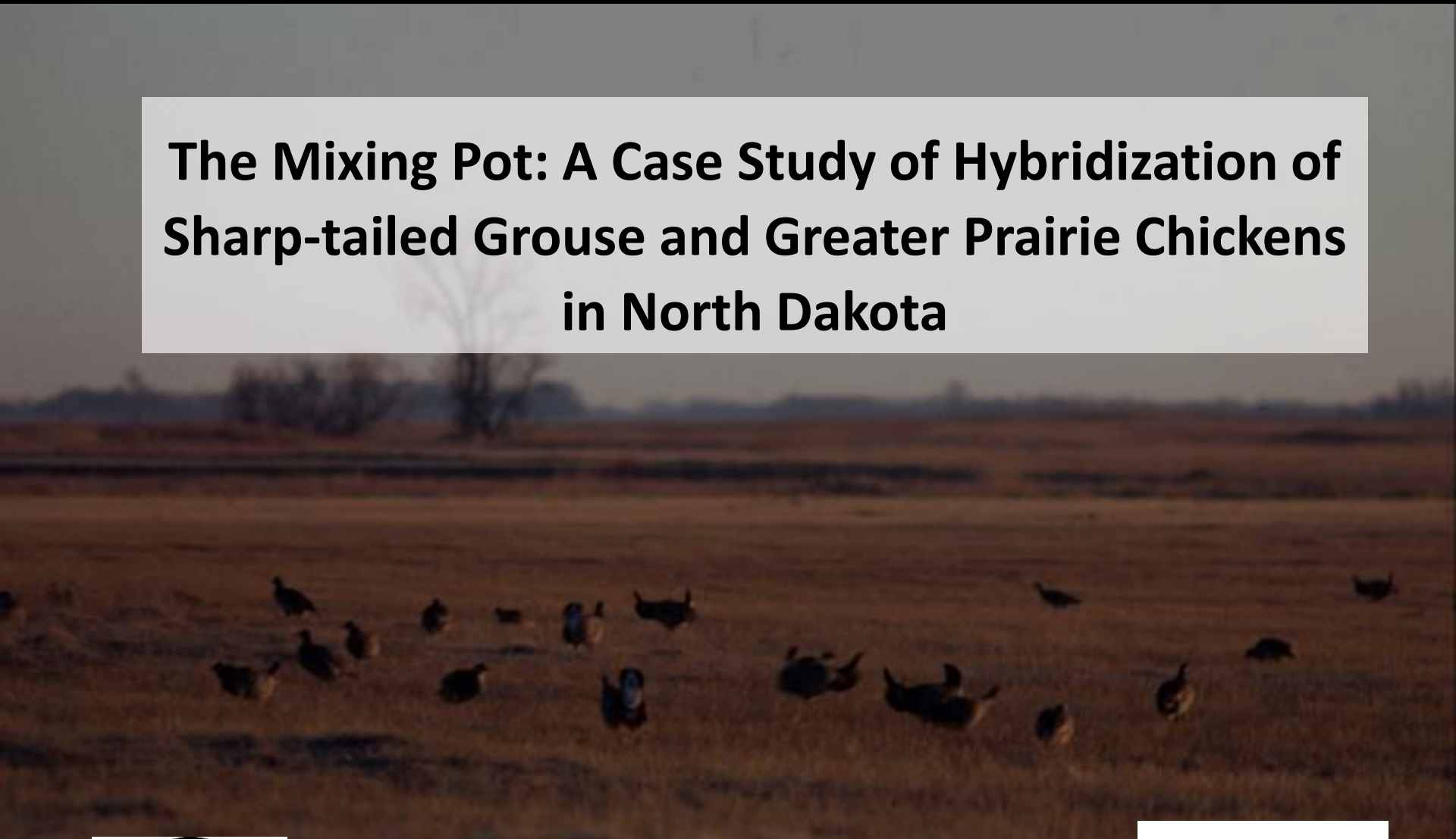
The Mixing Pot: A Case Study of Hybridization of Sharp-tailed Grouse and Greater Prairie Chickens in North Dakota



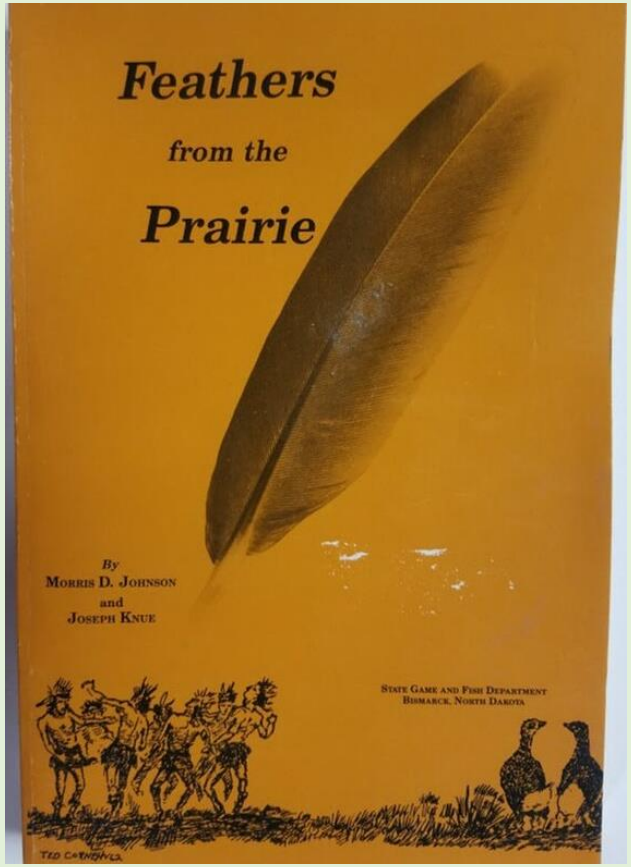
Amalie Victoria Jørgensen, Cailey Isaacson,
Jesse Kolar, and Susan Ellis-Felege

Fisheries & Wildlife Biology
University of North Dakota.

Hybridization of Sharp-tailed Grouse and Prairie Chickens in North Dakota

Prairie Chickens in ND

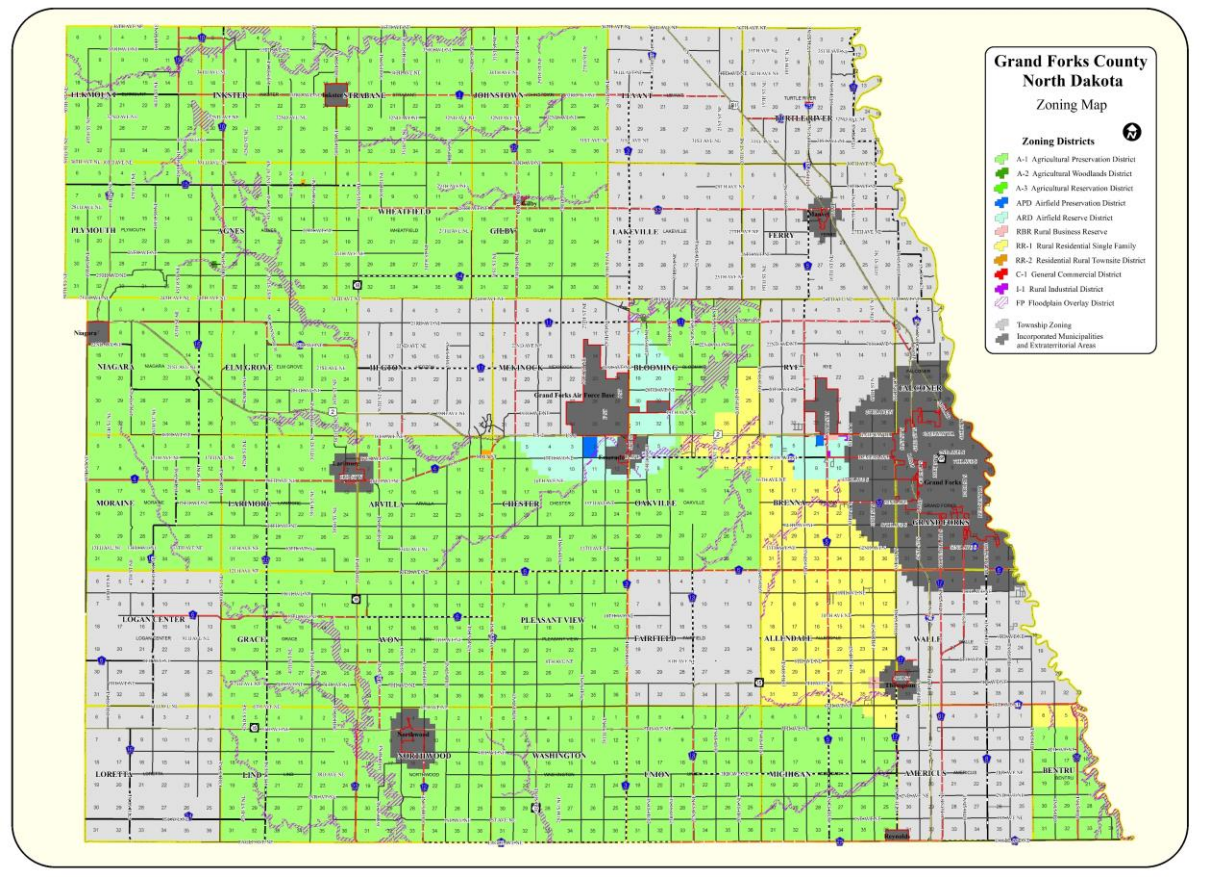
- Not always in ND!
- Expanded to ND: 1870-1880s
  - Small ag provided food supplements
- Throughout state (except Badlands)
- Peak: 1890-1930s (Johnson and Knue 1989)
- Declines: 1950s
- Rare: 1970s
- Current Range: Eastern ND/Red River Valley



Sharptails in ND

- Native to ND
- Found throughout the state
- Generally common but less so in Grand Forks County

Grand Forks County, ND



History and Conservation Efforts

- 1968: Ed Bry plea for land/$/support to manage for prairie chickens in the alkali area of Manvel, ND in GF county

- 1968-1977: Grand Forks Co.
  - Prairie Chicken WMA north and south units
  - Stewart Lake WPA
  - Kellys Slough NWR

- 1972: Sharptails surveyed for first time on PCWMA
  - 1972: 52 males
  - 1981: 118 males
  - 1991: 9 males

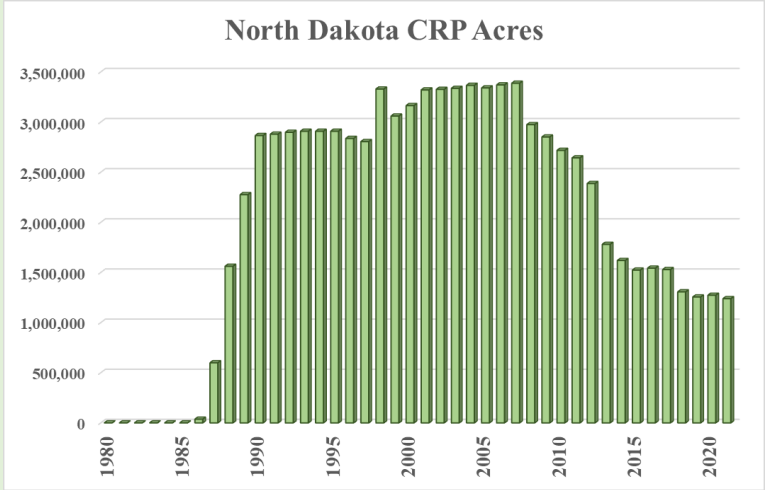
History and Conservation Efforts

1980:

- Sheyenne Grassland: Held only substantial population in state (~1980)
- Chickens disappeared in GF Project Area

1980s/1985: CRP and habitat for chickens?

- NDGF: 3,314 acres
- State Land Dept: 1,300 acres
- Waterfowl Production Areas (WPAs): 3,400 acres
- Federal extension agreements: 400 acres
- CRP (10-year): 34,310 acres but quality?
- **Total: 46,676 acres**



Potential for Bry's plan to build the habitat and then restoration could occur.

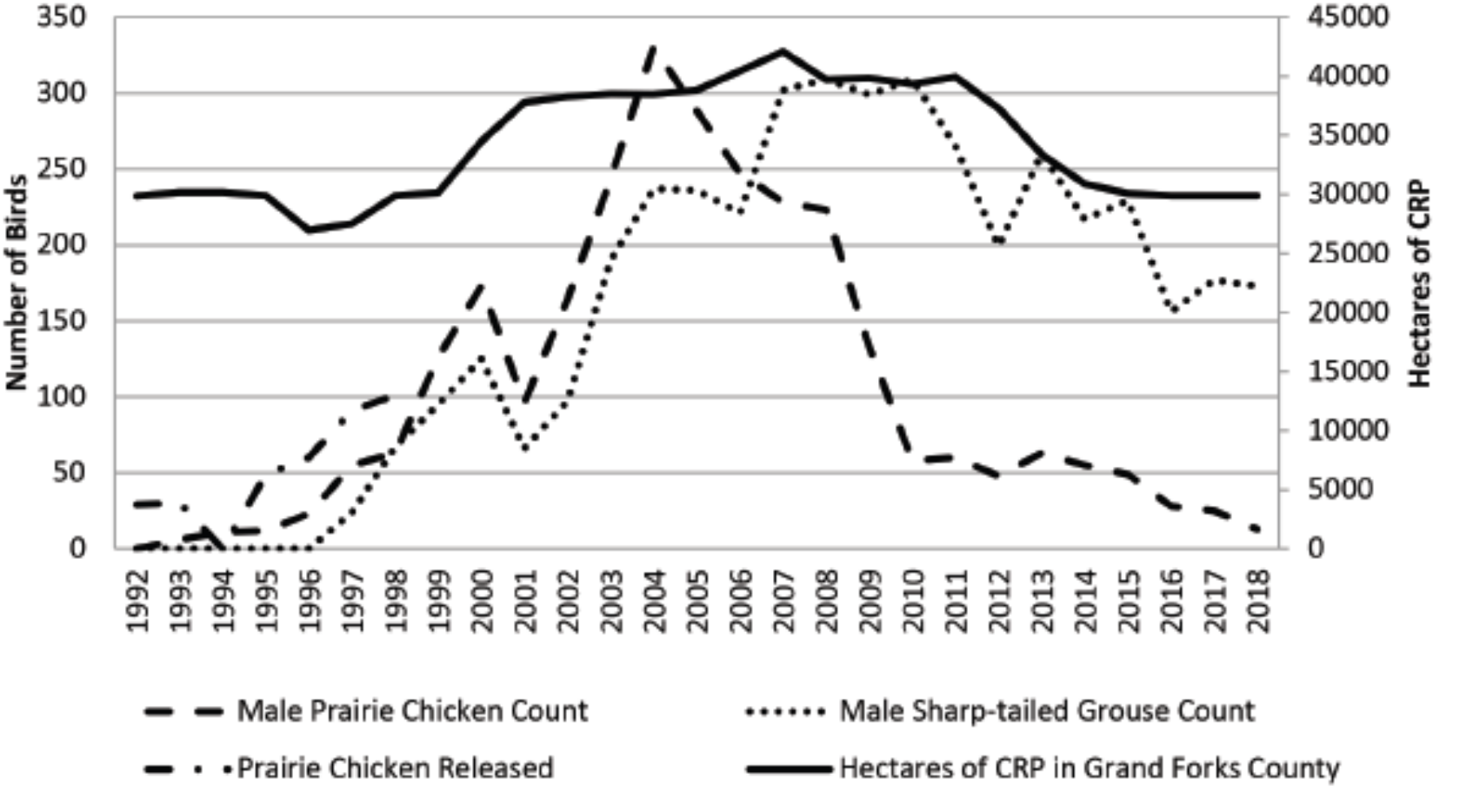
Translocation Study – Grand Forks Huschle and Toepfer 2020

1992-1998

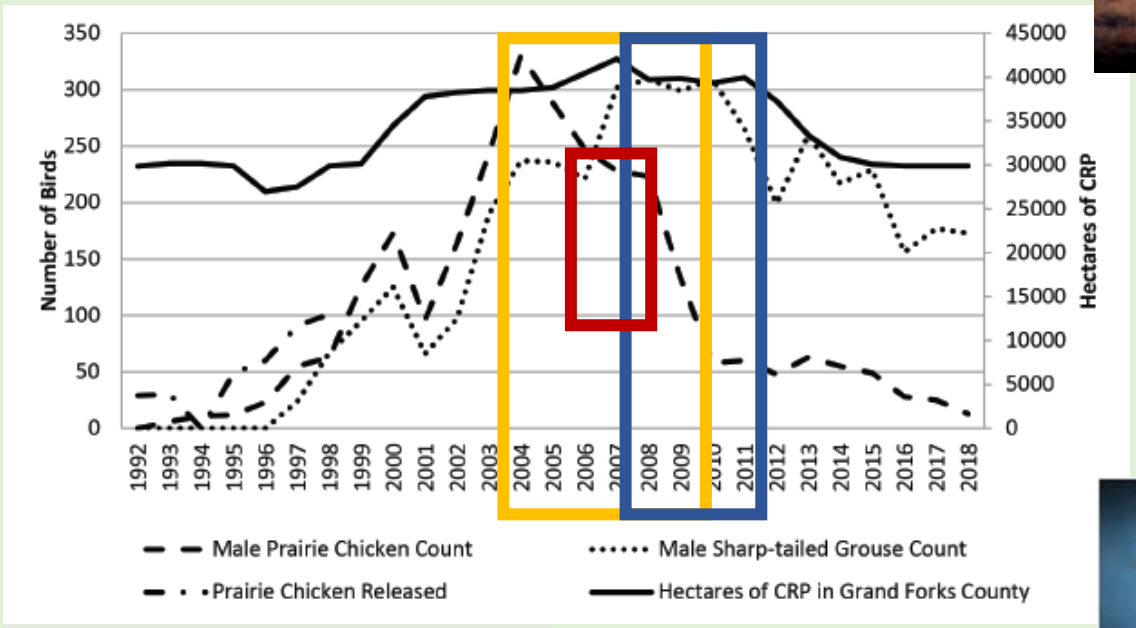
Translocated 414 prairie chickens to ND

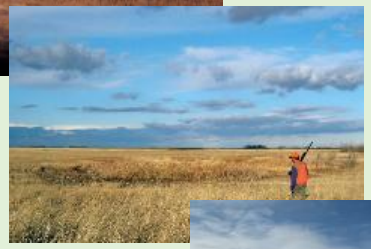
Successful response…initially

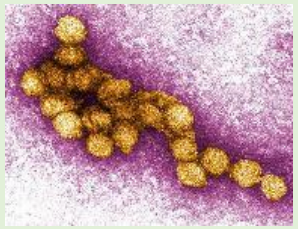
Huschle and Toepfer 2020



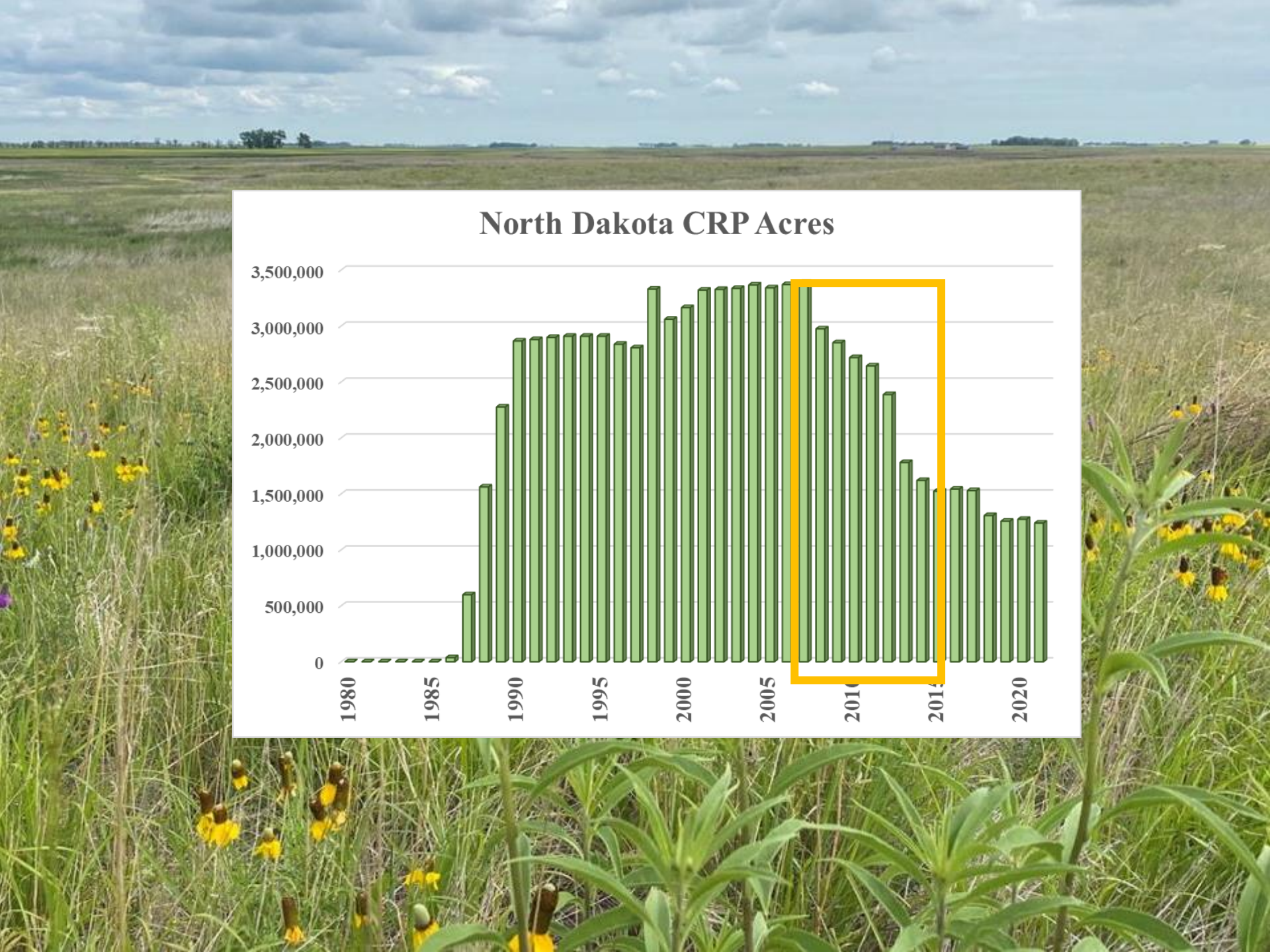
Followed by steady decline

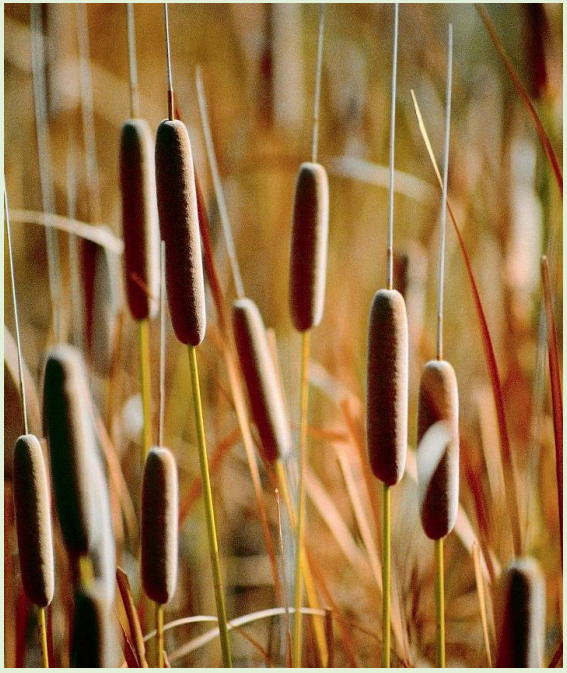






Huschle and Toepfer 2020

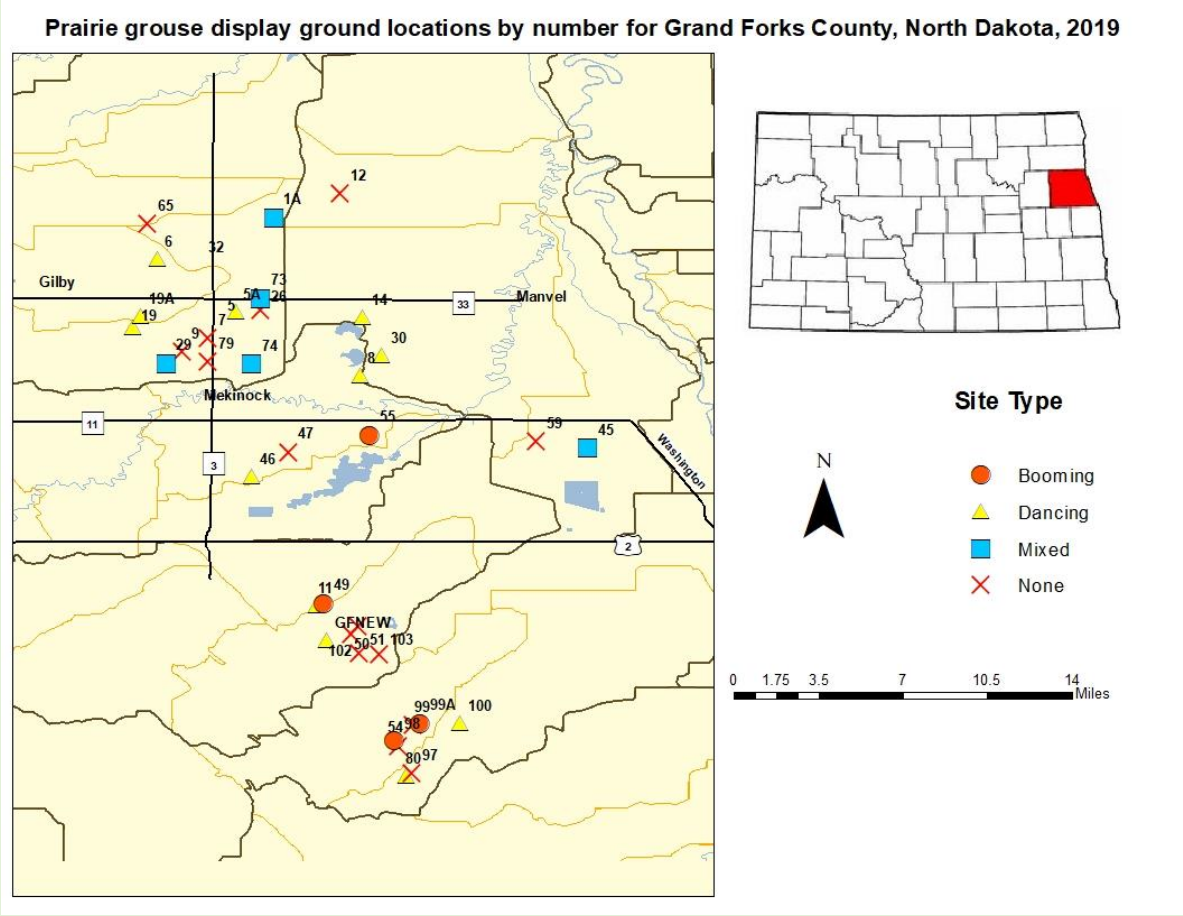

North Dakota CRP Acres
3,500,000
3,000,000
2,500,000
2,000,000
1,500,000
1,000,000
500,000
0
1980
1985
1990
1995
2000
2005
2020


Habitat changing

- Wet cycle
  - Flooding, wetlands, cattails
- Shrubs/Wood vegetation
  - Russian Olive and other woody vegetation
- Tile draining
  - Flood patterns, grass conversion

UND Surveys: 2019



Chickens:

- 29 male prairie chickens survey area
- 42 total (M, F, U)
- 10 leks with chickens
- 4 pure, 6 mixed leks

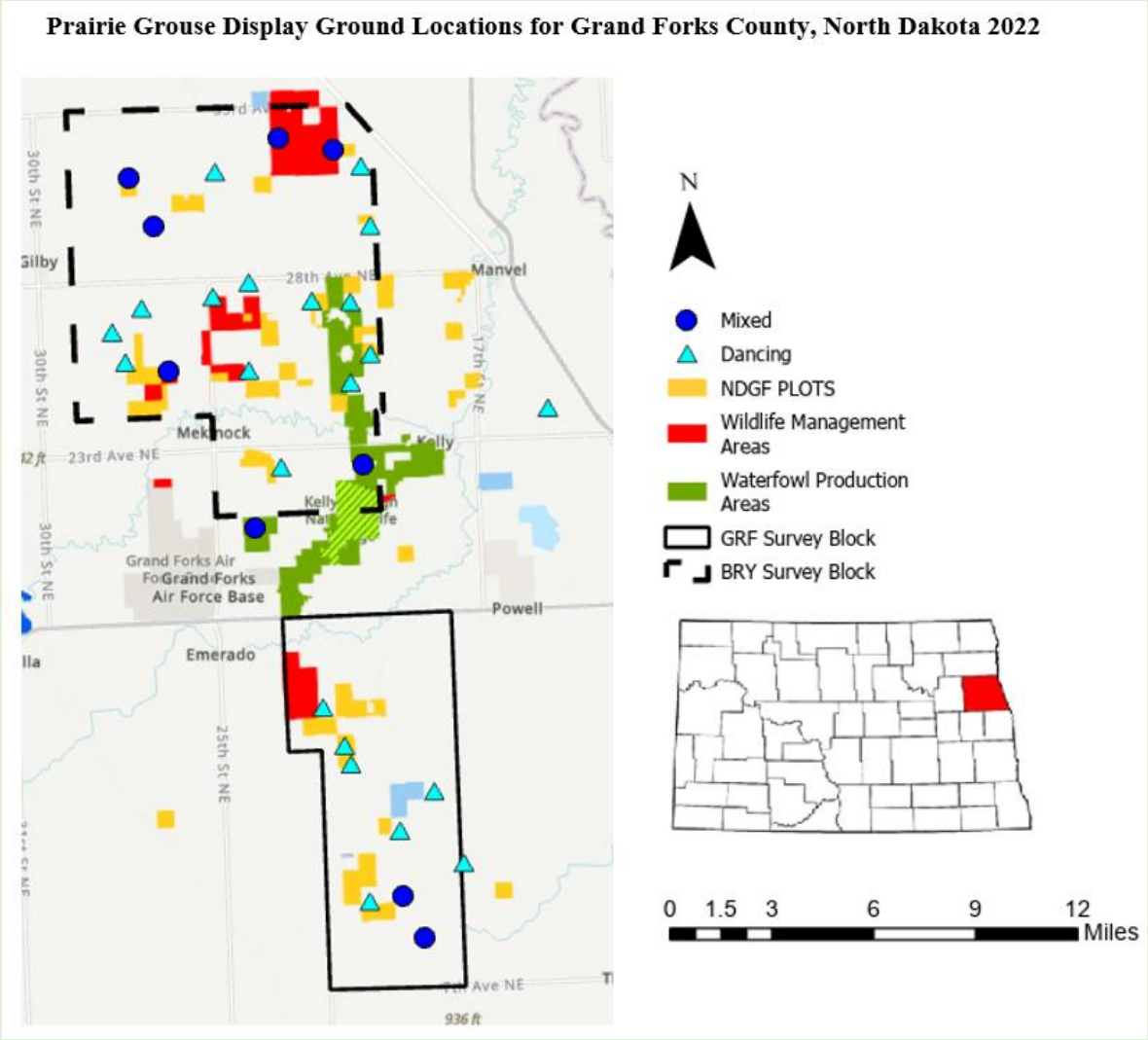
Hybrids:

- 6 total
- 4 males

Sharptails:

- 132 males
- 289 total (M, F, U)

Loss of Chickens - 2022



Chickens:

- 7 male prairie chickens
- 4 mixed leks
- 0 pure booming grounds!

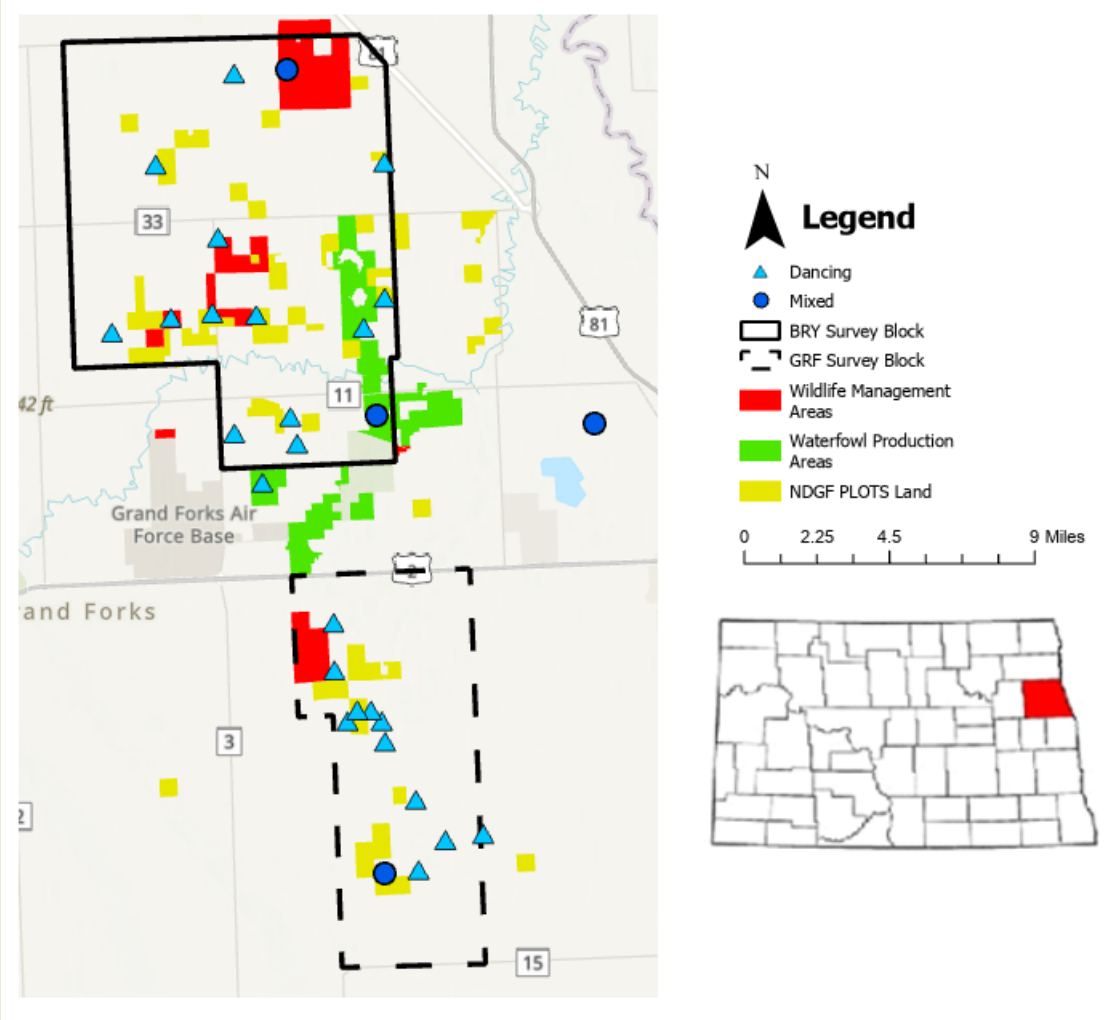
Hybrids:

- 16 total
- 14 males
- 8 leks

Sharptails:

- 294 males
- 544 total (M, F, U)

2023



Chickens:

- 5 male prairie chickens (7 total)
- 4 mixed leks
- 0 pure booming grounds!

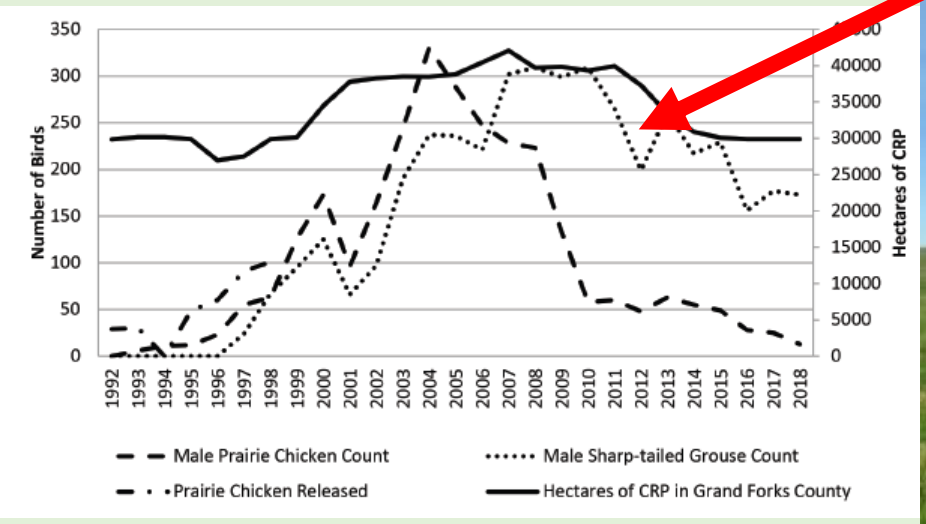
Hybrids:

- 13 total
- 10 males (3 Unk)
- 8 leks

Sharptails:

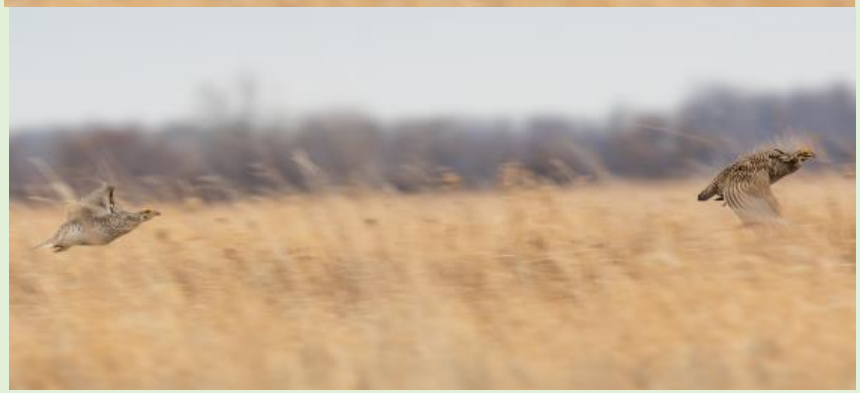
- 319 males
- 561 total (M, F, U)

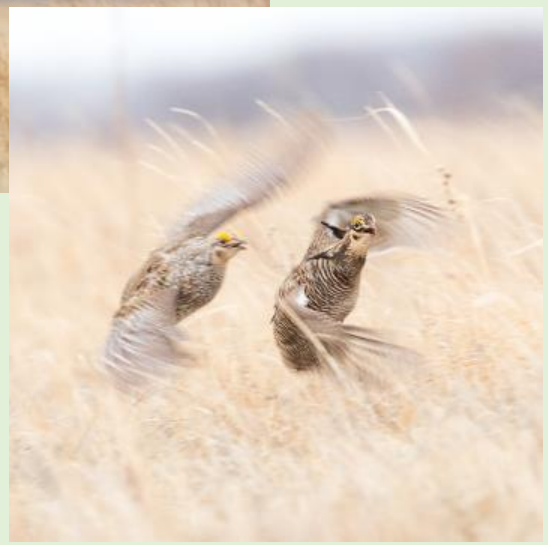
Sharptails


Number of Birds
Hectares of CRP
350
300
250
200
150
100
50
0
40000
35000
30000
25000
20000
15000
10000
5000
0
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
Male Prairie Chicken Count
Male Sharp-tailed Grouse Count
Prairie Chicken Released
Hectares of CRP in Grand Forks County

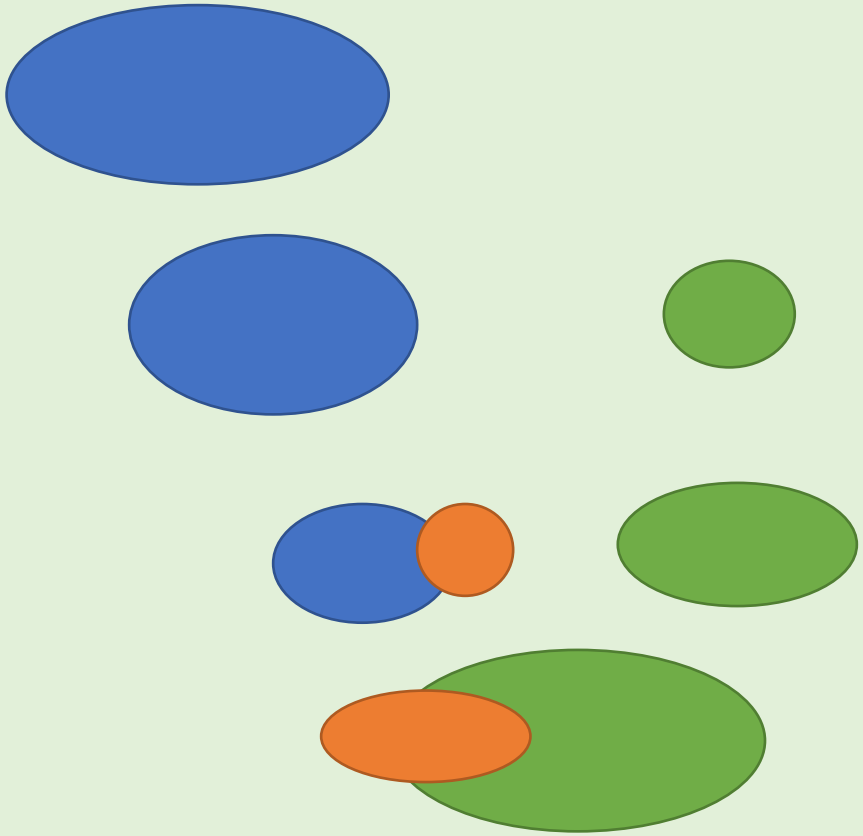
Competition

- Sharptails aggressive to chickens (Sparling 1981)
- Limited breeding opportunities (Augustine and Trauba 2015)





Lek “take over”



Prairie Chickens

Prairie Chickens with small sharptail lek nearby

Prairie Chickens ↓ with ↑ sharptails and hybrids

Prairie Chickens disappear. Sharptails take over and hybrids only remaining sign of chickens

Prairie Chickens

Hybrids

Sharptails

Hybridization

Hybridization

Potential for behavioral reproductive isolation between greater prairie-chickens and sharp-tailed grouse in west-central Minnesota

Jacqueline K. Augustine · David R. Trauba

Received: 4 February 2014 / Accepted: 19 August 2014 / Published online: 12 September 2014

Abstract When ecological or behavioral species-isolating mechanisms are relaxed or incomplete, hybrid zones form. Greater prairie-chickens (*Tympanuchus cupido*) hybridize with sharp-tailed grouse (*T. phasianellus*) wherever their ranges overlap. The objective of this study was to document the potential for reproductive isolation between greater prairie-chickens and sharp-tailed grouse in west-central Minnesota, a newly established sympatric and hybridizing population which developed following the translocation of greater prairie-chickens to the area. We describe and evaluate several potential mechanisms of behavioral isolation (intensity of display and aggressive behaviors, and vocal and non-vocal sounds). In addition, we monitored copulation success to determine the patterns of interspecific mating. Individuals of putative mixed genetic makeup (based on morphology) comprised 8 % of the population, a rate higher than previously reported for most areas of the hybrid zone between these two species. Apparent hybrid individuals stomped their feet faster than parental species during courtship displays, and their vocalizations were intermediate between the parental species. Intensity of display and aggressive behaviors were similar for parental species and hybrids. All copulations observed involved conspecific pairs; hybrid males were not observed to mate. Taken together, this study documents behaviors that might reinforce reproductive isolation (foot stomping and vocalization) and other behaviors that are similar among the parental species and hybrids that would hinder reproductive isolation (display and aggressive behaviors). We suggest that the small population sizes of both greater prairie-chickens and sharp-tailed grouse in this newly established population contribute to the higher rate of hybridization than is observed elsewhere in this hybrid zone.

Keywords Galliformes · Hybridization · Mating success · Nonvocal sound · *Tympanuchus cupido* · *Tympanuchus phasianellus* · Species isolation

Introduction

It is well documented across animal taxa that hybrid zones can form where closely related species co-occur and reproduce (Grant and Grant 1992; Mallet 2005). The presence of hybrids suggests that at least some ecological or behavioral

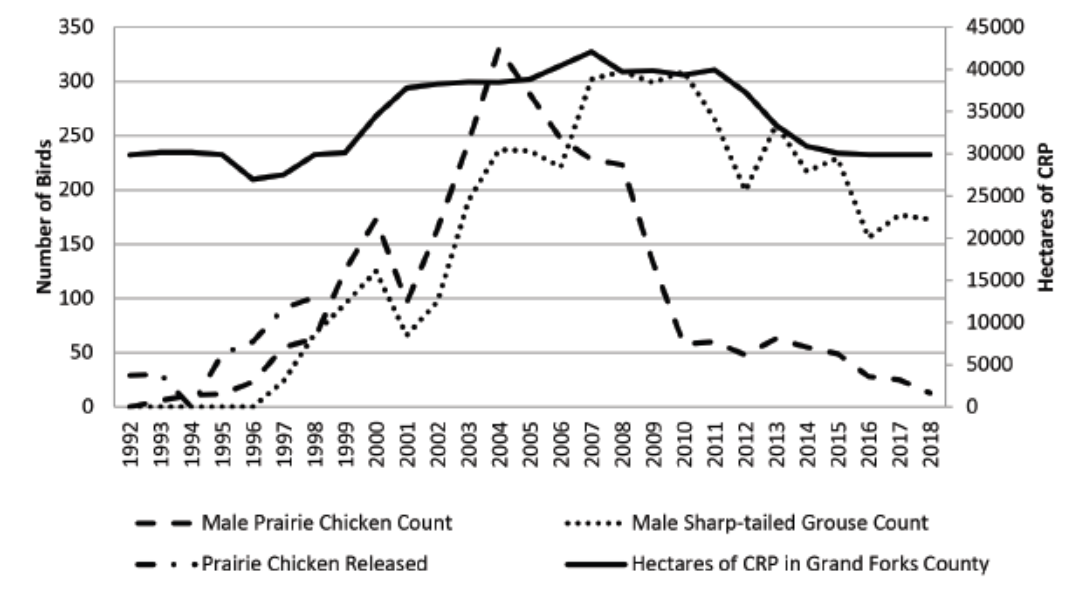
- Perfect storm of decreasing chickens, increasing sharptails → hybridization

Hybrids are Viable

- But males unlikely to have much reproductive success (Augustine and Trauba 2014)

Photos: J. Kolar, NDGF

Is there a population impact?



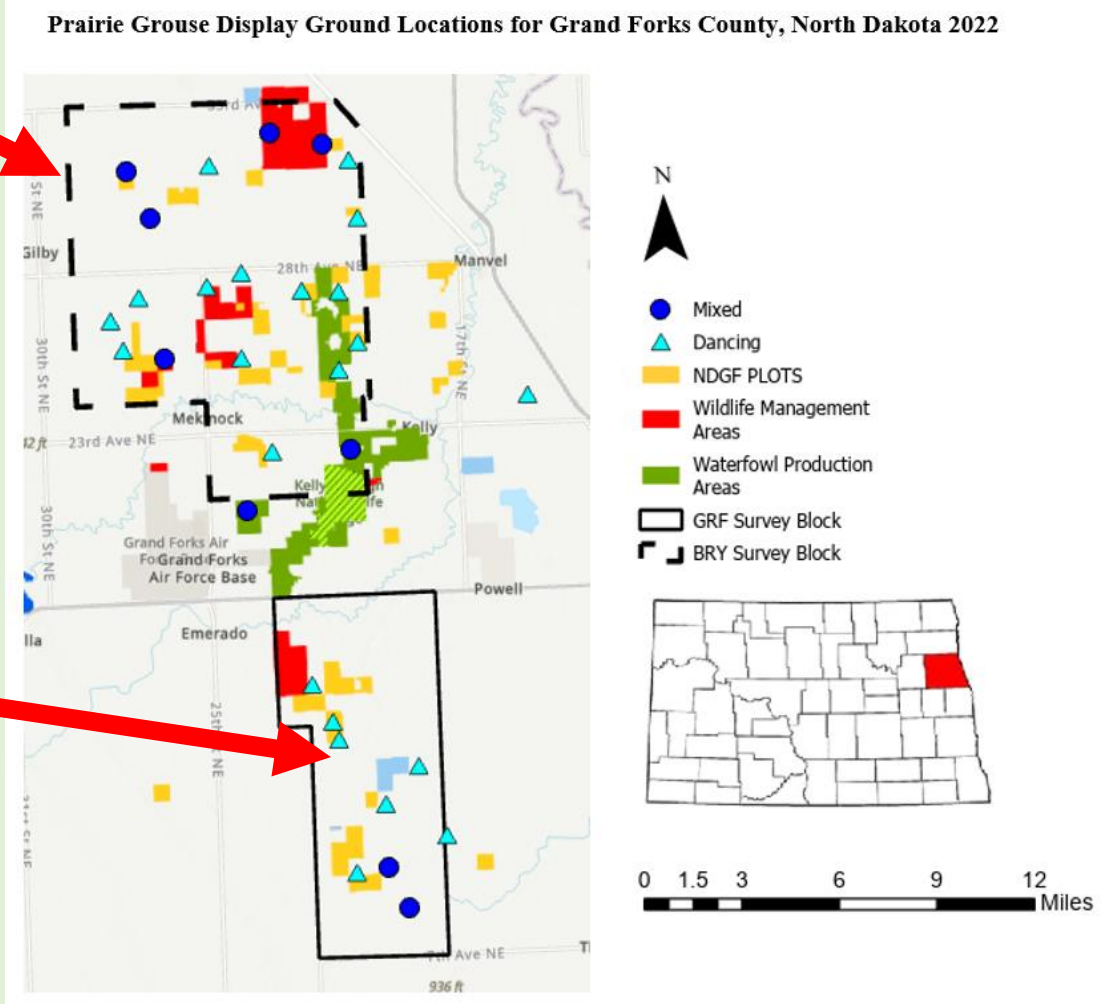
- Maybe?
- ↓ productivity in 1 or both populations as a result of hybrid offspring (Allendorf et al. 2001, Ottenburghs 2021)

Hybridization beyond Galliformes

- Anseriformes (e.g., mallard complex)
- Passeriformes
- Charadriiformes

Observations – Grand Forks

- North of Hwy 2
  - Significant public lands
  - Active management limited
  - Lots of woody encroachment
  - Sharptail hunting closed
- South of Hwy 2
  - Private lands with active grazing and haying
  - Less woody encroachment
  - Sharptail hunting open



Conclusions and Questions

- Shift from prairie chickens to sharptails
  - Grassland habitat loss
  - Wet period
    - Increased woody encroachment
  - Western Minnesota next?

- Increased hybridization
  - Two small populations → competition and opportunity
  - Hybrids a symptom of a larger problem? Succession?
  - Product of shifting populations?

Conclusions and Questions

- Coexist in some places?
  - What is unique about those places?
  - Is there a threshold in population sizes that leads to lek competition and hybridization?
  - When does it become too late for chickens?

Acknowledgements

- Previous work/ guidance: Gary Huschle, John Toepfer, David Lambeth, and Erik Fritzell

- UND Technicians
  - Allicyn Nelson, Ean Malchow, Grant Kapaun, Seth Owens, Noah Raitz, Mackenzie Jensen, Jacob Knutsen, and Lawson Frey

- North Dakota Game and Fish Department

- University of North Dakota

UND Fisheries & Wildlife Biology University of North Dakota

NORTH DAKOTA GAME AND FISH

Questions? Comments?

Email: susan.felege@und.edu
Twitter: @FelegeLab