North Dakota

COMPREHENSIVE WILDLIFE CONSERVATION STRATEGY

NORTH DAKOTA GAME AND FISH

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FOREWORD

NORTH DAKOTA
GAME & FISH
DEPARTMENT

"Variety in Hunting and Fishing"

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Dear Fish and Wildlife Enthusiast:

Recently, Congress provided states with supplemental funding to conserve species which typically receive no monetary support. These funds came to us through a federal funding program called State Wildlife Grants or SWG. Funding from the SWG program is to be used to benefit species of greatest conservation need in addition to keeping common wildlife common. In accepting these funds, North Dakota and all other 49 states were required to complete a Comprehensive Wildlife Conservation Strategy by October 1, 2005. The CWCS is intended to identify and focus on species of conservation priority, yet address the full array of wildlife. It is important to understand that this new program is not a threat to current game management programs. Rather, the SWG program is intended to complement funding shortfalls in programs already in place and to fill gaps where funding has been lacking.

This document represents the North Dakota Game and Fish Department's efforts to develop a Comprehensive Wildlife Conservation Strategy for the state of North Dakota. It is the result of nearly three years of compiling information on all species of fish and wildlife, both game and nongame species. Because of the sheer size of the document (i.e. nearly 400 pages) it is not something you can simply sit down and read in a short amount of time. The strategy contains a multitude of information including species of fish and wildlife in need of conservation, important habitat types and locations, data needs, maps, monitoring needs, partner agencies/programs and current issues affecting fish and wildlife resources. The CWCS is not so much a specific management plan for each individual species but rather a strategy or framework of how to sustain those species in greatest need of conservation and their habitats, alongside more common species of fish and wildlife. It's also worth pointing out the CWCS is a dynamic document that will be updated and changed as new information becomes available.

In closing, I think it's fitting that while celebrating the Department's 75th year of managing fish and wildlife resources in North Dakota, we look to the future as well as the past. The SWG program represents an ambitious endeavor as we attempt to take a more active hand in keeping species from becoming threatened or endangered in the future. This strategy will provide much of the framework for working towards that goal and preserving an important part of our state's heritage for future generations.

Sincerely,

Dean Hildebrand
Director

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LIST OF ABBREVIATIONS IN THE CWCS

ACOE	US Army Corp of Engineers	http://www.usace.army.mil/
BCR	Bird Conservation Region	
BLM	US Bureau of Land Management	www.mt.blm.gov
BMP	Best Management Practice	
CARA	Conservation and Reinvestment Act	http://www.teaming.com/
CBM	Coalbed Methane	
CRP	Conservation Reserve Program	http://www.fsa.usda.gov/dafp/cepd/crp.htm
CVB/CC	Convention and Visitors Bureau or Chambers of Commerce	http://www.ndtourism.com/Resources/
CWCS	Comprehensive Wildlife Conservation Strategy	
DAT	District Assistance Team	
DU	Ducks Unlimited	http://www.ducks.org/
EPA	Environmental Protection Agency	http://www.epa.gov/
ESA	Endangered Species Act	
FAA	Federal Aviation Administration	http://www.faa.gov/
FHWA	Federal Highway Administration	http://www.fhwa.dot.gov/
FNAWS	Foundation for North American Wild Sheep	http://www.fnaws.org/
FSA	Farm Service Agency	http://www.fsa.usda.gov/pas/
FY	Fiscal Year	
GFAFB	Grand Forks Air Force Base	http://public.grandforks.amc.af.mil/
GIS	Geographic Information System	
HAPET	Habitat and Population Evaluation Team	
JV	Joint Venture	http://www.fws.gov/birdhabitat/nawmp/jv.htm
MDF	Mule Deer Foundation	http://www.muledeer.org/
MN	Minnesota	
MT	Montana	
NAAT	National Advisory Acceptance Team	
NABCI	North American Bird Conservation Initiative	http://www.nabci-us.org/
NAWCP	North American Waterbird Conservation Plan	http://www.nacwcp.org/
NAWMP	North American Waterfowl Management Plan	http://www.fws.gov/birdhabitat/nawmp/nawmphp.htm
ND	North Dakota	
NDDAG	North Dakota Department of Agriculture	http://www.agdepartment.com/
NDDH	North Dakota Department of Health	http://www.health.state.nd.us/
NDFS	North Dakota Forest Service	http://www.ndsu.nodak.edu/forestservice/
NDGFD	North Dakota Game and Fish Department	http://www.nd.gov/gnf/
NDIC	North Dakota Industrial Commission – Oil and Gas Division	http://www.oilgas.nd.gov/
NDNRT	North Dakota Natural Resource Trust	http://www.ndnrt.com/
NDPRD	North Dakota Parks and Recreation Department	http://www.parkrec.nd.gov/

NDSEED	Sustainable Energy for Economic Development	http://www.ndseed.org/
NDSLD	North Dakota State Land Department	http://www.land.state.nd.us/
NDSUEXT	North Dakota State University Extension Service	http://www.ext.nodak.edu/
NDSWC	North Dakota State Water Commission	http://www.swc.state.nd.us/
NDT	North Dakota Tourism	http://www.ndtourism.com/
NDWCA	North Dakota Weed Control Association	http://www.ndweeds.homestead.com/index.html
NDWRB	North Dakota Water Resource Boards (County)	http://www.swc.state.nd.us/4DLink5/4dcgi/wrboards
NGO	Nongovernmental Organization	
NGPJV	Northern Great Plains Joint Venture	
NP/PPR	Northern Plains/Prairie Potholes Regional Shorebird Conservation Plan	http://www.fws.gov/shorebirdplan/RegionalShorebird/RegionalPlans.htm
NPPWCP	Northern Prairie and Parkland Waterbird Conservation Plan	http://www.fws.gov/birds/waterbirds/npp/
NPWRC	Northern Prairie Wildlife Research Center	http://www.npwrc.usgs.gov/
NRCS	Natural Resources Conservation Service	http://www.nrcs.usda.gov/
PF	Pheasants Forever	http://www.pheasantsforever.org/
PIF	Partners in Flight	http://www.partnersinflight.org/
PPJV	Prairie Pothole Joint Venture	http://www.ppjv.org
RMEF	Rocky Mountain Elk Foundation	http://www.rmef.org/
RRBRP	Red River Basin Riparian Project	http://www.health.state.nd.us/rrbrp/
SD	South Dakota	
SoCP	Species of Conservation Priority	
SWG	State Wildlife Grants	http://www.teaming.com/
T&E	Threatened and Endangered	
TNC	The Nature Conservancy	http://www.nature.org/
TRNP	Theodore Roosevelt National Park	http://www.nps.gov/thro/
UND	University of North Dakota	http://www.und.edu/
USBR	US Bureau of Reclamation	http://www.usbr.gov/
USDA	US Department of Agriculture	http://www.usda.gov/wps/portal/usdahome
USFS	US Forest Service	http://www.fs.fed.us/
USFWS	US Fish and Wildlife Service	http://www.fws.gov/
USNPS	US National Park Service	http://www.nps.gov/
USSCP	US Shorebird Conservation Plan	http://www.fws.gov/shorebirdplan/
WCRP	Wildlife Conservation and Restoration Program	http://www.teaming.com/
WIND	Wind Interests of North Dakota	http://www.windnd.com/
WS/APHIS	Wildlife Services/Animal Plant and Health Inspection Service	http://www.aphis.usda.gov/ws/

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EXECUTIVE SUMMARY

With the advent of Wildlife Conservation and Restoration Program and State Wildlife Grant legislation, the North Dakota Game and Fish Department can expand its fish and wildlife management programs. SWG resources allow the NDGFD to develop a more robust nongame fish and wildlife program for species that typically receive little or no attention. During the first few years of this program the NDGFD made considerable strides in adding staff to work on nongame and SWG issues. Much of their time the past three years has involved compiling scientific information on an array of fish and wildlife. The NDGFD staff have also worked to develop the state's first species of conservation priority list, networked and built a rapport with many future partners including but not limited to federal, state, and local agencies, nongovernmental organizations, universities, and private citizens; and finally, writing this document.

This document 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 or the time 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 CWCS is intended to identify species of greatest conservation need, provide fundamental background information, strategic guidance, and most importantly, a framework for developing and coordinated conservation actions involving partners to safeguard all fish and wildlife resources.

The CWCS 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. These elements have been open to interpretation by the states. In addressing each of the eight elements, we used the best available information to the best of our ability.

For North Dakota, 100 species of conservation priority were identified under Element 1. This list includes 45 birds, 2 amphibians, 9 reptiles, 15 mammals, 22 fish, and 7 freshwater mussels. 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 29 Level I species, 41 Level II species, and 30 Level III species. A sizeable portion of the CWCS provides pertinent biological and habitat information and addresses elements 1-5 for each individual species. Many species do not have existing data relating to population status/dynamics, preferred habitat, threats and conservation actions. In other instances there is a better understanding of the status of a species, the threats affecting them, and the conservation actions needed. Such disparity in information will require additional research and surveys conducted for some species at the same time we are implementing conservation measures for others.

This CWCS is a habitat based, rather than species based. We 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 deciduous 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 tools available). 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. This 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 conduct 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.

The NDGFD visualizes the CWCS as a dynamic document that will be updated on a regular basis as new information becomes available. There is innovative research being conducted at local, regional and national levels. New incentive programs will likely be developed and staying informed of these to avoid duplication and maximize opportunities to partner is critical. The intent is to update the strategy annually and conduct a formal review every ten years, as element 6 requires continued examination of the CWCS. In addition, species of conservation priority needs may change, adding species to or subtracting from the list. The first official review of the 100 species of conservation priority will occur in five years.

Early on in developing the CWCS, the NDGFD recognized the scope and magnitude of this endeavor 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 contains the underlying strength of North Dakota's CWCS.

The NDGFD is fortunate to have superb communication tools. From early on in the process, the public was informed of CARA, WCRP, SWG, and the CWCS 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.

While the completion of the CWCS represents a major achievement and progress towards the goal of preserving North Dakota's fish and wildlife diversity, there is still a long way to go. This CWCS is just the first chapter in long-term multifaceted effort to implement management actions and conservation efforts. The next phase will involve refining goals to put the best available conservation tools into action.

"Without habitat, there is no wildlife. It's that simple."
- Wildlife Habitat Canada

ROAD MAP TO THE EIGHT REQUIRED ELEMENTS

This section is provided for the National Acceptance Advisory Team (NAAT) which is evaluating this document to determine how well North Dakota's Comprehensive Wildlife Conservation Strategy process meets the eight Congressionally required elements. The NAAT is chaired by the USFWS Assistant Director for Migratory Birds and State Programs and includes seven USFWS assistant regional directors (ARD) for Migratory Birds and State Programs, and the five state presidents of the regional associations of fish and wildlife agencies. The NAAT will ultimately determine if all eight required elements are fulfilled, and will provide a recommendation to the director of the USFWS. The director then issues the final determination for approval or disapproval of North Dakota's CWCS.

Please refer to the following page numbers in order to examine how each required element was addressed in the development of the Comprehensive Wildlife Conservation Strategy.

Element 1: 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:

NAAT Guidance	Section	Page #	Table Figure	Page #	Appendix	Page #
A. The Strategy indicates sources of information (e.g., literature, data bases, agencies, individuals) on wildlife abundance and distribution consulted during the planning process.	3.5 3.5.a	32-33 33-34	Tables 2-5	28-30	A	114-409
B. The Strategy includes information about both abundance and distribution for species in all major groups to the extent that data are available. There are plans for acquiring information about species for which adequate abundance and/or distribution information is unavailable.	4.4.b 5	41 44-87			A	114-409
C. The Strategy identifies low and declining populations to the extent data are available.	3	22-26	Tables 1-4	27-30	A	114-409
D. All major groups of wildlife have been considered or an explanation is provided as to why they were not (e.g., including reference to implemented marine fisheries management plans). The State may indicate whether these groups are to be included in a future Strategy revision.	3.2.a 3.2.a.i	22-23 23				
E. The Strategy describes the process used to select the species in greatest need of conservation. The quantity of information in the Strategy is determined by the state with input from its partners, based on what is available to the state.	3 3.3	22-26 23-25	Tables 1-4	27-30		

Element 2: Descriptions of locations and relative condition of key habitats and community types essential to conservation of species identified in (1):

NAAT Guidance	Section	Page #	Table Figure	Page #	Appendix	Page #
A. The Strategy provides a reasonable explanation for the level of detail provided; if insufficient, the Strategy identifies the types of future actions that will be taken to obtain the information.	4.1-4.3	35-39			A	114-409
B. Key habitats and their relative conditions are described in enough detail such that the State can determine where (i.e., in which regions, watersheds, or landscapes within the State) and what conservation actions need to take place.	5	44-87			A B C	114-409 410-420 421-423

Element 3: 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:

NAAT Guidance	Section	Page #	Table Figure	Page #	Appendix	Page #
A. The Strategy indicates sources of information (e.g., literature, databases, agencies, or individuals) used to determine the problems or threats.	4.4 8.1	40 101			A	114-409
B. The threats/problems are described in sufficient detail to develop focused conservation actions (for example, “increased highway mortalities” or “acid mine drainage” rather than generic descriptions such as “development” or “poor water quality”).	5	44-87			A	114-409
C. The Strategy considers threats/problems, regardless of their origins (local, state, regional, national and international), where relevant to the state’s species and habitats.	4.4 5	40-43 45-87			A	114-409
D. If available information is insufficient to describe threats/problems, research and survey efforts are identified to obtain needed information.	4.4.a	40			A	114-409
E. The priority research and survey needs, and resulting products, are described sufficiently to allow for the development of research and survey projects after the Strategy is approved.	4.4.a 4.4.b 5	40 41 44-87			A	114-409

Element 4: Descriptions of conservation actions determined to be necessary to conserve the identified species and habitats and priorities for implementing such actions:

NAAT Guidance	Section	Page #	Table Figure	Page #	Appendix	Page #
A. The Strategy identifies how conservation actions address identified threats to species of greatest conservation need and their habitats.	5	44-87			A E	114-409 430-445

B. The Strategy describes conservation actions sufficiently to guide implementation of those actions through the development and execution of specific projects and programs.	5	44-87			A E	114-409 430-445
C. The Strategy links conservation actions to objectives and indicators that will facilitate monitoring and performance measurement of those conservation actions (outlined in Element #5).	5 6.2	44-87 89-91			A E	114-409 430-445
D. The Strategy describes conservation actions (where relevant to the state's species and habitats) that could be addressed by federal agencies or regional, national or international partners and shared with other states.	5	44-87			A	114-409
E. If available information is insufficient to describe needed conservation actions, the Strategy identifies research or survey needs for obtaining information to develop specific conservation actions.	4.4.a 5	41-42 44-87			A	114-409
F. The Strategy identifies the relative priority of conservation actions.	5.0	45-46				

Element 5: 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:

NAAT Guidance	Section	Page #	Table Figure	Page #	Appendix	Page #
A. The Strategy describes plans for monitoring species identified in Element #1, and their habitats.	6 6.3.a 6.3.b	88-99 91-94 95-97			A	114-409
B. The Strategy describes how the outcomes of the conservation actions will be monitored.	6 6.4	88-99 98				
C. If monitoring is not identified for a species or species group, the Strategy explains why it is not appropriate, necessary or possible.	6	88-99				
D. Monitoring is to be accomplished at one of several levels including individual species, guilds, or natural communities.	6 6.3.a 6.3.b	88-99 91-94 95-97				
E. Monitoring utilizes or builds on existing monitoring and survey systems or explains how information will be obtained to determine the effectiveness of conservation actions.	6 6.3 6.4	88-99 91-97 98				
F. Monitoring considers the appropriate geographic scale to evaluate the status of species or species groups and the effectiveness of conservation actions.	6 6.2 6.3	88-99 89-91 91-97				
G. The Strategy is adaptive in that it allows for evaluating conservation actions and implementing new actions accordingly.	6 6.2 6.4 7.1	88-99 89-91 98 100				

Element 6: Descriptions of procedures to review the Comprehensive Wildlife Conservation Strategy at intervals not to exceed 10 years:

NAAT Guidance	Section	Page #	Table Figure	Page #	Appendix	Page #
A. The state describes the process that will be used to review the Strategy within the next ten years.	7	100				

Element 7: Plans for coordinating, to the extent feasible, the development, implementation, review, and revision of the Comprehensive Wildlife Conservation 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 the conservation of identified species and habitats:

NAAT Guidance	Section	Page #	Table Figure	Page #	Appendix	Page #
A. The state describes the extent of its coordination with and efforts to involve federal, state and local agencies, and Indian tribes in the development of its Strategy.	8	101-106				
B. The state describes its continued coordination with these agencies and tribes in the implementation, review and revision of its Strategy.	8.2	106				

Element 8: 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:

NAAT Guidance	Section	Page #	Table Figure	Page #	Appendix	Page #
A. The state describes the extent of its efforts to involve the public in the development of its Strategy.	9	107-112				
B. The state describes its continued public involvement in the implementation and revision of its Strategy.	7 9.2.a	100 107				

SECTION 1

Introduction

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

1.1 History of CARA, WCRP, and SWG

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 was approved at $65 million, FY04 for $70 million, and FY05 for $70 million, for an impressive total of $340 million nationwide in funding over 5 years.

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 $500,000 and $750,000. Fiscal years 01-05 has provided North Dakota with more than $3 million in federal funding. The SWG program is a matching grants program, meaning all federal dollars awarded must be matched with non-federal dollars. For planning projects, 25 percent non-federal match is required; and for implementation, 50 percent non-federal match is required.

1.2 The CWCS

By accepting these funds, North Dakota and all other 49 states committed to completing a Comprehensive Wildlife Conservation Strategy (CWCS) by October 1, 2005. Congress identified eight required elements to be included in the CWCS. The CWCS must identify and focus on "species in greatest need of conservation," yet still address the "full array of wildlife." The CWCS promotes a comprehensive approach to habitat and wildlife management to leverage conservation of all species.

North Dakota's CWCS focuses on 100 **species of conservation priority**, including information on distribution, abundance, habitat requirements, threats, conservation actions, and monitoring techniques. It also includes information on all fish and wildlife. As new information is gathered, the CWCS will be updated to ensure the best scientific and most recent information is incorporated. Although the CWCS will change over time, the primary goal will stay the same: to protect, conserve and enhance all of North Dakota's fish and wildlife for sustained public use and enjoyment.

1.3 CWCS Purpose

Why does North Dakota need a CWCS focused mainly on nongame species of conservation priority? In North Dakota, nongame wildlife represents more than 80 percent of the state's vertebrate fauna. More than 300 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 any loss believe is tragic.

The SWG program has allowed North Dakota the opportunity to provide funding for much needed baseline survey work for a variety of species. Above, NDGFD and USFWS personnel visit a marsh bird survey site with a researcher. This SWG project will produce predictive models that relate presence and/or abundance of SoCP to habitat and landscape variables, creating a precise tool for implementation of conservation actions.

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.

2.1 Natural Vegetation

North Dakota is mostly a prairie state, but it does have a number of vegetation types unique to the Upper Midwest. This section describes the primary vegetative communities found in North Dakota.

2.1.a 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, meadow sedge, and the invasive Kentucky bluegrass. 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 phloz, white beardtongue, and fringed sage.

2.1.b 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.

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

Cropland Ponds
Occur in basins with soils that are frequently cultivated.

2.1.c 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. 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 popular, 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 unique habitat takes up only 9,500 acres dispersed through the southern half of North Dakota's badlands. Ponderosa pine is the most common species, but a small stand of limber pine is located in

Slope County. Rocky Mountain Juniper, a low growing shrub, dominates much of the rest of the badlands, occupying about 600,000 acres.

2.2 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. Only 2 percent of that area is 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.

2.2.a 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.

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 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.

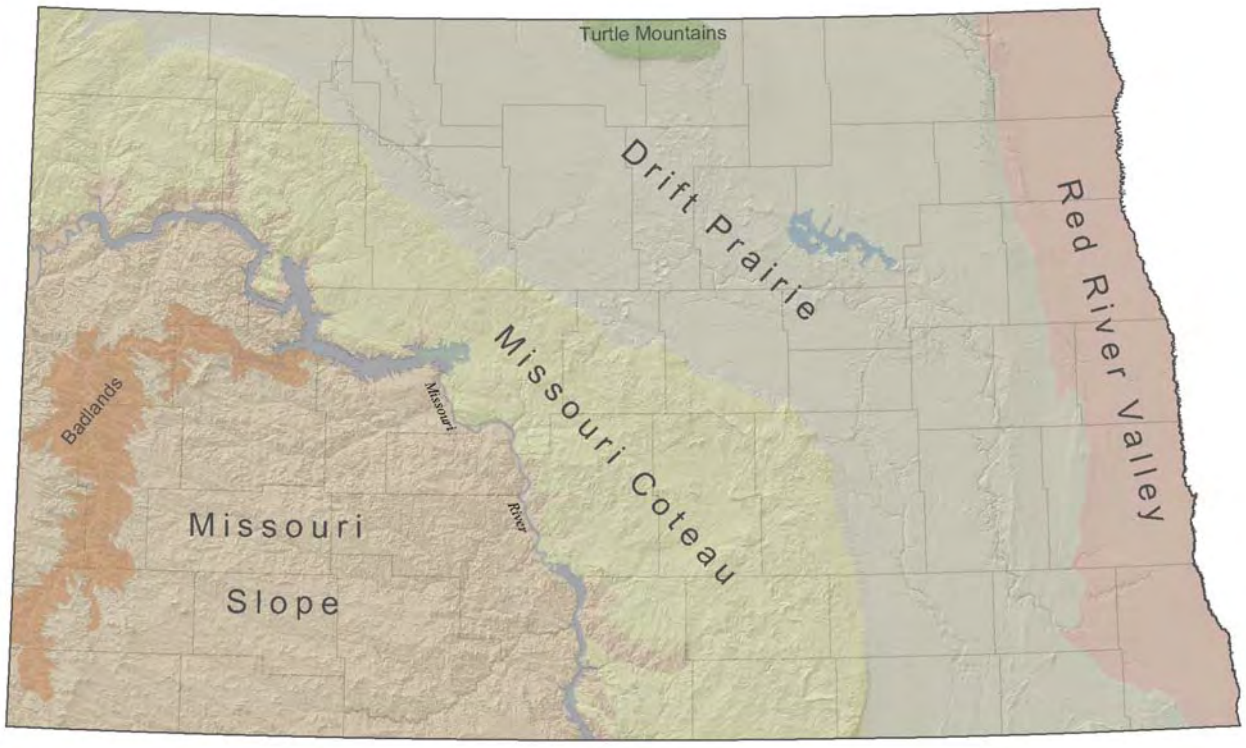

Figure 1. Major geographic regions of North Dakota.

2.3 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.

SECTION 3

Species of Conservation Priority

This section includes information on the following required element:

> **Element 1:** A primary requirement of the CWCS was 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.

3.1 Interpretation of Species in Greatest Need of Conservation

Additional guidance for interpreting Element 1 and the species of conservation priority list was provided in part 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.

3.2 The Overall Process

North Dakota did not have an up-to-date state list of species of conservation priority (SoCP). In May 2002, NDGFD staff began compiling information on birds, mammals, reptiles, amphibians, fish, and freshwater mussels. A preliminary draft of species of conservation priority was reviewed by select Department staff in January 2004. Comments from staff were used to create a second draft in early February. On February 25, 2004 the second version of the list was sent for comment and review to 8 federal agencies, 8 state agencies, 7 non-governmental organizations, 14 university academics, 5 Native American tribes, and several private citizens. Roughly 1/3 of the recipients provided comments, which were used to formulate a final species of conservation priority list published in the July 2004 issue of North Dakota Outdoors magazine, the official publication of the NDGFD (see Table 1). One-hundred SoCP were identified.

3.2.a Species Considered

All members of the following taxonomic groups that inhabit North Dakota were considered in the CWCS: 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.

Other than freshwater mussels, the Department chose not to include any invertebrates, including aquatic invertebrates, which were optional for integration in the CWCS. Freshwater mussels were included due to a fair amount of recent information to assess which of those species should be considered for conservation priority. Invertebrates were excluded due to an extreme lack of information or status and distribution on invertebrate species inhabiting the state. Due to the relatively short deadline for completing

the CWCS, the task of attempting to identify invertebrate species of conservation priority, threats, conservation actions, and priority research or survey needs for them was thought to be too great at this point.

3.2.a.i Addressing Invertebrates in the Future

The conservation actions identified in the CWCS will undoubtedly benefit invertebrates in addition to the 100 SoCP. For example, protecting native prairie for Baird's sparrows will also protect the Dakota skipper. Multiple species are likely to benefit from conservation actions applied. Although invertebrates are not specifically named in this document they are important parts of the key habitats and community types identified in Section 5.

Section 7 explains the process and timeline for reviewing and updating the CWCS. The NDGFD anticipates compiling a checklist of invertebrates gradually over the next 5-10 years. Whether there will be enough information to properly assess and identify SoCP is unknown at this time. If sufficient information is obtained, an attempt will be made to develop a SoCP list for those orders of invertebrates by 2015. The extent of survey and research efforts for invertebrates in the state is unidentified at this time. Therefore, no research or survey efforts for invertebrates will be identified in this or future versions of the CWCS until previous efforts are known.

3.2.b Rationale

Initial attempts to develop a species of conservation priority list were 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 probably more accurately represented the level of knowledge of a broad range of species. In addition, placing species into levels of conservation priority would allow us to focus on those species in the 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.

3.3 Process Used for Identifying Species of Conservation Priority

The methods for identifying avian SoCP differed greatly 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.

3.3.a 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. However, it was felt there was also a need to utilize a more encompassing tool for identifying and prioritizing SoCP. The PIF species assessment and prioritization scheme was this tool.

3.3.a.i. Partners in Flight Species Assessment and Prioritization

Partners In Flight (PIF) is a cooperative effort involving federal, state and local government agencies, philanthropic foundations, professional organizations, conservation groups, industry, the academic community, and private individuals. PIF was formed in 1990 to address the declines in many populations of land bird species. Initial focus was on neotropical migrants, but has since spread to include many other land birds requiring terrestrial habitats.

Of all the initiatives undertaken by PIF, identification of priority species may have been the most valuable to the CWCS. Beginning in 1991, PIF began developing a process to assess the status of each bird species in North America. As stated in the 2001 Partners In Flight Handbook on Species Assessment and Prioritization: "The principal objectives of this effort were to establish an unbiased means of identifying bird species that are in most need of conservation attention, and to identify areas where conservation efforts for those species are likely to be most effective." This system, which assigns scores to species in categories pertaining to their biology and conservation, was originally intended to assist in regional conservation priority-setting among breeding birds, specifically in the U.S. and PIF physiographic areas. More recently, the approach was applied at the continental scale to address species in Bird Conservation Regions (BCR), the planning units under the North American Bird Conservation Initiative (NABCI). (See figure 2 for a map of the BCR's in North Dakota).

Under the PIF Assessment process, scores are assigned to species in six biologically based categories, sometimes called vulnerability factors, and a seventh factor to reflect local stewardship responsibility. For a species, a score is assigned in each category. Scores for each factor range from 1 (lowest vulnerability) to 5 (highest vulnerability). The assessment factors are as follows:

- Relative Abundance (RA): A measure of the component of vulnerability that reflects the abundance of breeding individuals of a species, within its range, relative to other species.
- Breeding Distribution (BD): A measure of the component of vulnerability that reflects the global distribution of breeding individuals of a species during the breeding season.
- Non-breeding Distribution (ND): A measure of the component of vulnerability that reflects the global distribution of a species during the non-breeding season.
- Threats to Breeding (TB): An evaluation of the component of vulnerability that reflects the effects of current and future extrinsic conditions on the ability of a species to maintain healthy populations through successful reproduction.
- Threats to Non-breeding (TN): An evaluation of the component of vulnerability that reflects the effects of current and future extrinsic conditions on the ability of a species to maintain healthy populations through successful survival over the non-breeding season.
- Population Trend (PT): A measure of the component of vulnerability reflected by the direction and magnitude of changes in population size over the past 30 years.
- Area Importance (AI): Reflects the relative importance of an area to a species and its conservation, based on the abundance of the species in that area relative to other areas.

The seven factors listed above are used to complete a conservation assessment and prioritization scheme for each species in a planning region. The Total Assessment Score is derived by simply adding the scores from each of the seven categories for a particular species. Total scores may then range from 5 (being the lowest vulnerability) to 35 (being the highest vulnerability).

3.3.a.ii. Using Species Assessment and Prioritization and other Sources to Determine Birds of Conservation Priority

All landbirds, shorebirds, and waterbirds were evaluated if they met at least one of the following criteria:

(1) a PIF total assessment score of 20 or greater in either BCR* 11 or 17, with an AI score of 2 or greater

(2) a U.S. Shorebird Conservation Plan category of 4 (High Concern) or 5 (Highly Imperiled) on either the national or regional level

(3) a North American Waterbird Conservation Plan category of High Concern or Moderate Concern at the regional level

(4) current federal endangered, threatened, or candidate species

(5) proposed or recent delisting from the Endangered Species Act

(6) additional species of local management interest (i.e. waterfowl designations from the NAWMP and Birds of Conservation Concern as identified by the USFWS)

*BCR scores were used because North Dakota scores had not been completed at the time.

All bird species identified in at least one of these categories and in North Dakota during breeding season were considered. An internal review team then identified the species that warranted placement on the list and a corresponding level of conservation priority (see Table 2 for the matrix of avian SoCP and corresponding sources).

3.3.b Amphibians, Reptiles, Mammals, Fish and Freshwater Mussels

A species automatically made the list if it was designated as federally threatened or endangered. The process used to place other species on the list was more extensive. Little site-specific information is currently available on the majority of non-hunted species in North Dakota. There has been little research directed at, for example, identifying the population status of the plains spadefoot toad or the pygmy shrew, or even distribution and abundance of many other species. For avian species, several task forces and groups of bird experts are attempting to identify species of concern at regional or national levels. Surveys and monitoring efforts such as the North American Breeding Bird Survey also attempt to identify trends in bird populations. For other groups such as mammals, reptiles, amphibians, fish, and freshwater mussels, there is considerably less information available and much of it is dated.

From available sources, the NDGFD generated a working draft of species of conservation priority. 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 (2002). After compiling all information, species that were indicated on several lists were more likely to be included in the draft list. The decision to include other species on the list was more subjective. In those instances, we relied on anecdotal evidence, correspondence with academia, input from professionals in the field, information from surrounding states, and professional judgment. More weight was given to recent compilations when evidence was conflicting (see Tables 3 and 4 for the matrix of amphibian, reptile, mammals, fish, and freshwater mussel SoCP and corresponding sources).

3.4 Species of Conservation Priority Level Definitions

With limited funds and 100 SoCP, there was a need to prioritize species according to conservation need. The following categories were developed to describe the conservation needs for North Dakota's SoCP. These definitions apply only for the purposes of SWG planning.

Level I: These are species that are in decline and presently 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.

Table 1. North Dakota's 100 Species of Conservation Priority.

Level I	
Horned Grebe	*Podiceps auritus*
American White Pelican	*Pelecanus erythrorhynchos*
American Bittern	*Botaurus lentiginosus*
Swainson's Hawk	*Buteo swainsoni*
Ferruginous Hawk	*Buteo regalis*
Yellow Rail	*Coturnicops noveboracensis*
Willet	*Catoptrophorus semipalmatus*
Upland Sandpiper	*Bartramia longicauda*
Long-billed Curlew	*Numenius americanus*
Marbled Godwit	*Limosa fedoa*
Wilson's Phalarope	*Phalaropus tricolor*
Franklin's Gull	*Larus pipixcan*
Black Tern	*Chlidonias niger*
Black-billed Cuckoo	*Coccyzus erythropthalmus*
Sprague's Pipit	*Anthus spragueii*
Grasshopper Sparrow	*Ammodramus savannarum*
Baird's Sparrow	*Ammodramus bairdii*
Nelson's Sharp-tailed Sparrow	*Ammodramus nelsonii*
Lark Bunting	*Calamospiza melanocorys*
Chestnut-collared Longspur	*Calcarius ornatus*
Canadian Toad	*Bufo hemiophrys*
Plains Spadefoot	*Spea bombifrons*
Smooth Green Snake	*Liochlorophis vernalis*
Western Hognose Snake	*Heterodon nasicus*
Black-tailed Prairie Dog	*Cynomys ludovicianus*
Sturgeon Chub	*Macrhybopsis gelida*
Sicklefin Chub	*Macrhybopsis meeki*
Pearl Dace	*Margariscus margarita*
Blue Sucker	*Cycleptus elongatus*

Level II	
Northern Pintail	*Anas acuta*
Canvasback	*Aythya valisineria*
Redhead	*Aythya americana*
Northern Harrier	*Circus cyaneus*
Golden Eagle	*Aquila chrysaetos*
Bald Eagle	*Haliaeetus leucocephalus*
Prairie Falcon	*Falco mexicanus*
Sharp-tailed Grouse	*Tympanuchus phasianellus*
Greater Prairie-Chicken	*Tympanuchus cupido*
Greater Sage-Grouse	*Centrocercus urophasianus*
Piping Plover	*Charadrius melodus*
American Avocet	*Recurvirostra americana*
Least Tern	*Sterna antillarum*
Short-eared Owl	*Asio flammeus*
Burrowing Owl	*Athene cunicularia*
Red-headed Woodpecker	*Melanerpes erythrocephalus*
Loggerhead Shrike	*Lanius ludovicianus*
Sedge Wren	*Cistothorus platensis*
Dickcissel	*Spiza americana*
Le Conte's Sparrow	*Ammodramus leconteii*
Bobolink	*Dolichonyx oryzivorus*
Common Snapping Turtle	*Chelydra serpentina*
Short-horned Lizard	*Phrynosoma douglassi*
Northern Redbelly Snake	*Storeria occipitomaculata*
Pygmy Shrew	*Sorex hoyi*
Richardson's Ground Squirrel	*Spermophilus richardsonii*
Swift Fox	*Vulpes velox*
River Otter	*Lutra canadensis*
Black-footed Ferret	*Mustela nigripes*
Paddlefish	*Polyodon spathula*
Pallid Sturgeon	*Scaphirhynchus albus*
Silver Chub	*Macrhybopsis storeriana*
Northern Redbelly Dace	*Phoxinus eos*
Flathead Chub	*Platygobio gracilis*
Trout-perch	*Percopsis omiscomaycus*
Threeridge	*Amblema plicata*
Wabash Pigtoe	*Fusconaia flava*
Mapleleaf	*Quadrula quadrula*
Black Sandshell	*Ligumia recta*
Creek Heelsplitter	*Lasmigona compressa*
Pink Heelsplitter	*Potamilus alatus*

Level III	
Whooping Crane	*Grus americana*
Peregrine Falcon	*Falco peregrinus*
Brewer's Sparrow	*Spizella breweri*
McCown's Longspur	*Calcarius mccownii*
Smooth Softshell Turtle	*Apalone mutica*
False Map Turtle	*Graptemys pseudogeographica*
Northern Prairie Skink	*Eumeces septentrionalis*
Northern Sagebrush Lizard	*Sceloporus graciosus*
Arctic Shrew	*Sorex arcticus*
Western Small-footed Myotis	*Myotis ciliolabrum*
Long-eared Myotis	*Myotis evotis*
Long-legged Myotis	*Myotis volans*
Plains Pocket Mouse	*Perognathus flavescens*
Hispid Pocket Mouse	*Chaetodipus hispidus*
Sagebrush Vole	*Lemmiscus curtatus*
Eastern Spotted Skunk	*Spilogale putoris*
Gray Wolf	*Canis lupis*
Chestnut Lamprey	*Ichthyomyzon castaneus*
Silver Lamprey	*Ichthyomyzon unicuspis*
Central Stoneroller	*Campostoma anomalum*
Hornyhead Chub	*Nocomis biguttatus*
Pugnose Shiner	*Notropis anogenus*
Blacknose Shiner	*Notropis heterolepis*
Rosyface Shiner	*Notropis rubellus*
Finescale Dace	*Phoxinus neogaeus*
Yellow Bullhead	*Ameiurus natalis*
Flathead Catfish	*Pylodictis olivaris*
Logperch	*Percina caprodes*
River Darter	*Percina shumardi*
Pink Papershell	*Potamilus ohiensis*

Table 2. Matrix of avian SoCP and corresponding source score/listing.

Corresponding Source Number		18		18		19		20	6	21			22	
Species of Conservation Priority Level	**Birds**	PIF Area Importance for BCR11	PIF Total Assessment Score for BCR11	PIF Area Importance for BCR17	PIF Total Assessment Score for BCR17	USSCP National	USSCP Regional	NPPWCP	Current Federal Status	USFWS BCC BCR11 (Fig. 2)	USFWS BCC BCR17 (Fig. 2)	USFWS BCC Region 6 (Fig. 3)	NAWMP Breeding Importance/ Habitat Conservation Need for BCR11	NAWMP Breeding Importance/ Habitat Conservation Need for BCR17
1	Horned Grebe	3	19					High						
1	American White Pelican	4	21	4	21			Moderate						
1	American Bittern	5	22	2	18			High		X				
2	Northern Pintail	5	20	3	15								High/Highest	Mod. High/High
2	Canvasback	5	20	2	17								High/High	Mod. Low/Mod. Low
2	Redhead	5	19	2	18								High/High	Mod. Low/Mod. Low
2	Northern Harrier	5	22	5	21					X		X		
1	Swainson's Hawk	5	25	4	21					X		X		
1	Ferruginous Hawk	5	22	5	23					X	X	X		
2	Golden Eagle			5	19						X	X		
2	Bald Eagle	1	16	1	16				T					
3	Peregrine Falcon	2	19	3	19				Delisted	X	X	X		
2	Prairie Falcon			4	23						X	X		
2	Sharp-tailed Grouse	5	22	5	20									
2	Greater Prairie-Chicken	2	26	2	26									
2	Greater Sage-Grouse			5	25									
1	Yellow Rail	3	26					High		X		X		
3	Whooping Crane							Listed	E					
2	Piping Plover	2	26	3	27	5	5		T					
2	American Avocet	3	20	2	18	3	4							
1	Willet	5	24	2	20	3	3			X				
1	Upland Sandpiper	5	23	5	22	2	4			X	X	X		
1	Long-billed Curlew	5	24	4	24	5	2			X	X	X		
1	Marbled Godwit	5	26	2	21	4	4			X	X	X		
1	Wilson's Phalarope	5	25	5	27	4	4			X	X	X		
1	Franklin's Gull	5	21	1	18			High						
2	Least Tern	3	17	2	16			Listed	E					
1	Black Tern	5	20	1	17			High						
1	Black-billed Cuckoo	5	24	3	22					X	X	X		
2	Burrowing Owl	2	21	3	20					X	X	X		
2	Short-eared Owl	3	22	4	21					X	X	X		
2	Red-headed Woodpecker	4	22	2	21					X		X		
2	Loggerhead Shrike	2	19	3	17					X		X		
2	Sedge Wren	5	21	1	18									
1	Sprague's Pipit	5	27	3	21					X	X	X		
3	Brewer's Sparrow			3	21						X	X		
1	Lark Bunting	2	21	5	21									
1	Grasshopper Sparrow	4	22	5	22					X	X	X		
1	Baird's Sparrow	5	29	4	27					X	X	X		
2	Le Conte's Sparrow	4	24	2	22					X	X	X		
1	Nelson's Sharp-tailed Sparrow	5	28							X		X		
3	McCown's Longspur	5	29	5	28					X	X	X		
1	Chestnut-collared Longspur	5	24	5	27					X	X	X		
2	Dickcissel	2	20	2	23						X	X		
2	Bobolink	4	20	2	18							X		

Table 3. Matrix of amphibian, reptile, and mammal SoCP and corresponding source score/listing.

Corresponding Source Number		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	23	
Species of Conservation Priority Level	**Amphibians and Reptiles**	E, T & P Wildlife	NDCTWS	The Rare Ones	NDGFD Nongame Management Plan	ND Federal T,E & Candidate 1995	Current Federal Status	North Dakota Natural Heritage Rare Animals	North Dakota Natural Heritage State Ranks	South Dakota Natural Heritage State Ranks	Montana Natural Heritage State Ranks	Minnesota DNR: E, T, and Special Concern	TNC Northern Tallgrass Prairie Plan (Fig. 4)	TNC Northern Great Plains Steppe Plan (Fig.4)	IUCN Red List 2003	National Forest Service Northern Region	BLM Montana/Dakotas	COSEWIC	American Society of Mammalogists	Comments
1	Plains Spadefoot										S3									"Most warranted"
1	Canadian Toad										S1		2							Limited range
2	Common Snapping Turtle										S3	SC								
3	False Map Turtle	P	P	P	X	C		X	SU	S3										
3	Smooth Softshell Turtle	P	P	P	X			X	SU	S2		SC								
3	Northern Sagebrush Lizard	P	P	P	X	C		X	S4	S2	S3									
2	Short-horned Lizard		P	P		C		X	S?	S2	S3									
3	Northern Prairie Skink	P	P	P	X			X	S2S3				2					SC		
2	Northern Redbelly Snake									S3										
1	Western Hognose Snake										S3	SC								
1	Smooth Green Snake									S4	S2S3									
	Mammals																			
3	Arctic Shrew									S1										Limited range
2	Pygmy Shrew		W	W	X			X	SU	S2	S3									
3	Western Small-footed Myotis			W	X	C		X	SU											
3	Long-eared Myotis		W	W	X	C		X	SU	S1										
3	Long-legged Myotis		W	W	X	C		X	SU											
3	Hispid Pocket Mouse	P	P	P	X			X	S4		S1									
3	Plains Pocket Mouse	P	W	W	X			X	SU	S5	S3	SC	2							
3	Sagebrush Vole							X	S4	S1								D	X	
1	Black-tailed Prairie Dog		W	W	X	C		X	SU		S3/S4			1	X	X	X	SC		Recently delisted from candidate list
2	Richardson's Ground Squirrel																			Anecdotal observations of loss
3	Gray Wolf	E	W		X	E	T	X	SX	SA	S3	SC	2	1						Recently down listed
2	Swift Fox	E	E	E	X	C		X	S1	S1	S1			1	X					
2	River Otter		E	E	X			X	S1	S2										
2	Black-footed Ferret	E	E	E	X	E	E	X	S1	S1	S1			1	X	X	X	T	X	
3	Eastern Spotted Skunk			W	X			X	S1	S3	S1	T	2				X			

1, 2, 3, 11, and 17: E = Endangered, T = Threatened, P = Peripheral, Ext. = Extirpated, SC = Special Concern, W = Watch, NAR = Not At Risk, D = Data deficient
4, 7, 14, 15, 16, and 23: X = the species was designated on this list
5: C = once listed as a federal Candidate species
6: E = federal Endangered species, T = federal Threatened species, C = federal Candidate species
8, 9, and 10: S1 = Critically Imperiled, S2 = Imperiled, S3 = Vulnerable, S4 = Apparently Secure, S5 = Secure, SU = Unrankable, SX = Presumed Extirpated, SR = Reported
12 and 13: 1 = Primary and 2 = Secondary target species

Table 4. Matrix of fish and freshwater mussel SoCP and corresponding source score/listing.

Corresponding Source Number		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	24	
Species of Conservation Priority Level	**Fish**	E, T & P Wildlife	NDCTWS	The Rare Ones	NDGFD Nongame Management Plan	ND Federal T,E & Candidate 1995	Current Federal Status	North Dakota Natural Heritage Rare Animals	North Dakota Natural Heritage State Ranks	South Dakota Natural Heritage State Ranks	Montana Natural Heritage State Ranks	Minnesota DNR: E, T, and Special Concern	TNC Northern Tallgrass Prairie Plan (Fig. 4)	TNC Northern Great Plains Steppe Plan (Fig. 4)	IUCN Red List 2003	National Forest Service Northern Region	BLM Montana/Dakotas	COSEWIC	American Fisheries Society	Comments
3	Chestnut Lamprey							X										SC	P/SC1	
3	Silver Lamprey							X		SA									P/SC2	
2	Pallid Sturgeon	T	T	T	X	E	E	X	S1	S1	S1		1	1	X				E	
2	Paddlefish		W	W	X	C		X	S?		S1S2	T			X		X		SC1	
3	Central Stoneroller	T	W	W	X			X	S3										P/SC1	
1	Sturgeon Chub	T	W	W	X	C		X	S2	S2	S2			1	X				T	
1	Sicklefin Chub	E	W	W	X	C		X	S2	S1	S1			1	X				E	
2	Silver Chub							X										SC	SC2	
1	Pearl Dace	T	W	W	X			X	S3	S2	S2								SC1	
3	Hornyhead Chub	T	W	W	X			X	S3	S3								NAR	P/SC1	
3	Pugnose Shiner	T	W	W	X			X	S1			S3	1						T	
3	Blacknose Shiner	T	P	P	X			X	S3	S1									P/SC1	
3	Rosyface Shiner	T	P	P	X			X	S3	S2									P/SC1	
2	Northern Redbelly Dace	T	W	W	X			X	S4	S2									SC1	
3	Finescale Dace	P	W	P	X			X		S1									P/SC1	
2	Flathead Chub					C		X											SC1	
1	Blue Sucker	T	W	W	X	C		X	S3	S3	S2S3	SC	1	1	X				SC1	
3	Yellow Bullhead	P	P	P	X			X											P/SC2	
3	Flathead Catfish	P	P	P	X			X	S4										P/SC1	
2	Trout-perch							X		S2	S2								SC2	
3	Logperch	P	P	P	X			X	S3	S3									P/SC2	
3	River Darter	P	P	P				X											P/SC1	
	Mussels																			
2	Threeridge									S2										
2	Wabash Pigtoe				X			X	S4	S1										
2	Mapleleaf				X			X	S3	S2										
2	Black Sandshell				X			X	S4	S1	SC									
2	Creek Heelsplitter									S1	SC									
2	Pink Heelsplitter				X			X	S4	S3										
3	Pink Papershell							X	SU	S5										

1, 2, 3, 11, and 17: E = Endangered, T = Threatened, P = Peripheral, Ext. = Extirpated, SC = Special Concern, W = Watch, NAR = Not At Risk, D = Data deficient
4, 7, 14, 15, and 16: X = the species was designated on this list
5: C = once listed as a federal Candidate species
6: E = federal Endangered species, T = federal Threatened species, C = federal Candidate species
8, 9, and 10: S1 = Critically Imperiled, S2 = Imperiled, S3 = Vulnerable, S4 = Apparently Secure, S5 = Secure, SU = Unrankable, SX = Presumed Extirpated, SR = Reported
12 and 13: 1 = Primary and 2 = Secondary target species
24: SC1 = Special Concern 1, SC2 = Special Concern 2, P/SC1 = Peripheral/Special Concern 1, P/SC2 = Peripheral/Special Concern

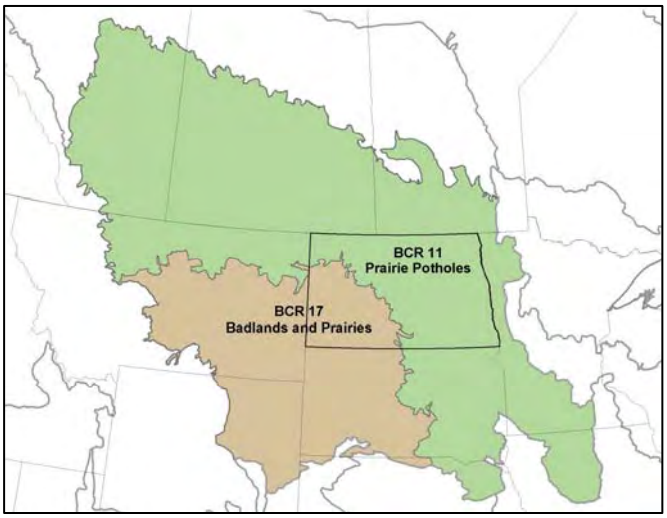

Figure 2. Bird Conservation Regions (BCR) encompassing North Dakota.

Figure 3. USFWS Region 6 states.

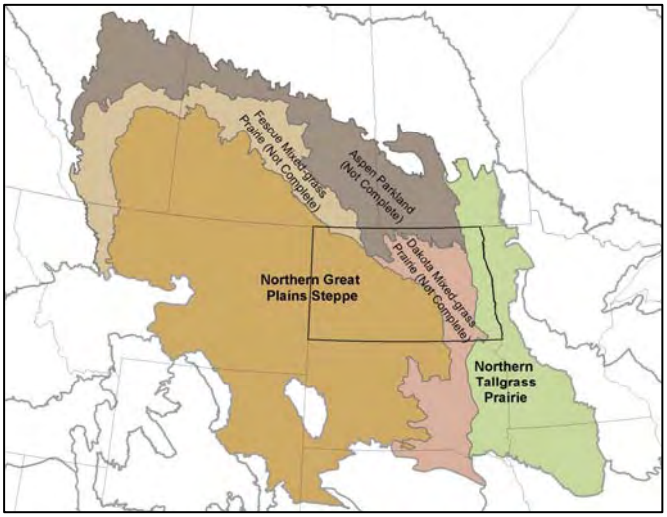

Figure 4. TNC Ecoregions encompassing North Dakota.

3.5 Primary Sources for Identifying Species of Conservation Priority

(Note: The numbered source corresponds to the first column in tables 2-4)

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SECTION 4

Habitat, Threats, and Conservation Actions

This section includes background information on how the following required elements were addressed and developed in North Dakota's CWCS:

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

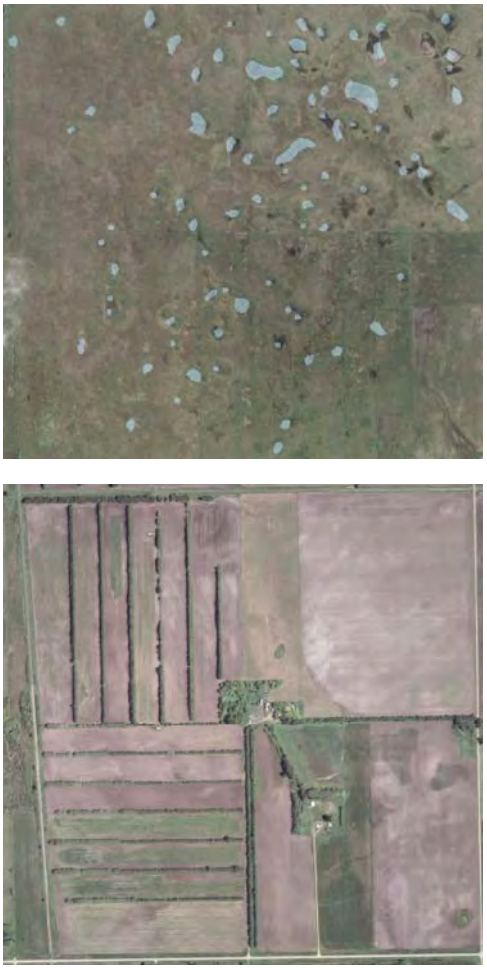
Element 3: This element requires descriptions of problems that may adversely affect species of conservation priority or their habitats, and priority research and survey efforts needed to identify factors that may assist in restoration and improved conservation of those species and habitats.

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.

4.1 Overview of Habitat and Community Types

Most of 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.

In the last 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 (see Appendix D for this and other map examples of other conservation challenges in North Dakota). It's estimated that 50 percent of the prairie and wetlands have been plowed or drained. Numerous tree shelterbelts were planted to help reduce erosion and protect farmsteads (see Figure 4). 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 5 provides a breakdown of the major land classes present in North Dakota today.



These two photos depict typical scenes of pre- and post-settlement. The top photo shows one square mile of native prairie with naturally occurring wetlands in blue while the bottom photo shows one square mile of agricultural land with several straight-line tree shelterbelts. Both aerial photographs from Grand Forks County.

4.1.a Habitat or Community Types Considered

North Dakota 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 CWCS will emphasize 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.

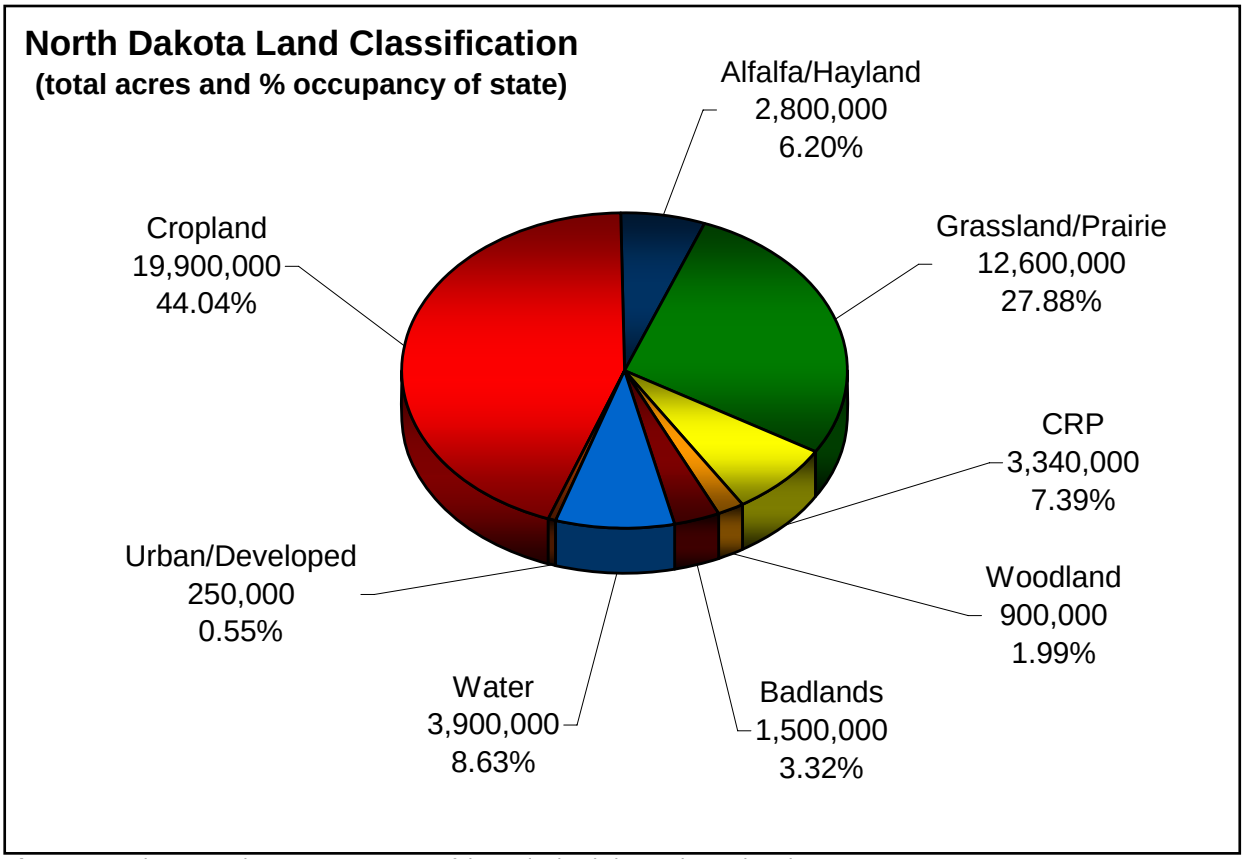


Figure 5. Total acres and percent occupancy of the major land classes in North Dakota.

Sources: North Dakota GAP Analysis, National Wetlands Inventory, National Agricultural Statistics Service, Farm Service Agency

4.2 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 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.

4.2.a Resources Used for Delineating Landscape Components

This section describes the information sources used for identifying key habitats and community types for North Dakota's CWCS. 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.

4.2.a.i Landcover

Several landcover classifications are available for North Dakota. The primary classifications used include:

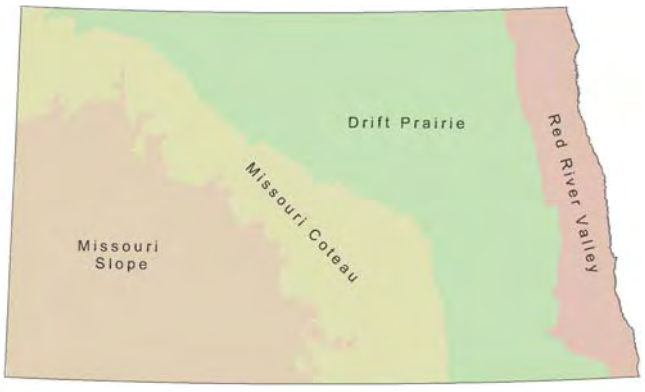
- ND GAP Analysis Statewide Landcover. Imagery used is dated from 1992-1998. There are 39 land classifications, focused primarily on non-cropland. The ground resolution is 30x30 meters.
- NASS (National Agricultural Statistics Service) statewide Landcover for 2003. The dates for imagery range from August 9-14, 2003. There are 27 land classifications, focused primarily on cropland types. The ground resolution is 30x30 meters.
- USFWS Landcover Classification for that portion of the state east of the Missouri River only. Imagery used dates from 1991-1995. There are 15 land classifications. The ground resolution is 30x30 meters.

By combining portions of the GAP and NASS landcovers, a more accurate vegetation layer for the entire state was produced. The NASS layer provides the most recent picture of cropland status while the GAP layer provides the best information on non-cropped areas. Landcover classes were merged based on similarity of cover type (e.g. the multiple prairie cover types were merged and reduced to two primary types: prairie/grassland, and planted or artificial prairie/grassland). By overlaying the NASS cropland cover classes on the GAP layer, a depiction of available vegetation was produced. A total of nine cover types were selected to represent the CWCS Landcover. These include cropland, planted or artificial grassland, prairie/grassland, shrubland, woodland, badlands, barren/sparse land, water, and developed. Although this does not provide insight as to the condition of the vegetation, it essentially provides a vision of what is cropland and what is not.

CWCS Landcover.

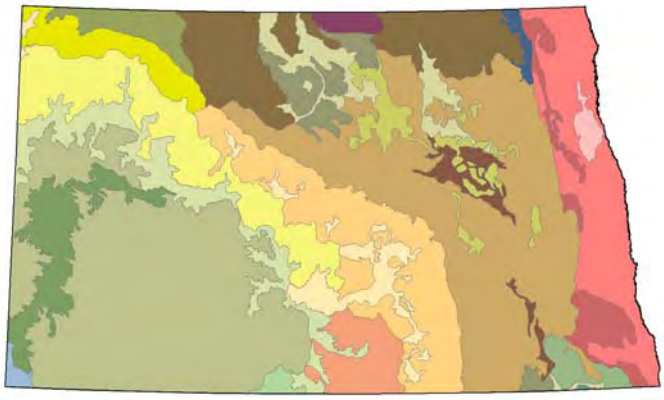
4.2.a.ii Ecoregions

There are two primary large scale geographic classification schemes that are commonly used for North America (i.e. Bailey et al. 1994 and Omernick 1987). Although different, they basically 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



Level III Ecoregions.

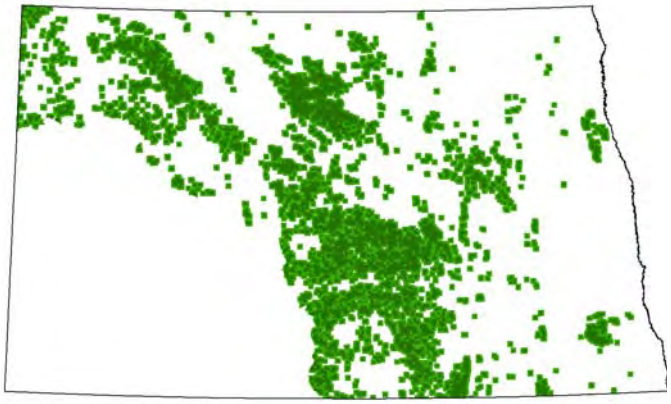
are differences between classification schemes, the EPA undertook a collaborative effort to develop a common framework of ecological regions for North Dakota in the mid 1990s. Using this approach North Dakota was divided into four level III ecoregions: the Lake Agassiz Plain, the Northern Glaciated Plains, 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 xx). 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.



Level IV Ecoregions.

4.2.a.iii Planning Models

Planning 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 has developed several models useful in predicting areas of bird conservation priority for grassland/wetland species in the Prairie Pothole Region of North Dakota. 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 SoCP. Other models depicting species presence/absence based on BBS information for some grassland/wetland associated species have been developed and will be used wherever possible.



GBCA model.

4.3 Process for Developing the CWCS Landscape Components and Focus Areas

North Dakota is predominately a grassland state with a variety of grassland types. Where these changes in grassland communities occur is an important factor in identifying different landscapes. The EPA's level III ecoregions provides a good framework for identifying the boundaries of different grassland landscapes in North Dakota. These grassland types are Tallgrass Prairie (Red River Valley), Eastern Mixed-grass Prairie (Drift Prairie), Mixed-grass Prairie (Missouri Coteau), and Western Mixed-grass/shortgrass Prairie (Missouri Slope). Each of these is considered as a separate landscape component. In addition to native grassland communities, there are several other major landscape components in North Dakota. They include planted or tame grassland, wetlands/lakes, rivers/streams/riparian, badlands and upland deciduous forest. These landscape components are embedded within the various grassland communities. They are typically rather large geographic areas that have fairly specific vegetative communities, topography, land uses, etc. Using this approach, nine landscape components were identified. (see Appendix B for individual landscape component maps).

In some cases there was sufficient information or reason to identify focus areas within a particular landscape component. These were developed using a GIS (i.e. ArcMap) that overplayed the Level IV ecoregions on the land cover layer that was developed for the CWCS. Some of the Level IV ecoregions boundaries were modified based on vegetation information provided by the CWCS landcover. The statistical models aided in further refining focus area boundaries. 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 Appendix C for focus area maps).

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 if managed properly.

4.3.a References

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4.4 The Process for Identifying Threats and Conservation Actions

Beginning in 2002, 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. At several of the meetings the group discussed the idea of forming a work group that would meet periodically to discuss ideas, ongoing research, information needs, etc. Many of the participants agreed that this was a good idea and one worth continuing.

For the most part, major problems affecting species and associated conservation actions were identified in general terms (i.e. loss of habitat due to agricultural conversion, protect habitat with grassland easements). More specific information was often lacking. For example, although a substantial portion of sagebrush habitat in North Dakota has been converted to cropland or has been severely degraded by grazing or other land uses, a fair amount of habitat remains intact. Sage grouse numbers, however, continue to decline. Potential reasons include continued habitat conversion, industrial development, grazing, noxious weeds, invasive plants, predation, disease and climatic conditions. While conservation issues and actions have been identified for all of these potential problems, the exact cause of the sage grouse decline, as well as the conservation actions needed to reverse the decline, are not certain (see Appendix E for examples of the effects of various management practices on birds and ideal breeding/habitat conditions).

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. NDGFD staff met with all of these groups and most have expressed a willingness to consider SoCP needs in future efforts and possibly partner on habitat projects of mutual benefit.

4.4.a Research Needs for Developing Conservation Actions

There is a clear need to collect baseline presence, absence and distribution data for many SoCP. There is also a major need to conduct research or collect information on threats and conservation actions affecting many of these species. It is essential to strike a balance between initiating studies or research to improve understanding of the threats and/or conservations actions with those studies intended to provide a better understanding of the population status for SoCP. Some of the threats and conservation actions are fairly well researched and documented (e.g. loss of native prairie and wetlands to cropland) while others have only been discussed or identified in a generic or anecdotal sense (e.g. pesticides, herbicides, road kills, disease, etc.). In those instances where little or nothing is known about the population status of a particular species, there is an overriding need to obtain this information prior to initiating action on generic or perceived threats. As varying climatic conditions and habitat in North Dakota can mean substantial changes in many populations, it would be imprudent to begin studies or research on unsubstantiated threats or conservations actions without first knowing something about the population status or natural variability of a particular species or group of species. When the population status of a species is not in question, and conservation actions and/or threats are well defined, documented and understood, the intention will be to initiate conservation actions that improve habitat conditions or reduce the impacts of threats. For SoCP that have good population trend data but whose threats and conservation actions are not well understood, research is needed to identify relevant threats and the appropriate conservation measures which might be conducted.

4.4.b Relative Priority of Research Needs for SoCP

The North Dakota CWCS identifies many research needs, survey efforts and necessary conservation actions (see also species accounts in Appendix A). Since funds for all of these actions are not available, priority was given to those species in the greatest need of conservation in order to stretch SWG dollars as far as possible. As it states in section 3.3, Level I SoCP are those that are in decline and have little or no monetary support. These species will be given priority for SWG funding when opportunities for survey or monitoring efforts and conservation actions occur. However, this will not preclude the NDGF from using SWG funding on Level II and Level III species when project opportunities and partners arise. This will ensure that all species in North Dakota will benefit from the CWCS and SWG funding.

4.5 Conservation Issues or Limits in North Dakota

North Dakota is an agricultural state. It ranks number one in production of barley and sunflowers in the United States. The state ranks number two for wheat production, and interestingly, number four for bee and honey production. There are approximately 30,000 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 (see figures 6 and 7). Cattle production ranks number 16 in the nation with nearly 1.9 million cattle raised in the state. The number of cattle operations has also declined, with a peak of 35,000 operations in 1965 and about 12,000 in 2002 (see figure 8). There are few operations with large numbers (500+ head) of cattle (see figure 9).

Figure 6. Number of farms in North Dakota.

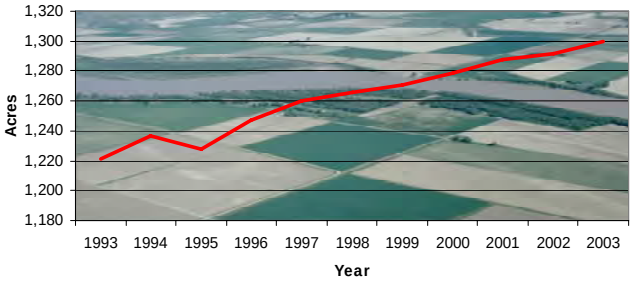


Figure 7. Average farm size in North Dakota.

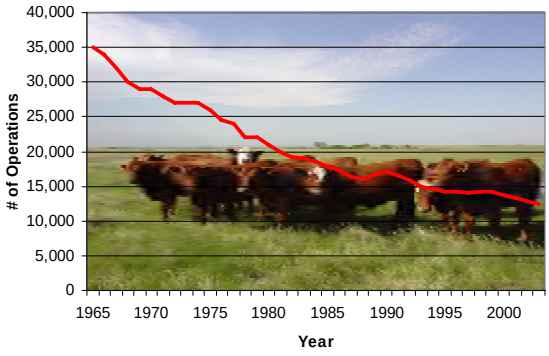


Figure 8. Number of cattle operations in North Dakota.

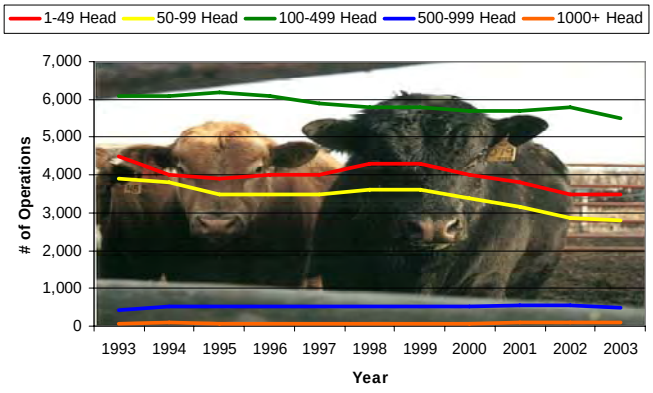


Figure 9. Number of cattle per operation in North Dakota.

4.5.a Private Land

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 make up a farm or ranch provide much of the state's habitat.. Therefore, the quantity and quality of these components will influence how successful the CWCS is 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. These landowners should be commended for their voluntary efforts to preserve a variety of fish and wildlife resources on their land. In addition, many landowners in the state have entered into conservation practices with the NRCS, USFWS, NDGFD and others. Besides farmers and ranchers, an increasing number of hunters and other recreationists have been purchasing land.

Since so much of the state is privately owned, it is worth noting some private land regulations, particularly in relation to conservation of wildlife and fish resources. Some laws were intended to protect private property rights and others to prohibit establishment of corporate farming. However, in other cases, conservation-minded landowners may be prevented by law from taking advantage of programs to protect natural areas on their property.

4.5.a.i Easements

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 example, a grassland easement between a landowner and the USFWS or DU 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, and are designed to protect the conservation value of existing habitat.

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 wholeheartedly by farm groups. Easements of 30 years or fewer implement conservation actions, yet give the operator the opportunity to decide which management strategies to employ in the future.

In every other state except North Dakota, landowners have the right to donate or sell perpetual conservation easements. However, according to N.D.C.C § 47-05-02.1, a North Dakota landowner may not consent to an easement from the state that exceeds 99 years. In order to prevent grassland birds such as the Baird's sparrow and Sprague's pipit from becoming endangered indefinitely, native prairie habitat must remain intact. The law preventing perpetual easements from being sold or donated in North Dakota could be a major impediment.

4.5.a.ii The Right to Purchase and Sell

The ability to own land in the United States is a gift. The right to sell land to willing buyers is just as valued. In many states, nonprofit organizations through fee title purchase are the leading conservers of natural areas.

Nonprofit organizations may purchase land but it is not an easy process in North Dakota. According to N.D.C.C § 10-06.1-10, "before farmland or ranchland may be purchased by a nonprofit organization for the purpose of conserving natural areas and habitats for biota, the governor must approve the proposed acquisition." In addition, before such a purchase takes place, a proposed acquisition plan must be submitted to the agriculture commissioner who then convenes an advisory committee to review the

proposed acquisition. The advisory committee consists of the director of the state Parks and Recreation Department, the Agricultural commissioner, the state forester, the director of the state Game and Fish Department, the president of the North Dakota Farmers Union, the president of the North Dakota Farm Bureau, the president of the North Dakota Stockmen's Association, and the chairman of the county commission of any county in which the land is to be acquired. The advisory committee holds a public hearing with the board of county commissioners and makes a recommendation to the governor if the land can be sold. The governor then makes the ultimate decision if the land may be acquired by the nonprofit organization. The nonprofit organization will be required to make payments in lieu of property taxes on the property, calculated in the same manner as if the property was subject to full assessment and levy of property taxes. This process is often unappealing to nonprofit conservation groups and is disappointing to landowners who wish to sell their land for conservation purposes.

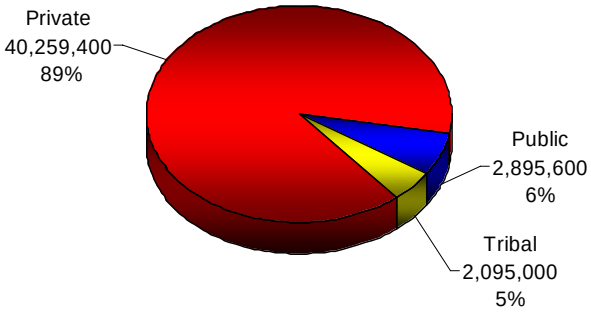


Figure 10. Land ownership in North Dakota. Total acres and % occupancy of the state.

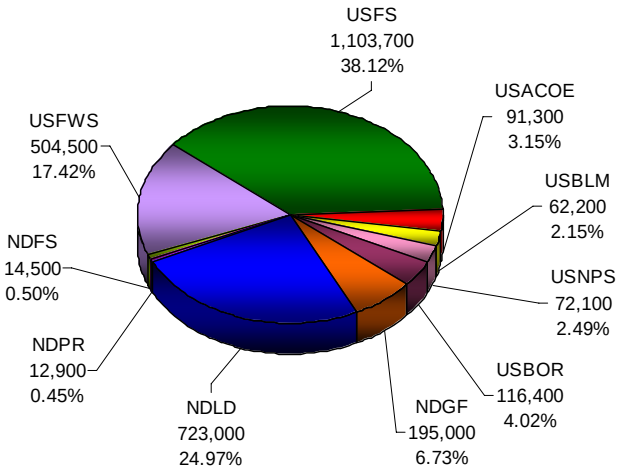


Figure 11. Public land ownership breakdown in North Dakota. Total acres and % of total public land.

4.5.b Public Land

A small percentage of North Dakota is held in public ownership. 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 relief in knowing that most of the public land is safe from conversion to cropland. Also, much public land, such as state school land, is still native vegetation. The potential exists to work cooperatively with other state and federal land holders to alter management practices to benefit SoCP and demonstrate the effectiveness of conservation tools to enhance wildlife habitat and populations.

Land acquisition is not a high priority conservation action for preserving SoCP. This is partly because the purchase of land in fee-title by the NDGFD is not a simple process. According to N.D.C.C § 20.1-02-05.1, every land acquisition exceeding 10 acres or $10,000 must be approved by the budget section of the legislative council. The governor must also approve the acquisition. If a federal agency such as the USFWS were to purchase land, the board of county commissioners of the affected county shall inspect the proposed acquisition area, give public notice of the acquisition, and then approve or disprove the acquisition (see N.D.C.C § 20.1-02-17.1). Because of these complexities, fee title acquisition of private land by public agencies is not a conservation tool that can be used with much frequency. There are, however, select opportunities where this option can be pursued. One example is in instances where unique habitats or natural areas are being threatened and the landowner is willing to sell. See N.D.C.C § 20.1-02-16.2 and N.D.C.C § 55-11-01 for further information on acquiring natural areas for the common benefit of the people of present and future generations.

SECTION 5

Landscape Components

This section includes **the 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.

5.0 The Landscape Components

This section is devoted to the nine primary landscape components and the 21 focus areas identified as key habitats or community types essential to species of conservation priority. Definitions for the bolded items of the subsections are as follows:

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.*
Predominant Natural Vegetation: *the primary natural grasses, forbs, shrubs, trees, or other vegetation present prior to European settlement.*
Associated Species of Conservation Priority: *the SoCP requiring the landscape component habitat during some portion of its life cycle.*
Key Associated Species of Conservation Priority: *the SoCP known to occur or depend highly upon a focus area.*
Other Characteristic Wildlife: *a comprehensive list of other fish and wildlife requiring the landscape component habitat during some portion of its life cycle.*

5.0.a Landscape Component Conservation Problems and Actions

For each landscape component and focus areas, a box (i.e. table) is provided with information on required elements 3 and 4. Because focus areas are embedded within the larger landscape areas, only one box is provided. The problems and conservation actions are not directed at specific species, but rather at the landscape component (i.e. habitat) the SoCP depend upon for survival. Species specific problems and conservation actions or management recommendations are found in Appendix A. This list is not intended to be a comprehensive list of all problems 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. In this instance, the box is generally arranged with the highest priority conservation actions at the top and those of a lesser priority toward the bottom. Habitat loss, fragmentation, and degradation are identified by most conservation groups and partners as the biggest problem affecting fish and wildlife. The associated conservation actions are then of highest priority (e.g. protect native prairie from destruction). However, the relative priority of conservation actions may change as implementation occurs on the ground. For example, if a substantial area of native prairie has already been protected with easements 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.

The nine primary landscape components and twenty-one focus areas. See Appendices B and C for maps of the Landscape Components and Focus Areas.

Section	Landscape Component	Focus Area
5.1	Tallgrass Prairie (Red River Valley)	
5.1.a		Saline Area
5.1.b		Sand Deltas and Beach Ridges
5.2	Eastern Mixed-grass Prairie (Drift Prairie)	
5.2.a		Glacial Lake Deltas
5.2.b		Devils Lake Basin
5.3	Mixed-grass Prairie (Missouri Coteau)	
5.3.a		Missouri Coteau Breaks
5.4	Western Mixed-grass/Shortgrass Prairie (Missouri Slope)	
5.4.a		Big Sagebrush Shrub-Steppe
5.5	Planted or Tame Grassland	
5.5.a		CRP
5.6	Wetlands and Lakes	
5.7	Rivers, Streams, and Riparian	
5.7.a		Missouri River System/Breaks
5.7.b		Red River and Tributaries
5.7.c		Sheyenne River
5.7.d		James River
5.7.e		Souris River
5.7.f		Cannonball River
5.7.g		Heart River
5.7.h		Knife River
5.7.i		Little Missouri River
5.8	Badlands	
5.8.a		Ponderosa Pines
5.9	Upland Deciduous Forest	
5.9.a		Pembina Hills
5.9.b		Turtle Mountains
5.9.c		Devils Lake Mountains
5.9.d		Killdeer Mountains

5.1 Tallgrass Prairie (Red River Valley)

Area: 4,630,000 acres (1,874,000 ha)
Description and Overall Condition: This landscape component consists of the tallgrass prairie, and associated wetlands, historically found predominantly in the eastern one-fourth of North Dakota. The Red River of the North (see section 5.7.b for information on this focus area) forms the state line between North Dakota and Minnesota. This region today is commonly referred to as the Red River Valley. Until just 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 another focus area, the "Saline Area." The Red River Valley has few wetlands compared to the mixed-grass prairie to the west, with roughly 150,000 total wetland basin acres. Farmland with woodlot and shelterbelt plantings is now prevalent, particularly in Grand Forks County.

Predominant Natural Vegetation:

Grasses: big bluestem, little bluestem, switchgrass, Indiangrass, prairie dropseed, slender wheatgrass, porcupine grass, mat muhly, fescue sedge, meadow sedge
Forbs: western prairie-fringed orchid, blue-eyed grass, meadow anemone, prairie cinquefoil, wild licorice, prairie blazing star, tall goldenrod, black-eyed susan, white sage

Associated Species of Conservation Priority:

Birds	Mammals	Reptiles/Amphibians
American Bittern	Pygmy Shrew	Canadian Toad
Northern Pintail	Arctic shrew	Northern Prairie Skink
Northern Harrier	Plains Pocket Mouse	Smooth Green Snake
Sharp-tailed Grouse	Richardson' Ground Squirrel	Western Hognose Snake
Greater Prairie-chicken		
Willet		
Upland Sandpiper		
Marbled Godwit		
Wilson's Phalarope		
Short-eared Owl		
Sedge Wren		
Grasshopper Sparrow		
Le Conte's Sparrow		
Nelson's Sharp-tailed Sparrow		
Dickcissel		
Bobolink		

Other Characteristic Wildlife:

Birds: mallard, blue-winged teal, red-tailed hawk, American kestrel, ring-necked pheasant, killdeer, Eastern kingbird, Western kingbird, American crow, common yellowthroat, clay-colored sparrow, vesper sparrow, Savannah sparrow, Henslow's sparrow, Western meadowlark, brown-headed cowbird,
Mammals: Northern short-tailed shrew, white-tailed jackrabbit, snowshoe hare, Franklin's ground squirrel, thirteen-lined ground squirrel, Northern pocket gopher, plains pocket gopher, Western harvest mouse, deer mouse, Northern grasshopper mouse, prairie vole, meadow vole, meadow

jumping mouse, Western jumping mouse, coyote, red fox, raccoon, badger, striped skunk, white-tailed deer, moose

Reptiles and Amphibians: American toad, Great Plains toad, Northern leopard frog, chorus frog, tiger salamander, plains garter snake, common garter snake

5.1.a Focus Area: Saline Area

Area: 200,000 acres (83,000 ha)

Public Landholdings: 11,600 acres (NDGFD 4,100; NDSLD 1,800; USFWS 5,700)

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 with an easement. 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 major 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, upland sandpiper, sedge wren, Le Conte's sparrow

5.1.b Focus Area: Sand Deltas and Beach Ridges

Area: 914,000 acres (370,000 ha)

Public Landholdings: 83,750 acres (NDGFD 5,800; NDSLD 500; NDFS 450; NDPRD 1,400; USFWS 3,600; USFS 72,000)

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. Beach ridges of parallel lines of sand and gravel are more prevalent in the northern portion, along with a smaller delta east of the Pembina Hills. Some agriculture, including irrigation, is taking place in the deltas and around the beach ridges. This focus area contains the Sheyenne National Grasslands which is approximately 72,000 acres in size and is managed by the USFS, making this the largest publicly owned tallgrass prairie preserve in the United States (Martin and Svingen, 2003). Oak savannah occurs in the delta areas. The Sheyenne River runs through the deltas (see section 5.7.c for information on this focus area). Overall, the USFS land is in suitable condition, although there are areas of overgrazing. Stands of privately owned native tallgrass prairie adjacent to the SNG are not protected by easements or other conservation.

Key Species of Conservation Priority

Birds: greater prairie-chicken, sharp-tailed grouse, short-eared owl, upland sandpiper, sedge wren, Le Conte's sparrow

Mammals: plains pocket mouse

Reptiles and Amphibians: Northern prairie skink, Western hognose snake

Sand hills in southeastern North Dakota.

5.1.c Conservation Problems and Actions for the Tallgrass Prairie (Red River Valley)

TALLGRASS PRAIRIE (Red River Valley)				
CONSERVATION PROBLEM	CONSERVATION ACTION	POTENTIAL PARTNERS		
Direct Loss of Habitat				
Very little native tallgrass prairie remains.	Protect native tallgrass prairie where possible. Sites within the Saline Area and Sand Deltas or Beach Ridges are of high priority (e.g. easements or land acquisition)	NDGFD USFWS USFS NRCS PPJV	NDNRT DU TNC Audubon PF	Private Landowners GFAFB UND
Urban development around larger cities, particularly Fargo and Grand Forks.	Work with city planners to conserve existing native tallgrass prairie.	NDGFD Grand Forks Fargo		
Habitat Fragmentation				
Highly fragmented with roads, shelterbelts, and agricultural practices.	Consider removal of dilapidated shelterbelts or stands of trees within grassland, particularly within 50 meters of grassland patches >100 ha.	NDGFD USFWS USFS NRCS PPJV	TNC	Private Landowners Volunteers
Habitat Degradation				
Improper grazing practices.	Implement grazing systems to benefit tallgrass species.	NDGFD NDSLD USFWS USFS NRCS PPJV	DU TNC	Private Landowners NDSUEXT
Loss of fire regime.	Work cooperatively with state and federal agencies to develop BMPs that promote use of fire.	NDGFD NDSLD USFWS USFS NRCS	TNC	
Long term haying of native prairie.	Find alternative hay sources (e.g. grass banks)	No partners identified.		
Invasive and Noxious Species				
Leafy spurge of great concern, particularly in and around the SNG.	Control noxious weeds through biological and chemical methods.	NDGFD NDSLD USFWS USFS NRCS	NDWCA	Private Landowners NDSUEXT
Woody encroachment.	Use fire or other tools to prevent woody invasion of grassland.	NDGFD NDSLD USFWS USFS NRCS	TNC	
Pesticides				
Pesticide drift and application.	Work with state and federal agencies to enforce existing pesticide regulations.	NDGFD NDDAG USFWS USFS		Private Landowners

TALLGRASS PRAIRIE (Red River Valley)				
CONSERVATION PROBLEM	CONSERVATION ACTION	POTENTIAL PARTNERS		
Industrial Development				
Wind energy potential is fair to good.	Coordinate with wind energy companies to minimize impacts.	NDGFD USFWS		WIND NDSEED
Data Gaps				
Lack of baseline information on SoCP.	Survey areas of data gaps. Conduct research/surveys to establish baseline information on SoCP.	NDGFD NDSLD USFWS USFS NPWRC PPJV	DU TNC	Volunteers Universities
Conservation Awareness				
Continuing education.	Create informational brochures, use tools such as television, radio, newspapers, magazines, and public forums, to provide information to citizens on the need for conservation of fish and wildlife resources and habitat.	NDGFD USFWS USFS NRCS	DU TNC Audubon	NDSUEXT

5.2 Eastern Mixed-grass Prairie (Drift Prairie)

Area: 16,425,000 acres (6,647,000 ha)
Description and Overall Condition: This landscape component consists of the Eastern mixed-grass prairie, or Drift Prairie, and associated wetlands. 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 extensively drained or filled. The Pembina Hills, Turtle Mountains, and Devils Lake are defining features within this region but are included under the landscape component of Upland Deciduous Forest (see sections 5.9.a, 5.9.b and 5.9.c for information on these focus areas). A large area of untilled land due to sandy, gravelly soil from another 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 section 5.7.e for information on this focus area) 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 rest 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 sections 5.7.c and 5.7.d for information on these focus areas).

Predominant Natural Vegetation:

Grasses: prairie junegrass, green needlegrass, needle-and-thread, blue grama, little bluestem, yellow sedge, Western wheatgrass, Canada wild rye, spike oats, big sandgrass, porcupine grass, mat muhly, side-oats grama, Leiberg's panicum, needleaf sedge, threadleaf sedge
Forbs: pasque flower, Western wall-flower, torch flower, prairie rose, Missouri milkvetch, purple loco, lead plant, Indian breadroot, purple prairie-clover, gaura, hairy puccoon, harebell, stiff goldenrod, smooth fleabane, purple coneflower, upland wormwood, fringed sage

Associated Species of Conservation Priority:

Birds	Mammals	Reptiles/Amphibians
American Bittern	Arctic Shrew	Plains Spadefoot
Northern Pintail	Pygmy Shrew	Canadian Toad
Northern Harrier	Richardson's Ground Squirrel	Smooth Green Snake
Swainson's Hawk		Western Hognose Snake
Ferruginous Hawk		
Sharp-tailed Grouse		
Willet		
Upland Sandpiper		
Marbled Godwit		
Wilson's Phalarope		
Short-eared Owl		
Loggerhead Shrike		
Sedge Wren		
Sprague's Pipit		
Lark Bunting		
Grasshopper Sparrow		
Baird's Sparrow		
Le Conte's Sparrow		
Nelson's Sharp-tailed Sparrow		
Chestnut-collared Longspur		
Dickcissel		
Bobolink		

Other Characteristic Wildlife:

Birds: American wigeon, green-winged teal, mallard, blue-winged teal, Northern shoveler, gadwall, lesser scaup, red-tailed hawk, American kestrel, gray partridge, ring-necked pheasant, spotted sandpiper, killdeer, mourning dove, common nighthawk, Western kingbird, Eastern kingbird, horned lark, American crow, Eastern bluebird, common yellowthroat, clay-colored sparrow, vesper sparrow, Savannah sparrow, Western meadowlark, brown-headed cowbird
Mammals: Northern short-tailed shrew, white-tailed jackrabbit, snowshoe hare, Franklin's ground squirrel, thirteen-lined ground squirrel, Northern pocket gopher, olive-backed pocket mouse, Western harvest mouse, deer mouse, Northern grasshopper mouse, prairie vole, meadow vole, meadow jumping mouse, Western jumping mouse, coyote, red fox, raccoon, badger, striped skunk, white-tailed deer, moose
Reptiles and Amphibians: American toad, Great Plains toad, Woodhouse's toad, Northern leopard frog, chorus frog, tiger salamander, plains garter snake, common garter snake

5.2.a Focus Area: Glacial Lake Deltas

Area: 1,500,000 acres (606,000 ha)
Public Landholdings: 92,200 acres (NDGFD 2,300; NDSLD 34,700; NDFS 800; USFWS 54,400)
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. 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: Sprague's pipit, Baird's sparrow, Le Conte's sparrow

Native mixed-grass prairie hillside.

5.2.b Focus Area: Devils Lake Basin

Area: 1,295,000 acres (525,000 ha)
Public Landholdings: 71,600 acres (NDGFD 3,300; NDSLD 22,500; NDPRD 1,000; USFWS 44,800)
Description and Condition: Extensive wetland drainage and intense farming is predominant 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. 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, Northern harrier, Swainson's hawk, sharp-tailed grouse, willet, upland sandpiper, marbled godwit, short-eared owl, bobolink
Mammals: Richardson's ground squirrel
Reptiles and Amphibians: plains spadefoot

5.2.c Conservation Problems and Actions for the Eastern Mixed-grass Prairie (Drift Prairie)

EASTERN MIXED-GRASS PRAIRIE (Drift Prairie)				
CONSERVATION PROBLEM	CONSERVATION ACTION	POTENTIAL PARTNERS		
Direct Loss of Habitat				
Substantial loss of native prairie.	Protect native prairie where possible, particularly within the Glacial Lake Deltas (e.g. easements or land acquisition).	NDGFD USFWS NDSLD NRCS PPJV	NDNRT DU TNC PF	Private Landowners
Habitat Fragmentation				
Highly fragmented with roads, shelterbelts, and agricultural practices.	Consider removal of dilapidated shelterbelts or stands of trees within grassland, particularly within 50 meters of grassland patches >100 ha.	NDGFD USFWS NDSLD NRCS PPJV	TNC	Private Landowners Volunteers
Habitat Degradation				
Improper grazing practices.	Implement grazing systems to benefit mixed-grass prairie species.	NDGFD NDSLD USFWS USFS NRCS PPJV	DU TNC	Private Landowners NDSUEXT
Loss of fire regime.	Work cooperatively with state and federal agencies to develop BMPs that promote use of fire.	NDGFD NDSLD USFWS NRCS	TNC	
Long term haying of native prairie.	Find alternative hay sources (e.g. grass banks)	No partners identified.		
Invasive and Noxious Species				
Noxious weeds (e.g. leafy spurge).	Control noxious weeds through biological and chemical methods.	NDGFD NDSLD USFWS USFS NRCS	NDWCA	Private Landowners NDSUEXT
Woody encroachment.	Use fire or other tools to prevent woody invasion of grassland.	NDGFD NDSLD USFWS USFS NRCS	TNC	
Pesticides				
Pesticide drift and application.	Work with state and federal agencies to enforce existing pesticide regulations.	NDGFD USFWS USFS NDDAG		
Industrial Development				
Wind energy potential is fair to good, with an area in western Dickey and Lamoure County being excellent to outstanding.	Coordinate with wind energy companies to minimize impacts.	NDGFD USFWS		WIND NDSEED

EASTERN MIXED-GRASS PRAIRIE (Drift Prairie)				
CONSERVATION PROBLEM	CONSERVATION ACTION	POTENTIAL PARTNERS		
Data Gaps				
Lack of baseline information on SoCP.	Survey areas of data gaps. Conduct research/surveys to establish baseline information on SoCP.	NDGFD USFWS USFS NPWRC PPJV NDSLD	DU TNC	Volunteers Universities
Conservation Awareness				
Continuing education.	Create informational brochures, use tools such as television, radio, newspapers, magazines, and public forums, to provide information to citizens on the need for conservation of fish and wildlife resources and habitat.	NDGFD USFWS USFS NRCS	DU TNC Audubon	NDSUEXT

5.3 Mixed-grass Prairie (Missouri Coteau)

Area: 10,290,000 acres (4,164,000 ha)
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 this region provides primarily for 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 other species 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.

Predominant Natural Vegetation:

Grasses: prairie junegrass, little bluestem, needle-and-thread, blue grama, green needlegrass, porcupine grass, prairie cordgrass, Northern reedgrass, plains muhly, Western wheatgrass, Kentucky bluegrass,

Forbs: pasque flower, torch flower, yarrow, gumweed, golden aster, prairie rose, Missouri milkvetch, purple loco, lead plant, Indian breadroot, purple prairie-clover, gaura, hairy puccoon, harebell, goldenrod, smooth fleabane, perennial ragweed, purple coneflower, upland wormwood, green sage and fringed sage.

Associated Species of Conservation Priority:

Birds	Mammals	Reptiles/Amphibians
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 Loggerhead Shrike Sedge Wren Sprague's Pipit Lark Bunting Grasshopper Sparrow Baird's Sparrow Le Conte's Sparrow Nelson's Sharp-tailed Sparrow Chestnut-collared Longspur Dickcissel Bobolink	Richardson's Ground Squirrel	Plains Spadefoot Canadian Toad Smooth Green Snake Western Hognose Snake

Other Characteristic Wildlife:

Birds: American wigeon, green-winged teal, mallard, blue-winged teal, Northern shoveler, gadwall, lesser scaup, red-tailed hawk, American kestrel, gray partridge, ring-necked pheasant, spotted sandpiper, killdeer, mourning dove, common nighthawk, Western kingbird, Eastern kingbird, horned lark, American crow, Eastern bluebird, common yellowthroat, clay-colored sparrow, vesper sparrow, Savannah sparrow, Western meadowlark, brown-headed cowbird
Mammals: white-tailed jackrabbit, snowshoe hare, thirteen-lined ground squirrel, Northern pocket gopher, olive-backed pocket mouse, Western harvest mouse, deer mouse, Northern grasshopper mouse, prairie vole, meadow vole, meadow jumping mouse, coyote, red fox, raccoon, badger, striped skunk, white-tailed deer
Reptiles and Amphibians: Great Plains toad, Woodhouse's toad, Northern leopard frog, chorus frog, tiger salamander, plains garter snake, common garter snake, yellowbelly racer, bullsnake

5.3.a Focus Area: Missouri Coteau Breaks

Area: 5,765,000 acres (2,333,000 ha)
Public Landholdings: 308,200 acres (NDGFD 17,700; NDSLD 155,000; USFWS 192,000; USBLM 640)
Description and Condition: Rolling, steep topography has spared much of this area from being farmed. Native prairie remains intact among areas tilled for wheat or hayed. Cattle grazing is the most common use. Abundant wetlands of all classes occur throughout. A great amount of conservation effort, including grassland easements, 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, loggerhead shrike, sedge wren, Sprague's pipit, lark bunting, grasshopper sparrow, Baird's sparrow, Le Conte's sparrow, Nelson's sharp-tailed sparrow, chestnut-collared longspur, dickcissel, bobolink
Mammals: Richardson's ground squirrel
Reptiles and Amphibians: spadefoot toad, smooth green snake

The rolling hills of the Missouri Coteau.

5.3.b Conservation Problems and Actions for the Mixed-grass Prairie (Missouri Coteau)

MIXED-GRASS PRAIRIE (Missouri Coteau)				
CONSERVATION PROBLEM	CONSERVATION ACTION	POTENTIAL PARTNERS		
Direct Loss of Habitat				
Moderate loss of native prairie.	Protect native prairie where possible, particularly within the Missouri Coteau Breaks (e.g. easements or land acquisition).	NDGFD USFWS NRCS PPJV	NDNRT DU TNC Audubon PF	Private Landowners
Habitat Fragmentation				
Highly fragmented with roads, shelterbelts, and agricultural practices.	Consider removal of dilapidated shelterbelts or stands of trees within grassland, particularly within 50 meters of grassland patches >100 ha.	NDGFD USFWS USFS NRCS PPJV	TNC	Private Landowners Volunteers
Habitat Degradation				
Improper grazing practices.	Implement grazing systems to benefit mixed-grass prairie species.	NDGFD USFWS USFS NRCS PPJV NDSLD	DU TNC	Private Landowners NDSUEXT
Loss of fire regime.	Work cooperatively with state and federal agencies to develop BMPs that promote use of fire.	NDGFD USFWS USFS NRCS NDSLD	TNC	
Long term haying of native prairie.	Find alternative hay sources (e.g. grass banks)	No partners identified.		
Invasive and Noxious Species				
Noxious weeds (e.g. leafy spurge).	Control noxious weeds through biological and chemical methods.	NDGFD NDSLD USFWS USFS NRCS	NDWCA	Private Landowners NDSUEXT
Woody encroachment.	Use fire or other tools to prevent woody invasion of grassland.	NDGFD NDSLD USFWS USFS NRCS	TNC	
Pesticides				
Pesticide drift and application.	Work with state and federal agencies to enforce existing pesticide regulations.	NDGFD NDDAG USFWS USFS		Private Landowners
Industrial Development				
Wind energy potential is fair to excellent.	Coordinate with wind energy companies to minimize impacts.	NDGFD USFWS		WIND NDSEED

MIXED-GRASS PRAIRIE (Missouri Coteau)				
CONSERVATION PROBLEM	CONSERVATION ACTION	POTENTIAL PARTNERS		
Data Gaps				
Lack of baseline information on SoCP.	Survey areas of data gaps. Conduct research/surveys to establish baseline information on SoCP.	NDGFD NDSLD USFWS USFS NPWRC PPJV	DU TNC	Volunteers Universities
Conservation Awareness				
Continuing education.	Create informational brochures, use tools such as television, radio, newspapers, magazines, and public forums, to provide information to citizens on the need for conservation of fish and wildlife resources and habitat.	NDGFD USFWS USFS NRCS	DU TNC Audubon	NDSUEXT

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

Area: 9,450,000 acres (3,828,000 ha)
Description and Overall Condition: This landscape component includes the Western mixed-grass prairie and short-grass prairie of the Missouri Slope and associated wetlands. This semiarid, unglaciated region of North Dakota includes level to rolling plains topography with isolated sandstone buttes or badlands formations. 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 sections 5.7.a for information on this focus area). Shrub-steppe, or prairie that has a large component of sagebrush, occurs scattered throughout. Wetland basins are minimal, probably constituting only several hundred-thousand acres. 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 fair amount of native vegetation remaining. The oil and gas industry is expanding in the western portion of this region.

Predominant Natural Vegetation:

Grasses: blue grama, Western wheatgrass, prairie junegrass, needle-and-thread, needleleaf sedge, buffalo grass, spikemoss, sixweeks fescue, green needlegrass, plains muhly, little bluestem, threadleaf sedge
Forbs: yarrow, gumweed, skeleton weed, purple coneflower, sandlily, white wild onion, death camas, buffalo-bean, purple loco, silverleaf, plains pricklypear, ball cactus, moss phlox, white beardtongue, fringed sage

Associated Species of Conservation Priority:

Birds	Mammals	Reptiles/Amphibians
Northern Pintail	Hispid Pocket Mouse	Plains Spadefoot
Northern Harrier	Sagebrush Vole	Short-horned Lizard
Ferruginous Hawk	Black-tailed Prairie Dog	Northern Sagebrush Lizard
Swainson's Hawk	*Swift Fox	Western Hognose Snake
Golden Eagle	*Black-footed Ferret	
Prairie Falcon		
Sharp-tailed Grouse		
Greater Sage-Grouse		
Upland Sandpiper		
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		

Other Characteristic Wildlife:

Birds: mallard, blue-winged teal, Northern shoveler, gadwall, red-tailed hawk, American kestrel, merlin, gray partridge, ring-necked pheasant, wild turkey, killdeer, mourning dove, common nighthawk, Western kingbird, Eastern kingbird, horned lark, Eastern bluebird, mountain bluebird,

common yellowthroat, clay-colored sparrow, vesper sparrow, lark sparrow, Savannah sparrow, Western meadowlark, brown-headed cowbird
Mammals: thirteen-lined ground squirrel, Northern pocket gopher, olive-backed pocket mouse, Ord's kangaroo rat, Western harvest mouse, deer mouse, Northern grasshopper mouse, prairie vole, meadow vole, meadow jumping mouse, coyote, red fox, raccoon, badger, striped skunk, mountain lion, bobcat, elk, mule deer, white-tailed deer, pronghorn
Reptiles and Amphibians: Woodhouse's toad, Great Plains toad, Northern leopard frog, Western chorus frog, tiger salamander, common garter snake, plains garter snake, yellowbelly racer, bullsnake, prairie rattlesnake

5.4.a Focus Area: Big Sagebrush Shrub-Steppe

Area: 300,000 acres (120,000 ha)
Public Landholdings: 69,000 acres (NDSLD 15,000; USFS 19,000; USBLM 35,000)
Description and Condition: Eroded buttes, scoria mounds, and salt pans make this area similar to the badlands. Minimal agriculture and low human occupancy but the oil and gas industry is prevalent. This characteristic big sagebrush ecosystem has been altered by livestock grazing, conversion to cropland, and in more recent years, oil development. 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
Mammals: sagebrush vole
Reptiles and Amphibians: short-horned lizard, sagebrush lizard

Big sagebrush in extreme southwestern North Dakota.

5.4.b Conservation Problems and Actions for the Western Mixed-grass/Short-grass Prairie (Missouri Slope)

WESTERN MIXED-GRASS/SHORTGRASS PRAIRIE (Missouri Slope)				
CONSERVATION PROBLEM	CONSERVATION ACTION	POTENTIAL PARTNERS		
Direct Loss of Habitat				
Moderate loss of native prairie.	Protect native prairie where possible (e.g. easements or land acquisition).	NDGFD USFWS USFS NRCS NGPJV	NDNRT DU TNC Audubon PF	Private Landowners
Habitat Fragmentation				
Highly fragmented with roads, shelterbelts, and agricultural practices.	Consider removal of dilapidated shelterbelts or stands of trees within grassland, particularly within 50 meters of grassland patches >100 ha.	NDGFD USFWS USFS NRCS NGPJV	TNC	Private Landowners Volunteers
Habitat Degradation				
Improper grazing practices.	Implement grazing systems to benefit mixed- and shortgrass species.	NDGFD NDSLD USFWS USFS NRCS NGPJV	DU TNC	Private Landowners NDSUEXT
Loss of fire regime.	Work cooperatively with state and federal agencies to develop BMPs that promote use of fire.	NDGFD NDSLD USFWS USFS NRCS	TNC	
Long term haying of native prairie.	Find alternative hay sources (e.g. grass banks)	No partners identified.		
Invasive and Noxious Species				
Leafy spurge of great concern, particularly in and around the SNG.	Control noxious weeds through biological and chemical methods.	NDGFD NDSLD USFWS USFS NRCS	NDWCA	Private Landowners NDSUEXT
Woody encroachment.	Use fire or other tools to prevent woody invasion of grassland.	NDGFD NDSLD USFWS USFS NRCS	TNC	
Pesticides				
Pesticide drift and application.	Work with state and federal agencies to enforce existing pesticide regulations.	NDGFD NDDAG USFWS USFS		Private Landowners
Industrial Development				
Wind energy potential is fair to excellent.	Coordinate with wind energy companies to minimize impacts.	NDGFD USFWS	WIND	

WESTERN MIXED-GRASS/SHORTGRASS PRAIRIE (Missouri Slope)				
CONSERVATION PROBLEM	CONSERVATION ACTION	POTENTIAL PARTNERS		
Data Gaps				
Lack of baseline information on SoCP.	Survey areas of data gaps. Conduct research/surveys to establish baseline information on SoCP.	NDGFD NDSLD USFWS USFS NPWRC NGPJV	DU TNC	Volunteers Universities
Conservation Awareness				
Continuing education.	Create informational brochures, use tools such as television, radio, newspapers, magazines, and public forums, to provide information to citizens on the need for conservation of fish and wildlife resources and habitat.	NDGFD USFWS USFS NRCS	DU TNC Audubon	NDSUEXT

5.5 Planted or Tame Grassland

Area: 5,350,000 acres
Description and Overall Condition: This landscape component includes prairie that has been converted to cropland and then re-planted to hayland, tame or native grasses. Hayland constitutes approximately 4.4% 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. Restrictions on haying occur in some areas such as road ditches. As of 2005, CRP grassland constitutes approximately 7.4% of the state and can be found in every county. It is presumed larger tracts of CRP are more beneficial than smaller tracts. These larger tracts, in concert with surrounding landscape features, are a focus area of this landscape component. CRP is generally left idle although the 2002 Farm Bill authorized managed haying and grazing of CRP. 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. A large number (1.7 million acres) of CRP contracts are set to expire in 2007, which would then result in the loss of approximately half the acreage of CRP in North Dakota. Tame grasslands are widespread throughout the state on wildlife management areas, waterfowl production areas, and other publicly owned land.

Predominant Natural Vegetation:

Grasses: smooth brome, crested wheatgrass, intermediate wheatgrass, tall wheatgrass, big bluestem
Forbs: alfalfa, sweet clover

Associated Species of Conservation Priority:

Birds	Mammals	Reptiles/Amphibians
American Bittern	Arctic shrew	Plains Spadefoot
Northern Harrier	Pygmy Shrew	Canadian Toad
Swainson's Hawk	Plains Pocket Mouse	Smooth Green Snake
Sharp-tailed Grouse	Hispid Pocket Mouse	Western Hognose Snake
Willet	Richardson' Ground Squirrel	
Upland Sandpiper		
Marbled Godwit		
Wilson's Phalarope		
Short-eared Owl		
Sedge Wren		
Lark Bunting		
Grasshopper Sparrow		
Baird's Sparrow		
Le Conte's Sparrow		
Nelson's Sharp-tailed Sparrow		
Chestnut-collared Longspur		
Dickcissel		
Bobolink		

Other Characteristic Wildlife:

Birds: American wigeon, green-winged teal, mallard, blue-winged teal, Northern shoveler, gadwall, red-tailed hawk, gray partridge, ring-necked pheasant, killdeer, mourning dove, Western kingbird, Eastern kingbird, horned lark, American crow, common yellowthroat, vesper sparrow, Savannah sparrow, Western meadowlark, red-winged blackbird, brown-headed cowbird
Mammals: Northern short-tailed shrew, white-tailed jackrabbit, snowshoe hare, Franklin's ground squirrel, thirteen-lined ground squirrel, Northern pocket gopher, olive-backed pocket mouse, Western harvest mouse, deer mouse, Northern grasshopper mouse, prairie vole, meadow vole,

meadow jumping mouse, Western jumping mouse, coyote, red fox, raccoon, badger, striped skunk, white-tailed deer, moose

Reptiles and Amphibians: American toad, Great Plains toad, Woodhouse's toad, Northern leopard frog, chorus frog, tiger salamander, plains garter snake, common garter snake

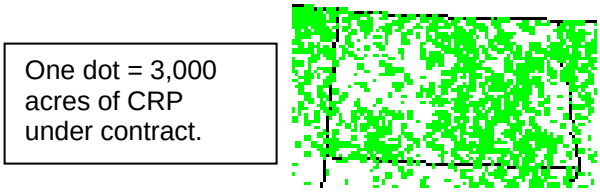
5.5.a Focus Area: CRP

Area: 3,340,000 acres (1,350,000 ha)

Description and Condition: CRP grasslands are found in every county in the state. Currently, the exact location, size, and expiration dates for CRP are unavailable. Once that information is obtained, larger CRP tracts in conjunction with priority surrounding landscape features can be identified as of particular importance to SoCP favoring larger grassland patches.

Key Species of Conservation Priority

Birds: sedge wren, lark bunting, grasshopper sparrow, Baird's sparrow, Le Conte's sparrow, bobolink, dickcissel



Typical planted grassland.

5.5.b Conservation Problems and Actions for Planted or Artificial Prairie

PLANTED OR TAME GRASSLAND				
CONSERVATION PROBLEM	CONSERVATION ACTION	POTENTIAL PARTNERS		
Direct Loss of Habitat				
Expiration of CRP contracts in 2007 would result in the loss of approximately 1.7 million acres in North Dakota.	Work with Northern Great Plains Workgroup partners to promote automatic re-enrollment of existing CRP and redesigned ranking criteria for new CRP sign-ups.	NDGFD FSA NRCS USFWS PPJV NGPJV	NDNRT DU Delta TNC Audubon PF	
Habitat Degradation				
Over-utilization of CRP due to haying or grazing.	Extend the time period between haying and grazing (i.e. from 3 year to 5 year rotation).	NDGFD FSA NRCS USFWS PPJV NGPJV	NDNRT DU Delta TNC Audubon PF	
	Promote mid-term required management (i.e. prescribed burning, interseeding, and managed haying or grazing).			
Early cutting of tame grass (i.e. prior to July 15).	Provide incentives to defer or idle.			
	Provide other sources of hay.			
Under-utilization of tame grass.	Implement haying, grazing, or fire management to obtain desired habitat condition for SoCP.	NDGFD USFWS NRCS		
Invasive and Noxious Species				
Noxious weeds (e.g. leafy spurge, Canada thistle, salt cedar).	Control noxious weeds through biological and chemical methods	NDGFD NDSLD USFWS USFS NRCS	NDWCA NDSUEXT	Private Landowners
Woody encroachment.	Use fire or other tools to prevent woody invasion of grassland.	NDGFD NDSLD USFWS USFS NRCS		
Data Gaps				
Lack of baseline information on SoCP.	Survey areas of data gaps. Conduct research/surveys to establish baseline information on SoCP.	NDGFD NDSLD USFWS USFS NPWRC PPJV NGPJV	DU TNC	Volunteers Universities
Conservation Awareness				
Knowledge on the value of planted grassland, particularly CRP, and the potential loss of wildlife if CRP were to expire.	Create informational brochures, use tools such as television, radio, newspapers, magazines, and public forums, to inform citizens on the need for conservation of fish and wildlife resources and the value of CRP.	NDGFD USFWS NRCS	DU Delta TNC Audubon NDSUEXT	

5.6 Wetlands and Lakes

Area: 3,920,000 acres (1,590,000 ha)
Description and Overall Condition: This landscape component includes all wetlands and lakes distributed throughout the state. There are thousands of wetlands 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 extensive and continues to occur. Wetlands located within cropland may be void of emergent vegetation, and those within pasture or range lands are often open to cattle use and degradation. Wetlands are very dynamic according to weather cycles. The key to conservation of many SoCP and other wetland associated wildlife is to provide a mosaic of wetlands and grasslands (see sections 5.1, 5.2, 5.3, 5.4, and 5.5) integrated to form a landscape. Lakes in North Dakota are particularly susceptible to non-point source pollution, in part due to the great amount of agriculture in the state.

Predominant Natural Vegetation:

Wetlands: fine-textured grasses, sedges, and rushes including common cattail, narrow-leaf cattail, hybrid cattail, Northern reedgrass, prairie cordgrass, phragmites, slender sedge, slough sedge, common spikerush, hardstem bulrush, river bulrush, slender bulrush, marsh smartweed, Baltic rush, sago pondweed, narrowleaf dock, Western dock, marsh cress, silverweed, rough cinquefoil, lanceleaf loostrife, claspingleaf dogbane, germander, marsh hegenettle, Western waterhorehound, wild mint, giant burreed, narrowleaf waterplantain, Western waterplantain, tall mannagrass, whitetop, sloughgrass, water parsnip, muskgrass, horned pondweed, grassleaf pondweed, coontail, white watercrowfoot, common watermilfoil, common bladderwort, Western wigeongrass softstem bulrush, water sedge, sandbar willow

Associated Species of Conservation Priority:

Birds	Distribution	Mammals	Distribution	Reptiles/Amphibians	Distribution
Horned Grebe	East of Missouri River	Arctic Shrew	East of Missouri River	Plains Spadefoot	Scattered
American White Pelican	East of Missouri River, occasionally west	Pygmy Shrew	East of Missouri River	Canadian Toad	East of Missouri River
American Bittern	Statewide			Common Snapping Turtle	Statewide
Northern Pintail	Statewide				
Canvasback	East of Missouri River				
Redhead	East of Missouri River				
Northern Harrier	Statewide				
Yellow Rail	East of Missouri River				
Whooping Crane	Statewide				
Piping Plover	East of Missouri River				
American Avocet	Statewide				
Willet	Statewide				
Long-billed Curlew	West of Missouri River				
Marbled Godwit	Statewide				
Wilson's Phalarope	Statewide				
Franklin's Gull	East of Missouri River				
Black Tern	East of Missouri River				
Short-eared Owl	Statewide				
Sedge Wren	East of Missouri River				
Le Conte's Sparrow	East of Missouri River				
Nelson's Sharp-tailed Sparrow	East of Missouri River				

Other Characteristic Breeding Birds	Fens	Temporary	Seasonal	Semipermanent	Permanent	Permanent Wood-bordered	Alkali	Cropland Ponds	Distribution
Common Loon						X			East of Missouri River, Turtle Mountains
Pied-billed Grebe			X	X	X				Statewide
Red-necked Grebe						X			East of Missouri River, Turtle Mountains, Devils Lake
Eared Grebe				X		X			Statewide
Western Grebe					X	X	X		East of Missouri River
Double-crested Cormorant					X				Statewide
Great Blue Heron					X	X			Statewide
Great Egret					X	X			
Black-crowned Night Heron			X	X	X	X		X	East of Missouri River
White-faced Ibis				X	X				East of Missouri River
Canada Goose				X	X			X	Statewide
Wood Duck									Statewide
Green-winged Teal		X	X	X	X		X	X	Statewide
Mallard	X	X	X	X	X	X		X	Statewide
Blue-winged Teal	X	X	X	X	X		X	X	Statewide
Northern Shoveler	X	X	X	X	X		X	X	Statewide
Gadwall	X	X	X	X	X		X	X	Statewide
American Wigeon		X	X	X	X	X		X	Statewide
Ring-necked Duck						X			East of Missouri River
Lesser Scaup				X	X	X			Statewide
Common Goldeneye						X			East of Missouri River, Turtle Mountains
Hooded Merganser									East of Missouri River
Ruddy Duck			X	X					Statewide
Virginia Rail	X		X	X					East of Missouri River
Sora	X		X	X					Statewide
American Coot			X	X	X				Statewide
Killdeer							X	X	Statewide
Spotted Sandpiper					X	X	X		Statewide
Wilson's Snipe	X								Statewide
Ring-billed Gull					X	X		X	East of Missouri River
California Gull							X	X	East of Missouri River
Common Tern					X	X	X		East of Missouri River
Forster's Tern				X	X				East of Missouri River
Belted Kingfisher						X			Statewide
Willow Flycatcher	X								Statewide
Tree Swallow	X					X			East of Missouri River
Northern Rough-winged Swallow						X			Statewide
Bank Swallow									Statewide
Cliff Swallow									Statewide
Marsh Wren			X	X					East of Missouri River
Yellow Warbler	X								Statewide
Common Yellowthroat	X	X	X	X					Statewide
Yellow-breasted Chat									Statewide
Savannah Sparrow	X	X							Statewide
Song Sparrow	X								Statewide
Swamp Sparrow	X								East of Missouri River
Red-winged Blackbird	X	X	X	X					Statewide
Yellow-headed Blackbird			X	X					Statewide
Brown-headed Cowbird		X	X	X					Statewide

Other Characteristic Breeding Amphibians, Reptiles, and Mammals	Fens	Temporary	Seasonal	Semipermanent	Permanent	Permanent Wood-bordered	Alkali	Cropland Ponds	Distribution
American Toad	X	X	X	X	X	X		X	Eastern 1/3 of state
Great Plains Toad	X	X	X	X				X	Statewide, except extreme northern counties
Woodhouse's Toad	X	X	X	X	X	X		X	West of Missouri River and Missouri Coteau
Gray Treefrog	X	X	X	X	X	X		X	Red River Valley
Chorus Frog	X	X	X	X	X	X		X	Statewide
Wood Frog						X			East of Missouri River
Northern Leopard Frog	X	X	X	X	X	X		X	Statewide
Tiger Salamander	X	X	X	X	X			X	Statewide
Common Mudpuppy									Red River
Painted Turtle	X	X	X	X	X	X		X	Statewide
Common Garter Snake					X	X			Statewide
Plains Garter Snake					X	X			Statewide

One township (6X6 miles) showing the high density of wetlands (black areas) in Kidder County.

Chase Lake, Stutsman County..

Typical wetland with emergent vegetation.

5.6.a Conservation Problems and Actions for Wetland Communities

WETLANDS AND LAKES				
CONSERVATION PROBLEM	CONSERVATION ACTION	POTENTIAL PARTNERS		
Direct Loss of Habitat				
Draining, filling or other loss of wetlands.	Protect wetlands where possible, particularly those which occur within grassland mosaics (i.e. wetland easements).	NDGFD USFWS NRCS ACOE FAA FHWA PPJV NGPJV	NDNRT DU Delta Audubon	
	Work with partners to ensure Swampbuster provisions are maintained.			
	Continue to use the Section 404 program to ensure affected wetlands are appropriately mitigated.			
	Continue to work with other federal agencies (i.e. FAA and FHWA) not covered by Section 404 or Swampbuster to ensure affected wetlands are appropriately mitigated.			
	Restore wetlands.			
Habitat Degradation				
Lowering of water tables and associated wetlands/lakes (e.g. irrigation or municipal withdrawal).	Work with NDSWC to include fish and wildlife values in the water permitting process.	NDGFD NDSWC USFWS		
Farming, grazing, and burning of wetlands resulting in the loss of vegetation and reduced water quality and quantity (e.g. sedimentation).	Develop or help promote additional incentive programs (e.g. buffer strips, fencing) to minimize impacts to wetland values (i.e. 319).	NDGFD USFWS NRCS PPJV NGPJV	NDNRT DU Delta Audubon	Private Landowners
Water quality impairment (i.e. non-point source run-off and sedimentation).	Continue to work with ND 319 Task Force in prioritizing projects within impaired watersheds and implementing BMPs.	NDGFD NDDOH 319 Task Force		
Invasive and Noxious Species				
Noxious weeds (i.e. purple loosestrife, salt cedar).	Control noxious weeds through biological and chemical methods.	NDSLD		
Invasion and expansion of cattails, particularly the hybrid species (i.e. *Tyhpa* x *glauca*).	Promote a diversity of cattail stands to provide for a variety of cover types.	NDGFD NDSLD USFWS NRCS WS/APHIS ACOE PPJV	DU	
Aquatic Nuisance Species.	Cooperate with Fisheries Division on state aquatic nuisance species plan.	NDGFD NDDAG NDDOH NDPRD NDSWC		Water Users Assoc.

WETLANDS AND LAKES		
CONSERVATION PROBLEM	CONSERVATION ACTION	POTENTIAL PARTNERS
Data Gaps		
Lack of baseline information on SoCP.	Survey areas of data gaps. Conduct research/surveys to establish baseline information on SoCP.	NDGFD
Conversion of ephemeral or temporary wetlands to a permanent wetland.	Continue to study the effects of altering ephemeral wetlands on fish and wildlife resources.	NDGFD NPWRC USFS USFWS
Improper fish stocking.	Study the effects of fish stocking on other aquatic SoCP.	NDGFD NPWRC Universities
Conservation Awareness		
Knowledge on the value of wetlands.	Continue to work with partners in promoting and distributing educational materials related to wetland values and good wetland stewardship.	NDGFD NDDOH NDSWC USFWS NRCS NDSUEXT

5.7 Rivers, Streams and Riparian

Total River Miles: 58,890 (includes all rivers and streams)
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. Cattle grazing in some areas has been detrimental to riparian habitat and is one factor relating to reduced water quality. Development such as increased housing along the Missouri River can be disturbing to some wildlife species. 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.

Predominant Natural Vegetation:

Trees and Shrubs: cottonwood, American elm, green ash, box elder, bur oak, basswood, hackberry, peachleaf willow, hophornbeam, prickly ash, Missouri gooseberry, black currant, buckthorn, nannyberry

Forbs: Virginia wild rye, nodding muhly, charming sedge, Sprengel's sedge, jack-in-the-pulpit, wood leek, large bellwort, false Solomon's seal, Solomon's seal, nodding trillium, carrion flower, tall nettle, wood nettle, wild four-o-clock, baneberry, wild ginger, columbine, kidneyleaf buttercup, tall meadowrue, bloodroot, yellow wood violet, pink wood violet, white avens, sweet cicely, wild sarsaparilla, honeywort, waterleaf, yellow wood parsnip, fringed loostrife, tall coneflower

Associated Species of Conservation Priority:

Birds	Mammals	Reptiles/Amphibians
Golden Eagle Bald Eagle Red-headed Woodpecker Black-billed Cuckoo Piping Plover Least Tern	Western Small-footed Myotis Long-legged Myotis Long-eared Myotis Pygmy Shrew River Otter	False Map Turtle Smooth Softshell Common Snapping Turtle Northern Redbelly Snake
Fish	**Mussels**	
Chestnut Lamprey Silver Lamprey Pallid Sturgeon Paddlefish Sturgeon Chub Sicklefin Chub Silver Chub Pearl Dace Hornyhead Chub Pugnose Shiner Blacknose Shiner Rosyface Shiner Northern Redbelly Dace Finescale Dace Flathead Chub Blue Sucker Yellow Bullhead Flathead Catfish Trout-perch Logperch River Darter Central Stoneroller	Threeridge Wabash Pigtoe Mapleleaf Black Sandshell Creek Heelsplitter Pink Heelsplitter Pink Papershell	

Other Characteristic Wildlife:

Birds: wood duck, mallard, hooded merganser, common merganser, turkey vulture, osprey, sharp-shinned hawk, Cooper's hawk, red-tailed hawk, American kestrel, ring-necked pheasant, wild turkey, American woodcock, mourning dove, yellow-billed cuckoo, great horned owl, Eastern screech owl, barred owl, long-eared owl, common nighthawk, chimney swift, ruby-throated hummingbird, yellow-bellied sapsucker, downy woodpecker, hairy woodpecker, yellow-shafted flicker, pileated woodpecker, Western wood pewee, Eastern wood-pewee, yellow-bellied flycatcher, willow flycatcher, least flycatcher, Eastern flycatcher, great crested flycatcher, purple martin, tree swallow, Northern rough-winged swallow, bank swallow, cliff swallow, blue jay, black-billed magpie, common crow, black-capped chickadee, white-breasted nuthatch, brown creeper, house wren, Eastern bluebird, veery, wood thrush, American robin, gray catbird, brown thrasher, cedar waxwing, Bell's vireo, yellow-throated vireo, warbling vireo, Philadelphia vireo, red-eyed vireo, yellow warbler, yellow-rumped warbler, American redstart, ovenbird, Northern waterthrush, common yellowthroat, migratory warblers, scarlet tanager, rose-breasted grosbeak, black-headed grosbeak, lazuli bunting, indigo bunting, spotted towhee, Eastern towhee, chipping sparrow, lark sparrow, clay-colored sparrow, song sparrow, common grackle, brown-headed cowbird, orchard oriole, Bullock's oriole, Baltimore oriole, American goldfinch

Mammals: little brown bat, silver-haired bat, big brown bat, Eastern red bat, hoary bat, Eastern cottontail, woodchuck, Eastern chipmunk, gray squirrel, fox squirrel, Northern flying squirrel, beaver, white-footed mouse, Southern red-backed vole, meadow vole, meadow jumping mouse, Western jumping mouse, porcupine, coyote, red fox, gray fox, raccoon, American marten, ermine, long-tailed weasel, least weasel, bobcat, elk, mule deer, white-tailed deer

Reptiles and Amphibians: Woodhouse's toad, Great Plains toad, gray tree frog, Northern leopard frog, tiger salamander, common mudpuppy, common garter snake, plains garter snake, painted turtle

5.7.a Focus Area: Missouri River System/Breaks

Water: 444,000 acres

Breaks: 2,248,000 acres (910,000 ha)

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. Tributaries in North Dakota include the Yellowstone, Little Missouri, Knife, Heart, and Cannonball rivers, and the Little Muddy and Tobacco Garden creeks. 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 lacking in some areas 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 area.

Missouri River/Yellowstone Confluence.

Key Species of Conservation Priority

Birds: bald eagle, piping plover, least tern, red-headed woodpecker, golden eagle

Mammals: river otter

Reptiles and Amphibians: smooth softshell, false map turtle

Fish: sturgeon chub, pearl dace, blue sucker, paddlefish, pallid sturgeon, flathead catfish, flathead chub, sicklefin chub, yellow bullhead

5.7.b Focus Area: Red River

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, but includes the Wild Rice, Maple, Rush, Elm, Goose, Turtle, Forest, Park 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.

The Red River of the North.

Key Species of Conservation Priority

Birds: bald eagle, red-headed woodpecker, black-billed cuckoo
Mammals: river otter
Reptiles and Amphibians: redbelly snake
Fish: pearl dace (Tongue and Park rivers), silver chub, Northern redbelly dace (Rush River), trout-perch, chestnut lamprey, silver lamprey, central stoneroller (Forest River), hornyhead chub (Forest River), pugnose shiner (Forest River), blacknose shiner, finsecale dace (Tongue River), yellow bullhead, logperch, river darter
Mussels: threeridge, wabash pigtoe, mapleleaf, black sandshell, creek heelsplitter, pink heelsplitter, pink papershell (Bois de Sioux River)

5.7.c Focus Area: Sheyenne River

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 also poses risks to the system.

Sheyenne River riparian area.

Key Species of Conservation Priority

Birds: black-billed cuckoo, red-headed woodpecker
Mammals: river otter
Reptiles and Amphibians:
Fish: Northern redbelly dace, pugnose shiner, blacknose shiner, roseyface shiner, yellow bullhead
Mussels: threeridge, wabash pigtoe, mapleleaf, black sandshell, creek heelsplitter, pink heelsplitter

5.7.d Focus Area: James River

Description and Condition: The James River begins in the Drift Prairie of central North Dakota

James River.

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

5.7.e Focus Area: Souris River

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.

Souris River.

Key Species of Conservation Priority

Birds: black-billed cuckoo
Mammals: river otter
Fish: pearl dace, trout-perch

5.7.f Focus Area: Cannonball River

Description and Condition: The Cannonball River flows 135 miles, west to east across southwestern North Dakota before flowing into Lake Oahe on the Missouri River. Flow in the river can range from no flow 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.

Cannonball River.

Key Species of Conservation Priority

Birds: golden eagle (possible)
Reptiles and Amphibians: smooth softshell (possible)
Fish: Northern redbelly dace, flathead chub,

5.7.g Focus Area: Heart River

Description and Condition: The Heart River crosses approximately 180 miles of western North Dakota. It begins in Billings County, in the Little Missouri National Grassland. It flows east through the Patterson Reservoir near Dickinson. At Gladstone, it is joined by the Green River, and flows ESE, through Lake Tschida which is formed by the Heart Butte Dam. It then turns northeast and joins the Missouri River at the town

Heart River oxbow.

of Mandan. The Heart River is threatened due to land use practices. Current problems include reduced riparian width, lack of native riparian plant diversity, stream bank erosion, channel and pool filling with sediments, and increased runoff from watershed. Degradation of the riparian zone is the result of poor grazing practices. A few stretches, particularly east of Lake Tschida, appear in satisfactory condition.

Key Species of Conservation Priority

Reptiles and Amphibians: smooth softshell (possible)

Fish: Northern redbelly dace, flathead chub, rosyface shiner

5.7.h Focus Area: Knife River

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

5.7.i Focus Area: Little Missouri River

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. It eventually dumps 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. Cattle grazing and unrestricted use along the majority of the river is a possible threat in North Dakota.

Key Species of Conservation Priority

Birds: red-headed woodpecker, golden eagle

Mammals: Western small-footed myotis, long-legged myotis, long-eared myotis

Fish: sturgeon chub, Sicklefin chub, Northern redbelly dace, flathead chub, flathead catfish

The Little Missouri River meanders through the badlands of western North Dakota.

5.7.j Conservation Problems and Actions for Rivers, Streams and Riparian

RIVERS, STREAMS AND RIPARIAN				
CONSERVATION PROBLEM	CONSERVATION ACTION	POTENTIAL PARTNERS		
Direct Loss of Habitat				
Draining, filling or other loss of river and stream channels.	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 federal agencies in situations where wetlands are not covered by Section 404 or Swampbuster to ensure affected rivers and riparian areas are mitigated to replace form and function.	NDGFD USFWS NRCS ACOE FAA FHWA PPJV NGPJV	NDNRT DU Delta Audubon	NDWRB
Loss of riparian habitat due to alteration of the natural hydrology (e.g. channelization, wetland draining).	Continue to work with NDSWC to develop minimum in-stream flow recommendations. Work with partners to implement easements (i.e. EWP, WRP, and ACOE sluffing or flood control easements).	NDGFD USFWS NRCS ACOE NDSWC NGPJV	NDNRT DU Audubon	NDWRB
Loss of riparian habitat due to farming activities (e.g. tillage).	Develop and promote incentive programs to restore riparian areas. Work with partners to implement easements (i.e. EWP and WRP).	NDGFD USFWS NRCS NGPJV FSA	NDNRT	RRBRP
Loss of riparian habitat due to development (e.g. urban sprawl, ranchettes, marinas).	Work with partners to implement easements. (e.g. NRCS and TNC) Work with county zoning and planning officials to designate areas in need of protective covenants.	NDGFD USFWS NRCS NGPJV	NDNRT TNC	County Zoning Boards
Habitat Degradation				
Degradation of riparian habitat due to grazing.	Develop and promote incentive programs to enhance or restore riparian areas.	NDGFD NRCS		
Water quality impairment (i.e. non-point source run-off, sedimentation, change in temperature regime).	Continue to work with ND 319 Task Force in prioritizing projects within impaired watersheds and implementing BMPs.	NDGFD NRCS NDDOH 319 Task Force		
Bank erosion.	Work to modify dam operation regimes. 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)	NDGFD USFWS ACOE NRCS		RRBRP
Clearing and snagging.	Work with local and county water boards	NDGFD NDSWC		NDWRB

RIVERS, STREAMS AND RIPARIAN			
CONSERVATION PROBLEM	CONSERVATION ACTION	POTENTIAL PARTNERS	
	and NDSWC on the importance of leaving snags.		
Other Problems			
Fish entrainment/impingement.	Implement intake conditions or recommendations (i.e. screening and velocity requirements)	NDGFD NDDOH NDSWC USFWS ACOE	
Restriction of fish migration (i.e. low head dams).	Work with the dam owners for potential removal or modification.	NDGFD NDDOH NDSWC USFWS ACOE	Private Landowners
Invasive and Noxious Species			
Noxious weeds (i.e. purple loosestrife, salt cedar, Eurasian milfoil).	Control noxious weeds through biological and chemical methods.	NDGFD NDSLD	NDWCA
Aquatic Nuisance Species.	Cooperate with Fisheries Division on state aquatic nuisance species plan.	NDGFD NDDAG NDDOH NDPRD NDSWC	Water Users Assoc.
Data Gaps			
Lack of baseline information on SoCP.	Survey areas of data gaps. Conduct research/surveys to establish baseline information on SoCP.	NDGFD	
Conservation Awareness			
Knowledge on the value of rivers, streams, and riparian areas.	Continue to work with partners in promoting and distributing educational materials related to river, stream and riparian values and good stewardship.	NDGFD NDDOH NDWSC NDFS USFWS NRCS	NDSUEXT

5.8 Badlands

Area: 1,845,000 acres
Description and Overall Condition: This landscape component includes the area associated with the Little Missouri River (see section 5.7.i for information on this focus area) 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. Perhaps the most unique of these is the ponderosa pines, making it a focus area. The lack of recent fire has allowed the expansion and overgrowth 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 USFS owns and manages about 1 million of acres as multiple-use in this landscape.

Predominant Natural Vegetation:

Grasses/Shrubs/Trees: cottonwood, green ash, Rocky Mountain juniper, Ponderosa pine, limber pine, bur oak, dwarf juniper, creeping juniper, spiny saltbrush, greasewood, prickly pear, rabbitbrush, silver sage, Western wheatgrass, blue grama, little bluestem, prairie sandreed, ricegrass, bluebunch wheatgrass, Indian ricegrass,
Forbs: yucca, fern, winter fat (TRNP), golden eriogonum, large-flowered dock, butte primrose, standing milkvetch, penstemon, purple coneflower, long-headed coneflower

Associated Species of Conservation Priority:

Birds	Mammals	Reptiles/Amphibians
Swainson's Hawk	Western Small-footed Myotis	Plains Spadefoot
Golden Eagle	Long-eared Myotis	Short-horned Lizard
*Peregrine Falcon	Long-legged Myotis	Northern Sagebrush Lizard
Prairie Falcon	Black-tailed Prairie Dog	
Sharp-tailed Grouse	*Black-footed Ferret	
Burrowing Owl	*Swift Fox	
Loggerhead Shrike		
Lark Bunting		
Grasshopper Sparrow		

Other Characteristic Wildlife:

Birds: turkey vulture, red-tailed hawk, sharp-shinned hawk, Cooper's hawk, Northern goshawk, American kestrel, merlin, ring-necked pheasant, wild turkey, great horned owl, long-eared owl, boreal owl, Northern saw-whet owl, rock dove, mourning dove, common nighthawk, common poorwill, downy woodpecker, hairy woodpecker, Northern flicker, Clark's nutcracker, least flycatcher, say's phoebe, Western kingbird, Eastern kingbird, black-billed magpie, American crow, common raven, horned lark, tree swallow, Northern rough-winged swallow, cliff swallow, barn swallow, violet-green swallow, black-capped chickadee, red-breasted nuthatch, white-breasted nuthatch, brown creeper, house wren, rock wren, golden-crowned kinglet, ruby-crowned kinglet, mountain bluebird, American robin, gray catbird, brown thrasher, townsend's solitaire, gray-cheeked thrush, Bohemian waxwing, cedar waxwing, yellow warbler, yellow-rumped warbler (Audubon's), black-and-white warbler, American redstart, ovenbird, pine warbler, blackpoll warbler, common yellowthroat, yellow-breasted chat, spotted towhee, chipping sparrow, clay-colored sparrow, field sparrow, vesper sparrow, lark sparrow, lazuli bunting, pine grosbeak, red crossbill, white-winged crossbill, evening grosbeak, Western meadowlark

Mammals: desert cottontail, mountain cottontail, Northern myotis, least chipmunk, bushy-tailed woodrat, bighorn sheep, elk, mule deer, white-tailed deer, pronghorn
Reptiles and Amphibians: Woodhouse's toad, Great Plains toad, Northern leopard frog, common garter snake, plains garter snake, bullsnake, yellowbelly racer, prairie rattlesnake

Typical eroded clay-scoria buttes and Juniper trees of the Badlands.

Grassy hills and woody draws of the Badlands.

5.8.a Focus Area: Ponderosa Pine Forest

Area: 8,000 acres (3,270 ha)

Description and Condition: The actual ponderosa pines occupy approximately 2,000 acres on private, USFS, and state school land. This forest may be outliers from pines in the Black Hills of South Dakota. In the summer of 2004, a fire swept through the region burning several hundred acres of pines.

Key Species of Conservation Priority

Mammals: possibly the bat species

Fire scorched Ponderosa Pines in Slope County.

5.8.c Conservation Problems and Actions for the Badlands

BADLANDS				
CONSERVATION PROBLEM	CONSERVATION ACTION	POTENTIAL PARTNERS		
Direct Loss of Habitat				
Loss due to development (e.g. ranchettes).	Work with county zoning planning officials to designate areas in need of protective covenants. Work with partners to implement easements or land acquisition.	NDGFD USFWS USFS NRCS	NDNRT TNC	Private Landowners
Habitat Fragmentation				
Recreational trail development (i.e. hiking and biking).	Become directly involved with the USFS trail development planning process.	NDGFD USFS		
Becoming highly fragmented with roads, primarily because of oil access.	Communicate with the oil industry to minimize road impacts.	NDGF USFS BLM	NDIC	
Habitat Degradation				
Improper grazing practices (e.g. loss of green ash draws).	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 AMPs).	NDGFD NDSLD USFWS USFS BLM NRCS	DU TNC RMEF MDF	Private Landowners NDSUEXT
Loss of fire regime (i.e. juniper expansion).	Work cooperatively with state and federal agencies to develop BMPs that promote use of fire. Conduct research to document landscape scale changes in juniper cover.	NDGFD NDSLD USFS USGS USNPS (TRNP) NRCS	RMEF MDF FNAWS	Private Landowners NDSUEXT
Conversion of ephemeral or temporary wetlands to a permanent wetland (i.e. tiger salamander depredation on other herp species, disease issues).	Continue to study the effects of altering ephemeral wetlands on fish and wildlife resources.	NDGFD NDSLD USFWS USFS USGS NGPJV	Universities	Private Landowners
Invasive and Noxious Species				
Noxious weeds (i.e. salt cedar, leafy spurge).	Control noxious weeds through biological and chemical methods.	NDGFD NDSLD USFWS USFS NRCS		Private Landowners NDSUEXT NDWCA
Pesticides				
Pesticide drift and application.	Work with state and federal agencies to enforce existing pesticide regulations.	NDGFD NDDAG USFWS USFS		Private Landowners

BADLANDS				
CONSERVATION PROBLEM	CONSERVATION ACTION	POTENTIAL PARTNERS		
Industrial Development				
Wind energy potential is marginal to fair.	Coordinate with wind energy companies to minimize impacts.	NDGFD USFS USFWS		WIND NDSEED
Oil and gas expansion and development.	Look to exchange and consolidate mineral rights, particularly within focus areas.	NDGFD USFS BLM NGPJV	NDCTWS Sierra Club	Individual oil and gas lease holders
	Continue to provide public land management agencies with mitigation recommendations in respect to species of concern.			
Coalbed methane extraction has potential.	Coordinate with CBM companies to minimize effects.	NDGFD USFS BLM NGPJV	NDCTWS Sierra Club	CBM companies
Other Impacts				
Off-road vehicle or ATV use and creation of trails.	Work to minimize additional trail development on public lands.	NDGFD USFS		CVB/CC
Black-tailed prairie dog reduction due to poisoning or shooting.	Public education and periodic evaluation of shooting regulations.	NDGFD NDSLD USFS		
Data Gaps				
Lack of baseline information on SoCP.	Survey areas of data gaps. Conduct research/surveys to establish baseline information on SoCP.	NDGFD USFWS USFS NPWRC NDSLD	DU TNC	Volunteers Universities
Potential for reintroduction of SoCP.	Evaluate the possibility of reintroduction of select SoCP in national parks (e.g. swift fox).	NDGFD USFWS USNPS		
Conservation Awareness				
Continuing education.	Create informational brochures, use tools such as television, radio, newspapers, magazines, and public forums, to provide information to citizens on the need for conservation of fish and wildlife resources and habitat.	NDGFD USFWS USFS NRCS	DU TNC Audubon	NDSUEXT
	Education on the harmful effects of pesticides on non-target species (e.g. bats, herps, and songbirds).			
	Education on the positive aspects of perceived undesirable species (e.g. rattlesnakes).			
	Fire suppression and juniper expansion.			

5.9 Upland Deciduous Forest

Area: 900,000 acres
Description and Overall Condition: This landscape component includes the larger tracts of native upland deciduous forest which occur scattered throughout the state. Representative upland deciduous forest constitutes approximately 2.2% of North Dakota. The larger tracts of forest have been identified as focus areas and include the Pembina Hills, Turtle Mountains, Devils Lake Mountains, and the Killdeer Mountains, although the term "mountain" is only relative to the rather level topography of North Dakota. Smaller, scattered tracts of deciduous forest occur on the Sheyenne River (see section 5.7.c for information on this focus area) bluffs and north- and east-facing slopes of the badlands (see section 5.8). 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 possible lack of forest regeneration may be of concern. Clearing of trees for farming or other development has occurred.

Predominant Natural Vegetation:

Trees and Shrubs: bur oak, green ash, quaking aspen, balsam poplar, paper birch, American hazelnut, black currant, Missouri gooseberry, red raspberry, Saskatoon serviceberry, hawthorn, prickly rose, pin cherry, choke cherry
Forbs: false lily-of-the valley, early meadowrue, yellow avens, pink wood violet, wild sarsaparilla, dwarf cornel, pink wintergreen, arrowleaf aster

Associated Species of Conservation Priority:

Birds	Mammals	Reptiles/Amphibians
Golden Eagle	Arctic Shrew	Northern Redbelly Snake
Bald Eagle	Pygmy Shrew	
Swainson's Hawk	Western Small-footed Myotis	
Black-billed Cuckoo	Long-eared Myotis	
Red-headed Woodpecker	Long-legged Myotis	

Other Characteristic Wildlife:

Birds: turkey vulture, sharp-shinned hawk, Cooper's hawk, broad-winged hawk (Turtle Mountains), red-tailed hawk, American kestrel, merlin, ruffed grouse, wild turkey, mourning dove, great horned owl, Eastern screech owl, long-eared owl, common nighthawk, ruby-throated hummingbird, yellow-bellied sapsucker, downy woodpecker, hairy woodpecker, yellow-shafted flicker, Western wood pewee, Eastern wood-pewee, yellow-bellied flycatcher, willow flycatcher, least flycatcher, great crested flycatcher, purple martin, tree swallow, blue jay, black-billed magpie, common crow, black-capped chickadee, white-breasted nuthatch, brown creeper, house wren, golden-crowned kinglet, ruby-crowned kinglet, Eastern bluebird, veery, wood thrush, American robin, gray catbird, brown thrasher, cedar waxwing, yellow-throated vireo, warbling vireo, Philadelphia vireo, red-eyed vireo, yellow warbler, chestnut-sided warbler, yellow-rumped warbler, American redstart, black-and-white warbler, ovenbird, Northern waterthrush, mourning warbler, common yellowthroat, migratory warblers, scarlet tanager, rose-breasted grosbeak, black-headed grosbeak, lazuli bunting, indigo bunting, spotted towhee, Eastern towhee, chipping sparrow, lark sparrow, clay-colored sparrow, song sparrow, common grackle, brown-headed cowbird, orchard oriole, Bullock's oriole, Baltimore oriole, pine siskin, American goldfinch, evening grosbeak
Mammals: little brown bat, silver-haired bat, big brown bat, Eastern red bat, hoary bat, Eastern cottontail, woodchuck, Eastern chipmunk, gray squirrel, fox squirrel, Northern flying squirrel, beaver, white-footed mouse, southern red-backed vole, meadow vole, meadow jumping mouse, Western jumping mouse, porcupine, coyote, red fox, gray fox, raccoon, American marten, ermine, long-tailed weasel, least weasel, bobcat, elk, mule deer, white-tailed deer
Reptiles and Amphibians: American toad, gray tree frog, wood frog, common garter snake, plains garter snake

5.9.a Focus Area: Pembina Hills

Area: 168,000 acres (68,000 ha)

Description and Condition: The Pembina Hills 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, but cattle grazing occurs. Flatter areas have been cleared for cropland of small grains, sunflowers, and flax.

Key Species of Conservation Priority

Birds: black-billed cuckoo

Reptiles and Amphibians: Northern redbelly snake

Deciduous trees and forest understory.

5.9.b Focus Area: Turtle Mountains

Area: 262,000 acres (106,000 ha)

Description and Condition: Set in the northern Drift Prairie, the rolling topography and extra 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, possibly bald eagle

Reptiles and Amphibians: Northern redbelly snake

Woodland-bordered wetland of the Turtle Mountains.

5.9.c Focus Area: Devils Lake Mountains

Area: 3,500 acres

Description and Condition: The deciduous forest bordering Devils Lake is similar to that of the Pembina Hills. Much of the natural forest along the shorelines of the lake has largely been inundated by recent rising water levels. Bald eagles now nest in the large, dead flooded trees.

Key Species of Conservation Priority

Birds: bald eagle

Reptiles and Amphibians: Northern redbelly snake

Deciduous woodland bordering the rising Devils Lake.

5.9.d Focus Area: Killdeer Mountains

Area: 15,000 acres (6,000 ha)

Description and Condition: Slightly 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, quaking

aspen, green ash, paper birch, Western black birch and American elm are the dominant deciduous vegetation. Grazing occurs on private land.

Key Species of Conservation Priority

Birds: golden eagle

Looking up at the east end of Killdeer Mountains.

View from on top of the Killdeer mountains looking down at a deciduous woodland area.

5.9.e Conservation Problems and Actions for Upland Deciduous Forest

UPLAND DECIDUOUS FOREST			
CONSERVATION PROBLEM	CONSERVATION ACTION	POTENTIAL PARTNERS	
Direct Loss of Habitat			
Loss due to farming activities (e.g. tillage).	Develop and promote incentive programs to restore woodlands.	NDGF NDFS NRCS USFWS NGPJV	NDNRT RMEF Private Landowners County Zoning Officials
	Work with partners to implement easements.		
Loss due to development (e.g. ranchettes).	Work with county zoning planning officials to designate areas in need of protective covenants.		
	Work with partners to implement easements or land acquisition.		
Habitat Degradation			
Degradation due to improper grazing.	Develop and promote incentive programs to enhance or restore woodlands.	NDGF NDFS USFWS NRCS	
Fire suppression.	Develop prescribed burn plans and initiate.		
Climax communities.	Identify areas in need of clear-cutting and conduct.		
Invasive and Introduced Species			
Noxious weeds (i.e. leafy spurge).	Control noxious weeds through biological and chemical methods.	NDGFD USFWS USFS NRCS	Private Landowners NDSUEXT NDWCA
Industrial Development			
Wind energy potential is excellent in the Turtle Mountains and Killdeer Mountains, and good in the Pembina Hills.	Coordinate with wind energy companies to minimize impacts.	NDGFD USFWS	
Human Impacts			
Off-road vehicle or ATV use and creation of trails.	Work to minimize additional trail development on public lands.	NDGFD NDFS	CVB/CC Recreational user groups
Data Gaps			
Lack of baseline information on SoCP.	Survey areas of data gaps. Conduct research/surveys to establish baseline information on SoCP.	NDGFD NPWRC	

UPLAND DECIDUOUS FOREST				
CONSERVATION PROBLEM	CONSERVATION ACTION	POTENTIAL PARTNERS		
Conservation Awareness				
Level of knowledge on the value of forest ecosystems.	Continue to work with partners in promoting and distributing educational materials related to forests and good stewardship.	NDGFD NDFS	RMEF NWTF	CVB/CC Recreational user groups

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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.

6.1 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 CWCS. These monitoring components complement each other and will provide a more comprehensive assessment of the efficacy of the CWCS.

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, USACOE, 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 entirely 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 SoCP 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, creating an incidental reporting system for the public, 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.

6.2 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.

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 CWCS. 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 12 depicts the adaptive management conceptual process.

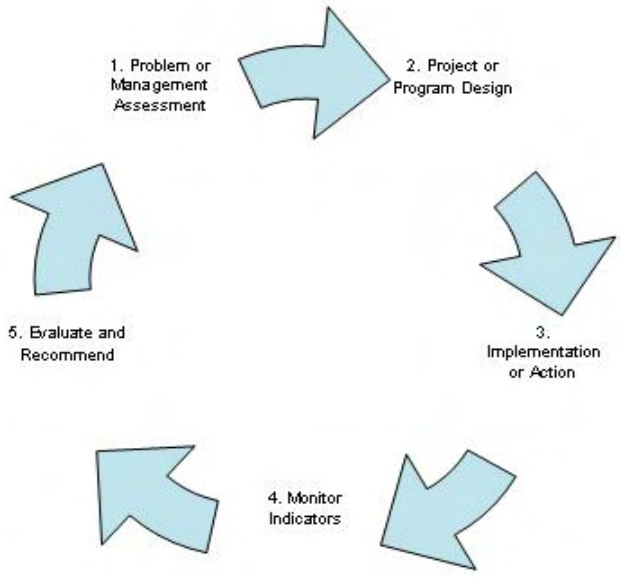

Figure 12. The Adaptive Management Process, conceptual view as described in Nyberg (1998).

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.

6.2.a 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. Existing programs will be discussed in Section 6.3.

A series of annual workshops involving both terrestrial and aquatic experts were initiated in 2004. 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. Conservation actions were reviewed, with a focus on the ability to evaluate and perhaps model those actions. Objectives have been set and requests issued for proposals addressing the objectives. The scientific community then responds. Research scientists identify indicators or proxies that may be used to address information needs. Respondents to the RFPs propose methods to accumulate relevant information to model and test selected objectives. Biologists and management staff from NDGFD evaluate the proposals and rank them based on a variety of parameters, and allocate limited resources accordingly. 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 CWCS planning process, NDGFD has amalgamated the information from all partners, as well as identified information that is lacking, and will develop monitoring plans. Through this process the goal is to develop both qualitative and quantitative aspects of monitoring species and their habitats.

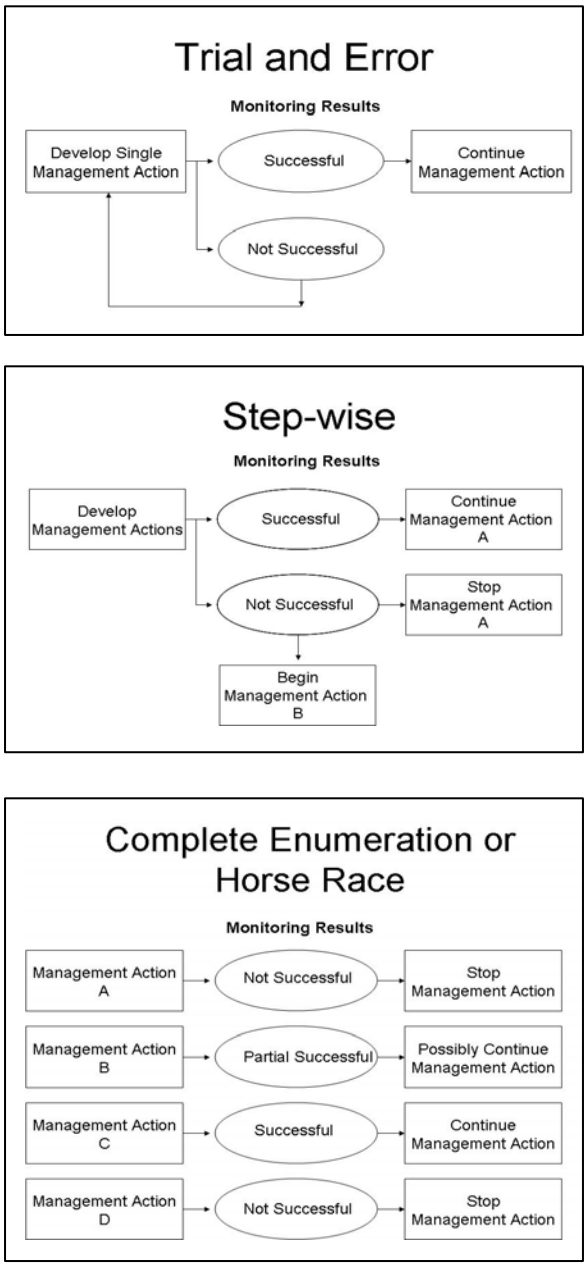

Figure 13. Visual depictions of Learning by Design.

6.2.b 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 13). 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 stocking 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 existing literature or expert opinions and workshops, to identify mechanisms for measuring the success of specific conservation actions.

6.2.c 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.

6.3 Habitat and Species Monitoring

6.3.a Habitat Monitoring

Section 5 detailed 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 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), 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 is collecting 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 is attempting to determine 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.
- 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 attains habitat quality information.
  http://www.ndsu.nodak.edu/ndsu/lbakken/forest/sustain/doc/2001 2002_forest_health_report.pdf
- North Central Research Station's Forest Inventory and Analysis (NCFIA) - US Forest Service: According to the USFS website "The Forest Inventory and Analysis (FIA) collects, analyzes, and reports information on the status and trends of America's forests: how much forest exists, where it exists, who owns it, and how it is changing. The North Central unit is responsible for inventorying more than 82 million acres of forest land spread across 11 Midwestern 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. Phase 1 consists of remote sensing for stratification, to identify where the forested land is. Phase 2 consists of one field sample site for every 6,000 acres of forest, where field crews collect data on forest type, site attributes, tree species, tree size, and overall tree condition. Phase 3 consists of a subset of Phase 2 sample plots which are measured for a broader suite of forest health attributes including tree crown conditions, lichen community composition, understory vegetation, down woody debris, and soil attributes. Soil samples are sent to a laboratory for chemical analysis. Finally, an associated sample scheme exists to detect cases of ozone damage occurring to adjacent forest vegetation." As of 2005, Phase 1 has been completed for North Dakota and Phase 2 and 3 are ongoing. This effort attains habitat quantity and quality information.
  http://ncrs.fs.fed.us/4801/
  http://fia.fs.fed.us/
- 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. This project, started in 2005, will take two years to complete. 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.
  http://www.epa.gov/owow/wetlands/bawwg/case/nd.html
  http://www.epa.gov/owow/wetlands/bawwg/publicat.html
- NDGFD Wildlife Management Area Field Mapping: Beginning in 2000, the NDGFD initiated the mapping of vegetation features and managed portions of state-owned wildlife management areas in a GIS. This effort includes 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.
- 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.
- LIDAR – LIght Detection And Ranging: LIDAR is a remote sensing tool used primarily to collect topographic data. From an airplane in flight, a LIDAR sensor records the time difference between the emission of a laser beam and the return of the reflected laser signal to the aircraft. However, LIDAR may also be utilized to determine above-ground surface features such as vegetation structure. LIDAR data has been collected in portions of North Dakota and future efforts are being planned. This effort attains habitat quantity and quality information.

6.3.a.i 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
- LIDAR

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
- LIDAR

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
- LIDAR

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

Upland Deciduous 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
- LIDAR

6.3.a.ii Monitoring for Statewide Changes in Habitat

A coarse-scale habitat assessment will be used to obtain an inventory of habitat in North Dakota. This inventory will be used to evaluate generalized conditions and trends in habitat on a statewide basis. When combined with the above mentioned landscape monitoring efforts, this inventory will provide a comprehensive overview of fish and wildlife habitat. A Geographic Information System provides the best opportunity to develop this coarse-scale assessment. Using a combination of habitat monitoring efforts and a standardized landcover, the NDGFD will monitor coarse-scale changes in habitat quantity and quality. Such a system requires extensive collaboration, sharing of resources and new technology. The following will occur to develop this system:

- The NDGFD will continue to maintain contact with other agencies or organizations active in creating landcovers, and encourage the sharing of spatial information.
- The NDGFD will encourage agencies/organizations involved to use landcover classifications which will satisfy the needs of all parties involved.
- The NDGFD will create a standardized landcover classification which can be systematically completed and utilized for monitoring the quantity and location of vegetation in North Dakota.
- The NDGFD will utilize new advancements in GIS technology as they become available.

6.3.b Species Monitoring

6.3.b.i Birds

Forty-five avian species are represented on North Dakota's list of SoCP. 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 SoCP. See Appendix A.1 for species specific monitoring efforts.

Existing Game 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 (SoCP include northern pintail, canvasback, and redhead):
    - Waterfowl Breeding Population and Habitat Survey, Four-square Mile Breeding Waterfowl Survey, Brood Counts, Nest Surveys (USFWS and NDGFD)
- Upland Game Birds (SoCP include sharp-tailed grouse, greater prairie-chicken and greater sage-grouse):
    - Lek Surveys, Brood Runs, Incidental Brood Reports (NDGFD)

Threatened and Endangered Species Monitoring

There are four federal threatened or endangered species on the SoCP list. These include bald eagle, whooping crane, piping plover, and least tern. The peregrine falcon was recently delisted.

- Midwinter Bald Eagle Survey. This is a national survey and the NDGFD has participated since 1986. It provides an index of wintering eagles on the Missouri River from Bismarck to Garrison Dam. The USFWS surveys portions of the Missouri River for breeding bald eagles in the spring. Due to funding constraints, the USFWS is unable to survey in some years.
- Whooping crane spring and fall migration sightings are currently coordinated with the USFWS and are adequately monitored.
- Piping plovers in the U.S. Alkali Lakes Core Area are monitored annually.
- The ACOE conducts annual monitoring of piping plovers and least terns along the Missouri River System.

Breeding Bird Survey (BBS)

The BBS has been in place since 1966. There are 45 active BBS routes in North Dakota. On average, surveys are conducted on 29 routes each year. Although the BBS has limitations and is considered by some to have significant bias, it is nonetheless the best source of long-term data for the majority of avian SoCP. There are only a handful of species the BBS does not detect well, 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 PIF 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 of many SoCP.

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 SoCP (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. Beginning in 2005, a survey on long-billed curlews will be conducted in the Missouri Slope.

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 is taking place. Beginning in 2004, a project looking at marsh bird distribution in relation to landscape composition was funded with SWG. This project, located in the Prairie Pothole Region of North Dakota, is continuing in 2005 and possibly into 2006 with the spatial extent modified to include western ND. See waterbird species accounts in Appendix A for more information.

Initial Avian Monitoring/Survey Goals

- Collate statewide information of bald eagle nests, survey for new nests, and monitor production.
- Work to 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.
- Work with the NGPJV and its science coordinator to develop and implement a similar survey south and west of the Missouri River. This could be in combination with the long-billed curlew survey.
- Work with the NPPWCP for creation and implementation of colonial and non-colonial waterbird monitoring on a spatial and temporal scale.

6.3.b.ii Reptiles and Amphibians

There are two species of amphibians and nine reptiles listed as SoCP. 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 A.2 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 Sheyenne 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 initiated efforts to develop standardized monitoring protocols. Once these protocols are developed and 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/index.asp
- 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.

6.3.b.iii Mammals

Monitoring protocol for mammals, especially small mammals, was identified as the greatest need for mammal conservation at the experts' workshop. 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 CWCS and will continue to develop monitoring protocol. See Appendix A.3 for species specific monitoring efforts.

Existing Surveys

- Swift fox are monitored every 3-5 years by the NDGFD.
- Gray wolf sightings and incidents are monitored primarily by the USFWS.

- Black-tailed prairie dogs will be monitored every five years 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.

Initial Mammal Monitoring/Survey Goals

- Develop 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 monitor many of the mammals in the state in the interim, and will be used to augment data in the future.
- 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.

6.3.b.iv Fish

North Dakota's CWCS includes 22 fish SoCP. 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 A.4 for species specific monitoring efforts.

Existing Surveys

- The NDGFD will survey select streams and 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.

Initial Fish Monitoring/Survey Goals

- The NDGFD incidental reporting system will be used to augment ongoing monitoring information.

6.3.b.v Freshwater Mussels

Mollusks have not been recently inventoried within the state. Currently no long-term monitoring plan has been developed to track populations of freshwater mussels. There is a need to develop a protocol to monitor the 13 freshwater mussel species within the state. This protocol will be developed largely from a previous survey of North Dakota waters. See Appendix A.5 for species specific monitoring efforts.

Existing Surveys

- No existing annual surveys are in place.
- NDDH will gather mussel data as part of its statewide IBI program beginning in 2005.

Initial Freshwater Mussel Monitoring/Surveys Goals

- Develop a monitoring protocol to track freshwater mussel species within the state. Generally this will consist of timed searches of a particular stream reach.
- The NDGFD will use the incidental reporting system to augment other monitoring efforts.

6.4 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.

6.5 Databases

The NDGFD must have an avenue for storing and accessing information obtained from monitoring efforts. Databases of existing and newly obtained information will allow 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 CWCS. 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.

6.5.a Species-Habitat Associations

Larger scale monitoring and assessment activities are focused on habitat inventories. Species habitat use or association information is the link between habitat inventory and potential species benefits or risks. Through an association database, species will be tied to habitats, and habitats back to species, at whatever levels current scientific information may support. The database link will enable both tabular and GIS summaries of habitat availability and estimated landscape carrying capacity for each modeled species. Through development of this database tool, simulation modeling will become available at the planning and implementation levels. A similar system has been designed by the Playa Lakes Joint Venture and NDGFD is participating with the Northern Great Plains Joint Venture to develop a system specific to western ND for validation of the concept.

6.5.b North Dakota GIS Hub (NDGH)

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
http://web.apps.state.nd.us/hubexplorer/generalinfo/viewer.html

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 sampling points, black-tailed prairie dog towns, and a growing database on SoCP locations as a result of the incidental reporting system. GIS databases will continue to grow in use for storage of species and habitat information.

6.5.c The North Dakota Natural Heritage Program and Incidental Reporting System

Within North Dakota, the Natural Heritage Program for several decades has served as the state's primary 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 NDGFD has also met with most of the previously mentioned resource agencies, university researchers, NGOs, birding clubs, etc., and emphasized the need for reporting survey information they collect on SoCP to the Heritage Program. Based on feedback received from these agencies, they also see the benefits of integrating their information into the Heritage Program's repository and will make it a priority to provide them with such data.

In addition to emphasizing the need to share information, the NDGFD initiated an incidental reporting system for the state's SoCP. The system is intended to provide members of the general public and others with an opportunity to report anecdotal observations of species of conservation priority. This information will be used to augment other monitoring efforts in an attempt to bolster knowledge of these species. The NDGFD web site currently has a link that individuals can log onto and electronically report a sighting http://www.nd.gov/gnf/gnfapps/SpeciesOfConservation/. Depending on the particular species, individuals are asked to provide information how it was observed, the location, and age structure. Each sighting is assessed for its validity and forwarded to the Heritage Program for entry into its database. Hard copies of the forms used in the incidental reporting system are also available for those without access to computers. Most of the resource agencies contacted expressed interest in having their staff use the incidental reporting system. Again, the incidental reporting system is intended only to provide additional species information to augment systematic and standardized monitoring surveys. The reporting system provides an opportunity for the public to interact in SoCP reporting and contribute to refining species distributions.

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SECTION 7

Reviewing the CWCS

This section includes information on the following required element:

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

7.1 CWCS Review

North Dakota's CWCS will be a dynamic document updated annually with relevant information gained from surveys, research, changes in habitat, threats, conservation actions, etc. Staff will be responsible for upgrading all facets of the CWCS (e.g. data gaps, monitoring needs, species accounts) as additional information becomes available. Revisions to the CWCS are anticipated to be made during January or February of each year. The public and other partners will be notified of changes to the CWCS through news releases and other forms of media. Updated copies will be made available on request. This approach should maximize the use and value as a contemporary strategy rather than becoming shelf art. It will also prevent NDGFD staff from getting bogged down with frequent large scale scoping efforts.

In addition to the annual updating of the CWCS, the Department intends to conduct a formal review of its entire CWCS in ten years or 2015. That effort will entail considerable scoping, public participation and will be similar to the process used for the development of the CWCS.

7.2 Species of Conservation Priority

North Dakota's SoCP list comprises the framework for much of the CWCS. As such, it will be important to periodically assess changes in status of species on this list. Due to the time needed to survey population dynamics and detect changes in species range, distribution, and abundance trends, a formal review of the list will be conducted at five year intervals. A process similar to the one developed for this effort will most likely be used. For example, numerous federal and state land management agencies, prominent experts from the public, academia, and various others will be solicited for comments with respect to adding or removing species from the list. The Department will compile and review the comments received and determine if changes to the list are needed. The first review of the species of conservation priority will occur in 2010.

SECTION 8

Coordination with Federal, State, and Local Agencies and Tribal Government

This section includes information on the following required element:

> **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.

8.1 Coordinating the CWCS Development

The following subsections provide information on various land management or conservation agencies with a presence in North Dakota. In addition to individual meetings or discussions, there were several coordination efforts which involved all of the agencies or organizations listed in this section, including Indian tribes, plus additional contacts not listed. These efforts included:

- Providing a document detailing the history of SWG, CWCS requirements, and a working draft list of species of conservation priority to roughly 60 agencies, groups, or local experts. This document, mailed in February 2004, provided an opportunity for those groups to review the draft list and give input on the draft SoCP list. Approximately twenty of those responded with comments. This feedback was used to finalize the SoCP list.
- In July of 2004, the SoCP list was finalized and published in the July issue of North Dakota Outdoors. This magazine was sent to all original reviewers, additional contacts, and approximately 30,000 subscribers in North Dakota and other states.
- Arranged an aquatics expert meeting on October 27, 2004 to gather information on threats, conservation actions, monitoring and survey efforts needed for fish SoCP. Those in attendance included NDGFD, NDDOH, and USFWS staff.
- Arranged a North Dakota All-bird Workshop on December 7-8, 2004 to educate participants on the various national/regional/ state bird initiatives, discuss priority bird issues, and provide an open discussion session on the needs of bird SoCP for the North Dakota CWCS. Nearly 60 individuals attended with representatives from nearly all the agencies mentioned below plus individuals from farm groups, birding groups, and other conservation groups looking to partner with North Dakota, such as the Rocky Mountain Bird Observatory.
- Arranged a joint mammal, reptile, and amphibian expert meeting on December 15, 2004 to gather information on threats, conservation actions, monitoring and survey efforts needed for small mammal, reptile, and amphibians of North Dakota. Twelve individuals attended from various agencies and Universities.
- In June of 2005 a draft of the state's CWCS was distributed to roughly 60 agencies, groups and others to review and provide comment.

8.1.a US Fish and Wildlife Services (USFWS)

The USFWS is an agency of the Department of the Interior. Its mission is to conserve, protect and enhance fish, wildlife and plants and their habitats for the continuing benefit of the American people. Among its major duties is the protection of endangered species and migratory birds. It also manages 93 million acres in the National Wildlife Refuge system. In North Dakota, the USFWS manages 63 refuges totaling more than 290,000 acres and 11 wetland management districts containing 254,000 acres of waterfowl production areas. The field office for North Dakota is in Bismarck.

- Met with USFWS HAPET office staff on April 25, 2003 to discuss SWG program and opportunities for information sharing and other partnership endeavors.
- Met with USFWS HAPET office staff on November 24, 2003 to discuss data sharing ideas.

- Attended February 4-6, 2004 PIF population objectives workshop.
- Met with the assistant regional director from the region 6 USFWS office on June 30, 2004 to discuss SWG progress and conducted field reviews of ongoing projects.
- Met with Ecological Services staff from Bismarck on August 11, 2004 to discuss SWG issues and opportunities to provide input.

8.1.b US Forest Service (USFS)

The Forest Service is an agency of the U.S. Department of Agriculture that manages public lands as multiple-use in national forests and grasslands. The USFS manages 1,103,712 acres of land in western and southeastern North Dakota. The Little Missouri National Grasslands (1,028,000 acres) in western North Dakota and the Sheyenne National Grasslands (70,200 acres) along with land in South Dakota are coordinated under the Dakota Prairie Grasslands (DPG) office in Bismarck, North Dakota. These public lands are home to numerous species including a number of North Dakota's Species of Conservation Priority.

- Met with DPG biologist on March 13, 2003 to discuss USFS projects and potential SWG projects.
- Met with USFS staff on March 27, 2003 to discuss issues associated with prairie dog managements on their lands.
- Met with USFS staff on August 31, 2004 to collect input and discuss UND golden eagle project.
- January 20, 2005 met with DPG biologist for an update and status on SWG projects of mutual concern or where partnering is occurring on projects.

8.1.c US Bureau of Land Management (BLM)

The BLM is an agency within the U.S. Department of the Interior that administers 261 million surface acres of America's public lands, located primarily in 12 western states. It also manages the subsurface mineral rights to 699 million acres nation wide including Alaska. In North Dakota, BLM manages 59,482 surface acres and over 5.6 million subsurface acres.

- Met with the BLM wildlife biologist from the Dickinson office on August 31, 2004 to discuss role of the BLM in SWG issues and opportunities to contribute in the development of the CWCS.

8.1.d US Army Corp of Engineers (ACOE)

The ACOE is charged with planning, designing, building and operating water resources and other civil works projects including navigation, flood control, environmental protection, and disaster response. They also design and manage for military lands and assist with engineering projects of other federal agencies. North Dakota is divided between two ACOE district offices, one in Omaha and the other in St. Paul. The Omaha district has jurisdiction over the Missouri River and all waterways to the west. The St. Paul district is charged with operation east of the Missouri River.

- December 2, 2004 met with ACOE biologists in Riverdale to discuss ACOE participation in SWG projects and opportunities to contribute in the development of the CWCS.

8.1.e US Geological Survey - Northern Prairie Wildlife Research Center (NPWRC)

The mission of the U.S. Geological Survey is to provide reliable scientific information to: describe and understand the earth; minimize loss of life and property from natural disasters; assist others in managing water, biological, and mineral resources; and enhance and protect quality of life. The USGS provides a broad range of national expertise in geography, geology, hydrology, and biology. The USGS biological resource division studies assist in maintaining healthy ecosystems and natural resources so that these habitats can continue to provide food, energy, medicine, transportation, and recreation.
Northern Prairie Wildlife Research Center (NPWRC) is one of 18 science and technology centers in the biological resources division, administratively positioned in the central region, and geographically located in the northern Great Plains. The NPWRC is located in Jamestown, North Dakota.

- Met with NPWRC staff on May 31, 2002 to discuss the GAP project and its potential use in the CWCS.
- Met with NPWRC researchers on April 2, 2003 to discuss SWG issues, current research projects and potential areas of future SWG needs.
- Conducted a mammal and herptile "experts" workshop at NPWRC on December 15, 2004

8.1.f US Department of Agriculture-Natural Resources Conservation Service (NRCS)

The NRCS is an agency of the U.S. Dept. of Agriculture that operates at the national, regional, and state levels. It offers technical assistance through cost share, as well as and financial assistance programs to private landowner for the conservation of soil, water, and other natural resources. Many of these programs are funded by the current Farm Bill. They also work closely with state and federal agencies to achieve their goals.

- Met with the NRCS's regional wildlife biologist on December 14, 2004 to discuss SWG and NRCS programs and opportunities to identify conservation practices. The Department will provide input to the NRCS to help guide priorities for SoCP.

8.1.g North Dakota Game and Fish Department (NDGFD)

The NDGFD is the state agency charged with protection, conservation, and enhancement of fish and wildlife populations and their habitats for sustained public consumptive and nonconsumptive use.

- Nongame biologists within the NDGFD have updated other agency staff on the SWG program and the progress/development of the CWCS through presentations at annual staff meetings, distributing weekly email notes, and informal one-on-one discussions.
- Numerous biologists within the NDGFD have also been asked to review and provide comments on various sections and drafts of the CWCS.

8.1.h North Dakota Parks and Recreation/Natural Heritage Program (NDPR/NHP)

The NDPR/NHP is a program developed in coordination with The Nature Conservancy to be the repository of unique records. The Natural Heritage Program operates a database for records of 230 plant species and 180 animal species that are endangered, threatened, rare, or declining in North Dakota. The NDPR/NHP has also developed a classification of approximately 100 aquatic, terrestrial and non-vegetated natural communities. It manages 13,000 acres of land in ND.

- Met with the coordinator of the Natural Resources Division on March 4, 2003 to discuss SWG issues and potential projects for partnerships on including development of an improved incidental reporting system. The NDGFD agreed to fund a program upgrade to Biotics with SWG funds.
- Met with Natural Resources Divisions to initiate a SWG project to upgrade the NDPR/NHP database and to better track SoCP in January of 2004.

8.1.i North Dakota State Land Department (NDSLD)

This state agency is divided into five sections responsible for the management of land held in trust for state schools and institutions. These sections are surface management, mineral management, unclaimed properties, energy development, and investments. It owns and manages 713,994 surface acres in North Dakota.

- Met with NDSLD staff on November 12, 2004 to discuss SWG issues and opportunities to partner on conservation actions.

8.1.j Colleges and Universities

North Dakota has 11 colleges and universities. Professors from several of these schools have been solicited for information, or are conducting studies for use in North Dakota's CWCS.

- Professors from a number of North Dakota's institutions were provided background information on the SWG program in October of 2003 and queried for interest in future research.
- Several professors were asked to conduct reviews and provide comments on various drafts of the CWCS.
- Several professors with expertise in specific taxonomic areas were invited to attend workshops in 2004 and 2005 to identify potential threats and conservation actions for SoCP.
- The NDGFD has initiated SWG related projects with the University of Montana, University of North Dakota and St. Cloud State University. These projects include survey work on grassland birds, raptors, small mammals and herptiles.

8.1.k Ducks Unlimited (DU)

Ducks Unlimited is a private organization that conserves, restores, and manages wetlands and associated habitats for North American waterfowl. The Great Plains regional office is located in Bismarck, North Dakota.

- Met with DU staff on July 1, 2003 to discuss SWG issues and opportunities for partnering.
- Initiated a study of grassland nesting shorebirds and raptors with DU on January 1, 2004.
- Conducted a field review of a SWG project being conducted by DU on June 6, 2004 to compile video footage and assess study techniques.
- Met with DU staff on November 30, 2004 to discuss status of ongoing SWG project and determine future opportunities.

8.1.l The Nature Conservancy (TNC)

TNC is a private organization whose mission is to preserve the plants, animals, and natural communities that represent the diversity of life on earth by protecting the lands and waters that they need to survive. TNC owns and manages a small number of properties in North Dakota including Cross Ranch, Davis Ranch, and John E. Williams preserve.

- Met with TNC's ND representative on July 1, 2003 to discuss SWG issues and opportunities to partner.
- Met with TNC staff and others to discuss bird planning initiatives for North Dakota and other Great Plains states at the November 13-14, 2003 TNC bird experts meeting in Bismarck, ND.
- Met with TNC staff and others to discuss aquatic planning initiatives for the Northern Mixed Grass Steppe at the November 19-20, 2003 TNC aquatics experts meeting in Aberdeen, SD.
- Met with TNC staff and others to discuss aquatic planning initiatives for the Northern Tall Grass Prairie at the March 18-19, 2004 TNC aquatics experts meeting in Grand Forks, ND.

8.1.m Audubon Society

Audubon is a conservation organization whose mission is to protect natural ecosystems with a focus on birds. The Audubon Society has one chapter in the state.

- Met with the North Dakota Chapter of Audubon Society executive director on October 20, 2003 to discuss SWG issues and opportunities to partner.
- North Dakota Audubon Chapter staff has been invited to numerous planning discussions, meetings and work groups.

8.1.n Pheasants Forever (PF)

Pheasants Forever is a non-profit organization dedicated to the protection and enhancement of pheasant and other wildlife populations in North America through habitat improvement, land management, public awareness, and education. There are 24 local chapters of Pheasants Forever in the state.

- Met with the regional wildlife biologist on June 25, 2003 to discuss SWG issues and the opportunities to partner.

8.1.o Delta Waterfowl (Delta)

Delta is a privately funded organization whose mission is to provide knowledge, future leaders, solutions and its passion for waterfowl to scientists, resource managers, waterfowlers, conservationists and the public to enhance waterfowl populations while securing the future of waterfowling**.** North Dakota currently has three chapters.

- Met with Delta staff on October 2, 2003 to discuss SWG issues and opportunities to partner.

8.1.p North Dakota Natural Resources Trust (NDNRT)

The North Dakota Natural Resources Trust's mission is to preserve, restore, manage, and enhance wetlands and associated wildlife habitat, grassland conservation and riparian areas in North Dakota. The group's board is made up of six members, three appointed by the governor, and three from various NGOs within the state.

- Met with the executive director of the NDNRT on July 7, 2003 to discuss SWG issues and opportunities to partner.

- January 7, 2004 again met with the Executive Director of the NDNRT on January 7, 2004 to discuss potential SWG projects (i.e., easements) along the Missouri River.

8.1.q Tribal Government

North Dakota includes all or parts of five reservations within the states boundaries. These are Spirit Lake Nation, Turtle Mountain Band of Chippewa Indians, Three Affiliated Tribes, Standing Rock Sioux Tribe, and Sisseton-Wahpeton Oyate.

- The NDGFD has provided tribal chairmen with information on SWG issues through various mailings. For example, each of the tribes were asked to review and provide comment on the initial draft SoCP. To date, a staff level point of contact for any of the tribes has not yet been developed.

8.1.r Neighboring States

North Dakota is bordered on the west by Montana, east by Minnesota, and to the south by South Dakota. Each state is also in the planning and developmental process of a CWCS.

- Met South Dakota Game Fish and Parks staff and other agencies from South Dakota on November 19-20, 2002 at the TNC aquatics meeting in Aberdeen, SD.
- Participated in a March 31, 2003 conference call with various states discussing burrowing owl conservation issues.
- Met with Wyoming, Montana, South Dakota provincial land resource agencies and academia at the MT/WY All-Bird workshop on August 20-21, 2003 in Billings, MT.
- Met with regional and national land resource agencies and NGO's at the September 8-12, 2003 IAFWA national meeting in Madison, WI.
- Participated in monthly DAT conference calls with other USFWS region 6 states, USFWS regional directors, and various NGOs during 2004 and 2005.
- Met with regional and national land resource agencies and NGOs at the September 2004, national SWG meeting in Nebraska City, NE.
- Participated in a conference call on October 29, 2004 with South Dakota Game, Fish and Parks SWG staff to discuss progress on each state's CWCS and opportunities to partner on future projects.

8.1.s Prairie Pothole Joint Venture (PPJV)

The Prairie Pothole Joint Venture (PPJV) includes one-third (100,000 square miles) of North America's Prairie Pothole Region, encompassing counties within North Dakota, South Dakota, Montana, Minnesota, and Iowa. The PPJV was formed in 1987 as one of the original six priority conservation areas designated by the North American Waterfowl Management Plan of 1986. The PPJV is a partnership of conservation agencies and organizations that share a common vision for PPR wildlife, their habitats, and people. Since its inception, the PPJV has secured over $15 million in NAWCA funding and partners have provided over $26 million in match to conserve, enhance, and restore over 600,000 acres of grassland and wetlands in North Dakota.

- Department nongame staff has regularly attended PPJV technical committee meetings and participated in review of the revised implementation plan.

8.1.t Northern Great Plains Joint Venture (NGPJV)

The Northern Great Plains Joint Venture encompasses counties within North Dakota, South Dakota, Montana, and Wyoming. The NGPJV was formed in 2002 and is the first all-bird joint venture. As a fairly new joint venture, partnerships continue to take shape along with a biological foundation on which to identify and implement all-bird landscape level conservation.

- NDGFD nongame staff is on the NGPJV technical committee.
- The NDGFD has provided SWG funds to this joint venture for the purpose of securing a science coordinator to amass information and build the biological foundation for all-bird conservation.

8.1.u North Dakota Chapter of The Wildlife Society (NDCTWS)

The Wildlife Society was founded in 1937 as an international, nonprofit, scientific and educational organization for professionals, students, and laypersons active and interested in wildlife research,

management, education and administration. The NDCTWS is an active affiliate of TWS. The NDCTWS was founded in 1963 and incorporated in 1981 under the laws of North Dakota. The NDCTWS provides expertise in advising legislative and judicial processes surrounding the controversial management of many natural resource assets including plant and animal communities of North Dakota.

- NDGFD staff provided a presentation to the members of the Chapter on the status of the SWG program and the state's CWCS at the annual meeting of the NDCTWS in February 2004.
- A chapter committee for SWG was formed at the 2005 annual business meeting.

8.1.v Dakota Chapter of the American Fisheries Society (DAFS)

The American Fisheries Society was founded in 1870 as an international, nonprofit, scientific and educational organization. The Dakota Chapter was originally organized as the Upper Missouri River Chapter in 1963 and was re-named in 1987 as the Dakota Chapter to include North and South Dakota.

- NDGFD staff provided a presentation to the members of the chapter on the status of the SWG program and the state's CWCS at the annual meeting of the DAFS in March 2005.

8.2 Agency Coordination for CWCS Implementation and Revision

The NDGFD has expended considerable effort in soliciting agency input for developing North Dakota's CWCS. Contact with most of the agencies that have an interest and/or expertise to contribute to the process has been made. The feedback and input these agencies provided was quite helpful and contributed significantly to the CWCS.

At some point in the future, the CWCS will change to more of an implementation or operational phase. Presumably, once the threats that are causing a species to decline have been identified, along with the conservation actions needed to stem the decline, implementing those measures can begin. For North Dakota the evolution to an implementation phase will be different depending on the SoCP. For example, considerably more is known about some species (e.g. birds) and we will be in a position to initiate implementation measures for these species sooner than for others that have data gaps.

As the NDGFD moves forward toward implementation of the CWCS, solicitation of input from partners (e.g. participating federal, state, local agencies, universities, general public) will continue. Input will be gathered through a variety of means including, but not limited to, distribution of study results and findings, joint work groups, agency meetings, written correspondence, etc. The collective participation and input of these groups is an ongoing, essential part of implementing the CWCS. Their involvement did not simply end with the completion of the strategic phase of the CWCS.

SECTION 9

Public Participation

This section includes information on the following required element:

> **Element 8:** Congress has affirmed through WCRP and SWG, that broad public participation is an essential element of developing and implementing the CWCS, the projects that are carried out while the CWCS is developed, and the Species of Conservation Priority that Congress has indicated such programs and projects are intended to emphasize.

9.1 The Public Considered

Interpretation of Element 8 and the public:

- "Public" in this instance is defined as the people of North Dakota as a whole.
- "Participation" in this instance is defined as the act of informing or involving.

9.2 The Overall Process

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 and provide a mechanism for input on fish and wildlife issues within the state and from a national perspective as well.

The NDGFD's Communication Section has several means of providing information to the public. At some point in the past few years, all of these tools have been used to inform the public of SWG issues and keep them updated on the status of the CWCS. The NDGFD's weekly newsletter is released every Wednesday to 200 media outlets (e.g. TV, radio, and newspapers) throughout the state, and to 1,700 other out-of-state subscribers. A brief weekly audio news release is also played on radio stations throughout the state, reaching about 50,000 people. *North Dakota Outdoors* magazine is the official publication of the NDGFD. It is published 10 times a year and is received by about 30,000 households. *North Dakota Outdoors* television is played weekly throughout the state on local news. These interesting two-minute programs feature a variety of outdoor topics from North Dakota's habitats and the wildlife that depends on them to unusual outdoor personalities. An estimated 125,000 people see the program each week. *North Dakota Outdoors Live!* radio program is on every Saturday morning from 11:00 a.m. to noon. Roughly 20,000 people listen in to hear the latest happenings in the NDGFD and other issues affecting fish and wildlife. *Watchable Wildlife Notes* is a publication for wildlife viewers published twice a year. About 4,500 wildlife enthusiasts subscribe to the publication. The NDGFD also maintains a home web page that provides a multitude of information about numerous fish and wildlife issues.

9.2.a Continued Public Involvement

Providing information to the public, receiving feedback, or answering questions and concerns will not end with this CWCS. The public will continue to be informed and educated on the progress of the CWCS, research projects, and other strides in conservation for SoCP with many of the same tools listed above. With the growing number of wildlife watchers in North Dakota, an increase in nongame wildlife awareness and interest over time is anticipated.

9.3 Public Information Exchange

The following provides instances of what, how, where, and when the NDGFD distributed information to the public on SWG issues and the state CWCS.

Message: Game and Fish Hires Two New Biologists. Will be working extensively on helping the agency develop a conservation plan and collect baseline data for nongame species.
Media: NDGFD weekly newsletter
Who: 1,900 total subscribers, 200 media sources in North Dakota
When: June 2002

Message: Nongame Biologists Hired. To improve the state's resource base on nongame species…development of a statewide conservation plan…to prevent species from serious declines.
Media: *Watchable Wildlife Notes*
Who: 4,500 subscribers
When: Spring 2002

Message: Discussion of current nongame issues; CARA, WCRP, bluebirds, nongame biologists, morel mushrooms.
Media: *North Dakota Outdoors* radio program
Who: 20,000 listeners on 5 major AM radio stations
When: June 8, 2002

Message: Going to the Dogs. Three minute video on black-tailed prairie dog status and monitoring, a project funded with WCRP.
Media: *North Dakota Outdoors* television news program
Who: 125,000 North Dakota residents
When: June 2002

Message: Field trip to look at nongame habitat, issues, and emphasize the need for SWG to include outreach and education.
Where: Sheyenne National Grasslands, USFS
Who: Senator Byron Dorgan's staff
When: August 14, 2002

Message: Conservation and Management of Nongame Wildlife in North Dakota: A North Dakota Game and Fish Department Perspective.
Media: Dakota Zoo, Bismarck
Who: 30 members of Bismarck-Mandan Bird Club
When: January 3, 2003

Message: Don't Slash Wildlife Grants – Editorial "the program works in North Dakota and other states and should be fully funded."
Media: *The Forum*
Who: Subscribers of Fargo newspaper
When: February 11, 2003

Message: Federal Wildlife Grants Important to At-Risk Species.
Media: NDGFD weekly newsletter
Who: 1,900 total subscribers, 200 media sources in North Dakota
When: March 12, 2003

Message: State Wildlife Grants. Contact your Congressman…tell them our wildlife needs reliable funding to maintain state wildlife projects already underway and to help conserve our wildlife species.
Media: *Watchable Wildlife Notes*
Who: 4,500 subscribers
When: Spring 2003

Message: Caring for North Dakota's Nongame Species. An introduction to CARA, WCRP, SWG, and how North Dakota is utilizing the funds.
Media: *North Dakota Outdoors* magazine
Who: 30,000 subscribers
When: July 2003

Message: Field trip to view a golden eagle project funded with SWG, and discuss other related issues in North Dakota.
Where: The badlands of North Dakota
Who: Senator Byron Dorgan's staff, including Committee on Appropriations staff
When: August 20, 2003

Message: State Wildlife Grants helping to prevent species declines.
Media: Audio news release
Who: 50,000 listeners on AM radio stations across the state
When: December 1, 2003

Message: Congress Gives Boost to North Dakota's Wildlife Program. Putting these dollars to work now will save taxpayers money in the future.
Media: NDGFD weekly newsletter
Who: 1,900 total subscribers, 200 media sources in North Dakota
When: December 3, 2003

Message: Grant Program Helps N.D. Manage Nongame Species. An article on the golden eagle study funded with SWG and how SWG is providing funding for other nongame species of concern.
Media: Doug Leier's Outdoor Column
Who: Newspaper subscribers across the state
When: December 2003

Message: Review and comment period for Version 2.0 Draft Species of Conservation Priority for North Dakota. Comments on species to include/exclude on the list were received by roughly 1/3 of the recipients by March 31.
Media: NDGFD publication
Who: 65 groups comprised of agencies, non-governmental organizations, tribal, academia, and experts from the public
When: February 25, 2004

Message: State Wildlife Grants Update.
Media: *Watchable Wildlife Notes*
Who: 4,500 subscribers
When: Spring 2004

Message: Badlands Field Trip Scheduled in July. Highlight some recent projects established by the department's nongame biologists through State Wildlife Grants.
Media: NDGFD weekly newsletter
Who: 1,900 total subscribers, 200 media sources in North Dakota
When: June 16, 2004

Message: North Dakota's 100 Species of Conservation Priority – What Are They? Profiles the species North Dakota identified as those in the greatest need of conservation. Also, contact information was provided for those wishing to provide input on the CWCS process.
Media: *North Dakota Outdoors* magazine
Who: 30,000 subscribers
When: July 2004

Message: Nongame Time, Although Not Game Animals, These Species Hardly a Nonfactor. On the front page of Outdoors section.
Media: *Bismarck Tribune*
Who: Subscribers of Bismarck newspaper
When: July 21, 2004

Message: Badlands Field Trip – Two-day trip focused on nongame species issues and the SWG program.
Where: The badlands of North Dakota
Who: 25 members from the general public
When: July 23 -24, 2004

Message: Badlands Tour. Three minute video on the badlands field trip geared toward SWG program.
Media: *North Dakota Outdoors* television news program
Who: 125,000 North Dakota residents
When: July 2004

Message: The SWG program in North Dakota and a discussion on the incidental report form
Where: Valley City, ND.
Who: 15 members of the North Dakota Birding Society
When: September 25, 2004

Message: Development and implementation of an Incidental Report System. This web-based application, developed in conjunction with the North Dakota Natural Heritage Program and funded with SWG, allows for any member of the public to report incidental sightings of species of conservation priority.
Where: Statewide
Who: All members of the public
When: October 2004

Message: Mid-winter Bald Eagle Survey update and how to report species of conservation priority on the incidental report form.
Media: *North Dakota Outdoors* radio program
Who: 20,000 listeners on 5 major AM radio stations
When: January 29, 2005

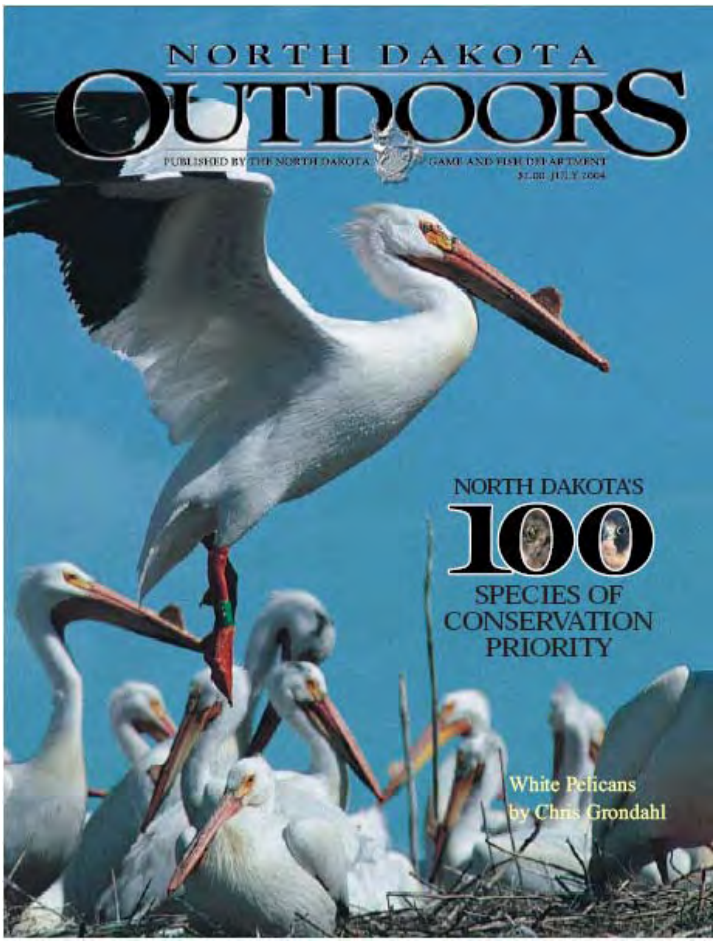
Message: Reptiles and Amphibians of North Dakota and those that are species of conservation priority.
Media: NDGFD Wildlife Wednesdays
Who: 160 total participants, 100 kids and 60 adults
When: February 2, 2005

Message: Birds and Their Nests and those that are species of conservation priority.
Media: NDGFD Wildlife Wednesdays
Who: 130 total participants, 80 kids and 50 adults
When: February 16, 2005

Message: NDGFD Seeking Public Comment on CWCS.
Media: NDGFD Outreach Biologist Jeb Williams's weekly radio show
Who: Listeners in Bismarck/Mandan area
When: May 14, 2005

Message: NDGFD is seeking comments on a strategic plan designed to identify and help fish and wildlife species that are in decline.
Media: Audio news release
Who: 50,000 listeners on AM radio stations across the state
When: May 15, 2005

Message: NDGFD Seeking Public Comment on CWCS.
Media: *North Dakota Outdoors* radio program
Who: 20,000 listeners on 5 major AM radio stations
When: June 18, 2005



The front cover of the widely distributed July 2004 issue of North Dakota Outdoors magazine which was nearly entirely devoted to SoCP and the initiation of the CWCS.

9.4 Wildlife Values in the West 2004 – Preliminary Findings

Beginning in 2004, a survey conducted cooperatively by Colorado State University and the North Dakota Game and Fish Department was mailed to a sample of 3,000 North Dakota residents. Of those surveys, 715 completed surveys were returned. The survey covered a broad range of fish and wildlife issues, from water resources to chronic wasting disease. Five questions were directed at categorizing residents' knowledge about game and nongame, how important it is to protect nongame from becoming rare, endangered or extinct, and where funding for such protection should come from.

Results reported were obtained from weighted data, i.e., from data weighted to accurately reflect the state's population characteristics. Data were weighted on the basis of age (using *U.S. Census 2000 projections*) and participation in wildlife-related recreation (estimates from the USFWS *2001 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation*). The preliminary results from this report provides a general view of how North Dakota residents view game and nongame conservation and opinions as to where it is acceptable to obtain non-federal match for nongame projects from. Preliminary results from this report are as follows *(Valid Percent and (Frequency))*:

4. How would you categorize your knowledge of fish and wildlife in North Dakota?

I'd categorize my knowledge about…	Not at All Knowledgeable	Slightly Knowledgeable	Moderately Knowledgeable	Quite Knowledgeable	Extremely Knowledgeable
Game.	12.1% (84)	30.7% (213)	31.7% (220)	20.8% (144)	4.6% (32)
NDG&F efforts to protect game.	25.8% (178)	32.6% (225)	25.9% (179)	13.5% (93)	2.1% (15)
Nongame.	29.8% (206)	37.0% (255)	23.2% (160)	9.3% (64)	0.7% (5)
NDG&F efforts to protect nongame.	40.6% (280)	32.0% (220)	20.5% (141)	6.5% (45)	0.5% (3)

5. Please indicate the importance of the following statements to you.

It is important to me that…	Not at All Important	Slightly Important	Moderately Important	Quite Important	Extremely Important
North Dakota protects as many types of fish and wildlife as possible.	2.2% (15)	12.6% (88)	27.3% (191)	39.0% (272)	18.9% (132)
North Dakota keeps nongame from becoming rare, endangered or extinct.	2.7% (19)	11.1% (78)	24.7% (172)	37.0% (258)	24.5% (171)
North Dakota maintains levels of waters in rivers, streams, and lakes that are sufficient for the protection of fish and other water-dependent animals.	0.8% (6)	5.1% (36)	17.8% (124)	39.8% (277)	36.5% (254)

6. NDG&F has various management projects to protect game and nongame. Please indicate your level of agreement with the following statements about these projects.

Do you disagree or agree that…	Strongly Disagree	Moderately Disagree	Slightly Disagree	Neither	Slightly Agree	Moderately Agree	Strongly Agree
The NDG&F efforts to protect nongame fish and wildlife are adequate.	0.7% (5)	1.0% (7)	4.2% (29)	40.2% (277)	22.9% (158)	27.1% (187)	4.0% (28)
Projects designed to benefit nongame fish and wildlife will benefit game as well.	0.4% (3)	1.0% (7)	2.2% (15)	25.3% (175)	24.8% (171)	32.6% (225)	13.8% (96)

7. North Dakota is required to match federal funds with state money to pay for protection of nongame fish and wildlife. Several possible sources for the state money to match federal funds for these programs have been suggested. There are differences of opinion about how these programs should be funded.

It is unacceptable or acceptable to…	Highly Unacceptable	Moderately Unacceptable	Slightly Unacceptable	Neither	Slightly Acceptable	Moderately Acceptable	Highly Acceptable
A) Use only money from people who hunt or fish?	15.1% (104)	15.1% (104)	17.6% (122)	7.1% (49)	16.5% (114)	16.2% (112)	12.4% (86)
B) Use a portion of revenue presently being collected from taxes?	4.5% (31)	5.3% (37)	10.3% (71)	6.2% (43)	40.3% (279)	26.3% (182)	7.0% (49)
C) Use new taxes or an increase in existing taxes?	25.7% (178)	19.5% (135)	14.5% (100)	15.8% (109)	18.3% (127)	4.3% (30)	1.8% (13)
D) Use only money from voluntary contributions?	14.6% (101)	17.0% (118)	16.9% (117)	13.2% (91)	16.5% (114)	12.6% (87)	9.3% (64)
E) Spend no money to keep nongame from becoming rare, endangered or extinct?	51.9% (360)	18.0% (125)	14.3% (99)	8.4% (58)	2.7% (19)	2.6% (18)	2.0% (14)

8. Of the options listed in #7 above (A to E), which source of money do you prefer to be used to pay for projects to keep nongame from becoming rare, endangered or extinct?

A	B	C	D	E
23.3% (123)	56.3% (298)	5.7% (30)	12.0% (64)	2.6% (14)

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APPENDIX A

Species of Conservation Priority Accounts

KEY TO SPECIES ACCOUNTS

The following sub-appendices (A.1 – A.5) are species accounts of North Dakota's 100 Species of Conservation Priority. They were developed to provide CWCS users with a summary of pertinent biological information. A secondary purpose of these accounts is to fulfill the requirements set forth by Congress for the CWCS.

It's worth noting that all bird and herptile accounts contain some management recommendations while most of the small mammals, fish and mussel accounts do not. Considerably more work has been performed on certain taxa (i.e., birds) than others. Consequently, more is known about the types of land treatments or conservation actions needed in order to benefit or sustain those populations. Rather than leave this information out of the CWCS simply because we took a landscape based approach, we provided these management recommendations for those individuals or partners who might have a particular interest in a single species. As we learn more about habitat requirements and issues limiting other species, we intend to refine or add these recommendations.

Appendix E also provides additional information on the effects of management practices on birds. This appendix will be refined with input from bird experts and may eventually serve as a key tool for use in implementing the CWCS.

The following two pages outline a sample species account. Descriptions of the items are italicized.

Common Name

SoCP Level I, II, or III

Scientific Name: *Genus species*

General Description: L = *length*, WS = *wingspan (for birds)*, *weight in ounces*. *Brief description of outward appearance.*

Status: *Period of the year when the species is present in North Dakota. Peak breeding approximations are also provided, if available. For birds this represents the approximate period when three-fourths or more of the individuals of a given species are engaged in nesting activities.*

Abundance:
Abundant = a species occurs in very large numbers and is easily observed
Common = a species that occurs in large numbers
Fairly Common = a species that occurs in moderate numbers
Uncommon = a species that occurs in low numbers
Rare = a species that occurs yearly somewhere in the state but in low numbers
Extirpated = a species that formerly occurred naturally in the state

Primary Habitat: *Brief description of habitat.*

Federal Status: *U.S. Fish and Wildlife Service designation.*

Reason for Designation: *Brief description of why this is a species of conservation priority. If available, high priority designations from other assessments are given.*

Breeding Bird Survey Data (1966-2002):
The estimated population trend in North Dakota and Survey-wide (all routes including the U.S. and Canada) results from 1966-2002, summarized as % change/year. (p = *results of a test to determine if the trend is significantly different from 0. Significant trend if p < 0.1 and non-significant trend if p > 0.1*).
The relative abundance for the species or the approximate measure of how many birds are seen on a route in North Dakota during the Breeding Bird Survey(BBS).

Photograph of Species

Distribution Map

KEY TO THE RANGE MAPS

Primary Range

Secondary Range

Not Present

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat
(Further details of preferential habitat. May include breeding, wintering, or food preferences)

Key Areas and Conditions for Species in North Dakota
(If known, a general description of key breeding areas or areas of known recurring presence)

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat
(Direct effects on breeding or other essential habitat)

Other Natural or Manmade Factors
(May include disease, pollutants, declining prey abundance, over harvest or illegal killing, and other anthropogenic factors)

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys
(Current, ongoing, or in place as of 2004)

Previous Research or Surveys
(Completed as of 2004)

Additional Research or Surveys Needed
(If available, key research or surveys needed to fill data gaps, target conservation actions, or document the species occurrence in North Dakota)

POPULATION ESTIMATES

(Breeding bird population estimates at national or continental and state or region levels. May include estimates from NAWMP, PIF, NAWCP, NP&PR, USSCP, and local estimates from accredited research. The PIF population estimates and objectives have not been refined or verified with local experts)

MANAGEMENT RECOMMENDATIONS

(If available, management practices that may benefit a species)

MONITORING PLANS

(General description of plans to take part in or initiate monitoring of the species or monitoring issues)

REFERENCES

(Sources used to obtain the above species information.

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APPENDIX A.1

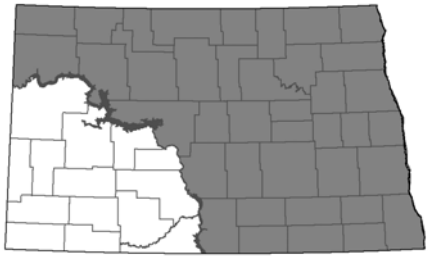
Bird
Species of Conservation Priority Accounts

Horned Grebe

Level I

Scientific Name: *Podiceps auritus*

USFWS



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: Present 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: Federal 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 NPPWCP. Although possibly secure in North Dakota, it appears the horned grebe is declining overall throughout the Prairie Pothole Region and elsewhere.

Breeding Bird Survey Data (1966-2002)
North Dakota BBS population trend 1.8%/yr (p = 0.77).
Survey-wide BBS population trend -3.2%/yr (p = 0.03).
North Dakota BBS relative abundance 0.17 birds/route.

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Breeds in small (0.05) 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 Grebes in North Dakota

Horned grebes are most common in the Turtle Mountains and fairly common at 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.

Horned Grebe

Level I

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- A study to determine marsh bird distribution in relation to landscape composition in North Dakota began in 2004. Horned grebe is one of 16 focal species for this study. Mark Sherfy of NPWRC is the principal investigator. The objectives of the study are as follows:
    1) Provide baseline data on distribution of marsh birds in eastern and northern North Dakota.
    2) Relate presence/absence of marsh birds on surveyed wetlands to site-specific habitat characteristics and to surrounding landscape metrics.
    3) Relate distribution of marsh birds in North Dakota to cropland area, grassland area, acreage of CRP, and other upland habitat variables in the adjacent landscape.
    4) Relate distribution of marsh birds in North Dakota to wetland acreage, percent of wetland basins holding water, and other wetland habitat variables in the adjacent landscape.

  No horned grebes were detected during the surveys in 2004. This project will continue in 2005 and possibly 2006. This study is funded with State Wildlife Grant federal aid funding, the North Dakota Game and Fish Department, Ducks Unlimited, and Alliance Pipeline.

Previous Research or Surveys

- Nothing identified at this time. Little effort has been applied to research or surveys specifically for horned grebe in North Dakota.

Additional Research or Surveys Needed

- Assess accuracy of Breeding Bird Survey and May Waterfowl Breeding Survey data.
- 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 ESTIMATES

- NPPWCP Continental Population Estimate: 200,000 – 400,000
- NPPWCP BCR11 Population Estimate: unknown
- PIF North Dakota Population Estimate: 7,879 in BCR11 (1.0% of the population)
- Uncommon Breeding Birds in North Dakota: 4,000 in 1967; 2,000 in 1992; 0 in 1993 (estimates provided in # of pairs)

MANAGEMENT RECOMMENDATIONS

- Identify key horned grebe associated wetlands and protect those wetlands with easements, or develop and promote incentive programs to minimize impacts to wetland values.
- Prevent encroachment of woody vegetation around wetlands.
- Limit residential development around and recreational use of wetlands.
- Maintain wetland complexes.

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. The NDGFD will work with the NPPWCP and its developers to implement a statewide waterbird monitoring plan.

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American White Pelican

Level I

Scientific Name: *Pelecanus erythrorhynchos*

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

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

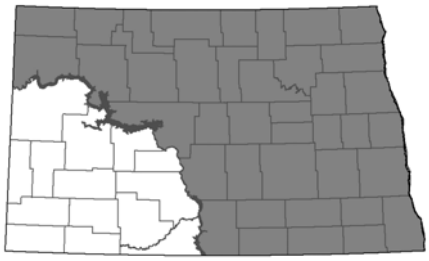
Abundance: Common.

Primary Habitat: Isolated, barren islands or peninsulas in large lakes or reservoirs.

Federal Status: Federal migratory bird.

Chris Grondahl

Reason for Designation: Listed as Critically Imperiled, Imperiled or Vulnerable throughout much of its range by NatureServe. There is only one known breeding colony of pelicans in North Dakota, located at Chase Lake National Wildlife Refuge. This is also 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. In 2004 and 2005, adult pelicans in this and other colonies mysteriously abandoned their nesting effort.



Breeding Bird Survey Data (1966-2002)
North Dakota BBS population trend 19.8%/yr (p = 0.08).
Survey-wide BBS population trend 3.4%/yr (p = 0.01).
North Dakota BBS relative abundance 3.3 birds/route.

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. 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 White Pelicans in North Dakota

Chase Lake National Wildlife Refuge near Woodworth in western Stutsman County hosts the world's largest colony of breeding white pelicans. High water levels have created two nesting islands. Key foraging sites have not been identified.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Water management by maintaining nesting islands may limit breeding opportunities or increase predator success. 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 in North America may be negatively affecting the pelican population in North Dakota. In 2003, half of the pre-fledged pelicans died. Investigation into the cause of death indicated some had died from WNV. Other diseases affecting large colonies include Newcastle's disease and avian botulism. The perceived competition for fish resources with sport and commercial fisheries produces negative feelings and perhaps future implications for pelicans. 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.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- In 2002, a study to measure survivorship, reproductive parameters, and the impacts of WNV at Chase Lake NWR and two other refuges in Montana and South Dakota was initiated by Marsha Sovada of USGS Northern Prairie Wildlife Center.
- In 2005, a study to explore factors that may lead to colony abandonment or reduced productivity was implemented. The principal investigators are Marsha Sovada and Pam Pietz of NPWRC. Funds have been secured to place 15 GPS satellite transmitters on pelicans which will help to meet the following objectives:
    1) Determine nest-attendance schedules and chick-feeding rates during the pre-crèche stages of breeding.
    2) Estimate distances to foraging sites.
    3) Determine locations and attributes of foraging sites.
    4) Document sources of disturbance at nesting areas.

  This project will continue through 2007 with final reports anticipated in 2008. This study is funded in part by the North Dakota Game and Fish Department and State Wildlife Grants.

Previous Research or Surveys

- More than 2,000 young white pelicans are banded each year at Chase Lake NWR. Otherwise, little effort has been directed to white pelicans in North Dakota. In the 1970s, studies on food habits, production and survival, and movements and mortality were conducted.

Additional Research or Surveys Needed

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

POPULATION ESTIMATES

- NPPWCP Continental Population Estimate: >109,110
- NPPWCP BCR11 Population Estimate: >32,203
- PIF North Dakota Population Estimate: 9,425 in BCR11; 1,867 in BCR17 (5.2% and 1.0% of population respectively)
- Uncommon Breeding Birds in North Dakota: 0 in 1967; 0 in 1992; 4,000 in 1993 (estimates provided in # of pairs)

MANAGEMENT RECOMMENDATIONS

- Protect nesting colonies from human intrusion during courtship and initial incubation stages.
- Create nesting islands if nesting habitat becomes limited. Islands should be at least 0.1 ha in size.
- Fence peninsulas if coyote predation becomes a problem.

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. The NDGFD will work with the NPPWCP and its developers to implement a statewide waterbird monitoring plan.

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American Bittern

Level I

Scientific Name: *Botaurus lentiginosus*

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

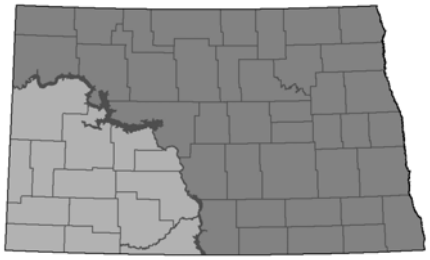
Status: Present in North Dakota from mid-April to October. Peak breeding season occurs from mid-June to late July.

Abundance: Fairly common.

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

Federal Status: Federal migratory bird.

Chris Grondahl



Reason for Designation: The American bittern is listed as Critically Imperiled or Vulnerable in several states and provinces. Designated as High Concern in the NPPWCP. It is a USFWS Bird of Conservation Concern in BCR 11. Decline may possibly be linked to declining amphibian populations, a primary prey.

Breeding Bird Survey Data (1966-2002)
North Dakota BBS population trend 3.3%/yr (p = 0.24).
Survey-wide BBS population trend -1.6%/yr (p = 0.04).
North Dakota BBS relative abundance 1.46 birds/route.

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

American bitterns use a variety of freshwater wetlands including seasonal, semipermanent, 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 purposes negatively affect breeding populations. Habitat loss is believed the number one cause for decline of this species.

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. If bitterns disappear from an area it may be an indicator of problems with their prey of frogs, suckers, sticklebacks, garter snakes, salamanders, meadow mice, and other invertebrates.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- A study to determine marsh bird distribution in relation to landscape composition in North Dakota began in 2004. American bittern is one of 16 focal species for this study. Mark Sherfy of NPWRC is the principal investigator. The objectives of which are as follows:
    1) Provide baseline data on distribution of marsh birds in eastern and northern North Dakota.
    2) Relate presence/absence of marsh birds on surveyed wetlands to site-specific habitat characteristics and to surrounding landscape metrics.
    3) Relate distribution of marsh birds in North Dakota to cropland area, grassland area, acreage of CRP, and other upland habitat variables in the adjacent landscape.
    4) Relate distribution of marsh birds in North Dakota to wetland acreage, percent of wetland basins holding water, and other wetland habitat variables in the adjacent landscape.

  Over 60 bitterns were detected during the surveys in 2004, primarily from call-playback tapes. The majority of the bitterns were encountered in the Drift Prairie. This project will continue in 2005 and possibly 2006. This study is funded with State Wildlife Grants, the North Dakota Game and Fish Department, Ducks Unlimited, and Alliance Pipeline.

Previous Research or Surveys

- Little effort has been applied to research or surveys specifically for American bittern in North Dakota. Little is known on the biology of this species. Long-term studies ongoing at Agassiz National Wildlife Refuge in Minnesota to determine fall/spring migration routes, migration/wintering habitat, and dispersal pattern of juvenile American bitterns.

Additional Research or Surveys Needed

- Develop/refine surveys to determine present distribution, population estimates, and identify key areas.
- Determine habitat relationships such as area requirements.
- Determine effect of cattail control techniques used to open up wetlands for other species.
- Determine site fidelity.
- Determine the effects of contaminants on wetland quality and prey species.

POPULATION ESTIMATES

- NPPWCP Continental Population Estimate: unknown
- NPPWCP BCR11 Population Estimate: unknown
- PIF North Dakota Population Estimate: 51,626 in BCR11; 1,766 in BCR17 (6.3% and 0.2% of population respectively)
- Uncommon Breeding Birds in North Dakota: 19,000 in 1967; 4,000 in 1992; 17,000 in 1993 (estimates provided in # of pairs)

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.

American Bittern

Level I

MONITORING PLANS

The NPPWCP has identified the basic elements of how a regional/continental waterbird monitoring program should be structured. The NDGFD will work with the NPPWCP and its developers to implement a statewide waterbird monitoring plan.

REFERENCES

Baughman, M. 2003. National Geographic Reference Atlas to the Birds of North America. National Geographic Society. Washington, D.C. 480 pp.

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Northern Pintail

Level II

Scientific Name: *Anas acuta*

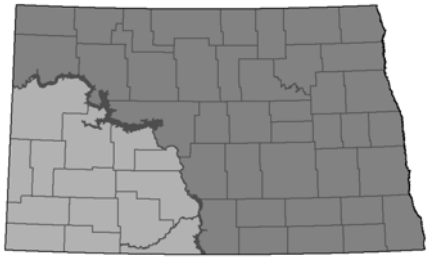
General Description: L 21", WS 34", 1.8 lb. Long and slender throughout. Sports a distinctive pointed black tail, white breast, and brown head.

USFWS

Status: Present in North Dakota from March to November. Peak breeding season occurs from early April to early May.

Abundance: Common to abundant.

Primary Habitat: Wetland complexes of open water and associated upland prairie.



Federal Status: Federal migratory bird.

Reason for Designation: The 2004 Waterfowl Breeding Population Survey in North Dakota indicates a -30% change from 1959 to 2003 and a -28% change from 1994-2003. Identified as a species of High Continental Priority by the NAWMP.

Breeding Bird Survey Data (1966-2002)
North Dakota BBS population trend 6.3%/yr (p = 0.00).
Survey-wide BBS population trend -3.1%/yr (p = 0.00).
North Dakota BBS relative abundance 7.48 birds/route.

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Ideal nesting habitat for Northern pintails is native prairie of low cover interspersed with seasonal or semipermanent wetlands. CRP, hayfields, pastures, and weedy field borders are utilized. Temporary, seasonal, and semipermanent wetlands, lakes, 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 particularly 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

In 1995, waterfowl pair density maps were generated with GIS modeling techniques utilizing National Wetland Inventory digital data, Four Square Mile Survey results, and pair/wetland regression equations (Reynolds 1995, Reynolds et al. 1996). The model created is commonly known as the waterfowl breeding pair density "Thunderstorm" map. Northern pintail is one of five target duck species for which breeding pair density information was combined to create this map. The Thunderstorm map is highly utilized by waterfowl managers in targeting key areas for protection of waterfowl foraging and breeding habitat.

Northern Pintail
Level II

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat
Wetland and grassland destruction and/or degradation are the primary factors limiting nesting habitat and food resources.

Other Natural or Manmade Factors
Lead poisoning from pintails ingesting spent lead shot was once of great concern. However, lead shot was banned for waterfowl hunting and the occurrence of lead poisoning in this species is reduced. Destruction of nests initiated in cropland by farm machinery is of concern. Predation by mammal species reduces nest success.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- Waterfowl Responses to USDA – Conservation Reserve Program (CRP): Several studies are evaluating factors influencing use of Conservation Reserve Program fields as breeding habitat by waterfowl. These studies focus on measuring changes in nesting effort and nest success of ducks according to features of CRP, including seeding mixes, spatial distribution of fields, and annual management programs such as emergency haying and grazing. Results of these studies illustrate the important benefits of CRP to prairie wildlife. Mark Sherfy of NPWRC is the principal investigator.
- Landscape Features and Waterfowl Demographics: This study focuses on estimating key reproductive parameters of upland-nesting ducks in relation to landscape characteristics. Research in the 1980s provided a foundation for demographic models currently in use to estimate recruitment rate of waterfowl. However, these models do not account for variation in landscape composition, including changing water conditions and availability of nesting cover. It is critical that uncertainties in models be addressed and that population demographic data are kept current with changes in landscape character. This study will contribute to these efforts by enhancing our understanding of how waterfowl reproductive parameters relate to habitat characteristics during a period of favorable landscape features (i.e., CRP), and will improve delivery of national wildlife refuge programs such as wetland and grassland easement acquisition. Mark Sherfy of NPWRC is the principal investigator.
- Use of Landscape and Weather Information to Predict Duckling Survival: The ability to reliably predict survival rates of broods and ducklings is a critical need in waterfowl management. NPWRC is working to develop methods to predict brood and duckling survival in prairie pothole landscapes from information gathered using remote sensing techniques. Results of these studies are being incorporated as predictive equations into the mallard productivity model to increase precision of recruitment estimates. Gary Krapu of NPWRC is the principal investigator.
- Wetlands and Use by Breeding Waterfowl in National Grasslands of the Dakotas: The U.S. Forest Service's national grasslands in North and South Dakota contain many wetlands that provide valuable habitat for waterfowl and other waterbirds as well as water sources for livestock. NPWRC is conducting a study to examine wetlands and waterfowl use in the Grand River National Grassland in north-central South Dakota and the McKenzie District of the Little Missouri National Grassland in northwestern North Dakota. This study will provide the U.S. Forest Service with scientific information for planning and management relating to wetland resources, their value to waterfowl breeding pairs and broods, and factors influencing their use by waterfowl. Jane Austin of NPWRC is the principal investigator.
- Strategic Conservation Planning Tool to Target Northern Pintails: Goal: To develop a decision matrix and Thunderstorm map to guide conservation decisions and identify practices that can impact local pintail populations in the Prairie Pothole Region. http://www.ducks.org/conservation/research/18.pdf
- A Spatially-Explicit Population Model of Northern Pintails: http://www.ducks.org/conservation/research/17.pdf

Northern Pintail

Level II

Previous Research or Surveys

A great amount of research and survey efforts have been conducted on Northern pintails in North Dakota and elsewhere. For a comprehensive list of efforts see the "Bibliography for Northern Pintails" http://www.npwrc.usgs.gov/resource/literatr/pintbibl/pintbibl.htm

Additional Research or Surveys Needed

- Determine effects of landscape factors on demographics and recruitment of ducks in the Prairie Pothole Region.
- Develop, improve, or update estimates of important parameters used in existing models for management and planning.
- Evaluate waterfowl management activities at broad, regional scales.
- Direct studies at waterfowl species of concern.
- Evaluate applicability of the bird-conservation-area concept to waterfowl.

POPULATION ESTIMATES

- Continental Population Estimate: 2,200,000 ± 0.2 million in 2004
- North Dakota Population Estimate: 116,100 in 2003; 237,100 in 2004
- NAWMP Breeding Duck Population Goal: 5,600,000

MANAGEMENT RECOMMENDATIONS

- Continue the protection of wetlands in the Prairie Pothole Region and large grassland tracts associated with them through easements or land acquisition.
- Implementation of winter wheat incentives for farmers.

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.

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Canvasback

Level II

Scientific Name: *Aythya valisineria*

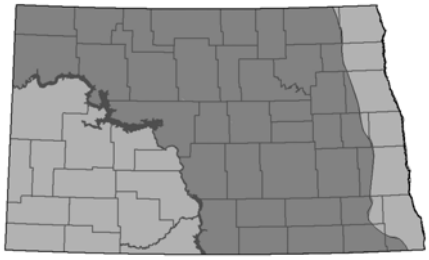
Ed Bry

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

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

Abundance: Fairly common to abundant.

Primary Habitat: Deep wetlands, particularly semipermanent wetlands with emergent cover.



Federal Status: Federal migratory bird.

Reason for Designation: The 2004 Waterfowl Breeding Population Survey in North Dakota indicates a -27% change from 1959 to 2003 and a -18% change from 1994-2003. Identified as a species of Moderately High Continental Priority by the NAWMP.

Breeding Bird Survey Data (1966-2002)
North Dakota BBS population trend 9.7%/yr (p = 0.01).
Survey-wide BBS population trend -0.8%/yr (p = 0.51).
North Dakota BBS relative abundance 1.43 birds/route.

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Canvasbacks use semipermanent wetlands, small lakes, or deep water marshes containing emergent cover such as bulrush and cattails. Will also 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

Lead poisoning from ingesting spent lead shot lying on the muddy bottom of wetlands was once of great concern, especially for this duck which forages on aquatic plant roots. A ban on lead shot for waterfowl hunting has reduced the occurrence of lead poisoning in this species. 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.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- There is currently nothing specific to canvasbacks in North Dakota other than traditional waterfowl survey efforts.

Previous Research or Surveys

- The canvasback is one of the most studied ducks in North America. The Birds of North America species account summarizes many previous efforts.

Additional Research or Surveys Needed

- Determine effects of landscape factors on demographics and recruitment of ducks in the Prairie Pothole Region.
- Develop, improve, or update estimates of important parameters used in existing models for management and planning.
- Evaluate waterfowl management activities at broad, regional scales.
- Direct studies at waterfowl species of concern.
- Evaluate applicability of the bird-conservation-area concept to waterfowl.

POPULATION ESTIMATES

- Continental Population Estimate: 617,000 in 2004
- North Dakota Population Estimate: 20,000 in 2003; 37,500 in 2004
- NAWMP Breeding Duck Population Goal: 540,000

MANAGEMENT RECOMMENDATIONS

- Continue to implement special harvest strategies to manage toward population goals.
- Continue protection of semipermanent wetlands in the Prairie Pothole Region through easements or land acquisition.

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.

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U.S. Fish and Wildlife Service. 2004. Waterfowl Population Status. http://migratorybirds.fws.gov/reports/status04/Waterfowl_Status_Report_04_Final.pdf

Redhead
Level II

Scientific Name: *Aythya americana*

General Description: L 19", WS 29", 2.3 lb. Rounded, bright red head, blue bill, yellow eye, and dark gray body sets this duck apart from the similar looking canvasback.

Status: Present in North Dakota from mid-March to November. Peak breeding season occurs from early June to late August.

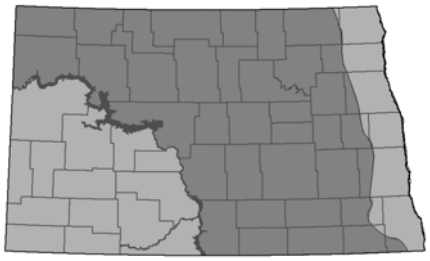
Abundance: Fairly common to abundant.

Primary Habitat: Deep wetlands.

Federal Status: Federal migratory bird.

Reason for Designation: The 2003 Waterfowl Breeding Population Survey in North Dakota indicates an 18% change from 1959 to 2003 and a -27% change from 1994-2003. Listed as a species of Moderately High Continental Priority by the NAWMP.

Chris Grondahl



Breeding Bird Survey Data (1966-2002)
North Dakota BBS population trend 10.6%/yr (p = 0.00).
Survey-wide BBS population trend 2.3%/yr (p = 0.01).
North Dakota BBS relative abundance 4.14 birds/route.

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

The redhead is a habitat generalist and uses a variety of wetlands. Semipermanent and deep seasonal wetlands are the most commonly used. Typically selects larger >4 ha wetlands for breeding. Associated vegetation includes cattails, bulrush, whitetop, and common spikerush. Nests are often placed over water in a fairly dense stand of emergent vegetation such as hardstem bulrush. Redheads may also nest in the uplands, particularly on islands. Hens are nest parasitizers, they may lay eggs in the nest of another duck species before laying eggs in their own; or just lay eggs in another duck nest and never produce their own clutch. Invertebrates and submerged vegetation such as pondweed, seeds of sedges, wild celery, and buds or tubers of aquatic plants are important food sources in the Prairie Pothole Region.

Key Areas and Conditions for Redhead in North Dakota

No specific sites have been identified at this time.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Wetland and grassland destruction and/or degradation are the primary factors limiting nesting habitat and food resources.

Other Natural or Manmade Factors

Lead poisoning from ingesting lead shot prior to the ban on using lead shot for hunting waterfowl may have had an effect on redhead populations, but the frequency of ingestion was not known. Human disturbance (e.g. recreational boaters) can cause birds to unnecessarily disperse from resting grounds.

Redhead

Level II

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- There is currently nothing specific to the species in North Dakota other than traditional waterfowl survey efforts.

Previous Research or Surveys

- The redhead has been extensively studied, but much is still not known on population dynamics.

Additional Research or Surveys Needed

- Determine effects of landscape factors on demographics and recruitment of ducks in the Prairie Pothole Region.
- Develop, improve, or update estimates of important parameters used in existing models for management and planning.
- Evaluate waterfowl management activities at broad, regional scales.
- Direct studies at waterfowl species of concern.
- Evaluate applicability of the bird-conservation-area concept to waterfowl.

POPULATION ESTIMATES

- Continental Population Estimate: 605,000 in 2004
- North Dakota Population Estimate: 96,400 in 2003; 161,300 in 2004
- NAWMP Breeding Duck Population Goal: 640,000

MANAGEMENT RECOMMENDATIONS

- Continue the protection of wetlands in the Prairie Pothole Region through easements or land acquisition.
- Island creation.

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.

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Northern Harrier

Level II

Scientific Name: *Circus cyaneus*

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: Present in North Dakota from mid-February to mid-November. Peak breeding season occurs from early May to mid-July.

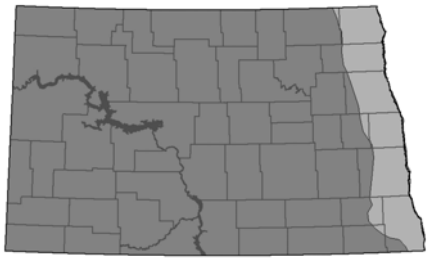
Abundance: Fairly common.

Primary Habitat: Open grasslands, wet meadows, marshes, and areas not heavily grazed.

Federal Status: Federal migratory bird.

Reason for Designation: Up to ten percent of this species' population, which appear to be declining rangewide, breeds in North Dakota. It is a USFWS Bird of Conservation Concern in Region 6 and BCR 11.

Sandra Hagen



Breeding Bird Survey Data (1966-2002)
North Dakota BBS population trend 1.7%/yr (p = 0.06).
Survey-wide BBS population trend -1.0%/yr (p = 0.02).
North Dakota BBS relative abundance 1.69 birds/route.

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. The conceptual GBCA model produced by the HAPET closely overlays with a spatially explicit probability map of Northern harrier presence produced by Niemuth et al.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Grassland and wetland destruction and/or degradation are the primary factors limiting nesting habitat and food resources. 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

- A study to determine demographic performance of prairie-nesting shorebirds and raptors in North Dakota has been ongoing since 2000. Northern harrier is one of six focal species for this study. Scott Stephens of DU is the principal investigator. The objectives are as follows:
    1) Locate and monitor nests of prairie-nesting shorebird and raptor species of concern across a gradient of landscapes and habitat types.
    2) Develop statistical models using field data on nest survival rates to identify the important landscape and habitat factors that influence nesting success rates for prairie breeding shorebirds and raptors and identify management prescriptions based on the results.
    3) Based on important factors identified in statistical models, develop GIS models of predicted nesting success rates for shorebirds and raptors across North Dakota and provide priorities for management activities.

  Results to date indicate Northern harrier nesting success rate is highest in wetlands and native grassland. This project continued in 2005 and possibly for additional years. This study was funded in part by State Wildlife Grants, the North Dakota Game and Fish Department, and Ducks Unlimited.

Previous Research or Surveys

- Little effort has been applied to research or surveys specifically for Northern harriers in North Dakota. Northern harrier use of CRP has been investigated and effects of management practices have been noted.

Additional Research or Surveys Needed

- Nothing has been identified at this time.

POPULATION ESTIMATES

- PIF Global Population Estimate: 1,300,000 (35% population in US and Canada)
- PIF North Dakota Population Estimate: 18,000 in BCR11; 14,345 in BCR17 (4.1% and 3.3% of population respectively)
- PIF State Population Objective: Increase the statewide population from 32,000 individuals to 48,000.
- Changes in Breeding Bird Populations in North Dakota 1967 to 1992-93: 33,000 in 1967; 46,000 in 1992; 75,000 in 1993 (estimates provided in # of pairs)

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.
- Manage for lightly grazed or idle grassland.
- Avoid disturbing nesting areas from April through July.
- Minimize human disturbance near nests.
- Do not use chemical pesticides where harriers occur.

Northern Harrier

Level II

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.

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Swainson's Hawk

Level I

Scientific Name: *Buteo swainsoni*

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: Present in North Dakota from April to September. Peak breeding season occurs from mid-May to late July.

Abundance: Common.

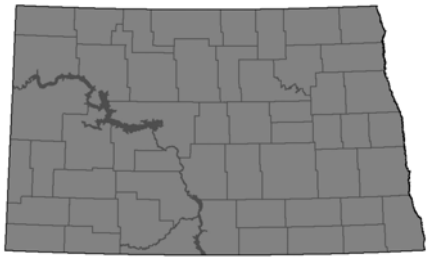
Primary Habitat: Native prairie and cropland with thickets of trees.

Federal Status: Federal migratory bird.

Reason for Designation: Declining population due to loss of breeding habitat, but concern also lies with its wintering habitat – the grasslands of Argentina. Humans may kill them for fear the hawks are preying on too many game animals. It is a USFWS Bird of Conservation Concern in Region 6 and BCR 11, and Partners in Flight Watch List species.

Breeding Bird Survey Data (1966-2002)
North Dakota BBS population trend 0.5%/yr (p = 0.51).
Survey-wide BBS population trend -0.5%/yr (p = 0.43).
North Dakota BBS relative abundance 1.3 birds/route.

Carl W. Schwartz



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. The hawks will nest in areas with little cropland to areas dominated by cropland. Primary prey includes small mammals, Richardson's ground squirrels, black-tailed prairie dogs, and insects such as grasshoppers. Although Swainson's hawks may occasionally take game species, up to 94% of their diet has been found to be insects. Home range size varies from 6.2 to 27.3 km².

Key Areas and Conditions for Swainson's Hawk in North Dakota

No specific sites have been identified. A high density of Swainson's hawks may occur in Kidder County in south central 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 have actually increased the availability of nest sites, 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 taking too many game birds. Other sources of mortality include being hit by cars, electrocution on power lines, or getting caught in fences.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- A study to determine the distribution and abundance of Swainson's and ferruginous hawks in North Dakota began in 2004. Marco Restani of St. Cloud State University is the principal investigator. The objectives are as follows:
    1) Determine current distribution and abundance (e.g., statewide and intensive study sites).
    2) Provide a basis for long-term monitoring of breeding populations.
    3) Determine land use and habitat associations (e.g., community types and features).
    4) Develop and test habitat suitability models specific to North Dakota.
    5) Identify factors affecting occurrences of the two species (e.g., habitat degradation).
    6) Recommend actions to promote species conservation (e.g., habitat improvement).

  Results to date indicate the land cover within 1 km of Swainson's hawk nest sites includes roughly 40% cropland, 23% planted herbaceous cover, 23% prairie, <1% forest, and 3% shrubland. Anticipated completion date is December 2005. This study is funded with State Wildlife Grants, the North Dakota Game and Fish Department, the U.S. Forest Service, and St. Cloud State University.

Previous Research or Surveys

- 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.

Additional Research or Surveys Needed

- Investigate why populations and productivity continues to decline although suitable habitat remains intact or unoccupied.

POPULATION ESTIMATES

- PIF Global Population Estimate: 490,000 (94% population in US and Canada)
- PIF North Dakota Population Estimate: 19,873 in BCR11; 8,455 in BCR17 (4.3% and 1.8% of population respectively)
- PIF State Population Objective: Maintain the statewide population of 29,000
- Changes in Breeding Bird Populations in North Dakota 1967 to 1992-93: 16,000 in 1967; 31,000 in 1992; 55,000 in 1993 (estimates provided in # of pairs)

MANAGEMENT RECOMMENDATIONS

- Protect existing stands of trees identified as important to Swainson's hawks, particularly known nesting sites.
- Prevent disturbance of nesting pairs.

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). The study described above and funded in part with State Wildlife Grants

will determine the current population status in the state and also provide recommendations for continual monitoring.

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Ferruginous Hawk

Level I

Scientific Name: *Buteo regalis*

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

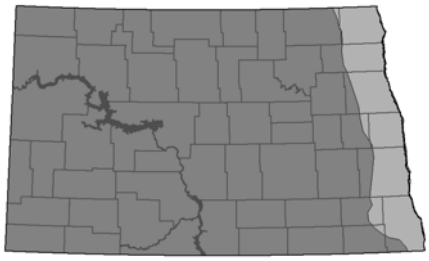
Abundance: Fairly common to uncommon.

Primary Habitat: Large tracts of native prairie.

Federal Status: Federal migratory bird. Former candidate species. As of February 28, 1996 no longer a candidate.

Reason for Designation: The ferruginous hawk is listed by NatureServe as Imperiled or Vulnerable in 13 states and 1 province and is Critically Imperiled in British Columbia. This grassland dependent bird is at risk from habitat destruction and other human related factors. It is a USFWS Bird of Conservation Concern in Region 6, BCR 11 and 17.

Doug Backlund



Breeding Bird Survey Data (1966-2002)
North Dakota BBS population trend 4.1%/yr (p = 0.09).
Survey-wide BBS population trend 3.6%/yr (p = 0.00).
North Dakota BBS relative abundance 0.39 birds/route.

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Ferruginous hawks inhabit a variety of open grasslands and shrub communities. Cultivated fields, heavily grazed pastures, high elevations, and forest interiors are avoided. Both native and tame grasslands are utilized, as well as hayland, cropland, and pastures. Will typically nest on or near the ground but may also nest in solitary trees, large shrubs, utility structures, hay bales, or on the rooftops of abandoned buildings. Will nest on hills <10 meters above the surrounding area, with slopes of about 14°, 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 Hawks in North Dakota

No specific sites have been identified. The Missouri Coteau, particularly between Bismarck and Jamestown, 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

Destruction of native prairie has had a negative impact on this species. Agricultural growth has limited ferruginous hawk distribution to areas with unplowed land. Most often, these areas have the greatest topographic relief. Also, the loss of prairie dog towns in southwestern North Dakota due to poisoning,

conversion to cropland, and other factors may also negatively affect hawk populations. However, prairie dog towns in North Dakota as of 2003 appear to be stable to increasing.

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 shot. Ferruginous hawk density and productivity is closely linked with cycles of its prey such as ground squirrels, pocket gophers and white-tailed jackrabbits. 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

- A study to determine the distribution and abundance of Swainson's and ferruginous hawks in North Dakota began in 2004. Marco Restani of St. Cloud State University is the principal investigator. The objectives are as follows:
    1) Determine current distribution and abundance (e.g., statewide and intensive study sites).
    2) Provide a basis for long-term monitoring of breeding populations.
    3) Determine land use and habitat associations (e.g., community types and features).
    4) Develop and test habitat suitability models specific to North Dakota.
    5) Identify factors affecting occurrences of the two species (e.g., habitat degradation).
    6) Recommend actions to promote species conservation (e.g., habitat improvement).

  Results to date indicate the land cover within 1 km of ferruginous hawk nest sites includes roughly 24% cropland, 27% planted herbaceous cover, 39% prairie, <1% forest, and 3% shrubland. Anticipated completion date is December 2005. This study is funded with State Wildlife Grants, the North Dakota Game and Fish Department, the U.S. Forest Service, and St. Cloud State University.

Previous Research or Surveys

- 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.

Additional Research or Surveys Needed

- Explore the role of jackrabbits or other primary prey species on population fluctuations of ferruginous hawks.
- Explore the migratory behavior of ferruginous hawks (i.e. do the breeding birds winter in North Dakota too?)

POPULATION ESTIMATES

- PIF Global Population Estimate: 23,000 (100% population in US and Canada)
- PIF North Dakota Population Estimate: 1,713 in BCR11; 207 in BCR17 (7.6% and 0.9% of population respectively)
- PIF State Population Objective: Maintain the statewide population of 1,900
- Uncommon Breeding Birds in North Dakota: 9,000 in 1967; 9,000 in 1992; 18,000 in 1993 (estimates provided in # of pairs)

Ferruginous Hawk

Level I

MANAGEMENT RECOMMENDATIONS

- Protect large tracts of native prairie through easements or land acquisition.
- Do not disturb nests from 15 March to 15 July (including construction, burning, mowing, etc.).
- Encourage rest-rotation, deferred-rotation or delayed grazing.
- 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.
- Artificial nesting platforms could be used where traditional tree nest sites have been destroyed.

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). The study described above and funded in part with State Wildlife Grants will determine the current population status in the state and also provide recommendations for continual monitoring.

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Golden Eagle

Level II

Scientific Name: *Aquila chrysaetos*

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: It is unclear if golden eagles should be considered residents or migrants. Peak breeding season occurs from early April to late June.

Abundance: Uncommon.

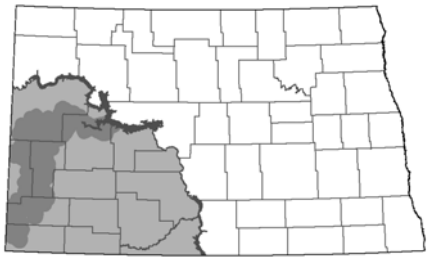
Primary Habitat: Rugged portions of the badlands, buttes over looking native prairie, large trees, and often found associated with prairie dog towns.

Federal Status: Federal migratory bird.

Reason for Designation: Raptor surveys in the 1980's and 1990s indicated a possible decline of nesting golden eagles. A survey of 226 nests on the Little Missouri National Grasslands in 2001 located only around 14 active nests/territories. The status of this species is unclear in North Dakota. It is a USFWS Bird of Conservation Concern in Region 6 and BCR 17.

Breeding Bird Survey Data (1966-2002)
Survey-wide BBS population trend 1.1%/yr (p = 0.53).

Sandra Hagen



LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Open shrubland and grasslands of shortgrass, mixed-grass, and xeric grasslands are preferred by golden eagles. Avoid 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 south. Nests will be reused by returning eagles or a new pair and may be associated with black-tailed prairie dog towns. Primary prey includes ground squirrels and rabbits; however, eagles are opportunistic and other prey include turkey, coyote, antelope, porcupine, skunk, bighorn sheep lamb, great-horned owls, and waterfowl.

Key Areas and Conditions for Golden Eagle in North Dakota

The badlands and the Killdeer Mountains are where most golden eagle nests are located 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 but being explored.

Other Natural or Manmade Factors

Humans are believed to be the biggest threat to eagles. This includes intentional harming such as shooting, or unintentional such as poisoning of prey species. Collisions with vehicles, power lines, or other structures, and electrocution are the leading human-induced causes of death. Pesticides or

contaminants are a threat when eagles consume poisoned prey. Even after the federal ban on lead shot for waterfowl hunting, golden eagles are still exposed to lead, possibly from consuming non-waterfowl prey. Human activity such as recreational viewing, research activities, noise, agricultural or construction activities, or the mere presence of humans may agitate nesting eagles. 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

- To assess 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) beginning in spring of 2002. The objectives will include using modern technology to re-evaluate information gathered from previous surveys to gain a better understanding of past golden eagle populations. The results from past surveys will be used for comparisons with information gathered on current golden eagle populations. This will serve as a base line study to detect possible trends over time and aid management efforts for raptors in particular golden eagles in the LMNG areas of North Dakota. University of North Dakota PhD candidate Anne Marguerite Coyle is the principal researcher on this project, the objectives of which are as follows:
    1) Gather, clean, correct, consolidate and enter all historic nesting data for golden eagles in and around the area of the LMNG of North Dakota into a database for analysis using GIS.
    2) Conduct aerial flight surveys to monitor existing nest sites, verify locations, locate new nests, determine observer bias for nest searching during nest surveys among and between habitat types, determine nesting activity and productivity, gather information on nesting density, and conduct behavioral observations.
    3) Use GIS to test the response in nest success of golden eagles to disturbance over time, model for habitat suitability, test for nesting preferences based on habitat suitability by calculating nesting density for all areas, identify potential trends between nesting activity and oil well activity, identify potential trends between nesting activity with black-tailed prairie dog colonies, compare behavior of nesting golden eagles between nesting sites with oil disturbance and without oil disturbance, and compare the effects of simulated “on foot human disturbance” within and between nesting sites with oil disturbance and without oil disturbance.
    4) Monitor home ranges, over wintering movements and behavior of golden eagles using the area of the LMNGs for summer/nesting habitat. Catch and apply radio/satellite transmitters on golden eagles, take blood samples for DNA analysis and to test for West Nile Virus, use aerial telemetry for tracking radio transmitters to monitor home range locations, nesting and foraging behavior, and monitor long-range movements and identify over wintering location behavior using satellite transmitters.

  Results to date include the identification of at least 40 active golden eagle nests. GPS transmitters have been placed on two juveniles. Anticipated completion date – spring 2006. However, GPS locations will continue to be obtained as long as battery power allows. This study is funded with State Wildlife Grants, the North Dakota Game and Fish Department, the University of North Dakota, and the U.S. Forest Service.

Previous Research or Surveys

- In the mid 1980’s, golden eagles were resurveyed in the southwest and a population estimate of 95±65 birds was determined (Allen 1985).
- 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. He found very few active nests (Knowles 2003).

Golden Eagle
Level II

Additional Research or Surveys Needed

- Continue the golden eagle project to determine migratory movements and the behavior of eagles in North Dakota.
- Explore the effects of environmental contaminants on prey species and subsequent effect on eagles.

POPULATION ESTIMATES

- PIF Global Population Estimate: 170,000 (47% population in US and Canada)
- PIF North Dakota Population Estimate: 18 in BCR11; 125 in BCR17 (0.2% and 0% of population respectively)
- North Dakota Population Estimate: 40 known active nests (Coyle pers. comm. August 04)
- PIF State Population Objective: Maintain the statewide population of 150
- Uncommon Breeding Birds in North Dakota: 0 in 1967; 4,000 in 1992; 7,000 in 1993 (estimates provided in # of pairs)

MANAGEMENT RECOMMENDATIONS

- Ensure new power lines are constructed to specifications that prevent raptor electrocutions.
- Maintain a buffer zone of no disturbance around eagle nests (i.e. from roads, mining operations, etc.)

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. The project highlighted above and funded in part with State Wildlife Grants will provide recommendations for monitoring eagles long-term.

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Bald Eagle
Level II

Scientific Name: *Haliaeetus leucocephalus*

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

Status: Year-round, many are migratory. Peak breeding season occurs from early April to July.

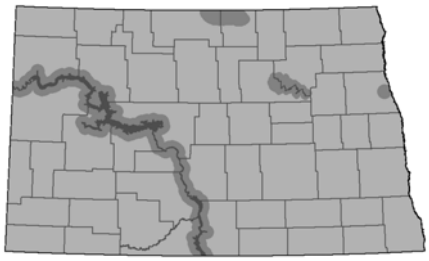
Abundance: Fairly common to uncommon.

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

Federal Status: Federal migratory bird. A federal threatened species.

Reason for Designation: The bald eagle is becoming more common in North Dakota as increased numbers migrate through the state and new nests are initiated. The eagle is expected to soon be removed from the federal threatened species list. However, monitoring must continue to ensure bald eagles are indeed recovering. It is also a PIF Stewardship species.


NDGFD



LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Bald eagles prefer large rivers and lakes bordered with mature stands or old-growth trees 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. 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. Eagles wintering along the Missouri River catch injured or crippled waterfowl using the available open water.

Key Areas and Conditions for Bald Eagle in North Dakota

The Missouri River, Devils Lake, and the Red River areas provide the best nesting habitat for bald eagles in North Dakota. Reports of eagles nesting elsewhere need to be verified.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Development along the Missouri River and other wooded areas could cause negative impacts on the population due to the loss of nesting, roosting, and associated aquatic foraging habitat. The lack of riparian regeneration may limit number of mature cottonwoods in the future.

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 sometimes shot by humans and the illegal trade of eagle parts for Native American purposes is of some concern. Intentional or accidental poisoning is responsible for considerable amount of mortality. Lead poisoning continues to be reported, indicating eagles are obtaining lead via a nonwaterfowl 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. Human activity such as recreational viewing, research activities, noise, agricultural or construction activities, or the mere presence of humans may

agitate nesting eagles. 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 North Dakota Game and Fish Department has taken part in the Midwinter Bald Eagle Survey since 1986. The survey is flown around January 10 of each year from Bismarck to Garrison Dam and back. Anywhere from 2 to 59 bald eagles utilizing the Missouri River in winter have been counted in past years.
- The U.S. Fish and Wildlife Service surveys the Missouri River by plane each spring before leaf-out to count the number of bald eagles and their nests. However, the USFWS has experienced budget losses in the last few years and is occasionally unable to fly the survey.

Previous Research or Surveys

- Little effort has been applied to research specifically for bald eagles in North Dakota. Although bald eagles are one of the most studied species in North America, limited effort has been directed to statewide surveys in North Dakota other than the USFWS surveys and the Midwinter Bald Eagle Survey.

Additional Research or Surveys Needed

- Conduct a statewide survey of bald eagles including identifying nest locations and territories. There are several hypothetical nesting locations that should be verified by air. An attempt should be made to identify all known nests and possibly conduct research similar to the golden eagle research in southwestern North Dakota.
- Explore tolerable limits of human development that will not compromise population viability.

POPULATION ESTIMATES

- PIF Global Population Estimate: 330,000 (>99% in U.S. and Canada)
- PIF North Dakota Population Estimate: 41 in BCR11 (0% of population)
- North Dakota Population Estimate: unknown

MANAGEMENT RECOMMENDATIONS

- Protect known nesting sites.
- Implement a buffer zone comprised of concentric circles around known nests. Human activity within each zone can be limited based on the distance to the nest.
- Preserve mature stands of tall trees, but ensure regeneration of new trees.

MONITORING PLANS

Continue with the Midwinter Bald Eagle Survey and work with the U.S. Fish and Wildlife Service to conduct spring surveys.

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Peregrine Falcon
Level III

Scientific Name: *Falco peregrinus*

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 occurs from early May to late July.

Abundance: Rare. North Dakota's only breeding pair nests in Fargo on the Community First National Bank building.

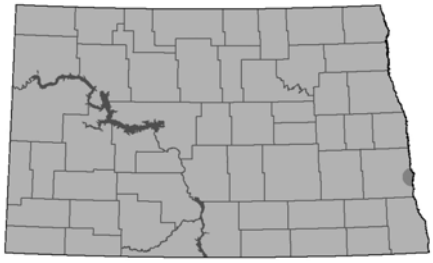
Primary Habitat: Expanses of native prairie, badland complexes, and open waterways.

Federal Status: Federal migratory bird. Removed from the federal endangered species list on August 25, 1999.

Reason for Designation: Recently removed from the federal endangered species list, it is still recovering from population declines. It is a USFWS Bird of Conservation Concern in Region 6, BCR 11 and 17, and a PIF Stewardship Species.

Breeding Bird Survey Data (1966-2002)
Survey-wide population trend 14.9%/yr (p = 0.00).


Craig Birhle


Known nesting location shown in dark gray, but can be seen throughout the state.

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. 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 other than the Community First National Bank building in Fargo. 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.

Peregrine Falcon

Level III

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- There is currently 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.

Additional Research or Surveys Needed

- Survey historic or potential nesting sites.

POPULATION ESTIMATES

- PIF Global Population Estimate: 1,200,000 (23% in U.S. and Canada)
- North Dakota Population Estimate: 1 breeding pair in Fargo
- PIF Continental Objective: Maintain

MANAGEMENT RECOMMENDATIONS

- Maintain a buffer zone of no disturbance around aeries if found (i.e. from roads, mining operations)
- Explore other potential artificial sites for nest box placement. Possible locations could include the Bismarck state capitol or the smoke stacks at the Montana-Dakota Utilities Heskett Power Station.

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.

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Prairie Falcon

Level II

Scientific Name: *Falco mexicanus*

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 occurs from April to July.

Abundance: Uncommon.

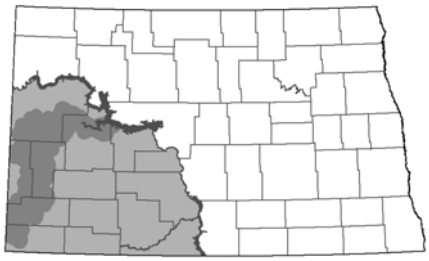
Primary Habitat: Expanses of native prairie, the badlands, and high cliffs along stream valleys or isolate buttes.

Federal Status: Federal migratory bird.

Reason for Designation: The status of prairie falcons in North Dakota is unclear. It is a USFWS Bird of Conservation Concern in Region 6 and BCR 17.

Breeding Bird Survey Data (1966-2002)
North Dakota BBS population trend -7.4%/yr (p = 0.09).
Survey-wide BBS population trend 2.9%/yr (p = 0.16).
North Dakota BBS relative abundance 0.03 birds/route.

Doug Backlund



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 is 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.

Prairie Falcon

Level II

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- There is currently 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

- 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 ESTIMATES

- PIF Global Population Estimate: 36,000 (96% in U.S. and Canada)
- PIF North Dakota Population Estimate: 552 in BCR 17 (1.6% of population)
- PIF State Population Objective: Maintain the statewide population of 550
- Uncommon Breeding Birds in North Dakota: 0 in 1967; 6,000 in 1992; 6,000 in 1993 (estimates provided in # of pairs)

MANAGEMENT RECOMMENDATIONS

- 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 cm^2.
- If harvesting nestlings for falconry, leave at least two young in the nest.

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.

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Sharp-tailed Grouse

Level II

Scientific Name: *Tympanuchus phasianellus*

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 occurs from mid-May to early August.

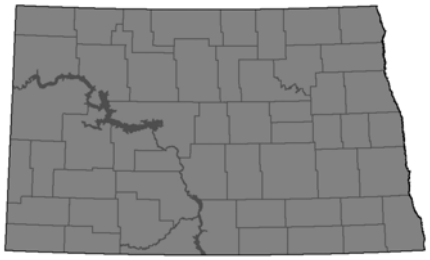
Abundance: Fairly common.

Primary Habitat: Mixed-grass prairie interspersed with shrubs.

Federal Status: None.

NDGFD

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. It is also a PIF Stewardship species.



Breeding Bird Survey Data (1966-2002)
North Dakota BBS population trend 3.0%/yr (p = 0.15).
Survey-wide BBS population trend -0.8%/yr (p = 0.53).
North Dakota BBS relative abundance 1.39 birds/route.

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 of particular importance to 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 located fairly close, often within 0.5 mile, to 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

Probably 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

The destruction of grassland breeding habitat for agriculture and other uses is a primary threat. The expiration of CRP grasslands is also of concern and will result in population declines. Degradation due to livestock use or fire suppression can also reduce habitat quality.

Other Natural or Manmade Factors

Accidents 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 the U.S. Forest Service conduct annual lek surveys counting the number of birds present during the breeding season.

Previous Research or Surveys

- The NDSU Extension Service has conducted several research projects on the effects of management practices and habitat usage by prairie grouse. This research has taken place primarily in the Sheyenne National Grasslands.

Additional Research or Surveys Needed

- Genetic research to better understand the relationship among individuals at the same and different leks to better understand the lek mating system, or hybridization with greater prairie chickens.

POPULATION ESTIMATES

- PIF Global Population Estimate: 1,200,000 (100% in U.S. and Canada)
- PIF North Dakota Population Estimate: 204,302 in BCR11; 191,395 in BCR17 (17.0% and 15.9% of population respectively)
- PIF State Population Objective: Maintain the statewide population of 390,000
- Changes in Breeding Bird Populations in North Dakota 1967 to 1992-93: 39,000 in 1967; 102,000 in 1992; 72,000 in 1993 (estimates provided in # of pairs)

MANAGEMENT RECOMMENDATIONS

- Protect leks and the surrounding habitat from loss or destruction.
- Continue to promote reenrollment of Conservation Reserve Program grasslands.
- Maintain short vegetation on lek sites.
- Provide good cover concealment adjacent to lek site (e.g. 100% VOM of 5.9 in.).

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.

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Greater Prairie Chicken

Level II

Scientific Name: *Tympanuchus cupido*

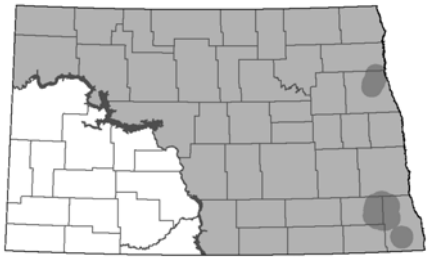
NDGFD

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 occurs from 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. Rare since, the prairie chicken is increasing in population although its preferred habitat is not entirely secure. It is a PIF Watch List species.

Breeding Bird Survey Data (1966-2002)
Survey-wide BBS population trend -1.4%/yr (p = 0.69).

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Initially the 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.

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.
- A tri-state (ND, SD, and MN) prairie chicken group is in place to identify and implement potential habitat bridges between chicken populations in the three states.

Previous Research or Surveys

- The NDSU Extension Service has conducted several research projects on the effects of management practices and habitat usage by prairie grouse (sharptails and prairie chickens). This research has taken place primarily in the Sheyenne National Grasslands.

Additional Research or Surveys Needed

- Continue to explore strategic options for creating habitat corridors or interconnectivity between the Grand Forks and Sheyenne National Grasslands populations and other states.
- Continue to seek effective methodologies for searching and monitoring new and existing prairie chicken booming grounds.

POPULATION ESTIMATES

- PIF Global Population Estimate: 690,000 (100% in U.S. and Canada)
- PIF State Population Objective: Double the population

MANAGEMENT RECOMMENDATIONS

- Use rotational disturbance every 3-5 years, with prescribed burning as the preferred method.
- Minimize woody vegetation in priority management areas.
- Provide agricultural food crops for winter survival (sunflowers or corn); cropland should be present in a 25:75 ratio with grassland.
- Reintroduction of birds into formerly occupied habitat.
- Create habitat corridors to connect isolated populations.

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.

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Greater Sage-Grouse

Level II

Scientific Name: *Centrocercus urophasianus*

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 occurs from early May to mid-July.

Abundance: Uncommon. An estimated 2,000 individuals in North Dakota

Primary Habitat: Big sagebrush ecosystem.

Federal Status: None. Recently petitioned for protection under the federal Endangered Species Act. The petition was denied.

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 due to loss of sagebrush and other human produced factors. It is a PIF Watch List Species.

Breeding Bird Survey Data (1966-2002)
Survey-wide BBS population trend 0.1%/yr (p = 0.97).

ND GFD

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Primarily associated with sagebrush (*Artemesia* spp.), 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, sheep bedding grounds, 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 Sage Grouse in North Dakota

Most active and inactive leks have been identified in the state. 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. Serum from 112 sage grouse showed none had developed antibodies to the virus. Of 22 testable grouse carcasses, 18

were confirmed to have died from WNV. Most, but not all, research suggests that hunting does not have an impact on sage grouse populations

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- The North Dakota Game and Fish Department has conducted population monitoring through spring lek surveys for more than 40 years. Other population information is obtained through hunter success and harvest data, and from wing samples collected during fall hunting season.
- In 2005, a project to determine nesting and brood-rearing habitat selection of greater sage-grouse, and associated survival of hens and broods, was initiated in North Dakota. Anticipated completion is December 2007.
- In 2005, a project to determine seasonal movements and autumn-winter habitat selection of greater sage-grouse in North Dakota will begin. Anticipated completion is December 2008.

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.

Additional Research or Surveys Needed

- Nothing identified at this time.

POPULATION ESTIMATES

- PIF Global Population Estimate: 150,000 (100% in U.S. and Canada)
- PIF North Dakota Population Estimate: 10,030
- ND Game and Fish Population Estimate: 2,000
- PIF Continental Objective: Increase 100%

MANAGEMENT RECOMMENDATIONS

- Protect existing big sagebrush stands through easements or land acquisition.
- 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.
- Close the hunting season if fewer than 100 males are in the population.

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 date on sage-grouse.

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Yellow Rail
Level I

Scientific Name: *Coturnicops noveboracensis*

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: Present in North Dakota from mid-May to July. Peak breeding season occurs from early June to mid-July.

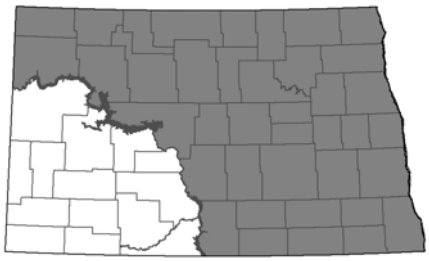
Abundance: Rare.

Primary Habitat: Fens or wet meadows with emergent vegetation, shallow water, and moist soil.

Federal Status: Federal 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 NPPWCP. It is a USFWS Bird of Conservation Concern in Region 6 and BCR 11.

John Clem



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 Rails in North Dakota

No specific sites have been identified. Yellow rails are primarily found in the northern half of North Dakota. Possible well 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

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 in 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 watchers invading yellow rail habitat to get a glimpse of the rare birds could cause abandonment or destruction of nests. Yellow rails may be lost to machinery during mowing or haying.

Yellow Rail

Level I

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- A study to determine marsh bird distribution in relation to landscape composition in North Dakota began in 2004. Yellow rail is one of 16 focal species for this study. Mark Sherfy of NPWRC is the principal investigator. The study objectives are as follows:
    1) Provide baseline data on distribution of marsh birds in eastern and northern North Dakota.
    2) Relate presence/absence of marsh birds on surveyed wetlands to site-specific habitat characteristics and to surrounding landscape metrics.
    3) Relate distribution of marsh birds in North Dakota to cropland area, grassland area, acreage of CRP, and other upland habitat variables in the adjacent landscape.
    4) Relate distribution of marsh birds in North Dakota to wetland acreage, percent of wetland basins holding water, and other wetland habitat variables in the adjacent landscape.

  A total of 7 yellow rails were detected during the surveys in 2004, predominantly in the Drift Prairie. This project will continue in 2005 and possibly 2006. This study is funded with State Wildlife Grants, the North Dakota Game and Fish Department, Ducks Unlimited, and Alliance Pipeline.

Previous Research or Surveys

- A project to determine the status of yellow rails in North Dakota and an inventory of probable rail habitat was conducted in 1990 and 1991 by Gordon Berkey. Still, little effort has been applied to research or surveys specifically for yellow rails in North Dakota.

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.

POPULATION ESTIMATES

- NPPWCP Continental Population Estimate: 7,000 – 10,000?
- NPPWCP BCR11 Population Estimate: unknown
- PIF North Dakota Population Estimate: 17,326 in BCR11 (8.0% of the population)
- Uncommon Breeding Birds in North Dakota: 0 in 1967; 2,000 in 1992; 0 in 1993 (estimates provided in # of pairs)

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.

MONITORING PLANS

The NPPWCP has identified the basic elements of how a regional/continental waterbird monitoring program should be structured. The NDGFD will work with the NPPWCP and its developers to implement a statewide waterbird monitoring plan.

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Whooping Crane

Level III

Scientific Name: *Grus americana*

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 mid-September to October.

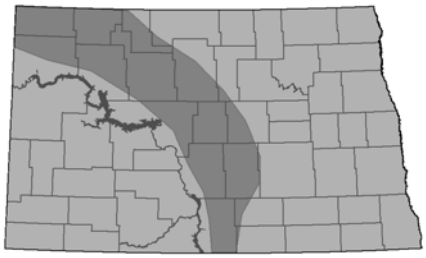
Abundance: Rare. Roughly 300 wild birds in the world and about 2/3 of those migrate through North Dakota annually.

Primary Habitat: Palustrine wetlands and cropland ponds.

Federal Status: Federal migratory bird, federal endangered species.

Reason for Designation: A federal endangered species since March 11, 1967. Whooping cranes formerly nested in North Dakota, but no nests have been recorded for the past 90 years. North Dakota provides important stopover habitat as the few birds left in the wild migrate through during both spring and fall.

USFWS



Primary migration path shown in dark gray. Can be seen migrating throughout the state.

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

During migration, use primarily wetlands and cropland ponds for roosting, feeding, or both. Seasonal and semipermanent wetlands are the most commonly used. Large >40 ha 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

Long Lake National Wildlife Refuge, northern McLean County, southwestern Ward County, Audubon National Wildlife Refuge, Burke, Divide, Williams, and Mountrail counties are the major locations where whooping cranes have been spotted during migration. A complete listing of named rivers, lakes, and reservoirs where whooping cranes have been sighted is in Austin and Richert, 2001.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Conversion of prairie breeding habitat for agriculture during settlement times, along with a great deal of 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 cause of multiple whooping crane mortalities in the last 50 years.

Whooping Crane

Level III

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- Annually since 1975, the public has been asked to provide sightings of whooping cranes in North Dakota and in other states.

Previous Research or Surveys

- In 2001, a comprehensive review of migration site data was conducted. This includes information for North Dakota.

Additional Research or Surveys Needed

- Nothing identified at this time.

POPULATION ESTIMATES

- NPPWCP Continental Population Estimate: 419 (300 wild, 119 captive)
- NPPWCP BCR11 Population Estimate: 194
- Whooping Crane Recovery Plan: downlist by 2020

MANAGEMENT RECOMMENDATIONS

- Continue to implement recovery plan http://ecos.fws.gov/docs/recovery_plans/2005/050111.pdf

MONITORING PLANS

Continue to report whooping crane sightings in the spring and fall.

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Piping Plover
Level II

Scientific Name: *Charadrius melodus*

General Description: L 7.25", WS 19", 1.9 oz. White belly and single, narrow black breast band.

Status: Present in North Dakota from mid-April to August. Peak breeding season occurs from late May to mid-July.

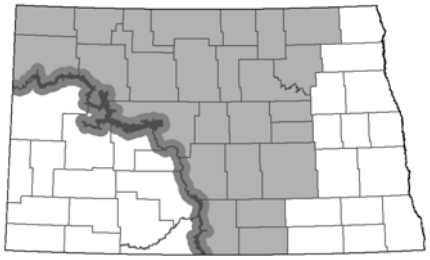
Abundance: Uncommon. Typically 300-400 nest along Missouri River System and about 200-300 breeding pairs in Alkali Lake Core Area.

Primary Habitat: Sandy or gravelly beaches and sandbars or alkaline wetlands.

Federal Status: Federal migratory bird, federal threatened species.

Reason for Designation: Listed as federally threatened in 1985. It is a USFWS Bird of Conservation Concern in Region 6, BCR 11 and 17, and is a USSCP Species of High Concern.

Chris Grondahl



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 subsaline semipermanent 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.

Other Natural or Manmade Factors

Predation by several species of avian and mammalian predators is of concern.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- The USACOE annually surveys piping plovers along the Missouri River. The program was initiated in 1993. Every year the river is searched for least tern and piping plover nests. The number of

nests, nest success, destroyed nest fate, the number of chicks fledged, and the fledge ratio are calculated. This provides for an excellent long term survey.
- A study to determine foraging ecology of Northern Great Plains piping plovers is ongoing. The purpose is to determine if differences in growth rates, development and survival of piping plover chicks between various sites on the Missouri River and between the Missouri River and the prairie are driven at least in part, by variations in food supply and intake (Le Fer and Fraser 2003).

Previous Research or Surveys
- In the mid-1980s, efforts to monitor piping plovers on alkali lakes began. From 1991-2003, area-wide recovery activity was undertaken. The goal was to achieve an annual fledging rate of at least 1.24-1.44 chicks/breeding pair. Since 1999, this goal has been met with the exception of 2001 when the fledging rate was just under 1.24 (Ivan 2003).
- Piping plover habitat use and reproductive success was explored in the mid 1980s (Prindiville Gaines and Ryan 1988).

Additional Research or Surveys Needed
- Nothing has been identified at this time.

POPULATION ESTIMATES
- USSCP Population Estimate: 3,300 (High confidence)
- USSCP Tentative Target: 6,000
- USSCP Proposed Action:
- Uncommon Breeding Birds in North Dakota: 11,000 in 1967; 4,000 in 1992; 2,000 in 1993 (estimates provided in # of pairs)

MANAGEMENT RECOMMENDATIONS
- Continue to implement recovery plans http://ecos.fws.gov/docs/recovery_plans/1994/940801.pdf
- Mimic natural flows on the Missouri River to create sandbar habitat.
- If needed, limit human access to sandbars or sensitive areas where plovers are nesting.
- Predator fences may be erected around nest.

MONITORING PLANS

Continue to work with the USACOE on long-term monitoring of piping plovers along the Missouri River. Support monitoring of the Alkali Lakes populations.

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American Avocet
Level II

Scientific Name: *Recurvirostra americana*

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

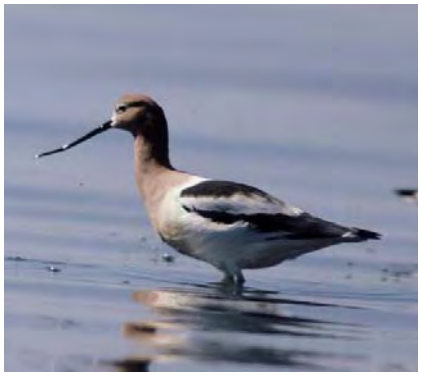
Abundance: Fairly common.

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

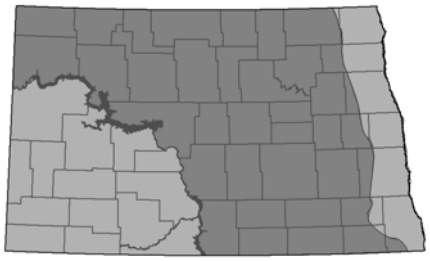
Federal Status: Federal migratory bird.

Reason for Designation: A reasonable proportion of the population breeds in North Dakota. Also listed as a USSCP Species of High Concern in the Prairie Pothole Region.

Breeding Bird Survey Data (1966-2002)
North Dakota BBS population trend 4.1%/yr (p = 0.22).
Survey-wide BBS population trend 0.1%/yr (p = 0.92).
North Dakota BBS relative abundance 1.10 birds/route.



NDGFD



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. Generally use shallow water (<1m) in tilled, alkali, ephemeral, temporary, seasonal, semipermanent, 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, islands built in wetlands, or those classified as L2ABF. 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. High water years can limit nesting substrate.

Other Natural or Manmade Factors
Nest losses to flooding and predation. An elevated level of selenium has been found in avocet eggs in other states. 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.

American Avocet

Level II

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- A study to determine marsh bird distribution in relation to landscape composition in North Dakota began in 2004. American avocet is one of 16 focal species for this study. Mark Sherfy of NPWRC is the principal investigator. Study objectives are as follows:
    1) Provide baseline data on distribution of marsh birds in eastern and northern North Dakota
    2) Relate presence/absence of marsh birds on surveyed wetlands to site-specific habitat characteristics and to surrounding landscape metrics
    3) Relate distribution of marsh birds in North Dakota to cropland area, grassland area, acreage of CRP, and other upland habitat variables in the adjacent landscape
    4) Relate distribution of marsh birds in North Dakota to wetland acreage, percent of wetland basins holding water, and other wetland habitat variables in the adjacent landscape

  Nearly 20 avocets were detected during the surveys in 2004 at 9 sites. The majority were encountered in the Missouri Coteau. This project will continue in 2005 and possibly 2006. This study is funded with State Wildlife Grants, the North Dakota Game and Fish Department, Ducks Unlimited, and Alliance Pipeline.

Previous Research or Surveys

- Avocet use of nesting islands in North Dakota was explored by Dahl (2003). Still, little effort has been applied to research or surveys specifically for American avocet in North Dakota.

Additional Research or Surveys Needed

- Nothing has been identified at this time.

POPULATION ESTIMATES

- USSCP Population Estimate: 450,000 (moderate confidence)
- USSCP Tentative Target: 450,000
- USSCP Proposed Action: Investigate suspected declines
- Uncommon Breeding Birds in North Dakota: 31,000 in 1967; 13,000 in 1992; 29,000 in 1993 (estimates provided in # of pairs)

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.

MONITORING PLANS

The Breeding Bird Survey continues to be a useful monitoring tool. However, the HAPET office has developed improved roadside surveys 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 in association with landscape characteristics. These surveys began in 2004, occur only in the PPR of North Dakota, are conducted by volunteers, and are likely an improved method of monitoring several shorebirds. American avocet is one of six target shorebird species.

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Willet
Level I

Scientific Name: *Cataptrophorus semipalmatus*

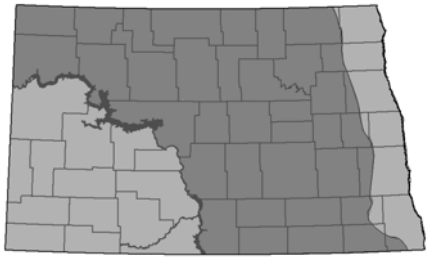

Ed Bry

General Description: L 15", WS 26", 8 oz. Gray overall except for striking black and white wings obvious in flight.

Status: Present 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: Federal 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 is a USFWS Bird of Conservation Concern in BCR 11 and a USSCP Species of Moderate Concern.

Breeding Bird Survey Data (1966-2002)
North Dakota BBS population trend -0.4%/yr (p = 0.69).
Survey-wide BBS population trend -0.5%/yr (p = 0.29).
North Dakota BBS relative abundance 2.5 birds/route.

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, semipermanent, 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
The destruction and/or degradation of native prairie and associated wetlands is the biggest threat to the population in the Great Plains. Over-grazed pastures which are grazed season-long or short-duration are less attractive to willets.

Other Natural or Manmade Factors
Insecticides can decrease food availability. Vehicle and power line collisions are one cause of direct mortality. Early mowing can destroy nests. Nest predation is a key mortality factor.

Willet

Level I

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- A study to determine demographic performance of prairie-nesting shorebirds and raptors in North Dakota has been ongoing since 2000. Willet is one of 6 focal species for this study. Scott Stephens of DU is the principal investigator. The objectives of which are as follows:
    1) Locate and monitor nests for prairie nesting shorebird and raptor species of concern across a gradient of landscapes and habitat types.
    2) Develop statistical models using field data on nest survival rates to identify the important landscape and habitat factors that influence nesting success rates for prairie breeding shorebirds and raptors and identify management prescriptions based on the results.
    3) Based on the important factors identified in the statistical models, develop GIS models of predicted nesting success rates for shorebirds and raptors across North Dakota and provide priorities for management activities.

  Results to date indicate willet has the highest nesting success rate of the five target shorebird species. Nest success is highest where there is a great amount of native grassland and wetland area in the landscape. This project will continue in 2005 and possibly additional years. This study was funded in part with State Wildlife Grants, the North Dakota Game and Fish Department, and Ducks Unlimited.

Previous Research or Surveys

- Habitat use by breeding willets in the Northern Great Plains was studied from 1979-1981 in Stutsman and Kidder counties (Ryan and Renken 1987). Little additional effort has been applied to research or surveys specifically for willets in North Dakota.

Additional Research or Surveys Needed

- Nothing has been identified at this time.

POPULATION ESTIMATES

- USSCP Population Estimate: 160,000 (poor confidence)
- USSCP Tentative Target: 160,000
- USSCP Proposed Action: Population change status unknown
- PIF North Dakota Population Estimate: 157,126 in BCR11; 4,253 in BCR17 (11.2% and 0.3% of population respectively)
- Changes in Breeding Bird Populations in North Dakota 1967 to 1992-93: 39,000 in 1967; 35,000 in 1992; 60,000 in 1993 (estimates provided in # of pairs)

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, twice-over deferred grazing versus season-long grazing, delay grazing until late May/early June.

MONITORING PLANS

The Breeding Bird Survey is a useful monitoring tool. However, the HAPET office has developed roadside surveys to improve detection of breeding shorebirds per unit effort, monitor population trends, and provide data suitable for development of spatial models that predict shorebird occurrence in association with landscape characteristics. These surveys began in 2004, occur only in the PPR of North Dakota, are conducted by volunteers, and are likely an improved method of monitoring several shorebirds. Willet is one of six target shorebird species.

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Stewart, R. E. 1975. Breeding Birds of North Dakota. Tri-College Center for Environmental Studies, Fargo, North Dakota. 295 pp.

Upland Sandpiper

Level I

Scientific Name: *Bartramia longicauda*

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: Present in North Dakota from mid-April to August. Peak breeding season occurs from late May to early July.

Abundance: Common.

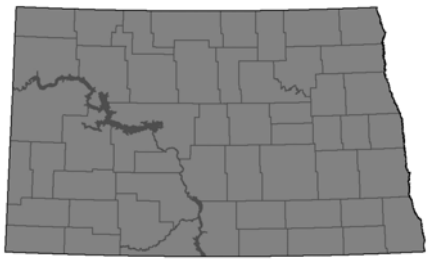
Primary Habitat: Dry, open mixed-grass prairie. Often uses wooden fence posts for viewing.

Federal Status: Federal migratory bird.

Reason for Designation: One-quarter of this species population breeds in the Prairie Pothole Region. It is a USFWS Bird of Conservation Concern in Region 6, BCR 11 and 17, and a USSCP Species of High Concern.

Breeding Bird Survey Data (1966-2002)
North Dakota BBS population trend 1.2%/yr (p = 0.07).
Survey-wide BBS population trend 1.0%/yr (p = 0.01).
North Dakota BBS relative abundance 9.61 birds/route.

Harold Umber



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

Destruction and/or degradation of native prairie is most likely the biggest threat to upland sandpipers in North Dakota. 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. Early mowing can destroy nests or kill the adult female on nest. Death from collisions with vehicles or power lines occurs, but is rare.

Upland Sandpiper

Level I

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- A study to determine demographic performance of prairie-nesting shorebirds and raptors in North Dakota has been ongoing since 2000. Upland Sandpiper is one of 6 focal species for this study. Scott Stephens of DU is the principal investigator. The objectives of which are as follows:
    1) Locate and monitor nests for prairie-nesting shorebird and raptor species of concern across a gradient of landscapes and habitat types.
    2) Develop statistical models using field data on nest survival rates to identify the important landscape and habitat factors that influence nesting-success rates for prairie-breeding shorebirds and raptors and identify management prescriptions based on the results.
    3) Based on the important factors identified in the statistical models, develop GIS models of predicted nesting success rates for shorebirds and raptors across the state of North Dakota and provide priorities for management activities across the state.

  Results to date indicate upland sandpiper nest success is highest where there is a high amount of native grassland and a large amount of wetland area in the landscape. This project will continue in 2005 and possibly additional years. This study was funded in part with State Wildlife Grants, the North Dakota Game and Fish Department, and Ducks Unlimited.

Previous Research or Surveys

- Bowen and Kruse (1993) explored the effects of grazing on upland sandpipers in North Dakota. They concluded that grazing during the nesting season influenced nest success. Nest density was higher when cattle were absent.
- Kirsch and Higgins explored upland sandpiper nesting and management in North Dakota.
- Additional research that includes effects on upland sandpipers from various management practices or other incidental information is available.

Additional Research or Surveys Needed

- Nothing has been identified at this time.

POPULATION ESTIMATES

- USSCP Population Estimate: 350,000 (poor confidence)
- USSCP Tentative Target: 470,000
- USSCP Proposed Action: Halt decline then restore to calculated 1980 levels
- PIF North Dakota Population Estimate: 133,332 in BCR11; 48,822 in BCR17 (14.7% and 5.4% of population respectively)
- Changes in Breeding Bird Populations in North Dakota 1967 to 1992-93: 139,000 in 1967; 236,000 in 1992; 198,000 in 1993 (estimates provided in # of pairs)

MANAGEMENT RECOMMENDATIONS

- Maintain large (>100 ha) contiguous blocks of native prairie.
- Implement spring burning at 3 year intervals.
- 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 if absent.
- Prevent encroachment of woody vegetation.
- Moderate grazing using a rotation system of two or more grazing units is beneficial to provide diverse grass heights. Delay grazing until late May to early June. Avoid season-long grazing.

MONITORING PLANS

The Breeding Bird Survey is a useful monitoring tool. However, the HAPET office has developed roadside surveys to improve detection of breeding shorebirds per unit effort, monitor population trends, and provide data suitable for development of spatial models that predict shorebird occurrence in association with landscape characteristics. These surveys began in 2004, occur only in the PPR of

North Dakota, are conducted by volunteers, and are likely an improved method of monitoring several shorebirds. Upland sandpiper is one of six target shorebird species.

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Long-billed Curlew

Level I

Scientific Name: *Numenius americanus*

General Description: L 23", WS 35", 1.3 lb. Long, down-curved 8-inch bill, buffy overall with pink-cinnamon underwings visible in flight.

Status: Present in North Dakota from mid-April to August. Peak breeding season occurs from early May to early July.

Abundance: Rare.

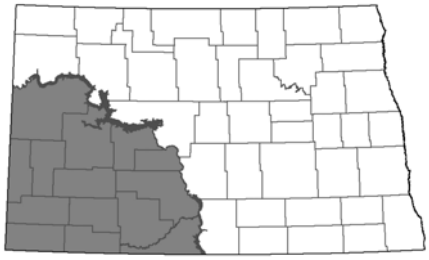
Primary Habitat: Short-grass prairie or shrub steppe prairie on gently rolling terrain.

Federal Status: Federal migratory bird.

Reason for Designation: Curlews numbered much higher during the 1800s and were more widely distributed. It is a USFWS Bird of Conservation Concern in Region 6, BCR 11 and 17, and a USSCP Highly Imperiled species.

Breeding Bird Survey Data (1966-2002)
Survey-wide BBS population trend -0.9%/yr (p = 0.23).

Harold Umber



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 more likely to be used. 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 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 biggest 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.

Long-billed Curlew

Level I

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- A two-year, rangewide survey to determine curlew distribution and population began in 2004. From this project, a plan to monitor long-term trends in population size and distribution will be developed. The principal investigator is Stephanie Jones of Region 6 USFWS. The survey is taking place in North Dakota on the Little Missouri National Grasslands. See http://mountain-prairie.fws.gov/species/birds/longbilled_curlew/ for more information.
- A study to determine the distribution and abundance of the long-billed curlew in southwestern North Dakota began in 2005. The principal investigator is Richard Crawford of UND. Study objectives are as follows:
    1) Participate in the range-wide curlew survey being conducted by the USFWS and USGS to produce range-wide curlew population estimates.
    2) Test assumptions made by the above monitoring plan by conducting double sampling intensive surveys in selected plots.
    3) Obtain an estimate of the population of breeding curlews in southwestern North Dakota.
    4) Investigate habitat use of curlews during their stay in North Dakota (i.e., importance of water in nest site selection, vegetative structure [height/density, species composition]).
    5) Develop a protocol for monitoring curlews within North Dakota that can be followed in subsequent years with reduced effort.

  This project will continue field work in 2006 and an anticipated completion date of June 2007. This study was funded in part with State Wildlife Grants, the North Dakota Game and Fish Department, and the U.S. Fish and Wildlife Service.

Previous Research or Surveys

- Little effort has been applied to research or surveys specifically for long-billed curlews in North Dakota. In 1986, the NDGFD asked the public to report sightings of curlews. A total of 108 curlews were observed and an estimated 49 breeding pairs were determined.

Additional Research or Surveys Needed

- Nothing has been identified at this time.

POPULATION ESTIMATES

- USSCP Population Estimate: 20,000 (moderate confidence)
- USSCP Tentative Target: 28,500
- USSCP Proposed Action: Restore to 1970 levels, increase by 30%
- PIF North Dakota Population Estimate: 913 in BCR17 (0.0% of population)

MANAGEMENT RECOMMENDATIONS

- Prevent conversion of native grassland.
- Protect breeding habitat from human disturbance (vehicular use, shooting).
- Remove tall, dense vegetation before nesting period by using haying and grazing.
- Use fire to remove shrub coverage and increase habitat openness.
- Avoid grazing during the incubation period.
- Do not drag hayfields to break up cowpies.

MONITORING PLANS

The project described above will include recommendations for long-term monitoring of long-billed curlews in North Dakota.

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Marbled Godwit

Level I

Scientific Name: *Limosa fedoa*

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: Present in North Dakota from mid-April to August. Peak breeding season occurs from early May to late June.

Abundance: Fairly common.

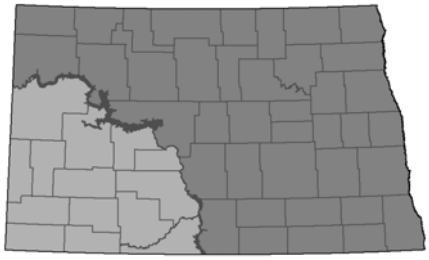
Primary Habitat: Forage in a variety of wetlands, nest commonly on grazed native prairie.

Federal Status: Federal migratory bird.

Reason for Designation: It is estimated 70% of this species population breeds in the Prairie Pothole Region. It is a USFWS Bird of Conservation Concern in Region 6, BCR 11 and 17, and a USSCP Species of High Concern.

Breeding Bird Survey Data (1966-2002)
North Dakota BBS population trend 0.7%/yr (p = 0.44).
Survey-wide BBS population trend -0.2%/yr (p = 0.78).
North Dakota BBS relative abundance 3.63 birds/route.

Chris Gro nda hl



LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Marbled godwits require large expanses of short, sparse to moderately vegetated uplands for nesting and a variety of wetlands for foraging. 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. Adults with broods will use taller, denser grass. Semipermanent, 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. Fairly common in the Missouri Coteau and Drift Prairie, rarer elsewhere in the state.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Destruction and/or degradation of native prairie and wetlands is most likely the biggest threat to marbled godwits in North Dakota.

Other Natural or Manmade Factors

A large number of godwits were previously shot in the late 1800s. Insecticides likely reduce prey availability. Early mowing can destroy nests or kill the adult female on nest. Deaths from collisions with vehicles or power lines occur or may also result in leg or wing injuries.

Marbled Godwit

Level I

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- A study to determine demographic performance of prairie nesting shorebirds and raptors in North Dakota has been ongoing since 2000. Marbled godwit is one of six focal species for this study. Scott Stephens of DU is the principal investigator. Study objectives are as follows:
    1) Locate and monitor nests for prairie nesting shorebird and raptor species of concern across a gradient of landscapes and habitat types.
    2) Develop statistical models using field data on nest survival rates to identify the important landscape and habitat factors that influence nesting success rates for prairie breeding shorebirds and raptors and identify management prescriptions based on the results.
    3) Based on the important factors identified in the statistical models, develop GIS models of predicted nesting success rates for shorebirds and raptors across North Dakota and provide priorities for management activities.

  Results to date indicate marbled godwit nest success is highest where there is a high amount of native grassland and a large amount of wetland area in the landscape. This project will continue in 2005 and possibly additional years. This study was funded in part with State Wildlife Grants, the North Dakota Game and Fish Department, and Ducks Unlimited.
- Dave Naugle, professor at the University of Montana, is conducting stable isotope analysis to link breeding and wintering grounds for marbled godwit sub-populations.

Previous Research or Surveys

- Ryan et al. (1981 and 1984) explored marbled godwit ecology and habitat selection in North Dakota in the early 1980s. Little additional effort has been applied to research or surveys specifically for marbled godwits in North Dakota.

Additional Research or Surveys Needed

- Little is known regarding the demographics and habitat use of this species in North Dakota or elsewhere. The NDGFD should work with the Tri-national Marbled Godwit Initiative to implement this type of research.

POPULATION ESTIMATES

- USSCP Population Estimate: 168,000 (moderate confidence)
- USSCP Tentative Target: 258,500
- USSCP Proposed Action: Restoration goal based on 35% increase, halt declines, determine extent and then reverse decline with goal of restoring loss
- PIF North Dakota Population Estimate: 224,396 in BCR11; 30,091 in BCR17 (16.0% and 2.1% of population respectively)
- Changes in Breeding Bird Populations in North Dakota 1967 to 1992-93: 37,000 in 1967; 18,000 in 1992; 31,000 in 1993 (estimates provided in # of pairs)

MANAGEMENT RECOMMENDATIONS

- Maintain wetland complexes.
- Protect grassland habitat, particularly native prairie, of at least 1 km^2.
- 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.
- When using season-long grazing, delay grazing until mid-June.
- Use short-term grazing of 2-4 weeks in May.
- On existing cropland, no-tillage and minimum-tillage processes can be less harmful to nesting godwits.

MONITORING PLANS

The Breeding Bird Survey is a useful monitoring tool. However, the HAPET office has developed roadside surveys to improve detection of breeding shorebirds per unit effort, monitor population trends,

and provide data suitable for development of spatial models that predict shorebird occurrence in association with landscape characteristics. These surveys began in 2004, occur only in the PPR of North Dakota, are conducted by volunteers, and are likely an improved method of monitoring several shorebirds. Marbled godwit is one of six target shorebird species.

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Wilson's Phalarope

Level I

Scientific Name: *Phalaropus tricolor*

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: Present in North Dakota from mid-April to September. Peak breeding season occurs from late May to early July.

Abundance: Common to abundant.

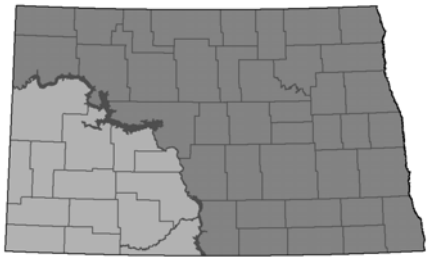
Primary Habitat: Shallow wetlands and mudflats, nest in the margins of wetlands.

Federal Status: Federal migratory bird.

Reason for Designation: An estimated 1/3 of this species' population breeds in the Prairie Pothole Region. It is a USFWS Bird of Conservation Concern in Region 6, BCR 11 and 17, and a USSCP Species of High Concern.

Breeding Bird Survey Data (1966-2002)
North Dakota BBS population trend -1.1%/yr (p = 0.62).
Survey-wide BBS population trend 1.1%/yr (p = 0.25).
North Dakota BBS relative abundance 2.71 birds/route.

Scott Gomes



LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Wetlands with open water, emergent vegetation, and open shoreline are used for foraging, and wet meadows, upland grasslands, and wetlands 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, semipermanent, 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

Destruction and/or degradation of native prairie and wetlands are most likely the biggest threat to Wilson's phalaropes in North Dakota.

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.

Wilson's Phalarope

Level I

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- A study to determine demographic performance of prairie-nesting shorebirds and raptors in North Dakota has been ongoing since 2000. Wilson's phalarope is one of six focal species for this study. Scott Stephens of DU is the principal investigator. Study objectives are as follows:
    1) Locate and monitor nests for prairie nesting shorebird and raptor species of concern across a gradient of landscapes and habitat types.
    2) Develop statistical models using field data on nest survival rates to identify the important landscape and habitat factors that influence nesting success rates for prairie breeding shorebirds and raptors and identify management prescriptions based on the results.
    3) Based on the important factors identified in statistical models, develop GIS models of predicted nesting success rates for shorebirds and raptors across North Dakota and provide priorities for management activities.

  Results to date indicate Wilson's phalarope nest success is highest where there is a high amount of native grassland and a large amount of wetland area in the landscape. This project will continue in 2005 and possibly additional years. This study was funded in part with State Wildlife Grants, the North Dakota Game and Fish Department, and Ducks Unlimited.

Previous Research or Surveys

- Breeding biology was studied in 1975 at Audubon National Wildlife Refuge. Little additional effort has been applied to research or survey specifically for Wilson's phalaropes in North Dakota.

Additional Research or Surveys Needed

- Nothing has been identified at this time.

POPULATION ESTIMATES

- USSCP Population Estimate: 1,500,000 (low confidence)
- USSCP Tentative Target: 2,800,000
- USSCP Proposed Action: Halt declines then restoration to calculated 1972 levels
- PIF North Dakota Population Estimate: 154,670 in BCR11; 10,405 in BCR17 (13.5% and 0.9% of population respectively)
- Changes in Breeding Bird Populations in North Dakota 1967 to 1992-93: 157,000 in 1967; 66,000 in 1992; 79,000 in 1993 (estimates provided in # of pairs)

MANAGEMENT RECOMMENDATIONS

- Maintain wetland complexes.
- Provide and protect wet-meadow areas.
- Do not mow, burn, or heavily graze nesting habitat during breeding season.

MONITORING PLANS

The Breeding Bird Survey is a useful monitoring tool. However, the HAPET office has developed roadside surveys to improve detection of breeding shorebirds per unit effort, monitor population trends, and provide data suitable for development of spatial models that predict shorebird occurrence in association with landscape characteristics. These surveys began in 2004, occur only in the PPR of North Dakota, are conducted by volunteers, and are likely an improved method of monitoring several shorebirds. Wilson's phalarope is one of six target shorebird species.

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Stewart, R. E. 1975. Breeding Birds of North Dakota. Tri-College Center for Environmental Studies, Fargo, North Dakota. 295 pp.

Franklin's Gull

Level I

Scientific Name: *Larus pipixcan*

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

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

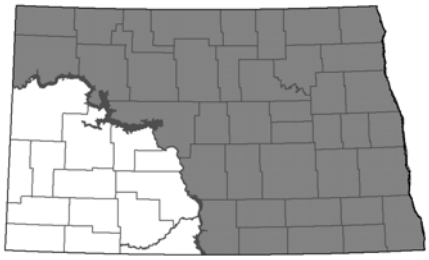
Abundance: Common to abundant.

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

Federal Status: Federal 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 NPPWCP.

Chris Grondahl



Breeding Bird Survey Data (1966-2002)
North Dakota BBS population trend 2.2%/yr (p = 0.75).
Survey-wide BBS population trend 8.3%/yr (p = 0.21).
North Dakota BBS relative abundance 10.73 birds/route.

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 Sayler NWR is another of the four.

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 which can cause high mortality. 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.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

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

Franklin's Gull

Level I

Previous Research or Surveys

- 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.

Additional Research or Surveys Needed

- Determine influence of human development on colony size, location, and production.
- 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.
- Investigate interactions between avian botulism and Franklin's gull.
- More accurately estimate population size, distribution, and trend.
- Identify and target high priority landscapes and habitats, including staging areas.

POPULATION ESTIMATES

- NPPWCP Continental Population Estimate: 315,608 – 990,864
- NPPWCP BCR11 Population Estimate: 183,600 – 689,400
- PIF North Dakota Population Estimate: 40,611 in BCR11 (4.3% of the population)
- Uncommon Breeding Birds in North Dakota: 48,000 in 1967; 171,000 in 1992; 125,000 in 1993 (estimates provided in # of pairs)

MANAGEMENT RECOMMENDATIONS

- Identify and target high priority landscapes, habitats, and staging areas for protection.
- If possible, maintain water levels during nesting.

MONITORING PLANS

The NPPWCP has identified the basic elements of how a regional/continental waterbird monitoring program should be structured. The NDGFD will work with the NPPWCP and its developers to implement a statewide waterbird monitoring plan.

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Least Tern
Level II

Scientific Name: *Sterna antillarum*

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

Abundance: Rare. Approximately 100 nests are located each year along the Missouri River.

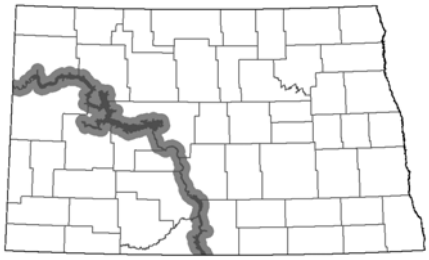
Primary Habitat: Sparsely vegetated sandbars or shorelines.

Federal Status: Federal migratory bird, federal endangered species.

Reason for Designation: Listed as federally endangered in 1985. The alteration of natural Missouri River stream flow has destroyed sandbar habitat and altered tern prey base.

Breeding Bird Survey Data (1966-2002)
Survey-wide BBS population trend -1.1%/yr (p = 0.65).


Chris Grondahl



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 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 USACOE annually surveys least terns along the Missouri River. The program was initiated in 1993. Every year the river is searched for least tern and piping plover nests. The number of nests,

nest success, destroyed nest fate, the number of chicks fledged, and the fledge ratio are calculated. This provides for an excellent long-term survey.

Previous Research or Surveys

- Little effort has been applied to research least terns in North Dakota.

Additional Research or Surveys Needed

- Nothing identified at this time.

POPULATION ESTIMATES

- NPPWCP Continental Population Estimate: 60,000 – 100,000
- NPPWCP BCR11 Population Estimate: ~680
- North Dakota Population Estimate: ~100 nests

MANAGEMENT RECOMMENDATIONS

- Continue to implement recovery plans http://ecos.fws.gov/docs/recovery_plans/1990/900919a.pdf
- 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.
- If needed, limit human access to sandbars or sensitive areas where plovers are nesting.

MONITORING PLANS

Continue to work with the USACOE on long-term monitoring of least terns along the Missouri River.

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Black Tern
Level I

Scientific Name: *Chlidonias niger*

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

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

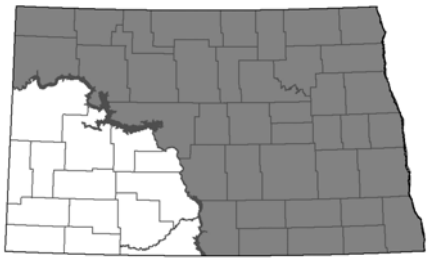
Abundance: Common to abundant.

Primary Habitat: Shallow wetlands surrounded by grassland.


Ed Bry

Federal Status: Federal migratory bird. Former candidate species, as of February 28, 1996 no longer a candidate.

Reason for Designation: Black terns are designated as High Concern in the NPPWCP. Fifty percent of the population breeds in BCR11.



Breeding Bird Survey Data (1966-2002)
North Dakota BBS population trend 6.7%/yr (p = 0.08).
Survey-wide BBS population trend -1.8%/yr (p = 0.22).
North Dakota BBS relative abundance 9.99 birds/route.

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, semipermanent, marshes, prairie sloughs, 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 semicolonially 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 Terns in North Dakota

No specific sites have been identified. Common throughout the Prairie Pothole Region but the presence of this species is highly dependent upon water availability.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Destruction and/or degradation of wetlands is the biggest factor in tern population declines. 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.

Black Tern

Level I

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- A study to determine marsh bird distribution in relation to landscape composition in North Dakota began in 2004. Black tern is one of 16 focal species for this study. Mark Sherfy of NPWRC is the principal investigator. Study objectives are as follows:
    1) Provide baseline data on distribution of marsh birds in eastern and northern North Dakota.
    2) Relate presence/absence of marsh birds on surveyed wetlands to site-specific habitat characteristics and to surrounding landscape metrics.
    3) Relate distribution of marsh birds in North Dakota to cropland area, grassland area, acreage of CRP, and other upland habitat variables in the adjacent landscape.
    4) Relate distribution of marsh birds in North Dakota to wetland acreage, percent of wetland basins holding water, and other wetland habitat variables in the adjacent landscape.

  Black terns were detected at over 40 sites during the surveys in 2004. The majority were encountered in the Drift Prairie. This project will continue in 2005 and possibly 2006. This study is funded with State Wildlife Grants, the North Dakota Game and Fish Department, Ducks Unlimited, and Alliance Pipeline.

Previous Research or Surveys

- Nothing has been identified at this time. Little effort has been applied to research or surveys specifically for black terns in North Dakota. Local efforts by the U.S. Fish and Wildlife Service to inventory colonial nesting waterbirds have occurred recently.

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.

POPULATION ESTIMATES

- NPPWCP Continental Population Estimate: 100,000 – 500,000
- NPPWCP BCR11 Population Estimate: unknown
- PIF North Dakota Population Estimate: 48,377 in BCR11; 368 in BCR17 (21.3% and 0.2% of population respectively)
- Changes in Breeding Bird Populations in North Dakota 1967 to 1992-93: 254,000 in 1967; 86,000 in 1992; 83,000 in 1993 (estimates provided in # of pairs)

MANAGEMENT RECOMMENDATIONS

- Prevent encroachment of woody vegetation around wetlands.
- Open cattail-choked wetlands.
- Provide wetland complexes with equal proportions of interspersed emergent vegetation and open water.
- Artificial nesting platforms may be used, but not as productive as natural sites.

MONITORING PLANS

The NPPWCP has identified the basic elements of how a regional/continental waterbird monitoring program should be structured. The NDGFD will work with the NPPWCP and its developers to implement a statewide waterbird monitoring plan.

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Black-billed Cuckoo

Level I

Scientific Name: *Coccyzus erythropthalmus*

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

Abundance: Fairly common to rare.

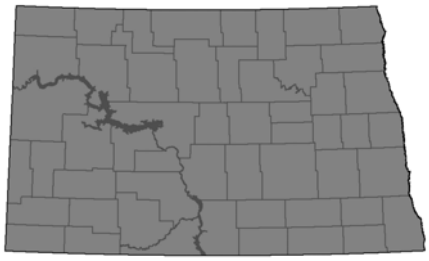
Primary Habitat: Brushy margins or woodland openings, thickets of small trees and prairie shrubs.

Federal Status: Federal migratory bird.

Reason for Designation: Cuckoos have been declining across North America for 20 years. The downward trend is continuing due to loss and degradation of riparian habitats. It is a USFWS Bird of Conservation Concern in Region 6, BCR 11, and 17.

Breeding Bird Survey Data (1966-2002)
North Dakota BBS population trend -3.2%/yr (p = 0.00).
Survey-wide BBS population trend -1.7%/yr (p = 0.00).
North Dakota BBS relative abundance 1.13 birds/route.

Doug Backlund



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 Cuckoo 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. No specific sites within these areas have been identified.

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. Mortality is high from collisions with towers, probably in part due to nocturnal migration behavior.

Black-billed Cuckoo

Level I

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

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

Previous Research or Surveys

- Very little effort has been applied to research or surveys specifically for black-billed cuckoos in North Dakota.

Additional Research or Surveys Needed

- A survey of the cuckoo along with other riparian or upland deciduous forest nesting species should be conducted to determine the status of the population and factors affecting the decline of the species.
- Basic life history is not well known, such as spacing, site tenacity, fecundity and mortality, and population structure and regulation.
- Explore the effects of pesticide use, and habitat fragmentation or modification.

POPULATION ESTIMATES

- PIF Global Population Estimate: 1,100,000 (100% population in US and Canada)
- PIF North Dakota Population Estimate: 70,314 in BCR11; 15,933 in BCR17 (6.1% and 1.4% of population respectively)
- PIF State Population Objective: Increase the statewide population from 86,000 to 130,000
- Changes in Breeding Bird Populations in North Dakota 1967 to 1992-93: 15,000 in 1967; 65,000 in 1992; 22,000 in 1993 (estimates provided in # of pairs)

MANAGEMENT RECOMMENDATIONS

- Identify native riparian habitats at risk.
- Limit grazing in riparian areas.

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).

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Burrowing Owl
Level II

Scientific Name: *Athene cunicularia*

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

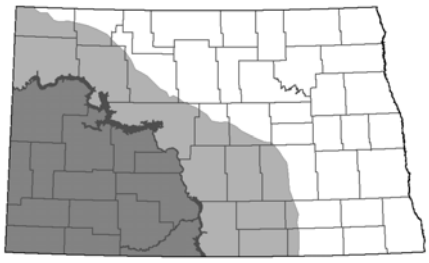
Abundance: Uncommon.

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

Federal Status: Federal migratory bird.

Reason for Designation: Burrowing owls once occurred statewide with the exception of the Red River Valley. They currently are found mostly west of the Missouri River because of declines in burrowing mammal populations east of the Missouri River. It is a USFWS Bird of Conservation Concern in Region 6, BCR 11 and 17.


Chris Grondahl



Breeding Bird Survey Data (1966-2002)
North Dakota BBS population trend -3.5%/yr (p = 0.37).
Survey-wide BBS population trend -1.5%/yr (p = 0.53).
North Dakota BBS relative abundance 0.14 birds/route.

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-tail 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. Prey 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 metapopulations; Sioux, southern Grant, and southern Morton counties (i.e. Standing Rock Reservation), 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.

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. There is some evidence to suggest 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

- A project to determine population limiting factors of burrowing owls by estimating adult and juvenile survivorship with radio telemetry is taking place on the Little Missouri National Grasslands. Principal investigator is Marco Restani, professor at St. Cloud State University.

Previous Research or Surveys

- 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 (Murphy et al. 2001).
- Nest site selection and productivity of burrowing owls have been examined on the Little Missouri National Grasslands (Restani 2001).
- A few reports on the food habitats or nesting ecology have been conducted in North Dakota.

Additional Research or Surveys Needed

- Identify traditional nesting sites.
- Determine survivorship of chicks and adults.
- Explore landscape features affecting nest site selection.

POPULATION ESTIMATES

- PIF Global Population Estimate: 2,000,000 (31% population in US and Canada)
- PIF North Dakota Population Estimate: 2,878 in BCR11; 3,748 in BCR17 (0.5% and 0.6% of population respectively)
- PIF State Population Objective: Increase the statewide population from 6,600 to 9,900
- Uncommon Breeding Birds in North Dakota: 7,000 in 1967; 7,000 in 1992; 5,000 in 1993 (estimates provided in # of pairs)

MANAGEMENT RECOMMENDATIONS

- Operation Burrowing Owl is a private stewardship program in Canada in which landowners voluntarily agree to protect nesting burrowing owls on their land. Over 37,000 acres of grassland habitat have been protected since 1989. http://www.unibase.com/~naturesk/burrowl.html
- Find working alternatives to maintain viable prairie dog colonies and the ranching system. The eradication of prairie dogs is economically costly and ecologically detrimental.
- 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.
- Provide fresh horse or cow manure near nesting areas if none is available.
- 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 nontarget 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.

Burrowing Owl

Level II

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).

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Short-eared Owl

Level II

Scientific Name: *Asio flammeus*

General Description: L 15”, WS 38”, 12 oz. Yellowish-brown, spotted back and subtle ear tufts on a large round head.

Status: Year-round. Peak breeding season occurs from late April to mid-July.

Abundance: Fairly common to uncommon.

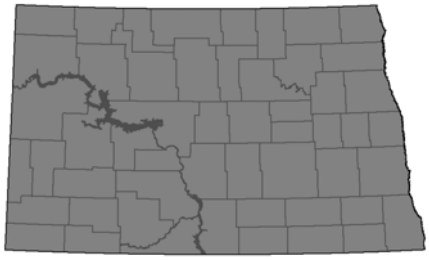
Primary Habitat: Open grasslands, native prairie, wet meadows, or hayfields.

Federal Status: Federal migratory bird.

Reason for Designation: Although possibly secure in North Dakota, it is showing a rangewide negative trend. It is a USFWS Bird of Conservation Concern in Region 6, BCR 11 and 17, and a PIF Watch List species.

Breeding Bird Survey Data (1966-2002)
North Dakota BBS population trend 3.4%/yr (p = 0.51).
Survey-wide BBS population trend -4.7%/yr (p = 0.00).
North Dakota BBS relative abundance 0.24 birds/route.

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, shrubsteppe, 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*.

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, particularly voles.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Destruction and/or degradation of grasslands, particularly CRP fields, are a key factor in population declines.

Other Natural or Manmade Factors

Illegal shooting does occur, but to what extent is unknown. Generally not very sensitive to human disturbance. Early haying or mowing could destroy nest or young birds.

Short-eared Owl

Level II

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- A study to determine demographic performance of prairie nesting shorebirds and raptors in North Dakota has been ongoing since 2000. Short-eared owl is one of six focal species for this study. Scott Stephens of DU is the principal investigator. Study objectives are as follows:
    1) Locate and monitor nests for prairie nesting shorebird and raptor species of concern across a gradient of landscapes and habitat types.
    2) Develop statistical models using field data on nest survival rates to identify the important landscape and habitat factors that influence nesting success rates for prairie breeding shorebirds and raptors and identify management prescriptions based on the results.
    3) Based on the important factors identified in the statistical models, develop GIS models of predicted nesting success rates for shorebirds and raptors across North Dakota and provide priorities for management activities.

  Results to date indicate short-eared owl nesting success rate is highest in wetlands and native grassland. This project will continue in 2005 and possibly additional years. This study was funded in part with State Wildlife Grants, the North Dakota Game and Fish Department, and Ducks Unlimited.

Previous Research or Surveys

- Little effort has been applied to research or surveys specifically for short-eared owl in North Dakota. However, limited research has touched on short-eared owl habitat use, nesting biology, and the effects of management practices.

Additional Research or Surveys Needed

- Nothing has been identified at this time.

POPULATION ESTIMATES

- PIF Global Population Estimate: 710,000 (29% population in US and Canada)
- PIF North Dakota Population Estimate: 5,995 in BCR11; 8,723 in BCR17 (0.8% and 1.2% of population respectively)
- PIF State Population Objective: Double the statewide population from 15,000 to 30,000
- Uncommon Breeding Birds in North Dakota: 0 in 1967; 2,000 in 1992; 2,000 in 1993 (estimates provided in # of pairs)

MANAGEMENT RECOMMENDATIONS

- Create and protect large, open areas of grassland.
- 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.

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.

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Red-headed Woodpecker

Level II

Scientific Name: *Melanerpes erythrocephalus*

USFWS

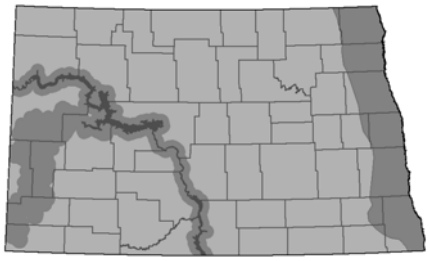
General Description: L 9.25", WS 17", 2.5 oz. Red head, black upper back and tail, white on rear of wings and upper rump.

Status: Present in North Dakota from mid-April to October. Peak breeding season occurs from 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: Federal migratory bird.



Reason for Designation: Less common in North Dakota today than previously. Red-headed woodpeckers have experienced a significant population decline in North Dakota and throughout their range. It is a USFWS Bird of Conservation Concern in Region 6 and BCR 11, and PIF Watch List species.

Breeding Bird Survey Data (1966-2002)
North Dakota BBS population trend -4.8%/yr (p = 0.02).
Survey-wide BBS population trend -2.5%/yr (p = 0.00).
North Dakota BBS relative abundance 0.25 birds/route.

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, sycamore, 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. A considerable number may be killed by automobiles while plucking injured or dead insects from roads. European starlings compete with red-headed woodpeckers for nesting cavities.

Red-headed Woodpecker

Level II

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- There is currently nothing specific in North Dakota.

Previous Research or Surveys

- Little effort has been applied to research or surveys specifically for red-headed woodpeckers in North Dakota.

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 ESTIMATES

- PIF Global Population Estimate: 2,500,000 (100% population in US and Canada)
- PIF North Dakota Population Estimate: 6,554 in BCR11; 5,621 in BCR17 (0.3% and 0.2% of population respectively)
- PIF State Population Objective: Double the statewide population from 12,000 to 24,000
- Uncommon Breeding Birds in North Dakota: 4,000 in 1967; 20,000 in 1992; 15,000 in 1993 (estimates provided in # of pairs)

MANAGEMENT RECOMMENDATIONS

- Protect riparian corridors.
- Leave snags and dead trees.
- Plant mast producing trees such as oak.
- Remove starlings if competition is present.

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).

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Loggerhead Shrike

Level II

Scientific Name: *Lanius ludovicianus*

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

Status: Present in North Dakota from mid-March to October. Peak breeding season occurs from early May to mid-July.

Abundance: Fairly common to uncommon.

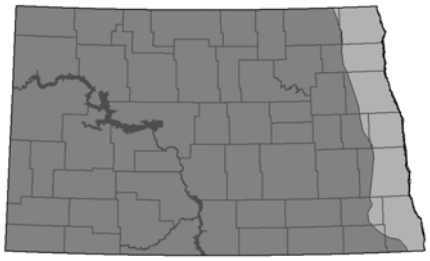
Primary Habitat: Open country with thickets of small trees, shrubs, and shelterbelts.

Federal Status: Federal migratory bird. A former candidate species, as of February 28, 1996, it is no longer a candidate.

Reason for Designation: The cause for significant rangewide declines is unclear. It is a USFWS Bird of Conservation Concern in Region 6 and BCR 11.

Breeding Bird Survey Data (1966-2002)
North Dakota BBS population trend -0.6%/yr (p = 0.74).
Survey-wide BBS population trend -3.8%/yr (p = 0.00).
North Dakota BBS relative abundance 1.05 birds/route.

Chris Grondahl



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

Destruction and/or degradation of native prairie. 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. Little brown-headed cowbird parasitism occurs. 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.

Loggerhead Shrike

Level II

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- Since 1984, a breeding population of loggerhead shrikes has been monitored in northeastern Sioux County. This 20-year long study is the longest population monitoring program for this species in the U.S. The monitoring began as part of a study of patterns of songbird reproductive success, dispersal, and mortality in shelterbelts. Since 1990, Katherine Haas, an elementary school teacher and shrike expert, has continued to monitor breeding shrikes while conducting a study of brown-headed cowbird parasitism of brown thrashers on the same study sites (Haas and Haas 2004).

Previous Research or Surveys

- Long-term monitoring of shelterbelts in Sioux County began in 1984. 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.

Additional Research or Surveys Needed

- Explore possible sources of loggerhead shrike population declines.

POPULATION ESTIMATES

- PIF Global Population Estimate: 4,200,000 (88% population in US and Canada)
- PIF North Dakota Population Estimate: 36,769 in BCR11; 42,559 in BCR17 (1.0% and 1.2% of population respectively)
- PIF State Population Objective: Double the statewide population from 80,000 to 160,000
- Changes in Breeding Bird Populations in North Dakota 1967 to 1992-93: 18,000 in 1967; 36,000 in 1992; 34,000 in 1993 (estimates provided in # of pairs)

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.

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).

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Sedge Wren
Level II

Scientific Name: *Cistothorus platensis*

General Description: L 4.5”, WS 5.5”, 0.32 oz. Brown body, short, stiff tail, streaked back, and orange-buff rump.

Status: Present in North Dakota from May to mid-October. Peak breeding season occurs from mid-June to early August.

Abundance: Fairly common.

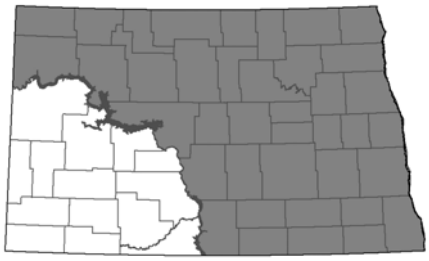
Primary Habitat: Wet meadows of tall grasses and sedges.

Federal Status: Federal migratory bird.

Reason for Designation: Nearly 1/3 of this species population may breed in North Dakota, constituting a significant portion of the breeding range.

Breeding Bird Survey Data (1966-2002)
North Dakota BBS population trend 7.3%/yr (p = 0.00).
Survey-wide BBS population trend 2.5%/yr (p = 0.00).
North Dakota BBS relative abundance 2.38 birds/route.


Bill Marchel



LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat
Sedge wrens prefer tall, dense vegetation of grasses and sedges in wet meadows, CRP, DNC, hayfields, the edges of wetlands, and lightly grazed pasture. In wet years, use upland grasslands which may include big bluestem, Indiangrass, reed canary grass or switchgrass. May be less common during dry years but will use wet meadows during those times. Sedge wrens prefer large areas of contiguous grassland habitat and typically avoid cropland and woody cover. Nest located in dense growth of sedges or tall grasses and is a woven ball of fine grasses or sedges about 10-90 cm above the ground. Primary food includes insects and spiders.

Key Areas and Conditions for Sedge Wren in North Dakota
No specific sites have been identified. Presence of sedge wrens is affected by yearly moisture conditions.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat
Destruction and/or degradation of grassland and wetlands, including expiration of CRP grassland will negatively affect sedge wren populations. It has been predicted if all CRP in North Dakota were converted to cropland, the number of sedge wrens would be reduced by about 25%. Sedge wrens avoid recently burned prairie, but may be found using the area later in the year. Grazing, mowing, and haying eliminate the tall vegetation needed, thereby negatively affecting their presence. Deemed woodland-sensitive, increased woodland cover negatively affects this species. Occurrence declines with increasing tall shrub (>1m) cover.

Other Natural or Manmade Factors
No known records of brood parasitism by brown-headed cowbirds. Sedge wrens are known to experience fatal collisions with towers.

Sedge Wren

Level II

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- In 2002, a study entitled “A landscape approach to grassland bird conservation in the Prairie Pothole Region of the Northern Great Plains” was undertaken. The principal investigator is Dave Naugle, Wildlife Professor at the University of Montana in Missoula. The goal is to develop breeding bird models/maps which link bird population density to local and landscape habitat features. Maps/models will be used to guide management decisions by predicting landscape capability to attract grassland birds, determining treatments required to meet habitat requirements, and predicting improvement in bird population status. This project is part of a large, multi-state (MN, IA, SD, ND, MT) effort to conserve grassland birds throughout the Prairie Pothole Region of the U.S. Sedge wren is one of 16 grassland birds targeted in this large, landscape-level approach to conserving grassland birds. Anticipated completion date is spring 2007. North Dakota has committed State Wildlife Grant funding to this project.

Previous Research or Surveys

- Nothing specific to the species has been identified. Several studies which include sedge wren and multiple other grassland/wetland 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.

Additional Research or Surveys Needed

- Basic demographic information on sedge wrens is lacking.
- The effects of contaminants or pesticides, disease, predators, and weather are not well known.

POPULATION ESTIMATES

- PIF Global Population Estimate: 6,500,000 (100% population in US and Canada)
- PIF North Dakota Population Estimate: 759,347 in BCR11; 10,571 in BCR17 (11.7% and 0.2% of population respectively)
- PIF State Population Objective: Maintain the statewide population of 770,000
- Uncommon Breeding Birds in North Dakota: 22,000 in 1967; 43,000 in 1992; 80,000 in 1993 (estimates provided in # of pairs)

MANAGEMENT RECOMMENDATIONS

- Provide areas of tall, dense cover such as CRP or DNC.
- Minimize disturbance such as mowing or herbicide spraying during the breeding season. Sedge wrens are late breeders and mowing should be delayed past the recommended date of July 15.
- Create a mosaic of burned and unburned areas.
- Prevent encroachment of woody vegetation using periodic disturbance such as burning, mowing, or grazing.

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).

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Sprague's Pipit
Level I

Scientific Name: *Anthus spragueii*

General Description: L 6.5", WS 10", 0.88 oz. Slender, rather dull light brown, wears a "necklace" of fine streaks.

Status: Present in North Dakota from mid-April to mid-October. Peak breeding season occurs from early May to mid-August.

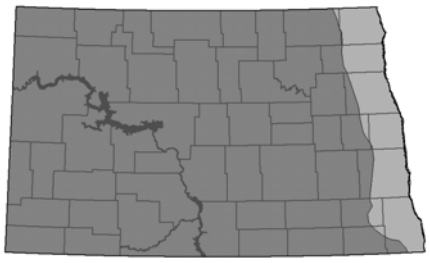
Abundance: Uncommon.

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

Federal Status: Federal migratory bird.

Doug Backlund

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 a USFWS Bird of Conservation Concern in Region 6, BCR 11 and 17, and Partners in Flight Watch List species.



Breeding Bird Survey Data (1966-2002)
North Dakota BBS population trend -2.2%/yr (p = 0.58).
Survey-wide BBS population trend -5.0%/yr (p = 0.00).
North Dakota BBS relative abundance 0.97 birds/route.

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

Destruction and/or degradation of native prairie is the biggest threat to Sprague's pipits in North Dakota. Overgrazing will 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. Prescribed fires every 2-4 years can be beneficial by preventing woody encroachment and removing excessive vegetation.

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.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys
- In 2002, a study entitled "A landscape approach to grassland bird conservation in the Prairie Pothole Region of the Northern Great Plains" was undertaken. The principal investigator is Dave Naugle, Wildlife Professor at the University of Montana in Missoula. The goal is to develop breeding bird models/maps which link bird population density to local and landscape habitat features. Maps/models will be used to guide management decisions by predicting landscape capability to attract grassland birds, determining treatments required to meet habitat requirements, and predicting improvement in bird population status. This project is part of a large, multi-state (MN, IA, SD, ND, MT) effort to conserve grassland birds throughout the Prairie Pothole Region of the U.S. Sprague's pipit is one of 16 grassland birds targeted in this large, landscape-level approach to conserving grassland birds. Anticipated completion date is spring 2007. North Dakota has committed State Wildlife Grant funding to this project.

Previous Research or Surveys
- Nothing specific to the species has been identified. Several studies which include Sprague's pipit and other grassland-associated species have taken place in North Dakota. The effects of various management practices such as grazing and burning have been investigated.

Additional Research or Surveys Needed
- Nothing identified at this time.

POPULATION ESTIMATES
- PIF Global Population Estimate: 870,000 (100% population in US and Canada)
- PIF North Dakota Population Estimate: 40,908 in BCR11; 12,535 in BCR17 (4.7% and 1.4% of population respectively)
- PIF State Population Objective: Double the statewide population from 54,000 to 110,000
- Uncommon Breeding Birds in North Dakota: 15,000 in 1967; 29,000 in 1992; 42,000 in 1993 (estimates provided in # of pairs)

MANAGEMENT RECOMMENDATIONS
- Protect large tracts of grassland habitat.
- 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.
- Avoid heavy grazing; light to moderate grazing may be beneficial.
- 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).

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Brewer's Sparrow

Level III

Scientific Name: *Spizella breweri*

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

Status: Present in North Dakota from May to mid-September. Breeding season occurs from mid-May to late July.

Abundance: Uncommon.

Primary Habitat: Big sagebrush patches within shortgrass prairie.

Federal Status: Federal migratory bird.

Reason for Designation: It is a USFWS Bird of Conservation Concern in Region 6 and BCR 17, and a PIF Watch List Species. A sagebrush obligate species, Brewer's sparrow is showing a survey-wide decline.

Breeding Bird Survey Data (1966-2002)
Survey-wide BBS population trend -2.9%/yr (p = 0.00).

Doug Backlund

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

A sagebrush obligate, Brewer's sparrow is closely associated with shrubland communities dominated by big sagebrush. Sagebrush dominated 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

Destruction 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.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

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

Brewer's Sparrow

Level III

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 purpose of the study was to characterize 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.

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 ESTIMATES

- PIF Global Population Estimate: 16,000,000 (100% population in US and Canada)
- PIF North Dakota Population Estimate: 262 in BCR17 (0.0% of population)
- PIF State Population Objective: Double the statewide population from 250 to 500
- Uncommon Breeding Birds in North Dakota: 4,000 in 1967; 2,000 in 1992; 6,000 in 1993 (estimates provided in # of pairs)

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.
- Reduce soil disturbance from livestock trampling, farm and recreational use, which breaks up the soil and allows for non-native weeds to establish.
- 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).

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Lark Bunting
Level I

Scientific Name: *Calamospiza melanocorys*

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: Present in North Dakota from May to August. Peak breeding season occurs from early June to early August.

Abundance: Abundant to common.

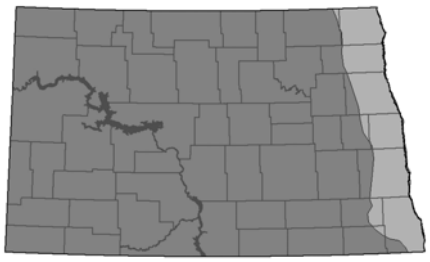
Primary Habitat: Sagebrush communities or mixed-grass prairie interspersed with shrubs, roadsides, and retired cropland.

Federal Status: Federal migratory bird.

Reason for Designation: Although still rather common, this species has declined dramatically. It is PIF Stewardship species.

Breeding Bird Survey Data (1966-2002)
North Dakota BBS population trend -4.3%/yr (p = 0.00).
Survey-wide BBS population trend -1.2%/yr (p = 0.01).
North Dakota BBS relative abundance 59.82 birds/route.

Doug Backlund



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.

Lark Bunting

Level I

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

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

Previous Research or Surveys

- 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.

Additional Research or Surveys Needed

- Nothing identified at this time.

POPULATION ESTIMATES

- PIF Global Population Estimate: 27,000,000 (100% population in US and Canada)
- PIF North Dakota Population Estimate: 828,655 in BCR11; 2,715,541 in BCR17 (3.0% and 9.9% of population respectively)
- PIF State Population Objective: Increase the statewide population from 3,500,000 to 5,300,000
- Changes in Breeding Bird Populations in North Dakota 1967 to 1992-93: 1,368,000 in 1967; 1,541,000 in 1992; 686,000 in 1993 (estimates provided in # of pairs)

MANAGEMENT RECOMMENDATIONS

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

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).

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Grasshopper Sparrow
Level I

Scientific Name: *Ammodramus savannarum*

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

Abundance: Common.

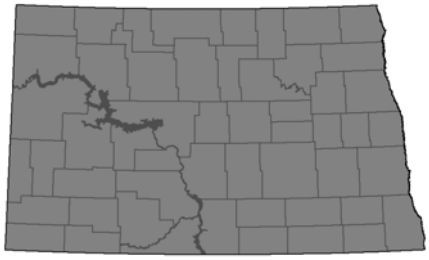
Primary Habitat: Idle or lightly grazed tall or mixed-grass prairie, shrub prairie meadows, and hayfields.

Federal Status: Federal migratory bird.

Reason for Designation: Significantly declining nationwide. It is a USFWS Bird of Conservation Concern in Region 6, BCR 11 and 17, and PIF Stewardship species.

Breeding Bird Survey Data (1966-2002)
North Dakota BBS population trend -4.5%/yr (p = 0.01).
Survey-wide BBS population trend -3.8%/yr (p = 0.00).
North Dakota BBS relative abundance 14.71 birds/route.

Doug Backlund



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. Use 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
Destruction and/or degradation of grasslands. Grasshopper sparrows respond positively to prescribed burns. The first year after a burn, densities are low but become most abundant 2-4 years postfire. 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. Expired CRP contracts resulting in no re-enrollment would negatively affect the population. It has been predicted if all CRP in North Dakota were converted to cropland, the number of grasshopper sparrows would be reduced by about 20%.

Other Natural or Manmade Factors
Rates of brood parasitism by brown-headed cowbirds varies, but has been recorded as over 50% of nests.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- In 2002, a study entitled "A landscape approach to grassland bird conservation in the Prairie Pothole Region of the Northern Great Plains" was undertaken. The principal investigator is Dave Naugle, Wildlife Professor at the University of Montana in Missoula. The goal is to develop breeding bird models/maps which link bird population density to local and landscape habitat features. Maps/models will be used to guide management decisions by predicting landscape capability to attract grassland birds, determining treatments required to meet habitat requirements, and predicting improvement in bird population status. This project is part of a large, multi-state (MN, IA, SD, ND, MT) effort to conserve grassland birds throughout the Prairie Pothole Region of the U.S. Grasshopper sparrow is one of 16 grassland birds targeted in this large, landscape-level approach to conserving grassland birds. Anticipated completion date is spring 2007. North Dakota has committed State Wildlife Grant funding to this project.
- In 2002, a study entitled "Influences of wind generators on grassland breeding birds" was undertaken. The principal investigators are Doug Johnson and Jill Shaffer, NPWRC. The goal of the study is to determine whether wind turbines constructed in mixed-grass prairie affect the density or species composition of breeding grassland birds. The research occurs on the Missouri Coteau at wind farms and nearby reference sites. Grasshopper sparrow is one of the species targeted in the study.

Previous Research or Surveys

- Nothing specific to the species has been identified. 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.

Additional Research or Surveys Needed

- Nothing identified at this time.

POPULATION ESTIMATES

- PIF Global Population Estimate: 15,000,000 (93% population in US and Canada)
- PIF North Dakota Population Estimate: 504,913 in BCR11; 775,170 in BCR17 (3.6% and 5.6% of population respectively)
- PIF State Population Objective: Double the statewide population from 1,300,000 to 2,600,000
- Changes in Breeding Bird Populations in North Dakota 1967 to 1992-93: 661,000 in 1967; 890,000 in 1992; 1,001,000 in 1993 (estimates provided in # of pairs)

MANAGEMENT RECOMMENDATIONS

- Burn, mow, or graze on a rotational schedule (i.e. disturb sections of a grassland, not the entire area at once).
- Burn grassland every 2-4 years.
- Use various grazing systems.
- Encourage no-till/minimum till when possible.

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).

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Baird's Sparrow

Level I

Scientific Name: *Ammodramus bairdii*

General Description: L 5.5", WS 8.75", 0.6 oz. Rather brownish overall except for yellow-ochre 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: Present in North Dakota from May to August. Peak breeding season occurs from early June to late July.

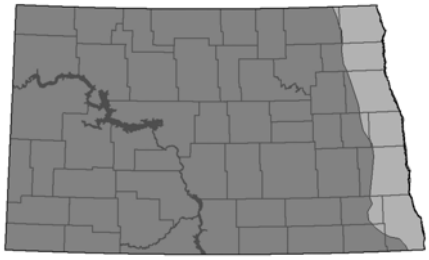
Abundance: Fairly common.

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

Federal Status: Federal migratory bird. A former candidate species, as of February 28, 1996, it is no longer a candidate.

Reason for Designation: The Baird's sparrow may have once been the most abundant bird species in North Dakota. This sparrow has a very restricted breeding range limited to parts of Canada, Montana, South Dakota and the majority of North Dakota. It is a USFWS Bird of Conservation Concern in Region 6, BCR 11 and 17, and a PIF Watch List species.

Chris Grondahl



Breeding Bird Survey Data (1966-2002)
North Dakota BBS population trend -4.2%/yr (p = 0.01).
Survey-wide BBS population trend -3.4%/yr (p = 0.01).
North Dakota BBS relative abundance 4.86 birds/route.

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Baird's sparrows prefer native prairie, but will also utilize idle, tame grasslands, and lightly to moderately grazed pastures. CRP, wet meadows, or dense grass within hayland 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 low-growing shrubs such as snowberry are often avoided. Native plant communities with *Stipa*, *Bouteloua*, *Koeleria*, and *Schizachyrium* 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 Sparrows in North Dakota

High 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 County in north central North Dakota and attracts a high number of this species.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Destruction of native prairie in North Dakota has greatly affected this species. Native prairie conversion to cropland, and existing degraded prairie habitat continue to threaten 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 is somewhat beneficial to Baird's sparrows. It has been predicted if all CRP in North Dakota were converted back to cropland, the number of Baird's sparrows would be reduced by about 3%.

Other Natural or Manmade Factors
Parasitism by brown-headed cowbirds may be increasing. Previous anecdotal observations indicated that Baird's sparrows were rare hosts; however, recent studies indicate otherwise. No information available on the effects of pesticides.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- In 2002, a study entitled "A landscape approach to grassland bird conservation in the Prairie Pothole Region of the Northern Great Plains" was undertaken. The principal investigator is Dave Naugle, Wildlife Professor at the University of Montana in Missoula. The goal is to develop breeding bird models/maps which link bird population density to local and landscape habitat features. Maps/models will be used to guide management decisions by predicting landscape capability to attract grassland birds, determining treatments required to meet habitat requirements, and predicting improvement in bird population status. This project is part of a large, multi-state (MN, IA, SD, ND, MT) effort to conserve grassland birds throughout the Prairie Pothole Region of the U.S. Baird's sparrow is one of 16 grassland birds targeted in this large, landscape-level approach to conserving grassland birds. Anticipated completion date is spring 2007. North Dakota has committed State Wildlife Grant funding to this project.

Previous Research or Surveys

- Baird's sparrow habitat use and effects of management practices have been closely investigated in North Dakota.

Additional Research or Surveys Needed

- Basic demographic information is lacking for Baird's sparrow.

POPULATION ESTIMATES

- PIF Global Population Estimate: 1,200,000 (100% population in US and Canada)
- PIF North Dakota Population Estimate: 199,727 in BCR11; 79,684 in BCR17 (16.7% and 6.7% of population respectively)
- PIF State Population Objective: Double the statewide population from 280,000 to 560,000
- Changes in Breeding Bird Populations in North Dakota 1967 to 1992-93: 376,000 in 1967; 171,000 in 1992; 279,000 in 1993 (estimates provided in # of pairs)

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.
- Prevent overgrazing.
- Use native grasses when replanting 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, but may not account for some issues (e.g. bias).

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Le Conte's Sparrow

Level II

Scientific Name: *Ammodramus leconteii*

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: Present in North Dakota from mid- April to mid-October. Peak breeding season occurs from late May to mid-August.

Abundance: Fairly common.

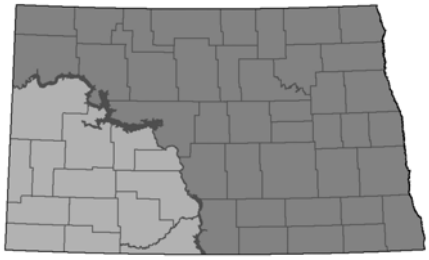
Primary Habitat: Fens, wet meadows, and marshes of sedge grasses.

Federal Status: Federal migratory bird.

Reason for Designation: It is listed as a USFWS Bird of Conservation Concern in Region 6, BCR 11, and 17. A good portion of the species' range includes North Dakota.

Breeding Bird Survey Data (1966-2002)
North Dakota BBS population trend 6.6%/yr (p = 0.00).
Survey-wide BBS population trend 0.3%/yr (p = 0.72).
North Dakota BBS relative abundance 0.83 birds/route.

Doug Backlund



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. Ares 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

Nothing has been identified.

Le Conte's Sparrow

Level II

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- In 2002, a study entitled "A landscape approach to grassland bird conservation in the Prairie Pothole Region of the Northern Great Plains" was undertaken. The principal investigator is Dave Naugle, Wildlife Professor at the University of Montana in Missoula. The goal is to develop breeding bird models/maps which link bird population density to local and landscape habitat features. Maps/models will be used to guide management decisions by predicting landscape capability to attract grassland birds, determining treatments required to meet habitat requirements, and predicting improvement in bird population status. This project is part of a large, multi-state (MN, IA, SD, ND, MT) effort to conserve grassland birds throughout the Prairie Pothole Region of the U.S. Le Conte's sparrow is one of 16 grassland birds targeted in this large, landscape-level approach to conserving grassland birds. Anticipated completion date is spring 2007. North Dakota has committed State Wildlife Grant funding to this project.

Previous Research or Surveys

- 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.
- 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. This was conducted in the Sheyenne National Grasslands and northwestern Minnesota. Nesting success was highly variable among sites and years and increased slightly with distance from trees. One of only 93 banded individuals returned.

Additional Research or Surveys Needed

- Nothing identified at this time.

POPULATION ESTIMATES

- PIF Global Population Estimate: 2,900,000 (100% population in US and Canada)
- PIF North Dakota Population Estimate: 134,509 in BCR11; 8,783 in BCR17 (4.7% and 0.3% of population respectively)
- PIF State Population Objective: Maintain the statewide population of 140,000
- Uncommon Breeding Birds in North Dakota: 12,000 in 1967; 4,000 in 1992; 29,000 in 1993 (estimates provided in # of pairs)

MANAGEMENT RECOMMENDATIONS

- 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.

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.

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Nelson's Sharp-tailed Sparrow

Level I

Scientific Name: *Ammodramus nelsoni*

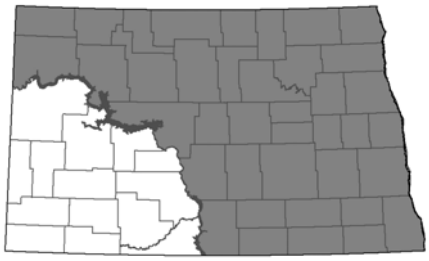
Craig Birhle

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: Present in North Dakota from mid-May to mid-September. Peak breeding season occurs from mid-June to early August.

Abundance: Uncommon.

Primary Habitat: Fens, shallow-marsh and wet meadow zones of wetlands.



Federal Status: Federal migratory bird.

Reason for Designation: This sparrow has a restricted inland breeding range limited to North Dakota, parts of Minnesota, South Dakota, and central Canada. It is designated as a USFWS Bird of Conservation Concern in Region 6 and BCR 11 and is a PIF Watch List species.

Breeding Bird Survey Data (1966-2002)
North Dakota BBS population trend 6.3%/yr (p = 0.04).
Survey-wide BBS population trend 2.4%/yr (p = 0.31).
North Dakota BBS relative abundance 0.34 birds/route.

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Sharp-tailed 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 (*Spartina pectinata*), squirreltail (*Hordeum jubatum*), whitetop (*Scolochloa festucacea*), and phragmites (*Phragmites australis*) 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 Sharp-tailed Sparrow 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

Nothing has been identified.

Nelson's Sharp-tailed Sparrow

Level I

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- There is 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.

Additional Research or Surveys Needed

- Little is known on area requirements and other basic habitat needs.

POPULATION ESTIMATES

- PIF Global Population Estimate: 510,000 (100% population in US and Canada)
- PIF North Dakota Population Estimate: 81,318 in BCR11 (16.0 % of population)
- PIF State Population Objective: Maintain the statewide population of 180,000
- Uncommon Breeding Birds in North Dakota: 7,000 in 1967; 7,000 in 1992; 27,000 in 1993 (estimates provided in # of pairs)

MANAGEMENT RECOMMENDATIONS

- Removal of vegetation by burning or mowing may cause negative effects.
- Increase ground cover in areas where short grasses prevail.

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.

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McCown's Longspur

Level III

Scientific Name: *Calcarius mccownii*

Doug Backlund

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: Present in North Dakota from mid-April to September. Peak breeding season occurs from late May to mid-July.

Abundance: Rare. Only one tract of native prairie is known to be occupied by breeding birds but apparently still found north of Buffalo Springs as well.

Primary Habitat: Arid, shortgrass prairie or heavily grazed mixed-grass prairie.

Federal Status: Federal 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 a USFWS Bird of Conservation Concern in Region 6, BCR 11, and 17, and a PIF Watch List Species.

Breeding Bird Survey Data (1966-2002)
Survey-wide BBS population trend -2.0%/yr (p = 0.38).

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, T130N R106W S 36. It is also referred to as the Rhame Prairie.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Destruction and/or degradation of native shortgrass prairie habitat.

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.

McCown's Longspur

Level III

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.

Additional Research or Surveys Needed

- Determine the breeding status or occurrence of McCown's longspurs in North Dakota. Population estimates probably grossly overestimate the population size.

POPULATION ESTIMATES

- PIF Global Population Estimate: 1,100,000 (100% population in US and Canada)
- PIF North Dakota Population Estimate: 1,161 in BCR17 (0.1% of population)
- PIF State Population Objective: Maintain the statewide population of 1,200
- Uncommon Breeding Birds in North Dakota: 50,000 in 1967; 4,000 in 1992; 2,000 in 1993 (estimates provided in # of pairs)

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).

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Chestnut-collared Longspur

Level I

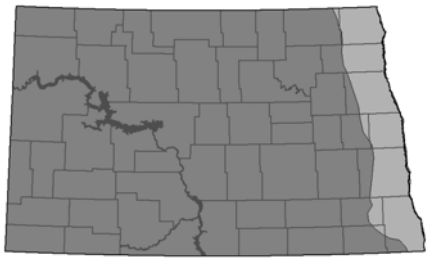
Scientific Name: *Calcarius ornatus*

Craig Birhle

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

Abundance: Abundant to common.



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

Federal Status: Federal migratory bird.

Reason for Designation: The abundance of this species in pre-settlement times was astonishing. Although still rather common in North Dakota, loss of native prairie habitat continues to reduce once great numbers. It is designated as a USFWS Bird of Conservation Concern in Region 6, BCR 11, and 17, and a PIF Stewardship species.

Breeding Bird Survey Data (1966-2002)
North Dakota BBS population trend -1.9%/yr (p = 0.01).
Survey-wide BBS population trend -2.4%/yr (p = 0.00).
North Dakota BBS relative abundance 22.23 birds/route.

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. 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

Destruction and/or degradation of native mixed-grass and shortgrass prairie is the biggest threat to longspurs. Some 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.

Other Natural or Manmade Factors
Parasitism by brown-headed cowbirds occurs but does not appear to have a major effect.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- In 2002, a study entitled "A landscape approach to grassland bird conservation in the Prairie Pothole Region of the Northern Great Plains" was undertaken. The principal investigator is Dave Naugle, Wildlife Professor at the University of Montana in Missoula. The goal is to develop breeding bird models/maps which link bird population density to local and landscape habitat features. Maps/models will be used to guide management decisions by predicting landscape capability to attract grassland birds, determining treatments required to meet habitat requirements, and predicting improvement in bird population status. This project is part of a large, multi-state (MN, IA, SD, ND, MT) effort to conserve grassland birds throughout the Prairie Pothole Region of the U.S. Chestnut-collard longspur is one of 16 grassland birds targeted in this large, landscape-level approach to conserving grassland birds. Anticipated completion date is spring 2007. North Dakota has committed State Wildlife Grant funding to this project.
- In 2002, a study entitled "Influences of wind generators on grassland breeding birds" was undertaken. The principal investigators are Doug Johnson and Jill Shaffer, NPWRC. The goal of the study is to determine whether wind turbines constructed in mixed-grass prairie affect the density or species composition of breeding grassland birds. The research occurs on the Missouri Coteau at wind farms and nearby reference sites. Chestnut-collared longspur is one of the species targeted in the study.

Previous Research or Surveys

- 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.

Additional Research or Surveys Needed

- Nothing identified at this time.

POPULATION ESTIMATES

- PIF Global Population Estimate: 5,600,00 (100% population in US and Canada)
- PIF North Dakota Population Estimate: 1,196,386 in BCR11; 711,565 in BCR17 (21.2% and 12.6% of population respectively)
- PIF State Population Objective: Increase the statewide population from 1,900,000 to 2,900,000
- Changes in Breeding Bird Populations in North Dakota 1967 to 1992-93: 2,544,000 in 1967; 1,351,000 in 1992; 1,707,000 in 1993 (estimates provided in # of pairs)

MANAGEMENT RECOMMENDATIONS

- Provide open, grazed native prairie.
- Avoid managing for idle, dense vegetation.
- Graze mixed-grass prairie moderate to heavy and shortgrass prairie light to moderate.
- Use prescribed fire to remove excessive litter.

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).

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Dickcissel
Level II

Scientific Name: *Spiza americana*


USFWS

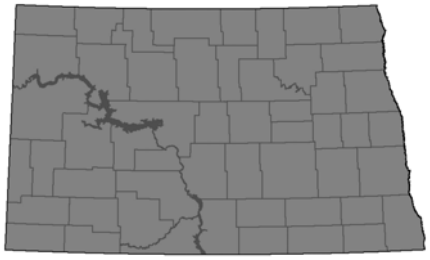
General Description: L 6.25”, WS 9.75”, 0.95 oz. Yellow breast, rufous shoulders, and a distinct black “V” on throat.

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

Abundance: Uncommon.

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

Federal Status: Federal 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 a USFWS Bird of Conservation Concern in Region 6 and BCR 17, and a PIF List species.

Breeding Bird Survey Data (1966-2002)
North Dakota BBS population trend -5.7%/yr (p = 0.02).
Survey-wide BBS population trend -1.3%/yr (p = 0.00).
North Dakota BBS relative abundance 1.48 birds/route.

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.

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 commonly hunted and eaten by people. Farmers in Venezuela deliberately and illegally poison them with toxic agricultural chemicals because dickcissels commonly feed on grain crops. Roosting birds are illegally sprayed with organophosphate and organochlorine pesticides, causing massive mortality.

Dickcissel

Level II

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- In 2002, a study entitled “A landscape approach to grassland bird conservation in the Prairie Pothole Region of the Northern Great Plains” was undertaken. The principal investigator is Dave Naugle, Wildlife Professor at the University of Montana in Missoula. The goal is to develop breeding bird models/maps which link bird population density to local and landscape habitat features. Maps/models will be used to guide management decisions by predicting landscape capability to attract grassland birds, determining treatments required to meet habitat requirements, and predicting improvement in bird population status. This project is part of a large, multi-state (MN, IA, SD, ND, MT) effort to conserve grassland birds throughout the Prairie Pothole Region of the U.S. Dickcissel is one of 16 grassland birds targeted in this large, landscape-level approach to conserving grassland birds. Anticipated completion date is spring 2007. North Dakota has committed State Wildlife Grant funding to this project.

Previous Research or Surveys

- Little effort has been applied to research or surveys specifically for dickcissels in North Dakota. Numerous studies have taken place in other states. 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.

Additional Research or Surveys Needed

- Nothing identified at this time.

POPULATION ESTIMATES

- PIF Global Population Estimate: 22,000,000 (100% population in US and Canada)
- PIF North Dakota Population Estimate: 37,921 in BCR11; 11,038 in BCR17 (0.2% and 0.0% of population respectively)
- PIF State Population Objective: Increase the statewide population from 49,000 to 74,000
- Uncommon Breeding Birds in North Dakota: 139,000 in 1967; 74,000 in 1992; 31,000 in 1993 (estimates provided in # of pairs)

MANAGEMENT RECOMMENDATIONS

- 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. Burn no more than 20-30% of a prairie fragment annually.
- Delay mowing until after peak nesting period but do not mow later than mid-September so vegetation can recover.
- In tallgrass prairie, do not graze warm-season grasses to <25 cm.
- Allow retired agricultural fields to undergo secondary succession, however, when succession advances to the point unsuitable for dickcissels, implement burning or grazing.

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).

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Bobolink
Level II

Scientific Name: *Dolichonyx oryzivorus*

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

Abundance: Fairly common to abundant.

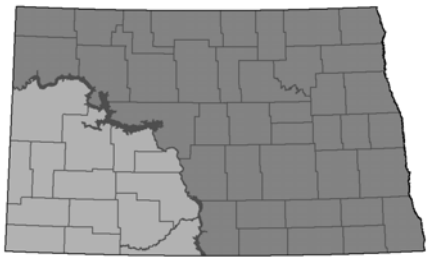
Primary Habitat: Tallgrass prairie, hayland, and retired cropland.

Federal Status: Federal migratory bird.

Reason for Designation: The bobolink is experiencing a significant rangewide decline. It is designated as a USFWS Bird of Conservation Concern in Region 6.

Breeding Bird Survey Data (1966-2002)
North Dakota BBS population trend 2.6%/yr (p = 0.04).
Survey-wide BBS population trend -1.6%/yr (p = 0.00).
North Dakota BBS relative abundance 18.32 birds/route.


USFWS



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 postburn, but decreases after 5 years postburn. Will not use heavily grazed pastures, but high densities have been found in areas under short-duration grazing (1 week grazed and 1 month ungrazed) 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. Most abundant in the Red River Valley and Drift Prairie.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat
Destruction and/or degradation of grasslands. CRP provides important breeding habitat. 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%. Deemed woodland-sensitive, increased woodland cover negatively affects this species. Occurrence declines with increasing tall shrub cover. Open, treeless grasslands are required for maximum probability of occurrence.

Other Natural or Manmade Factors

Nests are occasionally parasitized by brown-headed cowbirds. Bobolinks may be shot on their wintering grounds where it is considered an agricultural pest.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- In 2002, a study entitled "A landscape approach to grassland bird conservation in the Prairie Pothole Region of the Northern Great Plains" was undertaken. The principal investigator is Dave Naugle, Wildlife Professor at the University of Montana in Missoula. The goal is to develop breeding bird models/maps which link bird population density to local and landscape habitat features. Maps/models will be used to guide management decisions by predicting landscape capability to attract grassland birds, determining treatments required to meet habitat requirements, and predicting improvement in bird population status. This project is part of a large, multi-state (MN, IA, SD, ND, MT) effort to conserve grassland birds throughout the Prairie Pothole Region of the U.S. Bobolink is one of 16 grassland birds targeted in this large, landscape-level approach to conserving grassland birds. Anticipated completion date is spring 2007. North Dakota has committed State Wildlife Grant funding to this project.

Previous Research or Surveys

- Little effort has been applied to research or surveys specifically for bobolinks in North Dakota. Numerous studies have taken place in other states. Several studies which include bobolinks and multiple 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.
- From 1998-2001, nesting biology, variability in vegetation effects on density and nesting success, and patch size and landscape effects on the density and nesting success of grassland birds was researched in the Sheyenne National Grasslands and northwestern Minnesota. Bobolink was a primary species examined by Winter et al. 2004, 2005, and *in prep*.

Additional Research or Surveys Needed

- Nothing identified at this time.

POPULATION ESTIMATES

- PIF Global Population Estimate: 11,000,000 (100% population in US and Canada)
- PIF North Dakota Population Estimate: 1,285,150 in BCR11; 169,683 in BCR17 (11.9% and 1.6% of population respectively)
- Changes in Breeding Bird Populations in North Dakota 1967 to 1992-93: 464,000 in 1967; 405,000 in 1992; 371,000 in 1993 (estimates provided in # of pairs)

MANAGEMENT RECOMMENDATIONS

- Avoid disturbance such as haying, mowing, and moderate or heavy grazing of nesting habitat during the peak breeding season.
- Create large patches of habitat and minimize woody edges.
- Burn grassland every 2-4 years to prevent encroachment of woody vegetation and remove deep litter.
- Conduct controlled burns on CRP fields every 3-5 years.
- Provide hayland areas and mow as late as possible. High densities of bobolinks have been found using hayland mowed the previous year.
- Delay mowing until after 15 July.
- Heavy or moderate grazing can be negative, but light grazing may produce a positive response.

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).

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APPENDIX A.2

Amphibian and Reptile
Species of Conservation Priority Accounts

Plains Spadefoot

Level I

Scientific Name: *Spea bombifrons*

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.

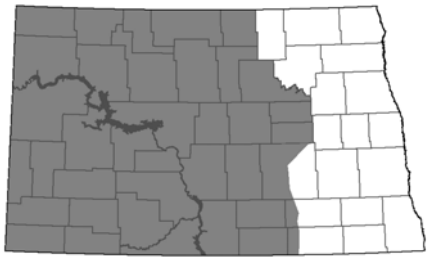
Abundance: Uncommon to locally abundant.

Primary Habitat: Dry grasslands with sandy or loose soil.

Federal Status: None.

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. Spadefoots may also emerge from the ground during very humid nights. Tadpoles may be omnivorous or sometimes even cannibalistic. Adults eat small invertebrates.

Key Areas and Conditions 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

The effect of pesticides, herbicides, road kills and disease is unknown.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- There is currently nothing specific to the species in North Dakota. In 2004, a study through UND began looking at the effect of climate change and land use effects on small mammal communities of southwestern North Dakota. Beginning in 2005, SWG funding will be awarded to expand this

study to recreate the REAP project of 1978. This will involve searching and trapping for a variety of mammals, amphibians, and reptiles, including spadefoot toads.

Previous Research or Surveys

- Wheeler and Wheeler (1966) conducted a statewide survey of all amphibians and reptiles, as well as compiled existing records. The toads were found primarily west of the Missouri River and in small numbers.
- The REAP program (1978) found few records of the spadefoot toad in the southwest.
- Hoberg and Gause (1992) recorded personal observations of spadefoot toads in North Dakota.
- A survey of calling amphibians conducted by Johnson and Batie (1996) found the toads east of the previously known range in Towner and Wells counties.
- A compilation of all records in North Dakota by Jundt (2000) listed around 45 documentations of the spadefoot toad in the state.
- In 2004, researchers from NPWRC concluded that "extending the natural hydroperiods of wetlands in western North Dakota for the combined benefit of livestock and waterfowl has had a negative effect on species such as the plains spadefoot which have adapted to the shallow transitory water sources natural to this arid region of the state."

Additional Research or Surveys 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). Consider creating permanent water where ephemeral wetlands do not exist or in an area that has already been altered.
- 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 stockponds or dugouts.

MONITORING PLANS

There currently is little or monitoring taking 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. Implementation of a monitoring system should occur by 2007.

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Canadian Toad

Level I

Scientific Name: *Bufo hemiophrys*

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.

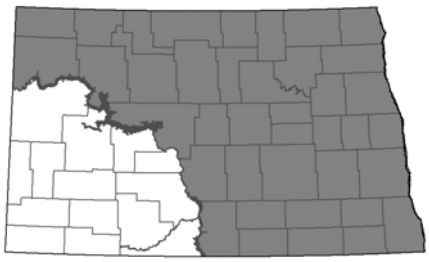
Abundance: Fairly common.

Primary Habitat: Margins of lakes, ponds, and a variety of wetlands.

Federal Status: None.

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. Recent surveys did not detect this toad as much as in the past.

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 and Conditions for Canadian Toad in North Dakota

Permanent water east of the Missouri River. No specific sites are known.

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

The effect of pesticides, herbicides, and disease is unknown.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- There is currently nothing specific to the species in North Dakota. Toads were document in the Sheyenne National Grasslands during a recent research project.

Previous Research or Surveys

- 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.

Canadian Toad

Level I

- 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 or Surveys Needed

- Visual encounter surveys appear to work well with this species and should continue in the future.

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 little or monitoring taking 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. Implementation of a monitoring system should occur by 2007.

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Common Snapping Turtle

Level II

Scientific Name: *Chelydra serpentina*

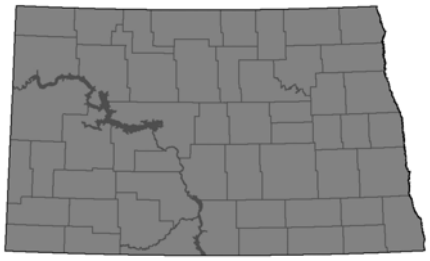
General Description: L 8-30”, 65lbs. Brown to gray turtle with undersides of light tan or gray. Snapping turtles have a large head, hooked jaw, muscular limbs, webbed feet with long claws and a long, robust tail. Carapace often covered with green algae.

Chris Grondahl

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: None.

Reason for Designation: Listed as vulnerable in Montana, Minnesota, Saskatchewan and Manitoba by NatureServe. Although a season limit of two turtles caught by hook and line is allowed with a fishing license, little is known about the current status of this species in North Dakota.

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 and Conditions for Common Snapping Turtle in North Dakota

No specific sites have been identified.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

The loss or lack of aquatic vegetation, stumps, logs, and other debris could affect this species. Road mortality may contribute to the decline.

Other Natural or Manmade Factors

Harvest of snapping turtles for their meat is largely unregulated. Contaminants have been linked to population decline or abnormal development in some areas. Snapping turtles can be defensive on land if aggravated, hissing loudly and striking out. They are sometimes deliberately killed because of this perceived danger.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

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

Previous Research or Surveys

- 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 or Surveys Needed

- Future survey work could include trapping rivers and larger lakes throughout the state to obtain presence information, or to request reports from the public.

MANAGEMENT RECOMMENDATIONS

- 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.

MONITORING PLANS

There currently is little or monitoring 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. Implementation of a monitoring system should occur by 2007.

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False Map Turtle

Level III

Scientific Name: *Graptemys pseudogeographica*

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.

Federal Status: None.

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 and Conditions for False Map Turtle in North Dakota

The extreme lower portion of the Missouri River System is the only stretch of river where the turtles have been verified.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

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 or Surveys

- Starting in 2004, member states of the Wildlife Subcommittee of the Missouri River Natural Resources Committee (MRNRC) will attempt to document the relative abundance of softshell and false map turtles on the Missouri River. Beginning in 2005, portions of the river in North Dakota will be surveyed using turtle traps.

Previous Research or Surveys

- Wheeler and Wheeler (1966) conducted a statewide survey of all amphibians and reptiles, as well as compiled existing records. False map turtle is not listed in this publication.
- Hoberg and Gause (1992) recorded personal observations of false map turtles in North Dakota.

- A compilation of all records in North Dakota by Jundt (2000) listed three documentations of the false map turtle in the state.

Additional Research or Surveys 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.
- 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.

MONITORING PLANS

There currently is little or monitoring 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. Implementation of a monitoring system should occur by 2007.

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Smooth Softshell Turtle

Level III

Scientific Name: *Apalone mutica*

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.

Federal Status: None.

Reason for Designation: Listed as Imperiled in South Dakota and Vulnerable in Minnesota by NatureServe. Few records have been verified in North Dakota, however, there are several reports of fishermen catching "leathery" turtles, possibly around the Williston area. The status of this species is unclear in North Dakota.

Ted Hoberg and Cully Gause

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 and Conditions 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

Availability and quality 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 or Surveys

- In 2004, member states of the Wildlife Subcommittee of the Missouri River Natural Resources Committee (MRNRC) will attempt to document the relative abundance of softshell turtles and false map turtles on the Missouri River. Beginning in 2005, portions of the river in North Dakota will be surveyed using turtle traps.

Smooth Softshell

Level III

Previous Research or Surveys

- Wheeler and Wheeler (1966) conducted a statewide survey of all amphibians and reptiles, as well as compiled existing records. Only one positive record for the state at that time.
- The REAP program (1978) had one observation of the smooth softshell turtle on the north branch of the Little Heart River and indicated it is rare and sparse in the project area.
- A compilation of all records in North Dakota by Jundt (2000) listed three documentations.

Additional Research or Surveys Needed

- Future survey efforts could include additional trapping efforts along the Missouri River and its tributaries.

MANAGEMENT RECOMMENDATIONS

- Avoid clearing or replacing natural vegetation along shoreline, providing at least 50-75 feet.
- 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.

MONITORING PLANS

There currently is little or monitoring taking 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. Implementation of a monitoring system should occur by 2007.

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Northern Sagebrush Lizard

Level III

Scientific Name: *Sceloporus graciosus*

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.

Abundance: Rare.

Primary Habitat: Sagebrush and rocky areas near water.

Federal Status: None.

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.

Ted Hoberg and Cully Gause

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 and Conditions for Northern 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 or Surveys

- There is currently nothing specific to the species in North Dakota. In 2004, a study through UND began looking at the effect of climate change and land use effects on small mammal communities of southwestern North Dakota. Beginning in 2005, SWG funding will be awarded to expand this study to recreate the REAP project of 1978. This will include searching and trapping for a variety of mammals, amphibians, and reptiles. There is a chance sagebrush lizards may be captured during the two-year study.

Northern Sagebrush Lizard

Level III

Previous Research or Surveys

- Wheeler and Wheeler (1966) conducted a statewide survey of all amphibians and reptiles, as well as compiled existing records. Only one record of the lizard was known at the time.
- The REAP program (1978) observed sagebrush lizards at the north unit of Theodore Roosevelt National Park and at a site in Slope County. Although rarely observed and sparse where found, they indicated the lizards are distributed in upland breaks all along the Little Missouri River.
- A compilation of all records in North Dakota by Jundt (2000) listed ten documentations of the sagebrush lizard in the state.

Additional Research or Surveys Needed

- Future efforts could include visual encounter surveys as the most productive for determining presence.

MANAGEMENT RECOMMENDATIONS

- Prevent overgrowth by shrubs and trees in sand habitats to maintain openness. This should include juniper removal and control.
- Restrict off-road vehicle use to pre-selected, less sensitive/lower quality areas.

MONITORING PLANS

There currently is little or monitoring 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. Implementation of a monitoring system should occur by 2007.

REFERENCES

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Short-horned Lizard

Level II

Scientific Name: *Phrynosoma douglassi*

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.

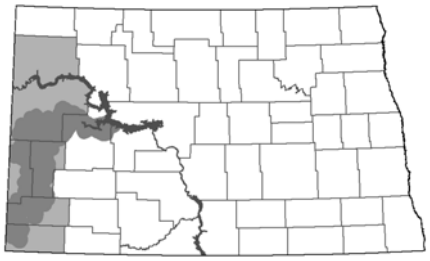
Abundance: Uncommon, locally abundant.

Primary Habitat: Semi-arid, shortgrass prairie in rough terrain.

Federal Status: None.

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 Hagen



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 and Conditions 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 or Surveys

- There is currently nothing specific to the species in North Dakota. In 2004, a study through UND began looking at the effect of climate change and land use effects on small mammal communities of southwestern North Dakota. Beginning in 2005, SWG funding will be awarded to expand this study to recreate the REAP project of 1978. This will include searching and trapping for a variety of mammals, amphibians, and reptiles. Short-horned lizards will likely be captured during the two year study.

Short-horned Lizard

Level III

Previous Research or Surveys

- Wheeler and Wheeler (1966) conducted a statewide survey of all amphibians and reptiles, as well as compiled existing records. The lizards were found west of the Missouri River and in low numbers.
- The REAP program (1978) rarely observed the short-horned lizard, but indicated it is locally abundant in upland breaks along the Little Missouri River.
- Hoberg and Gause (1992) recorded personal observations of short-horned lizards in North Dakota.
- A compilation of all records in North Dakota by Jundt (2000) listed around 20 documentations of the short-horned lizard in the state.

Additional Research or Surveys Needed

- Future efforts could include visual encounter surveys for determining presence.

MANAGEMENT RECOMMENDATIONS

- Prevent overgrowth by shrubs and trees in sand habitats to maintain openness. This should include juniper removal and control.
- Restrict off-road vehicle use to pre-selected, less sensitive/lower quality areas.

MONITORING PLANS

There currently is little or monitoring 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. Implementation of a monitoring system should occur by 2007.

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Wheeler, G. C., and J. Wheeler. 1966. The Amphibians and Reptiles of North Dakota. University of North Dakota Press, Grand Forks. 104 pp.

Northern Prairie Skink

Level III

Scientific Name: *Eumeces septentrionalis*

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.

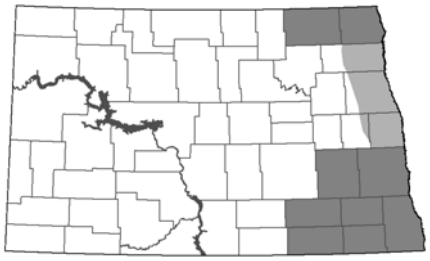
Abundance: Rare.

Primary Habitat: Sand dunes in grasslands.

Federal Status: None.

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 and Conditions 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 or Surveys

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

Previous Research or Surveys

- 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 or Surveys 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

There currently is little or monitoring 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. Implementation of a monitoring system should occur by 2007.

REFERENCES

Conant, R., and J. T. Collins. 1991. A Field Guide to Reptiles and Amphibians: Eastern and Central North America. Third edition. Houghton Mifflin Company, Boston, MA. 450 pp.

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Northern Redbelly Snake

Level II

Scientific Name: *Storeria occipitomaculata*

General Description: L 8-12". The underside of this snake is bright red to orangish/yellow and the back is brown to gray.

Status: Year-round resident.

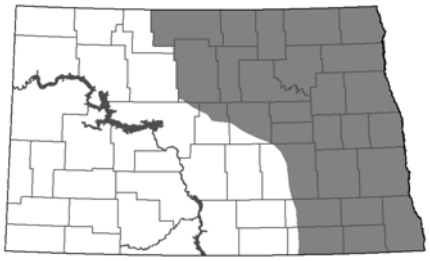
Abundance: Uncommon.

Primary Habitat: Moist woodlands.

Federal Status: None.

Reason for Designation: Listed as Vulnerable in South Dakota and Saskatchewan, Critically Imperiled in Kansas by NatureServe. The redbelly snake appears vulnerable throughout much of its eastern range but secure farther east. The status of the redbelly in North Dakota is unclear.

Ted Hoberg and Cully Gause



LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Redbelly snakes are most often found in or around moist woodlands or the margins of woodlands. Hide under stones, boards, rotten logs, and other forest cover during the day. May also use abandoned ant mounds. Emerge toward evening when they feed primarily on slugs, but also on small earthworms and beetle larvae.

Key Areas and Conditions for Northern Redbelly Snake in North Dakota

The Turtle Mountains and Devils Lake Mountains may be important focus areas for the snakes. Information on the occurrence along riparian focus areas is limited.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Destruction and/or degradation of native riparian and upland forest habitat.

Other Natural or Manmade Factors

None has been identified. It is unknown what effect pesticides, development, and other disturbance has on redbelly snakes.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

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

Previous Research or Surveys

- Wheeler and Wheeler (1966) conducted a statewide survey of all amphibians and reptiles, as well as compiled existing records. Few records of the snake were found.
- Hoberg and Gause (1992) recorded personal observations of redbelly snakes in North Dakota.

- A compilation of all records in North Dakota by Jundt (2000) listed roughly 20 documentations of the redbelly snake in the state.

Additional Research or Surveys Needed

- Future efforts could include visual encounter surveys, and drift fences with pitfall trap, as the most productive for determining presence.

MANAGEMENT RECOMMENDATIONS

- In forests, avoid fragmentation through careful placement of roads, agricultural fields, and other barriers.
- Do not clear cut and limit use of monoculture plantings.
- Protect wetlands within forests.
- Allow the forest understory to remain complex.
- Leave logs, snags, and other woody debris on site, and replace if removed.

MONITORING PLANS

There currently is little or monitoring 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. Implementation of a monitoring system should occur by 2007.

REFERENCES

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Wheeler, G. C., and J. Wheeler. 1966. The Amphibians and Reptiles of North Dakota. University of North Dakota Press, Grand Forks. 104 pp.

Western Hognose Snake

Level I

Scientific Name: *Heterodon nasicus*

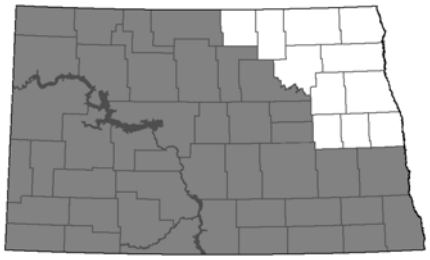
General Description: L 15-39". Tan to yellowish-gray with dark blotches and a black belly with yellow or whitish squares. A unique upturned nose with keel on top sets this snake apart from the prairie rattlesnake.

Chris Grondahl

Status: Year-round resident.

Abundance: Uncommon.

Primary Habitat: Dry grasslands with sandy or gravelly soil.



Federal Status: None.

Reason for Designation: Listed as Vulnerable in Montana, Minnesota and Saskatchewan, and Imperiled in Manitoba by NatureServe.

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 and Conditions for Western Hognose Snake in North Dakota

No specific sites have been identified.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Sandy areas preferred by hognose snakes are fragile habitats and may be easily degraded or destroyed.

Other Natural or Manmade Factors

Hognose snakes may be intentionally killed if mistaken for a rattlesnake. It is unknown how pesticides, development, and other disturbance affect hognose snakes.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- There is currently nothing specific to the species in North Dakota. In 2004, a study through UND began looking at the effect of climate and land use change on small mammal communities of southwestern North Dakota. Beginning in 2005, SWG funding will be awarded to expand this study to recreate the REAP project of 1978. This will include searching and trapping for a variety of mammals, amphibians, and reptiles. Hognose snakes will likely be captured during the two year study.

Western Hognose Snake

Level I

Previous Research or Surveys

- Wheeler and Wheeler (1966) conducted a statewide survey of all amphibians and reptiles, as well as compiled existing records. The snakes were found statewide in low numbers except in the northeast.
- The REAP program (1978) found few records of the hognose snake in the southwest.
- Hoberg and Gause (1992) recorded personal observations of hognose snakes in North Dakota.
- A compilation of all records in North Dakota by Jundt (2000) listed around 35 documentations of the hognose snake.

Additional Research or Surveys Needed

- Future recommended survey methods would include trapping for this species.

MANAGEMENT RECOMMENDATIONS

- Prevent overgrowth by shrubs and trees in sand habitats to maintain openness.
- Restrict off-road vehicle use to pre-selected, less sensitive/lower quality areas.

MONITORING PLANS

There currently is little or monitoring 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. Implementation of a monitoring system should occur by 2007.

REFERENCES

Conant, R., and J. T. Collins. 1991. A Field Guide to Reptiles and Amphibians: Eastern and Central North America. Third edition. Houghton Mifflin Company, Boston, MA. 450 pp.

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Smooth Green Snake

Level I

Scientific Name: *Liochlorophis vernalis*

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.

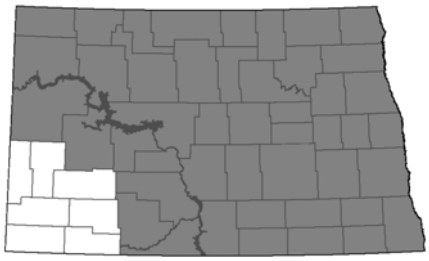
Abundance: Uncommon.

Primary Habitat: Grassland, upland hills.

Federal Status: None.

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.

Ted Hoberg and Cully Gause



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 and Conditions 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 grasslands.

Other Natural or Manmade Factors

It is unknown how pesticides, development, and other disturbances affect smooth green snakes.

RESEARCH AND SURVEY EFFORTS

Current Research or Surveys

- There is currently nothing specific to the species in North Dakota. In 2004, a study through UND began looking at the effect of climate change and land use effects on small mammal communities of southwestern North Dakota. Beginning in 2005, SWG funding will be awarded to expand this study to recreate the REAP project of 1978. This will include searching and trapping for a variety of mammals, amphibians, and reptiles. There is a chance smooth green snakes may be captured during the two year study.

Previous Research or Surveys

- Wheeler and Wheeler (1966) conducted a statewide survey of all amphibians and reptiles, as well as compiled existing records. The snakes were found primarily east river and in low numbers.
- The REAP program (1978) found few records of the smooth green snake in the southwest.

- Hoberg and Gause (1992) recorded personal observations of smooth green snakes in North Dakota.
- A compilation of all records in North Dakota by Jundt (2000) listed around 65 documentations of the smooth green snake in the state.

Additional Research or Surveys 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

There currently is little or monitoring 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. Implementation of a monitoring system should occur by 2007.

REFERENCES

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APPENDIX A.3

Mammal
Species of Conservation Priority Accounts

Arctic Shrew
Level III

Scientific Name: *Sorex arcticus*

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 venter. The top side of the tail is darker then the underside.

Status: Year-round resident.

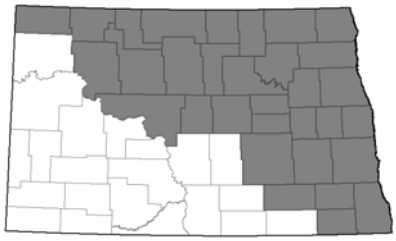
Abundance: Uncommon.

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.


Phil Myers



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. 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 for Artic 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.

Arctic Shrew
Level III

- 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

Direct Loss of Habitat

- Protect native prairie where possible.
- Work with city planners to conserve existing native prairie.

Habitat Fragmentation

- Consider removal of dilapidated shelterbelts or stands of trees within grassland, particularly within 50 meters of grassland patches >100 ha.

Habitat Degradation

- Implement grazing systems to benefit grassland species.
- Work cooperatively with state and federal agencies to develop BMP's that promote use of fire.

Invasive and Noxious Species

- Control noxious weeds through biological and chemical methods.
- Use fire or other tools to prevent woody invasion of grassland.

Pesticides

- Work with state and federal agencies to enforce existing pesticide regulations.

Industrial Development

- Coordinate with wind energy companies to minimize impacts.

Data Gaps

- Survey areas of data gaps. Conduct research/surveys to establish baseline information on SoCP.

MONITORING PLANS

- No monitoring plan has yet been developed for small mammals within the state.

REFERENCES

Baird, D. D., R. M. Timm, and G.E. Nordquist. 1983. *Reproduction in the Arctic Shrew, Sorex arcticus .* Journal of Mammalogy 64:298-301.

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Kirkland, G.L., Jr. and D.F. Schmidt. 1996. *Sorex articus*, Mammalian Species 524:1-5.

Wilson, Don E., Sue Ruff. 1999. *The Smithsonian Book of North American Mammals*. Smithsonian Institution Press. Washington and London. 750pp.

Pygmy Shrew
Level II

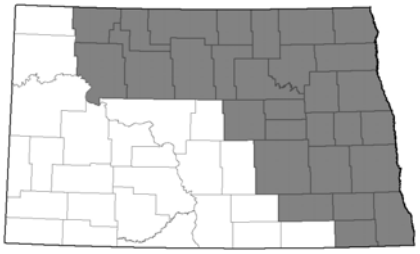
Scientific Name: *Sorex hoyi*


Rob Simpson

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: Common.



Primary Habitat: Although seeming to prefer forested areas, pygmy shrews are adaptable and are found in many habitat types.

Federal Status: None.

Reason for Designation: Little is known about this tiny mammal with in the state. Although it is common in North Dakota, 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 moist areas and riparian woodlands associated with mixed and tall grass prairies.

Key Areas for Pygmy Shrew in North Dakota

Forested areas in the Turtle Mountains and Pembina Gorge. Wetland complexes of Ransom and Benson counties have known populations.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

The conversion of native grasslands, wetlands, and riparian areas for agriculture and development is a major threat facing this species.

Other Natural or Manmade Factors

Use of pesticides on agricultural lands 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).

Additional Research and Survey Efforts Needed

- Develop a monitoring protocol for small mammals in North Dakota.

MANAGEMENT RECOMMENDATIONS

Direct Loss of Habitat

- Protect native prairie where possible.
- Work with city planners to conserve existing native prairie.

Habitat Fragmentation

- Consider removal of dilapidated shelterbelts or stands of trees within grassland, particularly within 50 meters of grassland patches >100 ha.

Habitat Degradation

- Implement grazing systems to benefit grassland species.
- Work cooperatively with state and federal agencies to develop BMP's that promote use of fire.

Invasive and Noxious Species

- Control noxious weeds through biological and chemical methods.
- Use fire or other tools to prevent woody invasion of grassland.

Pesticides

- Work with state and federal agencies to enforce existing pesticide regulations.

Industrial Development

- Coordinate with wind energy companies to minimize impacts.

Data Gaps

- Survey areas of data gaps. Conduct research/surveys to establish baseline information on SoCP.

MONITORING PLANS

- No monitoring protocol has yet been identified for this species.

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Wilson, Don E., Sue Ruff. 1999. *The Smithsonian Book of North American Mammals*. Smithsonian Institution Press. Washington and London. 750pp.

Western Small-footed Myotis

Level III

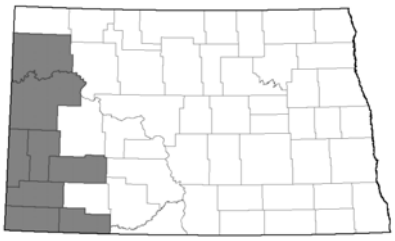
Scientific Name: *Myotis ciliolabrum*

Merlin Tuttle

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: Possibly year-round, may migrate short distances to hibernate.

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.

Federal Status: Currently no federal status was once as Candidate 2 species.

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.

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Western small-footed myotis 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 Myotis in North Dakota

Present only in North Dakota's badlands. No specific keys areas have been identified for this species.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

This and other bats in the state rely on caves and crevices as hibernacula and maternal roosts. These sites are susceptible to human and other types of disturbance. Frequent disturbance may cause abandonment or females to drop young in the rearing process.

Other Natural or Manmade Factors

- Western small-footed myotis and other North Dakota bat species are insectivores. The use of pesticides in the vicinity of a feeding ground would effect myotis populations by killing prey. Also, myotis species are known to store pesticides within fat reserves.

- Loss of water sources is also a potential threat to this species. This region of North Dakota is experiencing drought. 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

- Currently there is no research on bats on-going in the state.

Previous Research and Survey Efforts

- 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

- Survey to determine population status of Western small-footed Myotis in North Dakota.
- Research to assess primary threats to this species.
- Develop monitoring protocol for bats in the state.

MANAGEMENT RECOMMENDATIONS

- Protection and restoration of riparian habitat.
- Manage riparian habitats to maintain snags, connecting corridors, and edges.
- Maintain and improve seeps, ponds, and other wet areas as water sources.
- Education on the benefits and misconceptions about bats.
- Determine and protect nursery and hibernation sites.
- Protect and maintain identified roost sights.
- Provide roosting sites in areas where natural sites have been destroyed or disturbed.
- Reduce use of pesticides near waterways where bats forage.

MONITORING PLANS

- No monitoring protocol has been identified at this time.

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Wilson, Don E., Sue Ruff. 1999. *The Smithsonian Book of North American Mammals*. Smithsonian Institution Press. Washington and London. 750 pp.

Long-eared Myotis

Level III

Scientific Name: *Myotis evotis*

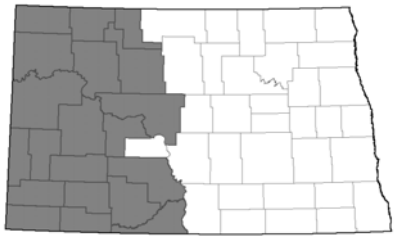
Merlin Tuttle

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 listing; once a Candidate 2 species.

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.

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 Myotis 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 myotis and other bats in North Dakota are insectivores. Pesticides used in the vicinity of feeding grounds would effect 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. Western North Dakota is experiencing drought. 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

- Currently there is no research on bats within the state.

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.

Additional Research and Survey Efforts Needed

- Survey to determine which bat species are declining in North Dakota.
- Research to assess primary threats to this species.
- Develop monitoring protocol for bats in the state.

MANAGEMENT RECOMMENDATIONS

- Protection and restoration of riparian habitat
- Manage riparian habitats to maintain snags, connecting corridors, and edges.
- Maintain and improve seeps, ponds, and other wet areas as water sources.
- Education on the benefits and misconceptions about bats.
- Determine and protect nursery and hibernation sites.
- Protect and maintain identified roost sights.
- Provide roosting sites in areas where natural sites have been destroyed or disturbed.
- Reduce use of pesticides near waterways where bats forage.

MONITORING PLANS

- No monitoring protocol has been identified at this time.

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Wilson, Don E., Sue Ruff. 1999. *The Smithsonian Book of North American Mammals*. Smithsonian Institution Press. Washington and London. 750 pp.

Long-legged Myotis

Level III

Scientific Name: *Myotis volans*

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: Possibly year-round resident. May migrate short distances to find winter hibernacula.

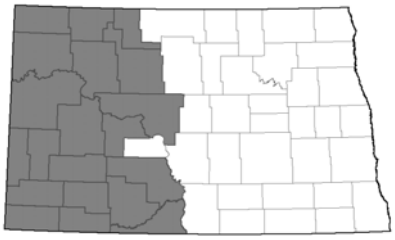
Abundance: Rare.

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.

Federal Status: No current status. Once a candidate 2 species.

Reason for Designation: Little is known about this species in North Dakota. Although rare to the state, there are indications it is declining range wide.

Merlin Tuttle



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 Myotis in North Dakota

The ponderosa pine area of the badlands has been identified as a key area for the long-legged myotis.

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 myotis and other bats in North Dakota are insectivores. Pesticides used in the vicinity of feeding grounds would effect 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. Western North Dakota is experiencing drought. 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.

Long-legged Myotis

Level III

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- Currently there is no research in progress on bats in the state.

Previous Research and Survey Efforts

- Northern Prairie Wildlife Research Center is in the process of identifying 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

- Survey to determine which species are declining in North Dakota.
- Research to assess primary threats within the state.
- Develop monitoring protocol for bats in the state.

MANAGEMENT RECOMMENDATIONS

- Protection and restoration of riparian habitat
- Manage riparian habitats to maintain snags, connecting corridors and edges.
- Maintain and improve seeps, ponds, and other wet areas as water sources.
- Education on the benefits and misconceptions about bats.
- Determine and protect nursery and hibernation sites.
- Protect and maintain identified roost sights.
- Provide roosting sites in areas where natural sites have been destroyed or disturbed.
- Reduce use of pesticides near waterways where bats forage.

MONITORING PLANS

- No monitoring protocol has been identified at this time.

REFERENCES

Anonymous, 1998. *Rare North Dakota animals: North Dakota Natural Heritage Inventory.* USDA Forest Service. 30 pp.

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Wilson, Don E., Sue Ruff. 1999. *The Smithsonian Book of North American Mammals*. Smithsonian Institution Press. Washington and London. 750 pp.

Hispid Pocket Mouse

Level III

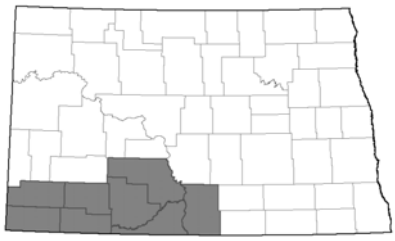
Scientific Name: *Chaetodipus hispidus*

Bob Gress

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: year-round 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.

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.

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

- No research is presently in progress on this species.
- Northern Prairie Wildlife Research Center has of developed an annotated bibliography for mammals in North Dakota.

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.

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

Direct Loss of Habitat

- Protect native prairie where possible.
- Work with city planners to conserve existing native prairie.

Habitat Fragmentation

- Consider removal of dilapidated shelterbelts or stands of trees within grassland, particularly within 50 meters of grassland patches >100 ha.

Habitat Degradation

- Implement grazing systems to benefit grassland species.
- Work cooperatively with state and federal agencies to develop BMP's that promote use of fire.

Invasive and Noxious Species

- Control noxious weeds through biological and chemical methods.
- Use fire or other tools to prevent woody invasion of grassland.

Pesticides

- Work with state and federal agencies to enforce existing pesticide regulations.

Industrial Development

- Coordinate with wind energy companies to minimize impacts.

Data Gaps

- Survey areas of data gaps. Conduct research/surveys to establish baseline information on SoCP.

MONITORING PLANS

- No monitoring plan has yet been developed.

REFERENCES

Anonymous, 1998. *Rare North Dakota animals: North Dakota Natural Heritage Inventory.* USDA Forest Service. 30 pp.

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Plains Pocket Mouse

Level III

Scientific Name: *Perognathus flavenscens*

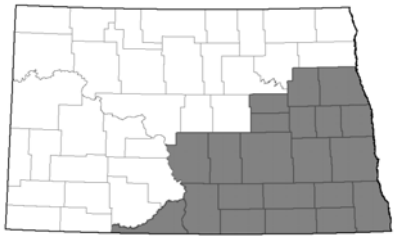
Vladimir Dinets

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 southeastern 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 Mice 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

- The University of North Dakota is conducting diversity and abundance work of terrestrial vertebrates in tall grass prairies.

Previous Research and Survey Efforts

- Small mammal inventories have been conducted on Sand Lake NWR, Sheyenne National Grasslands, and Tewaukon 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

Direct Loss of Habitat

- Protect native prairie where possible.
- Work with city planners to conserve existing native prairie.

Habitat Fragmentation

- Consider removal of dilapidated shelterbelts or stands of trees within grassland, particularly within 50 meters of grassland patches >100 ha.

Habitat Degradation

- Implement grazing systems to benefit grassland species.
- Work cooperatively with state and federal agencies to develop BMP's that promote use of fire.

Invasive and Noxious Species

- Control noxious weeds through biological and chemical methods.
- Use fire or other tools to prevent woody invasion of grassland.

Pesticides

- Work with state and federal agencies to enforce existing pesticide regulations.

Industrial Development

- Coordinate with wind energy companies to minimize impacts.

Data Gaps

- Survey areas of data gaps. Conduct research/surveys to establish baseline information on SoCP.

Conservation Awareness

- Education. Create informational brochures, use tools such as television, radio, newspapers, magazines, and public forums, to educate the public on the need for conservation of fish and wildlife resources and habitat.

MONITORING PLANS

- No monitoring protocol has yet been developed for this species

REFERENCES

Anonymous, 1998. *Rare North Dakota animals: North Dakota Natural Heritage Inventory.* USDA Forest Service. 30 pp.

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Sagebrush Vole

Level III

Scientific Name: *Lemmiscus curtatus*

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.

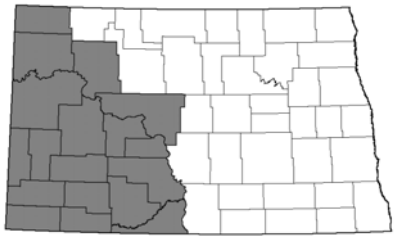
Abundance: Rare.

Primary Habitat: Semi-arid areas with loose soil; usually a combination of grass and sagebrush.

Federal Status: None.

Reason for Designation: Sagebrush habitat this species inhabits is threatened by conversion and many other land use practices.

Vladimir Dinets



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 Voles in North Dakota

Sagebrush voles are found in southwestern North Dakota. Specific areas of focus have yet to be identified. Mapping of sagebrush habitat is in progress. This will narrow the focus areas 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 problems have yet been identified for this species.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- There is currently no research specifically targeting the sagebrush vole.
- Northern Prairie Wildlife Research Center has developed an annotated bibliography for mammals of North Dakota.
- Rick Sweitzer of the University of North Dakota is currently revisiting the REAP sites in the Little Missouri National Grasslands.

Previous Research and Survey Efforts

- No previous research or surveys have been identified for this species.

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 this species.

MANAGEMENT RECOMMENDATIONS

Direct Loss of Habitat

- Work with county zoning planning officials to designate areas in need of protective covenants.
- Work with partners to implement easements or land acquisition.

Habitat Fragmentation

- Become directly involved with the USFS trail development planning process.
- Communicate with the oil industry to minimize road impacts.

Habitat Degradation

- 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.

Industrial Development

- 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.
- Coordinate with CBM companies to minimize efforts.

Other Impacts

- Work to minimize additional trail development on public lands.

Data Gaps

- Survey areas of data gaps. Conduct research/surveys to establish baseline information on SoCP.

MONITORING PLANS

- No monitoring plan for this species has been developed.

REFERENCES

Anonymous, 1998. *Rare North Dakota animals: North Dakota Natural Heritage Inventory.* USDA Forest Service. 30 pp.

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Black-tailed Prairie Dog

Level I

Scientific Name: *Cynomys ludovicianus*

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.

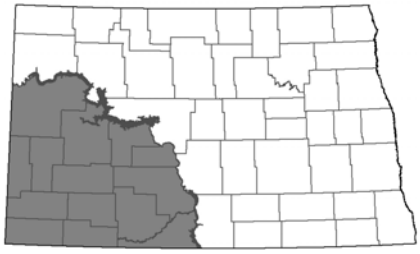
Abundance: Locally common.

Primary Habitat: Short and mixed grasslands, usually well grazed lands.

Federal Status: Warrants listing but precluded (Feb. 4, 2000). Removed from the candidate list in 2004.

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 the ferruginous hawk.

Sandra Hagen



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 Dogs 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 acreage at 20,000.

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 is the most common. Although poisoning of prairie dogs is illegal on public lands, a recent study indicates that it does occur.

RESEARCH AND SURVEY EFFORTS

Current Research

- Black-tailed prairie dog colonies are surveyed every three years by the North Dakota Game and Fish Department to estimated population status.

- The U. S. Forest Service Dakota Prairie Grasslands office also conducts surveys on Forest Service land in its region.

Previous Research

- 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 black-tailed prairie dog acreages in North Dakota.
- A black-tailed prairie dog population viability assessment was preformed 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 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.

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

- A monitoring effort with a 3 year interval will be used. This will estimate acreages for known colonies, but will also actively search for new colonies. A monitoring effort such as this should be able to document loss of previously utilized acres due to conversion and population loss due to poisoning.
- Monitor populations for growth or loss.
- Work to link subpopulations with each distinct complex.
- Maintain isolated colonies (those > 5 miles from nearest colony).

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Richardson's Ground Squirrel

Level II

Scientific Name: *Spermophilus richardsonii*

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.

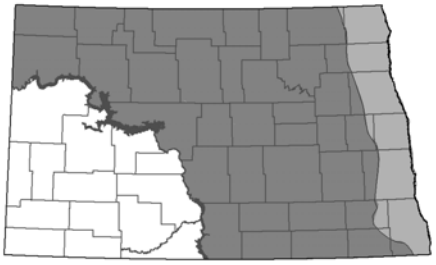
Abundance: Common.

Primary Habitat: Prefers native mixed-grass prairie. Commonly found in areas that are heavily grazed.

Federal Status: None.

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.

Craig Bihrle



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 Squirrels 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 effect 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

- The first year of a distribution study has been completed by the Northern Prairie Wildlife Research Center.

Richardson's Ground Squirrel

Level II

Previous Research and Survey Efforts

- The U.S. Forest Service mapped Richardson's ground squirrel colonies on the Sheyenne National Grasslands in 2002.
- A reproduction study was conducted by the University of North Dakota in 1975.

Additional Research and Survey Efforts Needed

- No additional surveys needs have been identified.
- Develop monitoring protocol for this species.
- Colonies will be mapped by the USFS on the Sheyenne Grasslands in 2005-06.

MANAGEMENT RECOMMENDATIONS

Direct Loss of Habitat

- Protect native prairie where possible.
- Work with city planners to conserve existing native prairie.

Habitat Fragmentation

- Consider removal of dilapidated shelterbelts or stands of trees within grassland, particularly within 50 meters of grassland patches >100 ha.

Habitat Degradation

- Implement grazing systems to benefit grassland species.
- Work cooperatively with state and federal agencies to develop BMP's that promote use of fire.

Invasive and Noxious Species

- Control noxious weeds through biological and chemical methods.
- Use fire or other tools to prevent woody invasion of grassland.

Pesticides

- Work with state and federal agencies to enforce existing pesticide regulations.

Industrial Development

- Coordinate with wind energy companies to minimize impacts.

Data Gaps

- Survey areas of data gaps. Conduct research/surveys to establish baseline information on SoCP.

MONITORING PLANS

- Use monitoring protocol developed by ongoing SWG distribution study.

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Gray Wolf
Level III

Scientific Name: *Canis lupis*


USFWS

General Description: The gray wolf, also called the Eastern timber wolf, is the largest undomesticated member of the canid family, with males weighing 57 - 102 lbs and females, 46 - 75 lbs. Fur coloration generally is gray, with a lighter underside, but can vary from pure white to jet black.

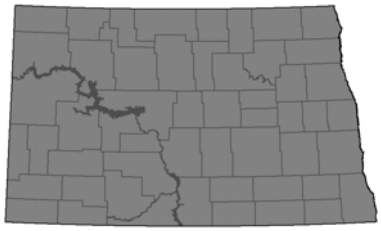
Status: Occasional sighting.

Abundance: Rare.

Primary Habitat: Wolves occupy a wide range of habitats where large ungulates, including elk, white-tailed deer, mule deer or moose are found. In Midwestern states, habitats currently used by wolves range from mixed hardwood-coniferous forests in wilderness and sparsely settled areas, to forest and prairie landscapes dominated by agricultural and pasture lands. Home range sizes of wolves vary, depending on prey density and pack size. In Minnesota, winter home ranges of wolves averaged 30-59 square miles.

Federal Status: Endangered.

Reason for Designation: Wolves historically occurred throughout the Midwest, including all of North Dakota. Once viewed as a menace, the species was eradicated from the plains in the early 1900s. By the 1950s, wolves were only found in the most remote habitats in northern Minnesota and Michigan, and on Isle Royale. Since receiving protection in 1974 under the Endangered Species Act, wolves have expanded their range in these states and farther, into Wisconsin. Additionally, individual animals of both sexes have been documented in North and South Dakota, although there are no known breeding populations in these states.



Historic Range

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Initial research on wolves suggested the animals required large tracts of remote wilderness habitat with low road densities to survive. However, as the federally protected animals expanded their range, new data indicate wolves are more adaptable than originally believed. Where major prey species are present, wolves now can be found in open habitats and in areas with relatively high road densities.

Key Areas for Gray Wolves in North Dakota

No known breeding populations of wolves exist in North Dakota. However, breeding populations occur in the adjacent states of Minnesota and Montana, and in the Canadian Province of Manitoba. The nearest wolf packs to North Dakota are found in northwestern Minnesota, approximately 17 mi from the northeastern border of North Dakota. Other wolf packs occur 40 to 100 miles north of the state, in southern Manitoba. In recent years, wolf sightings in North Dakota have increased. Most of these wolves are believed to be young males seeking a mate and suitable habitat to establish a territory. Skull morphology and genetic studies conducted on nine wolves killed in the Dakotas indicate that eight likely dispersed from Minnesota and the ninth probably came from Manitoba. Because wolves are capable of

traveling long distances (ranging 1 to 45 miles per day), habitat throughout North Dakota is likely important for dispersing and colonizing individuals. Dispersing wolves are important for maintaining gene flow among populations and establishing new packs.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

According to Licht and Fritts (1994), wolves could recolonize portions of their former range on the prairie in the Dakotas. However, the agricultural dominated landscape (cropland, hayland and pasture) and relatively high densities of roads would facilitate negative encounters between wolves and humans, which could preclude their re-establishment.

Other natural or manmade factors

The greatest hindrance to recolonization of wolves in North Dakota is their vulnerability to killing by humans. For example, the major documented threat to wolves in the Dakotas was killing by humans due to allegedly mistaken identity as coyotes. Licht and Fritts (1990) noted that relatively high road densities in eastern North Dakota would increase the likelihood of wolf-vehicle collisions. Furthermore, human tolerance for wolves likely would be low because livestock production is a major industry in North Dakota.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- Currently, no research is being conducted on the gray wolf in North Dakota.
- Sightings of wolves in the state are investigated, but no formal surveys are being conducted.

Previous Research and Survey Efforts

- The U.S. Fish and Wildlife Service conducted status reports for wolves in the United States.
- The U.S. Fish and Wildlife Service developed a recovery plan for the three distinct wolf populations in 1990.
- Licht and Fritts (1994) documented the occurrence of wolves in North and South Dakota and explored the potential for recolonization of the region.

Additional Research and Survey Efforts Needed

- No new research has been identified at this time.

MANAGEMENT RECOMMENDATIONS

- North Dakota is recognized by the U.S. Fish and Wildlife Service as lacking sufficient potential for restoration of the gray wolf. Neither the Fish and Wildlife Service's Eastern Recovery Plan nor the Northern Rockies Plan includes North Dakota on the list of possible locations for restoration of gray wolf populations. The Service has determined that lethal control of wolves depredating domesticated animals in North Dakota will not adversely affect the Eastern gray wolf recovery program. As a result, procedures have been established to allow for the control of wolves where livestock depredation has been documented.

MONITORING PLANS

The population will be monitored using an incidental reporting system, and through cooperation with the U.S. Fish and Wildlife Service and U.S. Department of Agriculture Wildlife Services Program.

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Gray Wolf
Level III

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Swift Fox
Level II

Scientific Name: *Vulpes velox*

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 extirpated.

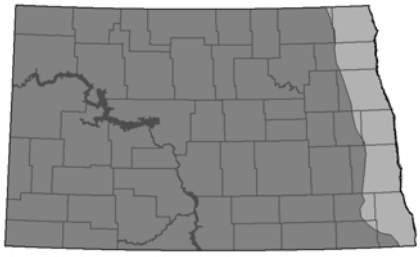
Abundance: Rare.

Primary Habitat: Large tracts of short and mixed-grass prairie.

Federal Status: No federal status.

Reason for Designation: Once common statewide, the swift fox now is presumed extirpated. A combination of loss of native prairie and poisoning efforts aimed at wolves and coyotes are thought to be the cause of the population decline.

USFWS



Historic Range

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

Swift fox were extirpated from much of their historic range due to indiscriminant poisoning in the early 1900s. Recently, loss of suitable native short and mixed-grass prairie due to conversion to agricultural and development threaten populations.

Other Natural or Manmade Factors

This species is vulnerable to over-trapping and poisoning. 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.

Swift Fox
Level II

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- The North Dakota Game and Fish Department currently conducts population surveys for swift fox every three years in southwestern North Dakota.
-

Previous Research and Survey Efforts

- A diet study was preformed 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.
- Feasibility of reintroduction of swift fox into North Dakota.

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

- The North Dakota Game and Fish Department currently surveys parts of southwestern North Dakota to determine presence/absence of swift fox. Expansion of this effort is being developed to include more of the western edge of North Dakota.

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River Otter

Level II

Scientific Name: *Lontra canadensis*

USFWS

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: Rare.

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.

Historic Range

Federal Status: No federal status.

Reason for Designation: Historically, river otters occurred in aquatic habitats throughout North Dakota. A combination of unregulated trapping, loss of wetlands and riparian habitat and susceptibility to pollutants resulted in the near-extirpation of otters from the state. In recent years, the number of otter sightings has increased, according to the NDGFD. However, it is not known if otters have re-colonized their former range or if a viable population exists in North Dakota.

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 Missouri and Red Rivers could be important waterways for expansion of river otters in North Dakota from populations in adjacent states. Since 1964, otter sightings (including visual observations, incidental trappings and road-killed animals) have increased, and most sightings have occurred along the Red River, tributaries draining into the Red River, and in Lake Sakakawea on the Missouri River System. Historically, otters were known to occur in the Missouri, Little Missouri, Yellowstone, Red, Park, Pembina, Salt, Turtle, Sheyenne and Heart rivers, and in Devils Lake.

River Otter

Level II

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. In 2004, five of six reported otters were human-caused mortalities.

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

- Sightings are recorded by NDGFD staff. Necropsies are performed on incidental catches or vehicle-hit otters.

Additional Research and Survey Efforts Needed

- A survey to assess the current population of river otters in North Dakota is needed.

MANAGEMENT RECOMMENDATIONS

Direct Loss of Habitat

- 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.
- Work with partners to implement easements (i.e. EWP, WRP, and ACOE Sluffing or Flood Control Easements).
- Develop and promote incentive programs to restore riparian areas
- Work with partners to implement easements (i.e. EWP and WRP).
- Work with partners to implement easements
- Work with county zoning planning officials to designate areas in need of protective covenants

Habitat Degradation

- 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. RRBRP
- Promote non-traditional bank stabilization measures (i.e. root wads, willow waddles, vegetative slope)

Other Problems
- 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.

Data Gaps
- Survey areas of data gaps. Conduct research/surveys to establish baseline information on SoCP.

Conservation Awareness
- 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 currently exists for river otters in North Dakota.
- The NDGFD incidental reporting system could be used in conjunction with a standardized survey or monitoring system.

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Black-footed Ferret
Level I

Scientific Name: *Mustela nigripes*

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: Extirpated.

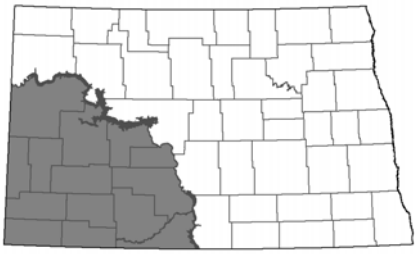
Abundance: Rare.

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



Historic Range

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 Ferrets in North Dakota
Currently there are no black-tailed prairie dog complexes in North Dakota that fit the acreage requirements for a viable ferret population. The Little Missouri National Grasslands and also 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
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
- Currently no black-footed ferret research is being conducted within the state.

Previous Research and Survey Efforts
- A biological survey of the state's fauna was preformed by Bailey.

- A status report of the black-footed ferret and the black-tailed prairie dog was conducted by Grondahl.

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://ecos.fws.gov/docs/recovery_plans/1988/880808.pdf Currently there are no areas of North Dakota that are suitable for black-footed ferret reintroduction. Black-tailed prairie dog towns will continue to be surveyed for ferrets.

MONITORING PLANS

- Prairie dog towns will be monitored for black-footed ferrets during black-tailed prairie dog survey efforts.

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Eastern Spotted Skunk

Level III

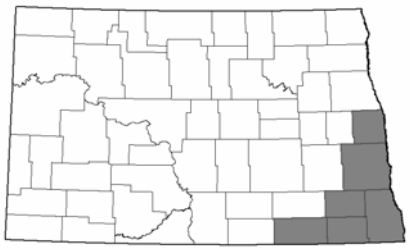
Scientific Name: *Spilogale putorius*

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.

Bob Gress

Status: Year-round resident.

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: None.

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.

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 Skunks in North Dakota

No specific focus areas have been identified. Its distribution is unclear for North Dakota, but most likely found in southeastern counties.

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 know threats to this species.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- There is currently no research being conducted on this species within the state.

Previous Research and Survey Efforts

- No survey efforts targeting the Eastern spotted skunk have been identified.

Additional Research and Survey Efforts Needed

- 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.

MANAGEMENT RECOMMENDATIONS

Direct Loss of Habitat

- 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.
- Work with partners to implement easements (i.e. EWP, WRP, and ACOE Sluffing or Flood Control Easements).
- Develop and promote incentive programs to restore riparian areas
- Work with partners to implement easements (i.e. EWP and WRP).
- Work with county zoning planning officials to designate areas in need of protective covenants

Habitat Degradation

- 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.
- Control noxious weeds through biological and chemical methods.

Data Gaps

- Survey areas of data gaps. Conduct research/surveys to establish baseline information on SoCP.

Conservation Awareness

- 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 developed for this species.

REFERENCES

Adams, A. W. 1961. Furbearers of North Dakota. North Dakota Game and Fish Department. 102 pp.

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APPENDIX A.4

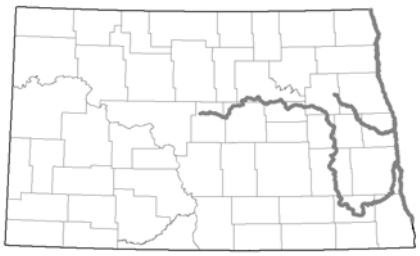
Fish
Species of Conservation Priority Accounts

Chestnut Lamprey
Level III

Scientific Name: *Ichthyomyzon castaneus*


Konrad Schmidt

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.

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 headwater stream habitat caused by poor agriculture and grazing 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 a number of poor land use practices in the Red River basin may contributed to the decline of this species.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts
- Currently there are no on going studies or surveys specifically targeting chestnut lamprey.

Previous Research and Survey Efforts
- Red River streams were surveyed during the 1960s by the University of North Dakota (UND).
- Surveys of several tributaries to the Red River in Minnesota were conducted by the BMNH from 1974-1976.

- In the late 1970s, Red River tributaries 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).

Additional Research and Survey Efforts Needed

- Conduct a review of historic literature and data collection efforts for all fish species of conservation priority.
- Re-examine sites where this species has been recorded.
- Develop a protocol to monitor 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.
- Work with partners to implement easements (i.e. EWP, WRP, and ACOE Sluffing or Flood Control Easements).
- Develop and promote incentive programs to restore riparian areas
- Work with partners to implement easements (i.e. EWP and WRP).
- Work with partners to implement easements
- Work with county zoning planning officials to designate areas in need of protective covenants
- 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. 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 SoCP.
- 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.
- Ongoing surveys, along with the North Dakota Game and Fish Department's incidental reporting system could be used to monitor this species.

- The North Dakota Department of Health will begin conducting Index of Biotic Integrity (IBI) surveys in the summer of 2005 for all of North Dakota's watersheds. This will document all species encountered.

REFERENCES

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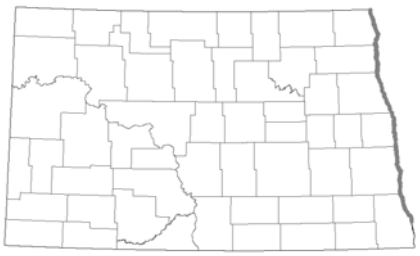
Silver Lamprey
Level III

Scientific Name: *Icthyomyzon unicuspis*


Konrad Schmidt

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 Unknown.

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.

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. 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 caused by poor agriculture and grazing 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 poor 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
- There are currently no studies or surveys specifically targeting the silver lamprey.

Previous Research and Survey Efforts
- Red River tributaries were surveyed during the 1960s by the University of North Dakota (UND).

- Surveys of several tributaries to the Red River in Minnesota were conducted by the Bell Museum of Natural History from 1974-1976.
- In the late 1970s, Red River tributary surveys were conducted by the Minnesota Department of Natural Resources, Ecological Services Section (MDNR ECO). A similar study was conducted on the Red River during 1983 and 1984.
- In 1985, the North Dakota Natural Heritage Inventory and the NDGF sampled fishes from 15 sites in the Pembina River watershed.
- 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 and the development of an index of biotic integrity for fishes in the basin.

Additional Research and Survey Efforts Needed

- Conduct a review of historic literature and data collection efforts for all species of conservation priority.
- Re-examine sites where this species has been recorded.
- Develop a protocol to monitor 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.
- Work with partners to implement easements (i.e. EWP, WRP, and ACOE Sluffing or Flood Control Easements).
- Develop and promote incentive programs to restore riparian areas
- Work with partners to implement easements (i.e. EWP and WRP).
- Work with partners to implement easements.
- Work with county zoning planning officials to designate areas in need of protective covenants
- 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. 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 SoCP.
- Continue to work with partners in promoting and distributing educational materials related to river, stream and riparian values and good stewardship.

Silver Lamprey

Level III

MONITORING PLANS

- No monitoring plan has been identified for this species.
- Ongoing surveys, along with the North Dakota Game and Fish Department's incidental reporting system could be used to monitor this species.
- The North Dakota Department of Health will begin conducting Index of Biotic Integrity (IBI) surveys in the summer of 2005 for all North Dakota watersheds. This will document all species encountered.

REFERENCES

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.

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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

Level II

Scientific Name: *Scaphirhynchus albus*

USFWS

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 then 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 separated populations.

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 vary seasonally, with most fish being found shallow in the spring and deeper in the fall.

Key Areas for Pallid Sturgeon in North Dakota

Pallid sturgeon 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 by the USFWS.

Additional Research and Survey Efforts Needed

- Protect and restore pallid sturgeon populations, individuals and their habitats.
- Conduct research necessary for the survival and recovery of pallid sturgeon.
- Specific actions and studies are documented in the pallid sturgeon recovery plan.

MANAGEMENT RECOMMENDATIONS

- Species specific recommendations are outlined in the USFWS Recovery Plan. http://ecos.fws.gov/docs/recovery_plans/1993/931107.pdf
- 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.
- Work with partners to implement easements (i.e. EWP, WRP, and ACOE Sluffing or Flood Control Easements).
- Develop and promote incentive programs to restore riparian areas.
- Work with partners to implement easements (i.e. EWP and WRP).
- Work with partners to implement easements.
- Work with county zoning planning officials to designate areas in need of protective covenants.
- 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. 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 SoCP.
- Continue to work with partners in promoting and distributing educational materials related to river, stream and riparian values and good stewardship.

Pallid Sturgeon

Level II

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.

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U.S. Fish and Wildlife Service. 1993. Pallid Sturgeon Recovery Plan. U.S. Fish and Wildlife Service, Bismarck, North Dakota. 55 pp.

Paddlefish

Level II

Scientific Name: *Polyodon spathula*

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: No federal status.

Reason for Designation: Loss of river habitat due to channelization and impoundment has caused declines in this species within the state and range wide.

Craig Bihrle

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.

Paddlefish

Level II

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.
- A telemetry study documenting season movements has been conducted by the University of Idaho and is being continued through the USFWS and USGS.
- Young-of-the-year surveys are conducted annually on the upper end of Lake Sakakawea.

Previous Research and Survey Efforts

- 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.
- Work with partners to implement easements (i.e. EWP, WRP, and ACOE Sluffing or Flood Control Easements).
- Develop and promote incentive programs to restore riparian areas.
- Work with partners to implement easements (i.e. EWP and WRP).
- Work with partners to implement easements.
- Work with county zoning planning officials to designate areas in need of protective covenants
- 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. 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 SoCP.
- Continue to work with partners in promoting and distributing educational materials related to river, stream and riparian values and good stewardship.

Paddlefish

Level II

MONITORING PLANS

- The NDGFD will continue to use data from current survey efforts to monitor populations.

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Fredericks, J. P., and D. L. Scarnecchia. 1997. Use of Surface Visual Counts for Estimating Relative Abundance of age-0 Paddlefish in Lake Sakakawea. North American Journal of Fisheries Management 17:1014-1018.

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Robinson, J. W. 1967. Observations on the life history, movement and harvest of the paddlefish, POLYODON SPATHULA, in Montana. Proc. Montana Acad. Sci. 26: 33-44.

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Sparrowe, R. D. 1986. Threats to paddlefish habitat. Pages 36-45 in J. G. Dillard, L. K. Graham, and T. R. Russell, editors. The Paddlefish: Status, Management and Propagation, North Central Division, American Fisheries Society, Special Publication Number 7.

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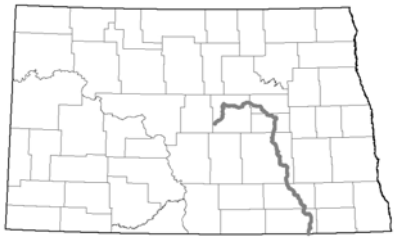
Central Stoneroller

Level III

Scientific Name: *Campostoma anomalum*

General Description: Member of the minnow family, grows to a length of 8 inches. Body arched behind nape. Complete lateral line. Breeding males have small bumps along top of head and back called tubercules. Black bands present on orange dorsal and anal fins.

Status: Possibly extirpated.



Abundance: Very rare, if present.

Primary Habitat: Found in pools, and riffles of small, clear streams with gravel or rubble bottoms.

Federal Status: No federal status.

Reason for Designation: Little is known of this species. It was historically very rare in the state and it is unclear whether it is still present in the state's waters.

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 Central Stoneroller in North Dakota

The central stoneroller has only been documented in the James River, but not in the last 100 years. No other state waters are known to hold the central stoneroller.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Degradation of quality habitat is recognized as the leading cause for the decline of this species, specifically the loss and destruction of riparian habitat along waterways caused by agricultural practices and grazing.

Other Natural or Manmade Factors

A decrease in water quality due to a number of land use practices in the James River basin may have and the addition of dams to the basin has changed the flow regime and blocked movement of this species, possibly contributing to its decline.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- Currently, there are no studies or surveys in progress specifically targeting the central stoneroller are on going.

Previous Research and Survey Efforts

- None have been identified.

Additional Research and Survey Efforts Needed

- Continue survey efforts to determine whether this species is present in the state.

- Review historic literature and data collection efforts.
- Development a protocol to monitor 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.
- Work with partners to implement easements (i.e. EWP, WRP, and ACOE Sluffing or Flood Control Easements).
- Develop and promote incentive programs to restore riparian areas.
- Work with partners to implement easements (i.e. EWP and WRP).
- Work with partners to implement easements.
- Work with county zoning planning officials to designate areas in need of protective covenants
- 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. 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 SoCP.
- 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.
- On-going surveys along with the NDGFD's incidental reporting system could be used to monitor this species.
- The NDDoH will begin conducting Index of Biotic Integrity (IBI) surveys in the summer of 2005 for all of North Dakota's watersheds which will document all species encountered.

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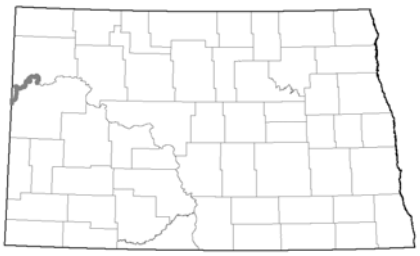
Sturgeon Chub
Level I

Scientific Name: *Macrhybopsis gelida*

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: Presently no federal status, was a candidate for listing until 1995.

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.

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 then 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 these 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 has also impacted sturgeon chub populations.

RESEARCH AND SURVEY EFFORTS

Current Research
- Currently there is no research specifically targeting sturgeon chub in the state.

Previous Research
- 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
- Conduct a review of historic literature and data collection efforts for all species of conservation priority.
- 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.
- Work with partners to implement easements (i.e. EWP, WRP, and ACOE Sluffing or Flood Control Easements).
- Develop and promote incentive programs to restore riparian areas.
- Work with partners to implement easements (i.e. EWP and WRP).
- Work with partners to implement easements.
- Work with county zoning planning officials to designate areas in need of protective covenants.
- 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. 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 SoCP.
- 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 yet been established.

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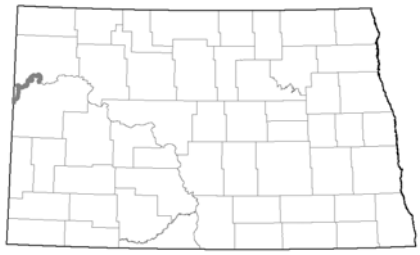
Sicklefin Chub

Level I

Scientific Name: *Macrhybopsis meeki*

David Ostendorf

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: Presently no federal status, was a candidate for listing until 1995.

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.

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 then 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.

Sicklefin Chub

Level I

RESEARCH AND SURVEY EFFORTS

Current Research

- No research for this species is currently being conducted.

Previous Research

- 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

- Conduct a review of historic literature and data collection efforts for all species of conservation priority.
- 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.
- Work with partners to implement easements (i.e. EWP, WRP, and ACOE Sluffing or Flood Control Easements).
- Develop and promote incentive programs to restore riparian areas.
- Work with partners to implement easements (i.e. EWP and WRP).
- Work with partners to implement easements.
- Work with county zoning planning officials to designate areas in need of protective covenants.
- 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. 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 SoCP.
- 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

Sicklefin Chub

Level I

MONITORING PLANS

- No monitoring plan has yet been established for this species.

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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

Level II

Scientific Name: *Macrhybopsis storeriana*

Konrad Schmidt

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.

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. 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 due to poor 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 there are no ongoing studies or surveys specifically targeting the silver chub.

Previous Research and Survey Efforts

- Red River basin and tributary streams were surveyed during the 1960s by the University of North Dakota (UND).

- In the late 1970s, Red River basin and tributary stream surveys were conducted by the Minnesota Department of Natural Resources, Ecological Services Section (MDNR ECO).

- Surveys were conducted in the Sheyenne River downstream from Baldhill Dam by Peterka (1978).
- A similar study 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 (NDDoH), 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).

Additional Research and Survey Efforts Needed

- Conduct a review of historic literature and data collection efforts for all fish species of conservation priority.
- Re-examine sites where this species has been recorded.
- Develop a monitoring plan for 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.
- Work with partners to implement easements (i.e. EWP, WRP, and ACOE Sluffing or Flood Control Easements).
- Develop and promote incentive programs to restore riparian areas.
- Work with partners to implement easements (i.e. EWP and WRP).
- Work with partners to implement easements.
- Work with county zoning planning officials to designate areas in need of protective covenants.
- 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. 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 SoCP.
- Continue to work with partners in promoting and distributing educational materials related to river, stream and riparian values and good stewardship.

Silver Chub

Level II

MONITORING PLANS

- Develop a monitoring plan for this species.
- Ongoing surveys along with the North Dakota Game and Fish Department's incidental reporting system could be used to monitor this species.
- The North Dakota Department of Health will begin Index of biotic Integrity (IBI) surveys for all watersheds in of North Dakota in the summer of 2005. These surveys will document all species captured.

REFERENCES

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.

Pearl Dace
Level I

Scientific Name: *Margariscus margarita*


Konrad Schmidt

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: No federal status.

Reason for Designation: Degradation of habitat is the main reason for the designation of the 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.

Current Distribution

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 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, as do the Park, Goose, and Willow rivers. Beaver Creek in the Missouri River drainage and the Souris River also have records of Pearl Dace.

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 agriculture and grazing.

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 due to poor land use practices 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 pearl dace are in progress.

Pearl Dace

Level I

Previous Research and Survey Efforts

- Red River streams were surveyed during the 1960s by the University of North Dakota (UND).
- Surveys of several Minnesota tributaries to the Red River were conducted by the BMNH from 1974-1976.
- In the late 1970s, Red River basin stream surveys were conducted by the Minnesota Department of Natural Resources, Ecological Services Section (MDNR ECO).
- A study was conducted on the Red River during 1983 and 1984.
- In 1985, the North Dakota Natural Heritage Inventory and the NDGF sampled fishes from 15 sites in the Pembina River watershed.
- 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 (IBI) for rivers in the basin (Goldstein et al. 1994).

Additional Research and Survey Efforts Needed

- Conduct a review of historic literature and data collection efforts for all species of conservation priority.
- Re-examine sites where this species has been recorded.
- Develop a protocol to monitor 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.
- Work with partners to implement easements (i.e. EWP, WRP, and ACOE Sluffing or Flood Control Easements).
- Develop and promote incentive programs to restore riparian areas.
- Work with partners to implement easements (i.e. EWP and WRP).
- Work with partners to implement easements.
- Work with county zoning planning officials to designate areas in need of protective covenants.
- 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. 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 SoCP.
- Continue to work with partners in promoting and distributing educational materials related to river, stream and riparian values and good stewardship.

Pearl Dace

Level I

MONITORING PLANS

- No monitoring plan has been identified for this species.
- The North Dakota Game and Fish Department's incidental reporting system as well as existing survey efforts could be used to monitor this species.
- The North Dakota Department of Health will begin IBI surveys of all watersheds in North Dakota starting in the summer of 2005. These will document specific fish and invertebrate species as a part of the process.

REFERENCES

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.

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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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

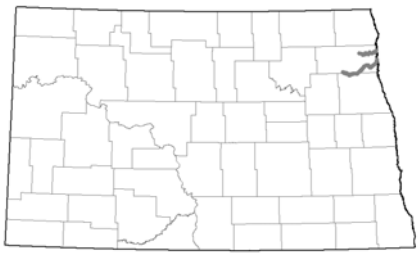
Level III

Scientific Name: *Nocomis biguttatus*

Konrad Schmidt

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: Rare.

Primary Habitat: Found in pools and slow runs of clear, small rivers.

Federal Status: No federal status

Reason for Designation: Water quality degradation is a concern for the rivers this species inhabits.

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. No key locations have been identified.

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 poor agriculture and grazing 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 are currently no studies or surveys specifically targeting the hornyhead chub.

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).

- 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).

Additional Research and Survey Efforts Needed

- Conduct a review of historic literature and data collection efforts for all species of conservation priority.
- Re-examine sites where this species has been recorded.
- Develop a protocol to monitor 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.
- Work with partners to implement easements (i.e. EWP, WRP, and ACOE Sluffing or Flood Control Easements).
- Develop and promote incentive programs to restore riparian areas.
- Work with partners to implement easements (i.e. EWP and WRP).
- Work with partners to implement easements.
- Work with county zoning planning officials to designate areas in need of protective covenants
- 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. 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 SoCP.
- 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 developed for this species.
- The North Dakota Game and Fish Department's incidental reporting system as well as existing survey efforts could be used to monitor this species.
- The North Dakota Department of Health will begin Index of Biotic Integrity (IBI) surveys of all watersheds in North Dakota in the summer of 2005. These will document specific species.

REFERENCES

Becker, G. C. 1983. Fishes of Wisconsin. Univ. Wisconsin Press, Madison. 1052 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.

Pugnose Shiner
Level III

Scientific Name: *Notropis anogenus*

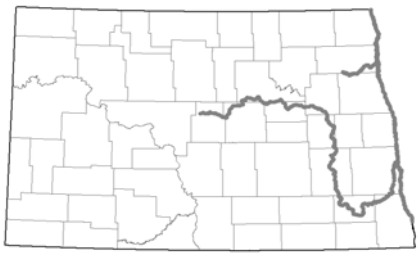
General Description: Grows to 2 inches in length. Olive on top with a thin black line that runs along the upper back. Sides and belly silvery with a black outline around the edge of scales. Mouth on this species is sharply upturned.


Konrad Schmidt

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.


Historic Range

Federal Status: No federal status.

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.

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 agriculture and grazing. 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).
- Surveys of several tributaries of the Red River in Minnesota were conducted by the BMNH from 1974-1976.

- In the late 1970s, Red River basin stream surveys were conducted by the Minnesota Department of Natural Resources, Ecological Services Section (MDNR ECO).
- Fish were collected in the Sheyenne River downstream from the Baldhill Dam by Peterka (1978).
- A similar study was conducted on the Red River during 1983 and 1984. The Otter Tail River was surveyed during the summers of 1978-1980.
- In 1985, the North Dakota Natural Heritage Inventory and the NDGF sampled fishes from 15 sites in the Pembina River watershed.
- 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 streams in the basin (Goldstein et al. 1994).

Additional Research and Survey Efforts Needed

- Conduct a review of historic literature and data collection efforts for all species of conservation priority.
- Re-examine sites where this species has been recorded.
- Develop a monitoring protocol for 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.
- Work with partners to implement easements (i.e. EWP, WRP, and ACOE Sluffing or Flood Control Easements).
- Develop and promote incentive programs to restore riparian areas.
- Work with partners to implement easements (i.e. EWP and WRP).
- Work with partners to implement easements.
- Work with county zoning planning officials to designate areas in need of protective covenants.
- 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. 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 SoCP.
- Continue to work with partners in promoting and distributing educational materials related to river, stream and riparian values and good stewardship.

Pugnose Shiner

Level III

MONITORING PLANS

- No monitoring plan has been identified for this species.
- The North Dakota Game and Fish Department's incidental reporting system as well as existing survey efforts could be used to monitor this species.
- The North Dakota Department of Health will begin Index of Biotic Integrity (IBI) surveys for all watersheds in North Dakota in the summer of 2005. These surveys will document all species captured.

REFERENCES

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.

Kelsh, S.W., J. Alm, J. Tesky. 2001. The Distribution of North Dakota Fishes. Unpublished. North Dakota Game and Fish. 19 pp.

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Blacknose Shiner

Level III

Scientific Name: *Notropis heterolepis*

Konrad Schmidt

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: No federal status.

Reason for Designation: Extirpated from much of its historic range in North Dakota. Populations confined to only a few sites.

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Prefer clear, vegetated pools within a stream system.

Key Areas for Blacknose Shiner in North Dakota

It appears the blacknose shiner is currently only present in spring-fed pools in a stretch of the Sheyenne River in Ransom County. 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 poor agriculture and grazing 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 are currently no studies or surveys specifically targeting the blacknose 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.

Additional Research and Survey Efforts Needed

- Conduct a review of historic literature and data collection efforts for all species of conservation priority.
- Re-examine sites where this species has been recorded.
- Develop a protocol to monitor 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.
- Work with partners to implement easements (i.e. EWP, WRP, and ACOE Sluffing or Flood Control Easements).
- Develop and promote incentive programs to restore riparian areas.
- Work with partners to implement easements (i.e. EWP and WRP).
- Work with partners to implement easements.
- Work with county zoning planning officials to designate areas in need of protective covenants
- 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. 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 SoCP.
- 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 will continue to monitor Iron Springs Creek for blacknose shiner.
- On going surveys along with the North Dakota Game and Fish Department's incidental reporting system could be used to monitor this species.

- The North Dakota Department of Health will begin Index of Biotic Integrity (IBI) surveys in the summer of 2005 for all North Dakota's watersheds. This will document all species encountered.

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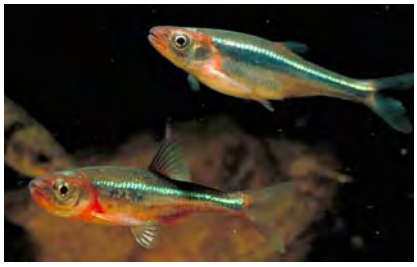
Rosyface Shiner

Level III

Scientific Name: *Hybopsis rubrifrons*

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.



Konrad Schmidt

Status: Year-round resident.

Abundance: Rare.

Primary Habitat: Found in pools with some current, or more swiftly flowing stretches adjacent to pools.

Federal Status: No federal status.

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.

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

The rosyface 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 Rosyface Shiner in North Dakota

The rosyface shiner has been collected from portions of the Sheyenne River in Ransom County. It was last collected in 1994.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Degradation of quality habitat is recognized as the leading cause of decline for this species, specifically loss and destruction of stream habitat caused by poor agriculture and grazing 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 rosyface shiner.

Previous Research and Survey Efforts

- Red River basin streams were surveyed during the 1960s by the University of North Dakota (UND).
- Surveys of several tributaries to the Red River in Minnesota were conducted by the BMNH from 1974-1976.
- In the late 1970s, Red River basin stream surveys were conducted by the Minnesota Department of Natural Resources, Ecological Services Section (MDNR ECO).

- Fish were collected in the Sheyenne River downstream from the Baldhill Dam by Peterka (1978).
- 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 streams in the basin (Goldstein et al. 1994).

Additional Research and Survey Efforts Needed

- Conduct a review of historic literature and data collection efforts for this species.
- Re-examine sites where this species has been recorded.
- Develop a protocol to monitor 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.
- Work with partners to implement easements (i.e. EWP, WRP, and ACOE Sluffing or Flood Control Easements).
- Develop and promote incentive programs to restore riparian areas.
- Work with partners to implement easements (i.e. EWP and WRP).
- Work with partners to implement easements.
- Work with county zoning planning officials to designate areas in need of protective covenants.
- 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. 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 SoCP.
- 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.
- Ongoing surveys along with the North Dakota Game and Fish Department's incidental reporting system could be used to monitor this species.

- The North Dakota Department of Health will begin Index of Biotic Integrity (IBI) surveys in the summer of 2005 for all of North Dakota's watersheds. This will document all species encountered.

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Northern Redbelly Dace

Level II

Scientific Name: *Phoxinus eos*


Konrad Schmidt

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 poor land use practices.

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

The 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 is found 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. Populations also occur in the Missouri River drainage, specifically Brush, Apple, Beaver, and Antelope creeks, and the Cannonball, Knife, Heart, and Little Missouri 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 of riparian habitat along waterways caused by agriculture and grazing.

Other Natural or Manmade Factors

The addition of dams to the Red River drainage has changed the flow regime and fragmented populations. Lower water quality due to poor land use practices in the Red River basin have contributed to the decline of this species.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- There are currently no ongoing studies or surveys in progress specifically targeting the Northern redbelly dace.

Northern Redbelly Dace

Level II

Previous Research and Survey Efforts

- Red River basin streams were surveyed during the 1960s by the University of North Dakota (UND).
- Surveys of several tributaries to the Red River in Minnesota were conducted by the BMNH from 1974-1976.
- In the late 1970s, Red River basin stream surveys were conducted by the Minnesota Department of Natural Resources, Ecological Services Section (MDNR ECO).
- Fish were surveyed in the Sheyenne River downstream from the Baldhill Dam by Peterka (1978).
- A similar study 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.
- Sites throughout the state 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).

Additional Research and Survey Efforts Needed

- Conduct a review of historic literature and data collection efforts for all species of conservation priority.
- Re-examine sites where this species has been recorded.
- Develop a protocol to monitor 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.
- Work with partners to implement easements (i.e. EWP, WRP, and ACOE Sluffing or Flood Control Easements).
- Develop and promote incentive programs to restore riparian areas.
- Work with partners to implement easements (i.e. EWP and WRP).
- Work with partners to implement easements.
- Work with county zoning planning officials to designate areas in need of protective covenants.
- 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. 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 SoCP.

- 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.
- Ongoing surveys along with the North Dakota Game and Fish Department's incidental reporting system could be used to monitor this species.
- The North Dakota Department of Health began Index of Biotic Integrity (IBI) surveys in the summer of 2005 for all of North Dakota's watersheds. This will document all species encountered.

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Finescale Dace

Level III

Scientific Name: *Phoxinus neogaeus*

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: No federal status.

Reason for Designation: The only viable population in the western basin of the Red River is in the Tongue River.

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 is found only in the Tongue River in northeastern North Dakota.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Degradation of habitat is recognized as the leading cause for decline in this species, specifically destruction of headwater stream habitat caused by agriculture and grazing.

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 streams were surveyed during the 1960s by the University of North Dakota (UND).
- Surveys of several tributaries to the Red River in Minnesota were conducted by the BMNH from 1974-1976.
- In the late 1970s, Red River stream surveys were conducted by the Minnesota Department of Natural Resources, Ecological Services Section (MDNR ECO).
- Fish were collected in the Sheyenne River downstream from the Baldhill Dam by Peterka in 1978.

- A similar study was conducted on the Red River during 1983 and 1984. The Otter Tail River was surveyed during the summers of 1978-1980.
- In 1985, the North Dakota Natural Heritage Inventory and the NDGFD sampled fishes from 15 sites in the Pembina River watershed.
- 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 (NDDoH), 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 and the development of an index of biotic integrity for the basin.

Additional Research and Survey Efforts Needed

- Conduct a review of historic literature and data collection efforts for this species.
- Re-examination of sites where this species has been recorded is needed.
- Development of a protocol to monitor this species is needed.

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.
- Work with partners to implement easements (i.e. EWP, WRP, and ACOE Sluffing or Flood Control Easements).
- Develop and promote incentive programs to restore riparian areas.
- Work with partners to implement easements (i.e. EWP and WRP).
- Work with partners to implement easements.
- Work with county zoning planning officials to designate areas in need of protective covenants
- 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. 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 SoCP.
- 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.
- Ongoing surveys along with the NDGFD's incidental reporting system could be used to monitor this species.

- The NDDoH began Index of Biotic Integrity (IBI) surveys in the summer of 2005 for all of North Dakota's watersheds which will document all species encountered.

REFERENCES

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Flathead Chub

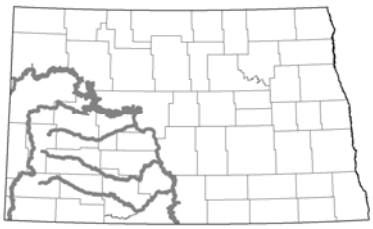
Level II

Scientific Name: *Platygobio gracilis*

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.

Montana Fish, Wildlife and Parks

Status: Year-round resident.



Abundance: Locally common in areas.

Primary Habitat: Found mostly in large turbid rivers with sand or gravel bottoms.

Federal Status: No federal status.

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.

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 then 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.

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.

Flathead Chub

Level II

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- Currently there is no research targeting this species.

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.

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.
- Work with partners to implement easements (i.e. EWP, WRP, and ACOE Sluffing or Flood Control Easements).
- Develop and promote incentive programs to restore riparian areas.
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- Work with county zoning planning officials to designate areas in need of protective covenants.
- 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. 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 SoCP.
- Continue to work with partners in promoting and distributing educational materials related to river, stream and riparian values and good stewardship.

MONITORING PLANS

- A monitoring protocol has not been identified for this species.

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Blue Sucker
Level I

Scientific Name: *Cycleptus elongatus*

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.

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.

Blue Sucker

Level I

Previous Research and Survey Efforts

- A status report for the blue sucker was conducted in 1993.

Additional Research and Survey Efforts Needed

- Conduct a review of historic literature and data collection efforts for all species of conservation priority.
- Re-examine sites where this species has been recorded.
- 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.
- Work with partners to implement easements (i.e. EWP, WRP, and ACOE Sluffing or Flood Control Easements).
- Develop and promote incentive programs to restore riparian areas.
- Work with partners to implement easements (i.e. EWP and WRP).
- Work with partners to implement easements.
- Work with county zoning planning officials to designate areas in need of protective covenants
- 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. 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 SoCP.
- 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 and new surveys developed to monitor this species.

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Yellow Bullhead

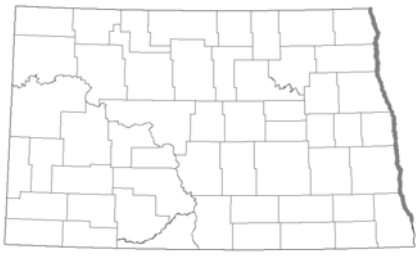
Level III

Scientific Name: *Ameiurus natalis*

Konrad Schmidt

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 apposed 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: No federal status.

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.

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

No key areas have been identified for this species to date.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Yellow bullhead are habitat specialists and do not tolerate changes to the system. Land use in the area has changed the hydrology of the river from its pre-settlement conditions.

Other Natural or Manmade Factors

The addition of dams to rivers in the Red River drainage has changed flow regimes and also blocked movement of fish into suitable habitat. A decrease in water quality due to poor 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

- There are ongoing no current studies or surveys specifically targeting the yellow bullhead.

Previous Research and Survey Efforts

- Red River basin streams were surveyed during the 1960s by the University of North Dakota (UND).
- Surveys of several tributaries to the Red River in Minnesota were conducted by the BMNH from 1974-1976.

- In the late 1970s, Red River basin stream surveys were conducted by the Minnesota Department of Natural Resources, Ecological Services Section (MDNR ECO).
- A similar study was conducted on the Red River during 1983 and 1984. The Otter Tail River was surveyed during the summers of 1978-1980.
- 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).

Additional Research and Survey Efforts Needed

- Conduct a review of historic literature and data collection efforts for all species of conservation priority.
- Re-examine sites where this species has been recorded.
- Develop a protocol to monitor 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.
- Work with partners to implement easements (i.e. EWP, WRP, and ACOE Sluffing or Flood Control Easements).
- Develop and promote incentive programs to restore riparian areas.
- Work with partners to implement easements (i.e. EWP and WRP).
- Work with partners to implement easements.
- Work with county zoning planning officials to designate areas in need of protective covenants
- 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. 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 SoCP.
- 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.

- Ongoing surveys along with the North Dakota Game and Fish Department's incidental reporting system could be used to monitor this species.
- The North Dakota Department of Health began Index of Biotic Integrity (IBI) surveys in the summer of 2005 for all of North Dakota's watersheds. This will document all species encountered.

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Flathead Catfish

Level III

Scientific Name: *Pylodictis olivaris*

General Description: Large fish, up to five feet in length. Large, flat, broad head. Dark above with a lighter belly. Lower jaw extending past upper jaw. Barbels along the lower lip. Fin on back and both sides have a sharp spine. Distinguishable from others in the family by large head, extended lower jaw, and white tip on caudal fin.

Status: Year-round resident

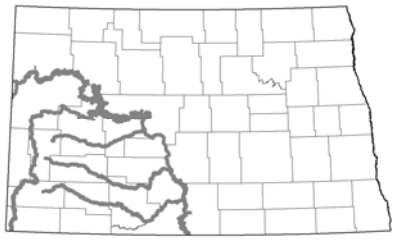
Abundance: Rare

Primary Habitat: Found mainly in large rivers in pools with brushy debris. Can also be found in impoundments.

Federal Status: No federal status

Reason for Designation: Few records in the state for this species. Listed as a species of concern by the American Fisheries Society Dakota Chapter.

Konrad Schmidt



Historic Distribution

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Found in pools and slow moving stretches in rivers. Prefer areas with debris and a hard bottom. Also can be found in impoundments where proper spawning habitat is available. Young can be found in shallow, rocky riffles.

Key Areas for Flathead Catfish in North Dakota

Historically found in the Missouri and Little Missouri rivers, as well as tributaries. Appears to be presently only in Lake Oahe portion of the Missouri River. No key areas have yet been identified for this species.

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. The construction of dams has largely changed the river system. Dams have reduced the sediment load in turn lowering turbidity, lowered the overall water temperature, and fragmented populations by restricting fish movement throughout the system.

Other Natural or Manmade Factors

The use of water for agricultural, industrial, and municipal purposes along the Missouri River System has also impacted fish populations.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- Currently no research targeting the flathead catfish is being conducted.

Previous Research and Survey Efforts

- The North Dakota Game and Fish Dept. conducts yearly fish surveys in the Missouri River and many of its tributaries.

Additional Research and Survey Efforts Needed

- Conduct a review of historic literature and data collection efforts for all species of conservation priority.
- Re-examine sites where this species has been recorded.

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.
- Work with partners to implement easements (i.e. EWP, WRP, and ACOE Sluffing or Flood Control Easements).
- Develop and promote incentive programs to restore riparian areas.
- Work with partners to implement easements (i.e. EWP and WRP).
- Work with partners to implement easements.
- Work with county zoning planning officials to designate areas in need of protective covenants.
- 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. 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 SoCP.
- Continue to work with partners in promoting and distributing educational materials related to river, stream and riparian values and good stewardship.

MONITORING PLANS

- The North Dakota Game and Fish Department's incidental reporting system as well as existing survey efforts will be used to monitor this species.
- The North Dakota Department of Health began Index of Biotic Integrity (IBI) surveys of all the watersheds in North Dakota in the summer of 2005. These will document specific species.

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Trout-perch
Level II

Scientific Name: *Percopsis omiscomaycus*

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: No federal status.

Reason for Designation: Imperiled in much of its northern range. Loss of suitable habitat seems to be the largest factor affecting this species.

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 throughout the Red River system including the Sheyenne River. 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 poor 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

- There are currently no ongoing studies or surveys specifically targeting the trout-perch.

Previous Research and Survey Efforts

- Red River basin streams were surveyed during the 1960s by the University of North Dakota (UND).
- Surveys of several tributaries to the Red River in Minnesota were conducted by the BMNH from 1974-1976.

- In the late 1970s, Red River basin stream surveys were conducted by the Minnesota Department of Natural Resources, Ecological Services Section (MDNR ECO).
- Sampling was conducted in the Sheyenne River downstream from the Baldhill Dam by Peterka (1978).
- A similar study 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).

Additional Research and Survey Efforts Needed

- Conduct a review of historic literature and data collection efforts for all fish species of conservation priority.
- Re-examine sites where this species has been recorded.
- Develop a monitoring plan for 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.
- Work with partners to implement easements (i.e. EWP, WRP, and ACOE Sluffing or Flood Control Easements).
- Develop and promote incentive programs to restore riparian areas.
- Work with partners to implement easements (i.e. EWP and WRP).
- Work with partners to implement easements.
- Work with county zoning planning officials to designate areas in need of protective covenants.
- 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. 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 SoCP.
- Continue to work with partners in promoting and distributing educational materials related to river, stream and riparian values and good stewardship.

Trout-perch

Level II

MONITORING PLANS

- No monitoring plan has been identified for this species.
- Ongoing surveys along with the North Dakota Game and Fish Department's incidental reporting system could be used to monitor this species.
- The North Dakota Department of Health began Index of Biotic Integrity (IBI) surveys for all watershed of North Dakota in the summer of 2005. These surveys will document all species captured.

REFERENCES

Becker, G. C. 1983. Fishes of Wisconsin. Univ. Wisconsin Press, Madison. 1,052 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.

Logperch
Level III

Scientific Name: *Percina caprodes*


Konrad Schmidt

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: No federal status.

Reason for Designation: Few records of this species in the state. North Dakota appears to be on the western edge of its range.

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 only been recorded recently in the Red and Pembina rivers. It has also been recorded in the Goose River, but not in the last 40 years.

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
- Currently no studies or surveys specifically targeting the logperch are ongoing.

Previous Research and Survey Efforts
- Red River basin streams were surveyed during the 1960s by the University of North Dakota (UND).
- Surveys of several tributaries to the Red River in Minnesota was conducted by the BMNH from 1974-1976.

- In the late 1970s, Red river stream surveys were conducted by the Minnesota Department of Natural Resources, Ecological Services Section (MDNR ECO).
- A study was conducted on the Red River during 1983 and 1984.
- In 1985, the North Dakota Natural Heritage Inventory and the NDGF sampled from 15 sites in the Pembina River watershed.
- 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).

Additional Research and Survey Efforts Needed

- Conduct a review of historic literature and data collection efforts for all fish species of conservation priority.
- Re-examine sites where this species has been recorded.
- Develop a protocol to monitor 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.
- Work with partners to implement easements (i.e. EWP, WRP, and ACOE Sluffing or Flood Control Easements).
- Develop and promote incentive programs to restore riparian areas.
- Work with partners to implement easements (i.e. EWP and WRP).
- Work with partners to implement easements.
- Work with county zoning planning officials to designate areas in need of protective covenants.
- 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. 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 SoCP.
- Continue to work with partners in promoting and distributing educational materials related to river, stream and riparian values and good stewardship.

Logperch
Level III

MONITORING PLANS

- Ongoing surveys along with the North Dakota Game and Fish Department's incidental reporting system will be used to monitor this species.
- The North Dakota Department of Health began Index of biotic Integrity (IBI) surveys for all North Dakota watersheds in the summer of 2005. These surveys will documents all species captured.

REFERENCES

Becker, G.C. 1983. Fishes of Wisconsin. Univ. Wisconsin Press, Madison. 1,052 pp.

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River Darter
Level III

Scientific Name: *Percina shumardi*

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: Year-round resident if present.

Abundance: Believed extirpated.

Primary Habitat: Found in rocky riffles of streams. Adults are normally found deeper than young.

Federal Status: No federal status.

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


Historic Distribution

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 to the Red River drainage has changed the flow regime and also blocked movement of fish, fragmenting populations. A decrease in water quality due to poor 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 there are no ongoing studies or surveys specifically targeting the river darter.

Previous Research and Survey Efforts
- Red River basin streams were surveyed during the 1960s by the University of North Dakota (UND).
- Surveys of several tributaries to the Red River in Minnesota was conducted by the BMNH from 1974-1976.

- In the late 1970s, Red River basin stream surveys were conducted by the Minnesota Department of Natural Resources, Ecological Services Section (MDNR ECO).
- Surveys were 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 electrofishing 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).

Additional Research and Survey Efforts Needed

- Conduct a review of historic literature and data collection efforts for all fish species of conservation priority.
- Re-examine sites where this species has been recorded to determine if it is found in ND waters.
- Develop a protocol to monitor 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.
- Work with partners to implement easements (i.e. EWP, WRP, and ACOE Sluffing or Flood Control Easements).
- Develop and promote incentive programs to restore riparian areas.
- Work with partners to implement easements (i.e. EWP and WRP).
- Work with partners to implement easements.
- Work with county zoning planning officials to designate areas in need of protective covenants.
- 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. 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 SoCP.
- 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.
- Ongoing surveys along with the North Dakota Game and Fish Department's incidental reporting system could be used to monitor this species.

- The North Dakota Department of Health began Index of Biotic Integrity (IBI) surveys in the summer of 2005 for all of North Dakota's watersheds. This will document all species encountered.

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APPENDIX A.5

Freshwater Mussel
Species of Conservation Priority Accounts

Threeridge
Level II

Scientific Name: *Amblema plicata*


Chris Grondahl

General Description: Shell up to 4 inches in length. The shell is generally thick, round and compressed. Coloration is yellow-green or brown. There are three distinct ridges in the shell that run from the hinge to the edge of the shell.

Status: Year-round resident.

Abundance: Locally common.

Primary Habitat: Prefer small to large rivers with a mud, sand or gravel substrate. In North Dakota confined to larger rivers.

Federal Status: No federal status.

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.

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 threeridge. Impoundments also block movement of host fish necessary for reproduction and dispersal of this species.
Secondly, agricultural practices within the basin have reduced suitable river habitat. Runoff from treated fields into the river decreases water quality. Ditches used to drain fields contribute agriculture run-off and sediments to waterways.

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.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts
- The NDDoH will begin Index of Biotic Integrity (IBI) surveys for state rivers in 2005. These surveys will include freshwater mussels.

Previous Research and Survey Efforts
- Cvancara conducted a statewide survey of the mollusks of North Dakota in 1978.

- The North Dakota Game and Fish Department revisited the Red river and its tributary sites in 1990.
- Valley City State University conducted a small-scale survey of the Sheyenne River in 2004.

Additional Research and Survey Efforts Needed

- A revisit of all of Cvancara's sites along with a habitat component is necessary to update the population status of freshwater mussels since 1978.

MONITORING PLANS

- No monitoring plan has been developed for freshwater mussels. Surveys by Cvancara will be used as a template.

REFERENCES

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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Wabash Pigtoe

Level II

Scientific Name: *Fusconaia flava*

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: Large rivers with mud or sand bottoms.

Federal Status: No federal status.

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.

Chris Grondahl

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. Secondly, 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.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- The NDDoH is initiating freshwater mussel surveys this year (2005) as a part of its Index of Biotic Integrity (IBI) work on the state waters. This work will cover all drainages in the state with one being covered each year.

Wabash Pigtoe
Level II

Previous Research and Survey Efforts

- Cvancara conducted a statewide survey of mollusks in North Dakota in 1978.
- The NDGFD revisited the Red River and its tributary sites in 1990.
- Valley City State University conducted a small-scale survey of the Sheyenne River in 2004.

Additional Research and Survey Efforts Needed

- A revisit of all of Cvancara's sites along with a habitat component is necessary to update the population status of freshwater mussels since 1978.

MONITORING PLANS

- No monitoring plan has been developed for freshwater mussels. Surveys by Cvancara will be used as a template.

REFERENCES

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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Mapleleaf

Level II

Scientific Name: *Quadrula quadrula*

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: Found in the Red River in areas of mud or gravel bottom.

Federal Status: No federal status

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.

Chris Grondahl

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. Secondly, 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 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

- The NDDoH will initiate mussel surveys this summer (2005) as a part of its Index of Biotic Integrity (IBI) work on state watersheds. This will cover all of the state's watersheds, with one being done each year.

Previous Research and Survey Efforts

- Cvancara conducted a statewide survey of the mollusks of North Dakota in 1978.
- The North Dakota Game and Fish Department revisited the Red River and its tributary sites in 1990
- Valley City State University conducted a small-scale survey of the Sheyenne River in 2004.

Additional Research and Survey Efforts Needed

- A revisit of all of Cvancara's sites along with a habitat component is necessary to update the population status of freshwater mussels since 1978.
- Develop a monitoring protocol for freshwater mussels.

MONITORING PLANS

- No monitoring plan has been developed for freshwater mussels to this point. Surveys by Cvancara will be used as a template.

REFERENCES

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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Black Sandshell

Level II

Scientific Name: *Ligumia recta*

Chris Grondahl

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: Presently holds no federal status.

Reason for Designation: Changes in land use in and around the rivers it inhabits, most notably agriculture, and impoundment, have impacted this species.

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 Sand Shell 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. Secondly, 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

No other threats have yet been identified.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- The NDDoH will initiate freshwater mussel surveys for states waters as a segment of its Index of Biotic Integrity (IBI) work. This work will begin in the summer of 2005.

Previous Research and Survey Efforts

- Cvancara conducted a statewide survey of mollusks in North Dakota in 1978.
- The North Dakota Game and Fish Department revisited the Red River and its tributary sites in 1990.

- A small scale sample of the Sheyenne River was conducted by Valley City State University in the fall of 2004.

Additional Research and Survey Efforts Needed

- A revisit of all of Cvancara's sites along with a habitat component is necessary to update the population status of freshwater mussels since 1978.
- Develop a monitoring plan to track the status of mussel populations in North Dakota waters.

MONITORING PLAN

- No specific monitoring plan has been developed to track freshwater mussel species. Survey effort by Cvancara will be used as a model to develop this.

REFERENCES

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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Creek Heelsplitter

Level II

Scientific Name: *Lasmigona compressa*

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.

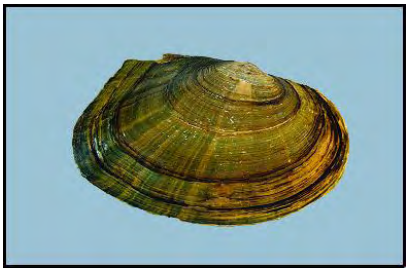
Status: Year-round resident.

Abundance: Rare.

Primary Habitat: Found in the Pembina, Forest, Wintering and Sheyenne rivers. Generally in headwaters of small streams with sandy bottoms.

Federal Status: No federal status.

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.



USFWS

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. Secondly, 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

No other threats have yet been identified for this species.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- The NDDoH is initiating freshwater mussel surveys as part of the Index of Biotic Integrity (IBI) they will conduct on state watersheds, beginning in 2005.

Previous Research and Survey Efforts

- Cvancara conducted a statewide survey of mollusks in North Dakota in 1978.
- The North Dakota Game and Fish Department revisited the Red River and its tributary sites in 1990.

- A small scale survey of the Sheyenne River was conducted by Valley City State University in 2004.

Additional Research and Survey Efforts Needed

- A revisit of all of Cvancara's sites along with a habitat component is necessary to update the population status of freshwater mussels since 1978.
- Develop a monitoring protocol to track freshwater mussel populations in state waters.

MONITORING PLANS

- No monitoring plan has been developed for freshwater mussels. Surveys by Cvancara will be used as a template.

REFERENCES

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.

Jensen, W.F, R.L. Kreil, S.R. Dyke, J.S. Schumacher, and M.G. McKenna. 2001. Distribution, relative abundance, and species diversity of freshwater mussels in the Sheyenne and Red rivers of eastern North Dakota. North Dakota Game and Fish. Div Rpt 42, 20 pp.

Heath, D.J., et al. 1988. An assessment of the 1986 commercial harvest of freshwater mussels in the Mississippi River bordering Wisconsin. Report to Wisconsin Department of Natural Resources. 28 pp.

Williams, J.D., Neves, R.J. La Roe, ET, Farris, G.S., Puckett, C.E., Doran, P.D., Mac, M.J. 1995. Freshwater mussels: a neglected and declining aquatic resource. In: *Our living resources: a report to the nation on the distribution, abundance, and health of US plants, animals, and ecosystems*. US Department of the Interior, National Biological Service, Washington, DC, pp 177-179.

Pink Heelsplitter

Level II

Scientific Name: *Potamilus alatus*

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: No federal status.

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.

Chris Grondahl

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. Secondly, 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 to agricultural run-off and sedimentation in the Red River and its tributaries.

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. This may contribute to an already declining population.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- The NDDoH will initiate mussel surveys in state watersheds as a part of its Index of Biotic Integrity (IBI) work, beginning in 2005.

Previous Research and Survey Efforts

- Cvancara conducted a statewide survey of the mollusks of North Dakota in 1978.

- The North Dakota Game and Fish Department revisited the Red River and its tributary sites in 1990.
- A small-scale survey of the Sheyenne River is being conducted by Valley City State University.

Additional Research and Survey Efforts Needed

- A revisit of all of Cvancara's sites along with a habitat component is necessary to update the population status of freshwater mussels since 1978.

MONITORING PLANS

- No monitoring plan has been developed for freshwater mussels. Surveys by Cvancara will be used as a template.

REFERENCES

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.

Jensen, W.F, R.L. Kreil, S.R. Dyke, J.S. Schumacher, and M.G. McKenna. 2001. Distribution, relative abundance, and species diversity of freshwater mussels in the Sheyenne and Red rivers of eastern North Dakota. North Dakota Game and Fish. Div Rpt 42, 20 pp.

Heath, D.J., et al. 1988. An assessment of the 1986 commercial harvest of freshwater mussels in the Mississippi River bordering Wisconsin. Report to Wisconsin Department of Natural Resources. 28 pp.

Williams, J.D., Neves, R.J. La Roe, ET, Farris, G.S., Puckett, C.E., Doran, P.D., Mac, M.J. 1995. Freshwater mussels: a neglected and declining aquatic resource. In: *Our living resources: a report to the nation on the distribution, abundance, and health of US plants, animals, and ecosystems*. US Department of the Interior, National Biological Service, Washington, DC, pp 177-179.

Pink Papershell

Level III

Scientific Name: *Potamilus oheinsis*

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.

USFWS

Status: Year-round resident.

Abundance: Rare.

Primary Habitat: Medium to larger rivers. Bottom substrate generally mud or sand.

Federal Status: No federal status.

Reason for Designation: Changes in land use around rivers, most notably agriculture and impoundment of river systems, have impacted this species.

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

- The NDDoH is initiating freshwater mussel surveys of the state watersheds as a segment of its Index of Biotic Integrity (IBI) work, beginning in 2005.

Previous Research and Survey Efforts

- Cvancara conducted a statewide survey of the mollusks of North Dakota in 1978.

Additional Research and Survey Efforts Needed

- A revisit of all of Cvancara's sites along with a habitat component is necessary to update the population status of freshwater mussels since 1978.

Pink Papershell

Level III

MONITORING PLANS

- No monitoring plan has been developed for freshwater mussels to this point. Surveys by Cvancara will be used as a template.

REFERENCES

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.

Jensen, W.F, R.L. Kreil, S.R. Dyke, J.S. Schumacher, and M.G. McKenna. 2001. Distribution, relative abundance, and species diversity of freshwater mussels in the Sheyenne and Red rivers of eastern North Dakota. North Dakota Game and Fish. Div Rpt 42, 20 pp.

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Williams, J.D., Neves, R.J. La Roe, ET, Farris, G.S., Puckett, C.E., Doran, P.D., Mac, M.J. 1995. Freshwater mussels: a neglected and declining aquatic resource. In: *Our living resources: a report to the nation on the distribution, abundance, and health of US plants, animals, and ecosystems*. US Department of the Interior, National Biological Service, Washington, DC, pp 177-179.

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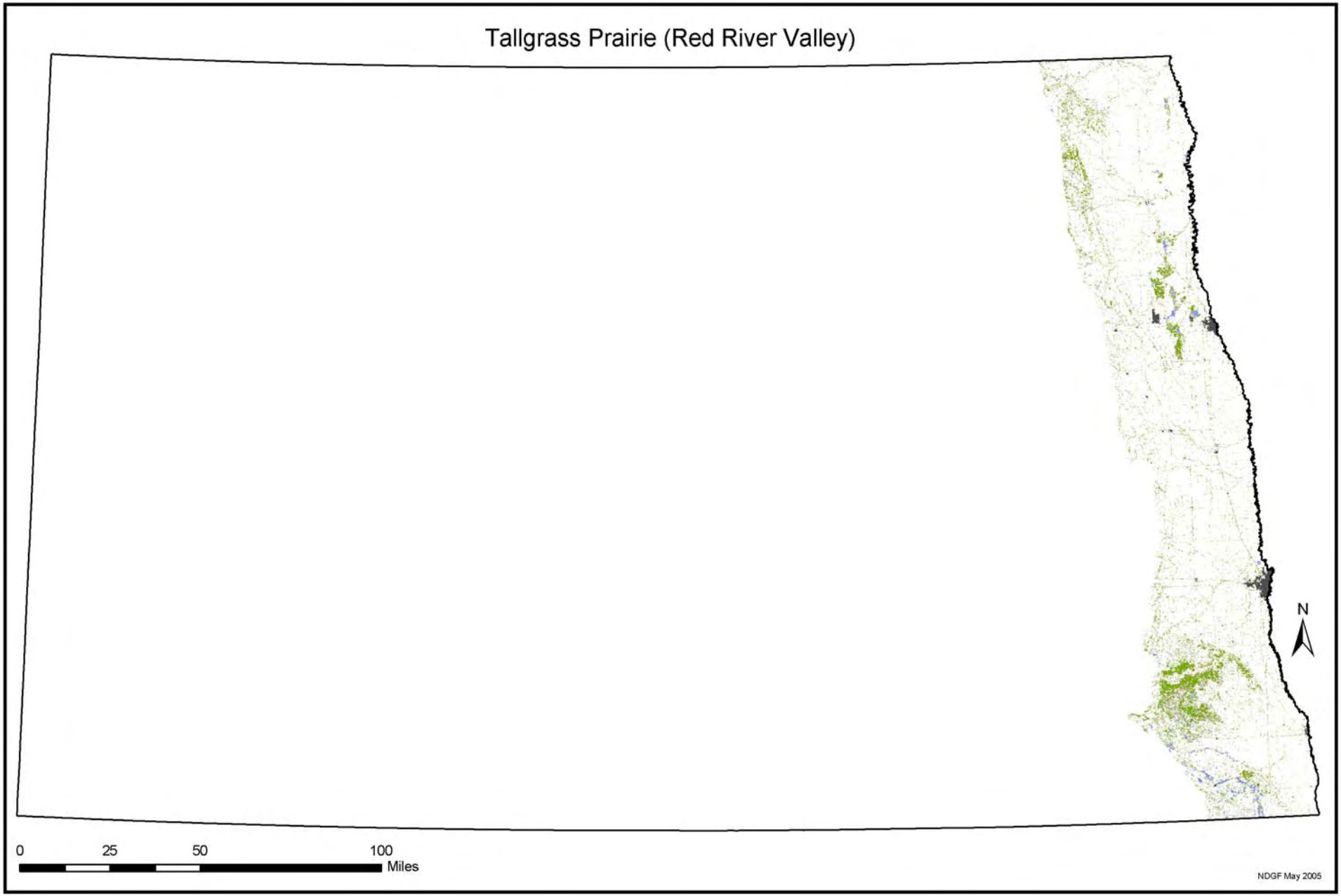
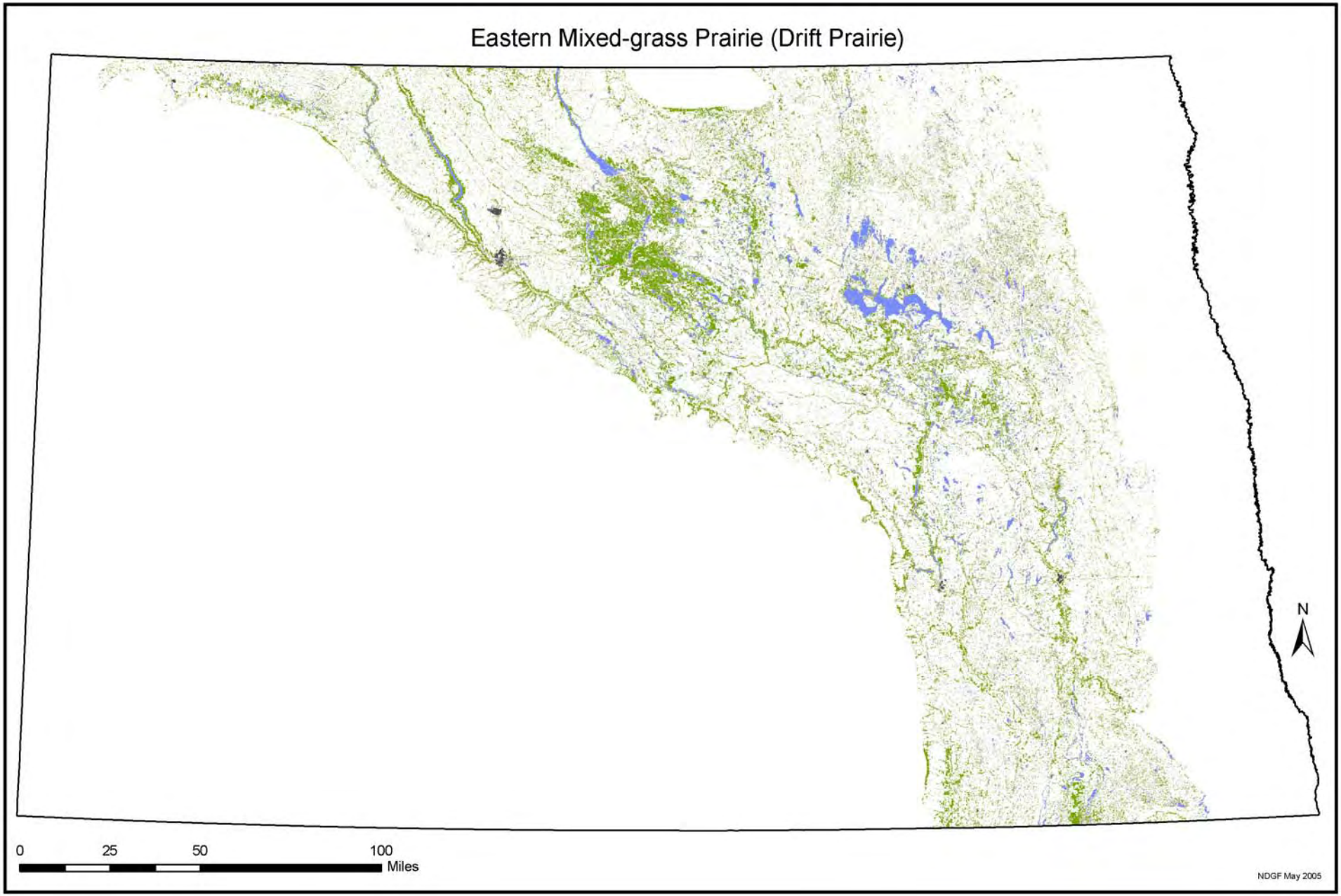
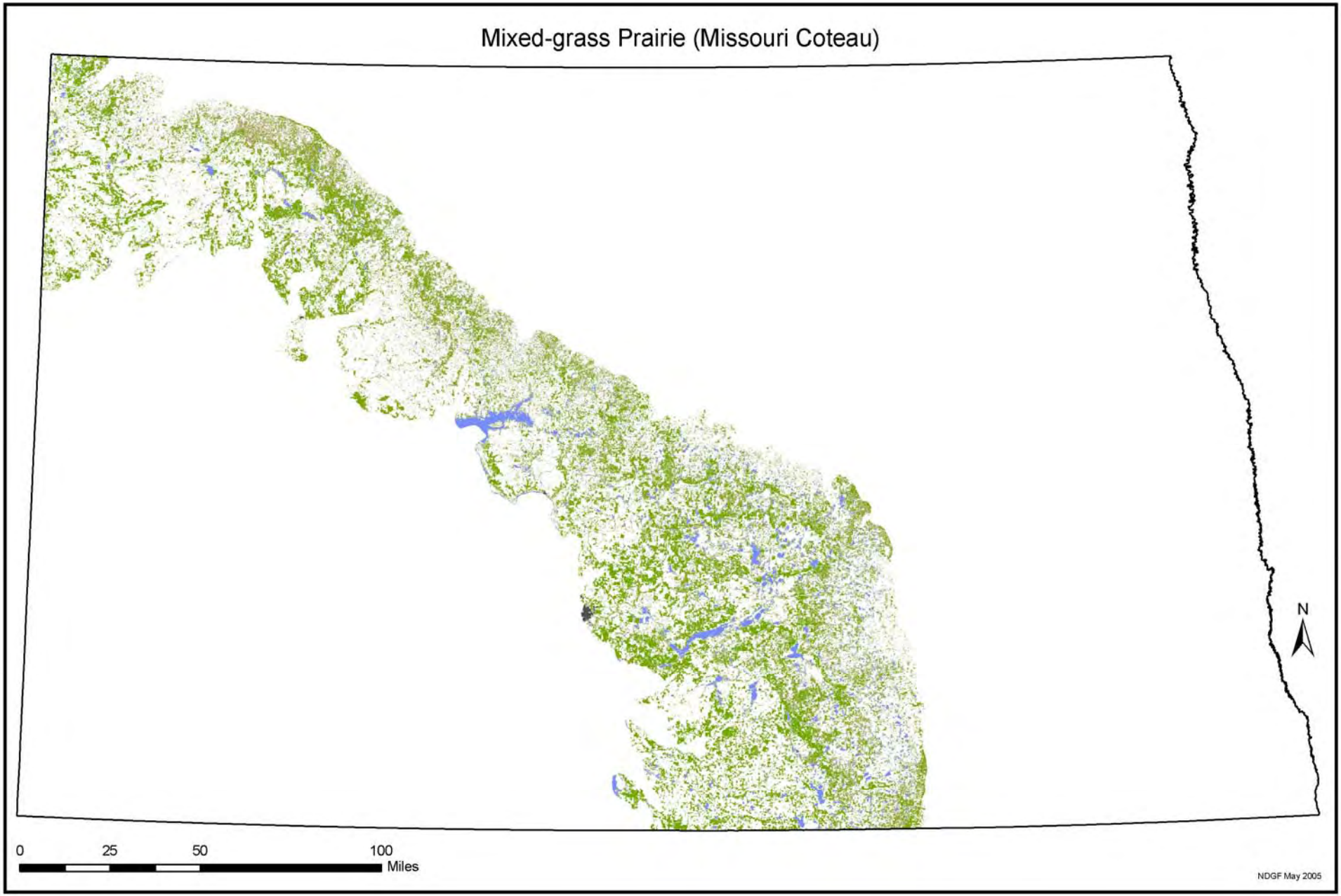
APPENDIX B

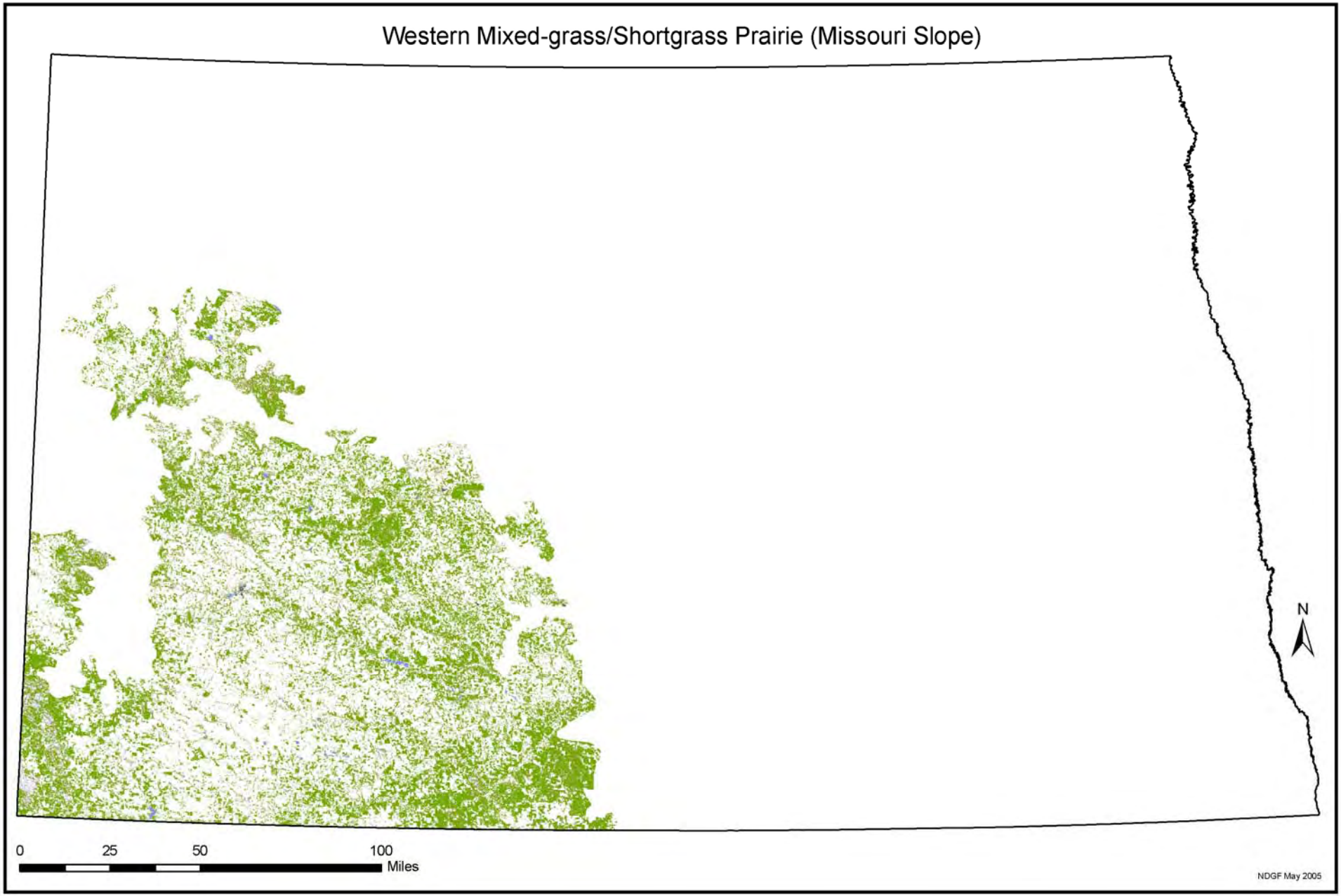
Landscape Component Maps

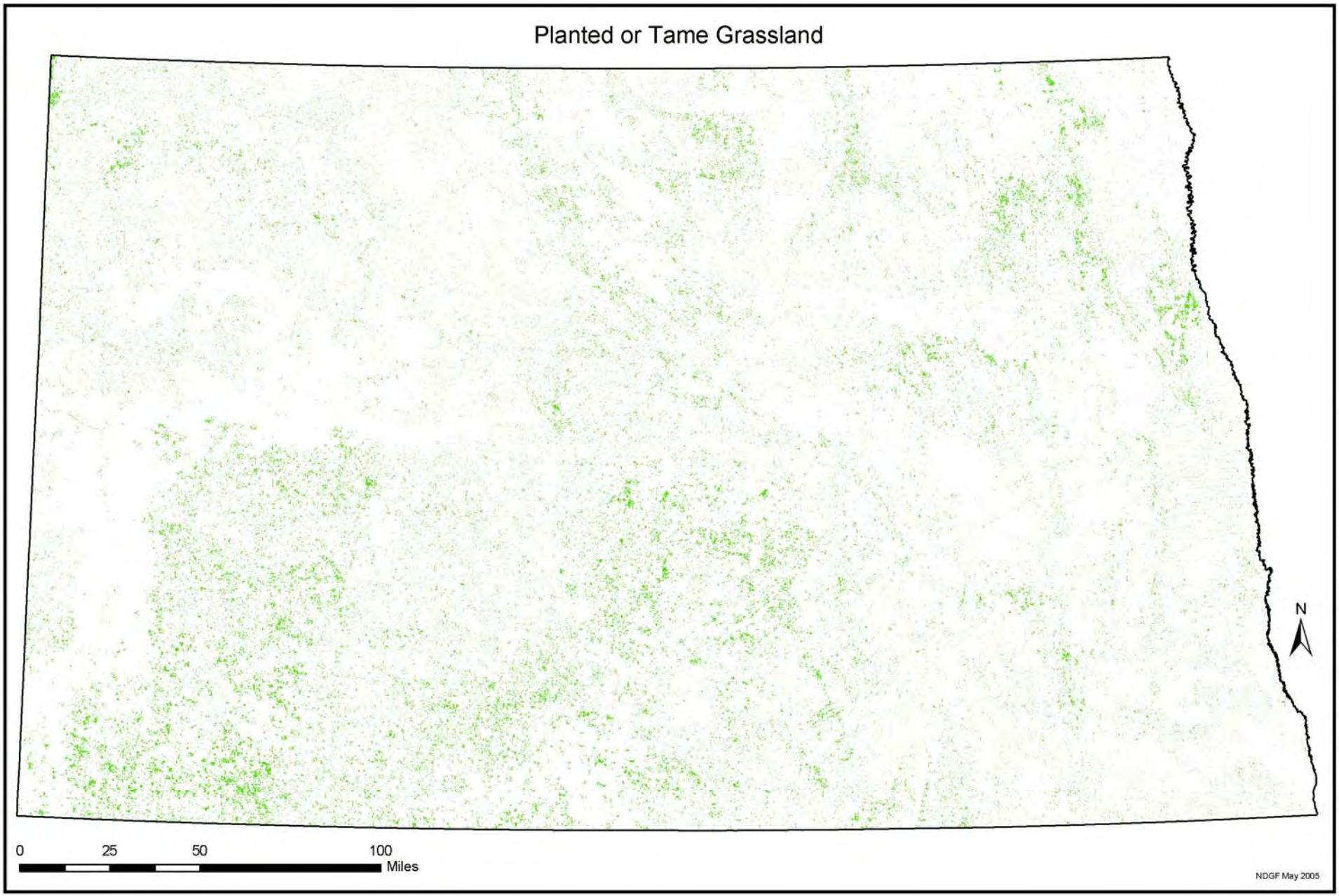
The following maps depict the nine individual landscape components identified for the CWCS, and many are displayed using the CWCS Landcover. Since wetlands and lakes are an integral component of grassland landscapes, they were included in the four prairie landscape component maps (tallgrass, Eastern mixed-grass, mixed-grass, and Western mixed-grass/shortgrass prairie) as light blue. The Wetlands and Lakes map amplifies these individual water bodies and is displayed using both the land cover information and digitized GIS layers (e.g. NDGFD managed lakes). The Planted and Tame Grassland map includes only those planted herbaceous perennials identified by land cover information. The Rivers, Streams, and Riparian map includes those digitized rivers and streams. The Upland Deciduous Forest map includes all woodland components identified by land cover information.

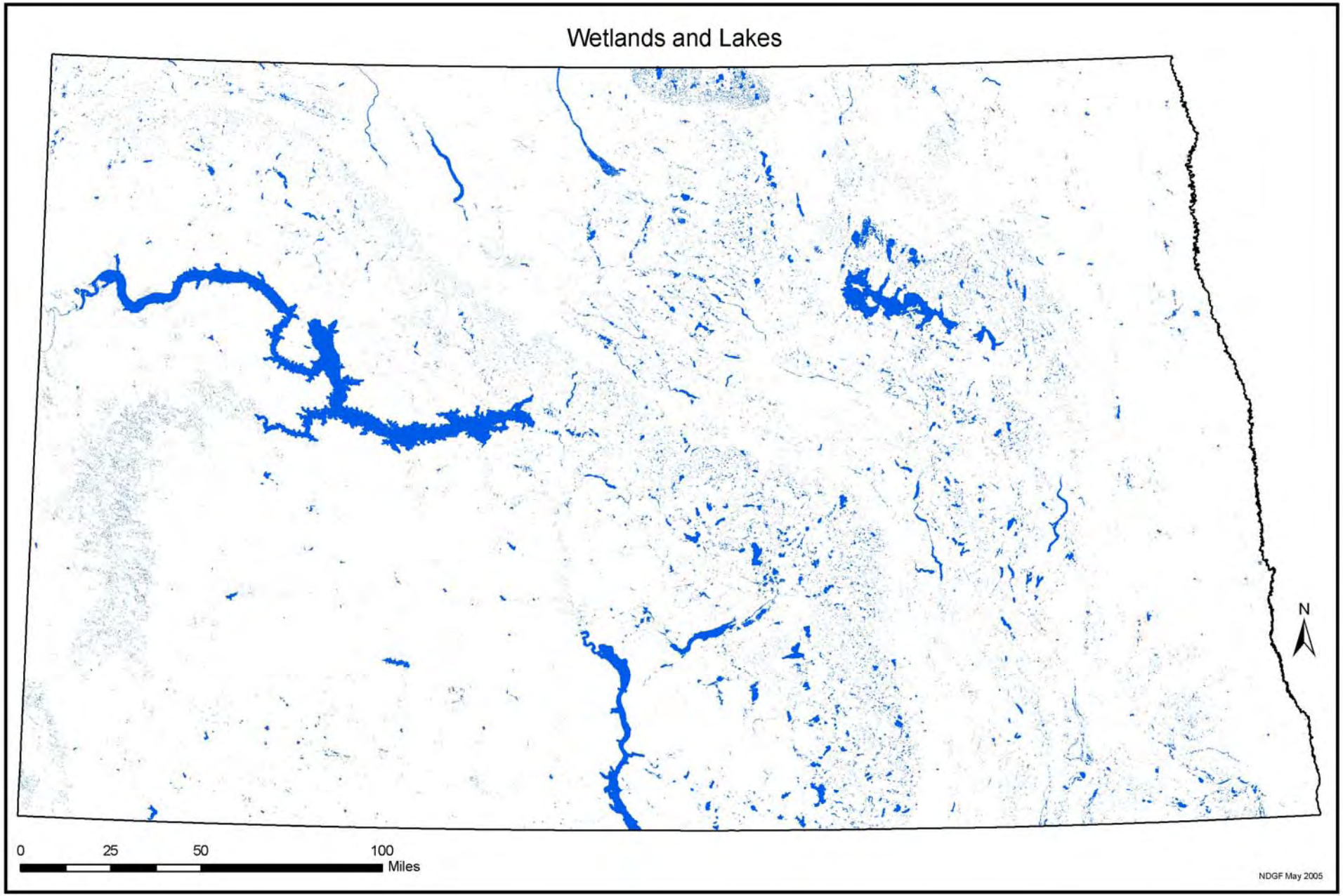

Tallgrass Prairie (Red River Valley)
N
0
25
50
100
Miles
NDGF May 2005

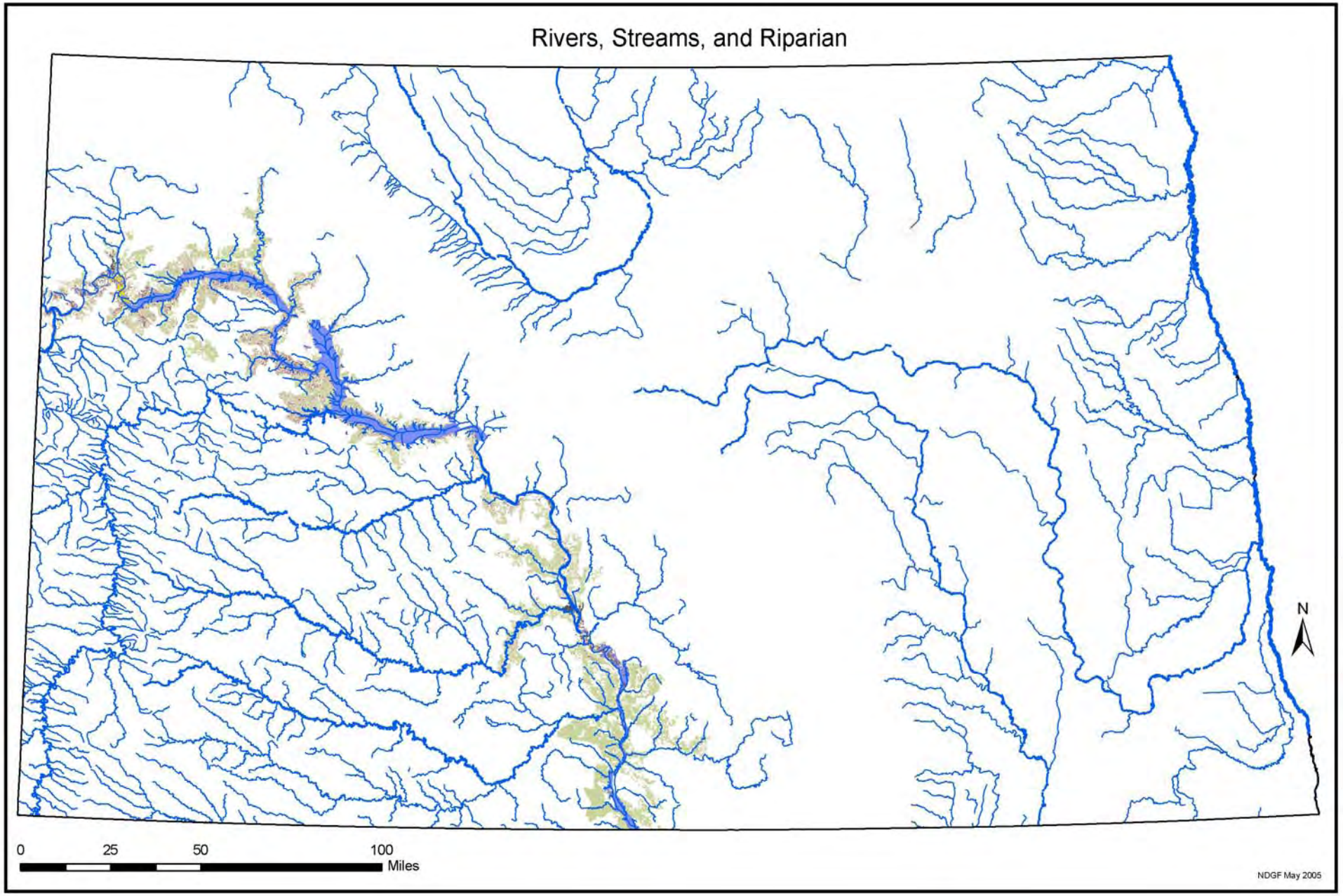

Eastern Mixed-grass Prairie (Drift Prairie)
N
0
25
50
100
Miles
NDGF May 2005

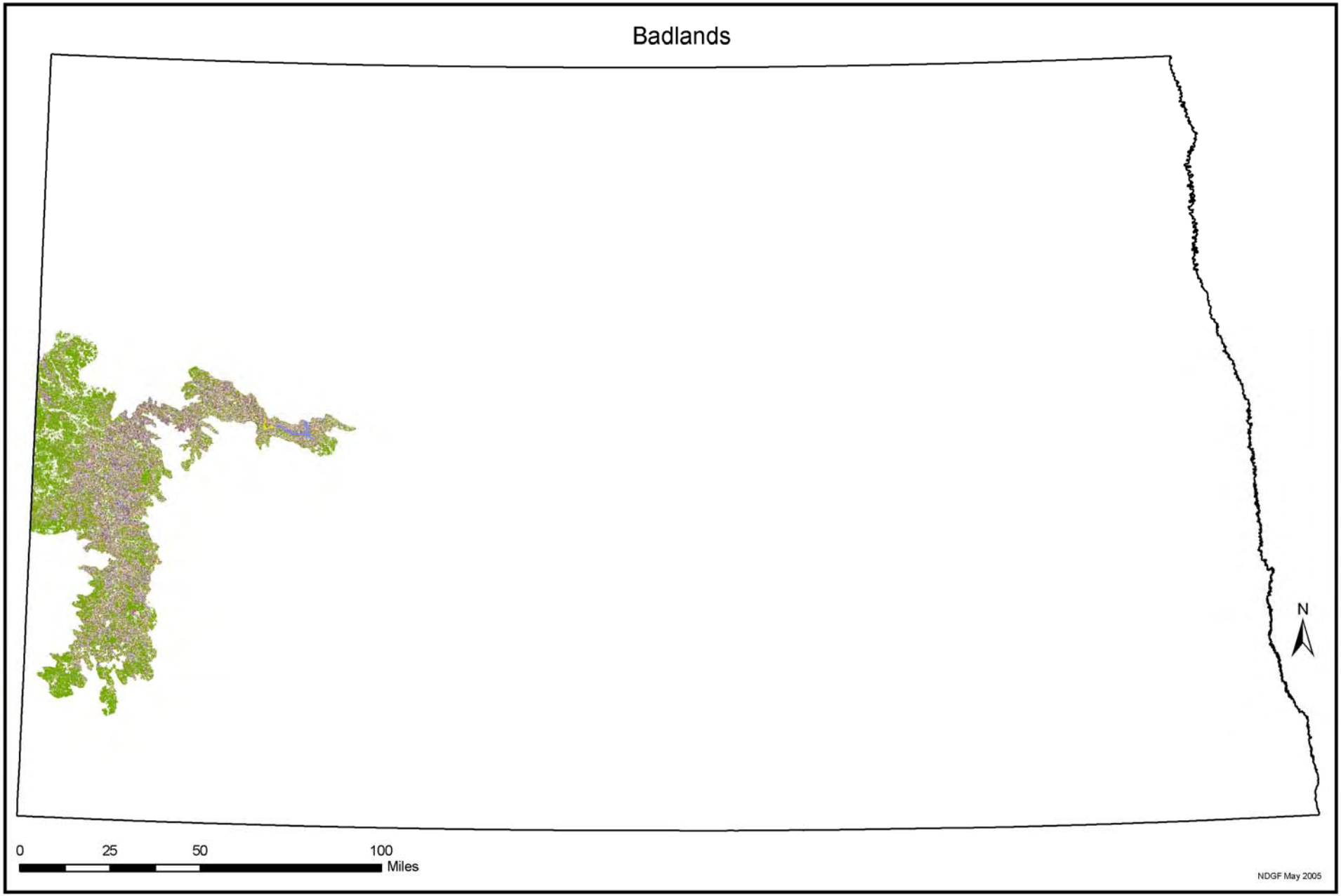

Mixed-grass Prairie (Missouri Coteau)
N
0
25
50
100
Miles
NDGF May 2005

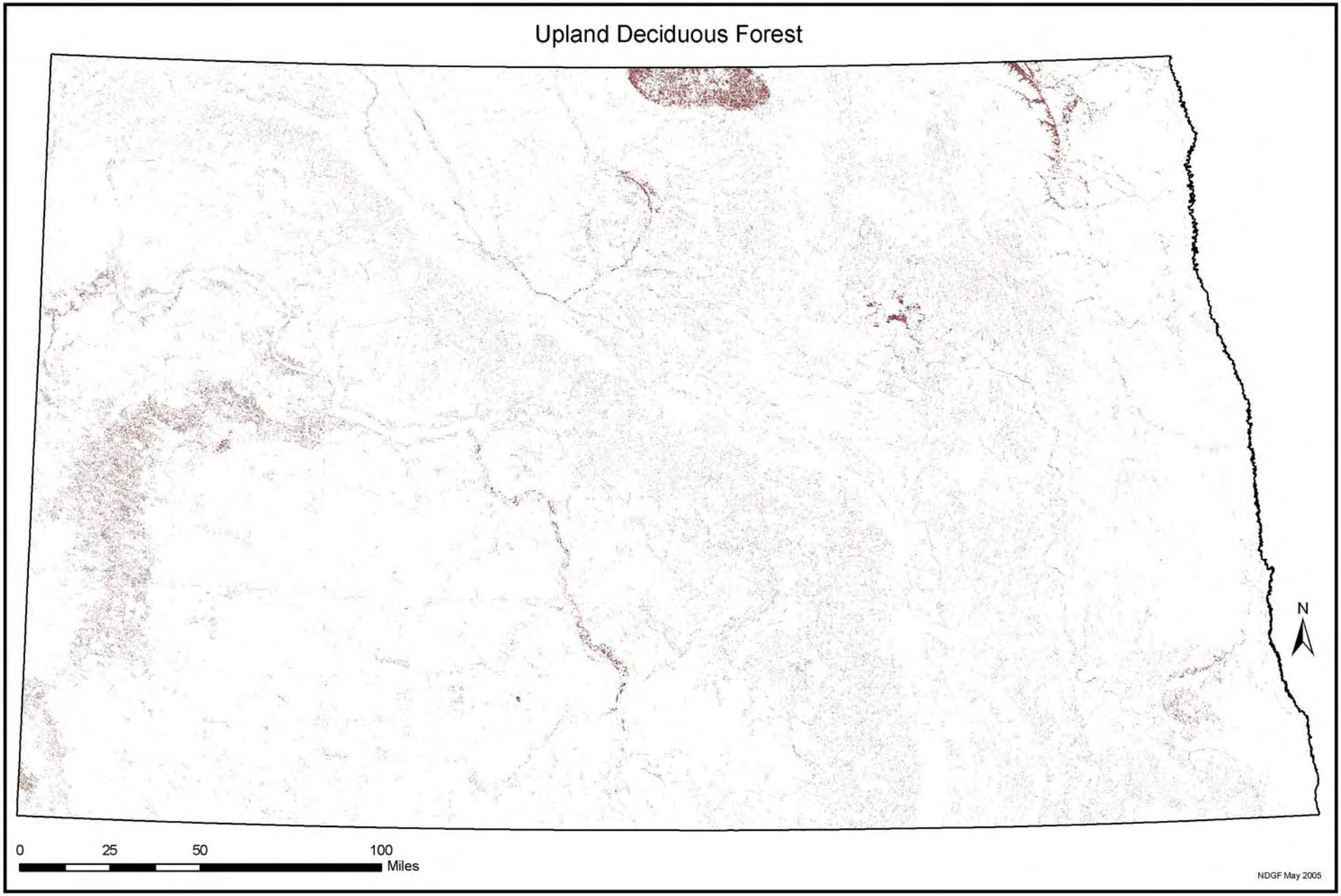

Western Mixed-grass/Shortgrass Prairie (Missouri Slope)
N
0
25
50
100
Miles
NDGF May 2005


Planted or Tame Grassland
N
0
25
50
100
Miles
NDGF May 2005


Wetlands and Lakes
N
0
25
50
100
Miles
NDGF May 2005


Rivers, Streams, and Riparian
N
0
25
50
100
Miles
NDGF May 2005


Badlands
N
0
25
50
100
Miles
NDGF May 2005


Upland Deciduous Forest
N
0
25
50
100
Miles
NDGF May 2005

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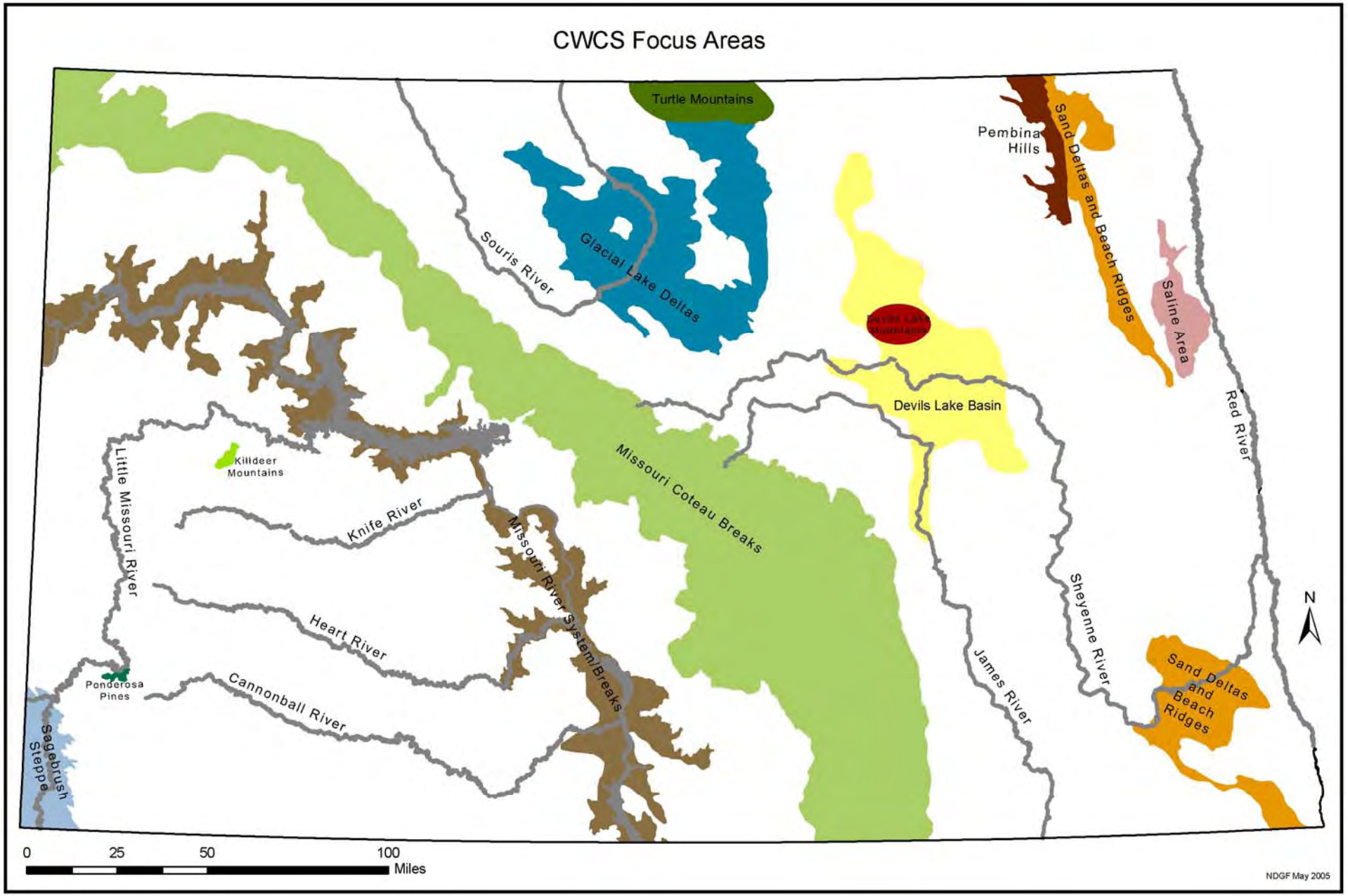
APPENDIX C

Focus Areas Map

The following map depicts the 21 focus areas (minus CRP) identified for the CWCS.



Note: The focus area “CRP” is not depicted on this map. The digital CRP information has not yet been obtained for North Dakota.

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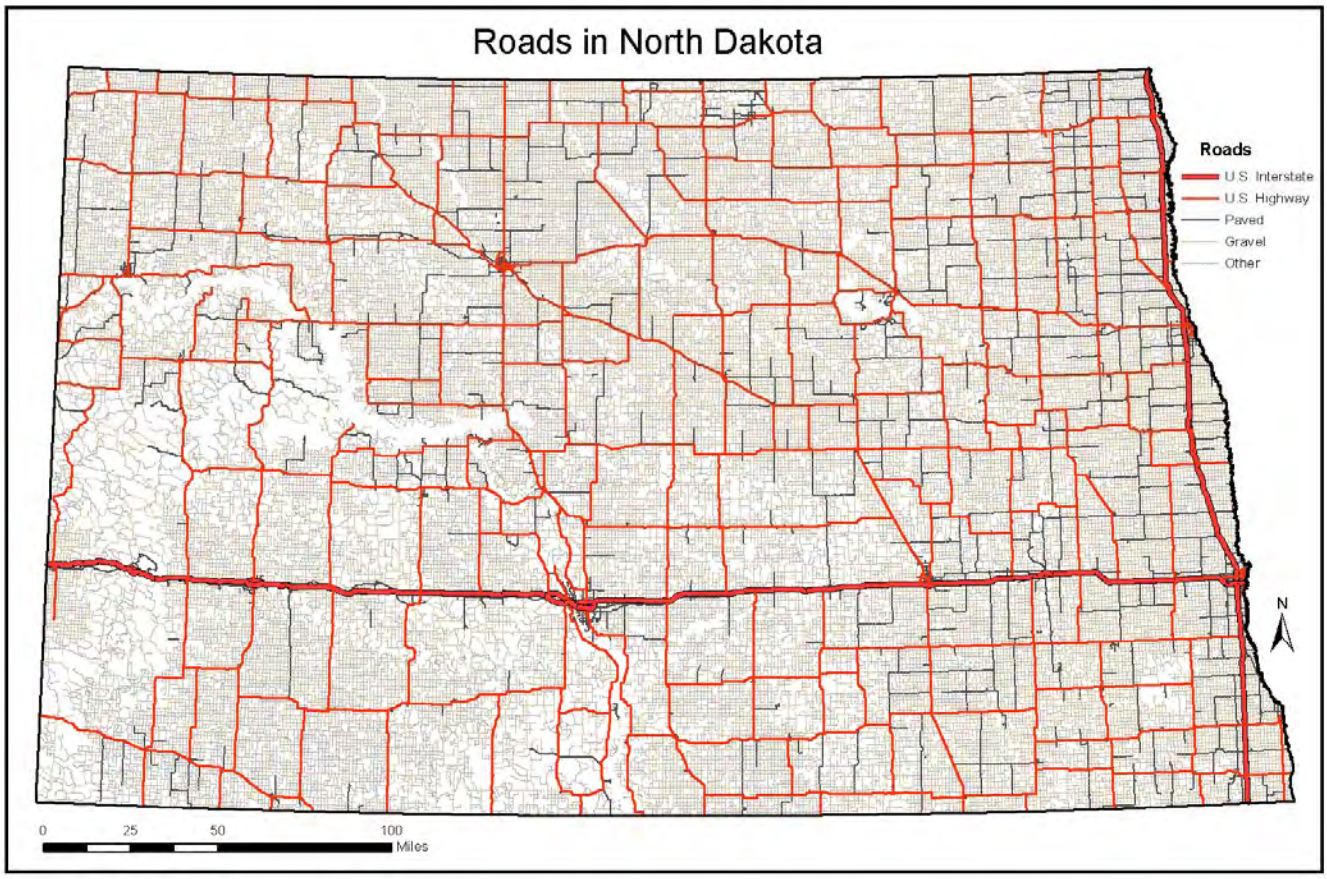
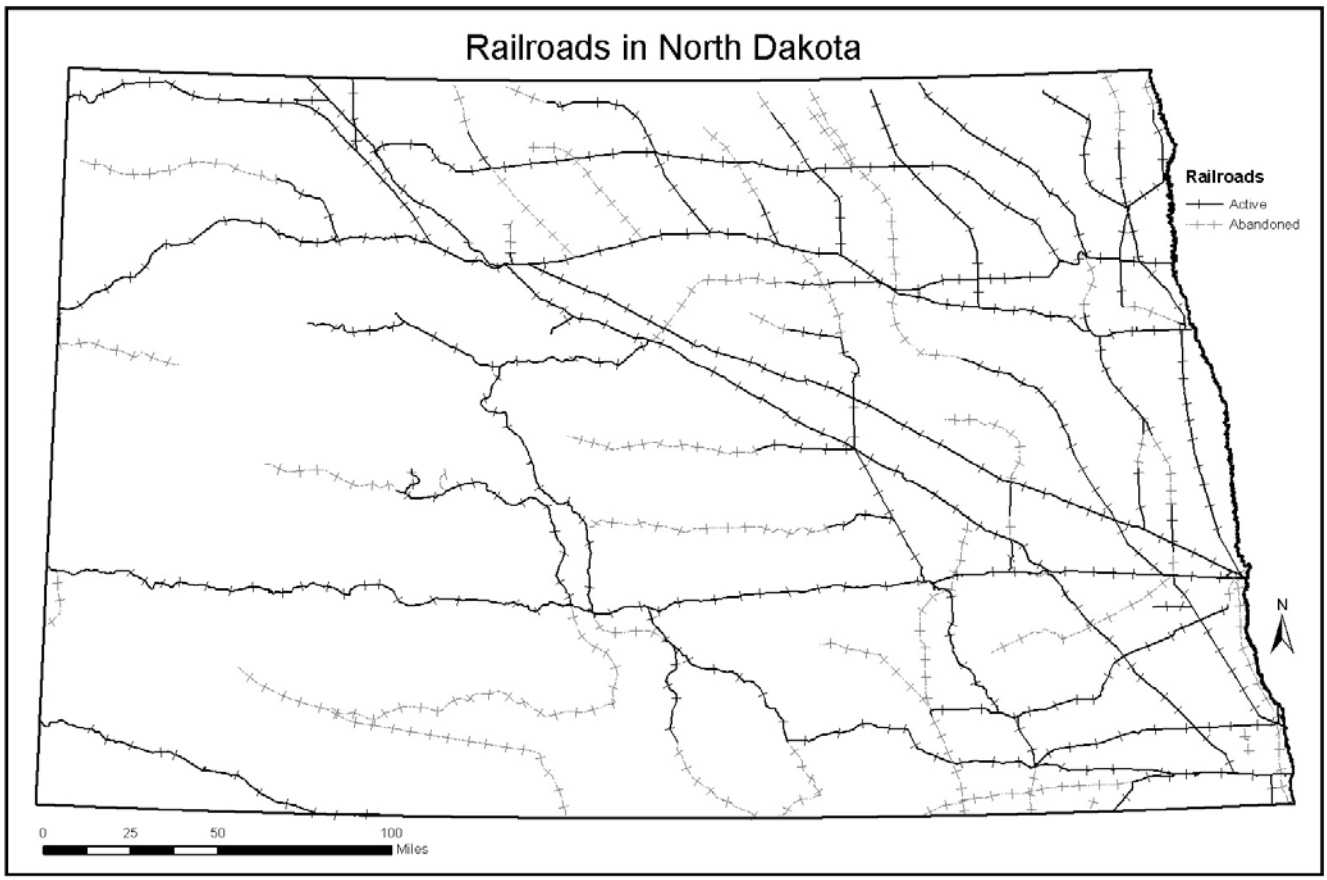
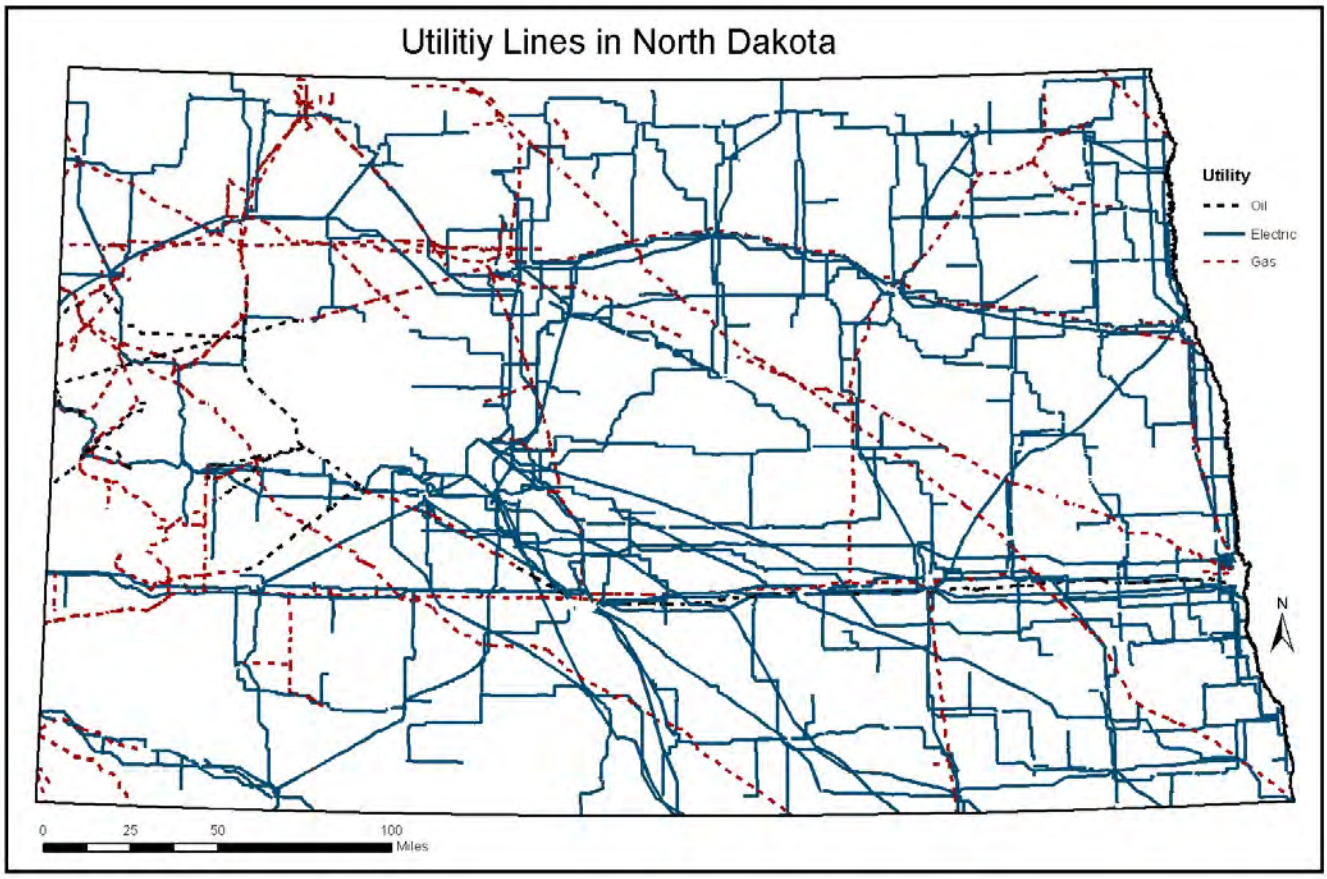
APPENDIX D

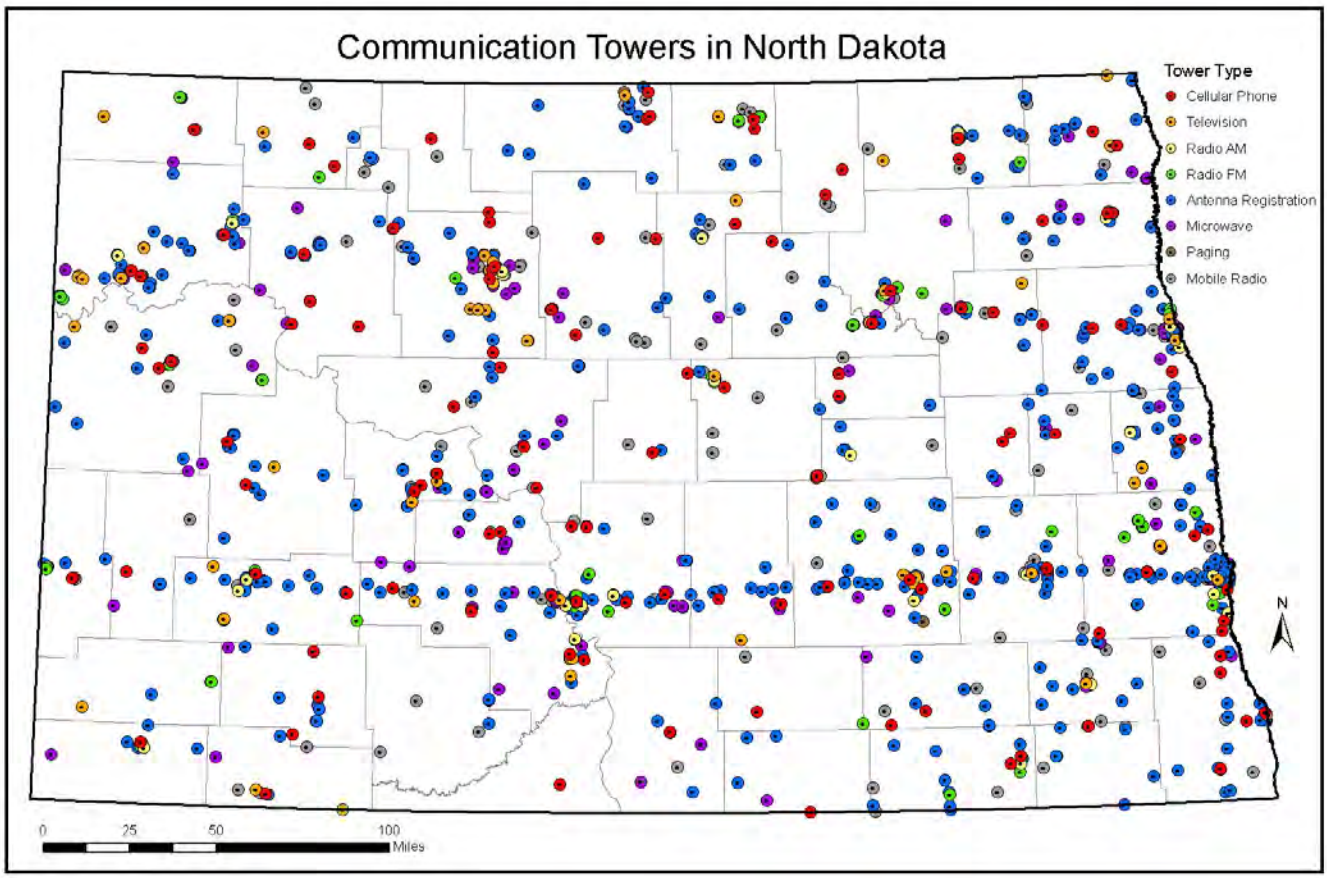
Conservation Challenges Maps

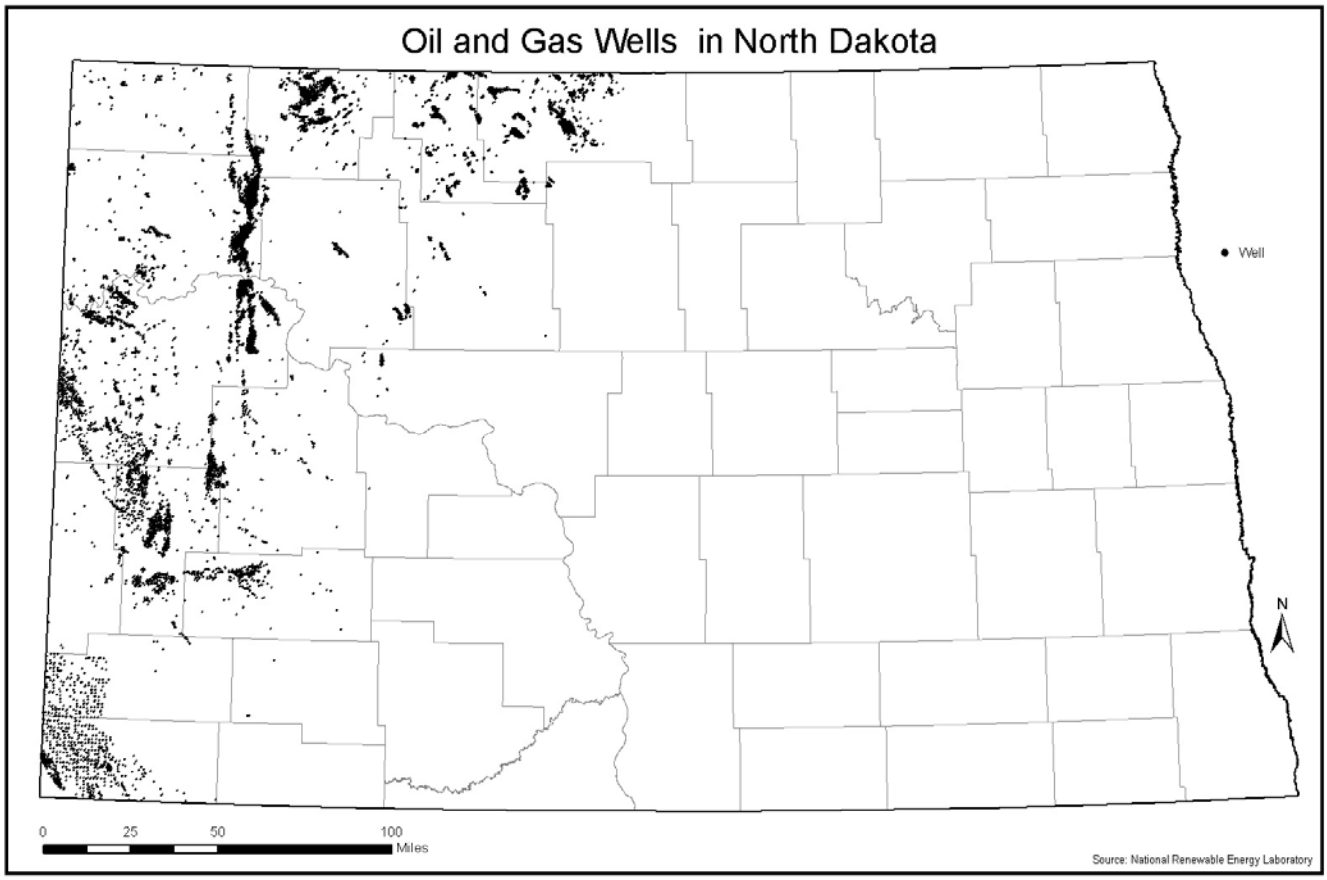
The following maps provide visual examples of the fragmentation of North Dakota (roads, railroads, and utility lines), obstacles which may affect species (communication towers, oil and gas wells, and wind energy potential), and a map depicting land ownership in North Dakota. These maps were developed for the CWCS for the purpose of providing additional visual information on the potential threats or problems which may adversely affect species of conservation priority.

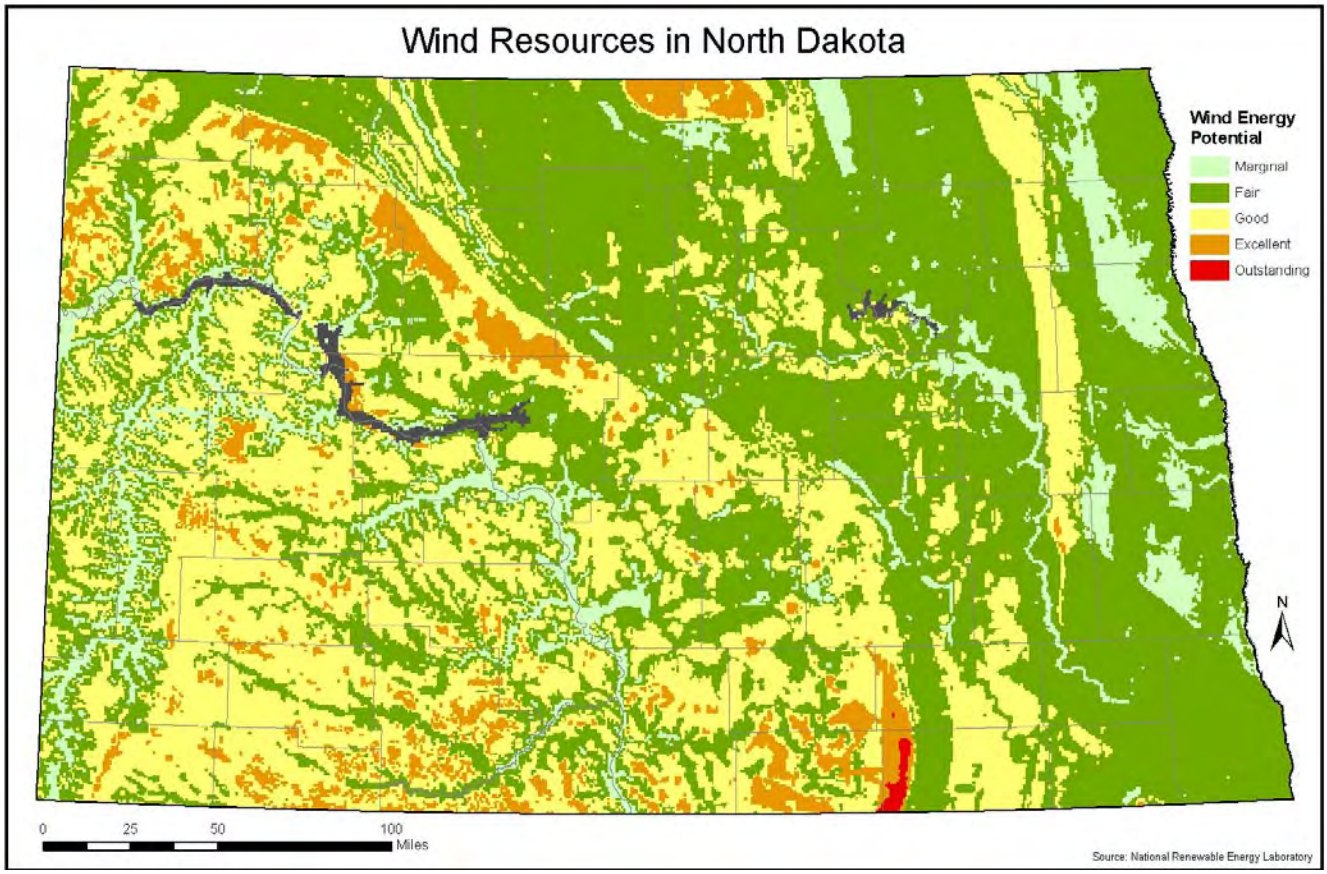

Roads in North Dakota
Roads
U.S. Interstate
U.S. Highway
Paved
Gravel
Other
N
0
25
50
100
Miles

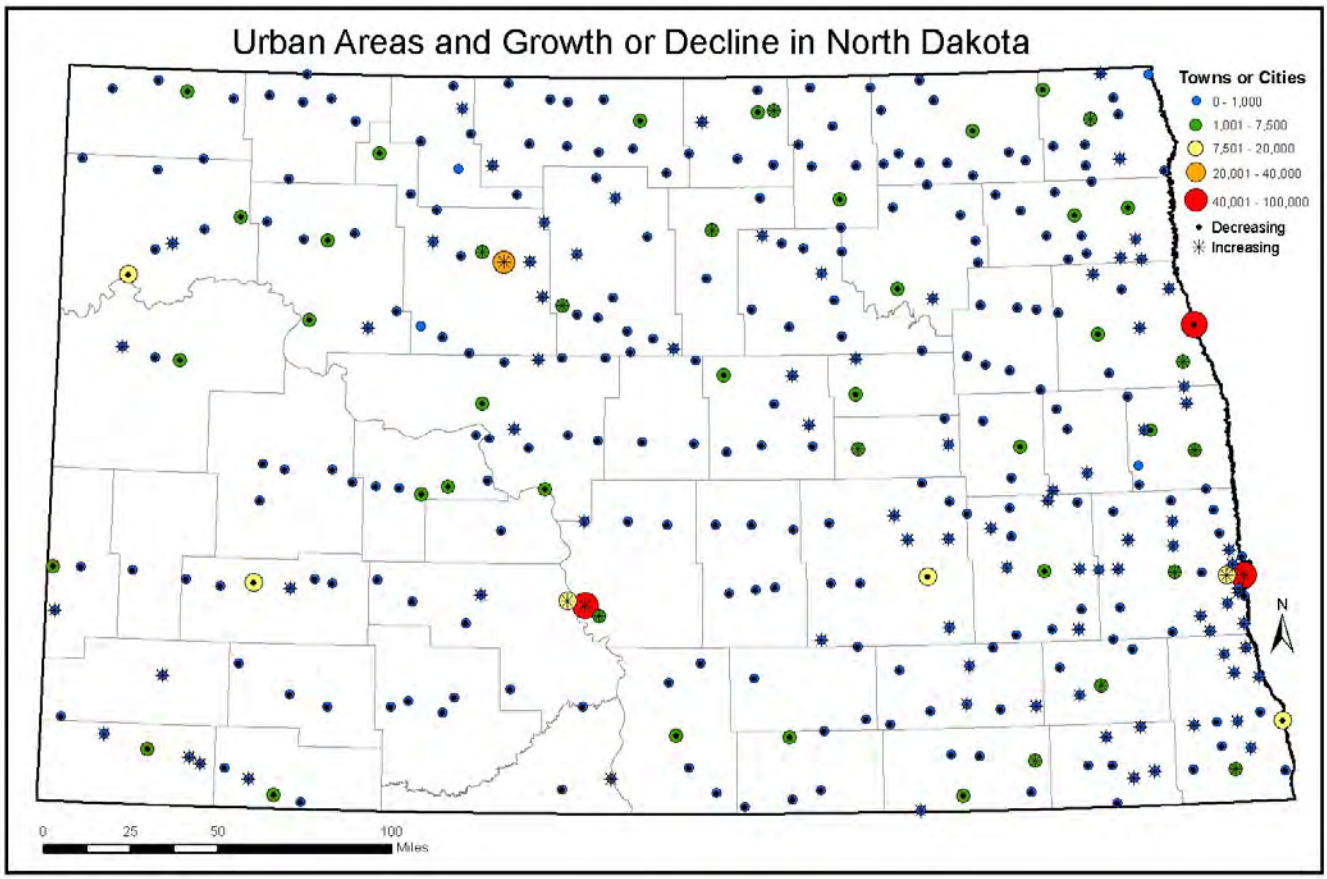

Railroads in North Dakota
Railroads
Active
Abandoned
N
0
25
50
100
Miles

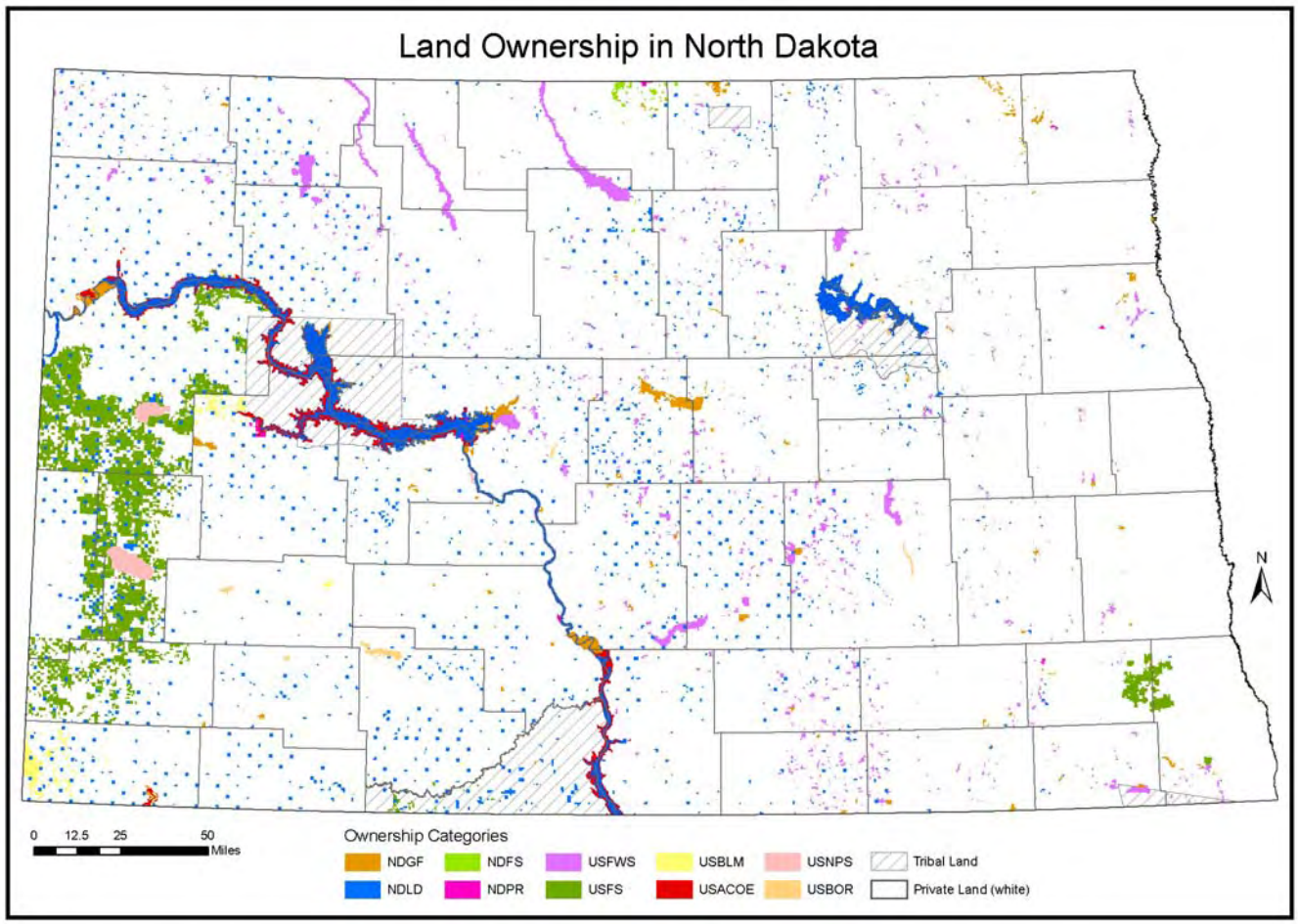

Utilitiy Lines in North Dakota
Utility
Oil
Electric
Gas
N
0
25
50
100
Miles


Communication Towers in North Dakota
Tower Type
Cellular Phone
Television
Radio AM
Radio FM
Antenna Registration
Microwave
Paging
Mobile Radio
N
0
25
50
100
Miles


Oil and Gas Wells in North Dakota
Well
N
0
25
50
100
Miles
Source: National Renewable Energy Laboratory


Wind Resources in North Dakota
Wind Energy Potential
Marginal
Fair
Good
Excellent
Outstanding
N
0
25
50
100
Miles
Source: National Renewable Energy Laboratory


Urban Areas and Growth or Decline in North Dakota
Towns or Cities
0 - 1,000
1,001 - 7,500
7,501 - 20,000
20,001 - 40,000
40,001 - 100,000
Decreasing
Increasing
N
0
25
50
100
Miles


Land Ownership in North Dakota
N
0
12.5
25
50
Miles
Ownership Categories
NDGF
NDFS
USFWS
USBLM
USNPS
Tribal Land
NDLD
NDPR
USFS
USACOE
USBOR
Private Land (white)

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APPENDIX E

Breeding Habitat for Bird, Mammal, Amphibian and Reptile Species of Conservation Priority

and

Effects of Management Practices on Bird Species of Conservation Priority

By Landscape Component

This appendix is intended to serve as a beginning discussion point for implementation of conservation actions. For the grassland landscape components, the first table provided depicts the general characteristics of (grazed) grasslands which will be used by various avian species. These characteristics for mammals, amphibians, and reptiles are not yet identified. The second table provides insight as to the effects of various management practices on the species of conservation priority within the landscape component. It is these types of tools which were identified by partners, particularly those who implement conservation, as useful in on-the-ground management. There is also a table for wetland associated species to serve as discussion for wetland characteristics important to species of conservation priority.

*It is very important to note that some of this information is still in DRAFT form. These tables were created as supplemental information for the CWCS. The authors should be consulted before citing or using this information. Again, the long-term goal is to edit and expand on these tables over time and create a useful tool for wildlife managers to conserve species of conservation priority.

Ideal Breeding/Habitat Conditions and Responses to Grazing for SoCP in the Tallgrass Prairie (Red River Valley).

	Breeding Habitat	Minimum Area Requirement (ha)	Idle	Lightly Grazed	Moderately Grazed	Heavily Grazed	Tall Vegetation	Moderate-Tall Vegetation	Short Vegetation	Dense Vegetation	Moderate-Dense Vegetation	Sparse Vegetation	High Forb Cover	Moderate Forb Cover	Low Forb Cover	Thick Litter	Moderate Litter	Low Litter	Bare Ground -- Positive	Bare Ground -- Negative	Shrubs -- Positive	Shrubs -- Negative
BIRDS																						
American Bittern	G/W		X					X			X						X					X
Northern Pintail	G/W																					
Northern Harrier	G/W		X	X	X		X			X						X					X	
Sharp-tailed Grouse	G/S																					
Greater Prairie-chicken	G		X	X		X	X	X	X	X	X	X		X				X				
Willet	G/W	100		X	X				X			X						X				
Upland Sandpiper	G		X	X	X		X	X	X		X			X	X		X			X		X
Marbled Godwit	G/W		X	X	X				X		X	X		X								
Wilson's Phalarope	G/W	100	X	X	X			X				X						X				
Short-eared Owl	G	100	X	X	X		X	X		X						X						
Sedge Wren	G/W	10		X			X			X				X								
Grasshopper Sparrow	G	>30	X	X	X			X			X			X			X					X
Le Conte's Sparrow	G/W		X				X			X				X		X						X
Nelson's Sharp-tailed Sparrow	G/W	5	X				X			X						X						
Dickcissel	G	10	X	X	X			X		X				X			X			X		
Bobolink	G	30	X	X	X		X	X		X	X			X			X			X		X
MAMMALS																						
Pygmy Shrew	G																					
Arctic Shrew	G																					
Plains Pocket Mouse	G																					
Richardson's Ground Squirrel	G																					
REPTILES/AMPHIBIANS																						
Canadian Toad	G/W																					
Northern Prairie Skink	G																					
Smooth Green Snake	G																					
Western Hognose Snake	G																					

X = that habitat type is preferred or acceptable. Or as it relates to the last four columns, that habitat component has positive or negative effects.
Source: Habitat Requirements and Responses to Grazing of Grassland Birds (Dechant et al. 1999).

Effects of Management Practices on Avian SoCP in the Tallgrass Prairie (Red River Valley).

	American Bittern	Northern Pintail	Northern Harrier	Sharp-tailed Grouse	Greater Prairie-chicken	Willet	Upland Sandpiper	Marbled Godwit	Wilson's Phalarope	Short-eared Owl	Sedge Wren	Grasshopper Sparrow	Nelson's Sharp-tailed Sparrow	Le Conte's Sparrow	Dickcissel	Bobolink
Grazing Overall	*N*					*B*	*B*	*B*		*B*	*U*	*B*	*U*	*U*		
Grazing -- Light		*B*			*B*					*B*		*B*				*B*
Grazing -- Moderate	*N*		*N*			*B*		*B*	*B*		*N*		*N*	*N*		
Grazing -- Heavy	*NN*	*N*	*N*		*NN*		*N*	*B*		*NN*	*NN*	*NN*	*NN*	*NN*	*N*	*NN*
Grazing -- Short Term, 2-4 weeks	N		N		N	B	N	B	U	N		N	N	N	N	N
Grazing -- Rotation	B		B	B		U	B	U	B	B	N	B				B
Grazing -- Season Long	*N*		*N*								*N*	*N*				
Grazing -- Twice over deferred																
Delayed Haying	B		B	B			B					U				U
Haying on NWRs/WPAs -- Long Term	B		B	B						B	B				B	B
Haying on NWRs/WPAs -- Short Term	N		N	N						N	N				N	N
Mowing	*N*							*B*					*N*			
Prescribed Burning	*N*		N		*B*	B	BB	B	*B*	*B*	*B*	B	*N*		*B*	*B*
Years Between Burn	*2-5*		*3-5*		*3-5*		*3*			*2-8*		*2-4*		*2-4*	*3-5*	*2-4*
Wetland Restoration	B		B			B		B	B			N		B		
Wetland Enhancement																
Wetland Creation			N							N						N
Wetland Creation -- Wet Meadow to Type II			N						NN	N	NN		NN	NN		N
Wetland Manipulation/Management on Hayland or Pastures	U								NN							
Re-seed Uplands to DNC	B		B	B		N	N	N		B	B				B	B
Re-seed Uplands to CRP	*B*	*B*	*B*	*B*	*B*		*B*			*B*	*B*	*B*	*B*	*B*		*B*
Re-seed Uplands to Native Grass				B		B	B	B				B				B
No Till or Minimum Till							B	B				B				B
Cropping --						N	N	N								
Chemical Fallow												B				B
Predator Fence Exclosures	BB		BB	BB						BB	B				B	B
Tree Planting -- Multi-row Shelterbelts								N								
Tree Removal	*B*	*B*	*B*	*U*	*B*	*B*	*B*	*B*	*B*	*B*	*B*	*B*	*B*	*B*	*B*	*B*
Weed Control																

Breeding Habitat Categories
G = Grassland
W = Wetland
G/W = Grassland/Wetland Complex
G/S = Grassland/Shrubland
G/S/T = Grassland/Shrubland/Trees

Management Practice Effect
BB = Very Beneficial
B = Beneficial
N = Negative
NN = Very Negative
U = Unknown

Color/text Codes
Black = from "A Review of Wildlife Management Practices in North Dakota" 1993.

Red & italicized = additions from current literature or personal communications.

Ideal Breeding/Habitat Conditions and Responses to Grazing for SoCP in the Eastern Mixed-grass Prairie (Drift Prairie).

	Breeding Habitat	Minimum Area Requirement (ha)	Idle	Lightly Grazed	Moderately Grazed	Heavily Grazed	Tall Vegetation	Moderate-Tall Vegetation	Short Vegetation	Dense Vegetation	Moderate-Dense Vegetation	Sparse Vegetation	High Forb Cover	Moderate Forb Cover	Low Forb Cover	Thick Litter	Moderate Litter	Low Litter	Bare Ground -- Positive	Bare Ground -- Negative	Shrubs -- Positive	Shrubs -- Negative
BIRDS																						
American Bittern	G/W		X					X			X						X					X
Northern Pintail	G/W																					
Northern Harrier	G/W		X	X	X		X			X						X					X	
Swainson's Hawk	G/S/T																					
Ferruginous Hawk	G/S/T	2000?	X	X	X	X		X	X													
Sharp-tailed Grouse	G/S																					
Greater Prairie Chicken	G		X	X		X	X	X	X	X	X	X		X				X				
Willet	G/W	100		X	X				X			X						X				
Upland Sandpiper	G		X	X	X		X	X	X		X			X	X		X			X		X
Marbled Godwit	G/W		X	X	X				X		X	X		X								
Wilson's Phalarope	G/W	100	X	X	X			X				X						X				
Short-eared Owl	G	100	X	X	X		X	X		X						X						
Loggerhead Shrike	G/S		X					X													X	
Sedge Wren	G/W	10		X			X			X				X								
Sprague's Pipit	G	190	X	X	X			X			X	X					X					X
Lark Bunting	G			X	X			X	X		X			X			X				X	
Grasshopper Sparrow	G	>30	X	X	X			X			X			X			X					X
Baird's Sparrow	G	700	X	X	X			X			X			X			X					X
Le Conte's Sparrow	G/W		X				X			X				X		X						X
Nelson's Sharp-tailed Sparrow	G/W	5	X				X			X						X						
Chestnut-collared Longspur	G	700		X	X				X			X						X	X			X
Dickcissel	G	10	X	X	X			X		X				X			X			X		
Bobolink	G	30	X	X	X		X	X		X	X			X			X			X		X
MAMMALS																						
Arctic Shrew	G																					
Pygmy Shrew	G																					
Richardson's Ground Squirrel	G																					
REPTILES/AMPHIBIANS																						
Plains Spadefoot	G/W																					
Canadian Toad	W																					
Smooth Green Snake	G																					
Western Hognose Snake	G																					

X = that habitat type is preferred or acceptable. Or as it relates to the last four columns, that habitat component has positive or negative effects.
Source: Habitat Requirements and Responses to Grazing of Grassland Birds (Dechant et al. 1999).

Effects of Management Practices on Avian SoCP in the Drift Prairie.

	American Bittern	Northern Pintail	Northern Harrier	Swainson's Hawk	Ferruginous Hawk	Sharp-tailed Grouse	Upland Sandpiper	Marbled Godwit	Wilson's Phalarope	Sedge Wren	Sprague's Pipit	Lark Bunting	Grasshopper Sparrow	Baird's Sparrow	Le Conte's Sparrow	Nelson's Sharp-tailed Sparrow	Chestnut-collared Longspur	Dickcissel	Bobolink
Grazing Overall	*N*						*B*	*B*		*U*			*B*	*B*	*U*	*U*	*B*		
Grazing -- Light		*B*			*N*								*B*	*B*					*B*
Grazing -- Moderate	*N*		*N*					*B*	*B*	*N*					*N*	*N*			
Grazing -- Heavy	*NN*	*N*	*N*		*B*		*N*	*B*		*NN*			*NN*	*NN*	*NN*	*NN*	*N*	*N*	*NN*
Grazing -- Short Term, 2-4 weeks	N		N		B		N	B	U				N	B	N	N	B	N	N
Grazing -- Rotation	B		B		N	B	B	U	B	*N*			B	B			N		B
Grazing -- Season Long	*N*		*N*							*N*			*N*						
Grazing -- Twice over deferred																			
Delayed Haying	B		B			B	B						U	U					U
Haying on NWRs/WPAs - Long Term	B		B			B				B								B	B
Haying on NWRs/WPAs - Short Term	N		N			N				N								N	N
Mowing	*N*							*B*								*N*			
Prescribed Burning	*N*		N		B		BB	B	*B*	*B*			B	BB		*N*	B	*B*	*B*
Years Between Burn	*2-5*		*3-5*				*3*						*2-4*	*2-10*	*2-4*			*3-5*	*2-4*
Wetland Restoration	B		B					B	B				N		B				
Wetland Enhancement																			
Wetland Creation			N																N
Wetland Creation - Wet Meadow to Type II			N						NN	NN					NN	NN			N
Wetland Manipulation Management on Hayland or Pastures	U								NN										
Re-seed Uplands to DNC	B		B			B	N	N		B							N	B	B
Re-seed Uplands to CRP	*B*	*B*	*B*			*B*	*B*			*B*			*B*		*B*	*B*	*B*		*B*
Re-seed Uplands to Native Grass						B	B	B					B	B					B
Cattail Control - Use of RODEO	N		N			N			B										
Cattail Control - Burning	N		N			N			B										
No Till or Minimum Till							B	B					B	B			B		B
Cropping -							N	N									N		
Chemical Fallow													B	B			B		B
Island Trapping			B						B										
Island Creation/Peninusla Cutoffs			B						B										
Predator Fence Exclosures	BB		BB			B B				B								B	B
Tree Planting -- Multi-row Shelterbelts								N									N		

Breeding Habitat Categories
G = Grassland
W = Wetland
G/W = Grassland/Wetland Complex
G/S = Grassland/Shrubland
G/S/T = Grassland/Shrubland/Trees

Management Practice Effect
BB = Very Beneficial
B = Beneficial
N = Negative
NN = Very Negative
U = Unknown

Color/text Codes
Black = from "A Review of Wildlife Management Practices in North Dakota" 1993.

Red & italicized = additions from current literature or personal communications.

Ideal Breeding/Habitat Conditions and Responses to Grazing for SoCP in the Mixed-grass Prairie (Missouri Coteau).

	Breeding Habitat	Minimum Area Requirement (ha)	Idle	Lightly Grazed	Moderately Grazed	Heavily Grazed	Tall Vegetation	Moderate-Tall Vegetation	Short Vegetation	Dense Vegetation	Moderate-Dense Vegetation	Sparse Vegetation	High Forb Cover	Moderate Forb Cover	Low Forb Cover	Thick Litter	Moderate Litter	Low Litter	Bare Ground -- Positive	Bare Ground -- Negative	Shrubs -- Positive	Shrubs -- Negative
BIRDS																						
American Bittern	G/W		X					X			X						X					X
Northern Pintail	G/W																					
Northern Harrier	G/W		X	X	X		X			X						X					X	
Swainson's Hawk	G/S/T																					
Ferruginous Hawk	G/S/T	2000?	X	X	X	X		X	X													
Sharp-tailed Grouse	G/S																					
Willet	G/W	100		X	X				X			X						X				
Upland Sandpiper	G		X	X	X		X	X	X		X			X	X		X			X		X
Marbled Godwit	G/W		X	X	X				X		X	X		X								
Wilson's Phalarope	G/W	100	X	X	X			X				X						X				
Short-eared Owl	G	100	X	X	X		X	X		X						X						
Loggerhead Shrike	G/S		X					X													X	
Sedge Wren	G/W	10		X			X			X				X								
Sprague's Pipit	G	190	X	X	X			X			X	X					X					X
Lark Bunting	G			X	X			X	X		X			X			X				X	
Grasshopper Sparrow	G	>30	X	X	X			X			X			X			X					X
Baird's Sparrow	G	700	X	X	X			X			X			X			X					X
Le Conte's Sparrow	G/W		X				X			X				X		X						X
Nelson's Sharp-tailed Sparrow	G/W	5	X				X			X						X						
Chestnut-collared Longspur	G	700		X	X				X			X						X	X			X
Dickcissel	G	10	X	X	X			X		X				X			X			X		
Bobolink	G	30	X	X	X		X	X		X	X			X			X			X		X
MAMMALS																						
Richardson's Ground Squirrel	G																					
REPTILES/AMPHIBIANS																						
Plains Spadefoot	G/W																					
Canadian Toad	W																					
Smooth Green Snake	G																					
Western Hognose Snake	G																					

X = that habitat type is preferred or acceptable. Or as it relates to the last four columns, that habitat component has positive or negative effects.
Source: Habitat Requirements and Responses to Grazing of Grassland Birds (Dechant et al. 1999).

Effects of Management Practices on SoCP in the Missouri Coteau.

	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	Loggerhead Shrike	Sedge Wren	Sprague's Pipit	Lark Bunting	Grasshopper Sparrow	Baird's Sparrow	Le Conte's Sparrow	Nelson's Sharp-tailed Sparrow	Chestnut-collared Longspur	Dickcissel	Bobolink
Grazing Overall	*N*						*B*	*B*	*B*		*B*		*U*	*B*	*B*	*B*	*B*	*U*	*U*	*B*		
Grazing -- Light		*B*			*N*						*B*			*B*		*B*	*B*					*B*
Grazing -- Moderate	*N*		*N*				*B*		*B*	*B*			*N*					*N*	*N*			
Grazing -- Heavy	*NN*	*N*	*N*		*B*			*N*	*B*		*NN*		*NN*	*NN*	*N*	*NN*	*NN*	*NN*	*NN*	*N*	*N*	*NN*
Grazing -- Short Term, 2-4 weeks	N		N		B		B	N	B	U	N			B	U	N	B	N	N	B	N	N
Grazing -- Rotation	B		B		N	B	U	B	U	B	B		N	B	B	B	B			N		B
Grazing -- Season Long	*N*		*N*										*N*			*N*						
Grazing -- Twice over deferred																						
Delayed Haying	B		B			B		B								U	U					U
Haying on NWRs/WPAs - Long Term	B		B			B					B		B		B						B	B
Haying on NWRs/WPAs -- Short Term	N		N			N					N		N		N						N	N
Mowing	*N*								*B*										*N*			
Prescribed Burning	*N*		N		B		B	BB	B	*B*	*B*		*B*	BB	B	B	BB		*N*	B	*B*	*B*
Years Between Burn	*2-5*		*3-5*					*3*			*2-8*			*2-4*		*2-4*	*2-10*	*2-4*			*3-5*	*2-4*
Wetland Restoration	B		B				B		B	B						N		B				
Wetland Enhancement																						
Wetland Creation			N								N											N
Wetland Creation - Wet Meadow to Type II			N							N N	N		NN					NN	NN			N
Wetland Manipulation Management on Hayland or Pastures	U									N N												
Re-seed Uplands to DNC	B		B			B	N	N	N		B		B		B					N	B	B
Re-seed Uplands to CRP	*B*	*B*	*B*			*B*		*B*			*B*		*B*		*B*	*B*		*B*	*B*	*B*		*B*
Re-seed Uplands to Native Grass						B	B	B	B							B	B					B
Cattail Control -- Use of RODEO	N		N			N				B												
Cattail Control -Burning	N		N			N				B												
No Till or Minimum Till								B	B						B	B	B			B		B
Cropping -							N	N	N											N		
Chemical Fallow															B	B	B			B		B
Island Trapping			B							B												
Island Creation/Peninusla Cutoffs			B							B												
Predator Fence Exclosures	BB		BB			B B					BB		B		B						B	B
Tree Planting -- Multi-row Shelterbelts									N			B		N						N		

Breeding Habitat Categories
G = Grassland
W = Wetland
G/W = Grassland/Wetland Complex
G/S = Grassland/Shrubland
G/S/T = Grassland/Shrubland/Trees

Management Practice Effect
BB = Very Beneficial
B = Beneficial
N = Negative
NN = Very Negative
U = Unknown

Color/text Codes
Black = from "A Review of Wildlife Management Practices in North Dakota" 1993.

Red & italicized = additions from current literature or personal communications.

Ideal Breeding/Habitat Conditions and Responses to Grazing for SoCP in the Western Mixed-grass Prairie (Missouri Slope).

	Breeding Habitat	Minimum Area Requirement (ha)	Idle	Lightly Grazed	Moderately Grazed	Heavily Grazed	Tall Vegetation	Moderate-Tall Vegetation	Short Vegetation	Dense Vegetation	Moderate-Dense Vegetation	Sparse Vegetation	High Forb Cover	Moderate Forb Cover	Low Forb Cover	Thick Litter	Moderate Litter	Low Litter	Bare Ground – Positive	Bare Ground – Negative	Shrubs – Positive	Shrubs – Negative
BIRDS																						
Northern Pintail	G/W																					
Northern Harrier	G/W		X	X	X		X			X						X					X	
Ferruginous Hawk	G/S/T	2000?	X	X	X	X		X	X													
Swainson's Hawk	G/S/T																					
Golden Eagle	G/S	2000?																				
Prairie Falcon	G/S	2000?																				
Sharp-tailed Grouse	G/S																					
Greater Sage-Grouse	Sage/G																					
Upland Sandpiper	G		X	X	X		X	X	X		X			X	X		X			X		X
Long-billed Curlew	G				X				X			X		X								
Wilson's Phalarope	G/W	100	X	X	X			X				X						X				
Burrowing Owl	G	35			X	X			X			X						X	X			
Short-eared Owl	G	100	X	X	X		X	X		X						X						
Loggerhead Shrike	G/S		X					X													X	
Sprague's Pipit	G	190	X	X	X			X			X	X					X					X
Brewer's Sparrow	Sage/G																					
Lark Bunting	G			X	X			X	X		X			X			X				X	
Grasshopper Sparrow	G	>30	X	X	X			X			X			X			X					X
Baird's Sparrow	G	700	X	X	X			X			X			X			X					X
Chestnut-collared Longspur	G	700		X	X				X			X						X	X			X
McCown's Longspur	G				X	X			X			X						X	X			
MAMMALS																						
Hispid Pocket Mouse	G																					
Sagebrush Vole	Sage/G																					
Black-tailed Prairie Dog	G																					
REPTILES/AMPHIBIANS																						
Plains Spadefoot	G/W																					
Short-horned Lizard	G/S																					
Northern Sagebrush Lizard	Sage/G																					
Western Hognose Snake	G																					

X = that habitat type is preferred or acceptable. Or as it relates to the last four columns, that habitat component has positive or negative effects.
Source: Habitat Requirements and Responses to Grazing of Grassland Birds (Dechant et al. 1999).

Effects of Management Practices on Avian SoCP in the Missouri Slope.

	Northern Pintail	Northern Harrier	Ferruginous Hawk	Swainson's Hawk	Golden Eagle	Prairie Falcon	Sharp-tailed Grouse	Greater Sage-Grouse	Upland Sandpiper	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
Grazing Overall									*B*			*B*	*B*		*B*		*B*	*B*	*B*	*B*	
Grazing -- Light	*B*		*N*									*N*	*B*		*B*			*B*	*B*		
Grazing -- Moderate		*N*									*B*										
Grazing -- Heavy	*N*	*N*	*B*						*N*			*BB*	*NN*		*NN*		*N*	*NN*	*NN*	*N*	
Grazing -- Short Term, 2-4 weeks		N	B						N		U		N		B		U	N	B	B	
Grazing -- Rotation		B	N				B		B		B	N	B		B		B	B	B	N	
Grazing -- Season Long		*N*																*N*			
Grazing -- Twice over deferred																					
Delayed Haying		B					B		B									U	U		
Haying on NWRs/WPAs - Long Term		B					B						B				B				
Haying on NWRs/WPAs - Short Term		N					N						N				N				
Mowing																					
Prescribed Burning		N	B						BB		B		B		BB		B	B	BB	B	
Years Between Burn		*3-5*							*3*				*2-8*		*2-4*			*2-4*	*2-10*		
Wetland Restoration		B									B							N			
Wetland Enhancement																					
Wetland Creation		N											N								
Wetland Creation - Wet Meadow to Type II		N									NN		N								
Wetland Creation - West of Missouri R.																					
Wetland Manipulation/Management on Hayland or Pastures											NN										
Re-seed Uplands to DNC		B					B		N				B				B			N	
Re-seed Uplands to CRP	*B*	*B*					*B*		*B*				*B*				*B*	*B*		*B*	
Re-seed Uplands to Native Grass							B		B									B	B		
Cattail Control - Use of RODEO		N					N				B										
Cattail Control - Burning		N					N				B										
No Till or Minimum Till									B								B	B	B	B	
Cropping -									N											N	
Chemical Fallow																	B	B	B	B	
Island Trapping		B									B										
Island Creation/Peninusla Cutoffs		B									B										
Predator Fence Exclosures		BB					BB						BB				B				
Tree Planting - Multi-row Shelterbelts														B	N					N	
Weed Control																					
Gravel Shoreline																					

Breeding Habitat Categories
G = Grassland
W = Wetland
G/W = Grassland/Wetland Complex
G/S = Grassland/Shrubland
G/S/T = Grassland/Shrubland/Trees
Sage/G = Big Sagebrush/Grassland

Management Practice Effect
BB = Very Beneficial
B = Beneficial
N = Negative
NN = Very Negative
U = Unknown

Color/text Codes
Black = from "A Review of Wildlife Management Practices in North Dakota" 1993.

Red & italicized = additions from current literature or personal communications.

Ideal Breeding/Habitat Conditions for SoCP in Wetlands or Lakes.

				Wetland Type								Potential Associated NWI Classification					
	Breeding Habitat	Wetland Size (ha)	Water Depth (cm)	Temporary	Seasonal	Semipermanent	Permanent	Permanent Wood-bordered	Alkali	Fens	Cropland Ponds	System (Subsystem)	Class	Water Regime	Water Chemistry	Special Modifiers	Cover Type
BIRDS																	
Horned Grebe	W	1-10	20-50			X		X				P	AB(3,4), EM(1)	C, F, H	9, 0	h, x	3
American White Pelican	W		<250				X					L(1)	RB, UB, AB, OW	H, G, K		h	4
American Bittern	G/W	3-180	10-90		X	X				X		P	EM(1)	A, B, C		h	1, 2
Northern Pintail	G/W			X	X	X	X		X	X	X	P, L(2)	AB, EM(1)	A, B, C, F, H, J, K	9	d, f, h, x	3, 4
Canvasback	W	<0.5	30-90			X						P, L	AB, EM(1)	F	9	h	2, 3
Redhead	W	0.5-0.8	20-150		X	X						P, L	AB, EM(1)	F, C	9	h	2, 3
Northern Harrier	G/W			X	X	X				X	X	P	EM(1)	B, A, C, F, H			
Yellow Rail	W	0.5-1000	0-20							X		P	EM(1)	**B**, A	0		1
Whooping Crane		>40, <4	10-100									P, L, R	EM, UB(3,4), AB, US	C, F, A, H			4
Piping Plover	W		<5						X			R(2), L(2)	US(1,2), UB	A, C, F, H	7, 8		4
American Avocet	W		<20			X	X		X		X	P, L(2), R(2)	UB(1,2,3), US(1,2,3)	F, H, G	7, 8, 9, 0	d, f, h	4
Willet	G/W		<20	X	X	X	X				X	P, L(2), R(2)	US(1,2,3)	F, C, H, G	7, 8, 9, 0	d, f, h	4
Long-billed Curlew	G/W		<20														
Marbled Godwit	G/W		<20	X	X	X	X		X		X	P, L(2), R(2)	US(1,2,3)	F, C, H, G	7, 8, 9, 0	d, f, h	4
Wilson's Phalarope	G/W			X	X	X	X		X	X		P, L(2), R(2)	US(1,2,3), EM	F, C, H, G, A, B	7, 8, 9, 0	d, f, h, x	4
Franklin's Gull	W		30-130			X	X		X		X	P, L(2)	EM(1)	C, F, H, J, K		h	2
Black Tern	W	>5	50-120		X	X	X					P, L(2)	EM(1)	F, C, H, J	9, 0	h	2
Short-eared Owl																	
Sedge Wren	G/W			X	X	X				X		P	EM(1)	**B**, A, F	0		1
Le Conte's Sparrow	G/W			X						X		P	EM(1)	B	0		1
Nelson's Sharp-tailed Sparrow	G/W				X	X				X		P	EM(1)	B	0		1
MAMMALS																	
Arctic Shrew	G/W/R																
Pygmy Shrew	G/W/R																
REPTILES/AMPHIBIANS																	
Plains Spadefoot	G/W			X	X	X	X			X	X						
Canadian Toad	G/W			X	X	X	X			X	X						
Common Snapping Turtle	W					X	X	X									

Ideal Breeding/Habitat Conditions and Responses to Grazing for SoCP in the Badlands.

	Breeding Habitat	Minimum Area Requirement (ha)	Substrate Height (m)	Idle	Lightly Grazed	Moderately Grazed	Heavily Grazed	Tall Vegetation	Moderate-Tall Vegetation	Short Vegetation	Dense Vegetation	Moderate-Dense Vegetation	Sparse Vegetation	High Forb Cover	Moderate Forb Cover	Low Forb Cover	Thick Litter	Moderate Litter	Low Litter	Bare Ground -- Positive	Bare Ground -- Negative	Shrubs -- Positive	Shrubs -- Negative
BIRDS																							
Swainson's Hawk																							
Golden Eagle	G/S	2000?	0-107																				
*Peregrine Falcon	G		20-200																				
Prairie Falcon	G/S	2000?	3-140																				
Sharp-tailed Grouse	G/S																						
Burrowing Owl	G	35				X	X			X			X						X	X			
Loggerhead Shrike	G/S			X					X													X	
Lark Bunting	G				X	X			X	X		X			X			X				X	
Grasshopper Sparrow	G	>30		X	X	X			X			X			X			X					X
MAMMALS																							
Western Small-footed Myotis																							
Long-eared Myotis																							
Long-legged Myotis																							
Black-tailed Prairie Dog	G																						
*Black-footed Ferret	G																						
*Swift Fox	G																						
REPTILES/AMPHIBIANS																							
Plains Spadefoot	G/W																						
Short-horned Lizard	G/S																						
Northern Sagebrush Lizard	Sage/G																						

X = that habitat type is preferred or acceptable. Or as it relates to the last four columns, that habitat component has positive or negative effects.
Source: Habitat Requirements and Responses to Grazing of Grassland Birds (Dechant et al. 1999).

Glossary/Definitions

Terrestrial Definitions

Breeding Habitat. G = Grassland; W = Wetland; S = Shrubland; T = Trees; R = Riparian; G/W = Grassland/Wetland; W/G = Wetland/Grassland; G/S = Grassland/Shrubland;

Minimum Area requirements: Provides minimum area requirements for species exhibiting area sensitivity.

Minimum Substrate Height.

Idle. An area of land left undisturbed or unmanaged (e.g., not burned, mowed, or grazed) during a given time period.

Light Grazing. A comparative term which indicates that the stocking rate of a pasture is relatively less than that of other pastures. Sometimes erroneously used to mean under use.

Moderate Grazing. A comparative term which indicates that the stocking rate of a pasture is between the rates of other pastures. Sometimes erroneously used to mean proper use.

Heavy Grazing. A comparative term which indicates that the stocking rate of a pasture is relatively greater than that of other pastures. Sometimes erroneously used to mean overuse.

Tall Vegetation. A comparative term which indicates that the vegetation is tall relative to other areas.

Moderate-Tall Vegetation. A comparative term which indicates that the vegetation is between heights relative to other areas.

Short Vegetation. A comparative term which indicates that the vegetation is short relative to other areas.

Dense Vegetation. A comparative term which indicates that the vegetation is thick relative to other areas.

Moderate-Dense Vegetation. A comparative term which indicates that the vegetation is between thicknesses relative to other areas.

Sparse Vegetation. A comparative term which indicates that the vegetation is scarce relative to other areas.

High Forb Cover. A comparative term which indicates that a great amount of forbs are present relative to other areas.

Moderate Forb Cover. A comparative term which indicates that an intermediate amount of forbs are present relative to other areas.

Low Forb Cover. A comparative term which indicates that small amounts of forbs are present relative to other areas.

Thick Litter. A comparative term which indicates that substantial dead vegetation accumulation is present relative to other areas.

Moderate Litter. A comparative term which indicates that an intermediate amount of vegetation accumulation is present relative to other areas.

Low Litter. A comparative term which indicates that a small amount of dead vegetation accumulation is present relative to other areas.

Bare Ground – Positive. A comparative term which indicates that the presence of bare ground, or no vegetation present, has beneficial impacts on a species.

Bare Ground – Negative. A comparative term which indicates that the presence of bare ground, or no vegetation present, has negative impacts on a species.

Shrubs – Positive. A comparative term which indicates that the presence of shrubs has beneficial impacts on a species.

Shrubs – Negative. A comparative term which indicates that the presence of shrubs has negative impacts on a species.

Aquatic Definitions

(Cowardin et al. 1979, Stewart and Kantrud 1979, Stewart 1975)

Wetland Size. Provides minimum area requirements.

Water Depth. Provides minimum preferred water depth.

Temporary (Class 2, Temporarily Flooded). Surface water present for a brief period during the early spring following snowmelt and occasionally for several days following heavy rainstorms during the late spring, summer, and fall.

Seasonal (Class 3, Seasonally Flooded). Surface water is present for extended periods in the spring and early summer, but disappears during the late summer and fall in most years.

Semipermanent (Class 4, Semipermanently Flooded). Surface water is present throughout most of the spring and summer and into the fall and winter in most years. During drought years, water may disappear as early as midsummer.

Permanent (Class 5, Permanently Flooded). Surface water is present throughout the year in all years.

Permanent Wood-bordered. Deep surface water is present throughout the year in all years and the periphery of the wetland is predominantly woodland.

Alkali (Class 6, Eusaline or Hpersaline). Highly saline shallow water and alkali salt flats.

Fens (Saturated). Surface water is sometimes lacking but bottom soils saturated by alkaline ground-water seepage.

Cropland Ponds. Occur in basins with soils that are frequently cultivated.

Potential Associated NWI Classification Definitions

System (Subsystem).

(R) Riverine. Water within a channel flowing either permanently or intermittently (rivers).

(2) Lower Perennial. Low gradient, slow velocity, well developed floodplain, sand and mud substrate, oxygen deficits at times.

(3) Upper Perennial. High gradient, fast velocity, poorly developed floodplain, stone and rock substrate, high oxygen levels

(4) Intermittent. Periodic flows, isolate pools possible.

(L) Lacustrine. Water in a depression, generally greater than 20 acres (lakes).

(1) Limmetic. Deep lake, water deeper than 2 meters at low lake.

(2) Littoral. Shallow lakes and shorelines of deeper lakes, water depth less than 2 meters at low lake.

(P) Palustrine. Wetlands generally less than 20 acres and less than 2 meters deep (marshes).

Class.

(RB) Rock Bottom. Stones, boulders, bedrock; at least semipermanently flooded; less than 30% vegetated.

Bedrock (1), Rubble (2)

(UB) Unconsolidated Bottom. Cobbles, sand, gravel, mud; at least semipermanently flooded; less than 30% vegetated.

Cobble-Gravel (1), Sand (2), Mud (3), Organic (4)

(AB) Aquatic Bed. Plants growing on or below the water surface; at least seasonally flooded.

Algal (1), Aquatic Moss (2), Rooted Vascular (3), Floating Vascular (4)

(RS) Rocky Shore. Stones, boulders, bedrock; seasonally flooded or less, less than 30% vegetated.

Bedrock (1), Rubble (2)

(UB) Unconsolidated Shore. Cobbles, sand, gravel, mud; seasonally flooded or less; less than 30% vegetated.

Cobble-Gravel (1), Sand (2), Mud (3), Organic (4), Vegetated (5)

(EM) Emergent. Erect, rooted, herbaceous hydrophytes; all water regimes (persistent and nonpersistent).

Persistent (1). Dominated by species that normally remain standing at least until the beginning of the next growing season.

Nonpersistent (2). Dominated by plants which fall to the surface of the substrate or below the surface of the water at the end of each growing season; at certain seasons of the year, there are no obvious signs of emergent vegetation.

Water Regime.

(A) Temporarily Flooded. Surface water present for brief periods during the growing season.

(B) Saturated. Substrate saturated to the surface for extended periods, but surface water is seldom present.

(C) Seasonally Flooded. Surface water is present for extended periods in the growing season, but is absent by the end of the season in most years.

(F) Semipermanently Flooded. Surface water is present throughout the growing season in most years.
(G) Intermittently Exposed. Surface water persists in most years except during extreme drought.
(H) Permanently Flooded. Surface water is present throughout the year in all years.
(J) Intermittently Flooded. Substrate usually exposed, but surface water is present for variable periods without seasonal periodicity.
(K) Artificially Flooded. Amount and duration of flooding is controlled by pumps in combination with dams.

Water Chemistry.

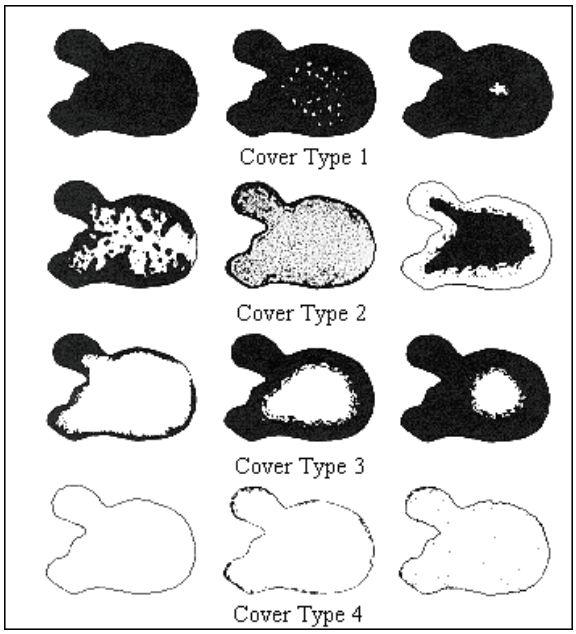
(7) Hypersaline.
(8) Eusaline
(9) Mixosaline
(0) Fresh

Special Modifiers.

(d) Partially Drained/Ditched. Water level is artificially lowered but soil moisture is sufficient to support hydrophytes.
(f) Farmed. Soil surface has been mechanically or physically altered for production of crops.
(h) Diked/Impounded. Created by a barrier obstructing the outflow or inflow of water.
(x) Excavated. Lies within a basin or channel excavated by man.

Cover Type:

Cover Type 1. Closed stands of emergents with open water or bare soil covering less than 5 percent of the wetland area.
Cover Type 2. Open water or bare soil covering 5 to 95 percent of the wetland area, with scattered dense patches or diffuse open stands of emergent cover. Closed stands of emergents, located in the central portion of a pond or lake and surrounded by open water along the shallow margins, are included in this cover type.
Cover Type 3. Central expanses of open water or bare soil (comprising more than 5 percent of the wetland area) surrounded by peripheral bands of emergent cover averaging 6 feet or more in width.
Cover Type 4. Open water or bare soil covers more than 95 percent of the wetland area. This cover type also includes small ponds in which emergent cover is restricted to marginal bands less than 6 feet in average width.



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APPENDIX F

Glossary

A

Abiotic. Non-living. Climate is an abiotic component of ecosystems.

Abundance. The total number of individuals of a species in an area, population, or community.

Adaptive Management. A type of natural resource management that implies making decisions as part of an on-going process. Monitoring the results of actions will provide a flow of information that may indicate the need to change a course of action. Scientific findings and the needs of society may also indicate the need to adapt resource management to new information.

Aerial Photograph. A photograph of the earth's surface taken from airborne equipment, sometimes called aerial photo or air photograph.

Arid. A term applied to regions or climates where lack of sufficient moisture severely limits growth and production of vegetation.

B

Bare Ground. All land surface not covered by vegetation, rock, or litter.

Barren. Any area devoid of vegetation, or practically so.

Biota. All the species of plants and animals occurring within an area or region.

Brush. A term encompassing various species of shrubs or small trees usually considered undesirable for livestock or timber management. The species may have value for browse, wildlife habitat, or watershed protection.

Bunch Grass. A grass having the characteristic growth habit of forming a bunch; lacking stolens or rhizomes.

Butte. An isolated hill with relatively steep sides.

C

Candidate Species. Any species being considered by the Secretary of the Interior for listing as an endangered or threatened species but is undergoing a status review or is proposed for listing.

Canopy Cover. The percentage of ground covered by a vertical projection of the outermost perimeter of the natural spread of foliage of plants. Small openings within the canopy are included.

Channelization. (1) The artificial enlargement or realignment of a stream channel. (2) Straightening a stream or river to allow water to travel through the area more quickly. (3) The process of changing or straightening the natural path of a waterway. Channelization is often used as a means of flood control, but its negative effects often outweigh its advantages. For example, channelization often damages wetlands associated with rivers and streams.

Classification. The assignment of items or concepts into classes based on similarity of selected attributes.

Community. An assemblage of populations of plants and/or animals in a common spatial arrangement.

Community Type. An aggregation of all plant communities distinguished by floristic and structural similarities in both overstory and undergrowth layers.

Conservation. (1)The use and management of natural resources according to principles that assure their sustained economic and/or social benefits without impairment of environmental quality. (2)The protection, preservation, management, or restoration of wildlife and of natural resources such as forests, soil, and water (www.dictionary.com).

Continuous Grazing. The grazing of a specific unit by livestock throughout the year or for that part of the year during which grazing is feasible. The term is not synonymous with *yearlong grazing*, since seasonal grazing may be involved.

Coordinated Resource Management Planning. The process whereby various user groups are involved in discussion of alternate resource uses and collectively diagnose management problems, establish goals and

objectives, and evaluate multiple use resource management.

Cover. (1) The plants or plant parts, living or dead, on the surface of the ground. Vegetative cover or herbage cover is composed of living plants and litter cover of dead parts of plants. (2) The area of ground cover by plants of one or more species.

Cover Type. The existing vegetation of an area.

D

Dam. A human-created embankment that controls or confines water (dike).

Debris. Accumulated plant and animal remains.

Deciduous (Plant). Plant parts, particularly leaves, that are shed at regular intervals, or at a given stage of development.

Deferment. Delay of grazing on an area for an adequate period of time to provide for plant reproduction, establishment of new plants, or restoration of vigor of existing plants.

Deferred Grazing. The use of *deferment* in *grazing management* of a management unit, but not in a systematic rotation including other units. cf. *grazing system*.

Deferred-Rotation. Any grazing system which provides for a systematic rotation of the deferment among pastures.

Distribution. The spatial or temporal array of a species. The geographic occurrence or range of an organism

Diversity. The distribution and abundance of different plants and animal communities within an area.

E

Easement. A voluntary agreement that allows a landowner to permanently limit the type and amount of development on their property while retaining private ownership.

Ecological Status. The present state of vegetation and soil protection of an ecological site in relation to the potential natural community for the site.

Ecological Type. A land classification category which is more specific than a phase of habitat type. Ecological types are commonly used to differentiate habitat phases into categories of land which differ in their ability to produce vegetation or their response to management.

Ecosystem. Organisms together with their abiotic environment, forming an interacting system, inhabiting an identifiable space.

Edge Effect. The influence of one adjoining plant community upon the margin of another affecting the composition and density of the populations. cf. *ecotone.*

Endangered Species. A plant or animal that is in danger of extinction throughout all or a significant portion of its range. Endangered species are identified by the Secretary of the Interior in accordance with the Endangered Species Act of 1973.

Endemic. Native to or restricted to a particular area, region or country.

Environment. The sum of all external conditions that affect an organisim or community to influence its development or existence.

Erosion. (v.) Detachment and movement of soil or rock fragments by water, wind, ice, or gravity. (n.) The land surface worn away by running water, wind, ice, or other geological agents, including such processes as gravitational creep.

Escarpment. A steep slope or ridge, terminating high lands abruptly, which was formed by erosion or by faulting.

Evergreen (Plant). A plant that has leaves all year round, and generally sheds them in a single season after new leaves of the current growing season have matured.

Exotic. An organism or species which is not native to the region in which it is found.

F

Fauna. The animal species of an area.

Feral. Escaped from cultivation or domestication and existing in the wild.

Flora. The plant species of an area.

Forb. Any broad-leafed herbaceous plant other than those in *Poaceae, Cyperaceae* and *Juncacea* families.

Fragmentation The process of transforming large continuous grassland patches into one or more smaller patches surrounded by disturbed areas.

G

Game. (1) Wild birds, fish, and other animals taken for sport or for use as food. (2) Wildlife species so designated by law and the harvest of which is regulated by law.

GIS. Geographic Information System. Software for creating and managing spatial data.

Graminoid. Grass or grass-like plant, such as *Poa, Carex* and *Juncus* species.

Grass. A member of the family *Poaceae*.

Grassland. Land on which the vegetation is dominated by grasses, grasslike plants, and/or forbs.

Graze. (1) (vi.) The consumption of standing *forage* by livestock or wildlife. (2) (vt.) To put livestock to feed on standing forage.

Grazing. (vt.) To graze.

Grazing Management. The manipulation of grazing and browsing animals to accomplish a desired result.

Grazing Management Plan. A program of action designed to secure the best practicable use of the forage resources with grazing or browsing animals.

Grazing Season. (1) On public lands, an established period for which grazing permits are issued. May be established on private land in a *grazing management plan*. (2) The time interval when animals are allowed to utilize a certain area.

Grazing System. A specialization of *grazing management* which defines the periods of grazing and non-grazing.

Ground Truth. Measurements or observations made on the ground for the purpose of verifying interpretations made from aerial photography or remote sensing.

H

Habitat. (1) The area or environment where an organism or ecological community normally lives or naturally occurs. (2) The natural abode of a plant or animal, including all biotic, climatic, and edaphic factors affecting life.

Heavy Grazing. A comparative term which indicates that the stocking rate of a pasture is relatively greater than that of other pastures. Often erroneously used to mean overuse. cf. *light* and *moderate grazing*.

Herbaceous. Vegetative growth with little or no woody component. Non-woody vegetation such as graminoids and forbs.

Herbicide. A phytotoxic chemical used for killing or inhibiting the growth of plants.

I

Idle. Not in use or operation. An area of land left undisturbed or unmanaged (e.g., not burned, mowed, or grazed) during a given time period.

Indicator Species. (1) Species that indicate the presence of certain environmental conditions, seral stages, or previous treatment. (2) One or more plant species selected to indicate a certain level of grazing use. cf. *key species.*

Indigenous. Born, growing, or produced naturally (native) in an area, region, or country.

Introduced Species. A species not a part of the original fauna or flora of the area in question. cf. *native and resident species.*

Invertebrate. An animal that does not have a backbone; examples include crayfish, insects and mollusks.

K

L

Landscape. (1) Aspects of the land characteristics of a particular region. (2) An area of land containing a mosaic of *habitat* patches. (3) Heterogeneous land area composed of a cluster of interacting ecosystems that is repeated in similar form throughout, not defined by size.

Light Grazing. A comparative term which indicates that the stocking rate of a pasture is relatively less than that of other pastures. Often erroneously used to mean under use. cf. *heavy* and *moderate grazing*.

Litter. The uppermost layer of organic debris on the soil surface; essentially the freshly fallen or slightly decomposed vegetal material.

M

Management Plan. A program of action designed to reach a given set of objectives.

Marginal Land. Land of questionable physical or economic capabilities for sustaining a specific use.

Migrant. An animal that migrates, or makes regular trips to and from a nesting or wintering area. (Audubon Encyclopedia)

Migration. A regular movement, as used here, refers to the spring movements of birds from their wintering to their summering or nesting places, and the fall movements from their nesting grounds to their wintering places.

Mitigation. As defined in 40 CFR 1508.20, one or more of the following: (1) avoiding impacts altogether by not taking a certain action or parts of an action; (2) minimizing impacts by limiting the degree or magnitude of an action and its implementation; (3) rectifying impacts by repairing, rehabilitating, or restoring the affected environment; (4) reducing or eliminating impacts over time by preservation and maintenance operations during the life of the action; and (5) compensating for impacts by replacing or providing substitute resources or environments.

Moderate Grazing. A comparative term which indicates that the stocking rate of a pasture is between the rates of other pastures. Often erroneously used to mean proper use. cf. *heavy* and *light grazing*.

Monitoring. The orderly collection, analysis, and interpretation of resource data to evaluate progress toward meeting management objectives.

Multiple Use. Use of range for more than one purpose, i.e., grazing of livestock, wildlife production, recreation, watershed and timber production.

N

Native Species. A species which is part of the original fauna or flora of the area in question.

Naturalized Species. A species not native to an area but which adapted to that area and has established a stable or expanding population. Does not require artificial inputs for survival and reproduction.

Niche. The ecological role of a species in a community.

Nongame. All species of native animals not commonly taken for sport or commercial purposes.

Nonpoint Source Pollution- Pollution whose source is not specific in location. The sources of the discharge are dispersed, not well defined, or constant. Rain storms and snowmelt often make this type of pollution worse. Examples include sediments from logging activities and runoff from agricultural chemicals.

Noxious Species. A plant species that is undesirable because it conflicts, restricts, or otherwise causes problems under management objectives.

Noxious Weed. According to the Federal Noxious Weed Act (PL 93-629), a weed that causes disease or has other adverse effects on humans and their environment and is therefore detrimental to public health and the agriculture and commerce of the United States.

O

Organism. Any living entity; plant, animal, fungus, etc.

Overgrazed Range. A range which has experienced loss of plant cover and accelerated erosion as a result of heavy grazing or browsing pressure.

Overgrazing. Continued heavy grazing which exceeds the recovery capacity of the community and creates a deteriorated range. cf. *overuse.*

Overstory. The upper canopy or canopies of plants. Usually refers to trees, tall shrubs and vines.

Overuse. Utilizing an excessive amount of the current year's growth which, if continued, will result in *range deterioration*. cf. *overgrazing.*

P

Pasture. (1) A grazing area enclosed and separated from other areas by fencing or other barriers; the management unit for grazing land. (2) Forage plants used as food for grazing animals. (3) Any area devoted to the production of forage, native or introduced, and harvested by grazing. (4) A group of subunits grazed within a rotational grazing system.

Pastureland. Grazing lands, planted primarily to introduced or domesticated native forage species, that receive periodic renovation and/or cultural treatments such as tillage, fertilization, mowing, weed control and irrigation. Not in rotation with crops.

Pesticide. Any chemical agent such as herbicide, fungicide, insecticide, etc., used for the control of a specific organism.

Plain. A broad stretch of relatively level treeless land.

Plant Succession. Syn. *Succession.*

Population. All the organisms that constitute a specific group or occur in a specified habitat.

Prairie. An extensive tract of level or rolling land that was originally predominantly treeless and grass-covered. cf. *grassland, rangeland.*

Prescribed Burning. The use of fire as a management tool under specified conditions for burning a predetermined area.

Proper Grazing. The act of continuously obtaining proper use.

Proper Use. A degree of utilization of current year's growth which, if continued, will achieve management objectives and maintain or improve the long-term productivity of the site. Proper use varies with time and systems of grazing.

Q

R

Range. (n.) Any land supporting vegetation suitable for grazing including rangeland, grazable woodland and shrubland. Range is not a use.

Range Condition. (a) A generic term relating to present status of a unit of range in terms of specific values or potentials. (b) The present state of vegetation of a range site in relation to the climax (natural potential) plant community for that site.

Rangeland. Land on which the native vegetation (climax or natural potential) is predominantly grasses, grass-like plants, forbs, or shrubs. Includes lands revegetated naturally or artificially when routine management of that vegetation is accomplished mainly through manipulation of grazing. Rangelands include natural grasslands, savannas, shrublands, and wet meadows.

Repeated Seasonal Grazing. A grazing strategy in which different kinds of pastures are arranged in a series and each is grazed at the same time each year, often for less than the full feasible grazing season to provide a special use. Syn. *seasonal grazing*.

Resident Species. Nonmigratory. A species common to an area without distinction as being native or introduced.

Rest. Leaving an area ungrazed, thereby foregoing grazing of one forage crop. Normally, rest implies absence of grazing for a full growing season or during a critical portion of plant development. cf. *deferment*.

Rest-Rotation. A grazing management scheme in which rest periods for individual pastures, paddocks or grazing units, generally for the full

growing season, are incorporated into a grazing rotation. cf. *grazing system*.

Riparian. Referring to or relating to areas adjacent to water or influenced by free water associated with streams or rivers on geologic surfaces occupying the lowest position on a watershed.

Rotation Grazing. A grazing scheme where animals are moved from one grazing unit (paddock) in the same group of grazing units to another without regard to specific graze-rest periods or levels of plant defoliation. cr. *grazing system.*

Runoff. The total stream discharge of water, including both surface and subsurface flow, usually expressed in acre-feet of water yield.

S

Seasonal Grazing. Grazing restricted to a specific season. Syn. seasonal use.

Semiarid. A term applied to regions or climates where moisture is normally greater than under arid conditions, but still definitely limits the production of vegetation.

Seral. Refers to species or communities that are eventually replaced by other species or communities within a sere.

Seral Stages. The developmental stages of an ecological succession.

Sere. All temporary communities in a successional sequence.

Short-Duration Grazing. Grazing management whereby relatively short periods (days) of grazing and associated non-grazing are applied to range or pasture units. Periods of grazing and non-grazing are based upon plant growth characteristics. Short duration grazing has nothing to do with intensity of grazing use.

Shrub. A plant that has persistent, woody stems and a relatively low growth habit, and that generally produces several basal shoots instead of a single bole. It differs from a tree by its low stature (generally less than 5 meters, or 16 feet) and non-arborescent form.

Shrubland. Any land on which shrubs dominate the vegetation.

Site. The place or seat of any specified thing.

Snag. A standing or fallen dead tree. Snags are important as habitat for a variety of wildlife species and their prey.

Species. A taxon or rank species; in the hierarchy or biological classification, the category below genus.

Species Composition. The proportions of various plant species in relation to the total on a given area. It may be expressed in terms of cover, density, weight, etc.

Standing Crop. The total amount of plant material per unit of space at a given time. Often is divided into above ground and below ground portions and further may be modified by the descriptors “dead” or “live” to more accurately define the specific type of biomass.

Stockpond. A water impoundment made by constructing a dam or by excavating a dugout or both, to provide water for livestock and wildlife.

Succession. The progressive replacement of plant communities on a site which leads to the potential natural plant community. Primary succession entails simultaneous successions of soil from parent material and vegetation. Secondary succession occurs following disturbances on sites that previously supported vegetation, and entails plant succession on a more mature soil.

Suitability. The adaptability of a particular plant or animal species to a given area.

T

Threatened Species. Those plant or animal species likely to become endangered throughout all or a specific portion of their range within the foreseeable future as designated by the U.S. Fish and Wildlife Service under the Endangered Species Act of 1973.

Tree. A woody perennial, usually single stemmed plant that has a definite crown shape and reaches a mature height of at least 16 feet (5 meters). There is no clearcut distinction

between trees and shrubs. Some plants, such as oaks, may grow as either trees or shrubs.

U

Undergrazing. The act of continued *underuse*.

Understory. Plants growing beneath the canopy of other plants. Usually refers to grasses, forbs and low shrubs under a tree or shrub canopy. cf. *overstory*.

Use. The proportion of current year's forage production that is consumed or destroyed by grazing animals.

V

Vegetation. Plants in general, or the sum total of the plant life above and below ground in an area.

Vegetation Type. A kind of existing plant community with distinguishable characteristics described in terms of the present vegetation that dominates the aspect or physiognomy of the area.

W

Waterway. A way or channel for water.

Watershed. A region or area bounded peripherally by a water parting and draining ultimately to a particular watercourse or body of water.

Weed. (1) Any plant growing where unwanted. (2) A plant having a negative value within a given management system.

Wetland. Lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. Wetlands must have one or more of the following three attributes: 1. at least periodically, the land supports predominantly hydrophytes; 2. the substrate is predominantly undrained hydric soil; and 3. the substrate is nonsoil and is saturated with water or covered by shallow water at some time during the growing season of each year.

Wildlife. Living organisms that are not in any way artificial or domesticated and living in a natural state. Commonly refers to fauna, not flora.

Woodland. A land area occupied by trees; a forest, woods.

Woody. A term used in reference to trees, shrubs, or browse that characteristically contain persistent ligneous material.

X

Y

Yearlong Grazing. Continuous grazing for a calendar year.

Z

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