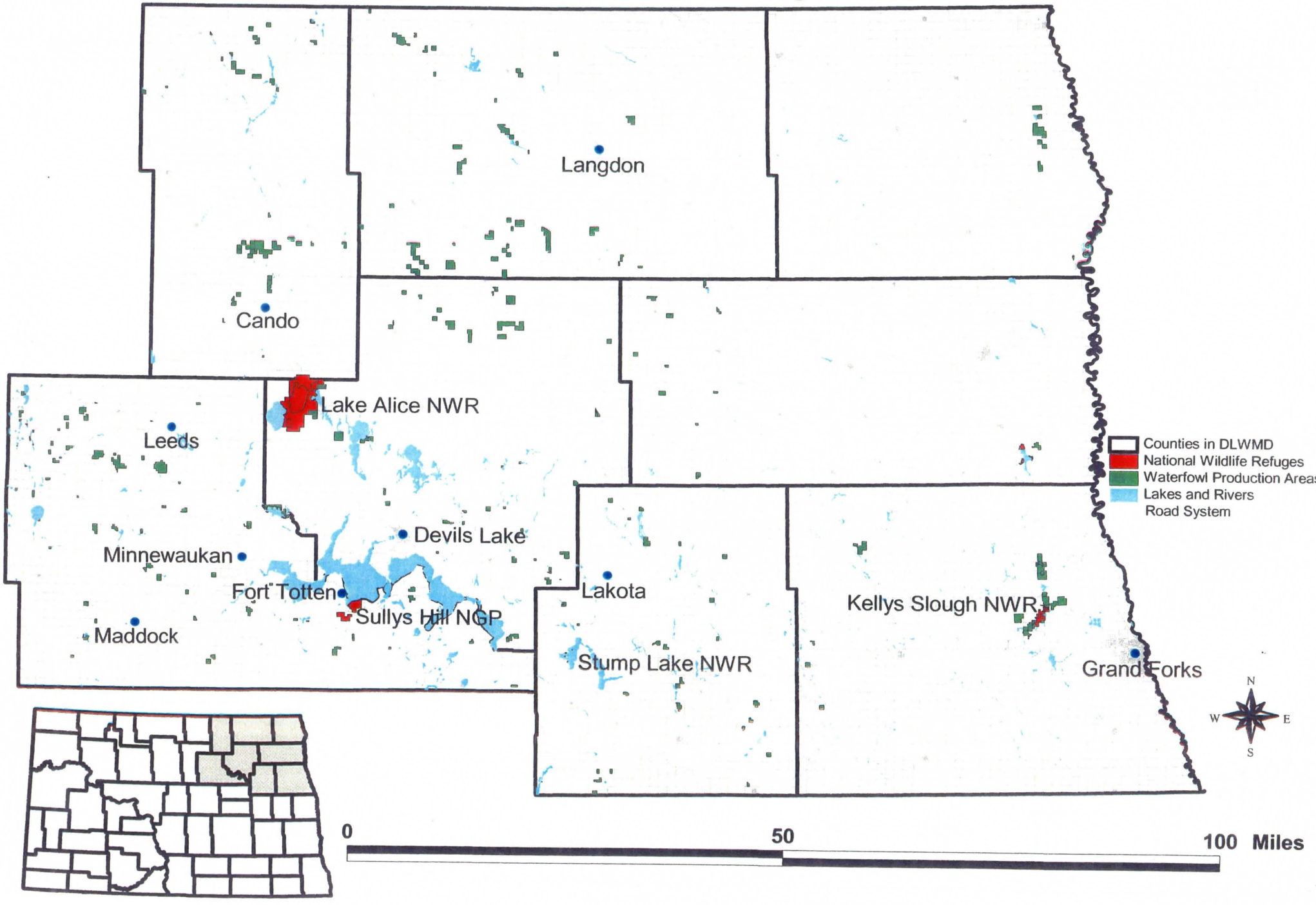

Devils Lake WMD
Summer Tour
2007

Devils Lake Wetland Management District



Devils Lake Wetland
Management District Complex

Vision

"To conserve, manage, restore, and enhance a diverse mosaic of habitats and wildlife resources in the northeast Drift Prairie of North Dakota for the benefit of present and future generations"

Complex Facts

* The Devils Lake WMD was established in 1962 and encompasses eight counties totaling 10,146 square miles in northeastern North Dakota.
* A total of 250,920 acres of National Wildlife Refuge System lands are managed out of the Devils Lake Complex Office located in Devils Lake, ND.

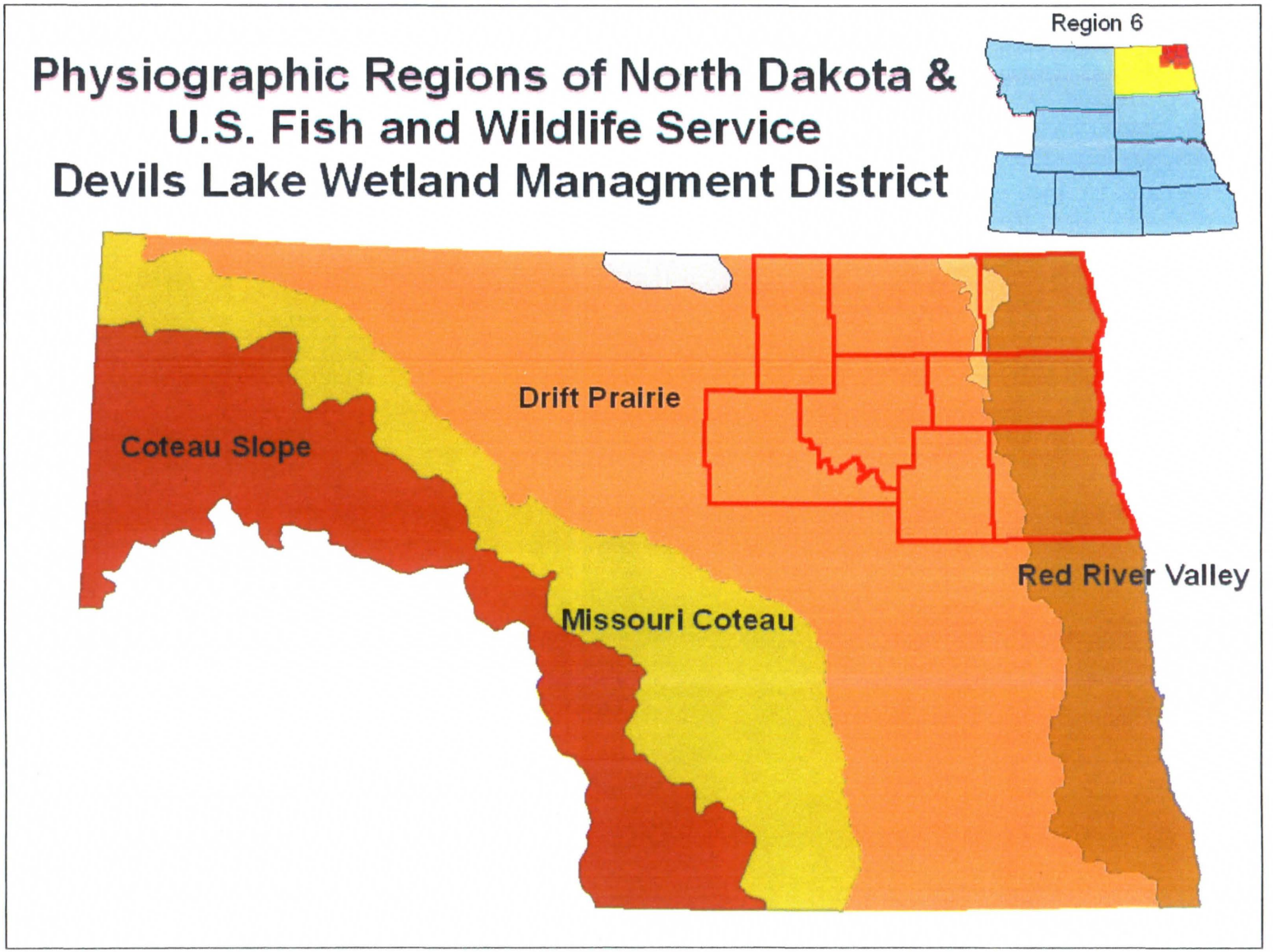
Acreage Summary	Number	Acres
Waterfowl Production Area (WPA's) and Wildlife Development Areas (by tract)	372	50,918
Wetland and Grassland Conservation Easements	2,639	160,740
FmHA Fee Tracts	5	947
Lake Alice National Wildlife Refuge (NWR)	1	12,096
Stump Lake National Wildlife Refuge (NWR)	1	27
Sullys Hill National Game Preserve (NGP)	1	1,675
Kellys Slough and Lake Ardoch NWR Complex (988-Fee, 2978-Easement)	2	3,966
Easement National Wildlife Refuges	9	15,890
FmHA Easements	65	4,661
Devils Lake NAWMP (3,814 square miles)	1	2,440,960
Kellys Slough NAWMP (400 square miles)	1	256,000

Natural History

* Devils Lake WMD is located in the center of the famed Prairie Pothole Region. This area is characterized by a variety of glacial land forms, among the most important are the various shallow wetlands and lakes. National Wetland Inventory has identified 480,165 acres of wetlands within the WMD.
* There are two major physiographic regions within the District; the Agassiz Lake Plain covers most of Pembina, Walsh, and Grand Forks Counties. The northeastern Drift Prairie covers the remaining five counties of Cavalier, Towner, Ramsey, Nelson, and Benson. The Drift Prairie is characterized by low rounded hills, numerous closed depressions and scattered waterways.

Total Complex Acreage:

66,651	Fee Lands
165,401	Conservation Easements
18,868	Easement Refuges
250,920	**TOTAL ACRES**


Physiographic Regions of North Dakota &
U.S. Fish and Wildlife Service
Devils Lake Wetland Managment District
Region 6
Drift Prairie
Coteau Slope
Missouri Coteau
Red River Valley

Wetland Management District

Biological Values of the Wetland Easement Program: *Shorebirds*

- Surveyed farmed temporary and seasonal basins in agricultural land classes.
- In the Drift Prairie, a conservative estimate of 2.7 million migrating shorebirds (25 species) used the wetland resources available.
- Many of these wetlands are covered by USFWS Wetland Easements.

Biological Values of the WPAs:
Wetland Conservation and Bird Diversity

- Colonial nesting waterbirds used 77.5% of surveyed semi-permanent wetlands in a 2001 survey.
- Waterbirds included: black tern, sora, pied-billed grebe, eared grebe, Wilson's phalarope, black-crowned night heron, Franklin's gull, American bittern, great blue heron, Forster's tern, least bittern, Virginia rail, red-necked grebe

Source: DLWMD, USFWS, 2001

North Dakota's Drift Prairie is characterized by . . .

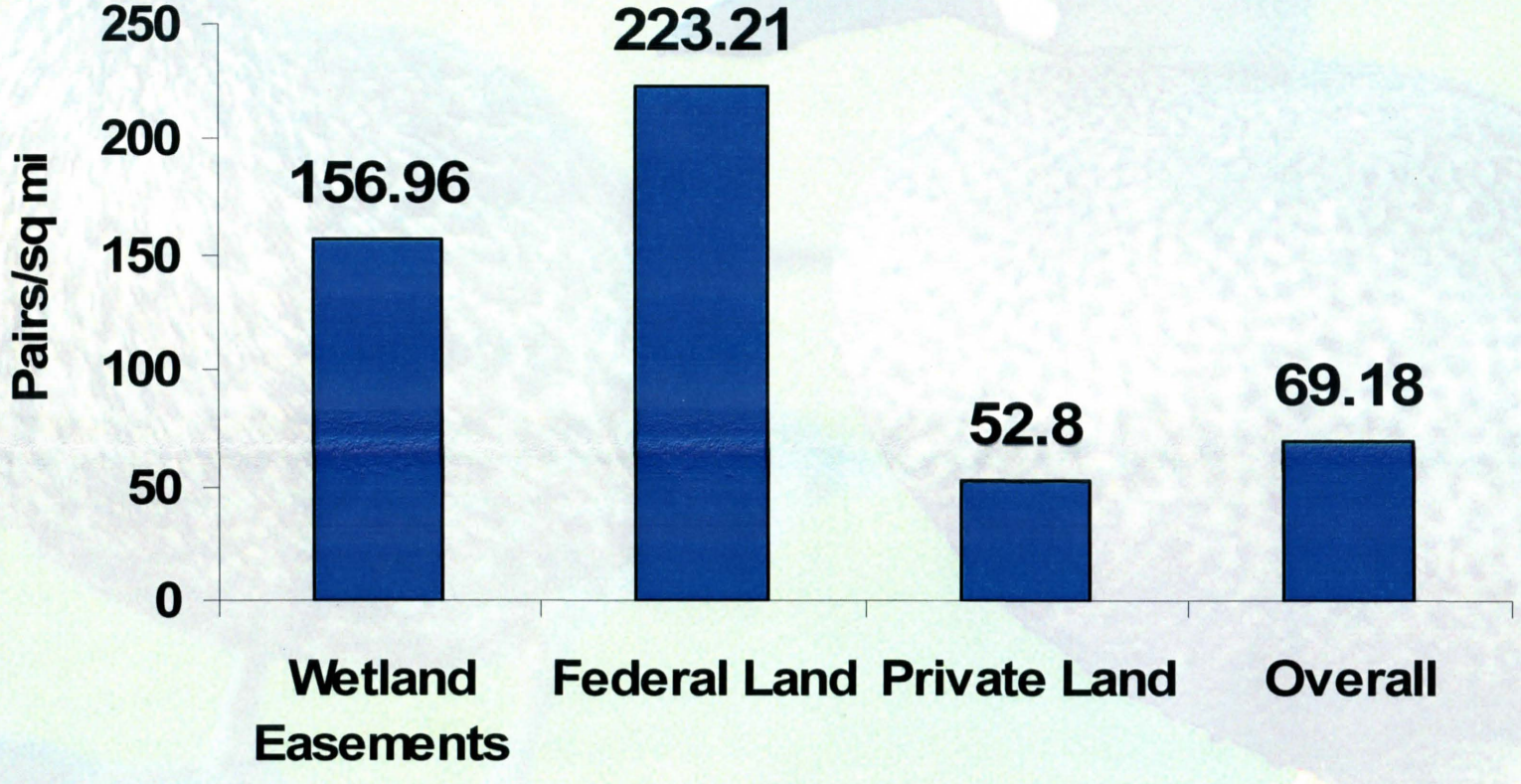
- *Very high wetland density (20 – 40 wetlands/sq. mi.)*
- *High waterfowl pair density (60-120 pairs/sq.mi)*
- *Forty-eight percent of the duck breeding population is contained in the Drift (R. Reynolds, HAPET, pers. com.)*
- *Numerous scattered tracts of grasslands (Refuges, WPA's, Easements, private land programs, WMA's and NGO lands)*
- *Fragmented landscape with agricultural uses*
- *Devils Lake WMD ranks as the 4th highest in spring waterfowl pair numbers over the long-term across WMD's in ND and SD*

Devils Lake Wetland Management District

- Duck Facts
  - Pairs Per Square Mile
    - Easements = 157 pairs
    - Fee = 223 pairs
    - Private = 53 pairs
  - All lands within the DLWMD → 701,953 duck pairs and 1.34 recruits per pair = 940,617 ducklings to the flight stage.
  - On Refuge Lands within the DLWMD → 247,902 duck pairs and 1.34 recruits per pair = 332,189 ducklings to the flight stage.
  - Of the 10,146 square miles in the DLWMD, we support the production of 35% of the duck production on Refuge Lands even though these lands encompass only 3.9% of the landscape

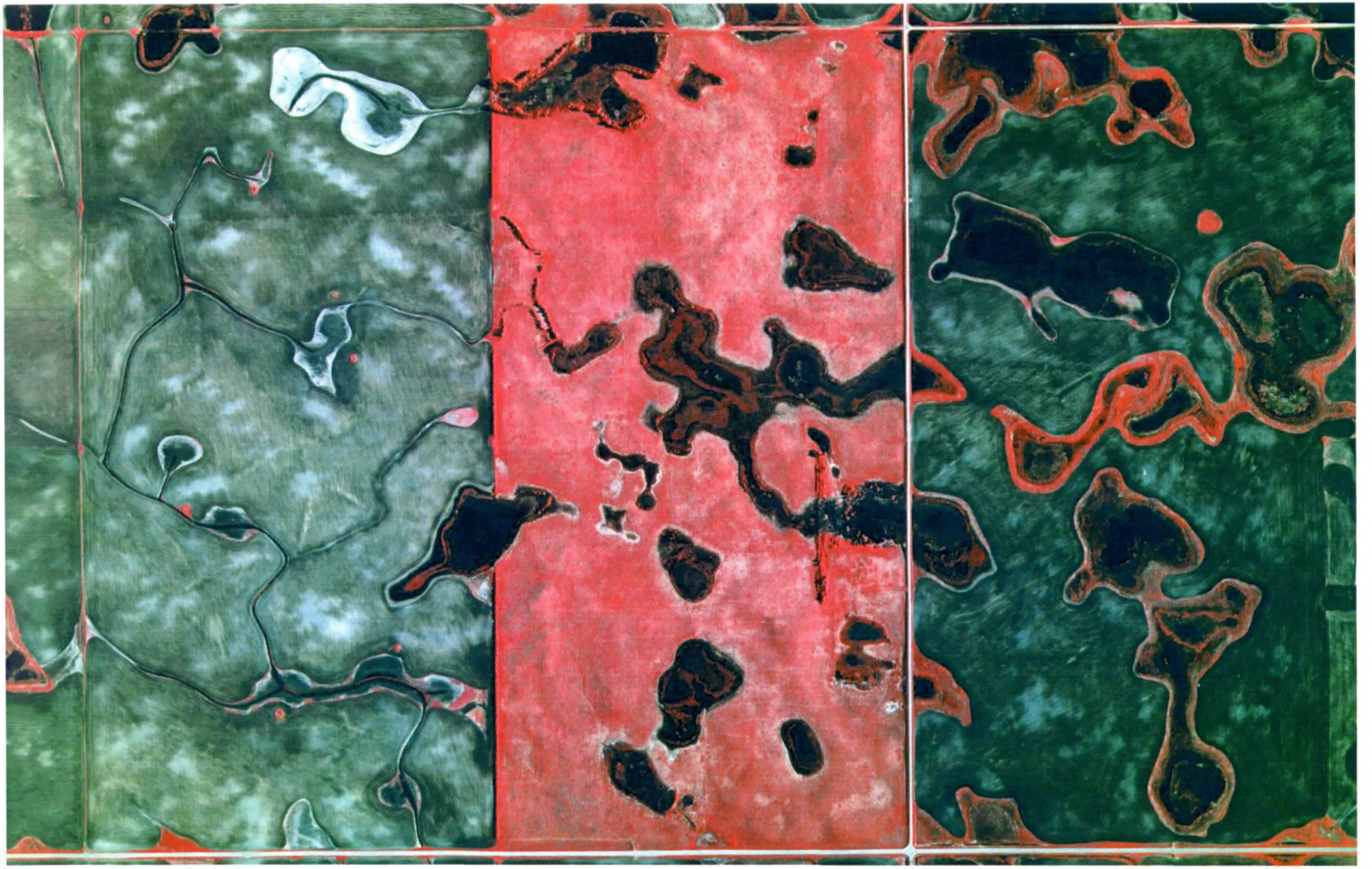
Devils Lake Wetland Management District

2004 Pairs Per Square Mile



The Value of the WPA Program

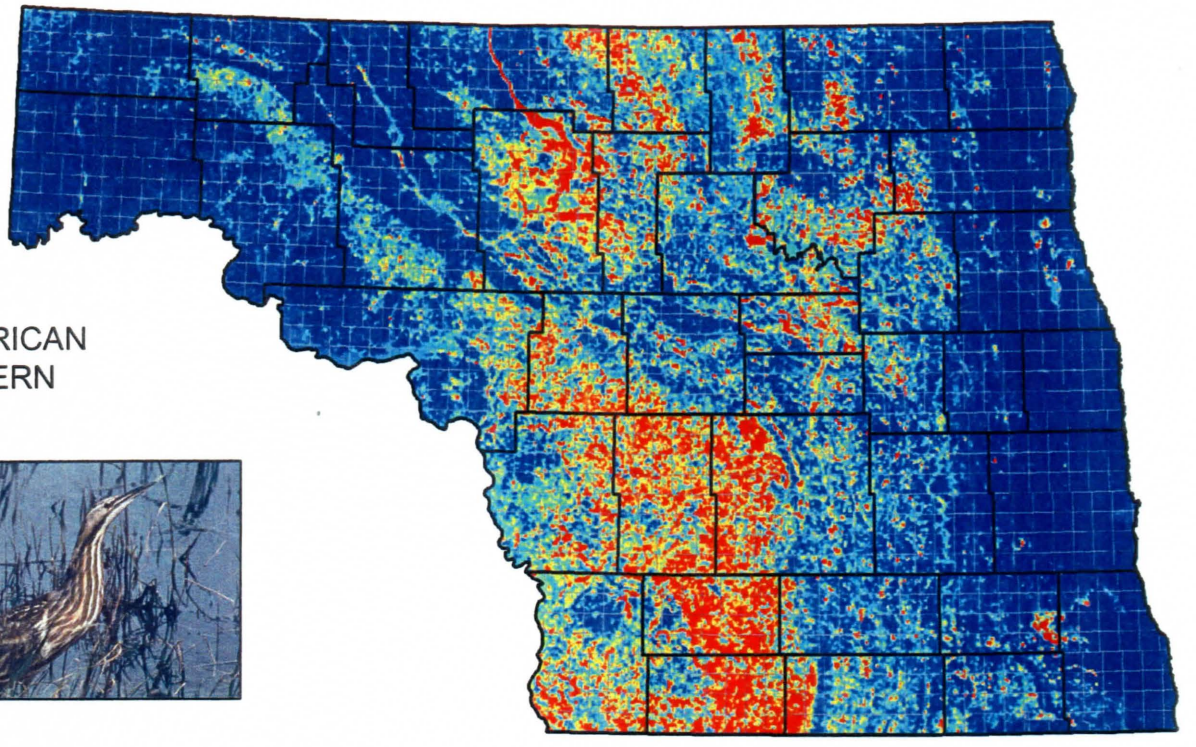
Devils Lake Wetland Management District, North Dakota



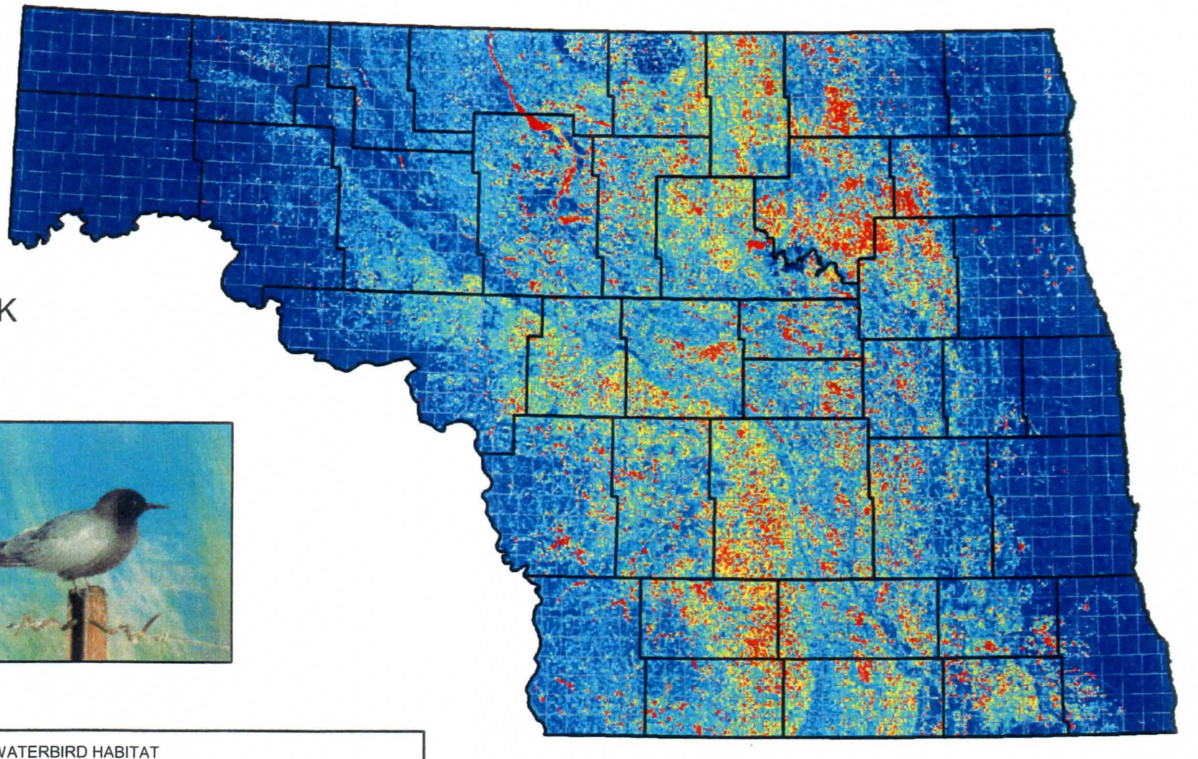
NON-EASEMENT WPA EASEMENT

Cavalier County, North Dakota, 1997

PREDICTED DISTRIBUTION OF AMERICAN BITTERN AND BLACK TERN IN THE PRAIRIE POTHOLE REGION OF NORTH DAKOTA



AMERICAN BITTERN



BLACK TERN

MODELING OF WATERBIRD HABITAT

Maps predicting relative probability of occurrence were generated using spatial modeling techniques and digital landcover information developed from satellite imagery and the National Wetlands Inventory. American Bittern and Black Tern observations were extracted from 1995 and 1997 stop-level North American Breeding Bird Survey data. Landscape characteristics were linked to bird presence using logistic regression models and information-theoretic model selection techniques.

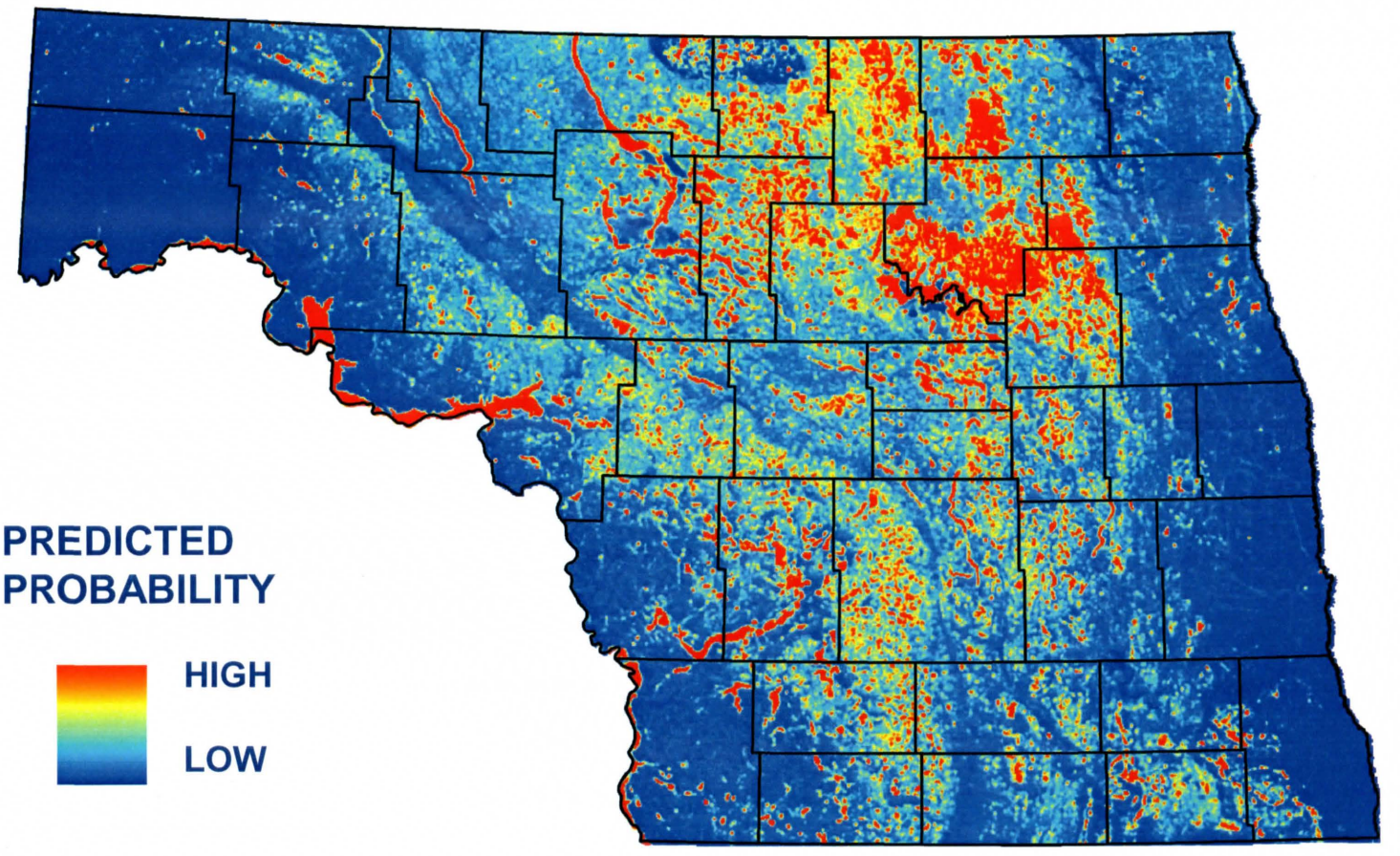
For more information, contact the HAPET Office, USFWS, Bismarck, North Dakota or refer to *Niemuth, N. D., M. E. Estey, and C. R. Loesch. 2005. Developing spatially explicit habitat models for grassland bird conservation planning in the Prairie Pothole Region of North Dakota. Pages 469-477 in Bird Conservation Implementation and Integration in the Americas: Proceedings of the Third International Partners in Flight Conference 2002, C.J. Ralph and T.D. Rich, eds. USDA Forest Service PSW-GTR-191, Albany, CA.*

RELATIVE PROBABILITY OF OCCURRENCE

HIGH

LOW

RELATIVE PROBABILTY OF DETECTING BLACK TERN IN NORTH DAKOTA 1993, 1995, 1997



Developed by Roger Hollevoet

PARTNERSHIPS

SCIENCE AND
LIMITING FACTORS

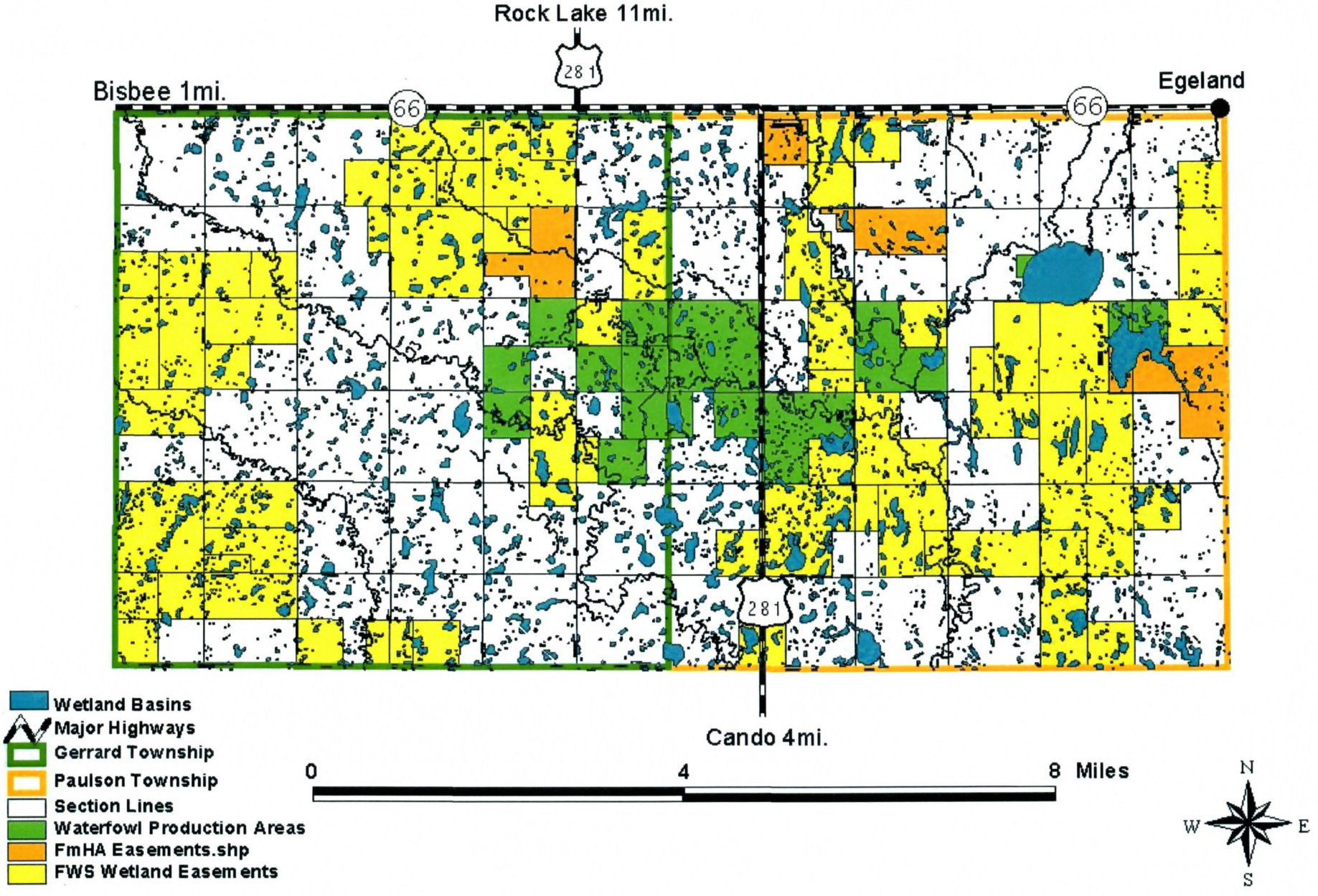
HABITAT DEVELOPMENT:
Restore, Create, Enhance

SPECIES MANAGEMENT:
Banding, Surveys, Hen Houses, Predators

HABITAT MANAGEMENT:
Fire, Grazing, IPM, Haying, Seeding, LE

HABITAT BASE:
Refuges, WPA's, Easements, Private Lands Program

Paulson and Gerrard Townships
Towner County North Dakota



Wetland Restorations
Devils Lake Wetland Management District, North Dakota

Habitat Objective

1. Restore ≥50 acres of degraded (i.e., drained, filled, leveled) wetlands on waterfowl production areas throughout the DLWMD over 15 years in an effort to increase functionality of the wetlands for migratory bird use.

Strategies:

1. Identify all surface and subsurface drains on WPAs throughout the DLWMD using photographic interpretations and on-site assessments.
2. Plug ditches on drained basins.
3. Remove sediment from temporary and seasonal basins on priority WPAs.
4. Photopoints will be taken annually to document the water storage and to some extent the floristic component on sediment removal wetlands.
5. The Hydrogeomorphic Model for Functional Assessment will be run on a sampling of sediment removal wetlands. Data will be collected on these samples basins every 3-5 years to re-run the model for monitoring the hydrology, soil, and plants.
6. Pursue a more intensive research project with a partner (i.e. USGS) regarding logistics of sediment removal.

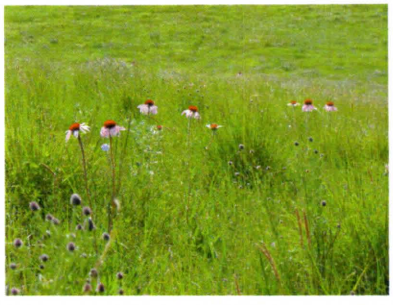
Hypotheses regarding sediment removal as wetland restoration technique:

1. With conventional tillage across the field for > 50 years, wetlands (especially temporary basins) have lost their 'bowl' shape. Also, seasonal wetlands are often cattail-choked because of the sedimentation and increased phosphorus levels.
2. Dr. Jimmy Richardson, Soil Scientist with NRCS, believes that on seasonal basins sediment removal should be down to the subsoil to reduce the likelihood that cattails will repopulate.
3. Primarily wetland restorations in the past included filling in surface or subsurface ditches, relying on the assumption that the plant seed and invertebrate egg bank remained viable even with the drainage. Essentially, the assumption was that restoring the hydrology will allow the wetland's flora and fauna to recover on their own. However, recent research shows that just 0.5 cm of sediment is enough to greatly reduce seedling and invertebrate emergence (Gleason, et al. 2003).

Soil samples from a wetland in Barnes County, North Dakota. Notice sample on the left (lighter colored sample) had sediment removed down to subsoil. Plant species present approximately 5 years after restoration included Sagittaria spp, Eleocharis spp, and Scirpus spp. On the right, the darker colored sample is an area within the same wetland where sediment was not removed. Plant species present was a monoculture of Typha spp. In this anecdotal example, the floristic quality of the vegetation was actually higher in the area of the wetland where sediment was removed down to the subsoil.

Native Prairie Management
Devils Lake Wetland Management District, North Dakota

"I would be converted to a religion of grass. Sleep the winter away and rise headlong each spring. Sink deep roots. Conserve water. Respect and nourish your neighbors and never let trees gain the upper hand. Such are the tenets and dogmas. As for practice – grow lush in order to be devoured or caressed, stiffen in sweet elegance, invent startling seeds – those also make sense. Bow beneath the arm of fire. Connect underground. Provide. Provide. Be lovely and do no harm." Louise Erdrich



Habitat Objective

1. Increase native grass and forb groupings to ≥50%, decrease Kentucky bluegrass and smooth brome grass groupings each to ≤30%, and decrease shrub component groupings to ≤ 15% on native prairie waterfowl production areas throughout the DLWMD to provide habitat for grassland nesting birds.

Strategies:

1. Implement typical prairie management activities, including prescribed fire, prescribed grazing, and various Integrated Pest Management strategies that are appropriately timed to enhance the native plants and reduce the prevalence of invasive plants.
2. Use mowing and burning to manage western snowberry and silverberry shrubs.
3. Use belt-transect (Grant et al. 2004) method to monitor vegetative response to management
4. Use point counts to monitor singing male bird presence and densities to evaluate management actions.
5. Implement range health assessment to ensure that intensive management on these areas is ecologically beneficial.

Hypotheses regarding management to reduce invasive species:

1. All native prairie WPAs within the DLWMD are invaded with smooth brome or Kentucky bluegrass.
2. Timing of management is critical to reduce these species and enhance the native species. For example, it appears that 4-5 leaf stage of brome is an appropriate time to burn to negatively impact this species and enhance the warm-season native grasses (Willson and Stubbendieck 2000). Further, there is evidence that a late season burn (i.e. September or October) may be effective for reducing Kentucky bluegrass (T. Grant, R. Murphy, and J. Hendrickson, USDA, ARS).
3. Frequency of burning is based on data from several sources that recommend intervals of approximately every 3-5 years (Miller 1971, Higgins1986, Kirsch and Higgins 1976,

Johnson and Temple 1990, Svedarsky and Van Amberg 1996, Wright and Bailey 1982). The DLWMD is in the mixed- and tallgrass prairie transitional zone, where literally it is possible that litter build up could have support multiple fires in a growing season.

4. Early grazing in the spring with a having stocking rate and short duration may reduce brome and bluegrass, and optimally can be used in combination with fire (T. Grant, R. Murphy, J.Printz, USDA, NRCS).

Grassland Restorations
Devils Lake Wetland Management District North Dakota

"...The black prairie soil was built by the prairie plants; a hundred distinctive species of grasses, herbs, and shrubs; by the prairie fungi, insects, and bacteria; by the prairie mammals and birds." Aldo Leopold

Habitat Objective

1. Develop long-term cover for migratory birds that mimics historic native prairie over the next 15 years by re-seeding at least a total of 7,500 acres to diverse, native herbaceous mixtures on priority waterfowl production areas, that 10 years post-establishment will be composed of ≥70% native grasses and forbs.

Strategies:

1. Prepare sites for seeding using multiple years of seed bed preparation (e.g., cropping followed by multiple years of chemical fallowing [using glyphosate-based herbicide]).
2. Develop a seed mixture with a nearly equal cool season to warm season grass and forb components.
3. Drill or broadcast the native flora mixture on site.
4. Implement a variety of tools in post-seeding management, including clipping, prescribed fire, prescribed grazing, and necessary Integrated Pest Management strategies.
5. Use the belt-transect (Grant et al. 2004) method to monitor establishment and maintenance phases of restoration.
6. Use point counts to monitor bird singing male presence and densities to assess the response to restoration.
7. Establish transects to monitor butterfly response to restoration using Royer et al.(1998) protocol.

Hypotheses regarding grassland restorations on refuge lands in the DLWMD:

1. Native grass and forb mixtures provide optimal habitat to more grassland obligate birds than introduced grass and legume mixtures (Howell 1988; Madden et al. 2000; Kantrud and Higgins 1992, Stewart 1975).
2. Diverse native grass and forb mixtures may be more resistant to weed invasion than introduced species mixtures (Blumenthal 2003; Carpinelli 2001; Pokorny 2002; Sheley and Half 2006; Tilman 1996).
3. Native grass and forb mixtures will eventually be more cost effective because of the long-term viability when appropriate management is applied. Essentially, native mixtures can be effectively treated with prescribed fire and grazing; whereas introduced species mixtures require intensive farming and a plethora of IPM strategies.

Logistics:

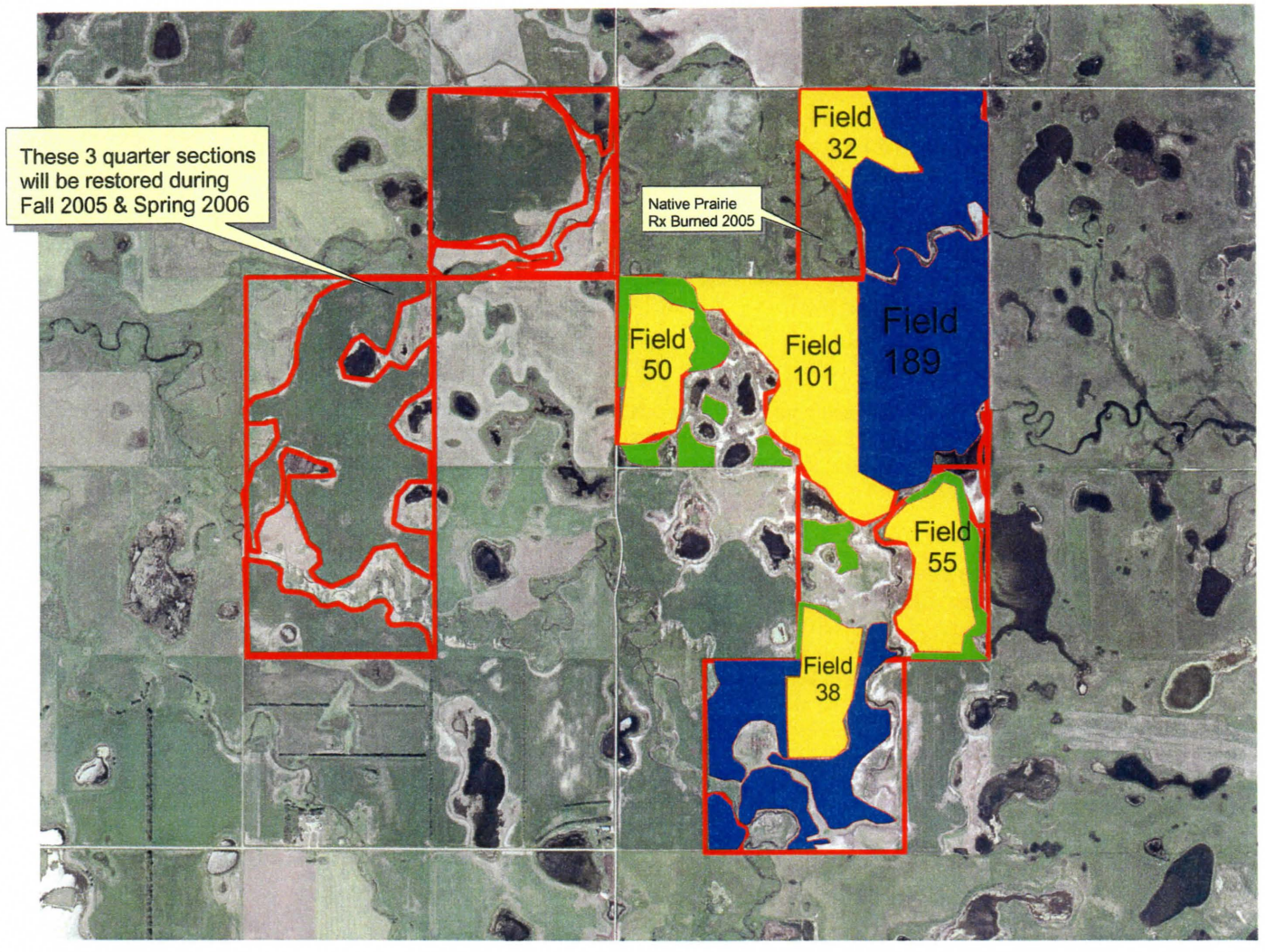
- Mixtures were developed based on compatibility with soils for each site
- Mixtures were developed in an attempt to emulate plant species that may have been present prior to settlement in this region (tallgrass/mixed grass transitional zone)
- Plantings have occurred in 2005, 2006, and 2007
- Intensive management is planned to control possible weed infestations
- Approximately 1,727 acres have been restored to grass thus far

Baseline Data Collection:

1. Vegetation monitoring began in 2005 and will continue indefinitely
    - field #101 (25 species were planted in 2005) 22 species were at least present in August 2007
    - field #101 in 2006, grass species with highest frequency were slender wheatgrass, green needle grass, and Canada wildrye, while forb species were vetch, purple prairie clover, and Maximilian sunflower

2. Neotropical migratory bird surveys in 2006
    - 3 most common grassland species identified in first round of surveys: grasshopper sparrow, clay-colored sparrow, and savannah sparrow

REGISTER UNIT - NIKOLAISEN WPA UPLAND RESTORATION MAP, TOWNER COUNTY, NORTH DAKOTA



2004 (Fall) Dense Nesting Cover Units (286 Acres)

2005 (Spring) Dense Nesting Cover Units (23 Acres)

2005 (Spring) Native Grass Units (243 Acres)

Field Boundaries

(Please see Attachment A for a complete list of planted species)

WATERFOWL PRODUCTION AREA

OPEN TO PUBLIC HUNTING

N
W E
S

U.S. FISH & WILDLIFE SERVICE

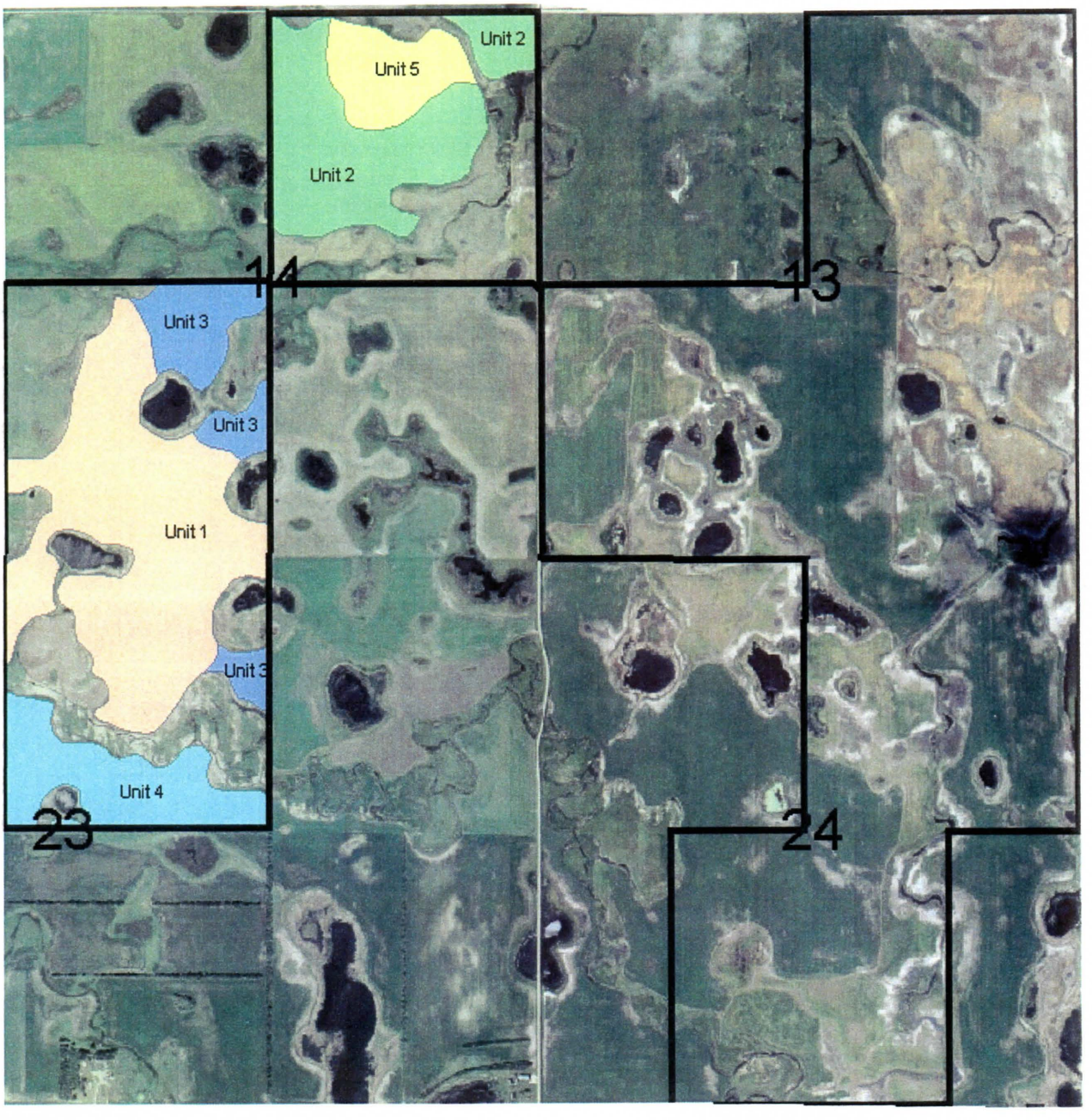
Map prepared by:
Mark R. Fisher
June, 2005

Nikolaisen WPA (Register Unit) Native Seeded Sites -- Total Acres = 465

Field Name	Species Composition	Date Planted
Field 189 (3 spp)	Tall Wheatgrass, Western wheatgrass, vernal alfalfa, yellow	October 20-28, 2004
Field 32 (7 spp)	Big Bluestem, Indiangrass, green needlegrass, slender wheatgrass, western wheatgrass, switchgrass, vernal alfalfa	May 5-8, 2005
Field 55 (8 spp)	Little bluestem, sideoats grama, blue grama, slender wheatgrass, western wheatgrass, green needlegrass, switchgrass, vernal alfalfa	May 9-14, 2005
Field 38 (12 spp)	Big bluestem, little bluestem, switchgrass, green needlegrass, needle-and-thread, porcupine grass, western wheatgrass, slender wheatgrass, purple prairieclover, yellow coneflower, blazingstar, maximilian sunflower	May 15-16, 2005
Field 50 (10 spp)	Big bluestem, indiangrass, switchgrass, western wheatgrass, slender wheatgrass, black-eyed susan, Maximilian sunflower, yellow coneflower, purple coneflower, yellow sweetclover	May 18-20, 2005
Field 101 (25 spp)	Big bluestem, little bluestem, indiangrass, sideoats grama, blue grama, Canada wildrye, switchgrass, green needlegrass, porcupine grass, needle-and-thread, western wheatgrass, slender wheatgrass, purple prairieclover, white prairieclover, black-eyed susan, Maximilian sunflower, yellow coneflower, American vetch, blanketflower, wild bergamont, Lewis flax, goldenrod, Canada Milkvetch, wild prairie rose, leadplant	May 23-27, 2005

Register Unit - Nikolaisen WPA
Towner County, North Dakota

T. 159 N., R 67 W., Section 13 S1/2, NE1/4, Section 24 NE1/4, W1/2SE1/4, E1/2SW1/4, Section 14 NE1/4, SW1/4, Section 23 NW1/4



N

Legend

UNIT NUMBER

Unit 1 Unit 2 Unit 3 Unit 4 Unit 5

0 0.25 0.5 1 Miles

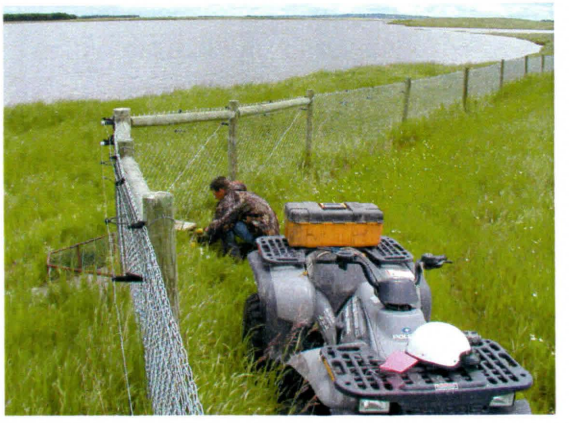
WATERFOWL PRODUCTION AREA

VS

Nikolaisen WPA (Register Unit) Native Seeded Sites -- Total Acres = 300

Field Name	Species Composition	Date Planted
Unit 1 (24 spp)	Switchgrass, Little Bluestem, Green Needlegrass, Big Bluestem, Indiangrass, Slender Wheatgrass, Sideoats grama, Needle and Thread, Canada Wildrye, Western Wheatgrass, Blanketflower, Purple Prairieclover, Maximilian Sunflower, Prairie Coneflower, Blue Flax, Pruple Coneflower, White Prairieclover, Black-eyed Susan, Canada Milkvetch, Stiff Goldenrod, Meadow Balzingstar, Wild Bergemont, American Vetch, Wild Prairie Rose	May 16-19, 2006
Unit 2 (22 spp)	Big Bluestem, Little Bluestem, Indiangrass, Switchgrass, Sideoats Grama, Green Needlegrass, Western Wheatgrass, Slender Wheatgrass, Needle and Thread, Canada Wildrye, Blanketflower, Purple Prairieclover, Maximilian Sunflower, Prairie Coneflower, Blue Flax, Pruple Coneflower, Black-eyed Susan, Canada Milkvetch, Dotted Gayfeather, Stiff Goldenrod, Wild Bergemont, Wild Prairie Rose	May 10-14, 2006
Unit 3 (20 spp)	Needle and Thread, Western Wheatgrass, Green Needlegrass, Canada Wildrye, Slender Wheatgrass, Sideoats Grama, Big Bluestem, Little Bluestem, Blanketflower, Purple Prairieclover, Max. Sunflower, Prairie Coneflower, White Prairieclover, Black-eyed Susan, Canada Milkvetch, Dotted Gayfeather, Leadplant, Stiff Goldenrod, Wild Bergemont, Wild Prairie Rose	May 15-16, 2006
Unit 4 (17 spp)	Big Bluestem, Little Bluestem, Indiangrass, Switchgrass, Western Wheatgrass, Slender Wheatgrass, Needle and Thread, Canada Wildrye, Blanketflower, Purple Prairieclover, Maximilian Sunflower, Prairie Coneflower, Blue Flax, Black-eyed Susan, Stiff Goldenrod, Wild Bergemont, Wild Prairie Rose	May 12-15, 2006
Unit 5 (12 spp)	Canada Wildrye, Western Wheatgrass, Slender Wheatgrass, Switchgrass, Blanketflower, Purple Prairieclover, Maximilian Sunflower, Prairie Coneflower, Blue Flax, Black-eyed Susan, Canada Milkvetch, Stiff Goldenrod	May 9-12, 2006

Predator Management
Devils Lake Wetland Management District



Objective

1. To help increase recruitment of ground nesting birds on waterfowl production areas within the DLWMD, we will annually utilize a minimum of two predator management techniques that in areas where implemented will achieve a Mayfield nest success of ≥40% for waterfowl.

Strategies:

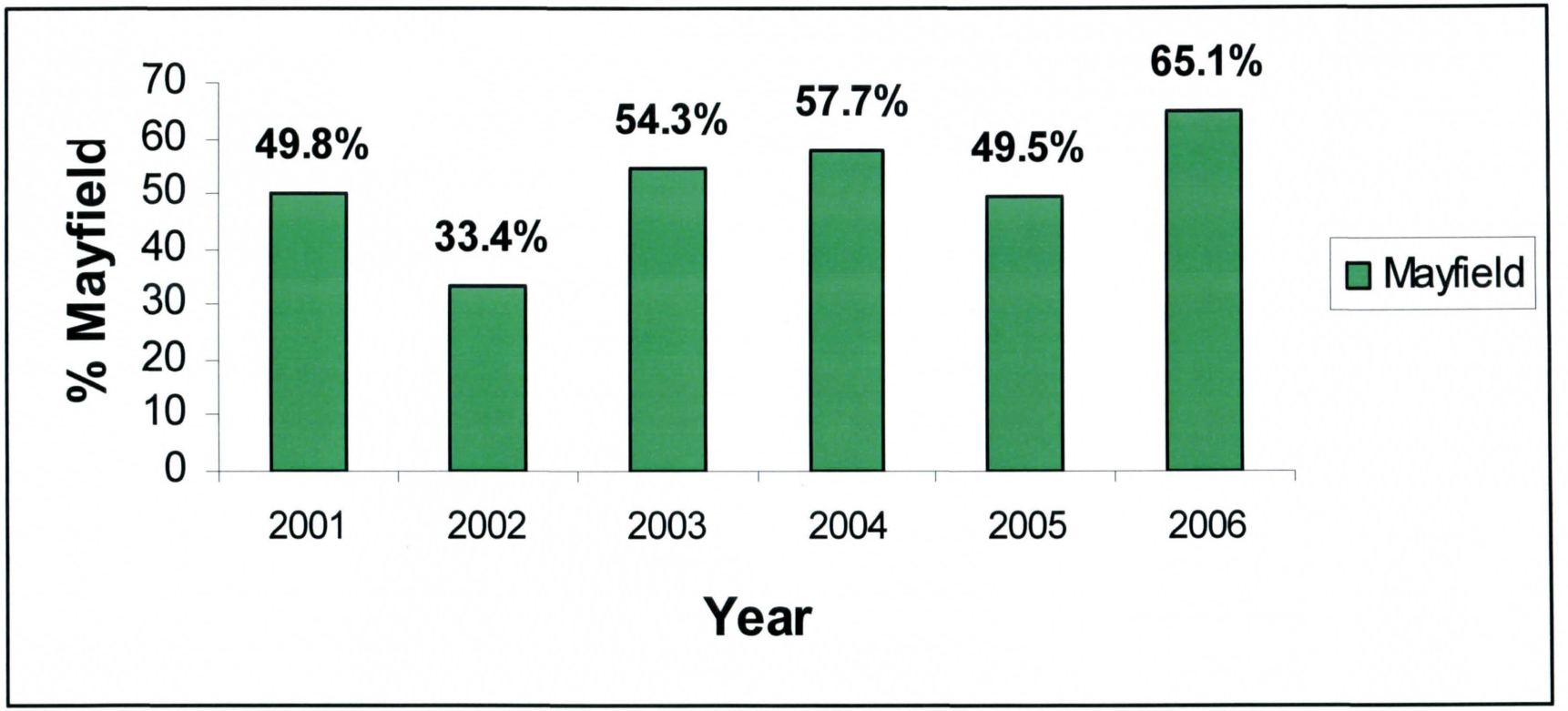
1. Hire professional trappers to trap selected 36-square mile predator management blocks.
2. Implement spring predator management activities on islands associated with WPAs.
3. Maintain established predator exclosures on WPAs on an annual basis.
4. Install and maintain nesting structures on WPAs.
5. Remove artificial microhabitats (e.g., rock piles, abandoned buildings, downed fences, and miscellaneous junk on WPAs.
6. Remove planted and invasive trees from WPAs.
7. Monitor migratory bird response to implemented predator management technique.

Hypotheses regarding need to implement predator management techniques:

1. Across the prairie landscape, grassland and wetland conversions changed the predator prey relationships, and actually bolstered the populations of several waterfowl predators (Sovada et al. 2005).
2. The major source of mortality for North American waterfowl during the breeding season is predation (Sargeant and Raveling 1992), with greater than 70% of nest failures are attributed to predation (Sovada et al. 2001).
3. In addition to waterfowl, predation on passerines and other non-game birds is considered an important cause of nest failure (Martin 1988, 1995). Specifically, predator communities in fragmented landscapes such as the prairie pothole region do not provide safe nesting sites for songbirds (Dion et al. 2000).

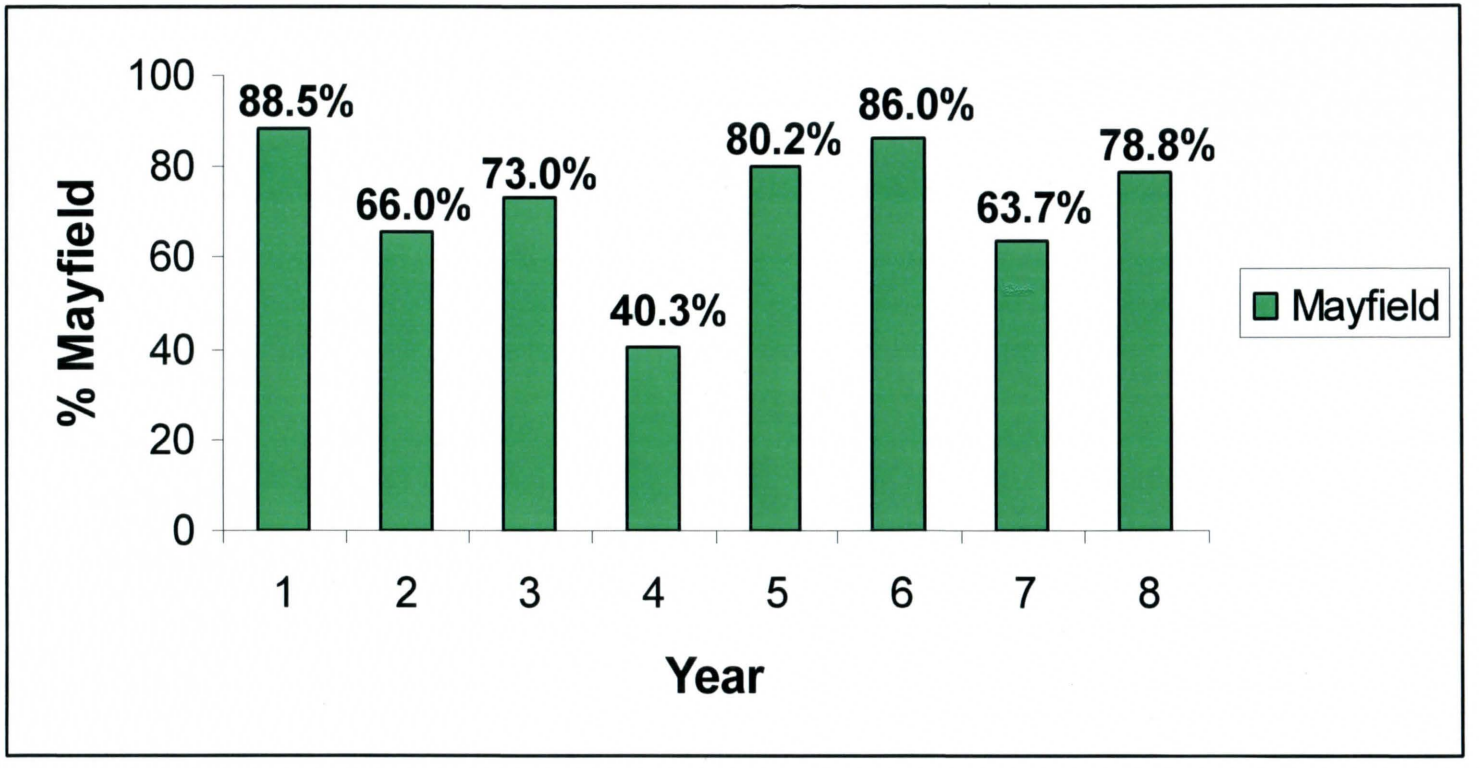
4. Several studies document that intensive predator removal can increase duck nest success and brood production (Balsar et al. 1968, Duebbert and Lokemoen 1980, Sargeant et al. 1995, Garrettson et al. 1996).
5. Reynolds et al. (2001) indicate that on average (dependent on certain variables) 40% of the landscape must be in grassland cover for mallards to obtain a nest success of 15-20 % (population maintenance level).
6. In situations where habitat protection and management is not enough to maintain and enhance waterfowl nest success, predator management can be implemented as an acceptable and viable alternative (Sovada et al. 2005).

North Dakota-Predator Mgmt. Average Nest Success for all Blocks for Past Six Years!



Six year average-51.6%

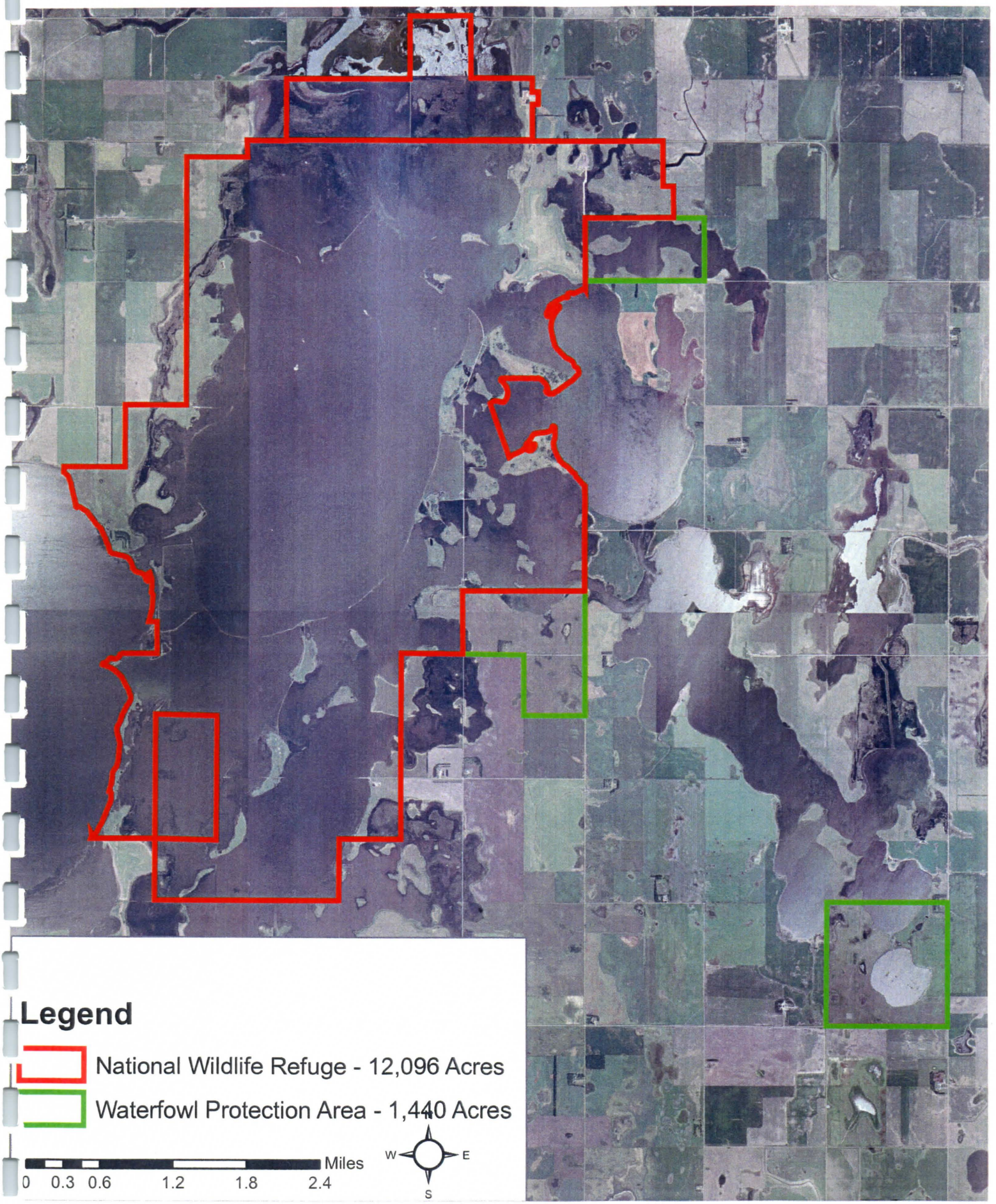
Cando, N.D. Block
"A Success Story"



Average Success for 8 years-72.06%

Lake Alice

Lake Alice National Wildlife Refuge & Adjacent Waterfowl Protection Areas



Lake Alice

"Everglades of the Prairies"

- Grebes
  - Western Grebe *
  - Clark's Grebe
  - Red-necked Grebe *
  - Eared Grebe *
  - Pied-billed Grebe *
  - Horned Grebe *
- Pelicans
  - White Pelican *
- Cormorants
  - Double Crested Cormorant *
- Herons
  - Least Bittern
  - American Bittern *
  - Black-crowned Night Heron *
  - Great Blue Heron
  - Little Blue Heron
  - Cattle Egret *
  - Snowy Egret *
  - Great Egret
- Ibises
  - White-faced Ibis *
- Cranes
  - Sandhill Cranes
- Rails
  - Virginia Rail *
  - Sora *
  - American Coot *
- Terns
  - Black Tern *
  - Common Tern *
  - Forster's Tern *
  - Caspian Tern *
- Other Water Birds
  - Franklin's Gulls **
  - American Avocet *
  - Common Snipe *
  - Ruddy Turnstone
  - Wilson's Phalaropes *
  - Piping Plover *
  - Killdeer *
  - Marbled Godwit *
  - Hudsonian Godwit
  - Willet *
  - Greater Yellowlegs
  - Lesser Yellowlegs
  - Spotted Sandpiper
  - Solitary Sandpiper
  - Short-billed Dowitcher
  - Upland Sandpiper *

* Confirmed nesting on Lake Alice NWR

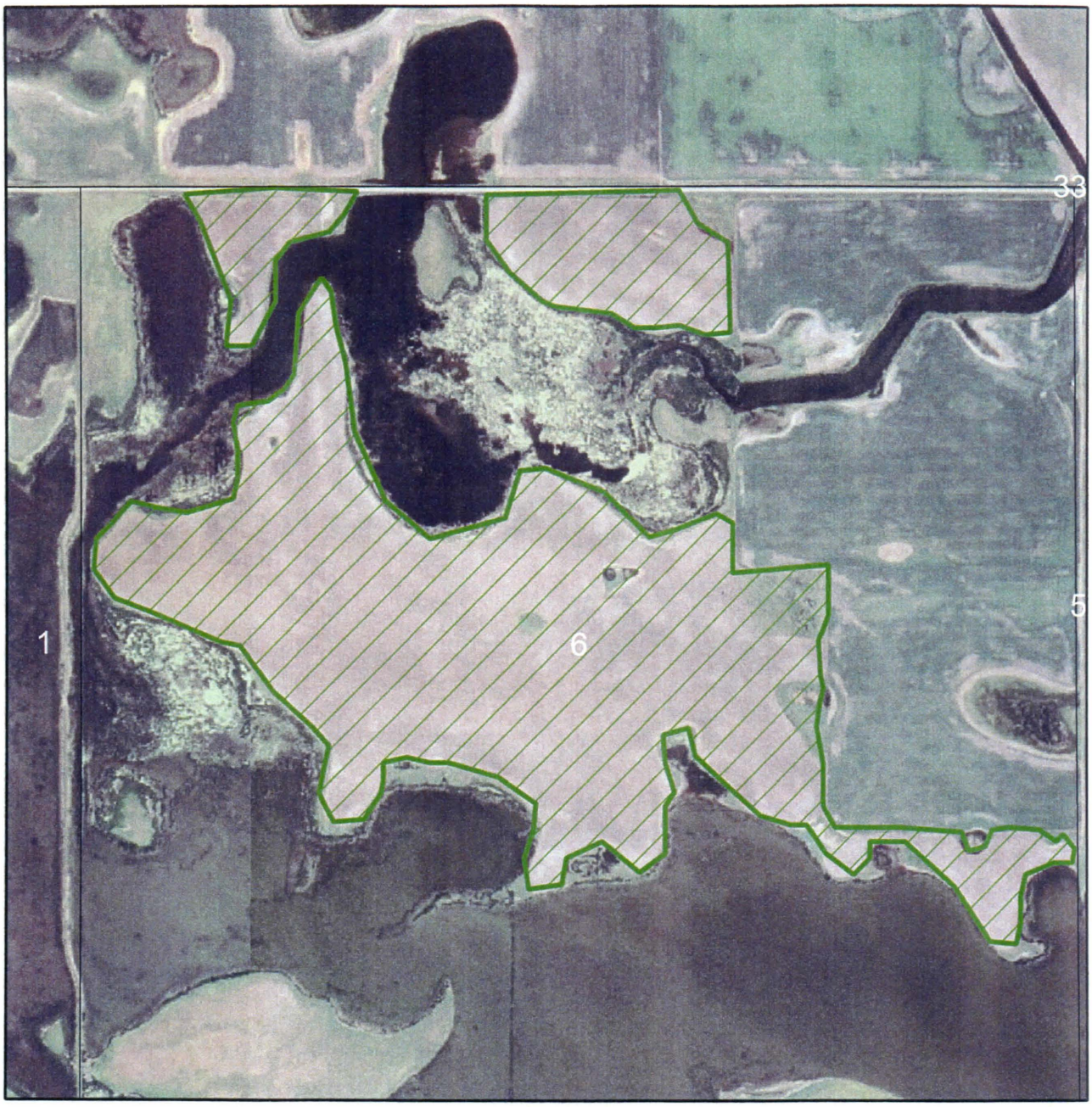
** Second Largest Franklin's Gull Colony in the World

Table 2. Estimated number of nesting pairs present by species at LANWR during 1999 and 2000. The change in nesting pairs by species between years is also presented.

Species	1999	2000	Change from 1999 to 2000
Franklin's Gull	16,915	24,842	+7,927
Eared Grebe	29,630	18,596	-11,034
Black-crowned Night-Heron	426*	5,005	+4,488
Forster's Tern	298	337	+39
Black Tern	59	3	-56
Cattle Egret	0	12	+12
Western Grebe	10	244	+234
White-faced Ibis	0	8	+8

*whole colony count

Lake Alice National Wildlife Refuge
Native Seeding 2007
(151 acres)



0 0.1 0.2 0.4 0.6 0.8 Miles

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U.S. DEPARTMENT OF THE INTERIOR
U.S. Fish and Wildlife Service
NATIONAL WILDLIFE REFUGE SYSTEM

U.S. FISH & WILDLIFE SERVICE

Lake Alice NWR

Native Grass Planting

Research and Data

Lake Alice National Wildlife Refuge
Native Seed Mixture 2007
151 acres – 16 species

Grasses:
Green needlegrass
Western wheatgrass
Slender wheatgrass
Canada wildrye
Big bluestem
Indiangrass
Switchgrass
Little bluestem
Sideoats grama

Forbs:
Prairie Coneflower
Blanketflower
Black-eyed Susan
Purple prairie clover
Maximilian sunflower
Blue flax
Canada milkvetch

CURRENT RESEARCH IN THE DEVILS LAKE WMD
2007

	Partner	Subject of Study
1	USGS	Capacity of wetlands to store carbon
2	USGS	Restoration of grasslands by interseeding with native plant species
3	Delta	Density dependence in upland nesting waterfowl
4	Delta	Effects of predator management and brood densities on mallard brood survival
5	Delta	Mallard microhabitat nest selection and density dependent effects on mallard post fledging survival and subsequent homing rates
6	Delta	Predatory mammal and avian densities in response to predator reduction
7	Delta	Aquatic invertebrate responses to duck population densities as a product of predator management.
8	University of North Dakota	Water quality assessment on Lake Alice National Wildlife Refuge
9	University of North Dakota	Ungulate carrying capacity of the big game unit at Sully's Hill National Game Preserve
10	North Dakota State University	Breeding waterbird use of Lake Alice National Wildlife Refuge
11	Frostburg State University	Census of river otter and fisher at various areas throughout the District

INTENDED FUTURE RESEARCH

	Possible Partner	Subject of Study
1	USGS	Migratory bird response to various native seed mixtures
2	USGS or University	Habitat use of marbled godwits in the Drift Prairie
3	USGS or University	Shorebird use of wetlands where sediment has been removed
4	USGS	Identification of optimal native seed mixtures to reduce noxious weed and invasive species infestations
5	University of North Dakota	Census of yellow rails within the Red River Valley, specifically Kelly's Slough NWR area
6	University of North Dakota	Census of marbled godwits within the Red River Valley, specifically Kelly's Slough area
7	University of North Dakota	Using GIS modeling techniques, assess the impacts of upstream hog operations on the water quality of Lake Alice NWR
8	Delta	Various density dependence studies
9	?	Optimal windows for utilizing fire as a management tool to reduce Kentucky bluegrass and smooth brome grass in the DLWMD
10	?	The impact of ungulate grazing on migratory birds within the Sully's Hill National Game Preserve
11	NRCS	Identifying optimal levels of sediment removal on temporary and seasonal wetlands
12	University of Montana	Response of grassland songbirds to the removal of woody vegetation on Waterfowl Production Areas

Delta Waterfowl Foundation Research in the DLWMD, 2007-2008*

1. Courtney Amundson – Ph. D. candidate
Advisor: Dr. Todd Arnold
University: University of Minnesota

Mallard Brood Survival – Density Dependence and the Effects of Mammalian Predator Reduction

Nest success is the single most important factor driving duck production on the prairies. For forty years managers have focused their efforts in the prairie pothole region on improving hatch rates. Few managers expected to be able to enhance brood survival, but that began to change when Delta resurrected direct predator reduction as a management option. Much recent research on Mallard reproduction has shown that brood survival is the second most important component influencing duck production. Prior Delta funded work has suggested that predator reduction enhances brood survival for Mallards. However, that work was conducted on 16 square mile blocks where trapping intensity is higher than on the township sized (36 mi^2) blocks that we currently trap in North Dakota. Our initial assessment of recruitment from trapped blocks suggests that enhanced brood survival would almost double duckling recruitment on trapped blocks. Accordingly we believe it is essential to evaluate brood survival on trapped blocks in North Dakota that are 36 square miles in size. In addition to examining the impact of trapping we have a secondary goal of understanding the impact of brood density on brood survival. We believe brood density on trapped blocks is enhanced because of high nest success and because of population growth due to repeated trapping of some blocks of habitat. This variation in brood density will allow Courtney to examine the central question of whether brood density has a negative impact on duckling survival. This research will span three years and will involve a great deal of radio telemetry – with brood hens and two ducklings in each brood fitted with a radio.

2. Matt Perion – Ph.D. candidate
Advisor: Drs. Liz Loos and Frank Rohwer
University: Louisiana State University

The effects of mammalian predator reduction on duck pair and nest density

Predator reduction clearly increases nest success in prairie ducks. Even if brood survival is not enhanced, duck production is much greater on trapped blocks than on non-trapped blocks. Most prairie dabbling ducks show homing to nesting areas and yearling females nest in the area where they hatched. Thus the population of breeding ducks on trapped blocks should grow over a series of years because more females nested successfully in prior years. This result seems apparent to anyone that nest searches on the Cando Block in Towner County, North Dakota, which has been trapped for six consecutive years. However, the increased duck density on trapped blocks has not been scientifically established. That job is the top priority for Matt, who will quantify both pair and nest densities and relate those measures of duck abundance to years of trapping history. In addition, Matt will take on the contractual responsibility of nest success evaluation on the sites trapped with state agency funding. Matt will also examine two additional aspects of nest success that Delta has been unable to evaluate in prior research. First, he will relate nest success to wetland abundance to determine if areas with an abundance of wetlands have different nest success than areas with fewer wetlands. More importantly, he will relate

several metrics of duck production – nesting dates, clutch size, egg size, and hatch rates – to duck density. The goal is to evaluate the impact of duck density on components of breeding success.

3. Laura Beaudoin – Ph.D. candidate
Advisor: Dr. Tom Nudds
University: University of Guelph

Mallard microhabitat nest selection and density dependent effects on mallard post fledging survival and subsequent homing rates

In 2007, two studies were initiated that take advantage of landscape-level manipulations of meso-predators of waterfowl by Delta Waterfowl Research Foundation on replicated 92km^2 blocks in northeastern North Dakota. One study (from April to July) is to investigate the evolution of nest site selection in relation to microclimate and predation risk; the other (from July until November) is to evaluate dispersal and survival of HY birds from predator-reduced and control blocks. Although predation is a primary factor affecting nest success of mallard ducks, numerous factors affect nest site selection including, but not limited to, upland cover, wetland abundance, wetland permanency, and prey abundance. These studies will measure nest site selection and nest success by female mallards in the presence and absence of mammalian nest predators to determine experimentally the relative importance of nest site characteristics to breeding females. Further, although nest success is greater on trapped blocks, neither nest nor breeding pair density have increased. These observations may call into question the efficacy of predator management to increase recruitment to breeding populations, but they might nevertheless be explained if SY birds hatched on trapped blocks settle elsewhere. These results would be consistent with the hypothesis that trapped blocks are resource-saturated and act as sources of breeding individuals. If so, then predator management may indeed contribute to overall population growth through recruitment from females derived from predator managed areas. Alternatively, females from predator managed breeding sites may not disperse to other areas. This study would be the first to document experimentally fall survival, dispersal, and settling and recruitment in this breeding population.

4. Chris Martin – Master of Science candidate
Advisor: Dr. Tom Nudds
University: University of Guelph

Predatory mammal and avian densities in response to predator reduction

5. Jennifer McCarter – Master of Science candidate
Advisor: Dr. Tom Nudds
University: University of Guelph

Aquatic Invert responses to duck population densities as product of predator management

*Likely additional studies will be added for field season 2008 and further into 2009.

Shorebird Nests Minnewauken Block
2005

Shorebird_Nests_Minnewauken Block 2005 selection

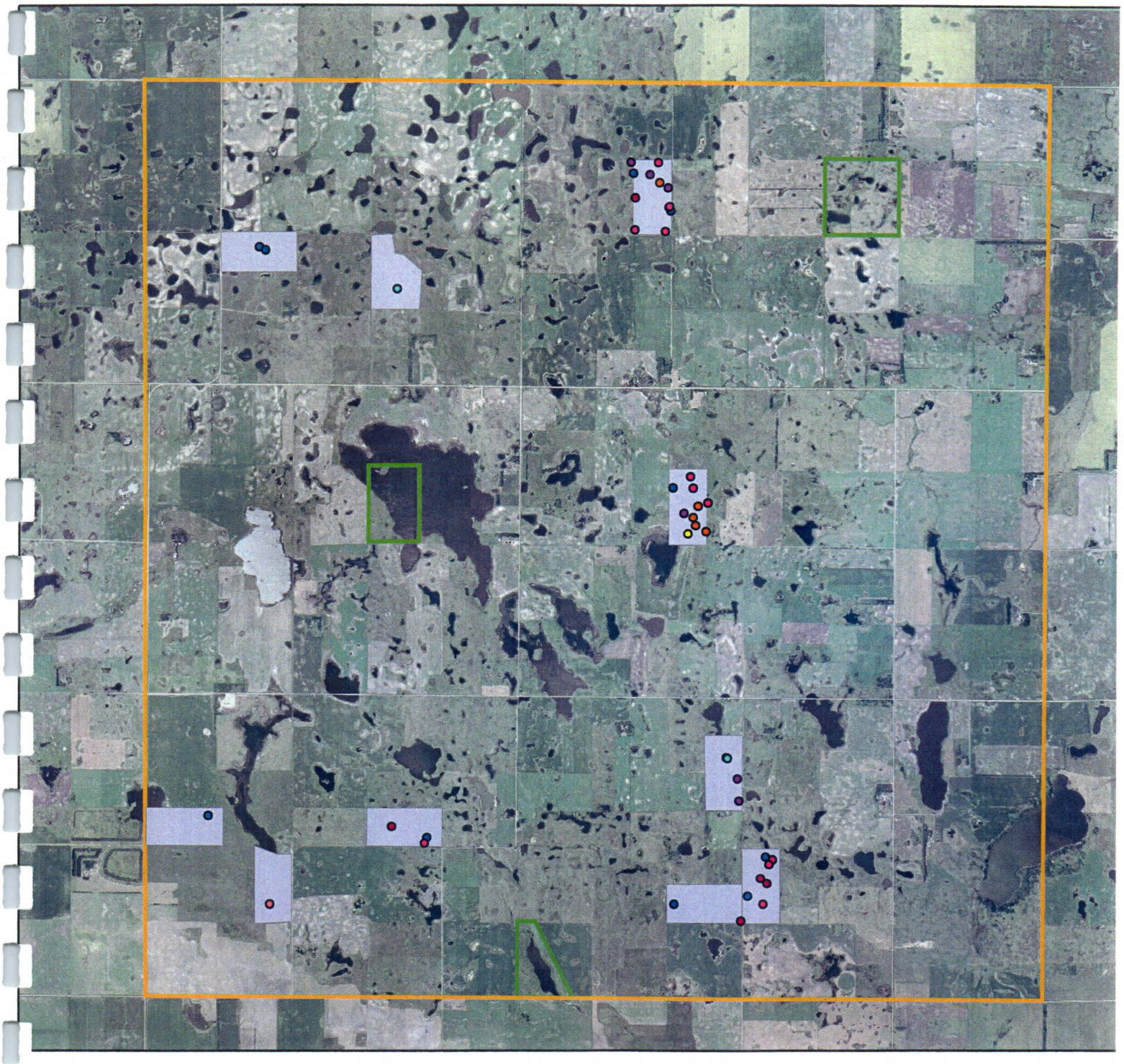
- <all other values>

Species (43 nests)

- ambi_1
- cosn_8
- kill_2
- modo_5
- noha_1
- stgr_10
- upsa_11
- wiph_5

N

0 0.25 0.5 1 1.5 2
Mile




Field 10¢
Trans. 2 Aug 2005

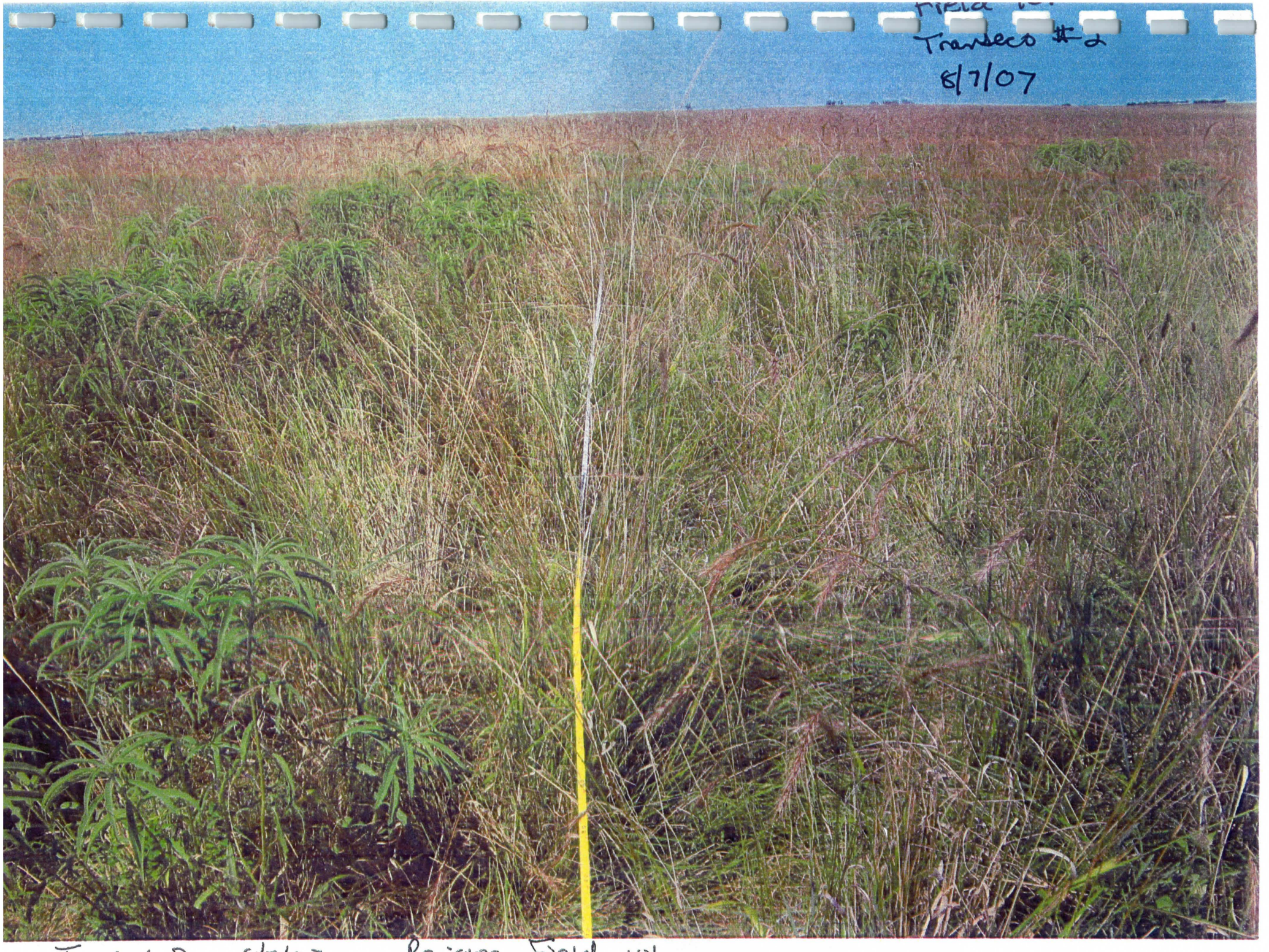
Trans 2, 6-M Quad Field 101

Register

Field 101

Trans. 2 July 2006

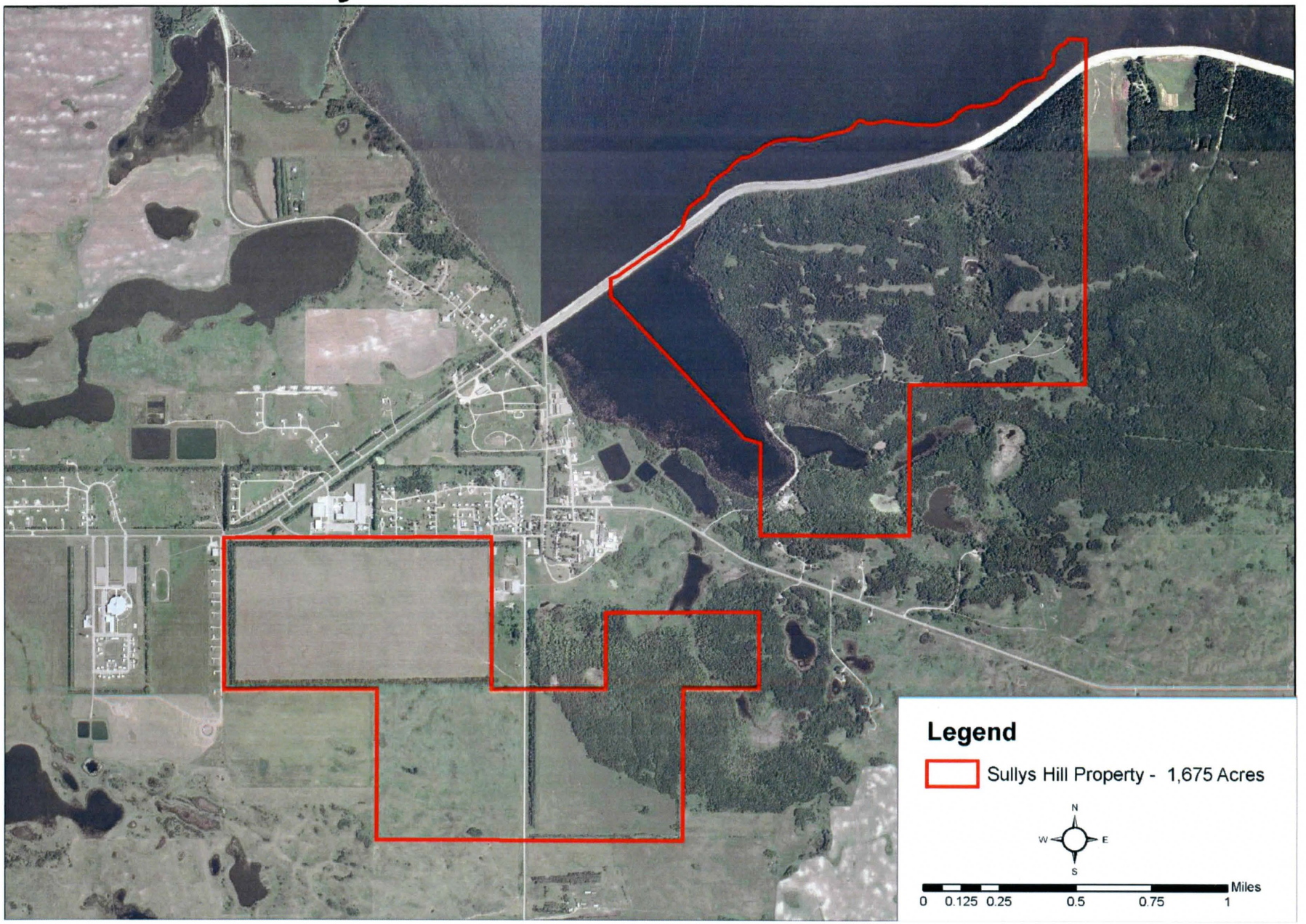
5 Transect 2 July 06



Transect 2. 8/7/07 Register Field 101

Sullys Hill

Sullys Hill National Game Preserve



Sully's Hill National Game Preserve
Devils Lake Wetland Management District
Draft Habitat and Wildlife CCP Goals and Objectives

Goal
WOODLAND HABITAT
Manage for healthy native woodlands of various age classes and structure to provide habitat for migratory birds, in balance with bison, elk, and other indigenous wildlife.

Objectives:
1. Develop woodland restoration units with a target of 80 acres in 15 years within the native forest community of the big game unit. An emphasis will be placed on increasing the understory species composition to approximately 500 bur oak seedlings per acre, 1000 green ash seedlings per acre, and 500 basswood seedlings per acre.

2. Establish five year interval surveys to monitor the presence and density of birds in the ungrazed forest units (lower and south forest units), in the restoration areas outlined in objective 1, and in current grazed areas of the big game unit using American redstart, red-eyed vireo, and ovenbirds as focal species. Eventually compare this presence and density data to evaluate the avian response to restoration efforts.

Goal
PRAIRIE HABITAT
Maintain prairie plant communities representative of the historic mixed-grass prairie that supports healthy populations of grassland-dependent migratory birds in balance with bison, elk and other indigenous wildlife.

Objectives:
1. Create a diverse vegetative composition and structure composed of $\geq$50% native grasses (cool and warm season), 5-15% native forbs, $\leq$ 2% native shrubs, while controlling invasive cool season grasses at $\leq$ 30%, and controlling all noxious weed infestations on the grazed prairie areas within the big game unit (Figure XX). This managed native prairie will be utilized by grazing bison and elk while still providing habitat for migratory birds dependent on forest-edge habitat. (15 years).

2. Increase native grass and forb grouping to ≥50%, decrease Kentucky bluegrass and smooth brome grass groupings each to ≤10%, and decrease shrub component to ≤ 20% on the 160 acre native prairie unit to provide habitat for grassland nesting birds.

3. Restore Eastern Hay Unit to diverse, multiple species seed mixtures that post-establishment maintain >60% cover of native grassland groupings based on the belt transect method (Grant et al. 2004). (by year 15)

4. Provide habitat structure of ≥25-cm visual obstruction reading (VOR) (Robel et al. 1970) on West Hay Unit during the primary avian nesting season (approximately May 1 - August 1), and continue to provide winter forage for refuge ungulates.

Goal

WILDLIFE POPULATION MANAGEMENT

Carry out management practices to ensure healthy populations of rocky mountain elk, plains bison, and other indigenous wildlife species that exemplify the genetic integrity of historic prairie wildlife.

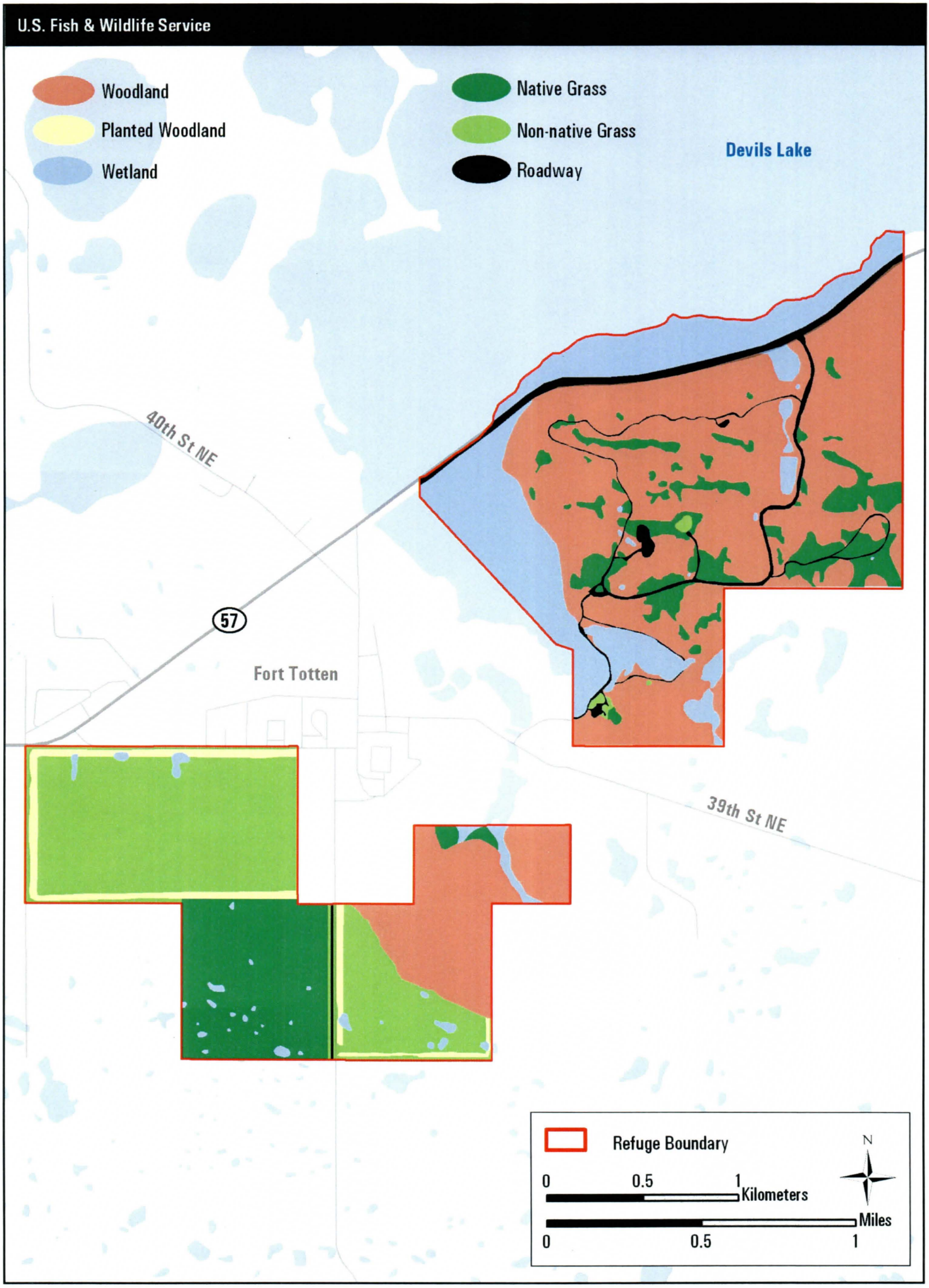
Objectives:

1. Maintain the purpose of Sully's Hill as a big game preserve by retaining a bison herd size of ≤ 20 animals, an elk herd size of ≤ 18 animals, and a white-tailed deer herd size of ≤18 animals for the purpose of improved habitat conditions while maintaining public viewing and interpretive opportunities.

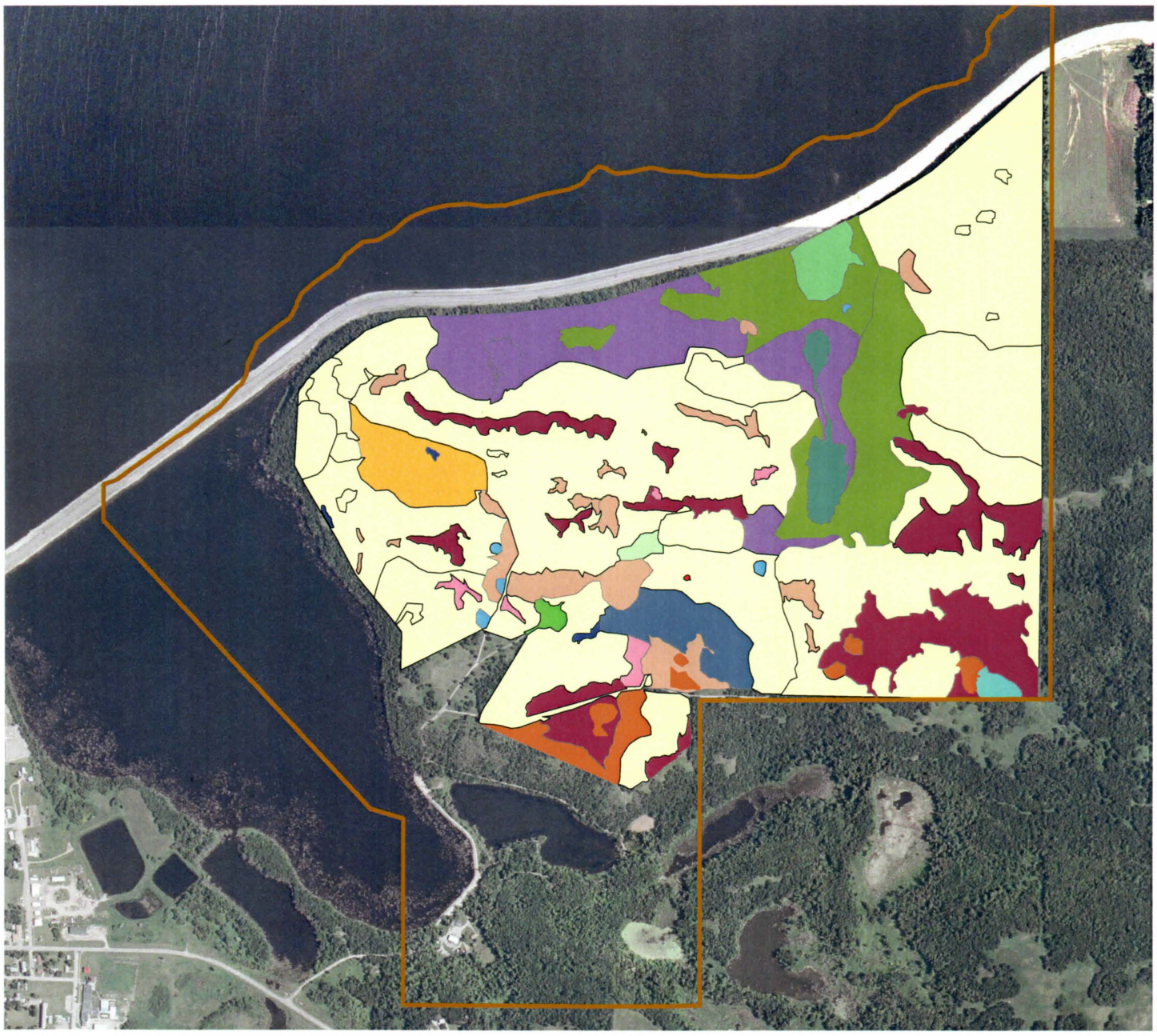
2. Reduce the prevalence of brainworm and lungworm in elk so no animals externally exhibit clinical infection over the life of this CCP. Also, reduce and where possible eliminate introgression risks of chronic wasting disease, brucellosis, and any other non-endemic diseases of wild native ungulates or cattle.

3. Retain a bison herd at Sully's Hill that meets the standards of the 'Management of Bison in the National Wildlife Refuge System' document, and actively participate in the meta-population management of bison genetics.

4. Manage the black-tailed prairie dog population by maintaining a town size of 1.5 acres to provide appropriate education and outreach opportunities.


U.S. Fish & Wildlife Service
Woodland
Planted Woodland
Wetland
Native Grass
Non-native Grass
Roadway
Devils Lake
40th St NE
57
Fort Totten
39th St NE
Refuge Boundary
N
0
0.5
1
Kilometers
Miles
0
0.5
1

Sullys Hill National Game Preserve
Big Game Unit Habitat Inventory 2006



Sully's Hill Habitat:

CLASS					
Ash/Basswood	Native_Grassland_N	Oak
Ash/Basswood/Oak	Native_Shrub_N	Oak Savanna
Ash/Elm	New Shop	Oak/Ash
Ash/Oak	Non_N_Grassland_N	PEMA
Aspen	Noxious Weed	PEMC
	Noxious Weeds	PEMF

N
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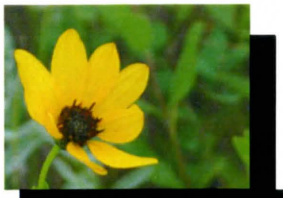
S

0 0.25 0.5 0.75 1
Miles

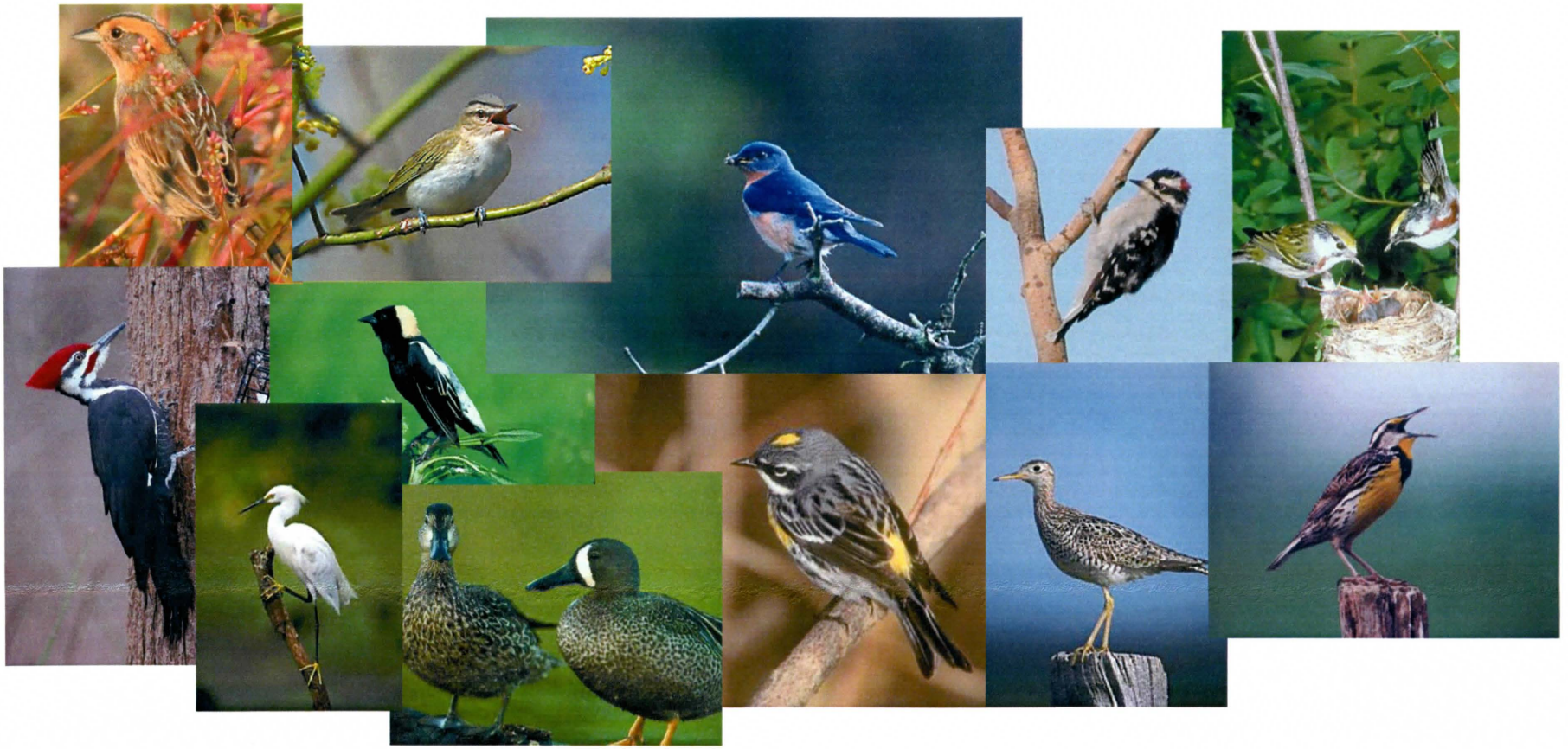


Management of Sullys Hill Planning

- Completion of big game management plan
- Completion of forest management plan
- Development of a disease management plan
- Genetic testing on Bison

- Inventory of migratory songbirds within the woodland and grassland habitats
- Development of a GIS habitat inventory to develop an ungulate carrying capacity model
- Assessment of liver fluke and brain worm presence to determine potential disease issues

Biological Values of Sullys Hill



Over 270 species of birds on list
170 have been recorded in last 2 years

Table 3. Average, standard deviation and 95% confidence intervals of the ten most common bird species of the 25 woodland points at Sullys Hill National Game Preserve.

Species	Mean	Mean	Standard Deviation		95% Confidence Interval	
	2003	2004	2003	2004	2003	2004
Ovenbird	3.2	3.5	2.488	1.828	0.9753	0.716
Red-eyed Vireo	5.3	3.9	2.132	1.856	0.8355	0.727
Yellow Warbler	4.7	6	2.092	2.806	0.8201	1.09
Least Flycatcher	2.3	3.1	2.304	2.403	0.9033	0.942
Clay-colored Sparrow	2	2.1	2.821	2.768	1.1057	1.084
Common Yellowthroat	4.2	1.76	2.449	1.832	0.9602	0.718
House Wren	2	1.4	2.189	1.44	0.858	0.564
Chipping Sparrow	1.6	1.2	1.633	1.384	0.6401	0.542
Eastern Wood Pewee	3	1.3	1.485	1.1	0.5823	0.431
American Redstart	1.2	1	2.18	1.457	0.8543	0.571

All standard deviations are at a 95% confidence interval

Table 4. Average, standard deviation and 95% confidence intervals of the three most common bird species from the 10 grassland points at Sullys Hill National Game Preserve.

Species	Mean	Mean	Standard Deviation		95% Confidence Interval	
	2003	2004	2003	2004	2003	2004
Bobolink	6.1	4.1	4.6536	3.3813	1.8242	1.3255
Grasshopper Sparrow	2.4	2	2.7162	2.5386	1.0647	0.9951
Clay-colored Sparrow	4.2	3.4	7.51	5.4	2.9439	2.1166

All standard deviations are at a 95% confidence interval

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