncommon.

Primary Habitat: Burbot are generally found in large river systems and cold reservoirs.

Federal Status: None.

Reason for Designation: Biologist believe that Burbot populations show cause for concern and more information is needed.



Konrad Schmidt

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Burbot are found in large river systems and reservoirs.

Key Areas for Burbot in North Dakota

Burbot are found in the Missouri and Red river systems in North Dakota.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Impoundments along the Missouri and Red River Systems have impeded the movement of fish throughout the system, separating populations and preventing migration.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- No current research or surveys specifically targeting Burbot ongoing.

Previous Research and Survey Efforts

- Garrison Hatchery propagated Burbot in the early 2000s.
- USFWS sampled young of the year Burbot.

Additional Research and Survey Efforts Needed

- Life history data specific to North Dakota waters.
- Expanded information in recruitment, spawning, rearing.

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.

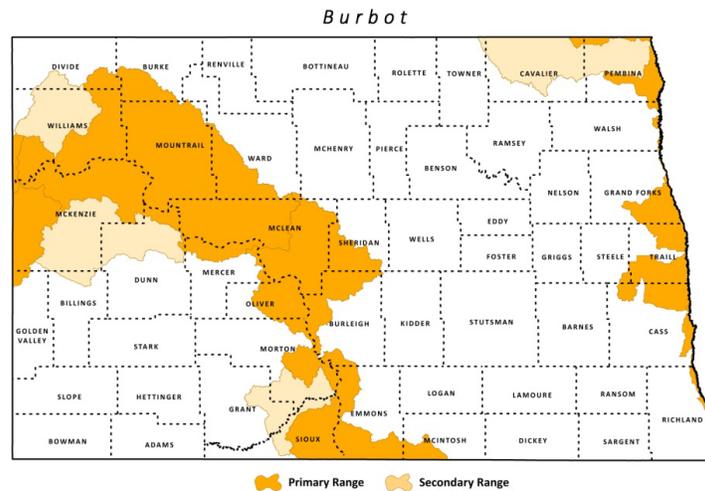
- Survey areas of data gaps. Conduct research/surveys to establish baseline information on SCP.
- Continue to work with partners in promoting and distributing educational materials related to river, stream and riparian values and good stewardship.

MONITORING PLANS

Currently there is no specific monitoring of Burbot in North Dakota. Information is obtained currently in the Garrison reach of the Missouri River during fall Electrofishing and Adult sampling. Information from Lake Sakakawea comes from incidental capture during early spawning surveys.

2005-2015 PROGRESS

The Burbot was added as a Level II Species of Conservation Priority ranking during the 2015 revision of the Wildlife Action Plan. State fisheries biologist have some concern for the Burbot in the Missouri River system and more



information is needed to assess its status.

WORKS CONSULTED

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Williams, J. E., J.E. Johnson, D. A. Hendrickson, S. Contreras-Balderas, J. D. Williams, M. Navarro-Mendoza, D. E. McAllister, and J. E. Deacon. 1989. Fishes of North America endangered, threatened, or of special concern: 1989. Fisheries 14:2-20.

CARMINE SHINER

Scientific Name: *Notropis percobromus*

Species of Conservation Priority:
Level III

General Description: 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: Year-round resident.

Abundance: Rare.

Primary Habitat: Found in pools with some current, or more swiftly flowing stretches adjacent to pools.

Federal Status: None.

Reason for 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.



Konrad Schmidt

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

The Carmine Shiner rarely occurs in lakes, and usually occurs in clear, swift streams, 1.5 meters deep and 3-24 meters wide, with substrates of gravel, rubble, or sand.

Key Areas for Carmine Shiner in North Dakota

The Carmine Shiner has been collected from portions of the Sheyenne River in Ransom County. Was not collected in last survey effort in 2008. Last documented in 1994.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

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.

Other Natural or Manmade Factors

The addition of dams to the Sheyenne River has fragmented habitat and blocked fish movement.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- Currently there are no studies or surveys specifically targeting the Carmine Shiner.

Previous Research and Survey Efforts

- Red River basin streams were surveyed during the 1960s by the University of North Dakota (UND).
- In the late 1970s, Red River basin stream surveys were conducted by the Minnesota Department of Natural Resources, Ecological Services Section (MDNR ECO).
- A survey was conducted on the Red River during 1983 and 1984.
- Investigations of stream fishes in the Red River basin occurred during 1993 and 1994 as a part of two major studies.
- Several sites throughout the basin have been sampled for fishes using electro-fishing gear by the MDNR, Minnesota Pollution Control Agency (MPCA), North Dakota Department of Health (NDDH), U.S. Environmental Protection Agency (EPA), and the U.S. Geological Survey (USGS). These studies are a part of the USGS National Water Quality Assessment program (Stoner et al. 1993) and the development of an index of biotic integrity for fishes in the basin (Goldstein et al. 1994).
- A survey of the Sheyenne River and its tributaries within the Sheyenne National Grasslands was conducted by Brooks in 2000.
- South Dakota State University surveyed the stream fish of the Red River and its drainages in 2008.
- South Dakota State University surveyed western North Dakota streams in 2010.
- A survey effort was conducted in the Sheyenne River by Valley City State University in 2012.
- A survey effort was conducted in Baldhill Creek by Valley City State University in 2013.

Additional Research and Survey Efforts Needed

- Develop a protocol to monitor stream fish.

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.

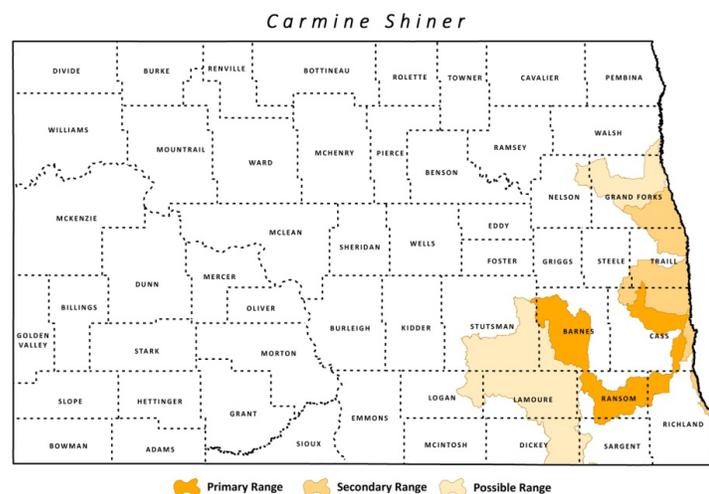
- Continue to work with other federal agencies (i.e. FAA and FHWA) not covered by Section 404 or Swampbuster to ensure affected rivers and riparian areas are mitigated to replace form and function.
- Continue to work with NDSWC to develop minimum in-stream flow recommendations.
- Develop and promote 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. RRBPR).
- 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.

MONITORING PLANS

No monitoring plan has been identified for this species. The North Dakota Department of Health conducts Index of Biotic Integrity (IBI) surveys for all of North Dakota's watersheds. This will document all species encountered.

2005-2015 PROGRESS

The Carmine Shiner (formerly Roseyface Shiner) maintains a Level III Species of Conservation Priority ranking. SWG T-14-R Status of selected fishes with immediate conservation need in North Dakota provided the important information for this species. Follow up surveys to assess this species status are needed.



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Hayer, C-A, et al. 2011. Status and distribution of select fishes in Central and Western North Dakota Rivers and Streams, Final Report. North Dakota Game and Fish Department, Bismarck, 106 pp.

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CHESTNUT LAMPREY

Scientific Name: *Ichthyomyzon castaneus*

Species of Conservation Priority:
Level III

General Description: Eel-like in body shape, up to 15 inches in length. Tan on top with a white belly, no scales. One continuous fin on back and belly. No paired fins on the sides or belly. Mouth is a suction cup like disc with teeth in a circular pattern. Parasitic, maybe found attached to another fish.

Status: Year-round resident.

Abundance: Rare.

Primary Habitat: Found in streams and rivers. Young spend first part of life in pools and backwater with a silt bottom.

Federal Status: None.

Reason for Designation: Little is known of this species within the state. It may be at the western edge of its range in North Dakota. Only a couple of records for the state exist.



David Ostendorf

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Adults are found in larger river systems and lakes. Spawning occurs in smaller streams. Young (ammocoetes) will stay buried at the bottom for that stage of their life.

Key Areas for Chestnut Lamprey in North Dakota

The only records of this species in North Dakota come from the Red, Goose, and Sheyenne rivers. No specific sites have been identified for this species.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

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. Siltation is a threat to ammocoetes in upper stretches of streams.

Other Natural or Manmade Factors

The addition of dams to the Red River and its tributaries has changed the flow regime and blocks movement of fish, segmenting populations. A decrease in water quality due to current land use practices in the Red River basin may contribute to the decline of this species.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- Currently there are no ongoing studies or surveys specifically targeting Chestnut Lamprey.

Previous Research and Survey Efforts

- Red River basin streams were surveyed during the 1960s by the University of North Dakota (UND).
- In the late 1970s, Red River basin stream surveys were conducted by the Minnesota Department of Natural Resources, Ecological Services Section (MDNR ECO).
- A survey was conducted on the Red River during 1983 and 1984.
- Investigations of stream fishes in the Red River basin occurred during 1993 and 1994 as a part of two major studies.
- Several sites throughout the basin have been sampled for fishes using electro-fishing gear by the MDNR, Minnesota Pollution Control Agency (MPCA), North Dakota Department of Health (NDDH), U.S. Environmental Protection Agency (EPA), and the U.S. Geological Survey (USGS). These studies are a part of the USGS National Water Quality Assessment program (Stoner et al. 1993) and the development of an index of biotic integrity for fishes in the basin (Goldstein et al. 1994).
- A survey of the Sheyenne River and its tributaries within the Sheyenne National Grasslands was conducted by Brooks in 2000.
- South Dakota State University surveyed the stream fish of the Red River and its drainages in 2008.
- South Dakota State University surveyed western North Dakota streams in 2010.
- A survey effort was conducted in the Sheyenne River by Valley City State University in 2012.
- A survey effort was conducted in Baldhill Creek by Valley City State University in 2013.

Additional Research and Survey Efforts Needed

- Develop a protocol to monitor stream fish.

MANAGEMENT RECOMMENDATIONS

- Protect rivers, streams, and riparian areas where possible (i.e. easements and/or acquisition).

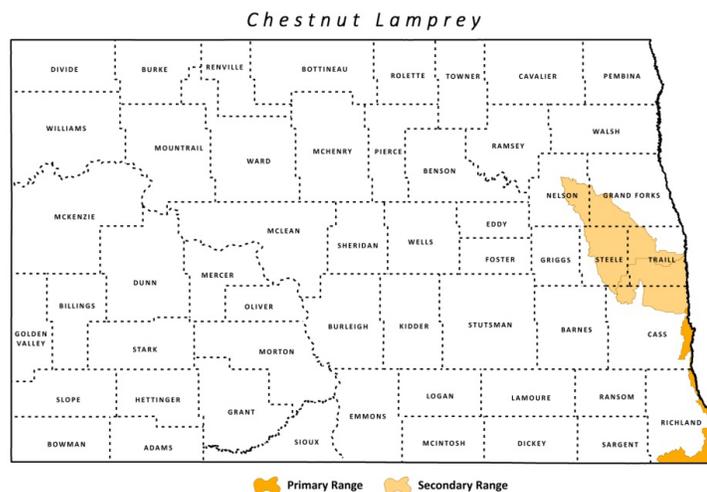
- Work with partners to ensure Swampbuster provisions are maintained.
- Continue to use the Section 404 program to ensure affected rivers and riparian areas are mitigated to replace form and function.
- Continue to work with other federal agencies (i.e. FAA and FHWA) not covered by Section 404 or Swampbuster 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.

MONITORING PLANS

No monitoring plan has been identified for this species. The North Dakota Department of Health conducts Index of Biotic Integrity (IBI) surveys for all of North Dakota's watersheds. This will document all species encountered.

2005-2015 PROGRESS

The Chestnut Lamprey maintains its Level III Species of Conservation Priority. The most recent survey of stream fish SWG T-14-R **Status of selected fishes with immediate conservation need in North Dakota**, documented only one occurrence of Chestnut Lamprey. Their status remains uncertain, and additional surveys are necessary.



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- Brooks, L. 2001. Fish Survey on Seven Tributaries to the Sheyenne River, Sheyenne National Grasslands, North Dakota September 9-10, 2000. Report to the U.S. Forest Service-Sheyenne Ranger District. Lisbon, North Dakota. 24 pp.
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- Hayer, C-A, et al. 2011. Status and distribution of select fishes in Central and Western North Dakota Rivers and Streams, Final Report. North Dakota Game and Fish Department, Bismarck, 106 pp.
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- Power, Greg J. and F. Ryckman. 1998. Status of North Dakota's Fishes. ND Game and Fish Dept., Div. Rpt. 27, 20 pp.
- Stoner et al. 1993. Red River of the North Basin, Minnesota, North Dakota, and South Dakota: Water Resource Bulletin. v. 29, pp. 575-615.

FINESCALE DACE

Scientific Name: *Phoxinus neogaeus*

Species of Conservation Priority:
Level III

General Description: 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: Year-round resident.

Abundance: Rare.

Primary Habitat: Found in pools and slow moving water in small streams. Bottom substrate is normally silted, with vegetation.

Federal Status: None.

Reason for Designation: Rare species. The only viable population is believed to be found in the Tongue River.



Konrad Schmidt

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred 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.

Key Areas for Finescale Dace in North Dakota

The Finescale Dace has been documented only in the Tongue River in northeastern North Dakota, although recent surveys did not document it.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

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.

Other Natural or Manmade Factors

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.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- Currently, there are no studies or surveys specifically targeting the Finescale Dace.

Previous Research and Survey Efforts

- Red River basin streams were surveyed during the 1960s by the University of North Dakota (UND).
- In the late 1970s, Red River basin stream surveys were conducted by the Minnesota Department of Natural Resources, Ecological Services Section (MDNR ECO).
- A survey was conducted on the Red River during 1983 and 1984.
- Investigations of stream fishes in the Red River basin occurred during 1993 and 1994 as a part of two major studies.
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- A survey effort was conducted in the Sheyenne River by Valley City State University in 2012.
- A survey effort was conducted in Baldhill Creek by Valley City State University in 2013.

Additional Research and Survey Efforts Needed

- Re-examination of sites where this species has been recorded.
- Development of a protocol to monitor stream fish.

MANAGEMENT RECOMMENDATIONS

- Protect rivers, streams, and riparian areas where possible (i.e. easements and/or acquisition).

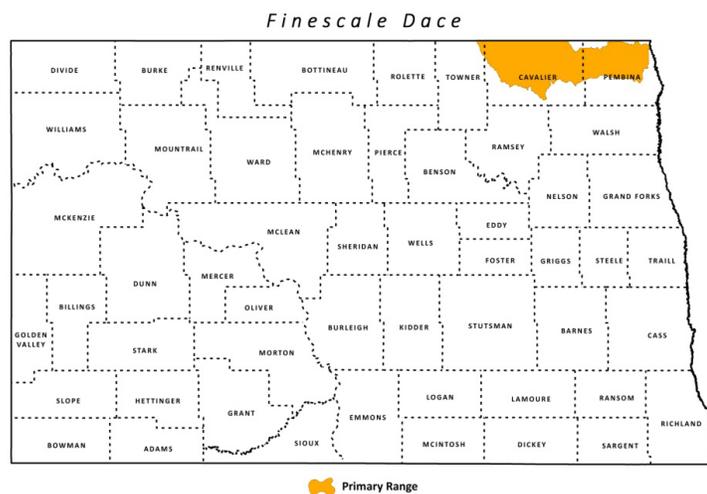
- Work with partners to ensure Swampbuster provisions are maintained.
- Continue to use the Section 404 program to ensure affected rivers and riparian areas are mitigated to replace form and function.
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- Develop and promote incentive programs to restore 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.

MONITORING PLANS

No monitoring plan has been identified for this species. The North Dakota Department of Health conducts Index of Biotic Integrity (IBI) surveys for all of North Dakota's watersheds. This will document all species encountered.

2005-2015 PROGRESS

The Finescale Dace maintains its Level III Species of Conservation Priority. The most recent survey of stream fish SWG T-14-R **Status of selected fishes with immediate conservation need in North Dakota**, did not document the Finescale Dace. Sites within their range need to be revisited to confirm their presence in the state.



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- Brooks, L. 2001. Fish Survey on Seven Tributaries to the Sheyenne River, Sheyenne National Grasslands, North Dakota September 9-10, 2000. Report to the U.S. Forest Service-Sheyenne Ranger District. Lisbon, North Dakota. 24 pp.
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FLATHEAD CHUB

Scientific Name: *Platygobio gracilis*

Species of Conservation Priority:
Level II

General Description: 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: Year-round resident.

Abundance: Uncommon, declining.

Primary Habitat: Found mostly in large turbid rivers with sand or gravel bottoms.

Federal Status: None.

Reason for 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. Recent surveys failed to document it in the tributaries of the Missouri River.



Konrad Schmidt

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Prefer slow 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 250 NTU (nephelometric turbidity unit). They can be found at most depths within this habitat, but prefer depths less than 1 meter with water temperatures in the range of 18°C to 22°C.

Key Areas for Flathead Chub in North Dakota

Populations occur in the Little Missouri, Yellowstone and upper Missouri rivers near the confluence. Many Missouri River tributaries such as the Knife, Heart and Cannonball rivers hold populations, although recent surveys have not documented them.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

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.

Other Natural or Manmade Factors

Competition and predation from nonnative fish that have been introduced into the Missouri River System impact Flathead Chub populations. The use of water for agricultural, industrial, and municipal purposes along the river has also impacted Flathead Chub populations.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- Currently, there are no studies or surveys specifically targeting the Flathead Chub.

Previous Research and Survey Efforts

- The biology of the Flathead Chub was studied in Montana in 1985 by Gould.
- Welker and Scarnecchia conducted a study on habitat use and population structure in 1997-1998.

Additional Research and Survey Efforts Needed

- Information gaps concerning feeding habits, reproduction, seasonal habitat use, and other aspects of Flathead Chub biology need to be addressed.
- Develop a monitoring protocol for the Flathead Chub.
- Additional survey effort to determine current distribution.

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.

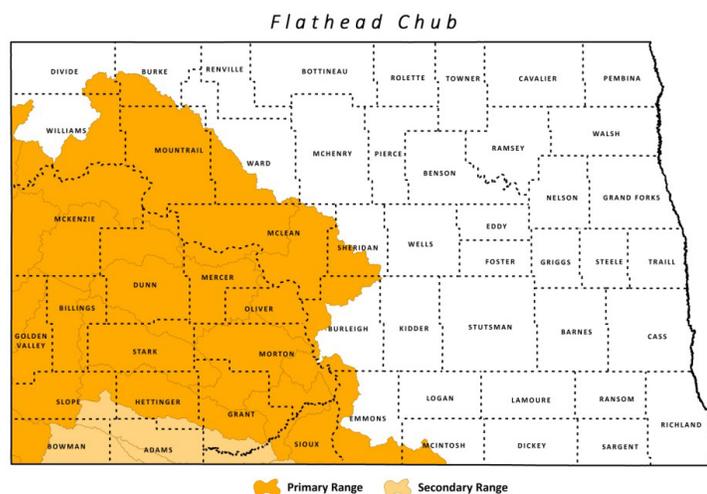
- Continue to use the Section 404 program to ensure affected rivers and riparian areas are mitigated to replace form and function.
- Continue to work with other federal agencies (i.e. FAA and FHWA) not covered by Section 404 or Swampbuster to ensure affected rivers and riparian areas are mitigated to 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.

MONITORING PLANS

No monitoring plan has been identified for this species. The North Dakota Department of Health conducts Index of Biotic Integrity (IBI) surveys for all of North Dakota's watersheds. This will document all species encountered.

2005-2015 PROGRESS

The Flathead Chub maintains its Level II Species of Conservation Priority. The most recent survey of western stream fish did not document the flathead. Sites within their range need to be revisited to evaluate their status in the state.



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- Becker, G. C. 1983. Fishes of Wisconsin. Univ. Wisconsin Press, Madison. 1052 pp.
- Brooks, L. 2001. Fish Survey on Seven Tributaries to the Sheyenne River, Sheyenne National Grasslands, North Dakota September 9-10, 2000. Report to the U.S. Forest Service-Sheyenne Ranger District. Lisbon, North Dakota. 24 pp.
- Goldstein, R.M. et al. 1994. Concepts for an Index of Biotic Integrity for Streams of the Red River of the North Basin: Proceedings of the North Dakota Water Quality Symposium, March 30-31, 1994. Fargo, North Dakota, pp. 169-180.
- Hayer, C-A, L. J. Borgstrom, and C. R. Berry Jr. 2008. Status of selected fishes with immediate conservation need in the Red River Basin, Final Report. North Dakota Game and Fish Department, Bismarck. 46 pages plus appendices.
- Hayer, C-A, et al. 2011. Status and distribution of select fishes in Central and Western North Dakota Rivers and Streams, Final Report. North Dakota Game and Fish Department, Bismarck, 106 pp.
- Kelsh, S.W., J. Alm, J. Tesky. 2001. The Distribution of North Dakota Fishes. Unpublished. North Dakota Game and Fish. 19 pp.
- Koel, Todd Marvin. 1997. Distribution of fishes in the Red River of the North Basin on Multivariate Environmental Gradients. Ph.D. thesis, North Dakota State University, Fargo, North Dakota. 275 pp.
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- Peterka, John J. and Todd M. Koel. 1996. Distribution and dispersal of fishes in the Red River basin. Report submitted to Interbasin Biota Transfer Studies Program, Water Resources Research Institute, Fargo, ND. Northern Prairie Wildlife Research Center Home Page. <http://www.npwrc.usgs.gov/resource/distr/others/fishred/fishred.htm> (Version 29AUG97).
- Power, Greg J. and F. Ryckman. 1998. Status of North Dakota's Fishes. ND Game and Fish Dept., Div. Rpt. 27, 20 pp.
- Stoner et al. 1993. Red River of the North Basin, Minnesota, North Dakota, and South Dakota: Water Resource Bulletin. v. 29, pp. 575-615.

HORNYHEAD CHUB

Scientific Name: *Nocomis biguttatus*

Species of Conservation Priority:
Level III

General Description: 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.

Abundance: Locally Common.

Primary Habitat: Found in pools and slow runs of clear, small rivers.

Federal Status: None.

Reason for 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.



Konrad Schmidt

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Found in pools and slow runs of clear, small rivers.

Key Areas for Hornyhead Chub in North Dakota

The Hornyhead Chub is presently found in the Forest and Park rivers. Historically it was also in the Sheyenne and Maple rivers but has not been documented there recently.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

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.

Other Natural or Manmade Factors

The addition of dams to many streams in the Red River drainage has changed the flow regime and blocked fish movement, segmenting populations. A decrease in water quality has contributed to the decline of this species.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- There is no research currently targeting this species.

Previous Research and Survey Efforts

- Red River basin streams were surveyed during the 1960s by the University of North Dakota (UND).
- In the late 1970s, Red River basin stream surveys were conducted by the Minnesota Department of Natural Resources, Ecological Services Section (MDNR ECO).
- A survey was conducted on the Red River during 1983 and 1984.
- Investigations of stream fishes in the Red River basin occurred during 1993 and 1994 as a part of two major studies.
- Several sites throughout the basin have been sampled for fishes using electro-fishing gear by the MDNR, Minnesota Pollution Control Agency (MPCA), North Dakota Department of Health (NDDH), U.S. Environmental Protection Agency (EPA), and the U.S. Geological Survey (USGS). These studies are a part of the USGS National Water Quality Assessment program (Stoner et al. 1993) and the development of an index of biotic integrity for fishes in the basin (Goldstein et al. 1994).
- A survey of the Sheyenne River and its tributaries within the Sheyenne National Grasslands was conducted by Brooks in 2000.
- South Dakota State University surveyed the stream fish of the Red River and its drainages in 2008.
- South Dakota State University surveyed western North Dakota streams in 2010.
- A survey effort was conducted in the Sheyenne River by Valley City State University in 2012.
- A survey effort was conducted in Baldhill Creek by Valley City State University in 2013.

Additional Research and Survey Efforts Needed.

- Develop a protocol to monitor stream fish.

MANAGEMENT RECOMMENDATIONS

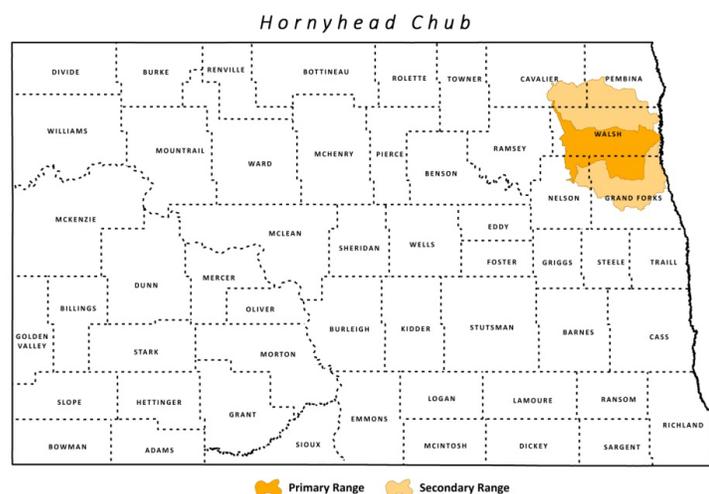
- Protect rivers, streams, and riparian areas where possible (i.e. easements and/or acquisition).
- Work with partners to ensure Swampbuster provisions are maintained.
- Continue to use the Section 404 program to ensure affected rivers and riparian areas are mitigated to replace form and function.
- 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. RRBPR).
- 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.

MONITORING PLANS

No monitoring plan has been identified for this species. The North Dakota Department of Health conducts Index of Biotic Integrity (IBI) surveys for all of North Dakota's watersheds. This will document all species encountered.

2005-2015 PROGRESS

The Hornyhead Chub maintains its Level III Species of Conservation Priority. The most recent survey of stream fish documented the Hornyhead Chub in only the Forest and Park rivers. Sites within their range need to be revisited to evaluate their status in the state.



WORKS CONSULTED

- Becker, G. C. 1983. Fishes of Wisconsin. Univ. Wisconsin Press, Madison. 1052 pp.
- Goldstein, R.M. et al. 1994. Concepts for an Index of Biotic Integrity for Streams of the Red River of the North Basin: Proceedings of the North Dakota Water Quality Symposium, March 30-31, 1994. Fargo, North Dakota, pp. 169-180.
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LARGESCALE STONEROLLER

Scientific Name: *Campostoma oligolepis*

Species of Conservation Priority:
Level III

General Description: Member of the minnow family, grows to a length of 8 inches. Body arched behind nape. Complete lateral line. Gray, brown, or olive above with dark blotching. Cream to yellow underneath. Breeding males have small bumps along top of head and back called tubercules. Black bands present on orange dorsal and anal fins.

Status: Year-round resident.

Abundance: Rare, if present.

Primary Habitat: Found in pools, and riffles of small, clear streams with gravel or rubble bottoms.

Federal Status: None.

Reason for Designation: Little is known of this species. Known range is confined to only one stream in the state.



Konrad Schmidt

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Found in pools and riffles of small, clear streams with gravel or rubble bottoms.

Key Areas for Largescale Stoneroller in North Dakota

The Largescale Stoneroller is only found in the Forest River, a tributary to the Red River of the North, No other state waters are known to hold the Largescale Stoneroller.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

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.

Other Natural or Manmade Factors

The addition of dams to the Red River drainage has changed the flow regime and segmented populations. Poor water quality, due to runoff and sedimentation in many stretches of the Red River basin has contributed to the decline of this species.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- No research specifically targeting this species is underway.

Previous Research and Survey Efforts

- Red River basin streams were surveyed during the 1960s by the University of North Dakota (UND).
- In the late 1970s, Red River basin stream surveys were conducted by the Minnesota Department of Natural Resources, Ecological Services Section (MDNR ECO).
- A survey was conducted on the Red River during 1983 and 1984.
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- A survey effort was conducted in the Sheyenne River by Valley City State University in 2012.
- A survey effort was conducted in Baldhill Creek by Valley City State University in 2013.

Additional Research and Survey Efforts Needed.

- Develop a protocol to monitor stream fish.

MANAGEMENT RECOMMENDATIONS

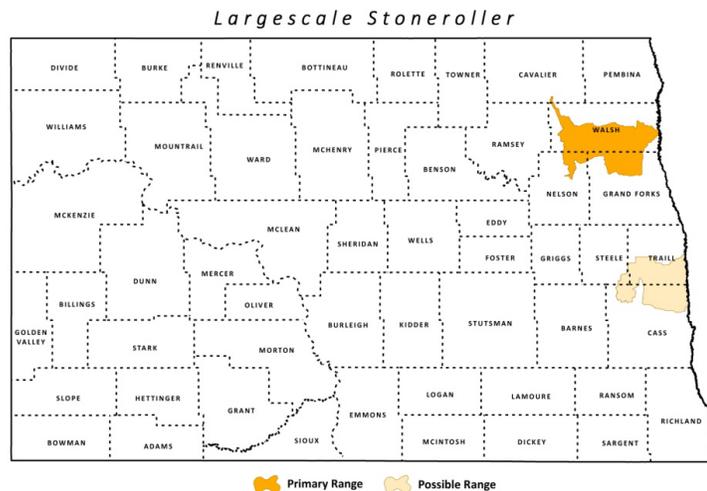
- Protect rivers, streams, and riparian areas where possible (i.e. easements and/or acquisition).
- Work with partners to ensure Swampbuster provisions are maintained.
- Continue to use the Section 404 program to ensure affected rivers and riparian areas are mitigated to replace form and function.
- 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.
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- Develop and promote incentive programs to restore riparian areas.
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- 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.

MONITORING PLANS

No monitoring plan has been identified for this species. The North Dakota Department of Health conducts Index of Biotic Integrity (IBI) surveys for all of North Dakota's watersheds. This will document all species encountered.

2005-2015 PROGRESS

The Largescale Stoneroller maintains its Level III Species of Conservation Priority. The most recent survey of stream fish documented it in only the Forest River. Sites within their range need to be revisited to evaluate their status in the state.



WORKS CONSULTED

- Becker, G. C. 1983. Fishes of Wisconsin. Univ. Wisconsin Press, Madison. 1052 pp.
- Goldstein, R.M. et al. 1994. Concepts for an Index of Biotic Integrity for Streams of the Red River of the North Basin: Proceedings of the North Dakota Water Quality Symposium, March 30-31, 1994. Fargo, North Dakota, pp. 169-180.
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LOGPERCH

Scientific Name: *Percina caprodes*

Species of Conservation Priority:
Level III

General Description: Length up to 7 inches. The Logperch is yellow-brown above and lighter on its belly. It has vertical stripes alternating between long and short running the length of the body. There are no scales on the head.

Status: Year-round resident.

Abundance: Rare.

Primary Habitat: Found in the Red River. Usually found in gravel-rocky areas, but can be found in most any habitat type.

Federal Status: None.

Reason for Designation: Few records of this species in the state. North Dakota appears to be on the western edge of its range.



Konrad Schmidt

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Usually found in gravel-rocky areas in medium to large streams, but can be found in most any habitat type. Spawning occurs in riffle habitat of rivers and streams and shallow sand flats in lakes.

Key Areas for Logperch in North Dakota

This species has historically been recorded in the Red, Goose and Pembina rivers, but recent surveys of those drainages did not document it.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Land uses within the basin, most notably agricultural practices have changed the landscape and reduced habitat quality for this species. The draining of wetlands, through ditches diverted to area streams and rivers increases sedimentation and agricultural run-off in the water.

Other Natural or Manmade Factors

The addition of dams to the Red River drainage has changed the flow regime, blocking movement of fish into suitable habitat and fragmenting populations. 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.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- No research specifically targeting this species is underway.

Previous Research and Survey Efforts

- Red River basin streams were surveyed during the 1960s by the University of North Dakota (UND).
- In the late 1970s, Red River basin stream surveys were conducted by the Minnesota Department of Natural Resources, Ecological Services Section (MDNR ECO).
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- A survey effort was conducted in Baldhill Creek by Valley City State University in 2013.

Additional Research and Survey Efforts Needed.

- Develop a protocol to monitor stream fish.

MANAGEMENT RECOMMENDATIONS

- Protect rivers, streams, and riparian areas where possible (i.e. easements and/or acquisition).

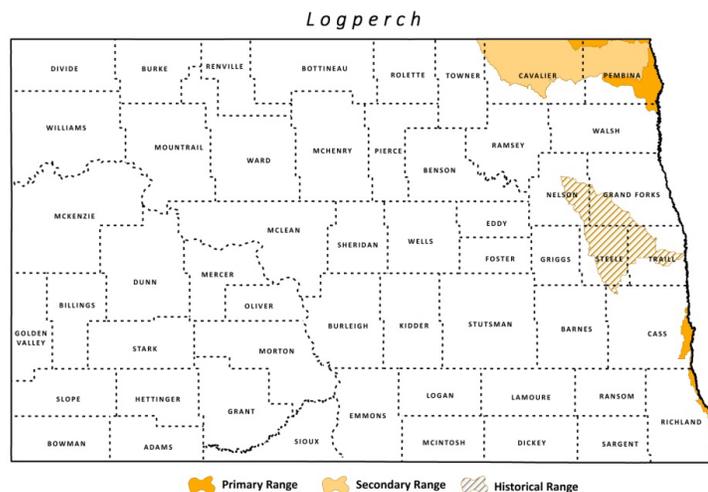
- Work with partners to ensure Swampbuster provisions are maintained.
- Continue to use the Section 404 program to ensure affected rivers and riparian areas are mitigated to replace form and function.
- Continue to work with other federal agencies (i.e. FAA and FHWA) not covered by Section 404 or Swampbuster 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.

MONITORING PLANS

No monitoring plan has been identified for this species. The North Dakota Department of Health conducts Index of Biotic Integrity (IBI) surveys for all of North Dakota's watersheds. This will document all species encountered.

2005-2015 PROGRESS

The Logperch maintains its Level III Species of Conservation Priority. The most recent survey of stream fish did not document this species. Sites within their range need to be revisited to evaluate their status in the state.



WORKS CONSULTED

- Becker, G. C. 1983. Fishes of Wisconsin. Univ. Wisconsin Press, Madison. 1052 pp.
- Goldstein, R.M. et al. 1994. Concepts for an Index of Biotic Integrity for Streams of the Red River of the North Basin: Proceedings of the North Dakota Water Quality Symposium, March 30-31, 1994. Fargo, North Dakota, pp. 169-180.
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- Stoner et al. 1993. Red River of the North Basin, Minnesota, North Dakota, and South Dakota: Water Resource Bulletin. v. 29, pp. 575-615.

NORTHERN PEARL DACE

Scientific Name: *Margariscus margarita*

Species of Conservation Priority:
Level I

General Description: 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.

Abundance: Rare.

Primary Habitat: Found in pools of streams and small rivers, usually with sand or gravel bottom. They may also be found in ponds and lakes.

Federal Status: None.

Reason for Designation: Degradation of habitat is the main reason for the designation of the Northern Pearl Dace as a Level I Species of Conservation Priority. Critical clear headwater streams used by this species are threatened by a change in land use practices.



Konrad Schmidt

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Pearl Dace prefer cool, clear headwater streams 1-3 meters wide and less than 0.5 meters deep. They are associated with pools with slow to moderate current in these streams. Bottom substrate is generally sand or gravel.

Key Areas for Northern Pearl Dace in North Dakota

The 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 Creek in the Missouri River drainage. Historically they were present in the Park, Goose, Willow, and Souris Rivers but were not documented recently.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

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 changing land use practices.

Other Natural or Manmade Factors

The addition of dams within the Red River drainage has changed the flow regime and also blocks fish movement into suitable habitat. A decline in water quality in the Red River basin may have contributed to the decrease of this species.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- Currently no studies or surveys specifically targeting the Northern Pearl Dace are in progress.

Previous Research and Survey Efforts

- Red River basin streams were surveyed during the 1960s by the University of North Dakota (UND).
- In the late 1970s, Red River basin stream surveys were conducted by the Minnesota Department of Natural Resources, Ecological Services Section (MDNR ECO).
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- A survey effort was conducted in Baldhill Creek by Valley City State University in 2013.

Additional Research and Survey Efforts Needed

- Re-examine sites where this species has been recorded.
- Develop a protocol to monitor stream fish.

MANAGEMENT RECOMMENDATIONS

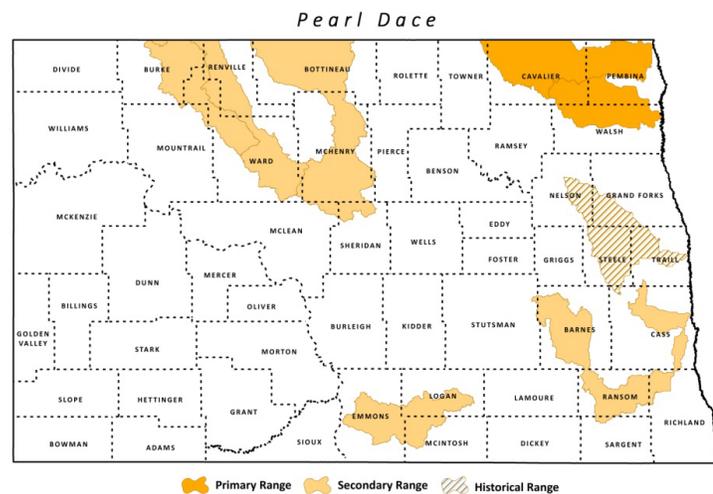
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- Work with partners to ensure Swampbuster provisions are maintained.
- Continue to use the Section 404 program to ensure affected rivers and riparian areas are mitigated to replace form and function.
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- Develop and promote incentive programs for adjacent landowners to improve bank stability through land use changes (e.g. RRBPR).
- 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.

MONITORING PLANS

No monitoring plan has been identified for this species. The North Dakota Department of Health conducts Index of Biotic Integrity (IBI) for all North Dakota's watersheds. This will document all species encountered.

2005-2015 PROGRESS

The Northern Pearl Dace maintains a Level I Species of Conservation Priority ranking. SWG T-14-R **Status of selected fishes with immediate conservation need in North Dakota** provided the important information for this species. Follow up surveys to assess this species status are needed.



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- Goldstein, R.M. et al. 1994. Concepts for an Index of Biotic Integrity for Streams of the Red River of the North Basin: Proceedings of the North Dakota Water Quality Symposium, March 30-31, 1994. Fargo, North Dakota, pp. 169-180.
- Hayer, C-A, L. J. Borgstrom, and C. R. Berry Jr. 2008. Status of selected fishes with immediate conservation need in the Red River Basin, Final Report. North Dakota Game and Fish Department, Bismarck. 46 pages plus appendices.
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NORTHERN REDBELLY DACE

Scientific Name: *Chrosomus eos*

Species of Conservation Priority:
Level II

General Description: 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.

Abundance: Uncommon.

Primary Habitat: Prefers slower moving stretches of rivers with clear water over silt bottoms. Vegetation is usually found in close proximity. Found to a lesser extent in pools and impoundments.

Federal Status: None.

Reason for Designation: Clear headwater streams used by this species are threatened by current land use practices.



Konrad Schmidt

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred 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.

Key Areas for Northern Redbelly Dace in North Dakota

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.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Degradation of quality habitat is recognized as the leading cause for decline in this species; specifically, loss of riparian habitat along waterways caused by current land use practices.

Other Natural or Manmade Factors

The addition of dams to this species habitat has changed the flow regime and fragmented populations.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- No research specifically targeting this species is underway.

Previous Research and Survey Efforts

- Red River basin streams were surveyed during the 1960s by the University of North Dakota (UND).
- In the late 1970s, Red River basin stream surveys were conducted by the Minnesota Department of Natural Resources, Ecological Services Section (MDNR ECO).
- A survey was conducted on the Red River during 1983 and 1984.
- Investigations of stream fishes in the Red River basin occurred during 1993 and 1994 as a part of two major studies.
- Several sites throughout the basin have been sampled for fishes using electro-fishing gear by the MDNR, Minnesota Pollution Control Agency (MPCA), North Dakota Department of Health (NDDH), U.S. Environmental Protection Agency (EPA), and the U.S. Geological Survey (USGS). These studies are a part of the USGS National Water Quality Assessment program (Stoner et al. 1993) and the development of an index of biotic integrity for fishes in the basin (Goldstein et al. 1994).
- A survey of the Sheyenne River and its tributaries within the Sheyenne National Grasslands was conducted by Brooks in 2000.
- South Dakota State University surveyed the stream fish of the Red River and its drainages in 2008.
- South Dakota State University surveyed western North Dakota streams in 2010.
- A survey effort was conducted in the Sheyenne River by Valley City State University in 2012.
- A survey effort was conducted in Baldhill Creek by Valley City State University in 2013.

Additional Research and Survey Efforts Needed.

- Re-examine this species range.
- Develop a protocol to monitor stream fish.

MANAGEMENT RECOMMENDATIONS

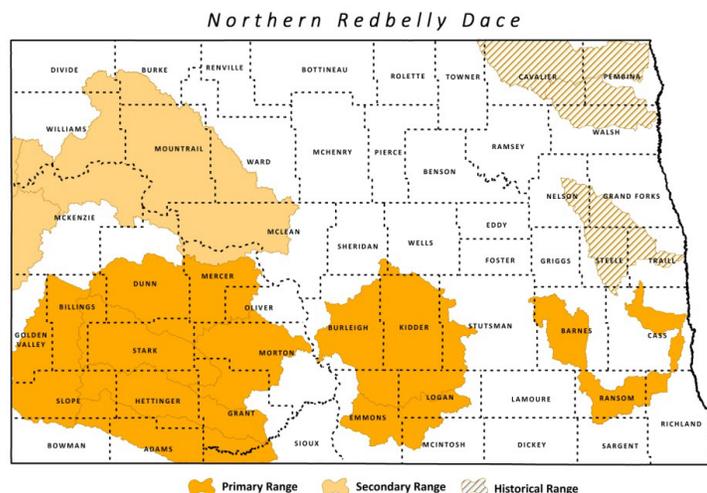
- Protect rivers, streams, and riparian areas where possible (i.e. easements and/or acquisition).
- Work with partners to ensure Swampbuster provisions are maintained.
- Continue to use the Section 404 program to ensure affected rivers and riparian areas are mitigated to replace form and function.
- 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.

MONITORING PLANS

No monitoring plan has been identified for this species. The North Dakota Department of Health conducts Index of Biotic Integrity (IBI) surveys for all of North Dakota's watersheds. This will document all species encountered.

2005-2015 PROGRESS

The Northern Redbelly Dace maintains its Level II Species of Conservation Priority. The most recent survey of stream fish seem to point to a reduction of range for this species. Sites within their range need to be revisited to evaluate their status in the state.



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- Becker, G. C. 1983. Fishes of Wisconsin. Univ. Wisconsin Press, Madison. 1,052 pp.
- Goldstein, R.M. et al. 1994. Concepts for an Index of Biotic Integrity for Streams of the Red River of the North Basin: Proceedings of the North Dakota Water Quality Symposium, March 30-31, 1994. Fargo, North Dakota, pp. 169-180.
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- Koel, Todd Marvin. 1997. Distribution of fishes in the Red River of the North Basin on Multivariate environmental gradients. Ph.D. thesis, North Dakota State University, Fargo, North Dakota. 275 pp.
- Page, L. M., and B. M. Burr. 1991. A Field Guide to Freshwater Fishes: North America north of Mexico. Houghton Mifflin Company, Boston, Massachusetts. 432 pp.
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PADDLEFISH

Scientific Name: *Polyodon spathula*

Species of Conservation Priority:
Level II

General Description: Can grow 7 feet in length and can 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.

Abundance: Locally common.

Primary Habitat: Large river species.

Federal Status: None.

Reason for Designation: Loss of river habitat due to channelization and impoundment has caused declines in this species within the state and range wide.



NDGFD

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred 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.

Key Areas for Paddlefish in North Dakota

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.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

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.

Other Natural or Manmade Factors

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. Water withdrawal or diversion for irrigation from the Yellowstone River is a growing concern.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- 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.

Previous Research and Survey Efforts

- The North Dakota Game and Fish Department surveyed stretches of the Missouri River below Garrison dam and Lake Oahe to document populations.
- A Habitat Suitability Index (HSI) was developed for the Paddlefish by the US Fish and Wildlife Service in 1984 and again in 1987.
- A study of the predation of Walleye and Sauger on young Paddlefish was conducted in 1994 and 2002.
- The use of visual observations for estimating relative abundance was tested in 1997.

Additional Research and Survey Efforts Needed

- No additional research and survey efforts have been identified.

MANAGEMENT RECOMMENDATIONS

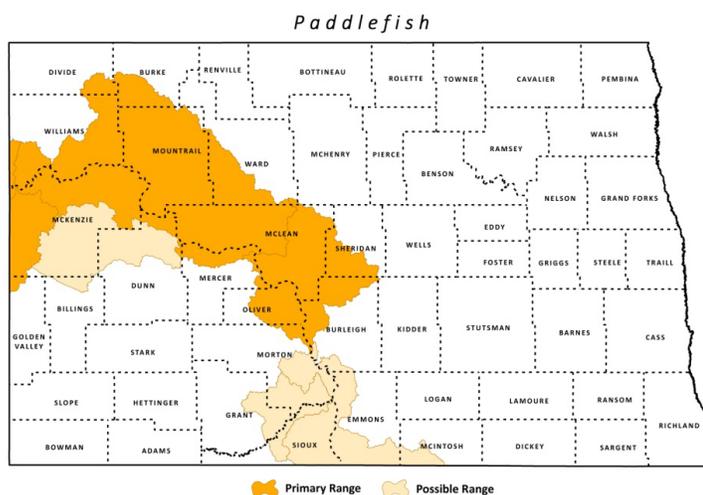
- Protect rivers, streams, and riparian areas where possible (i.e. easements and/or acquisition).
- Work with partners to ensure Swampbuster provisions are maintained.
- Continue to use the Section 404 program to ensure affected rivers and riparian areas are mitigated to replace form and function.
- 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.
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- 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.

MONITORING PLANS

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.

2005-2015 PROGRESS

The Paddlefish maintains its Level II Species of Conservation Priority. This species is highly regulated as a game fish by the North Dakota Game and Fish Department's fisheries division.



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- Becker, G. C. 1983. Fishes of Wisconsin. Univ. Wisconsin Press, Madison. 1,052 pp.
- Goldstein, R.M. et al. 1994. Concepts for an Index of Biotic Integrity for Streams of the Red River of the North Basin: Proceedings of the North Dakota Water Quality Symposium, March 30-31, 1994. Fargo, North Dakota, pp. 169-180.
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- Hayer, C-A, et al. 2011. Status and distribution of select fishes in Central and Western North Dakota Rivers and Streams, Final Report. North Dakota Game and Fish Department, Bismarck, 106 pp.
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- Peterka, John J. and Todd M. Koel. 1996. Distribution and dispersal of fishes in the Red River basin. Report submitted to Interbasin Biota Transfer Studies Program, Water Resources Research Institute, Fargo, ND. Northern Prairie Wildlife Research Center Home Page. <http://www.npwrc.usgs.gov/resource/distr/others/fishred/fishred.htm> (Version 29AUG97).
- Power, Greg J. and F. Ryckman. 1998. Status of North Dakota's Fishes. ND Game and Fish Dept., Div. Rpt. 27, 20 pp.
- Stoner et al. 1993. Red River of the North Basin, Minnesota, North Dakota, and South Dakota: Water Resource Bulletin. v. 29, pp. 575-615.

PALLID STURGEON

Scientific Name: *Scaphirhynchus albus*

Species of Conservation Priority:
Level II

General Description: Grows up to seven feet in length. Light gray in color with a lighter underside. Small black eyes set on a large 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 more common shovelnose sturgeon. The top side of its body is covered in large scales called scutes.

Status: Year-round resident.

Abundance: Rare.

Primary Habitat: Only found in the Missouri River and parts of the Yellowstone River. Usually in fast current areas with a firm sand or gravel bottom.

Federal Status: Endangered.

Reason for 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.



David Ostendorf

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred 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.

Key Areas for Pallid Sturgeon in North Dakota

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.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

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).

Other Natural or Manmade Factors

The ACOE manages water releases from impoundments in the Missouri River System. Flows are generally reduced in the spring and then increased later in the summer. This is the opposite of pre-impoundment when high flows were common in spring and then decreased throughout the year. This has impacted reproduction, larval fish rearing, and food supplies (USFWS 1993).

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- 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.

Previous Research and Survey Efforts

- A status review and recovery plan has been conducted and developed by the USFWS.

Additional Research and Survey Efforts Needed

- No additional research and survey efforts have been identified.

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.

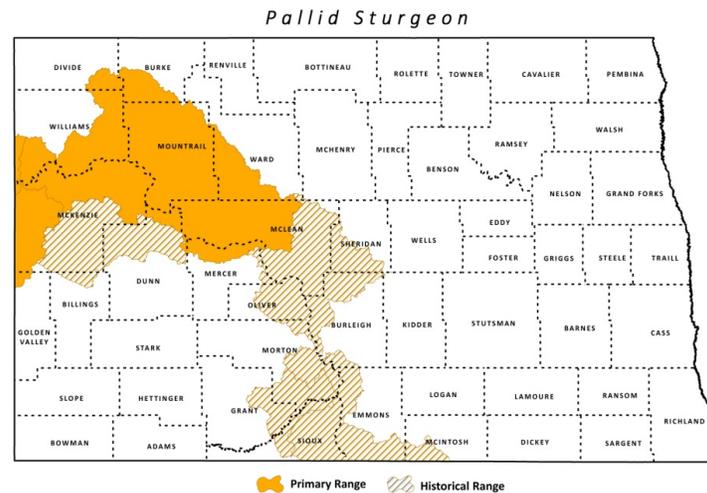
- Continue to work with other federal agencies (i.e. FAA and FHWA) not covered by Section 404 or Swampbuster to ensure affected rivers and riparian areas are mitigated to replace form and function.
- Continue to work with NDSWC to develop minimum in-stream flow recommendations.
- Develop and promote 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. RRBPR).
- 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.

MONITORING PLANS

USFWS, USGS, and Montana FWP conduct population surveys of the Pallid Sturgeon in the Yellowstone River and Williston reach of the Missouri River.

2005-2015 PROGRESS

The Pallid Sturgeon maintains its Level II Species of Conservation Priority. Much is known about the status of this species within the state. As part of a recovery plan pallids are captive bred to be released in to the Missouri River system. Known individuals are tracked throughout the year.



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- Page, L. M., and B. M. Burr. 1991. A Field Guide to Freshwater Fishes: North America north of Mexico. Houghton Mifflin Company, Boston, Massachusetts. 432 pp.
- NatureServe Explorer, an online encyclopedia of life. 7/26/2004. <http://www.natureserve.org/explorer/>
- U.S. Fish and Wildlife Service. 1993. Pallid Sturgeon Recovery Plan. U.S. Fish and Wildlife Service, Bismarck, North Dakota. 55 pp.

PUGNOSE SHINER

Scientific Name: *Notropis anogenus*

Species of Conservation Priority:
Level III

General Description: 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: Possibly Extirpated.

Abundance: Rare.

Primary Habitat: Found in clear pools and runs in small to medium sized streams. Prefers areas with vegetation over sand or mud bottoms.

Federal Status: None.

Reason for 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.



Konrad Schmidt

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Inhabits pools and small runs in clear streams. Prefers vegetated areas with a firm bottom.

Key Areas for Pugnose Shiner in North Dakota

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.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

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.

Other Natural or Manmade Factors

The addition of dams within the Red River drainages has changed the flow regime. This has fragmented habitat and blocking movement. A decrease in water quality due to a number of land use practices in the Red River basin may have contributed to the decline of this species.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- Currently no studies or surveys specifically targeting the Pugnose Shiner are in progress.

Previous Research and Survey Efforts

- Red River basin streams were surveyed during the 1960s by the University of North Dakota (UND).
- In the late 1970s, Red River basin stream surveys were conducted by the Minnesota Department of Natural Resources, Ecological Services Section (MDNR ECO).
- A survey was conducted on the Red River during 1983 and 1984.
- Investigations of stream fishes in the Red River basin occurred during 1993 and 1994 as a part of two major studies.
- Several sites throughout the basin have been sampled for fishes using electro-fishing gear by the MDNR, Minnesota Pollution Control Agency (MPCA), North Dakota Department of Health (NDDH), U.S. Environmental Protection Agency (EPA), and the U.S. Geological Survey (USGS). These studies are a part of the USGS National Water Quality Assessment program (Stoner et al. 1993) and the development of an index of biotic integrity for fishes in the basin (Goldstein et al. 1994).
- A survey of the Sheyenne River and its tributaries within the Sheyenne National Grasslands was conducted by Brooks in 2000.
- South Dakota State University surveyed the stream fish of the Red River and its drainages in 2008.
- South Dakota State University surveyed western North Dakota streams in 2010.
- A survey effort was conducted in the Sheyenne River by Valley City State University in 2012.
- A survey effort was conducted in Baldhill Creek by Valley City State University in 2013.

Additional Research and Survey Efforts Needed

- Re-examine sites where this species has been recorded.
- Develop a protocol to monitor stream fish.

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.
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- Develop and promote incentive programs for adjacent landowners to improve bank stability through land use changes (e.g. RRBPR).
- 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.

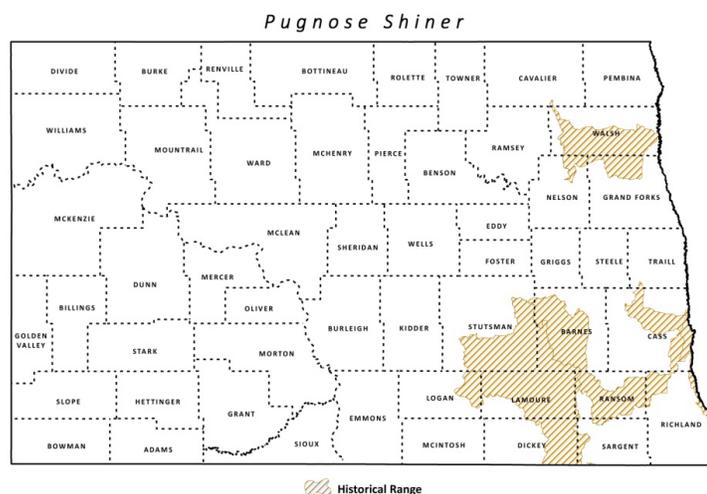
MONITORING PLANS

No monitoring plan has been identified for this species. The North Dakota Department of Health conducts Index of Biotic Integrity (IBI) for all North Dakota's watersheds. This will document all species encountered.

2005-2015 PROGRESS

The Pugnose Shiner maintains a Level III Species of Conservation Priority ranking.

SWG T-14-R Status of selected fishes with immediate conservation need in North Dakota did not document this species. Sites where this species has been documented previously need to be re-examined.



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- Goldstein, R.M. et al. 1994. Concepts for an Index of Biotic Integrity for Streams of the Red River of the North Basin: Proceedings of the North Dakota Water Quality Symposium, March 30-31, 1994. Fargo, North Dakota, pp. 169-180.
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- Stoner et al. 1993. Red River of the North Basin, Minnesota, North Dakota, and South Dakota: Water Resource Bulletin. v. 29, pp. 575-615.

RIVER DARTER

Scientific Name: *Percina shumardi*

Species of Conservation Priority:
Level III

General Description: 3 inches in length. Olive on the top with dark bars along the back. A small black spot at the front and large black dot at the rear of the dorsal fin distinguish this from other common darters.

Status: Believed Extirpated.

Abundance: Rare.

Primary Habitat: Found in rocky riffles of streams. Adults are normally found deeper than young.

Federal Status: None.

Reason for Designation: Believed to be extirpated from North Dakota waters. Listed as a species of concern by the Dakota Chapter of the American Fisheries Society.



Konrad Schmidt

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Found in rocky riffles of all size streams. Young are found in shallow, swift riffles and adults are found in deeper, slower moving water.

Key Areas for River Darter in North Dakota

Believed to be extirpated, the River Darter was once present in the Red and Sheyenne rivers. No specific key areas have been identified for this species.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

River Darters are habitat specialists and do not tolerate changes to the system. Land use in the area has changed the hydrology of the rivers from their pre-settlement conditions.

Other Natural or Manmade Factors

The addition of dams within the Red River drainages has changed the flow regime. This has fragmented habitat and blocking movement. A decrease in water quality due to a number of land use practices in the Red River basin may have contributed to the decline of this species.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- Currently no studies or surveys specifically targeting the River Darter are in progress.

Previous Research and Survey Efforts

- Red River basin streams were surveyed during the 1960s by the University of North Dakota (UND).
- In the late 1970s, Red River basin stream surveys were conducted by the Minnesota Department of Natural Resources, Ecological Services Section (MDNR ECO).
- A survey was conducted on the Red River during 1983 and 1984.
- Investigations of stream fishes in the Red River basin occurred during 1993 and 1994 as a part of two major studies.
- Several sites throughout the basin have been sampled for fishes using electro-fishing gear by the MDNR, Minnesota Pollution Control Agency (MPCA), North Dakota Department of Health (NDDH), U.S. Environmental Protection Agency (EPA), and the U.S. Geological Survey (USGS). These studies are a part of the USGS National Water Quality Assessment program (Stoner et al. 1993) and the development of an index of biotic integrity for fishes in the basin (Goldstein et al. 1994).
- A survey of the Sheyenne River and its tributaries within the Sheyenne National Grasslands was conducted by Brooks in 2000.
- South Dakota State University surveyed the stream fish of the Red River and its drainages in 2008.
- South Dakota State University surveyed western North Dakota streams in 2010.
- A survey effort was conducted in the Sheyenne River by Valley City State University in 2012.
- A survey effort was conducted in Baldhill Creek by Valley City State University in 2013.

Additional Research and Survey Efforts Needed

- Re-examine sites where this species has been recorded.
- Develop a protocol to monitor stream fish.

MANAGEMENT RECOMMENDATIONS

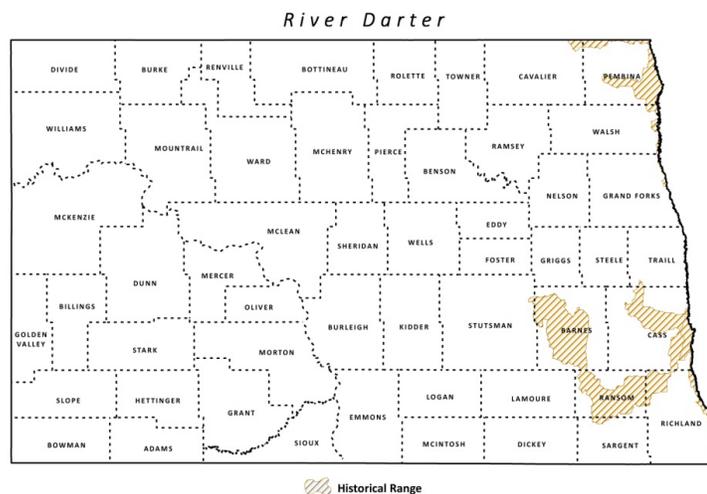
- Protect rivers, streams, and riparian areas where possible (i.e. easements and/or acquisition).
- Work with partners to ensure Swampbuster provisions are maintained.
- Continue to use the Section 404 program to ensure affected rivers and riparian areas are mitigated to replace form and function.
- 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.

MONITORING PLANS

No monitoring plan has been identified for this species. The North Dakota Department of Health conducts Index of Biotic Integrity (IBI) for all North Dakota's watersheds. This will document all species encountered.

2005-2015 PROGRESS

The River Darter maintains a Level III Species of Conservation Priority ranking. SWG T-14-R **Status of selected fishes with immediate conservation need in North Dakota** did not document this species. Sites where this species has been documented previously need to be re-examined.



WORKS CONSULTED

- Goldstein, R.M. et al. 1994. Concepts for an Index of Biotic Integrity for Streams of the Red River of the North Basin: Proceedings of the North Dakota Water Quality Symposium, March 30-31, 1994. Fargo, North Dakota, pp. 169-180.
- Hayer, C-A, L. J. Borgstrom, and C. R. Berry Jr. 2008. Status of selected fishes with immediate conservation need in the Red River Basin, Final Report. North Dakota Game and Fish Department, Bismarck. 46 pages plus appendices.
- Hayer, C-A, et al. 2011. Status and distribution of select fishes in Central and Western North Dakota Rivers and Streams, Final Report. North Dakota Game and Fish Department, Bismarck, 106 pp.
- Koel, Todd Marvin. 1997. Distribution of fishes in the Red River of the North Basin on Multivariate environmental gradients. Ph.D. thesis, North Dakota State University, Fargo, North Dakota. 275 pp.
- Page, L. M., and B. M. Burr. 1991. A Field Guide to Freshwater Fishes: North America north of Mexico. Houghton Mifflin Company, Boston, Massachusetts. 432 pp.
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- Stoner et al. 1993. Red River of the North Basin, Minnesota, North Dakota, and South Dakota: Water Resource Bulletin. v. 29, pp. 575-615.

SICKLEFIN CHUB

Scientific Name: *Macrhybopsis meeki*

Species of Conservation Priority:
Level I

General Description: 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.

Abundance: Rare.

Primary Habitat: Large turbid rivers, usually with a sand or gravel bottom.

Federal Status: None.

Reason for 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.



David Ostendorf

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred 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.

Key Areas for Sicklefin Chub in North Dakota

Populations occur in the Yellowstone and upper Missouri rivers near the confluence of the two rivers.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

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.

Other Natural or Manmade Factors

The use of water for agricultural, industrial, and municipal purposes along the river has also impacted Sicklefin Chub populations.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- Currently no studies or surveys specifically targeting the Sicklefin Chub are in progress.

Previous Research and Survey Efforts

- South Dakota State University surveyed western North Dakota streams in 2010.
- A status study for the Sicklefin Chub was conducted by Reigh and Elsen in 1979.
- A status report was again conducted in 1993 and 2001 by the U.S. Fish and Wildlife Service.
- Everett studied the ecology and life history of the Sicklefin Chub in the Yellowstone and Missouri Rivers in 1999.
- Population structure and habitat uses were studied by Galat et al. in 2002.

Additional Research and Survey Efforts Needed

- Establish a protocol for monitoring Sicklefin Chub populations.
- Locate important areas for this species, including spawning and rearing areas.

MANAGEMENT RECOMMENDATIONS

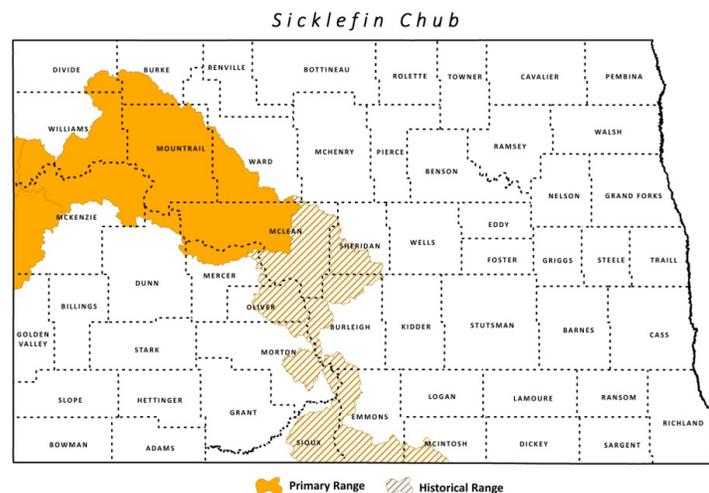
- Protect rivers, streams, and riparian areas where possible (i.e. easements and/or acquisition).
- Work with partners to ensure Swampbuster provisions are maintained.
- Continue to use the Section 404 program to ensure affected rivers and riparian areas are mitigated to replace form and function.
- 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.
- Work with county zoning planning officials to designate areas in need of protective covenants
- 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.
- Control noxious weeds through biological and chemical methods.
- 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.
- Species specific actions are found in the Updated status review of the sicklefin and Sturgeon Chub in the United States. http://www.fws.gov/mountain-prairie/species/fish/chubs/chub_status_review_032001.pdf

MONITORING PLANS

No monitoring plan has been identified for this species. The North Dakota Department of Health conducts Index of Biotic Integrity (IBI) for all North Dakota's watersheds. This will document all species encountered.

2005-2015 PROGRESS

The Sicklefin Chub maintains a Level I Species of Conservation Priority ranking. Little work has been done with this species over the last 10 years. Efforts are needed to evaluate its status and important areas in the state.



WORKS CONSULTED

- Everett, S.R. 1999. Ecology and life history of three native benthic fishes in the Missouri and Yellowstone River. MSc Thesis. University of Idaho, Moscow. 69 pp.
- Galat, D.L. et al. 2002. Synthesis of the Benthic Fish Study. Vol. 5. Population structure and habitat use of benthic fishes along the Missouri and lower Yellowstone rivers. University of Missouri, Columbia, Missouri: U.S. Geological Survey, Cooperative Research Units.
- Kelsh, S.W., J. Alm, J. Tesky. 2000. The Distribution of North Dakota Fishes. Unpublished. North Dakota Game and Fish. 19 pp.
- Page, L.M., B.M. Burr, 1991. A Field Guide to Freshwater Fishes: North America north of Mexico. New York: Houghton Mifflin Company. 104 pp.
- Reigh, R.C., and D.S. Elsen. 1979. Status of the Sturgeon Chub (*Hybopsis gelida*) and Sicklefin Chub (*Hybopsis meeki*) in North Dakota. *Prairie Naturalist* 11:49-52.
- USFWS, 1995. Endangered and Threatened wildlife and plant notice of 90-day finding on the petition to list the Sturgeon Chub and Sicklefin Chub as endangered. U.S. Fish and Wildlife Service. 4 pp.
- USFWS. 1994. 50 CFR 17 58996-59000. Endangered and threatened wildlife and plants; animal candidate review. Federal Register 59:219. Washington, D.C.
- USFWS, 2001. Updated status review of sicklefin and Sturgeon Chub in the United States. Denver, CO. report of the U.S. Fish and Wildlife Service. 80 pp.
- Welker, T.L., D.L. Scarnecchia, 2004. Habitat use and population structure of four native minnows (family Cyprinidae) in the upper Missouri and lower Yellowstone rivers, North Dakota (USA). *Ecology of Freshwater Fish* 13: 8-22.

SILVER CHUB

Scientific Name: *Macrhybopsis storeriana*

Species of Conservation Priority:
Level II

General Description: The Silver Chub grows to 4-5 inches. It has a short head, large eyes, and a long snout. The Silver Chub is grey-green dorsally, and its sides are silvery. Its caudal fin is forked.

Status: Year-round resident.

Abundance: Rare.

Primary Habitat: Sand, silt, and sometimes gravel-bottomed pools and backwaters of small to large rivers, or lakes.

Federal Status: No federal status. Protected in Canada under the Species at Risk Act.

Reason for Designation: Rare to North Dakota. Little is known about the status of this species. Highly susceptible to poor water quality.



Konrad Schmidt

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Sand, silt, and sometimes gravel-bottomed pools and backwaters of small to large rivers. Found in riffles and pools with little vegetation.

Key Areas for Silver Chub in North Dakota

The Silver Chub is known to occur in the Red River drainage in North Dakota. It is found mainly in the northern 2/3rds of the Red River preferring the main channel habitat. It has also been documented in the Sheyenne, Forest and Turtle rivers.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Water quality is a concern for this species. Silver Chub are dependent on insect larva as a food source. Many of these species are intolerant of poor water quality.

Other Natural or Manmade Factors

The addition of dams within the Red River drainage has changed the flow regime and segmented populations. A decrease in water quality in the Red River basin may have contributed to the decline of this species.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- Currently no studies or surveys specifically targeting the silver chub are in progress.

Previous Research and Survey Efforts

- University of North Dakota (UND).
- In the late 1970s, Red River basin stream surveys were conducted by the Minnesota Department of Natural Resources, Ecological Services Section (MDNR ECO).
- A survey was conducted on the Red River during 1983 and 1984.
- Investigations of stream fishes in the Red River basin occurred during 1993 and 1994 as a part of two major studies.
- Several sites throughout the basin have been sampled for fishes using electro-fishing gear by the MDNR, Minnesota Pollution Control Agency (MPCA), North Dakota Department of Health (NDDH), U.S. Environmental Protection Agency (EPA), and the U.S. Geological Survey (USGS). These studies are a part of the USGS National Water Quality Assessment program (Stoner et al. 1993) and the development of an index of biotic integrity for fishes in the basin (Goldstein et al. 1994).
- A survey of the Sheyenne River and its tributaries within the Sheyenne National Grasslands was conducted by Brooks in 2000.
- South Dakota State University surveyed the stream fish of the Red River and its drainages in 2008.
- South Dakota State University surveyed western North Dakota streams in 2010.
- A survey effort was conducted in the Sheyenne River by Valley City State University in 2012.
- A survey effort was conducted in Baldhill Creek by Valley City State University in 2013.

Additional Research and Survey Efforts Needed

- Re-examine sites where this species has been recorded.
- Develop a protocol to monitor stream fish.

MANAGEMENT RECOMMENDATIONS

- Protect rivers, streams, and riparian areas where possible (i.e. easements and/or acquisition).

SILVER LAMPREY

Scientific Name: *Ichthyomyzon unicuspis*

Species of Conservation Priority:
Level III

General Description: Eel-like in body shape up to 15 inches in length. Body is tan on top with a white belly. It has no scales. One continuous fin on its back and belly. No paired fins on the sides or belly. Mouth is a suction cup-like disc with teeth arranged in a circular pattern. Parasitic, may be found attached to another fish.

Status: Year-round resident.

Abundance: Rare.

Primary Habitat: Found mainly in streams and rivers. Young spend first part of their life in pools and backwater areas with a silt bottom.

Federal Status: None.

Reason for Designation: Little is known of this species within the state. Presence recorded from only a couple of records in the Red River.



Konrad Schmidt

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Adults are found in larger river systems and lakes. Spawning occurs in smaller streams. Young or ammocoetes will stay buried at the bottom for that stage of their life.

Key Areas for Silver Lamprey in North Dakota

The only records of this species in North Dakota come from the Red River. Was not documented in recent surveys of the Red River. No specific sites have been identified for this species.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Degradation of quality habitat is recognized as a leading cause for fish declines in the Red River drainage, specifically, loss and destruction of headwater stream habitat due to current land use practices. Siltation is a threat to ammocoetes in upper stretches of streams.

Other Natural or Manmade Factors

The addition of dams to Red River tributaries has changed the flow regime and blocked fish movement throughout the system. A decrease in water quality due to current land use practices in the Red River basin may contribute to the decline of this species.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- Currently no studies or surveys specifically targeting the silver lamprey are in progress.

Previous Research and Survey Efforts

- Red River basin streams were surveyed during the 1960s by the University of North Dakota (UND).
- In the late 1970s, Red River basin stream surveys were conducted by the Minnesota Department of Natural Resources, Ecological Services Section (MDNR ECO).
- A survey was conducted on the Red River during 1983 and 1984.
- Investigations of stream fishes in the Red River basin occurred during 1993 and 1994 as a part of two major studies.
- Several sites throughout the basin have been sampled for fishes using electro-fishing gear by the MDNR, Minnesota Pollution Control Agency (MPCA), North Dakota Department of Health (NDDH), U.S. Environmental Protection Agency (EPA), and the U.S. Geological Survey (USGS). These studies are a part of the USGS National Water Quality Assessment program (Stoner et al. 1993) and the development of an index of biotic integrity for fishes in the basin (Goldstein et al. 1994).
- A survey of the Sheyenne River and its tributaries within the Sheyenne National Grasslands was conducted by Brooks in 2000.
- South Dakota State University surveyed the stream fish of the Red River and its drainages in 2008.
- South Dakota State University surveyed western North Dakota streams in 2010.
- A survey effort was conducted in the Sheyenne River by Valley City State University in 2012.
- A survey effort was conducted in Baldhill Creek by Valley City State University in 2013.

Additional Research and Survey Efforts Needed

- Re-examine sites where this species has been recorded.
- Develop a protocol to monitor stream fish. Specific effort may be needed to survey this species

MANAGEMENT RECOMMENDATIONS

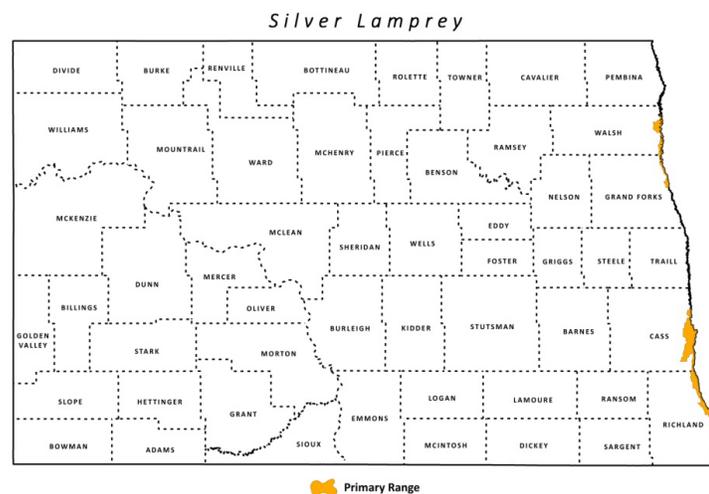
- Protect rivers, streams, and riparian areas where possible (i.e. easements and/or acquisition).
- Work with partners to ensure Swampbuster provisions are maintained.
- Continue to use the Section 404 program to ensure affected rivers and riparian areas are mitigated to replace form and function.
- 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.

MONITORING PLANS

No monitoring plan has been identified for this species. The North Dakota Department of Health conducts Index of Biotic Integrity (IBI) for all North Dakota's watersheds. This will document all species encountered.

2005-2015 PROGRESS

The Silver Lamprey maintains a Level III Species of Conservation Priority ranking. SWG T-14-R **Status of selected fishes with immediate conservation need in North Dakota** did not document this species. Special sampling efforts maybe needed to survey this species.



WORKS CONSULTED

- Goldstein, R.M. et al. 1994. Concepts for an Index of Biotic Integrity for Streams of the Red River of the North Basin: Proceedings of the North Dakota Water Quality Symposium, March 30-31, 1994. Fargo, North Dakota, pp. 169-180.
- Hayer, C-A, L. J. Borgstrom, and C. R. Berry Jr. 2008. Status of selected fishes with immediate conservation need in the Red River Basin, Final Report. North Dakota Game and Fish Department, Bismarck. 46 pages plus appendices.
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- Page, L. M., and B. M. Burr. 1991. A Field Guide to Freshwater Fishes: North America north of Mexico. Houghton Mifflin Company, Boston, Massachusetts. 432 pp.
- Peterka, John J. and Todd M. Koel. 1996. Distribution and dispersal of fishes in the Red River basin. Report submitted to Interbasin Biota Transfer Studies Program, Water Resources Research Institute, Fargo, ND. Northern Prairie Wildlife Research Center Home Page. <http://www.npwrc.usgs.gov/resource/distr/others/fishred/fishred.htm> (Version 29AUG97).
- Power, Greg J. and F. Ryckman. 1998. Status of North Dakota's Fishes. ND Game and Fish Dept., Div. Rpt. 27, 20 pp.
- Stoner et al. 1993. Red River of the North Basin, Minnesota, North Dakota, and South Dakota: Water Resource Bulletin. v. 29, pp. 575-615.

STURGEON CHUB

Scientific Name: *Macrhybopsis gelida*

Species of Conservation Priority:
Level I

General Description: Grows to 3 inches in length. Member of the minnow family. Light green to brown on dorsal side with a lighter ventral region. Brown and silver spots cover sides. Snout extends over mouth, with a barbel in the corners. Similar to the Sicklefin Chub except fins have a straight edge.

Status: Year-round resident.

Abundance: Rare.

Primary Habitat: Large turbid rivers, usually with a sand or gravel bottom.

Federal Status: None.

Reason for 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.



David Ostendorf

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Prefer slow-moving turbid water such as is present in the upper Missouri and lower Yellowstone Rivers in North Dakota. Found mainly within the main channel of these systems. Prefer water with a turbidity of less than 250 NTU (nephelometric turbidity unit), but can be found in water up to 500 NTU. They can be found at most all depths within this habitat, but prefer depths between 2 and 5 meters with water temperatures in the range of 18°C to 24°C.

Key Areas for Sturgeon Chub in North Dakota

Populations occur in the Yellowstone and upper Missouri rivers near the confluence of the two rivers.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

The loss of suitable habitat caused by a change in the riverine regime is the largest problem affecting this species. Historically, Sturgeon Chub were present throughout the entire Missouri River System, but 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 Sturgeon Chub. Dams also have fragmented populations by restricting movement throughout the system. Channelization of the Missouri River has increased the rate of flow through the system. The narrowing of the river channel has reduced habitat, and changed the natural cycle of the river by reducing over-land flooding. Sturgeon Chub have not been found in the Little Missouri River for many years. It is believed that they used the Missouri River as refuge in times of drought in the Little Missouri River. When the Missouri River was impounded, it is possible that this refugia was altered, leaving the fish no place to go during times of low water in the Little Missouri River.

Other Natural or Manmade Factors

The use of water for agricultural, industrial, and municipal purposes along the river has also impacted Sturgeon Chub populations.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- Currently no studies or surveys specifically targeting the Sturgeon Chub are in progress.

Previous Research and Survey Efforts

- South Dakota State University surveyed western North Dakota streams in 2010.
- A status study for the Sturgeon Chub was conducted by Reigh and Elsen in 1979.
- A status report was again conducted in 1993 as a result of the candidate listing by the U.S. Fish and Wildlife Service. This was updated in 2001.
- In 1997 the U.S. Fish and Wildlife Service implemented a reintroduction effort in the Little Missouri River with stock from the lower Yellowstone River in Montana. This was unsuccessful.
- Everett studied the ecology and life history of the Sturgeon Chub in the Yellowstone and Missouri rivers in 1999.

- Population structure and habitat uses were reported by Galat et al. in 2002.

Additional Research and Survey Efforts Needed

- Re-examine sites where this species has been recorded.
- Information gaps concerning feeding habits, reproduction, seasonal habitat use, and other aspects of Sturgeon Chub biology need to be addressed.
- Develop a monitoring protocol for the Sturgeon Chub.

MANAGEMENT RECOMMENDATIONS

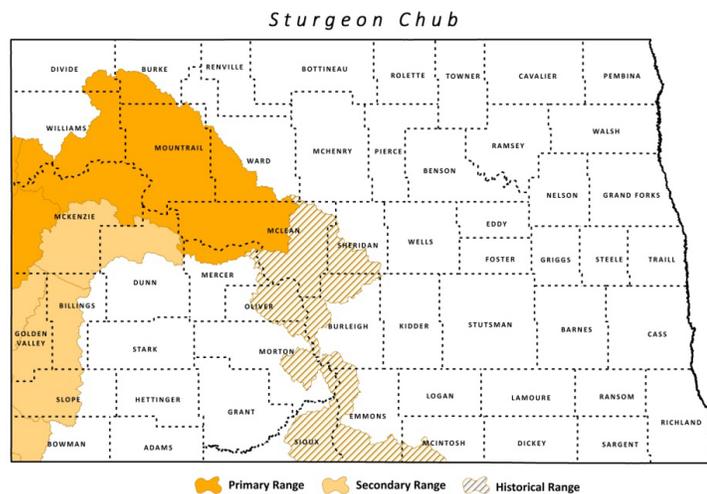
- Protect rivers, streams, and riparian areas where possible (i.e. easements and/or acquisition).
- Work with partners to ensure Swampbuster provisions are maintained.
- Continue to use the Section 404 program to ensure affected rivers and riparian areas are mitigated to replace form and function.
- 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.
- Work with county zoning planning officials to designate areas in need of protective covenants
- 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. RRBPR).
- 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.
- Control noxious weeds through biological and chemical methods.
- 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.
- Species specific actions are found in the Updated status review of the sicklefin and Sturgeon Chub in the United States. http://mountainprairie.fws.gov/species/fish/chubs/chub_status_review_032001.pdf

MONITORING PLANS

No monitoring plan has been identified for this species. The North Dakota Department of Health conducts Index of Biotic Integrity (IBI) for all North Dakota's watersheds. This will document all species encountered.

2005-2015 PROGRESS

The Sturgeon Chub maintains a Level I Species of Conservation Priority ranking. Little work has been done with this species over the last 10 years. Efforts are needed to evaluate its status and important areas in the state.



WORKS CONSULTED

- Hayer, C-A, et al. 2011. Status and distribution of select fishes in Central and Western North Dakota Rivers and Streams, Final Report. North Dakota Game and Fish Department, Bismarck, 106 pp.
- Kelsch, S. W. 1993. Survey of the Fishes of the Little Missouri River from Marmarth to Medora, North Dakota, 1993. Univ. of North Dakota. (Completion report to the North Dakota Game and Fish Department).
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- USFWS, 1995. Endangered and Threatened wildlife and plant notice of 90-day finding on the petition to list the Sturgeon Chub and Sicklefins Chub as endangered. U.S. Fish and Wildlife Service. 4 pp.
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TROUT-PERCH

Scientific Name: *Percopsis omiscomaycus*

Species of Conservation Priority:
Level II

General Description: 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.

Abundance: Uncommon.

Primary Habitat: Primarily found in lakes, but may be found in deeper pools of rivers and streams. Bottoms substrate is normally sand.

Federal Status: None.

Reason for Designation: Imperiled in much of its northern range. Loss of suitable habitat seems to be the largest factor affecting this species.



David Ostendorf

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Typically in lakes but also in deep flowing pools of creeks and small to large rivers; usually over sand. Spawns in shallow water over sand or gravel bars. Often spawns in streams in spring and uses deeper water during the rest of the year.

Key Areas for Trout-perch 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.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

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.

Other Natural or Manmade Factors

The addition of dams to the Red River drainage has changed the flow regime and fragmented populations. A decrease in water quality due to current land use practices in the Red River basin may have contributed to the decline of this species.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- Currently no studies or surveys specifically targeting the Trout-perch are in progress.

Previous Research and Survey Efforts

- Red River basin streams were surveyed during the 1960s by the University of North Dakota (UND).
- In the late 1970s, Red River basin stream surveys were conducted by the Minnesota Department of Natural Resources, Ecological Services Section (MDNR ECO).
- A survey was conducted on the Red River during 1983 and 1984.
- Investigations of stream fishes in the Red River basin occurred during 1993 and 1994 as a part of two major studies.
- Several sites throughout the basin have been sampled for fishes using electro-fishing gear by the MDNR, Minnesota Pollution Control Agency (MPCA), North Dakota Department of Health (NDDH), U.S. Environmental Protection Agency (EPA), and the U.S. Geological Survey (USGS). These studies are a part of the USGS National Water Quality Assessment program (Stoner et al. 1993) and the development of an index of biotic integrity for fishes in the basin (Goldstein et al. 1994).
- A survey of the Sheyenne River and its tributaries within the Sheyenne National Grasslands was conducted by Brooks in 2000.
- South Dakota State University surveyed the stream fish of the Red River and its drainages in 2008.
- South Dakota State University surveyed western North Dakota streams in 2010.
- A survey effort was conducted in the Sheyenne River by Valley City State University in 2012.
- A survey effort was conducted in Baldhill Creek by Valley City State University in 2013.

Additional Research and Survey Efforts Needed

- Re-examine sites where this species has been recorded.
- Develop a protocol to monitor stream fish.

MANAGEMENT RECOMMENDATIONS

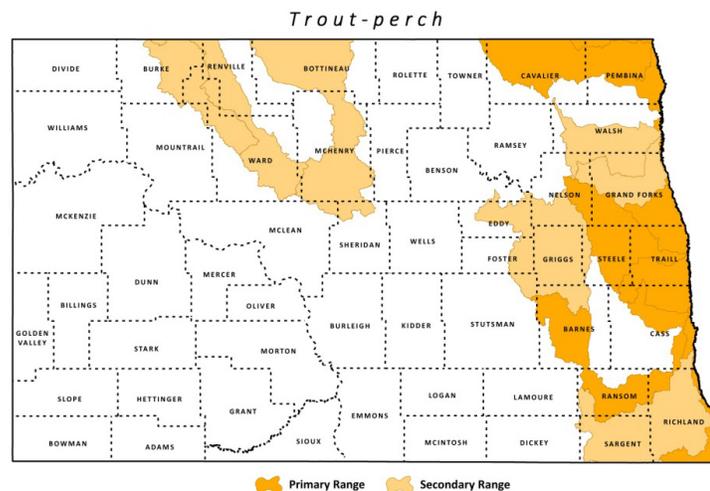
- Protect rivers, streams, and riparian areas where possible (i.e. easements and/or acquisition).
- Work with partners to ensure Swampbuster provisions are maintained.
- Continue to use the Section 404 program to ensure affected rivers and riparian areas are mitigated to replace form and function.
- 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.

MONITORING PLANS

No monitoring plan has been identified for this species. The North Dakota Department of Health conducts Index of Biotic Integrity (IBI) for all North Dakota's watersheds. This will document all species encountered.

2005-2015 PROGRESS

The Trout-perch maintains a Level II Species of Conservation Priority ranking. SWG T-14-R **Status of selected fishes with immediate conservation need in North Dakota** provided important information on this species. Some evidence of range expansion was found.



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- Goldstein, R.M. et al. 1994. Concepts for an Index of Biotic Integrity for Streams of the Red River of the North Basin: Proceedings of the North Dakota Water Quality Symposium, March 30-31, 1994. Fargo, North Dakota, pp. 169-180.
- Hayer, C-A, L. J. Borgstrom, and C. R. Berry Jr. 2008. Status of selected fishes with immediate conservation need in the Red River Basin, Final Report. North Dakota Game and Fish Department, Bismarck. 46 pages plus appendices.
- Hayer, C-A, et al. 2011. Status and distribution of select fishes in Central and Western North Dakota Rivers and Streams, Final Report. North Dakota Game and Fish Department, Bismarck, 106 pp.
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- Page, L. M., and B. M. Burr. 1991. A Field Guide to Freshwater Fishes: North America north of Mexico. Houghton Mifflin Company, Boston, Massachusetts. 432 pp.
- Peterka, John J. and Todd M. Koel. 1996. Distribution and dispersal of fishes in the Red River basin. Report submitted to Interbasin Biota Transfer Studies Program, Water Resources Research Institute, Fargo, ND. Northern Prairie Wildlife Research Center Home Page. <http://www.npwrc.usgs.gov/resource/distr/others/fishred/fishred.htm> (Version 29AUG97).
- Power, Greg J. and F. Ryckman. 1998. Status of North Dakota's Fishes. ND Game and Fish Dept., Div. Rpt. 27, 20 pp.
- Stoner et al. 1993. Red River of the North Basin, Minnesota, North Dakota, and South Dakota: Water Resource Bulletin. v. 29, pp. 575-615.

YELLOW BULLHEAD

Scientific Name: *Ameiurus natalis*

Species of Conservation Priority:
Level III

General Description: Up to 18 inches in length. Brown on top increasing in yellow toward the belly. Has a sharp spine in its back and side fins. Distinguishable from other bullhead species by color of barbels around the mouth. Yellow Bullhead barbels are white or yellow in color as opposed to black in other bullhead species.

Status: Year-round resident.

Abundance: Rare.

Primary Habitat: Found in pools and slack water of streams. Bottom substrate normally soft (mud, silt).

Federal Status: None.

Reason for Designation: Rare to North Dakota. Species is on the western edge of range. Denoted as a species of concern by the Dakota Chapter of the American Fisheries Society.



Konrad Schmidt

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Found in pools, backwaters, and slack current of rivers. May also be found in impoundments. Bottom substrate is normally mud or silt. It has been collected a few times from the Red River.

Key Areas for Yellow Bullhead in North Dakota

Historically found in the Red River system. Recent surveys found the Yellow Bullhead in only the Wild Rice and Bois de Sioux rivers.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

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.

Other Natural or Manmade Factors

The addition of dams to the Red River drainage has changed the flow regime and fragmented populations. A decrease in water quality due to current land use practices in the Red River basin may have contributed to the decline of this species.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- Currently no studies or surveys specifically targeting the Yellow Bullhead are in progress.

Previous Research and Survey Efforts

- Red River basin streams were surveyed during the 1960s by the University of North Dakota (UND).
- In the late 1970s, Red River basin stream surveys were conducted by the Minnesota Department of Natural Resources, Ecological Services Section (MDNR ECO).
- A survey was conducted on the Red River during 1983 and 1984.
- Investigations of stream fishes in the Red River basin occurred during 1993 and 1994 as a part of two major studies.
- Several sites throughout the basin have been sampled for fishes using electro-fishing gear by the MDNR, Minnesota Pollution Control Agency (MPCA), North Dakota Department of Health (NDDH), U.S. Environmental Protection Agency (EPA), and the U.S. Geological Survey (USGS). These studies are a part of the USGS National Water Quality Assessment program (Stoner et al. 1993) and the development of an index of biotic integrity for fishes in the basin (Goldstein et al. 1994).
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- South Dakota State University surveyed the stream fish of the Red River and its drainages in 2008.
- South Dakota State University surveyed western North Dakota streams in 2010.
- A survey effort was conducted in the Sheyenne River by Valley City State University in 2012.
- A survey effort was conducted in Baldhill Creek by Valley City State University in 2013.

Additional Research and Survey Efforts Needed

- Re-examine sites where this species has been recorded.
- Develop a protocol to monitor stream fish.

MANAGEMENT RECOMMENDATIONS

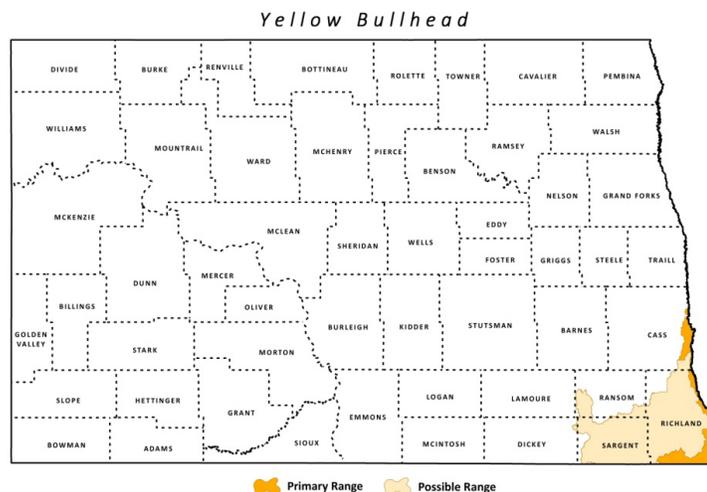
- Protect rivers, streams, and riparian areas where possible (i.e. easements and/or acquisition).
- Work with partners to ensure Swampbuster provisions are maintained.
- Continue to use the Section 404 program to ensure affected rivers and riparian areas are mitigated to replace form and function.
- 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.

MONITORING PLANS

No monitoring plan has been identified for this species. The North Dakota Department of Health conducts Index of Biotic Integrity (IBI) for all North Dakota's watersheds. This will document all species encountered.

2005-2015 PROGRESS

The Yellow Bullhead maintains a Level III Species of Conservation Priority ranking. SWG T-14-R **Status of selected fishes with immediate conservation need in North Dakota** documented this species in the Wild Rice and Bois de Sioux rivers.



WORKS CONSULTED

- Goldstein, R.M. et al. 1994. Concepts for an Index of Biotic Integrity for Streams of the Red River of the North Basin: Proceedings of the North Dakota Water Quality Symposium, March 30-31, 1994. Fargo, North Dakota, pp. 169-180.
- Hayer, C-A, L. J. Borgstrom, and C. R. Berry Jr. 2008. Status of selected fishes with immediate conservation need in the Red River Basin, Final Report. North Dakota Game and Fish Department, Bismarck. 46 pages plus appendices.
- Hayer, C-A, et al. 2011. Status and distribution of select fishes in Central and Western North Dakota Rivers and Streams, Final Report. North Dakota Game and Fish Department, Bismarck, 106 pp.
- Koel, Todd Marvin. 1997. Distribution of fishes in the Red River of the North Basin on Multivariate environmental gradients. Ph.D. thesis, North Dakota State University, Fargo, North Dakota. 275 pp.
- Page, L. M., and B. M. Burr. 1991. A Field Guide to Freshwater Fishes: North America north of Mexico. Houghton Mifflin Company, Boston, Massachusetts. 432 pp.
- Peterka, John J. and Todd M. Koel. 1996. Distribution and dispersal of fishes in the Red River basin. Report submitted to Interbasin Biota Transfer Studies Program, Water Resources Research Institute, Fargo, ND. Northern Prairie Wildlife Research Center Home Page. <http://www.npwrc.usgs.gov/resource/distr/others/fishred/fishred.htm> (Version 29AUG97).
- Power, Greg J. and F. Ryckman. 1998. Status of North Dakota's Fishes. ND Game and Fish Dept., Div. Rpt. 27, 20 pp.
- Stoner et al. 1993. Red River of the North Basin, Minnesota, North Dakota, and South Dakota: Water Resource Bulletin. v. 29, pp. 575-615.

APPENDIX E. Freshwater Mussels

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BLACK SANDSHELL

Scientific Name: *Notropis heterolepis*

Species of Conservation Priority:
Level II

General Description: Shell elongated and generally flattened. This species can reach up to 4 ½ inches in length. Shell is smooth, shiny, and generally dark in color. Nacre is pink, purple, or white in coloration.

Status: Year-round resident.

Abundance: Rare.

Primary Habitat: Found in the Red River and lower Sheyenne River. Generally found in riffles or areas of swift current with a gravel or sand bottom.

Federal Status: None.

Reason for Designation: Changes in land use in and around the rivers it inhabits, most notably agriculture, and impoundment, have impacted this species.



NDGFD

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Inhabit large to medium rivers nationwide but confined to large turbid rivers in North Dakota. Found in riffles and raceways in these rivers.

Key Areas for Black Sandshell in North Dakota

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.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Impoundment of the Red River and its tributaries have changed the flow regime and increased sediment deposits, making many areas in the river unsuitable to the Black Sandshell. Impoundments also block host fish movement. These fish are a necessary component of reproduction and dispersion of this species. Agricultural practices within the basin have reduced suitable habitat in the rivers. Runoff from treated fields into the river decreases water quality. Ditches used to drain wetlands contribute to agricultural run-off and sedimentation in the Red River and its tributaries.

Other Natural or Manmade Factors

Release of water from Devils Lake may negatively the water chemistry in the Sheyenne River.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- No current research or survey efforts are on-going in this species range.

Previous Research and Survey Efforts

- Cvancara conducted a state-wide survey of the mussels of North Dakota in 1978.
- The North Dakota Game and Fish Department revisited Cvancara's sites in 1990.
- Valley City State University revisited Cvancara's sites and surveyed additional sites in 2008.
- The NDDH conducted freshwater mussel surveys for state waters as a segment of its Index of Biotic Integrity (IBI) work.

Additional Research and Survey Efforts Needed

- A monitoring protocol for mussel species has been developed for the North Dakota Game and Fish Department under the SWG program. Implementation of this monitoring protocol is a future goal.

MANAGEMENT RECOMMENDATIONS

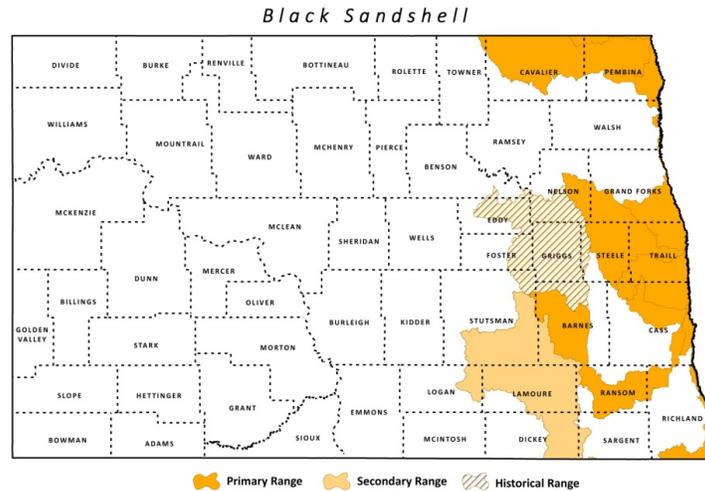
- Develop buffers along riparian areas.
- Work with partners to reduce the use of chemical near waterways.
- Work with partners to reduce wetland drainage.
- Remove river impoundments where possible.
- Work with partners to maintain instream flows.

MONITORING PLANS

A monitoring protocol has been developed for the North Dakota Game and Fish Department under the SWG program. Implementation of this monitoring protocol is a future goal.

2005-2015 PROGRESS

SWG T-24-R **A Two Phase Population Survey of Mussels in North Dakota Rivers** provided important information on the distribution of this species. Work to implement a monitoring protocol for mussels species will be a goal of the revised Wildlife Action Plan.



WORKS CONSULTED

- Cummings, K.S., and C.A. Mayer. 1992. Field Guide to Freshwater Mussels of the Midwest. Illinois Natural History Survey Manual 5. 194 pp.
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CREEK HEELSPLITER

Scientific Name: *Lasmigona compressa*

Species of Conservation Priority:
Level I

General Description: Shell relatively thin, flattened, and elongated up to 3 inches in length. Yellow in color with green rays extending from back along top. Darker in larger shells.

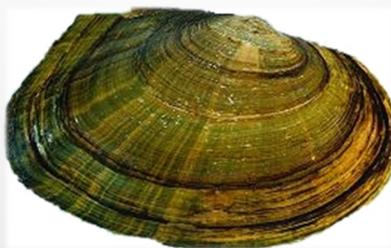
Status: Year-round resident.

Abundance: Rare.

Primary Habitat: Found in the Pembina, Forest, Wintering and Sheyenne rivers. Generally in headwaters of small streams with sandy bottoms.

Federal Status: None.

Reason for Designation: Changes in land use in around these rivers, most notably agriculture, and impoundment of river systems have impacted beds of these mussels.



NDGFD

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Found in headwaters of small and medium-sized streams.

Key Areas for Creek Heelsplitter in North Dakota

The Creek Heelsplitter is found most frequently in the Wintering River. It is also found in the Pembina, Forest, and Sheyenne rivers.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Impoundment of the Red River and its tributaries have changed the flow regime and increased sediment deposits making many areas in the river unsuitable to the Creek Heelsplitter. 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.

Other Natural or Manmade Factors

Release of water from Devils Lake may negatively the water chemistry in the Sheyenne River.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- No current research or survey efforts are on-going in this species range.

Previous Research and Survey Efforts

- Cvancara conducted a state-wide survey of the mussels of North Dakota in 1978.
- The North Dakota Game and Fish Department revisited Cvancara's sites in 1990.
- Valley City State University revisited Cvancara's sites and surveyed additional sites in 2008.
- The NDDH conducted freshwater mussel surveys for state waters as a segment of its Index of Biotic Integrity (IBI) work.

Additional Research and Survey Efforts Needed

- A monitoring protocol for mussel species has been developed for the North Dakota Game and Fish Department under the SWG program. Implementation of this monitoring protocol is a future goal.

MANAGEMENT RECOMMENDATIONS

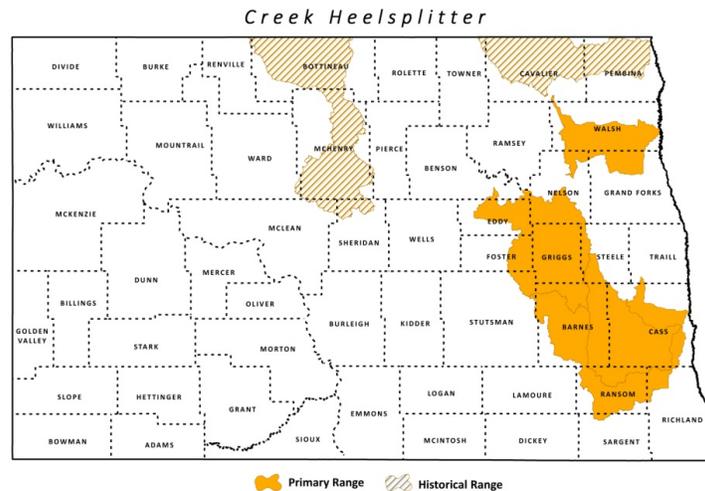
- Develop buffers along riparian areas.
- Work with partners to reduce the use of chemical near waterways.
- Work with partners to reduce wetland drainage.
- Remove river impoundments where possible.
- Work with partners to maintain instream flows.

MONITORING PLANS

A monitoring protocol has been developed for the North Dakota Game and Fish Department under the SWG program. Implementation of this monitoring protocol is a future goal.

2005-2015 PROGRESS

Upgraded to the a Level I Species of Conservation Priority in the 2015 revision of the Wildlife Action Plan. SWG T-24-R **A Two Phase Population Survey of Mussels in North Dakota Rivers** provided important information on the distribution of this species. Work to implement a monitoring protocol for mussels species will be a goal of the revised Wildlife Action Plan.



WORKS CONSULTED

- Cummings, K.S., and C.A. Mayer. 1992. Field Guide to Freshwater Mussels of the Midwest. Illinois Natural History Survey Manual 5. 194 pp.
- Cvancara, Alan M. 1983. Aquatic Mollusks of North Dakota. North Dakota Geological Survey, Report of Investigation No. 78. 141 pp.
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CREEPER

Scientific Name: *Strophitus undulatus*

Species of Conservation Priority:
Level III

General Description: Shell is elliptical in shape and slightly compressed. Anterior of shell is rounded, posterior 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.

Abundance: Rare.

Primary Habitat: Streams with mud, sand or gravel bottoms.

Federal Status: None.

Reason for Designation: Found in low numbers during recent surveys. May be an edge of range species.



Andre Delorme

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

The Creeper is found from the east coast to a line extending south through North Dakota, Nebraska, Texas on the western edge. Species is found in varying stream sizes and bottom substrates throughout its range.

Key Areas for Creeper in North Dakota

The Creeper is found in the Forest River, South Branch of the Park River, and the Sheyenne River. The Sheyenne River appears to have the largest population.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Impoundments have changed the historic flow regime of the habitat. It has also blocked movements of fish species and in turn mussel species. Land use practices on surrounding lands have also impacted the river negatively. Chemical run-off and sedimentation contribute to deteriorated water quality.

Other Natural or Manmade Factors

Release of water from Devils Lake may negatively the water chemistry in the Sheyenne River.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- No current research or survey efforts are on-going in this species range.

Previous Research and Survey Efforts

- Cvancara conducted a state-wide survey of the mussels of North Dakota in 1978.
- The North Dakota Game and Fish Department revisited Cvancara's sites in 1990.
- Valley City State University revisited Cvancara's sites and surveyed additional sites in 2008.
- The NDDH conducted freshwater mussel surveys for state waters as a segment of its Index of Biotic Integrity (IBI) work.

Additional Research and Survey Efforts Needed

- A monitoring protocol for mussel species has been developed for the North Dakota Game and Fish Department under the SWG program. Implementation of this monitoring protocol is a future goal.

MANAGEMENT RECOMMENDATIONS

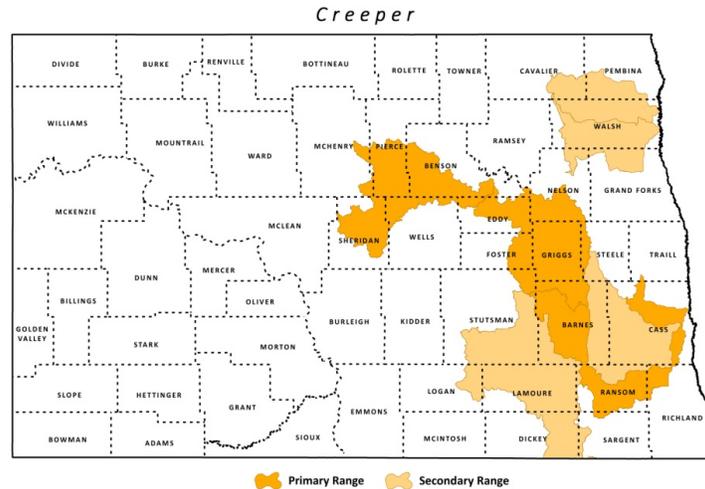
- Develop buffers along riparian areas.
- Work with partners to reduce the use of chemical near waterways.
- Work with partners to reduce wetland drainage.
- Remove river impoundments where possible.
- Work with partners to maintain instream flows.

MONITORING PLANS

A monitoring protocol has been developed for the North Dakota Game and Fish Department under the SWG program. Implementation of this monitoring protocol is a future goal.

2005-2015 PROGRESS

SWG T-24-R A Two Phase Population Survey of Mussels in North Dakota Rivers provided important information on the distribution of this species. Work to implement a monitoring protocol for mussels species will be a goal of the revised Wildlife Action Plan.



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DEERTOEO

Scientific Name: *Truncilla truncata*

Species of Conservation Priority:
Level III

General Description: North Dakota's smallest mussel. Shell is generally triangular in shape. Anterior rounded, posterior bluntly pointed. Color is highly variable ranging from yellow green to dark brown. Green rays present of varying widths.

Status: Year-round resident.

Abundance: Rare.

Primary Habitat: Found in medium to larger river systems. Bottom substrate can be gravel, mud or sand.

Federal Status: None.

Reason for Designation: The Deertoe was found in low numbers during recent surveys. The species may be on the edge of its range and requires more investigation.



Andre Delorme

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

The Deertoe is found in medium to large rivers with mud, sand or gravel bottoms.

Key Areas for Deertoe in North Dakota

Deertoe are found throughout the Mississippi and Missouri river systems nationally. In North Dakota the Deertoe is currently found only in the James River in North Dakota.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Impoundment of the James River has changed the historic flow regime of the river. It has also blocked movements of fish species and in turn mussel species. Land use practices on surrounding lands have also impacted the river negatively. Chemical run-off and sedimentation contribute to deteriorated water quality.

Other Natural or Manmade Factors

No other threats have yet been identified for this species.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- No current research or survey efforts are on-going in this species range.

Previous Research and Survey Efforts

- Cvancara conducted a state-wide survey of the mussels of North Dakota in 1978.
- The North Dakota Game and Fish Department revisited Cvancara's sites in 1990.
- Valley City State University revisited Cvancara's sites and surveyed additional sites in 2008.
- The NDDH conducted freshwater mussel surveys for state waters as a segment of its Index of Biotic Integrity (IBI) work.

Additional Research and Survey Efforts Needed

- Additional surveys of the James River should be conducted to find the range of this species.
- A monitoring protocol for mussel species has been developed for the North Dakota Game and Fish Department under the SWG program. Implementation of this monitoring protocol is a future goal.

MANAGEMENT RECOMMENDATIONS

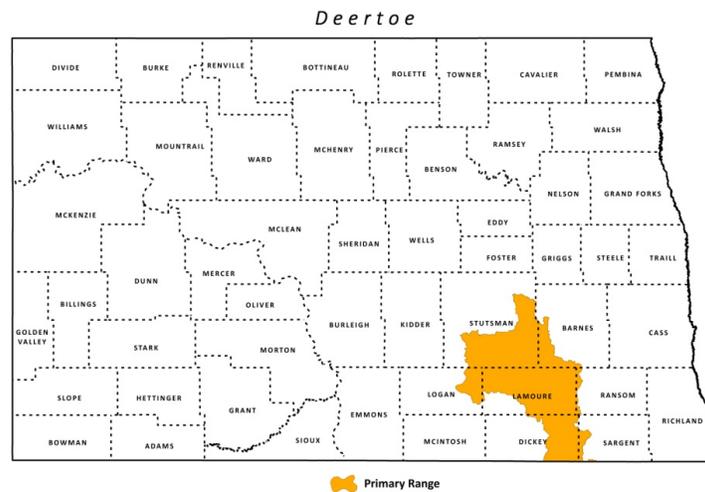
- Develop buffers along riparian areas.
- Work with partners to reduce the use of chemical near waterways.
- Work with partners to reduce wetland drainage.
- Remove river impoundments where possible.
- Work with partners to maintain instream flows.

MONITORING PLANS

A monitoring protocol has been developed for the North Dakota Game and Fish Department under the SWG program. Implementation of this monitoring protocol is a future goal.

2005-2015 PROGRESS

Added as a Level III Species of Conservation Priority in the 2015 revision of the Wildlife Action Plan. SWG T-24-R A **Two Phase Population Survey of Mussels in North Dakota Rivers** provided important information on the distribution of this species. Work to implement a monitoring protocol for mussels species will be a goal of the revised Wildlife Action Plan.



WORKS CONSULTED

- Cummings, K.S., and C.A. Mayer. 1992. Field Guide to Freshwater Mussels of the Midwest. Illinois Natural History Survey Manual 5. 194 pp.
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FRAGILE PAPERSHELL

Scientific Name: *Leptodea fragilis*

Species of Conservation Priority:
Level III

General Description: Shell compressed and generally oblong. Both ends rounded with the exception of females where posterior end is expanded. Shell is commonly yellow to yellow/green with light green rays.

Status: Year-round resident.

Abundance: Common throughout its core range. Rare in North Dakota.

Primary Habitat: Streams with mud, sand or gravel bottoms.

Federal Status: None.

Reason for Designation: Species was just recently document in the state. Little is known of the species and requires more investigation.



LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Species is found in varying stream sizes and bottom substrates throughout its range.

Key Areas for the Fragile Papershell in North Dakota

Documented only in the James River.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Impoundment of the James River has changed the historic flow regime of the river. It has also blocked movements of fish species and in turn mussel species. Land use practices on surrounding lands have also impacted the river negatively. Chemical run-off and sedimentation contribute to deteriorated water quality.

Other Natural or Manmade Factors

No other threats have yet been identified for this species.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- No current research or survey efforts are on-going in this species range.

Previous Research and Survey Efforts

- Cvancara conducted a state-wide survey of the mussels of North Dakota in 1978.
- The North Dakota Game and Fish Department revisited Cvancara's sites in 1990.
- Valley City State University revisited Cvancara's sites and surveyed additional sites in 2008.
- The NDDH conducted freshwater mussel surveys for state waters as a segment of its Index of Biotic Integrity (IBI) work.

Additional Research and Survey Efforts Needed

- Additional surveys of the James River should be conducted to find the range of this species.
- A monitoring protocol for mussel species has been developed for the North Dakota Game and Fish Department under the SWG program. Implementation of this monitoring protocol is a future goal.

MANAGEMENT RECOMMENDATIONS

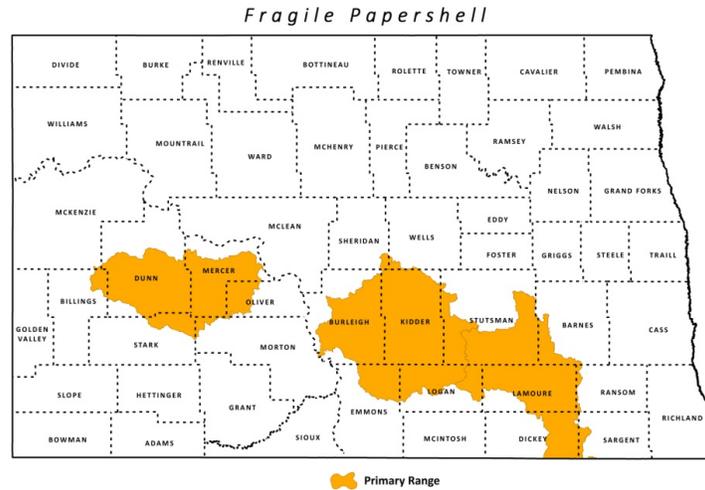
- Develop buffers along riparian areas.
- Work with partners to reduce the use of chemical near waterways.
- Work with partners to reduce wetland drainage.
- Remove river impoundments where possible.
- Work with partners to maintain instream flows.

MONITORING PLANS

A monitoring protocol has been developed for the North Dakota Game and Fish Department under the SWG program. Implementation of this monitoring protocol is a future goal.

2005-2015 PROGRESS

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MAPLELEAF

Scientific Name: *Quadrula*

Species of Conservation Priority:
Level III

General Description: 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.

Abundance: Rare.

Primary Habitat: Streams with mud, sand or gravel bottoms.

Federal Status: None.

Reason for Designation: Changes in land use in and around these rivers, most notably agriculture, and impoundment of river systems have impacted beds of these mussels. They are also of commercial value and are protected from harvest in North Dakota.



NDGFD

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

The Mapleleaf is found in medium to large rivers with gravel or mud bottoms. Usually associated with deeper water in areas where the channel width is 30-88m wide.

Key Areas for Mapleleaf in North Dakota

The Red River is the only place where this species has ever been documented alive. This species may also be found in parts of the Sheyenne River.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Impoundment of the Red River and its tributaries has changed the flow regime and increased sediment deposits making many areas in the river unsuitable to the Mapleleaf. Impoundments also impede the movement of host fish needed for 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 and fields contribute to runoff and sedimentation in the Red River and its tributaries. These practices may contribute to this species' decline. Freshwater mussels are generally intolerant of pollution.

Other Natural or Manmade Factors

The Mapleleaf is considered a commercially valuable species. It is presently illegal to collect mussels for commercial use, but this practice may occur in parts of its range.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- No current research or survey efforts are on-going in this species range.

Previous Research and Survey Efforts

- Cvancara conducted a state-wide survey of the mussels of North Dakota in 1978.
- The North Dakota Game and Fish Department revisited Cvancara's sites in 1990.
- Valley City State University revisited Cvancara's sites and surveyed additional sites in 2008
- The NDDH conducted freshwater mussel surveys for state waters as a segment of its Index of Biotic Integrity (IBI) work.

Additional Research and Survey Efforts Needed

- A monitoring protocol for mussel species has been developed for the North Dakota Game and Fish Department under the SWG program. Implementation of this monitoring protocol is a future goal.

MANAGEMENT RECOMMENDATIONS

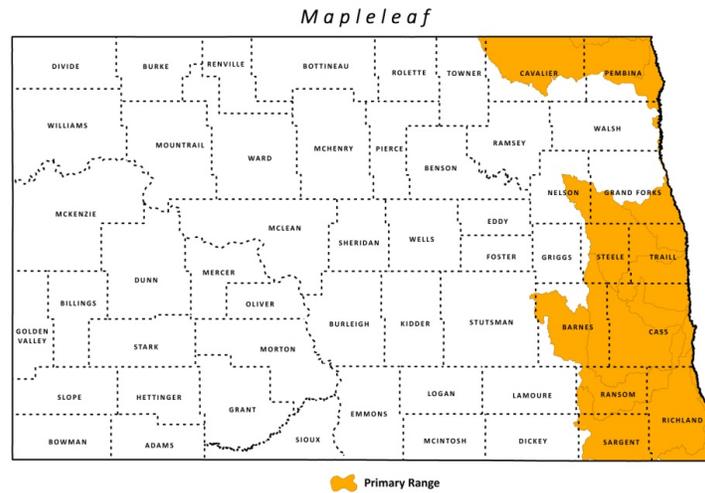
- Develop buffers along riparian areas.
- Work with partners to reduce the use of chemical near waterways.
- Work with partners to reduce wetland drainage.
- Remove river impoundments where possible.
- Work with partners to maintain instream flows.

MONITORING PLANS

A monitoring protocol has been developed for the North Dakota Game and Fish Department under the SWG program. Implementation of this monitoring protocol is a future goal.

2005-2015 PROGRESS

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PINK HEELSPLITTER

Scientific Name: *Potamilus alatus*

Species of Conservation Priority:
Level II

General Description: 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.

Abundance: Locally common.

Primary Habitat: Medium to large rivers. Bottom substrate mud or a mix of mud and sand.

Federal Status: None.

Reason for Designation: Changes in land use in around the Red and Sheyenne rivers, and impoundment have impacted beds of these mussels.



NDGFD

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Found in large rivers with a channel width of 18-63 m.

Key Areas for Pink Heelsplitter in North Dakota

Found in the Red and Sheyenne rivers. Highest concentrations found in the Red River near the town of Argusville.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Impoundments of the Red River and its tributaries have changed the flow regime and increased sediment deposits, making many areas in these rivers unsuitable to the Pink Heelsplitter. 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 and fields contribute to run-off and sedimentation in the Red River and its tributaries. These practices may contribute to this species' decline. Freshwater mussels are generally intolerant of pollution.

Other Natural or Manmade Factors

The Pink Heelsplitter is considered a commercially valuable species. It is presently illegal to collect mussels for commercial use, but this practice may occur in parts of its range.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- No current research or survey efforts are on-going in this species range.

Previous Research and Survey Efforts

- Cvancara conducted a state-wide survey of the mussels of North Dakota in 1978.
- The North Dakota Game and Fish Department revisited Cvancara's sites in 1990.
- Valley City State University revisited Cvancara's sites and surveyed additional sites in 2008.
- The NDDH conducted freshwater mussel surveys for state waters as a segment of its Index of Biotic Integrity (IBI) work.

Additional Research and Survey Efforts Needed

- A monitoring protocol for mussel species has been developed for the North Dakota Game and Fish Department under the SWG program. Implementation of this monitoring protocol is a future goal.

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MANAGEMENT RECOMMENDATIONS

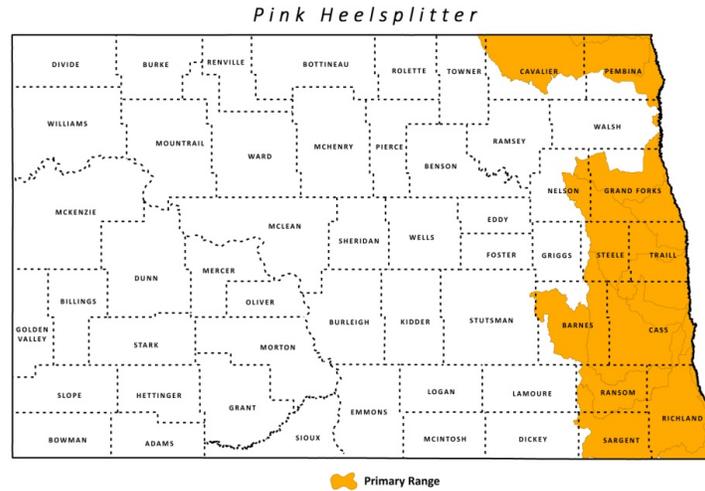
- Develop buffers along riparian areas.
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- Work with partners to reduce wetland drainage.
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MONITORING PLANS

A monitoring protocol has been developed for the North Dakota Game and Fish Department under the SWG program. Implementation of this monitoring protocol is a future goal.

2005-2015 PROGRESS

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PINK PAPERSHELL

Scientific Name: *Potamilus ohiensis*

Species of Conservation Priority:
Level I

General Description: 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.

Abundance: Rare.

Primary Habitat: Medium to larger rivers. Bottom substrate generally mud or sand.

Federal Status: None.

Reason for Designation: Changes in land use in around rivers, and impoundment have impacted beds of these mussels.



NDGFD

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Pink Papershell prefer large river systems, but was collected only from tributaries of the Missouri River with a stream width of 14 to 30m. The substrate of the river is normally mud, sand, or gravel.

Key Areas for Pink Papershell in North Dakota

Found only in the lower reaches of the Missouri River and tributaries below Garrison Dam in North Dakota.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

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.

Other Natural or Manmade Factors

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 SURVEY EFFORTS

Current Research and Survey Efforts

- No current research or survey efforts are on-going in this species range.

Previous Research and Survey Efforts

- Cvancara conducted a state-wide survey of the mussels of North Dakota in 1978.
- The North Dakota Game and Fish Department revisited Cvancara's sites in 1990.
- Valley City State University revisited Cvancara's sites and surveyed additional sites in 2008.
- The NDDH conducted freshwater mussel surveys for state waters as a segment of its Index of Biotic Integrity (IBI) work.

Additional Research and Survey Efforts Needed

- A monitoring protocol for mussel species has been developed for the North Dakota Game and Fish Department under the SWG program. Implementation of this monitoring protocol is a future goal.

MANAGEMENT RECOMMENDATIONS

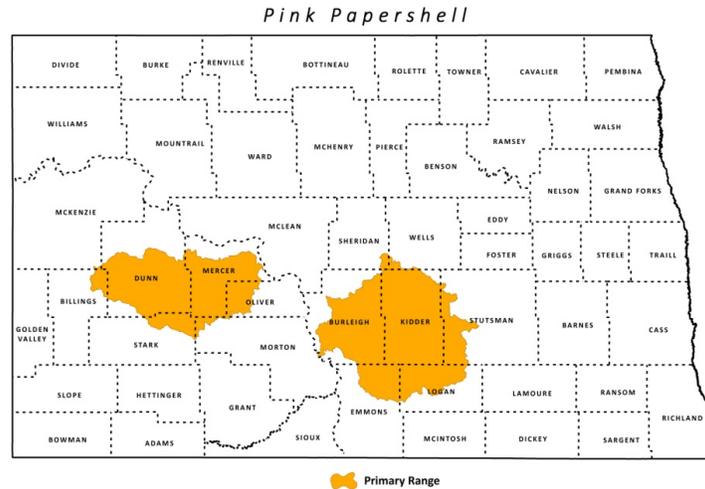
- Develop buffers along riparian areas.
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- Work with partners to reduce wetland drainage.
- Remove river impoundments where possible.
- Work with partners to maintain instream flows.

MONITORING PLANS

A monitoring protocol has been developed for the North Dakota Game and Fish Department under the SWG program. Implementation of this monitoring protocol is a future goal.

2005-2015 PROGRESS

Upgraded to a Level I Species of Conservation Priority in the 2015 revision of the Wildlife Action Plan. SWG T-24-R **A Two Phase Population Survey of Mussels in North Dakota Rivers** provided important information on the distribution of this species. Work to implement a monitoring protocol for mussels species will be a goal of the revised Wildlife Action Plan.



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THREERIDGE

Scientific Name: *Potamilus ohiensis*

Species of Conservation Priority:
Level I

General Description: 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.

Abundance: Locally common.

Primary Habitat: Prefer large rivers with a mud, sand or gravel substrate. In North Dakota confined to larger rivers.

Federal Status: None.

Reason for Designation: Believed to be declining in state waters. Changes in land use in and around these rivers, most notably agriculture, and impoundment of river systems, may impact mussel populations. They are also of commercial value and are protected from harvest in North Dakota.



NDGFD

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Threeridge prefer large river systems. The substrate of the river is normally mud, sand, or gravel.

Key Areas for Threeridge in North Dakota

Found only in the Red and Sheyenne rivers. It is found in highest concentrations in the section of the Sheyenne River in Ransom County.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Impoundment of the Red River and its tributaries have changed the flow regime and increased sediment deposits making many areas in the river unsuitable to the Creek Heelsplitter. 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.

Other Natural or Manmade Factors

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. This 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 SURVEY EFFORTS

Current Research and Survey Efforts

- No current research or survey efforts are on-going in this species range.

Previous Research and Survey Efforts

- Cvancara conducted a state-wide survey of the mussels of North Dakota in 1978.
- The North Dakota Game and Fish Department revisited Cvancara's sites in 1990.
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Additional Research and Survey Efforts Needed

- A monitoring protocol for mussel species has been developed for the North Dakota Game and Fish Department under the SWG program. Implementation of this monitoring protocol is a future goal.

MANAGEMENT RECOMMENDATIONS

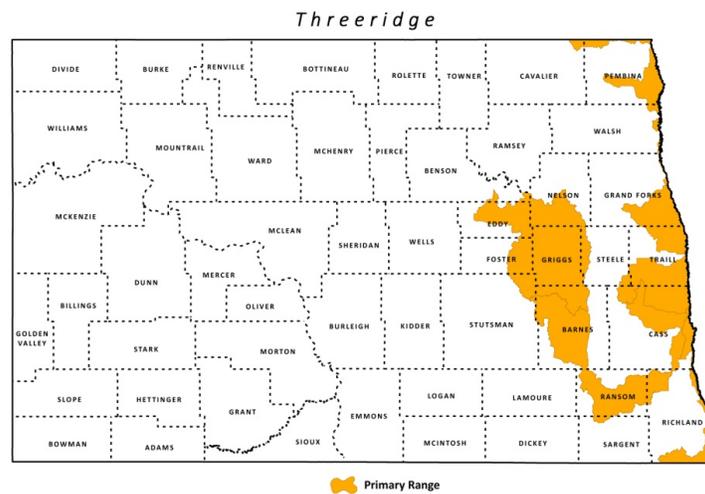
- Develop buffers along riparian areas.
- Work with partners to reduce the use of chemical near waterways.
- Work with partners to reduce wetland drainage.
- Remove river impoundments where possible.
- Work with partners to maintain instream flows.

MONITORING PLANS

A monitoring protocol has been developed for the North Dakota Game and Fish Department under the SWG program. Implementation of this monitoring protocol is a future goal.

2005-2015 PROGRESS

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WABASH PIGTOE

Scientific Name: *Fusconaia flava*

Species of Conservation Priority:
Level II

General Description: The shell is up to 3 inches in length. The shape is variable, but generally thick and compressed. Commonly a triangular shape. Younger individuals yellow in color with faint green rays, becoming dark brown with age.

Status: Year-round resident.

Abundance: Locally common.

Primary Habitat: Prefer large rivers with a gravel substrate. In North Dakota confined to larger rivers.

Federal Status: None.

Reason for Designation: Changes in land use around these rivers, most notably agriculture, and impoundment of river systems may impact freshwater mussel populations. This species is protected from commercial harvest.



NDGFD

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Prefer large river systems with channel width greater than 11 m. The river substrate is normally mud or sand.

Key Areas for Wabash Pigtoe in North Dakota

Found only in the Red and Sheyenne rivers. It is found in the highest concentrations in the section of the Sheyenne River in Ransom County.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Impoundment of the Red River and its tributaries have changed the flow regime and increased sediment deposits, making many areas in the river unsuitable to this species. Impoundments also block movement of host fish needed for reproduction and dispersal. Agricultural practices within the basin have reduced suitable habitat in the river. Runoff from treated fields into waterways decreases water quality. Ditches used to drain wetlands and fields contribute to run-off and sedimentation in the Red River and its tributaries.

Other Natural or Manmade Factors

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. This 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 SURVEY EFFORTS

Current Research and Survey Efforts

- No current research or survey efforts are on-going in this species range.

Previous Research and Survey Efforts

- Cvancara conducted a state-wide survey of the mussels of North Dakota in 1978.
- The North Dakota Game and Fish Department revisited Cvancara's sites in 1990.
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Additional Research and Survey Efforts Needed

- A monitoring protocol for mussel species has been developed for the North Dakota Game and Fish Department under the SWG program. Implementation of this monitoring protocol is a future goal.

MANAGEMENT RECOMMENDATIONS

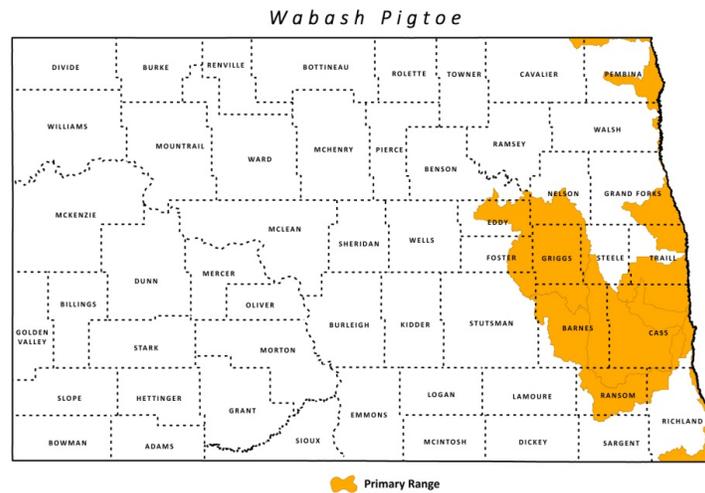
- Develop buffers along riparian areas.
- Work with partners to reduce the use of chemical near waterways.
- Work with partners to reduce wetland drainage.
- Remove river impoundments where possible.
- Work with partners to maintain instream flows.

MONITORING PLANS

A monitoring protocol has been developed for the North Dakota Game and Fish Department under the SWG program. Implementation of this monitoring protocol is a future goal.

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APPENDIX F. Insects

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DAKOTA SKIPPER

Scientific Name: *Hesperia dacotae*

Species of Conservation Priority:
Level II

General Description: 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 Ottoo skipper in which it shares habitat preferences.

Status: Resident.

Abundance: Rare.

Primary Habitat: Found in native tracts of tall and mixed grass prairie. Bluestem is indicative of the habitat. Purple Cone flower is often found in these sites as well.

Federal Status: Threatened.

Reason for Designation: Listed as Threatened by the USFWS. Loss of habitat is the driving concern.



USFWS

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Dakota Skippers are found in two types of prairie habitat. The first is moist areas dominated by bluestem grass species with three wildflower species indicative of the habitat, wood lily (*Lilium philadelphicum*), harebell (*Campanula rotundifolia*) and smooth camas (*Zygadenus elegans*). The second type is mesic upland prairie found often on ridges and hillsides. Bluestem grasses and needlegrasses dominate these prairies; purple coneflower (*Echinacea angustifolia*) is typical found at these sites.

Key Areas for Dakota Skipper in North Dakota

Dakota Skipper have been documented in McKenzie, Dunn, Oliver, Mountrail, Ward, Burke, McHenry, Bottineau, Rolette, Wells, Eddy, Griggs, Stutsman, Barnes, Ransom, Sargent, Richland counties in North Dakota.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

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.

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 SURVEY EFFORTS

Current Research and Survey Efforts

- The USFWS will continue to monitor known sites in North Dakota.

Previous Research and Survey Efforts

- A Conservation Status was developed by Royer and Marrone for North Dakota and South Dakota in 1992.
- USFS surveyed butterfly fauna in the McKenzie Ranger district in 2002, 2003, 2004, and 2010.
- USFWS conducted surveys of McHenry Co in 1998.
- Royer conducted field survey and habitat assessments for 29 sites in ND for Dakota Skipper and Poweshiek Skipperling in 2012.

Additional Research and Survey Efforts Needed

- Training of additional biologists to identify and survey prairie butterflies is needed.
- Development of a protocol to monitor NDGFD managed sites.

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.

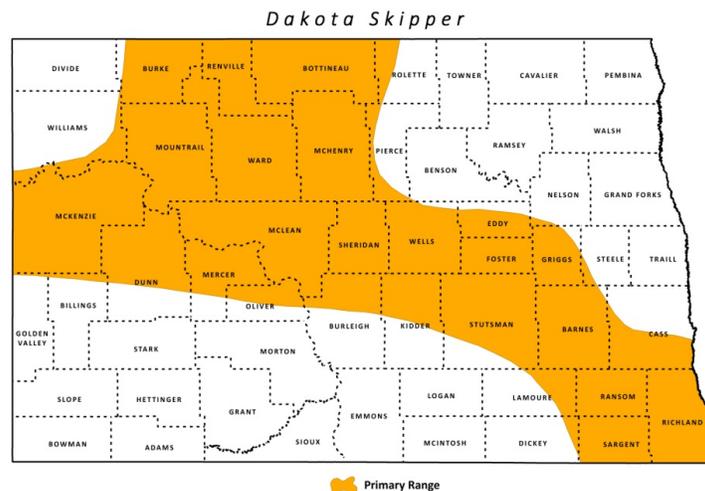
- Delay haying of habitat until after end of adult flight. Leave 8 inches of structure to provide over-wintering cover. Do not hay entire occupied site each season when possible.
- Limit the duration and intensity of grazing in Dakota Skipper habitat. Do not graze habitat for entire season and manage for 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.

MONITORING PLANS

The North Dakota Game and Fish Department currently does not have a monitoring protocol for this species. Currently the Dakota Skipper is not known to occur on NDGFD managed lands. Should they be found, development of a protocol to monitor NDGFD managed lands would be necessary.

2005-2015 PROGRESS

The Dakota Skipper was added as a Level II Species of Conservation Priority during the 2015 Wildlife Action Plan revision. A new SWG proposed with the University of North Dakota will look to develop a model to predict habitat suitable for this and other prairie obligate butterflies.



WORKS CONSULTED

- Endangered and Threatened Wildlife and Plants; Threatened Species Status for Dakota Skipper and Endangered Species Status for Poweshiek Skipperling; Final Rule. Vol. 79. No. 206 Fed. Reg. October 24, 2014. 50 CFR Part 17
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MONARCH BUTTERFLY

Scientific Name: *Danaus plexippus*

Species of Conservation Priority:
Level I

General Description: 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.

Abundance: Common.

Primary Habitat: Monarchs are found in areas a high number of nectar sources. Native plants are preferred most importantly milkweed.

Federal Status: Petitioned for listing in 2014.

Reason for Designation: Loss of native prairie habitat containing milkweed. Milkweed is the lone food source for the Monarch caterpillar.



NDGFD

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred 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.

Key Areas for Monarch Butterfly in North Dakota

Monarchs are found throughout North Dakota. Areas with a higher density of native prairie would be more likely to support Monarchs.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

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. 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 be a factor.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- No research or survey efforts are underway for this species.

Previous Research and Survey Efforts

- The University of Minnesota has done feeding studies of the Monarch.
- Iowa St. University has looked at the effects of herbicide use on Monarchs.
- Royer surveyed butterflies at a number of sites in North Dakota

Additional Research and Survey Efforts Needed

- Implementation of a monitoring protocol for this species.

MANAGEMENT RECOMMENDATIONS

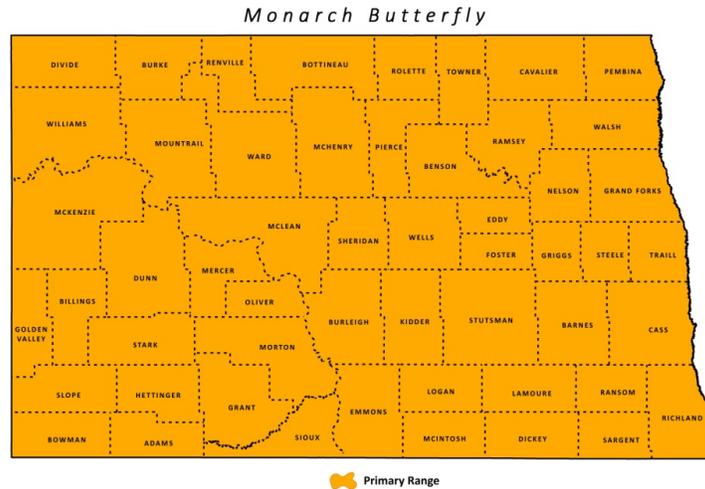
- Develop pollinator habitat.
- Protect and manage high quality native prairie.
- Develop connectivity between quality habitat
- Delay haying of habitat until after end of adult flight
- Planting milkweed and native nectar plants to improve habitat
- Avoid broadcast spraying of pesticides and herbicides at known sites to minimize loss of adults and nectar sources.

MONITORING PLANS

The North Dakota Game and Fish Department currently does not have a monitoring protocol for this species.

2005-2015 PROGRESS

The Monarch Butterfly was added as a Level I Species of Conservation Priority during the 2015 Wildlife Action Plan revision. The Monarch is currently under consideration for list under the Threatened and Endangered Species Act.



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POWESHIEK SKIPPERLING

Scientific Name: *Oarisma poweshiek*

Species of Conservation Priority:
Level II

General Description: 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: Resident

Abundance: Rare, believed extirpated.

Primary Habitat: Found in native tracts of tall and mixed grass prairie. Bluestem is indicative of the habitat. Purple Coneflower is often found in these sites as well.

Federal Status: Endangered.

Reason for Designation: Listed as Endangered by the USFWS. Loss of habitat is the driving concern.



USFWS

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Poweshiek Skipperling is found in high quality native grassland tracts. Preferred areas are considered wet-to-dry prairie with mesic hillsides near low moist areas within undisturbed habitat.

Key Areas for Poweshiek Skipperling in North Dakota

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.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

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.

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 SURVEY EFFORTS

Current Research and Survey Efforts

- The USFWS will continue to monitor previously occupied sites in North Dakota.

Previous Research and Survey Efforts

- Most recently Royer surveyed 29 sites in North Dakota for Dakota Skipper and Poweshiek Skipperling.
- Royer et al originally surveyed above sites in 1992.
- Royer and Marrone developed a conservation status of the Poweshiek Skipperling for the USFWS in 1992.

Additional Research and Survey Efforts Needed

- Training of additional biologists to identify and survey prairie butterflies is needed.
- Continued monitoring of potential sites for presence of Poweshiek Skipperling.

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

8 inches of structure. Spring grazing is preferable. Avoid grazing of nectar sources during the flight period.

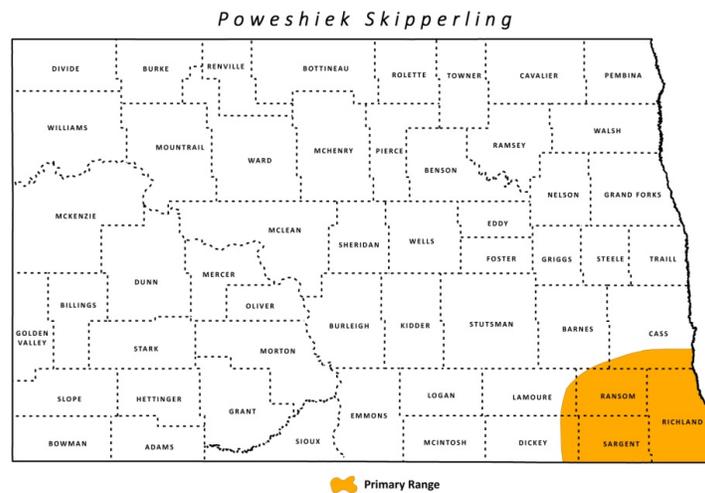
- Avoid broadcast spraying of pesticides and herbicides at known sites to minimize loss of adults and nectar sources.
- Monitor known inhabited sites.

MONITORING PLANS

The North Dakota Game and Fish Department currently does not have a monitoring protocol for this species. Currently the Dakota Skipper is not known to occur on NDGFD managed lands. Should they be found, development of a protocol to monitor NDGFD managed lands would be necessary.

2005-2015 PROGRESS

The Poweshiek Skipperling was added as a Level II Species of Conservation Priority during the 2015 Wildlife Action Plan revision. A new SWG proposed with the University of North Dakota will look to develop a model to predict habitat suitable for this and other prairie obligate butterflies.



WORKS CONSULTED

- Endangered and Threatened Wildlife and Plants; Threatened Species Status for Dakota Skipper and Endangered Species Status for Poweshiek Skipperling; Final Rule. Vol. 79. No. 206 Fed. Reg. October 24, 2014. 50 CFR Part 17
- Royer, R. A. 2003. Butterflies of North Dakota: An Atlas and Guide (2nd Edition). MSU Science Monograph Number Two.
- Royer, R. A. and M. R. Royer. 2012a. Dakota Skipper and Poweshiek Skipperling Field Survey and Habitat Assessment at Twenty-Nine North Dakota Sites During the 2012 Season. Minot State University, Minot, ND.
- Royer, R. A. and G. M. Marrone. 1992b. Conservation Status of the Poweshiek Skipper (*Oarisma powesheik*) in North and South Dakota. U. S. Fish and Wildlife Service Endangered Species Office. Denver. 31 pp, plus maps and appendices.

REGAL FRITILLARY

Scientific Name: *Speyeria idalia*

Species of Conservation Priority:
Level I

General Description: Forewings orange with black bars running between veins. Hind wings are darker orange to black with a pattern of white spots present.

Status: Resident.

Abundance: Rare.

Primary Habitat: Regal Fritillaries are found in tall-grass and wet prairie habitats. Native plants are the preferred food source with native violets required for larva.

Federal Status: Petitioned for listing in 2013.

Reason for Designation: The loss and fragmentation of prairie habitat.



USFWS

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred 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.

Key Areas for Regal Fritillary 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.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

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 SURVEY EFFORTS

Current Research and Survey Efforts

- NDSU is currently collecting habitat data on rare prairie butterflies.

Previous Research and Survey Efforts

- Royer surveyed butterflies at a number of sites in North Dakota.

Additional Research and Survey Efforts Needed

- Training of additional biologists to identify and survey prairie butterflies is needed.
- Implementation of a monitoring protocol for this species.

MANAGEMENT RECOMMENDATIONS

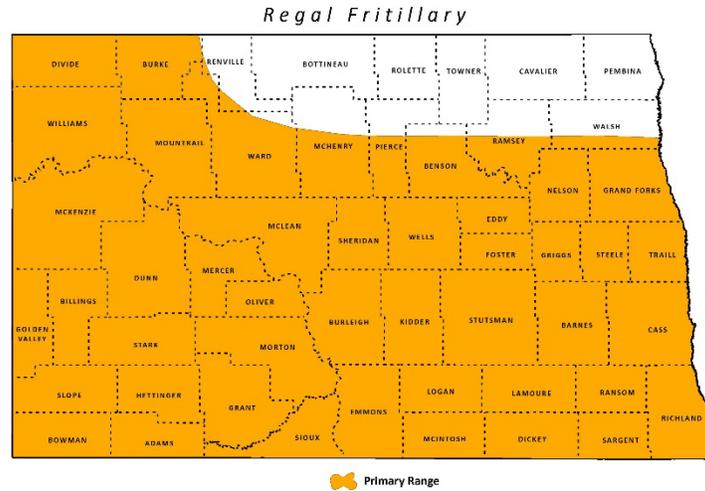
- Develop pollinator habitat.
- Protect and manage high quality native prairie.
- Develop connectivity between quality habitats.
- Delay haying of habitat until after end of adult flight.
- Planting native nectar plants to improve habitat.
- Avoid broadcast spraying of pesticides and herbicides at known sites to minimize loss of adults and nectar sources.

MONITORING PLANS

The North Dakota Game and Fish Department currently does not have a monitoring protocol for this species.

2005-2015 PROGRESS

The Regal Fritillary was added as a Level I Species of Conservation Priority during the 2015 Wildlife Action Plan revision. The regal fritillary is currently under consideration for listing under the Threatened and Endangered Species Act.



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United States Fish and Wildlife Service, Species profile for Regal fritillary (*Speyeria idalia*) available at <http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?scode=1075> viewed June 2015.

**North Dakota State Wildlife Action Plan:
Planning for Climate Change
in North Dakota**

Prepared by:

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March 2015

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LIST OF ABBREVIATIONS

A2	High-emission
B1	Low-emission
CCVI	Climate Change Vulnerability Index
CMIP3	Coupled Model Intercomparison Project phase 3
CMIP5	Coupled Model Intercomparison Project phase 5
CO ₂	Carbon dioxide
Dec	December
EV	Extremely Vulnerable
Feb	February
GCM	General Circulation Model
GFPP	Grand Forks Prairie Project
HV	Highly Vulnerable
IPCC	Intergovernmental Panel on Climate Change
Mar	March
MV	Moderately Vulnerable
NARCCAP	North American Regional Climate Change Assessment Program
NCA	National Climate Assessment
ND	North Dakota
NEON	National Ecological Observatory Network
NOAA	National Oceanic and Atmospheric Administration
NV-IL	Not vulnerable-Increase Likely
NV-PS	Not vulnerable-Potentially Stable
PDSI	Palmer Drought Severity Index
RCP	Representative Concentration Pathway
SCP	Species of Conservation Priority

ACKNOWLEDGEMENTS

Steve Dyke, Sandra Johnson, and NDGF Staff provided invaluable feedback on earlier drafts of this report. Amanda Saul and Tanner Stechmann provided photos. Within this document we summarize extensive efforts by colleagues around the world, we did our best to summarize these works and encourage readers to seek the cited references for additional details. This project was funded by a North Dakota State Wildlife Grant to KAY, BJG and RN.

EXECUTIVE SUMMARY

In response to the mandate to address regional climate change within the revision of the North Dakota State Wildlife Action Plan (SWAP), we were tasked with developing an addendum chapter on climate change in North Dakota. For this effort, we choose to summarize what is understood about future climate change in North Dakota and *to begin* an ongoing process of identifying vulnerabilities and relevant actions. Climate models predict statewide changes in temperature and potentially precipitation that will affect North Dakota's natural resources, and it appears that aquatic species may be most vulnerable to these changes. In response to these ecological effects, we provide a list of recommended strategies to guide future climate change adaptation strategies and set goals for moving this process forward. We also note that, although it is certainly challenging to anticipate how a particular site could be affected by future climate change, site-based actions can be taken to proactively address potential vulnerabilities. This process can be facilitated by evaluating past climate related decisions and increasing communication among relevant stakeholders. While this report aims to address climate change adaptation within the context of managing species of conservation concern, we hope that the information described herein can help to initiate climate change discussion and adaptation planning across natural resource management sectors in North Dakota.

INTRODUCTION

Global temperature, precipitation, and oceanographic patterns are changing (Melillo et al. 2014; Pachauri et al. 2014) and these changes have already affected North Dakota. North Dakota experienced the fastest rate of increase in annual temperature (primarily due to winter warming) of the lower 48 states in the last century (Melillo et al. 2014), and this climate change has and will continue to affect regional human and natural systems (George et al. 1992; Larson 1995; Strode 2003; Johnson et al. 2005; Johnson et al. 2010; Dunnell & Travers 2011; Forcey et al. 2011). To adapt North Dakota's social, economic, and ecological systems to these effects, steps need to be taken to develop and balance ways to defend against (resist) and absorb (increase resilience to) this relatively rapid environmental change (Heller & Zavaleta 2009; Melillo et al. 2014; Pachauri et al. 2014).

As agencies have begun to address potential climate change effects, a substantial body of literature has emerged evaluating how this planning process can be applied and turned into actionable steps at a variety of organizational, spatial, and temporal scales (reviewed in Heller & Zavaleta 2009; Mawdsley et al. 2009; Groves et al. 2012; Bierbaum et al. 2013). The climate change adaptation process can be generalized into steps (Figure 1) where risks and vulnerabilities are identified, where potential actions are identified and implemented, and where these actions are continuously monitored, reviewed, and revised with a diverse group of engaged stakeholders (Glick *et al.* 2011; Bierbaum *et al.* 2013).

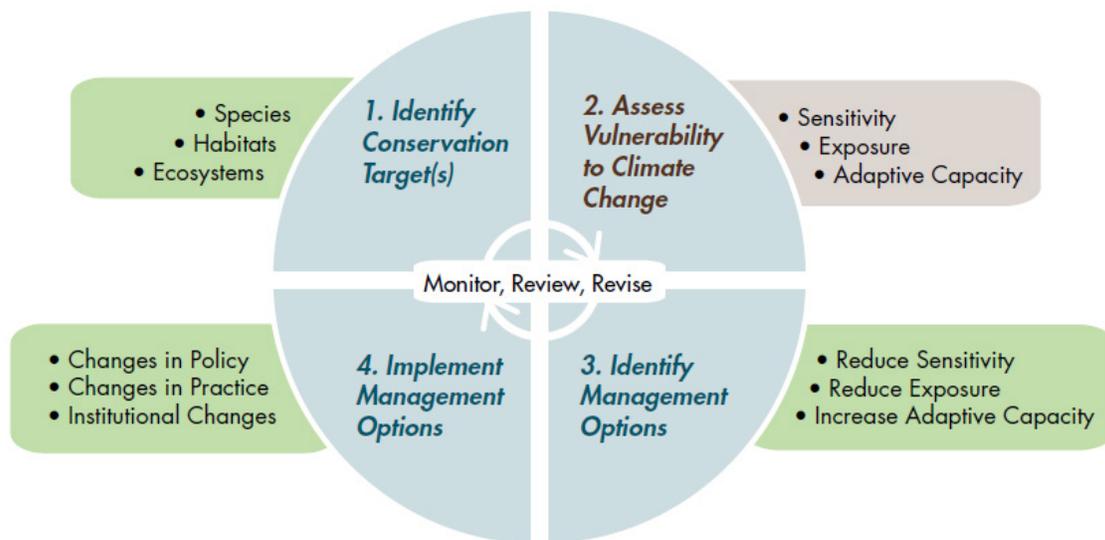


Figure 1. Framework for developing climate change adaptation strategies from Glick et al. (2011).

In the natural resources management sector, this involves identifying conservation goals and asking whether “business as usual” approaches are sufficient to maintain current species, habitats, and ecosystems, or whether new actions are needed to meet resistance and resilience goals. **To accommodate climate change, new paradigms will be necessary to achieve desired conservation goals and to coordinate natural resource planning within the regional socioeconomic context.** Our focus is to review historical (SECTION 1) and projected (SECTION 2) climate patterns in North Dakota and provide an initial assessment of vulnerability to climate change for species of conservation priority (SCP) and related actions that can be used to incorporate climate change adaptation into North Dakota conservation efforts (SECTION 3).

SECTION 1: North Dakota Climate

Historical patterns

Regional temperature and precipitation patterns (climate) are a major driver of the ecological and human processes that affect species distributions and habitat availability. North Dakota, at the geographic center of North America, has a continental climate, characterized by very cold winters, hot summers, and seasonally variable precipitation (Larson 1995; Jensen 1998; Euliss et al. 1999). The annual growing season is relatively short compared to the rest of the continental United States and is limited by fall and spring freezing conditions. Temperature and precipitation patterns also vary geographically (Figure 2), with regions in the southwest typically experiencing warmer winter temperatures (red lines in Figure 3) and drier summers than regions in the northeast (blue lines in Figures 3 and 4). Monthly average high temperatures (upper solid lines in Figure 3) begin to reliably exceed freezing as early as March and may remain above freezing into November. Monthly average low temperatures (lower set of solid lines in Figure 3) typically remain well-below freezing from October through April. This, along with variation in local geological (glacial) history, creates ecologically distinctive regions within the state (Bryce et al. 1998; Seabloom 2011).

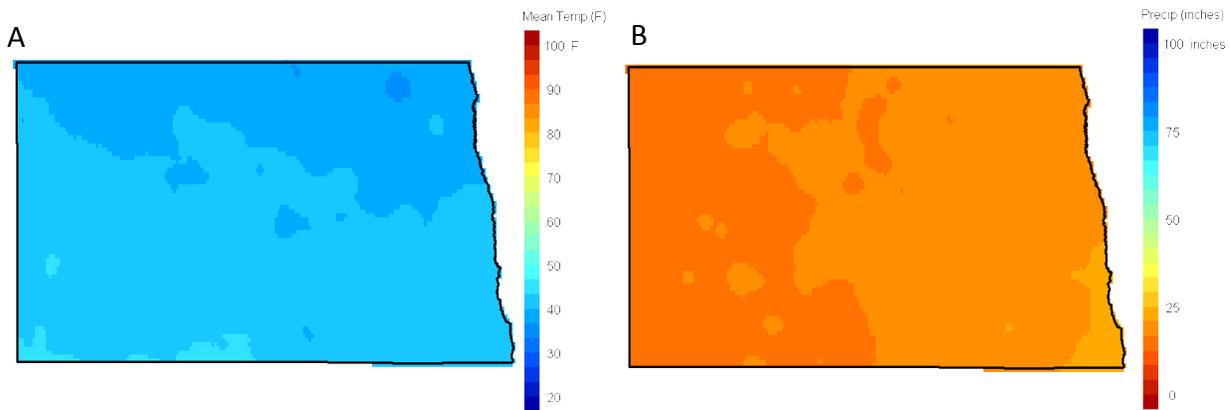


Figure 2. Average annual mean temperature (A) and precipitation (B) in North Dakota from 1951 to 2006. Map produced by ClimateWizard © University of Washington and The Nature Conservancy, 2009. Base climate data from the PRISM Group, Oregon State University, <http://www.prismclimate.org>.

Temperature (Figures 5 and 6) and precipitation (Figure 4) are also annually variable and fluctuate with annual, decadal, and even longer cycles (see Clark et al. 2002; Millett et al. 2009). Historical precipitation patterns (Figure 4) have included extended wet or dry periods, which, in turn, have produced periodic fluctuations in inundation or drought conditions (Figure 7) (Johnson et al. 2005). Climate fluctuations on any time scale affect resource and habitat availability and, consequently, species abundances and distributions. For example, the multi-decadal fluctuation in wetland numbers through the Prairie Pothole Region (encompassing North Dakota), which is driven by climatic fluctuations, closely corresponds with changes in the numbers of breeding waterfowl (Figure 8) (Larson 1995; Johnson et al. 2005; Niemuth et al. 2010). Additionally, Ciutu et al. (2014) recently reported that winter temperatures and decadal oscillations in the North Pacific Index (a measure of sea level air pressure linked to El Niño and La Niña events) affected mule deer fawn recruitment rates in North Dakota. In this case, knowledge of both annual conditions (i.e., recorded winter temperatures) and decadal fluctuations can be used to predict subsequent fall fawn recruitment and adjust yearly harvest allocations (Ciutu et al. 2014).

In addition to recurring droughts and floods, the region also experiences other extreme weather events that can affect biological systems and resources. This includes severe convective storms (frequently producing tornados), exceptional precipitation events, and extreme temperatures in both summer and winter (Melillo et al. 2014).

Recent climate trends

In relation to recent climate change, there is strong evidence that North Dakota’s climate is becoming warmer and somewhat wetter. Despite annual fluctuations, average temperatures (Figure 5), and average seasonal temperatures (Figure 6) have increased. Warming appears to be occurring similarly across the state (Figure 3), and has most notably occurred during the winter months (Figure 6). Likewise, precipitation has also increased over the past century (Figure 4). However, this has occurred with greater geographic disparity, as precipitation has increased more in the eastern portion of the state than in the western portion (Figure 4). These trends are consistent with those for the Prairie Pothole Region which has been experiencing increasing temperatures and an increasing, but eastward shift, in precipitation (Millett et al. 2009).

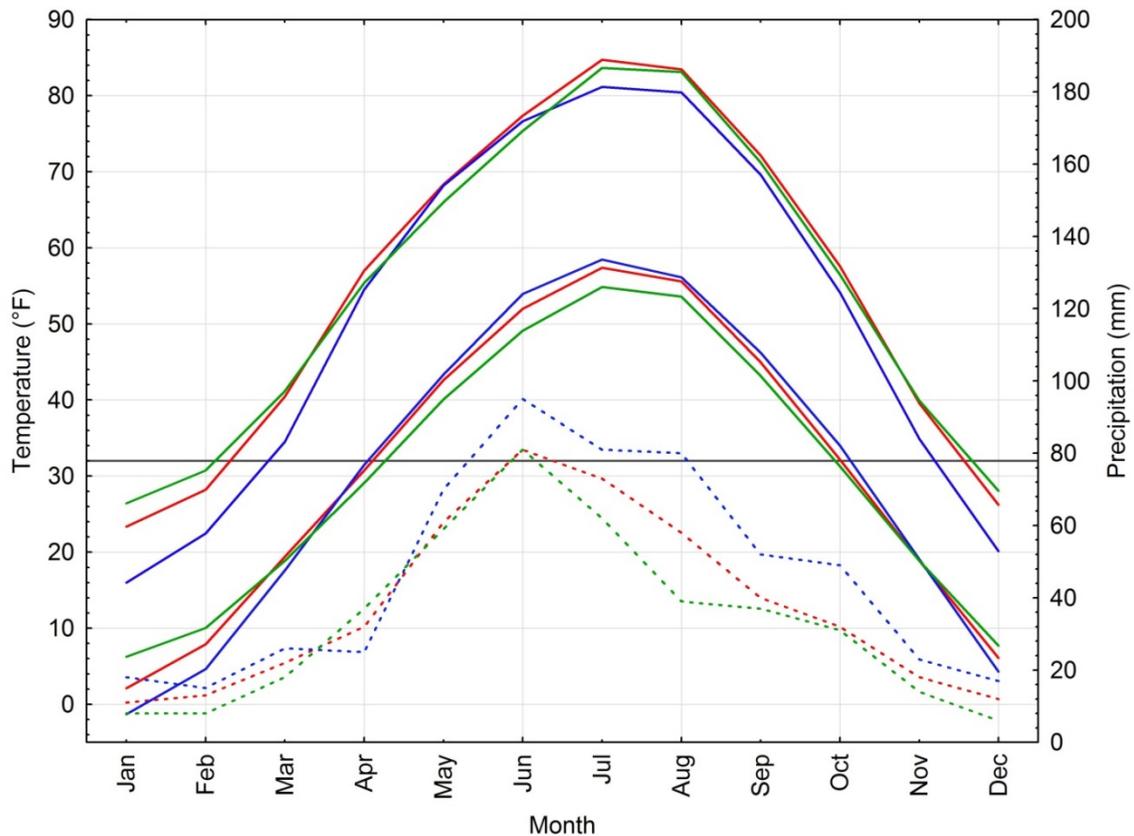


Figure 3. Average monthly temperature (upper solid lines = average monthly high; lower solid lines = average monthly low) and precipitation (dashed lines) for 3 locations (Green = Dickinson, southwest; Red = Bismarck, south central; Blue = Grand Forks, northeast) spanning the climatic range across North Dakota from 1981-2010. Gray horizontal line references temperature of 32°F. Data source: NOAA (<http://www.ncdc.noaa.gov/cag/time-series/us>).

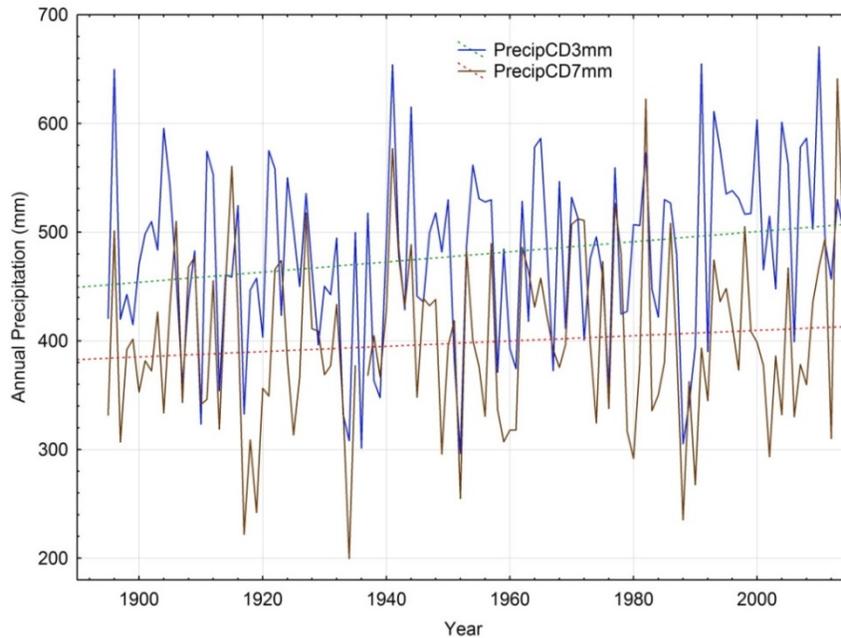


Figure 4. Total annual precipitation in the wetter northeastern region of ND (Climate Division 3; blue) and the drier southwestern region of ND (Climate Division 7; brown). Trend lines (dashed) are significant ($p < 0.05$). Data source: NOAA (<http://www.ncdc.noaa.gov/cag/time-series/us>).

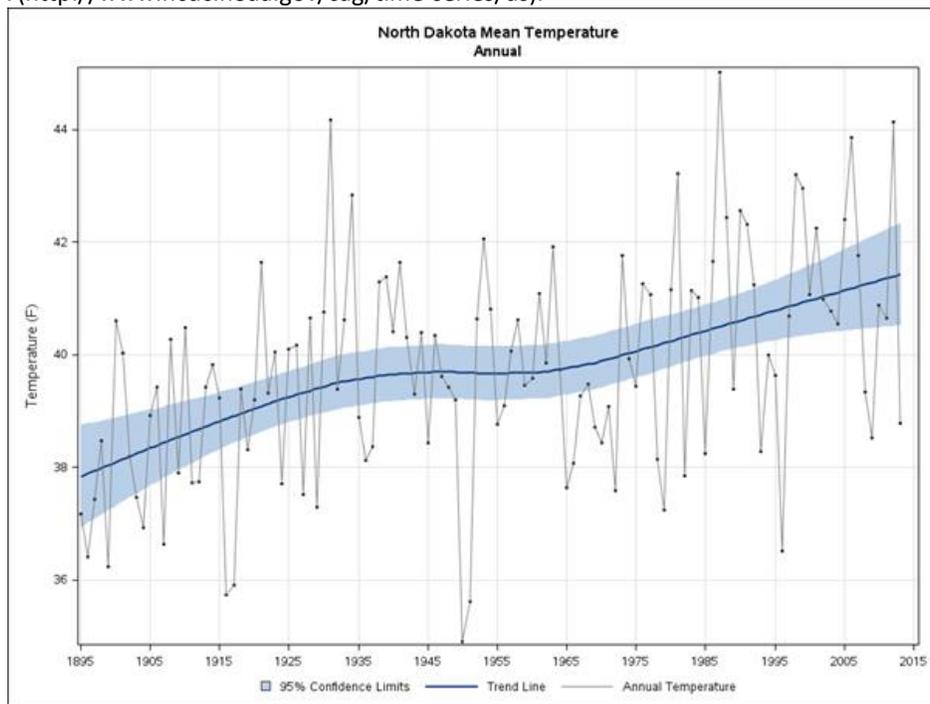


Figure 5. Total annual precipitation in the wetter northeastern region of ND (Climate Division 3; blue) and the drier southwestern region of ND (Climate Division 7; brown). Precipitation in the northeast appears to have increased, on average, over the last century, as indicated by a significant trend ($p < 0.05$, dashed line), despite extremely high annual variability ($R^2 < 5\%$). The trend in the southwestern division was not statistically significant. Data and fitted curve source: NOAA (<http://www.ncdc.noaa.gov/temp-and-precip/state-temps/>).

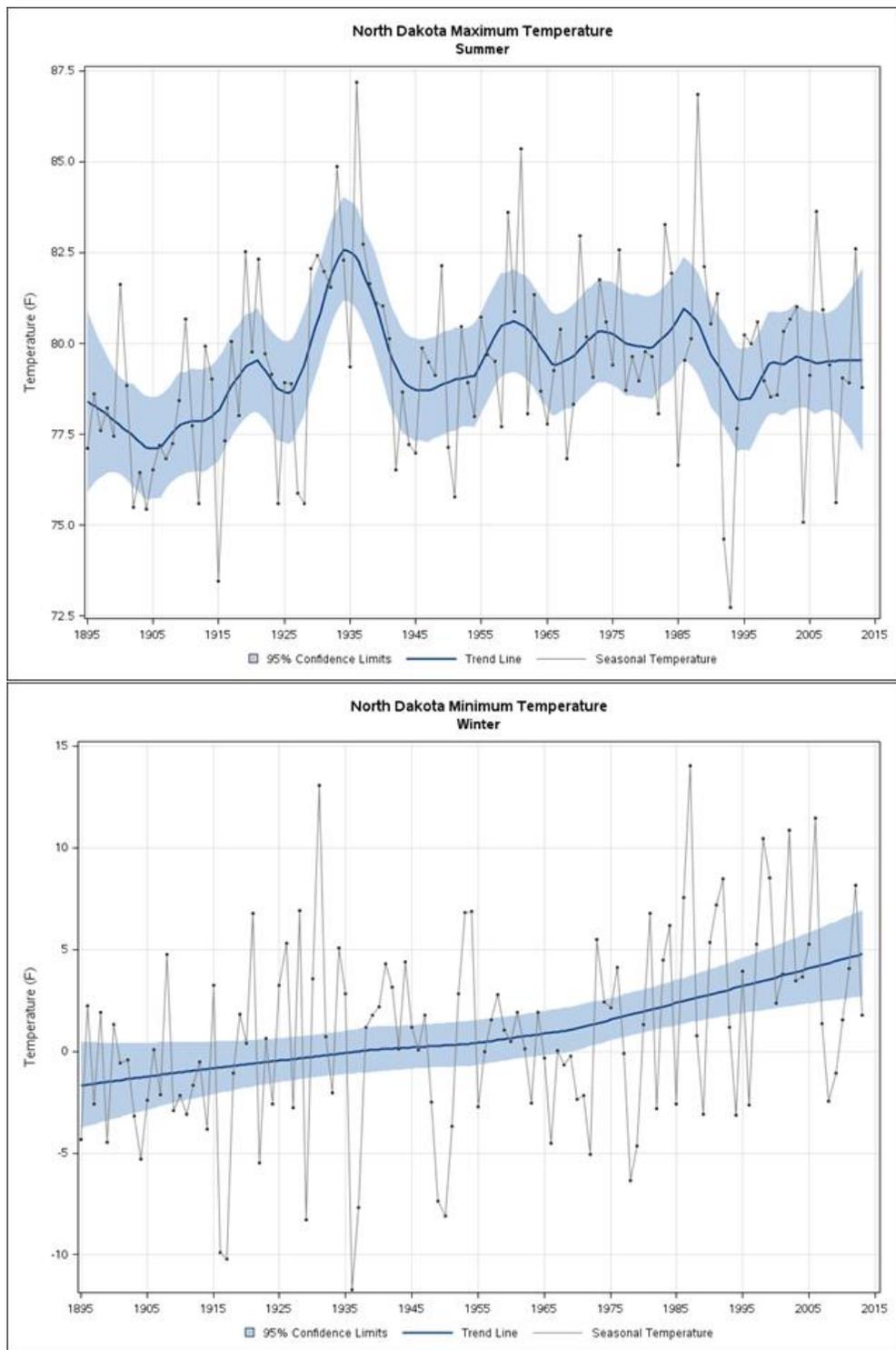


Figure 6. Average annual statewide maximum summer (upper panel) and minimum winter (lower panel) temperature in North Dakota. Temperature values (gray line) were smoothed (using Local Regression smoothing) to show overall climate trends (blue) and associated 95% confidence limits (blue shading). Data and fitted curve source: NOAA (<http://www.ncdc.noaa.gov/temp-and-precip/state-temps/>).

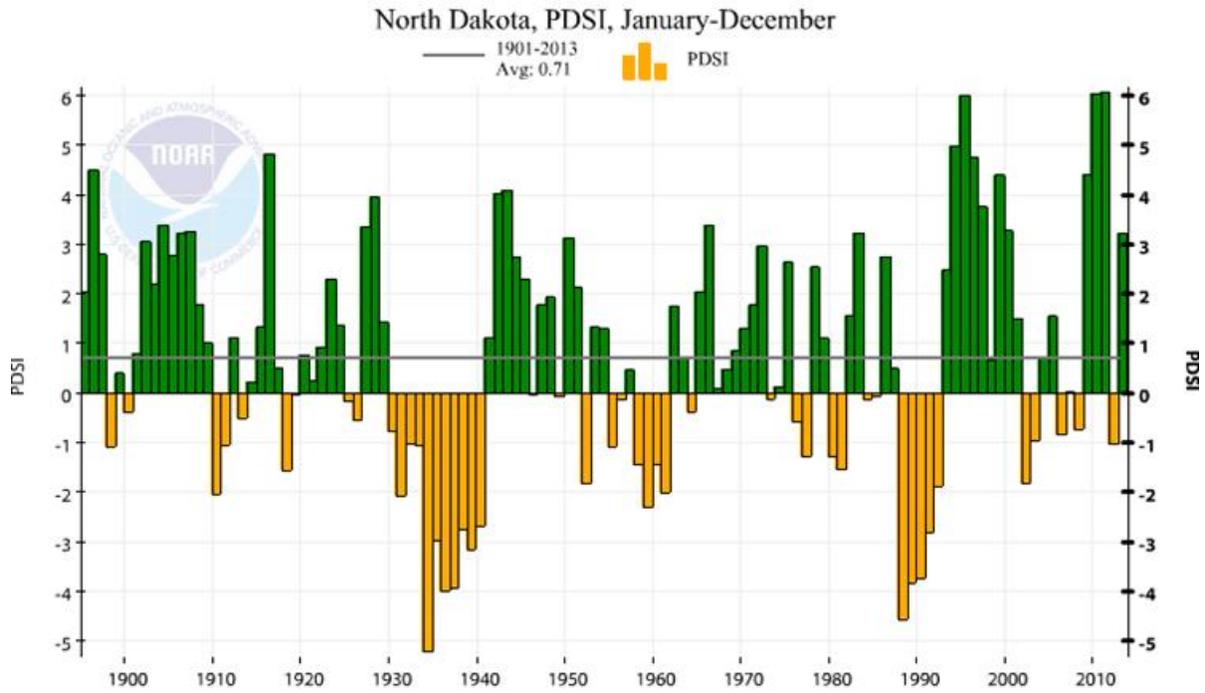


Figure 7. Statewide average Palmer Drought Severity Index (PDSI). The PDSI is a standardized metric that incorporates recent precipitation and temperature history to quantify the relative severity of wet and dry periods in a region. Data source: NOAA (<http://www.ncdc.noaa.gov/cag/time-series/us>).

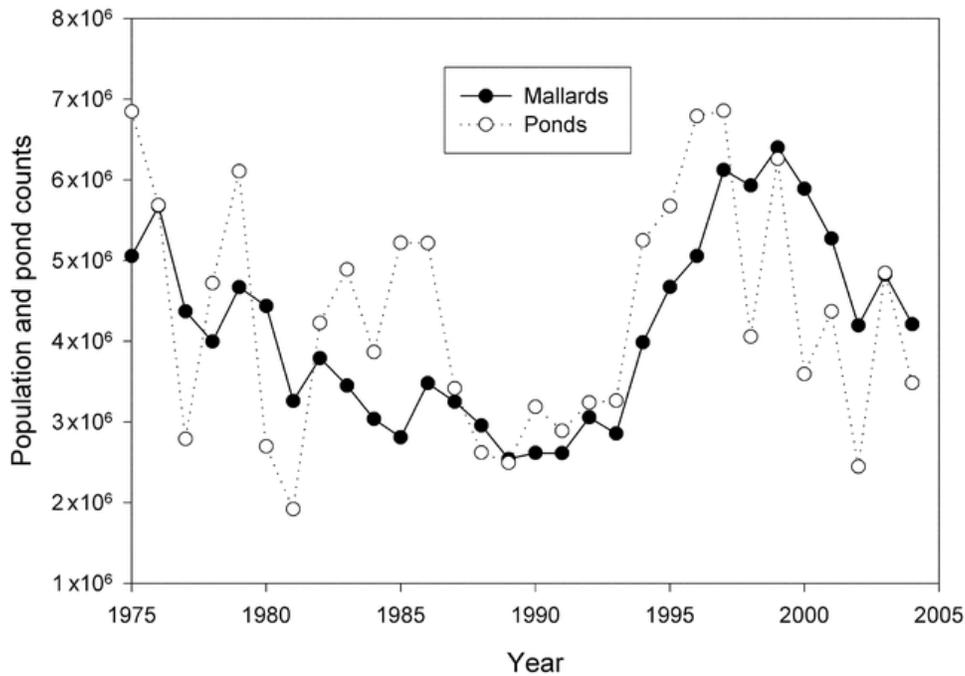


Figure 8. Number of mallard ducks and May ponds ($1 \times 10^6 = 1$ million) for the North American Prairie Pothole Region, 1975-2004. Figure created by and taken from Johnson et al. (2005).

SECTION 2: Climate Change in the Northern Plains

Global emissions scenarios

The extent to which the climate will change into the future depends on the quantity of greenhouse gases that are emitted (on a global scale) into the atmosphere and subsequent impacts on ocean temperatures. Our current and future emissions depend on global energy use, land-use, population growth, technological adaptations, and the steps that are taken to manage these emissions (among other factors as described in Newman et al. 2011). Given the complexities involved in managing emissions, we cannot accurately predict what emissions levels will be in the future. However, we can consider what effect different, plausible, emissions outcomes would have on our climate. Several possible emissions scenarios have been laid out by the Intergovernmental Panel on Climate Change (IPCC), the international body tasked with assessing global climate change impacts. IPCC global emissions scenarios are generated based on alternative global population, energy use, land-use, technological development, and socio-political outcomes and choices over the next century. These scenarios result in different emissions levels, and emissions under the highest and lowest emissions scenarios are typically considered in climate modeling efforts. Climate projections in the IPCC third and fourth reports were based on the low-emission “B1” scenario (with slowing increases now and substantial reductions in 2050) and the high-emission “A2” scenario (continued increase in emissions). Emission scenarios were revisited for the fifth IPCC climate assessment report (Pachauri et al. 2014), and climate projections will be based on the newly defined Representative Concentration Pathways (RCP’s). In this system, the low-emission RCP 2.6 assumes that emissions will peak and subsequently decline in the next decade, and the high-emission RCP 8.5 describes a scenario where emissions continue to increase through the next century. Within this report we will consider climate projections based on both the B1/A2 and RCP 2.6/RCP 8.5 scenarios, as both were considered in the recent National Climate Assessment report (Melillo et al. 2014), which provides the basis for our summary of potential climate changes in the Northern Plains.

Global climate modeling

To characterize future climate conditions, alternative greenhouse gas emissions scenarios are used within General Circulation Models (GCMs) that incorporate multiple variables through layers of the atmosphere and the ocean that affect the climate (for more details see summarizations in Newman et al. 2011). There are over 25 models that have been developed at climate modeling centers located throughout the world. Models vary in their inputs and predictions, and as a result their outcomes can vary. In forming recommendations on how the climate might change into the future, the strategy has been to look at these holistically and assess overall or consistent trends in their output. These so-called “ensemble models” average (e.g., CMIP3, Coupled Model Intercomparison Project phase 3 and the CMIP5, Coupled Model Intercomparison Project phase 5) the differences among the individual GCMs and tend to predict climate outcomes better than any single model.

Outputs from these models center on summarizing temperature and precipitation patterns, which we can then use to describe potential direct and indirect ecological effects of these predicted climate changes. Additional potential effects of climate change on phenomena such as flood magnitude, severe convective storms (thunderstorms, tornados), winter storms, and snow cover cannot be predicted directly from current models, and climate scientists rely on historical patterns of these events in relation to climatological conditions for projecting how these might change in the future.

Additionally, it is important to note that these global models are developed for simulating global climate patterns and, as a result, they have a very coarse resolution. Their predictions serve large geographic regions (100 x 200 mile areas), which can be challenging when attempting to incorporate climate model results with more regional planning efforts. This is solved through what is termed “downscaling” (e.g., where the same principles in the larger models are applied in a more restricted geographic area; a downscaled CMIP3 model exists) or through regionally specific models (e.g., North American Regional Climate Change Assessment Program – NARCCAP) with a resolution on the order of 10 to 30 miles.

Regardless of the type of model considered, climate scientists are unable to assign probabilities to any predicted climate outcomes due to inherent limits in the modelling process. As such, model outcomes are best interpreted as describing plausible future scenarios for planning purposes.

To address potential climate change effects on North Dakota’s ecological resources, we summarize the output of these larger models for the geographic area defined by North Dakota. Any changes associated with North Dakota need to be considered in the context of the predicted regional climate changes and associated uncertainties in the relevant climate models (outlined in Melillo et al. 2014).

Climate change predictions

We summarize the climate predictions for North Dakota (Figure 9) outlined in the 2013 NOAA Climate of the U.S. Great Plains Report (Kunkel et al. 2013) and the 2014 National Climate Assessment Report (Melillo et al. 2014) below and in Table 1. The 2013 NOAA report (Kunkel et al. 2013) was prepared based on three model data sets: CMIP3, a Downscaled CMIP3 (Daily_CMIP3), and the North American Regional Climate Change Assessment Program (NARCCAP). This report evaluated the A2 and B1 scenarios for the Great Plains (Montana, North Dakota, South Dakota, Wyoming, Nebraska, Kansas, Oklahoma, and Texas) over a series of three periods through the next century (using 2035 [2021-2050], 2055 [2041-2070], 2085[2070-2099] midpoints). This report was then used as the basis for the regional assessments in the 2014 National Climate Assessment report (Melillo et al. 2014), with the addition of outcomes from CMIP5 under RCP 2.6 and RCP 8.5. Model details are provided in the sources for both reports.

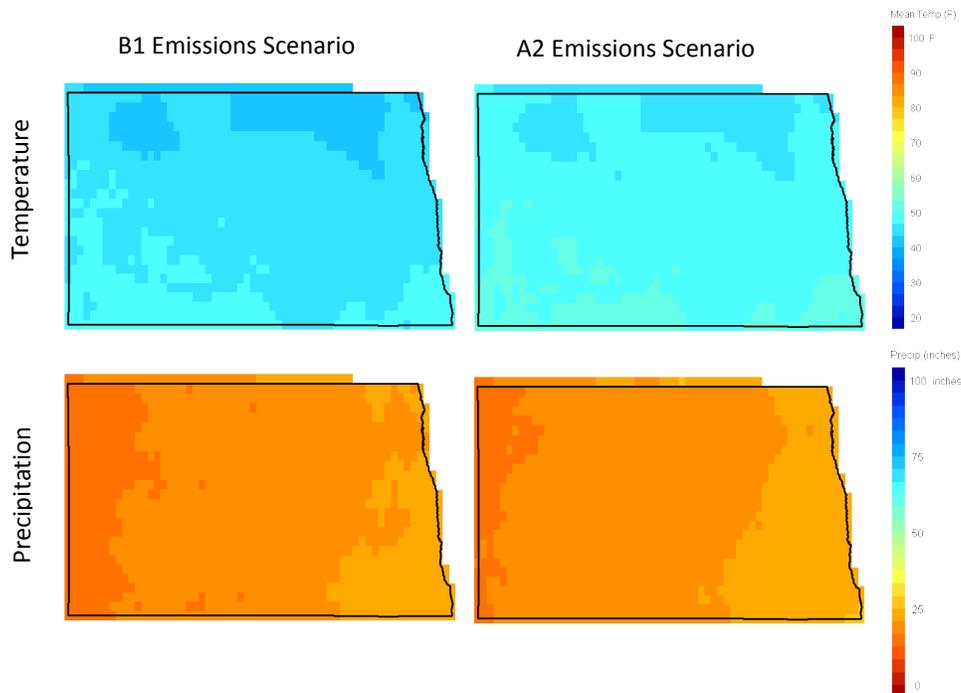


Figure 9. Predicted average annual temperature and precipitation under the B1 (low) and A2 (high) emissions scenarios for 2070-2099. Note the scales are comparable to Figure 2 and that models predict warming and increases in precipitation from past conditions. Map produced by ClimateWizard ©University of Washington and The Nature Conservancy, 2009. Base climate projections downscaled by Maurer et al. (2007). We acknowledge the modeling groups, the Program for Climate Model Diagnosis and Intercomparison (PCMDI) and the WCRP's Working Group on Coupled Modeling (WGCM) for making available the WCRP CMIP3 multi-model dataset. Support of this dataset is provided by the Office of Science, U.S. Department of Energy.

Primary aspects of regional Climate predictions

1. **Average temperature:** Climate models collectively predict increases in average annual temperatures for North Dakota. By late century, this could range from 3-4 ° F to 10-15 ° F across the state, depending on the emissions scenario (Figure 9, Table 1). This warming trend is predicted to be stronger in the Dakotas than elsewhere in the Great Plains.
2. **Seasonal temperatures:** While some warming is predicted to occur in all seasons, mid-century winter (Dec-Feb) temperatures are predicted to increase the most and spring (Mar-May) temperatures the least (Table 1).
3. **Extreme temperatures:** Climate change is simulated to have a geographically variable effect on summer temperature extremes in North Dakota. By mid-century, the number of days >95 ° F and the temperatures on the hottest days are simulated to increase more strongly in the southern than in the northern portions of the state (Table 1).

In the winter, models simulate a decrease in the number of < 10 ° F days and the coldest days are simulated to be warmer (Table 1). This warming is predicted to correspond with an increase in the length of the frost-free season (days between the last spring frost and first fall frost; Table 1, Figure 10).

4. **Average precipitation:** Predicted effects of climate change on precipitation in North Dakota are more variable (no effect to a notable increase depending on the emissions scenario) under alternative models (Table 1). Under scenarios where average precipitation is predicted to increase, increases occur more rapidly in the eastern than in the western parts of the state.
5. **Seasonal precipitation:** Under high emission scenarios, precipitation is predicted to increase by the end of the century in winter and spring (Table 1). The models do not simulate significant, consistent changes in summer or fall precipitation under either emissions scenario.
6. **Extreme Precipitation:** Climate models simulate a localized increase in the number heavy precipitation events in the central, northeast, and far western parts of the state, and a decrease in the number of consecutive dry days (<0.1 in precipitation) in the Red River Valley and the northern and western parts of the state by mid-century (Table 1).



Figure 10. Changes to cold days could decrease the length of ice cover on water sources. Photo credit: Amanda Saul 2014, North Golden Lake, Steele County.

Table 1. Summary of climate projections for North Dakota as outlined in Kunkel et al. (2013) and Melillo et al. (2014). Ranges within columns indicate the variation in the predicted response across North Dakota. Unless otherwise noted († = late-century), values are for mid-century. Dashes indicate where values were not reported for a particular variable or scenario.

Variable	B1^A	A2^A	RCP 2.6^B	RCP 8.5^B
Temperature				
Average	+ 4.5 to 5.5 °F†	+ 7.5 to 9.5 °F†	+ 3 to 4 °F	+ 10 to 15 °F
<i>Seasonal Temperatures</i>				
Winter	--	+ 4.5 to 6.5 °F	--	--
Spring	--	+ 3 to 4 °F	--	--
Summer	--	+ 4 to 5 °F	--	--
Fall	--	+ 4.5 to 5.5 °F	--	--
<i>Extreme Temperatures</i>				
Days > 95 °F	--	+ 5 to 15	--	--
Temperatures on the hottest days	--	--	+ 3 to 4 °F	+ 10 to 15 °F
Days < 10 °F	--	- 20 to 25 days	--	--
Temperatures on the coldest days	--	--	+ 5 to 9 °F	+ 15 °F
Days < 32 °F	--	- 15 to 20 days	--	--
Frost-free Season	+ 20 to 30 days	+ 30 to 40 days	--	--
Precipitation				
Average	+ 3 to 6 %†	+ 6 to 9%†	+ 0 to 10%	+ 10 to 20%
<i>Seasonal Precipitation</i>				
Winter	--	+ 10 to 20%†	+ 0 to 10%†	+ 20 to 30%†
Spring	--	+ 20 to 30%†	+ 0 to 10%†	+ 20 to 30%†
Summer	--	No difference†	No difference†	- 10 to 0%†
Fall	--	+ 10 to 20%†	No difference†	+ 0 to 10%†
<i>Extreme Precipitation</i>				
Heavy downpours	--	+ 30 to 45%	1 to 2 times greater†	3 to 4 times greater†
Number of consecutive dry days	--	- 3 to 0 days	- 10 to 0%†	+ 0 to 10%†

^A Kunkel et al. (2013); ^B Melillo et al. (2014)

Ecological Impacts

Past and ongoing climate change in North Dakota has affected, and will continue to affect, ecological patterns and processes that are critical for maintaining North Dakota's fish and wildlife resources (George et al. 1992; Larson 1995; Strode 2003; Johnson et al. 2005; Johnson et al. 2010; Dunnell & Travers 2011; Forcey et al. 2011; Ciutu et al. 2014). Recent climate change has been associated with advances in the onset of spring (Fargo, ND; defined by 300 accumulated heating degree days; 5°C base)(Strode 2003), changes in the time of first flowering (Figure 11) for several native plant species (Dunnell & Travers 2011), and earlier arrivals of *Dendroica coronata* (yellow-rumped warbler) in Fargo, ND (but not for a suite of seven other wood warblers) (Strode 2003). Additionally, precipitation and temperature variation has affected the number of wet basins (Larson 1995) and waterbird (including *Anas platyrhynchos* - Mallard, *Anas discors* - Blue-winged teal, *Oxyura jamaicensis* - Ruddy duck and *Podilymbus podiceps* - Pied billed grebe) abundances in the region (Johnson et al. 2005; Forcey et al. 2011). These and other changes occur across ecological scales, and it is important to consider this scaling within climate change adaptation planning (Glick et al. 2011; Newman et al. 2011).



Figure 11. Climate change can affect the timing of plant flowering. Pasque flower (*Pulsatilla patens*) is one of the first prairie species to flower in the spring. Photo credit: Amanda Saul 2014; Sully's Hill National Game Preserve, Benson County

In general, changing atmospheric CO₂ concentrations, temperature, and precipitation affects temporal patterns of water and abiotic resource availability. As a result, individuals may experience greater or altered temperature or moisture stress, and can respond to changing resource conditions with changes in their physiology, movement, and timing of activities (reviewed in Glick et al. 2011). For plants, this may mean flowering earlier or later in the season, and for animals this may mean changing diurnal behaviors or dispersal and movement patterns. Collectively, species vulnerability to climate change is largely determined by their life history and habitat needs and their subsequent sensitivity and exposure to potential climate changes (Glick et al. 2011). For example, species with specialized habitat requirements, with narrow environmental tolerances that are exceeded in future scenarios, that depend on specific triggers, that depend on interactions between species, or have poor ability to disperse are more likely to be affected by climate change. Assessment of this vulnerability is critical for identifying relevant actions during the climate change adaptation planning process (Glick et al. 2011; Rowland et al. 2011; Bierbaum et al. 2013).

Individuals vary genetically and interact in populations with adaptive potential to climate change. Differential survival and reproduction of individuals who vary in their ability to withstand climate change allows populations either to adapt *in situ* or to adapt through movement into new climatically suitable geographic locations (Heller & Zavaleta 2009), though such movements maybe complicated by concurrent anthropogenic landscape changes (e.g., habitat loss, fragmentation, or other alternations that disrupt connectivity across a landscape). Many modeling approaches have been developed to identify geographic locations that could have climatic conditions that most similarly match those associated with current species ranges (reviewed in Gillson et al. 2013). On a taxonomic level, this has been most thoroughly done for birds in the region (Johnson et al. 2010; Forcey et al. 2011; Ando & Mallory 2012; Langham et al. 2014). Although these models are beneficial for understanding potential

range shifts, observed distributional shifts may not be consistent with predictions (Gillson *et al.* 2013). For example, the tick *Ixodes scapularis*, a vector for Lyme disease, is expanding westward into North Dakota (Russart *et al.* 2014) beyond the range predicted through previous modeling efforts (Brownstein *et al.* 2005). This example is certainly not an exception, and several species have experienced recent distribution changes that are not consistent with predictions under changing climate conditions (Gillson *et al.* 2013). This is arguably because so little is understood about individual phenotypic plasticity, population evolutionary potential, and the flexibility of species-habitat relationships, and because these are difficult to incorporate into modeling efforts (Gillson *et al.* 2013). While future efforts need to model potential species ranges and investigate their genetic and phenotypic plasticity, steps can be taken to maximize the adaptive potential of populations in the absence of this information.

Ecological communities are composed of populations of species whose interactions could be disrupted by climate change. **This is arguably the most concerning and uncertain aspect of potential climate change as altered or even new interactions may affect ecosystem functions and services that human systems depend on.** Ecological communities can be affected by climate change if their interacting species are differentially sensitive to changing environmental conditions (e.g., flowering phenology driven by accumulated degree days versus photoperiod). This could result in a decoupling or disruption of species interactions (e.g. C3 versus C4 composition of a grassland community) or a shift to formation of new species interactions. A prime example is seen in food availability for migrating birds in the region. At least for wood warblers, the onset of later spring conditions to the south appears to be limiting northward migration into regions that are experiencing earlier spring onset (Strode 2003). As a result, while the birds are arriving at generally the same time each year, they are entering into ecosystems that have further progressed through the growing season (Strode 2003; Dunnell & Travers 2011). This could result in changes to their herbivore prey base, which could further affect populations already at-risk due to anthropogenic landscape changes (Strode 2003). These communities could also be affected by climate change if their nutrient and resource flows and fluxes are affected by climate change (e.g. water availability and input/export) (Milly *et al.* 2005).

Changing climatic conditions could result in the decoupling of established species associations and the formation of new ones, and a suite of adaptive conservation strategies have emerged to maintain ecosystem functionality in light of changing species relationships (Heller & Zavaleta 2009). Proposed actions range from protecting extant populations to translocating species outside of their current ranges (see Galatowitsch *et al.* 2009 for regional recommendations). These approaches ask managers to transition from potentially exclusive paradigms of managing for historic landscape types toward paradigms of facilitating formation of novel species assemblages. As with any conservation decision, moving forward with such approaches necessitates a close evaluation of the conservation goals and potential risks and uncertainties associated with anticipated outcomes.

Ecological impacts in a human system

Clearly, natural resource conservation occurs in the context of human systems and in human dominated landscapes (Heller & Zavaleta 2009), and no conservation plan can occur independent of this. Climate change will alter how humans use the landscape and natural resources. For example, climate change is likely to affect seasonality and acreage in crop production in northern latitudes (Parry *et al.* 1999; Olesen & Bindi 2002; Parry *et al.* 2004), and could result in additional declines in privately owned wetlands and grasslands (Wright & Wimberly 2013). Such habitat loss driven by agricultural responses to climate change could further affect organisms, and it may become difficult to separate direct effects of climatic

shifts on organisms from indirect effects of climate change on human land use and land cover (for example see Conly & van der Kamp 2001). At best, conservation practices need to maximize suitability of the landscape surrounding habitat patches and evaluate broadly how landscape use intersects with conservation goals (as in Quinn et al. 2014).

It is also imperative that regional stakeholders are sought to participate in the climate adaptation decision making process and that actions to address climate impacts are made within the context of stakeholder concerns (Heller & Zavaleta 2009; Bierbaum et al. 2013). A few notable studies have considered regional stakeholder concerns regarding climate change. For example, concerns over climate variability, the adaptability of human and ecological systems to climate impacts, and climate effects on water and soil resources were predominant among stakeholders within the central great plains (Ojima et al. 2002). However, only half of the respondents to a recent survey of government officials across the great plains were concerned or very concerned about climate change, and only 20% of the jurisdictions had developed climate change action plans (Romsdahl et al. 2013). Involving stakeholders and bridging information gaps will be a necessary component of SCP and habitat climate adaptation efforts.

Ecology of climate change in North Dakota

Winter warming and increased winter precipitation under future climate scenarios may affect North Dakota's ecosystems in a variety of ways, but much still needs to be understood about potential effects of winter warming in temperate ecosystems (Kreyling 2010). Clearly, winter warming could affect overwintering species and the arrival and emergence of species during spring and early summer (reviewed in Cooper 2014; Williams et al. 2014). Recent studies have shown that winter warming may affect grassland plant species composition (Schuerings *et al.* 2014) and biomass production (Henry et al. 2015), the dynamics of a regionally abundant non-native species (*Poa pratensis* - Kentucky bluegrass) (Malyshev & Henry 2012), invertebrate life-cycles (Stuhldreher et al. 2014), and the interactions among herbivores and their browse species (Christenson et al. 2014).

In a region prone to flooding, increased snow fall, rapid spring warming, and intense rainfall could lead to increased soil moisture reserves and flooding which would affect the volume, longevity, and quality of water resources (Murdoch et al. 2000; Barnett et al. 2005). Coupled with declines in regional wetlands and increasing use of tile drainage in agricultural areas, this could dramatically affect the availability of wetlands and water resources for state SCP under future climate conditions (Johnson et al. 2005; Johnson et al. 2010; Ando & Mallory 2012). In particular, Johnson et al. (2005) and Johnson et al. (2010) have noted potential drying and a decline in productive wetland habitat through the western portions of the Prairie Pothole Region in North Dakota. Continued and additional monitoring of water resources will be vital for understanding and responding to long-term temporal changes in these resources.

Part of the climate adaptation process involves understanding temporal patterns in biological resources and ecosystem functions and services through sustained monitoring. Several national and regional monitoring efforts have and will continue to be helpful in understanding how species and ecosystems respond to climate change in North Dakota (Reviewed in the SWAP section 6.3). Most notably, the Region 9 NEON (National Ecological Observatory Network) site has recently been established in Woodworth, ND. Through a series of terrestrial and aquatic sites, long-term data will be collected on atmospheric, soil, aquatic, and biological resources. These data will be publicly available and invaluable for assessing climate change, land use changes, and invasive species in North Dakota.

Summary

North Dakota has already seen the fastest warming trends in the lower 48 states, and climate change will continue to affect ecological and human systems in North Dakota (Figure 12). Model predictions will help us get a sense of what the climate could look like in North Dakota under possible emissions scenarios. After reviewing predictions and potential effects, the 2014 NCA summarized several key messages associated with projected climate change in the Great Plains that are of key consideration in North Dakota:

1. Rising temperatures are leading to increased demand for water and energy.
2. Changes to the growing seasons due to warming winters and alterations in the timing and magnitude of rainfall events have been observed, and they will require new land management practices in the future.
3. Landscape fragmentation is increasing and this could hinder adaptation of species when climate change alters habitat composition and timing of plant development cycles.
4. Communities (ecological and social) already vulnerable to weather and climate extremes will be stressed further by more frequent extreme events within an already highly variable climate system.
5. The magnitude of expected climate-associated changes will exceed those in the past century.

While we are aware of these impacts, we need to take steps to: a) monitor these effects, b) understand species and system vulnerability to these effects, and c) address ecological resistance and resilience to these changes. In many cases there is high uncertainty regarding the interconnected pathways by which climate change can affect ecological systems, but efforts can be made to address ecological resistance and resilience in the face of these uncertainties. Management efforts have already been underway (although not necessarily explicitly) to respond to these ongoing changes, and we need to further identify how actions can be tailored to future climate scenarios.



Figure 12. Variation in the North Dakota Landscape. The North Dakota landscape includes dryland (left; Theodore Roosevelt National Park, McKenzie County) and wetland (right; Crosby Wetland Management District, Divide County) areas that are used and managed in different ways. Photo Credit: Amanda Saul 2014.

SECTION 3: Climate Change Adaptation in North Dakota

Developing climate adaptation strategies involves assessing species, habitat, and ecosystem vulnerabilities to climate change and identifying actions that could reduce these vulnerabilities (Figure 1) (Glick et al. 2011; Rowland et al. 2011; Bierbaum et al. 2013). Vulnerability assessments center around understanding species sensitivity, potential exposure, and adaptive capacity to climate change (Glick et al. 2011). Several rapid assessment methods have been developed to determine where the greatest vulnerabilities occur within suites of taxonomically diverse species distributed over broad geographic scales (Glick et al. 2011; Young et al. 2011; Lindsay et al. 2013; Sherwin et al. 2013).

North Dakota has not previously undertaken a climate change vulnerability assessment for the state SCP and this effort represents the first step in the process of understanding SCP climate change vulnerabilities and connecting these with relevant conservation priorities. Future assessments need to: 1. Evaluate SCP vulnerabilities within the predicted climate environment for North Dakota, 2. Consider how additional species will be reviewed and added to this plan, and 3. Review proposed climate change adaptation actions to determine their relevance within the context of predicted climate change in North Dakota.

SCP Vulnerability Assessment

Several procedures have been used to characterize species climate change vulnerability based on their life history, current climatic niche, and the projected climate within a geographic location. Of these methods, the procedure that generates the Climate Change Vulnerability Index (CCVI) developed by NatureServe (Young et al. 2011) has been widely employed within multi-taxa planning efforts (e.g., Zack et al. 2010; Walk et al. 2011; Hoving et al. 2013). The CCVI is generated based on a scoring system that incorporates a species predicted exposure to climate change with known information about the species biology and potential climate change sensitivity (Young et al. 2011). Species are scored with a categorical scheme ranging from Not Vulnerable to Extremely Vulnerable, and these scores can serve as the basis for future conservation action planning. As with any rapid assessment procedure, the CCVI assessment is sensitive to the quality of our broader understanding of a species and does not replace the need for detailed monitoring and predictive modeling in the context of changing human landscapes in the location of interest (Young et al. 2011; Small-Lorenz et al. 2013; Lankford et al. 2014).

Nearly two-thirds of the North Dakota SCP have been previously evaluated for their CCVI for some portion of their North American range. While these species were not scored with regard to their predicted climate change exposure in North Dakota (see exceptions noted in-text; Appendix I), CCVI scores based on climate data from other parts of the country can be a good indicator of species and species groups that should be prioritized within a North Dakota specific assessment. This is based on the fact that North Dakota has already shown the most notable signal of climate change and is expected to continue to have some of the strongest climate change in the lower 48 states and, as such, species that are predicted to be vulnerable in other areas of the country should be just as vulnerable, if not more so, in North Dakota.

Due to their large-scale distributions and their seasonality, migratory birds have been most closely evaluated for their vulnerability to climate change (Figure 13, Table 2). Of the bird species that have been considered, *Charadrius melodus* (Piping plover) is the only species that has been ranked as Highly Vulnerable to climate change in some portion of its range. A preliminary reanalysis of this species for North Dakota suggests that this ranking may be reduced to Moderately Vulnerable (Appendix I). The

remaining species have been ranked as Moderately to Not Vulnerable, but they may be indirectly affected by climate-induced human landscape-use changes (Zack *et al.* 2010). Additionally, although many species are Potentially Stable under climate change (Table 2), these species may experience substantial shifts in their climatically suitable ranges under future climate scenarios (Table 3). Two-thirds of the SCP birds (32 of 47) were included in the recent National Audubon Society's Birds and Climate Change Report that used more detailed bioclimatic envelope modeling to predict climatically suitable summer and wintering ranges for North American birds (Schuetz *et al.* 2013; Langham *et al.* 2014). While a few species were predicted to experience suitable future climate conditions in North Dakota (e.g., *Ammodramus savannarum* - Grasshopper Sparrow), the climatic suitability zones associated with a bulk of the species are predicted to exist outside of North Dakota by 2080 (Schuetz *et al.* 2013; Langham *et al.* 2014). Given these predictions, efforts to understand the distributions and in situ adaptation capacity of avian SCP will be essential.

As with birds, a majority of the mammals (Table 4) and all of the reptiles (Table 5) that have been evaluated were previously ranked as Not Vulnerable. The notable exception is *Lemmiscus curtatus* (sagebrush vole) where it was ranked as Highly Vulnerable in Nevada. A preliminary reanalysis of this species for the mid-century climate projections in North Dakota indicates that it is likely Moderately Vulnerable in this portion of its range (Appendix I).

Climate change vulnerability within the remaining taxonomic groups are much less understood (Tables 6-7). None of the North Dakota amphibian SCP have been included in published CCVI assessments, and *Oarisma poweshiek* (Poweshiek Skipperling) is the only insect that has been evaluated (Extremely Vulnerable in Michigan). Only six of the fish and four of the mussels have been previously evaluated, and all were either Moderately to Extremely vulnerable due to their sensitivity to changing water cycles (Walk *et al.* 2011; Hoving *et al.* 2013). Preliminary evaluations of *Notropis anogenus* (Pugnose shiner; Moderately Vulnerable) and *Ligumia recta* (Black Sandshell; Extremely Vulnerable) in North Dakota indicate that both would maintain their CCVI scores in the region (Appendix I). Given the large proportion of fish and mussels that have been scored as Highly or Extremely Vulnerable to climate change effects in other portions of their ranges, these taxa should be given priority within future climate planning efforts in North Dakota.



Figure 13. North Dakota Bird SCP. Climate change may result in shifts of the ranges of Wilson's Phalarope (*Phalaropus tricolor*; left) and American Bittern (*Botaurus lentiginosus*; right) out of North Dakota in the future. Photo credit: Tanner Stechmann 2014, LaMoure County.

Table 2. North Dakota bird SCP that have been evaluated with respect to their climate change vulnerability within their North American range. The Climate Change Vulnerability Index (CCVI) indicates the degree to which the species are vulnerable (EV: Extremely Vulnerable; HV: Highly Vulnerable; MV: Moderately Vulnerable; NV-PS: Not Vulnerable-Potentially Stable; NV-IL: Not Vulnerable-Increase Likely) to climate change based on their potential sensitivity and exposure to regional climate change. CCVI scores are as listed in the online NatureServe CCVI database (<https://connect.natureserve.org/climate-change/species-search>) and in vulnerability assessment reports for the state of Michigan (Hoving et al. 2013), the state of Illinois (Walk *et al.* 2011), and the Great Plains (Zack et al. 2010).

Scientific name†	Common name	CCVI	Location
<i>Aythya affinis</i>	Lesser Scaup	MV	Michigan
<i>Botaurus lentiginosus</i>	American Bittern	MV	Nevada
<i>Pelecanus erythrorhynchos</i>	American White Pelican	MV	Nevada
<i>Spizella breweri</i>	Brewer's Sparrow	MV	Nevada
<i>Charadrius melodus</i>	Piping Plover	MV; MV; HV	Michigan; New York; Virginia
<i>Aythya valisineria</i>	Canvasback	MV; NV-PS	Michigan; Nevada
<i>Coturnicops noveboracensis</i>	Yellow Rail	MV; NV-PS	Michigan; Ontario
<i>Tringa semipalmata</i>	Willet	MV; NV-PS	New York; Nevada
<i>Falco peregrinus</i>	Peregrine Falcon	MV; NV-PS; NV-PS	Michigan; West Virginia; Nevada
<i>Chlidonias niger</i>	Black Tern	MV; NV-PS; NV-PS; NV-PS	Michigan; New York; Ontario; Nevada
<i>Ammodramus leconteii</i>	Le Conte's Sparrow	NV-IL	Michigan
<i>Melanerpes erythrocephalus</i>	Red-headed Woodpecker	NV-IL	Michigan
<i>Rhynchophanes mccownii</i>	McCown's Longspur	NV-IL	Great plains
<i>Bartramia longicauda</i>	Upland Sandpiper	NV-IL	Michigan
<i>Coccyzus erythrophthalmus</i>	Black-billed Cuckoo	NV-IL	Michigan
<i>Spiza americana</i>	Dickcissel	NV-IL	Michigan
<i>Ammodramus savannarum</i>	Grasshopper Sparrow	NV-IL; NV - PS	Great Plains; Michigan
<i>Tympanuchus phasianellus</i>	Sharp-tailed Grouse	NV-IL; NV -PS	Great Plains; Michigan
<i>Dolichonyx oryzivorus</i>	Bobolink	NV-IL; NV-IL; NV-PS; MV; NV-PS; NV-PS	Great Plains; Michigan; New York; West Virginia; Ontario; Nevada
<i>Haliaeetus leucocephalus</i>	Bald Eagle	NV-IL; NV-PS	Michigan; Nevada
<i>Anthus spragueii</i>	Sprague's Pipit	NV-PS	Great Plains
<i>Aquila chrysaetos</i>	Golden Eagle	NV-PS	Nevada

Scientific name†	Common name	CCVI	Location
<i>Athene cunicularia</i>	Burrowing Owl	NV-PS	Great Plains
<i>Buteo swainsoni</i>	Swainson's Hawk	NV-PS	Nevada
<i>Falco mexicanus</i>	Prairie Falcon	NV-PS	Nevada
<i>Lanius ludovicianus</i>	Loggerhead Shrike	NV-PS	Nevada
<i>Leucophaeus pipixcan</i>	Franklin's Gull	NV-PS	Nevada
<i>Numenius americanus</i>	Long-billed Curlew	NV-PS	Great Plains
<i>Recurvirostra americana</i>	American Avocet	NV-PS	Nevada
<i>Sturnella neglecta</i>	Western Meadowlark	NV-PS	Michigan
<i>Buteo regalis</i>	Ferruginous Hawk	NV-PS to IL	Great Plains
<i>Calamospiza melanocorys</i>	Lark Bunting	NV-PS to IL	Great Plains
<i>Calcarius ornatus</i>	Chestnut-collared Longspur	NV-PS to IL	Great Plains
<i>Tympanuchus cupido</i>	Greater Prairie-Chicken	NV-PS to IL	Great Plains
<i>Circus cyaneus</i>	Northern Harrier	NV-PS; MV; NV-IL	Great Plains; Michigan; Southern Appalachians
<i>Asio flammeus</i>	Short-eared Owl	NV-PS; NV-PS	Michigan; Nevada
<i>Phalaropus tricolor</i>	Wilson's Phalarope	NV-PS; NV-PS; MV	Great Plains; Michigan; Nevada
<i>Anas acuta</i>	Northern Pintail	NV-PS; NV-PS; NV-IL	Michigan; Nevada; Southern Appalachians

†Not previously evaluated: *Ammodramus bairdii* (Baird's Sparrow); *Ammodramus nelsoni* (Nelson's Sparrow); *Calidris canutus rufa* (Rufa Red Knot); *Centrocercus urophasianus* (Greater Sage-Grouse); *Falco sparverius* (American Kestrel); *Grus Americana* (Whooping Crane); *Limosa fedoa* (Marbled Godwit); *Podiceps auritus* (Horned Grebe); *Sterna antillarum athalassos* (Interior Least Tern)

Table 3. Predicted changes in the climatic suitability ranges of North Dakota bird SCP based on bioclimatic envelope modeling (Schuetz *et al.* 2013; Langham *et al.* 2014). *Centrocercus urophasianus* (Greater Sage-Grouse) was not indicated to have any present or future range in North Dakota with this modeling effort.

Scientific name	Common name	Predicted 2080 ND Suitable Climate Range
<i>Athene cunicularia</i>	Burrowing Owl	Summer and winter range in isolated areas
<i>Tympanuchus phasianellus</i>	Sharp-tailed Grouse	Summer and winter range in isolated areas
<i>Ammodramus bairdii</i>	Baird's Sparrow	Summer range absent
<i>Anthus spragueii</i>	Sprague's Pipit	Summer range absent
<i>Botaurus lentiginosus</i>	American Bittern	Summer range absent
<i>Coccyzus erythrophthalmus</i>	Black-billed Cuckoo	Summer range absent
<i>Leucophaeus pipixcan</i>	Franklin's Gull	Summer range absent
<i>Limosa fedoa</i>	Marbled Godwit	Summer range absent
<i>Numenius americanus</i>	Long-billed Curlew	Summer range absent
<i>Phalaropus tricolor</i>	Wilson's Phalarope	Summer range absent
<i>Podiceps auritus</i>	Horned Grebe	Summer range absent
<i>Recurvirostra americana</i>	American Avocet	Summer range absent
<i>Rhynchophanes mccownii</i>	McCown's Longspur	Summer range absent, winter range in isolated areas
<i>Ammodramus leconteii</i>	Le Conte's Sparrow	Summer range absent, winter range includes ND
<i>Aythya affinis</i>	Lesser Scaup	Summer range absent, winter range includes ND
<i>Buteo regalis</i>	Ferruginous Hawk	Summer range absent, winter range includes ND
<i>Calcarius ornatus</i>	Chestnut-collared Longspur	Summer range absent, winter range includes ND
<i>Pelecanus erythrorhynchos</i>	American White Pelican	Summer range absent, winter range includes ND
<i>Buteo swainsoni</i>	Swainson's Hawk	Summer range in isolated areas
<i>Chlidonias niger</i>	Black Tern	Summer range in isolated areas
<i>Dolichonyx oryzivorus</i>	Bobolink	Summer range in isolated areas
<i>Circus cyaneus</i>	Northern Harrier	Summer range in isolated areas, winter range includes ND
<i>Falco sparverius</i>	American Kestrel	Summer range in isolated areas, winter range includes ND
<i>Ammodramus savannarum</i>	Grasshopper Sparrow	Summer range includes ND
<i>Tympanuchus cupido</i>	Greater Prairie-Chicken	Winter range increases in ND
<i>Aquila chrysaetos</i>	Golden Eagle	Winter range increases in ND
<i>Spizella breweri</i>	Brewer's Sparrow	Winter range includes ND
<i>Asio flammeus</i>	Short-eared Owl	Winter range includes ND
<i>Falco mexicanus</i>	Prairie Falcon	Winter range includes ND
<i>Haliaeetus leucocephalus</i>	Bald Eagle	Winter range includes ND

Table 4. North Dakota mammal SCP that have been evaluated with respect to their Climate Change Vulnerability Index (CCVI; EV: Extremely vulnerable; HV: Highly vulnerable; MV: Moderately vulnerable; NV-PS: Not vulnerable-Potentially Stable; NV-IL: Not vulnerable-Increase Likely) within their North American range. Sources are as described in Table 2.

Scientific name†	Common name	CCVI	Location
<i>Lemmys curtatus</i>	Sagebrush Vole	HV	Nevada
<i>Myotis evotis</i>	Long-eared Bat	NV - IL	Nevada
<i>Vulpes velox</i>	Swift Fox	NV - IL	Great Plains
<i>Corynorhinus townsendii</i>	Townsend's Big-eared Bat	NV - PS	Nevada
<i>Cynomys ludovicianus</i>	Black-tailed Prairie Dog	NV - PS	Great Plains
<i>Mustela nigripes</i>	Black-footed Ferret	NV - PS	Great Plains
<i>Myotis ciliolabrum</i>	Western Small-footed Bat	NV - PS	Nevada
<i>Myotis septentrionalis</i>	Northern Bat	NV - PS	Southern Appalachians
<i>Sorex arcticus</i>	Arctic Shrew	NV - PS	Michigan
<i>Sorex merriami</i>	Merriam's Shrew	NV - PS	Nevada
<i>Urocyon cinereoargenteus</i>	Grey Fox	NV - PS	Michigan
<i>Martes americana</i>	American Marten	NV - PS; MV	Nevada; New York
<i>Lontra canadensis</i>	Northern River Otter	NV - PS; MV	Florida; Nevada
<i>Sorex hoyi</i>	Pygmy Shrew	NV - PS	Southern Appalachians
<i>Myotis lucifugus</i>	Little Brown Bat	NV - PS; NV - IL	New York; Nevada

†Not previously evaluated: *Chaetodipus hispidus* (Hispid Pocket Mouse); *Eptesicus fuscus* (Big Brown Bat); *Myotis volans* (Long-legged Bat); *Perognathus flavescens* (Plains Pocket Mouse); *Spilogale putorius* (Eastern Spotted Skunk); *Urocyon richardsonii* (Richardson's ground squirrel)

Table 5. North Dakota reptile SCP that have been evaluated with respect to their Climate Change Vulnerability Index (CCVI; EV: Extremely vulnerable; HV: Highly vulnerable; MV: Moderately vulnerable; NV-PS: Not vulnerable-Potentially Stable; NV-IL: Not vulnerable-Increase Likely) within their North American range. Sources are as described in Table 2.

Scientific name†	Common name	CCVI	Location
<i>Chelydra serpentina</i>	Snapping Turtle	NV - PS	Michigan
<i>Liochlorophis vernalis</i>	Smooth Green Snake	NV - PS	Michigan
<i>Phrynosoma hernandesi</i>	Short-horned Lizard	NV - PS	Nevada
<i>Apalone spinifera</i>	Spiny Softshell Turtle	NV - PS; NV - IL	New York; Southern Appalachians

†Not previously evaluated: *Graptemys pseudogeographica* (False Map Turtle); *Plestiodon septentrionalis* (Northern Prairie Skink); *Sceloporus graciosus* (Sagebrush Lizard). *Apalone mutica* (Smooth Softshell Turtle) and *Heterodon nasicus* (Plains hog-nosed snake) were evaluated in Illinois and did not rank as EV or HV (Walk *et al.* 2011).

Table 6. North Dakota fish SCP that have been evaluated with respect to their Climate Change Vulnerability Index (CCVI; EV: Extremely vulnerable; HV: Highly vulnerable; MV: Moderately vulnerable; NV-PS: Not vulnerable-Potentially Stable; NV-IL: Not vulnerable-Increase Likely) within their North American range. Sources are as described in Table 2.

Scientific name†	Common name	CCVI	Location
<i>Macrhybopsis storeriana</i>	Silver Chub	EV	Michigan
<i>Percina shumardi</i>	River Darter	HV	Michigan
<i>Lota lota</i>	Burbot	MV	New York
<i>Notropis anogenus</i>	Pugnose Shiner	MV; HV	New York; Michigan
<i>Campostoma oligolepis</i>	Largescale Stoneroller	HV	Illinois
<i>Polyodon spathula</i>	Paddlefish	MV	Illinois; Southern Appalachians

†Not previously evaluated: *Ameiurus natalis* (Yellow Bullhead); *Chrosomus eos* (Northern Redbelly Dace); *Chrosomus neogaeus* (Finescale Dace); *Cycleptus elongatus* (Blue Sucker); *Ichthyomyzon castaneus* (Chestnut Lamprey); *Ichthyomyzon unicuspis* (Silver Lamprey); *Macrhybopsis gelida* (Sturgeon Chub); *Macrhybopsis meeki* (Sicklefin Chub); *Margariscus nachtriebi* (Northern Pearl Dace); *Nocomis biguttatus* (Hornyhead Chub); *Notropis heterolepis* (Blacknose Shiner); *Notropis percobromis* (Carmine Shiner); *Percina caprodes* (Loggerperch); *Percopsis omiscomaycus* (Trout-perch); *Platygobio gracilis* (Flathead Chub); *Scaphirhynchus albus* (Pallid Sturgeon)

Table 7. North Dakota mussel SCP that have been evaluated with respect to their Climate Change Vulnerability Index (CCVI; EV: Extremely vulnerable; HV: Highly vulnerable; MV: Moderately vulnerable; NV-PS: Not vulnerable-Potentially Stable; NV-IL: Not vulnerable-Increase Likely) within their North American range. Sources are as described in Table 2.

Scientific name†	Common name	CCVI	Location
<i>Strophitus undulatus</i>	Creeper	EV	Southern Appalachians
<i>Ligumia recta</i>	Black Sandshell	EV;EV	New York; Southern Appalachians
<i>Amblema plicata</i>	Threeridge	HV	New York
<i>Lasmigona compressa</i>	Creek Heelsplitter	HV	Michigan

†Not previously evaluated: *Fusconaia flava* (Wabash Pigtoe); *Leptodea fragilis* (Fragile papershell); *Potamilus alatus* (Pink heelsplitter); *Potamilus ohioensis* (Pink Papershell); *Quadrula quadrula* (Mapleleaf); *Truncilla truncata* (Deertoe)

Climate Change Adaptation Actions

Climate change adaptation action involves addressing species and habitat vulnerabilities that are identified with assessment procedures. Many efforts are underway nationally to identify relevant sets of actions that address vulnerabilities, and several recent studies have attempted to synthesize these efforts. Mawdsley et al. (2009) organized potential actions (Table 8) into those based on land and water protection and management, those related to direct species management, those related to monitoring and planning, and those related to law and policy (see Glick *et al.* 2011; Groves *et al.* 2012 for variations on this scheme). Their recommendations form a succinct set of strategies that could guide climate change planning in North Dakota. Actions related to each of these categories are listed in Table 8 with an example of how the action could be addressed regionally. Heller and Zavalata (2009) also reviewed published direct climate related conservation actions, and identified 113 distinct actions that fall within the general framework listed in Table 8. Additional review of the Heller and Zavalata (2009) actions will help focus how the guidelines in Table 8 can be applied within North Dakota.

Given the large-scale nature of climate change effects, it can be difficult to identify and articulate how site-based actions can contribute to improving the adaptive capacity of the regional landscape (Figure 14). Several studies have focused on providing additional guidance to frame site-based decisions. These actions can range from bolstering defense against environmental change (resistance) to increasing the regional capacity to absorb environmental change (resilience) (Heller & Zavaleta 2009), and represent a continuum of actions each with their own benefits and drawbacks. Focusing purely on resistance strategies can be risky because this may result in loss of ecological functions if critical native species are lost from the regional pool (Heller & Zavaleta 2009). Focusing purely on resilience strategies asks managers to facilitate ecological self-organization and accept potential losses of historical species assemblages (Heller & Zavaleta 2009). Gillison et al. (2013) argue that the decision to select between these approaches for a site should be conditional on the landscape's current capacity to support conservation (i.e., percentage of protected area, connectivity, condition of the landscape matrix between habitat patches) and the regional vulnerability to climate change (i.e., regional habitat heterogeneity and rate of climate change) (Figure 15).



Figure 14. Site-based decisions can affect how the broader landscape adapts to climate change. Established perennial vegetation reduces soil erosion and soil carbon loss during winter. Photo Credit: Drew MacDonald 2015, Grand Forks County.

Table 8. Example climate change adaptation strategies adapted from Mawdsley et al. (2009) are consistent with the more extensive list in Heller and Zavaleta (2009). These strategies can immediately guide climate change adaptation actions in North Dakota and examples activities are provided for each strategy.

Strategy	Regional example
<i>Land and Water Protection and Management</i>	
Increase extent of protected areas	Additional land acquisition; additional conservation easements
Improve representation and replication within protected-area networks	Identify and bolster conservation efforts in protected-area networks – e.g. Grand Forks Prairie Project Area
Improve management and restoration of existing protected areas to facilitate resilience	Promote higher diversity plantings and grassland fire and grazing management
Design new natural areas and restoration sites to maximize resilience	Use modeling approaches to identify critical conservation areas under future climate scenarios as in (Ando & Mallory 2012)
Protect movement corridors, stepping stones, and refugia	Participate in national planning efforts for migratory species
Manage and restore ecosystem function rather than focusing on specific components	Include landscape nutrient and water movement within conservation planning
Improve landscape permeability to species movement	Promote use of cover crops and conservation agricultural practices in agricultural areas
<i>Direct species management</i>	
Focus conservation resources on at-risk species	Develop a climate adaptation plan for the Sagebrush vole, fish, mussels
Translocate at-risk species	Use genetically diverse stocks of native plant seed sources within planting efforts
Establish captive populations of at-risk species	This strategy has a place in plant propagation to ensure adequate seed sources for future planning efforts
Reduce pressures on species from sources other than climate change	Address effects of grassland conversion and tile drainage on land and water resources
<i>Monitoring and Planning</i>	
Evaluate and enhance monitoring programs for wildlife and ecosystems	Increase systematic monitoring of invertebrates
Incorporate predicted climate-change impacts into species and land-management plans, programs, and activities	Include climate change planning in all conservation decision-making exercises
Develop dynamic landscape conservation plans	Include assessment of species, their genetic variation and ecosystems within planning
Ensure wildlife and biodiversity needs are considered as part of the broader societal adaptation process	Include wildlife and conservation elements in state-wide and municipal climate planning efforts
<i>Law and Policy</i>	
Review and modify existing laws, regulations, and policies regarding wildlife and natural resource management	Review current law and policy regarding coordination among conservation organizations, species translocation, and captive management.

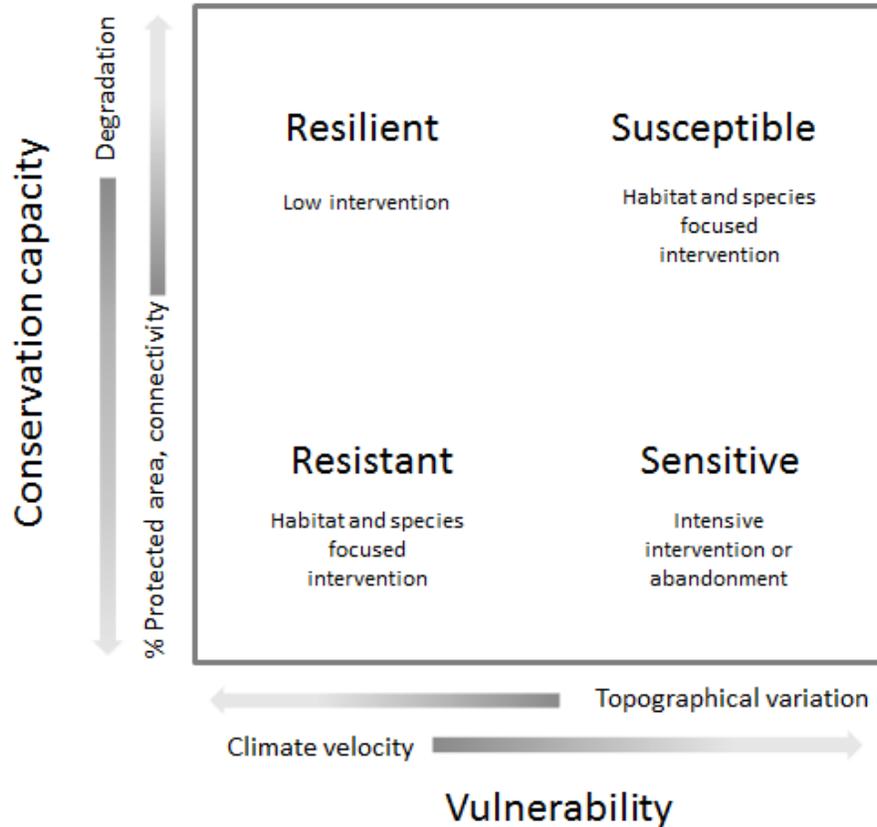


Figure 15. Framework for distinguishing types of management interventions. Conservation strategies can be broadly characterized by the degree of landscape vulnerability and the landscape conservation capacity. Landscapes are considered more vulnerable when exposed to greater climate changes and less vulnerable when they contain greater local heterogeneity (topographical variation). Landscapes are considered to have greater conservation capacity when their components are more connected and less degraded. The focus and type of management depends on the degree of landscape vulnerability and conservation capacity. Adapted from Figure 2 in Gillison et al. (2013).

To follow this framework (Gillison *et al.* 2013) one would assess the heterogeneity (topographical variation), degradation, and ecological connectivity of a focal conservation area and, with an understanding of the projected climate change, plot this within the framework on Figure 9. The position on the figure would suggest different types of management actions. Resilience based strategies focused on maintaining connectivity and preventing additional stressors would be appropriate in more pristine heterogeneous landscapes with higher connectivity and proportion of protected area (e.g. within the Grand Forks Prairie Project Area or the Sheyenne National Grassland Area). Resistance based strategies focused on preserving specific habitats and species would be more appropriate in more degraded heterogeneous landscapes with lower connectivity and proportion of protected area. In more homogenous landscapes with a greater likelihood of climate change effects (high climate velocity), a susceptible to sensitive continuum may be adopted that includes the consideration of whether active management should be abandoned.

Summary

Climate change adaptation planning involves selecting and implementing conservation actions that increase a region's adaptive capacity to climate change. Review of the climate vulnerabilities associated with ND SCP and potential climate adaptation strategies has resulted in the development of a list of specific actions that need to be undertaken in North Dakota:

1. SCP need to be evaluated for their climate change vulnerability given their potential exposure to climate change in their North Dakota range. Insects, fishes, and mussels should be prioritized in this process. Preliminary analysis suggests birds and mammals are less vulnerable.
2. The SCP list needs to be revisited during scheduled revisions to determine whether species should be added as a result of their potential climate vulnerability. Review of similar assessments throughout the region would be helpful in this process.
3. The strategies listed in Table 8 should be incorporated into conservation planning in North Dakota. The additional actions listed by Heller and Zavalata (2009) should be reviewed to determine their applicability to site and regional scale planning in North Dakota.

While a majority of the North Dakota SCP appear to have low vulnerability to climate change, we need to consider how they would be affected as a result human responses to climate change in North Dakota. Some species may become more vulnerable as a result of changing human activity. Additionally, some currently undesired species (i.e., invasive species) may be critical for maintaining ecosystem services in future landscapes. Following the adaptation actions in Table 8 will position North Dakota to maintain or increase the ability of regional ecosystems to defend against and absorb future climate change (Figure 16).



Figure 16. Human responses to climate change will affect natural resource management. Wind energy development in LaMoure, County, ND. Photo Credit: Tanner Stechmann 2014.

FINAL RECOMMENDATIONS

North Dakota natural resource managers have and will continue to respond to climate related changes. Given the magnitude of predicted climate changes for the region, our current challenge is to become proactive in planning and managing for future climate change effects. To the best of our ability, we should strive to increase climate related planning and communication across multiple ecological and social scales. A successful climate change adaptation effort should be able to document by the end of the century that:

1. The relevance of any proposed natural resource actions under future climate conditions was considered.
2. Guiding principles and actions regarding practices that are sound to climate related effects were adapted and followed.
3. Vulnerable species and habitats were identified and funding, resources, and research efforts were focused on addressing these vulnerabilities.
4. To the extent possible, species and ecological function were maintained or increased through adaptive management.
5. Regular communication occurred across sectors regarding climate related actions and effects.

To continue climate change related planning in North Dakota, we recommend that:

1. CCVI and climate envelope modelling assessments for current state SCP should be completed within the next two years.
2. State species should be reviewed within the next ten years to determine whether additional species should be added to the SCP list due to their climate sensitivity.
3. Actions should be identified to address the climate adaptive capacity of the most vulnerable species within the next five years.
4. A list of guiding principles and actions be adopted to promote climate change adaptation planning in North Dakota.
5. Relevant stakeholders across state agencies are identified and included in the climate change action planning process.

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Appendix I. Evaluation of North Dakota SCP for their Climate Change Vulnerability Index (CCVI). Following procedures outlined by Young et al. (2011), we evaluated a set of North Dakota SCP for their CCVI (EV = Extremely vulnerable, MV = Moderately vulnerable, IL = Increase Likely, PS = Potentially Stable) with an associated confidence level (VH = Very High, Mod = Moderate) using NatureServe 2.1. The procedure to develop the CCVI asks users to rate a species potential direct and indirect (rows 1.1 to 1.4) exposure to climate change, their sensitivity to changes in the abiotic and biotic environment (rows 2.1 to 2.15), and provide any known information about the species documented response to climate change (rows 3.1 to 3.4) through a series of standardized questions with categorical responses (see Young et al. 2011 for details on headings). All species were evaluated for climate change at the center of their ND range based on predicted climate changes in North Dakota and previously published CCVI sources (Table 2). Species were evaluated with regard to their likelihood of being affected (GI = Greatly increase (Red), I = Increase (orange), SI = Somewhat increase (orange), N = neutral, SD = Somewhat decrease (Green), D = Decrease (Green); N/A = Not applicable; U = Unknown).

Factor	Black Sandshell (<i>Ligumia recta</i>)	Piping Plover (<i>Charadrius melodus</i>)	Pugnose Shiner (<i>Notropis anogenus</i>)	Sagebrush Vole (<i>Lemmiscus curtatus</i>)	Monarch Butterfly (<i>Danaus plexippus</i>)	American Bittern (<i>Botaurus lentiginosus</i>)	Swainson's Hawk (<i>Buteo swainsoni</i>)	Franklin's Gull (<i>Leucophaeus pipixcan</i>)
1.1 Exposure to sea level rise	N	N	N	N	N	N	U	U
1.2 Natural barriers to range shifts	I	N	SI	N	N	N	N	N
1.3 Anthropogenic barriers to range shifts	I-SI	N	SI	N	N	N	N	N
1.4 Impact of human climate related land use change	SI-N	SI-N	N	I	SD	SD	I	N
2.1 Dispersal/ Movement capability	GI	D	U	N	SD-D	D	D	D
2.2 Historical thermal niche	SD	SD	SD	SD	SD	SD	SD	SD
2.3 Physiological thermal niche	SD	SI-N	U	N	SI	N	N	N
2.4 Historical hydrological niche	I-SI	I-SI	I-SI	I-SI	I-SI	I-SI	I-SI	I-SI
2.5 Physiological Hydrological niche	GI	SI	U	N	SD	I	N	I
2.6 Disturbance regime dependence	N-SD	I-SI	SI	I	SI	SI-N	SI	N
2.7 Dependence on ice /snow habitats	N	N	N	N	N	N	N	N
2.8 Dependence on uncommon physical habitats	I	SI	N	N	D	SD	SD	SD
2.9 Reliance on other species to generate habitat	N	N	N	N	SI	N	N	N
2.10 Dietary versatility	SD	N	N	N	SI	N	N	N
2.11 Dependence on other species for dispersal	I	N	N	N	N	N	N	N
2.12 Part of an interspecific interaction	U	N	N	N	N	N	N	N
2.13 Measured genetic variation	U	N	U	U	N	U	U	U
2.14 Recent genetic bottlenecks	N	N/A	SI	U	N/A	U	U	U
2.15 Phenological response	U	U	U	U	N	U	U	U
3.1 Documented response to Climate Change	U	U	U	U	U	U	U	U
3.2 Modeled Change in Range or Population	U	U	U	U	U	U	U	U
3.3 Modeled overlap of future and current range	U	U	U	U	U	U	U	U
3.4 Occurrence of protected areas in future range	U	U	U	U	U	U	U	U
CCVI	EV	MV	MV	MV	IL	IL	PS	PS
Confidence	VH	Low	VH	Low	VH	Mod	VH	Low