

*Ecological assessment of Waterfowl  
Production Areas (WPAs) in the  
Rainwater Basin (RWB)*

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Rainwater Basin Joint Venture Informational Seminar

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# UNK<sup>®</sup>



UNIVERSITY OF  
**Nebraska**<sup>®</sup>  
System

Nebraska  
Research  
Initiative

Jeff Drahota  
USFWS





# Contribution of grassland-wetland complexes to fragmented agricultural landscapes?

2023-2025 Collaboration between  
UNK and UNL faculty



# Ecosystem goods and services (EGS)

Contributions of ecosystems to human well-being

- Goods → tangible products
- Services → intangibles



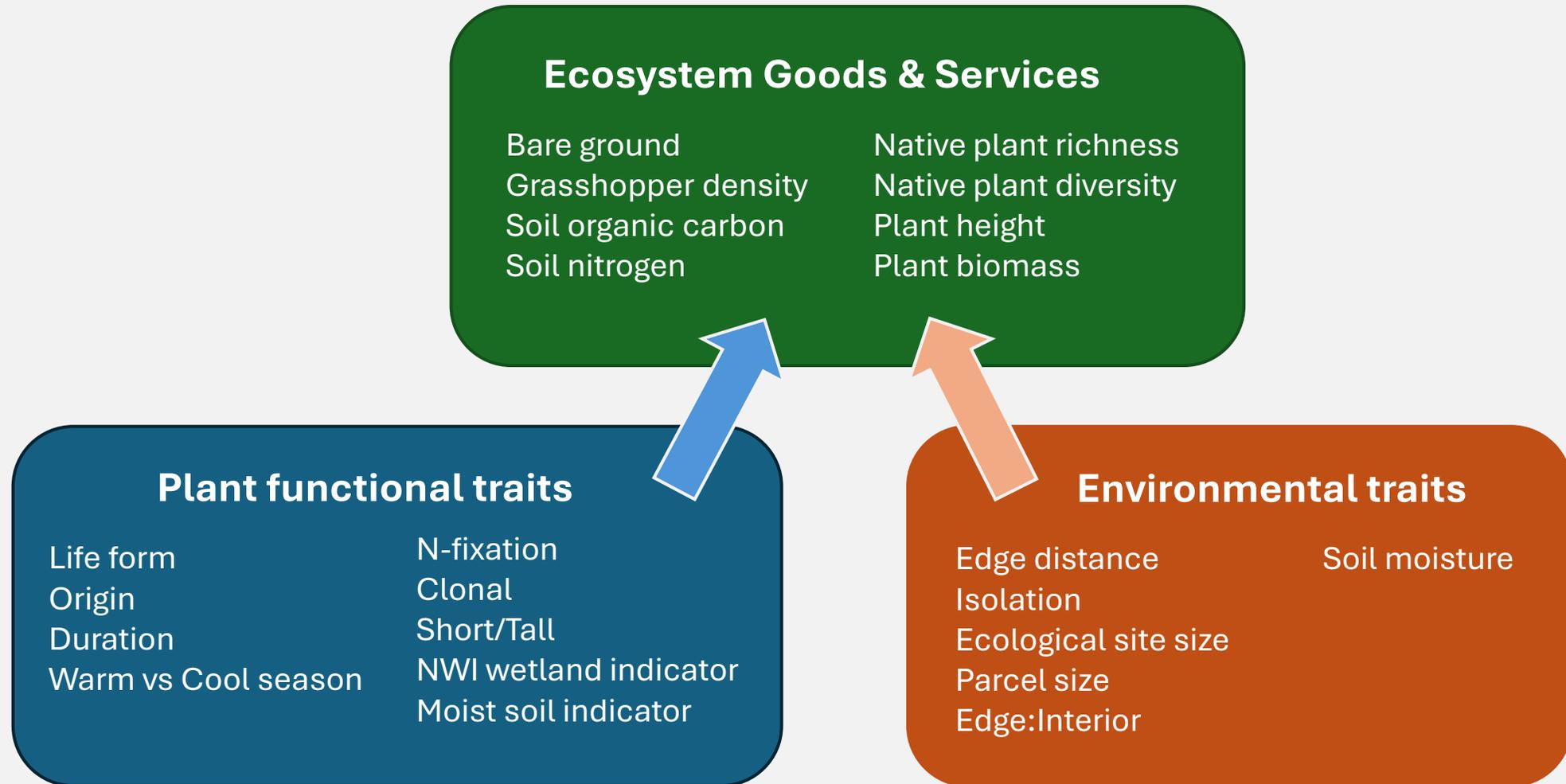
Image: Cody McGregor



Image: San Diego Zoo

Image: Brandon Jones/USFWS

# Field-scale factors contributing to EGS



# 2023 Sampling Sites

- Prairie Dog
  - North
  - South
- Clark
- Gleason
  - East
  - West
- Lindau
- Ritterbush



# Where are EGS highest?

## High

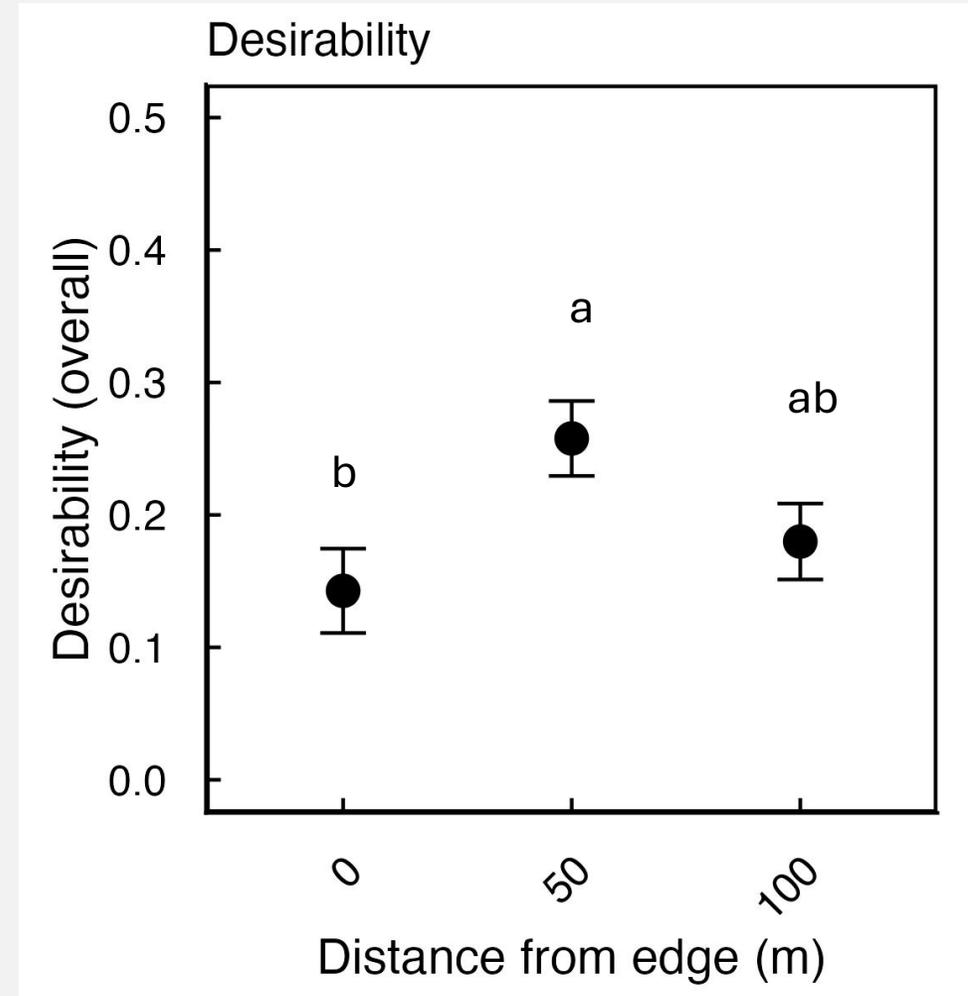
Soil organic carbon  
Soil nitrogen  
Native plant richness  
Native plant diversity  
Plant height variability  
Plant biomass

## Low

Bare ground

## Intermediate

Grasshopper density

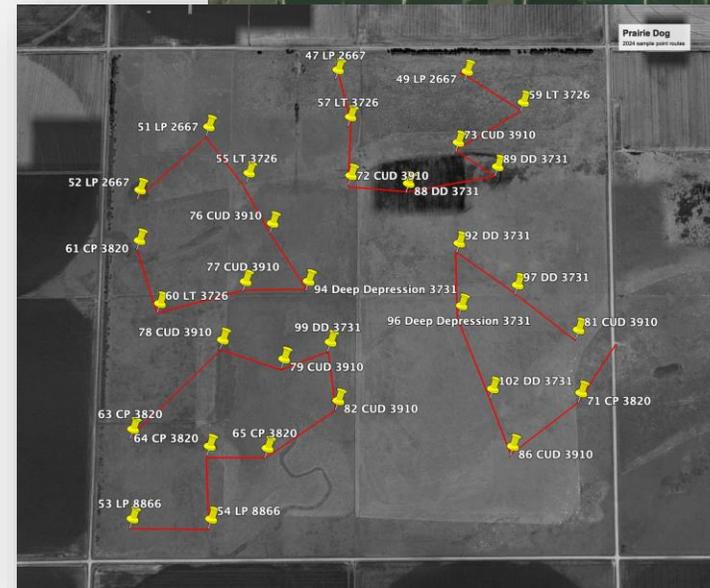
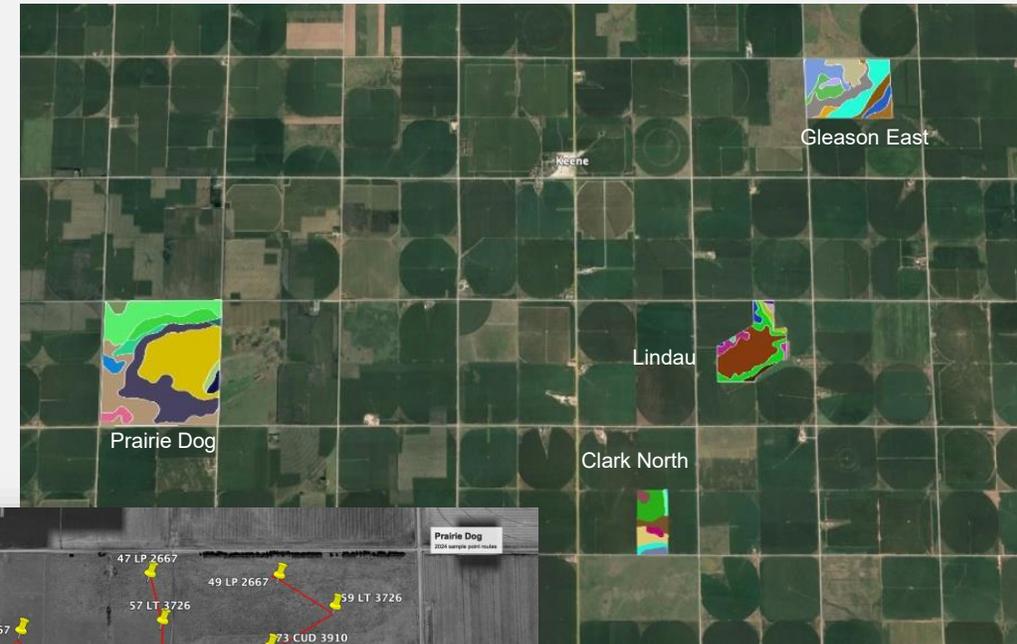


# What about the interiors?

## 2024 Strategy

- Fewer parcels
- More points in each parcel
- Targeted sampling, fewer EGS

Soil temperature  
Soil moisture  
Native plant richness  
Plant height variability  
Leaf Area Index  
Plant cover (lifeform)  
Bare ground  
Grasshopper density



# Modeling indicators of grasshopper density

Bella Neuhaus, Megan tenBensel, Dr. Paul Burger

## Satellite data

Enhanced vegetation index (EVI)

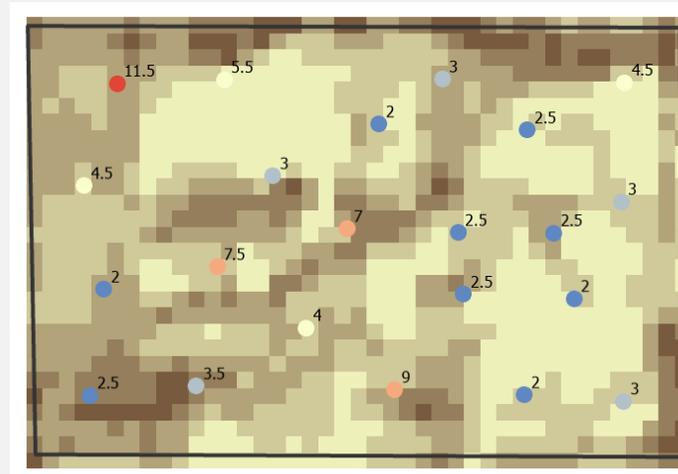
- Plant production

Thermal infrared (TIR)

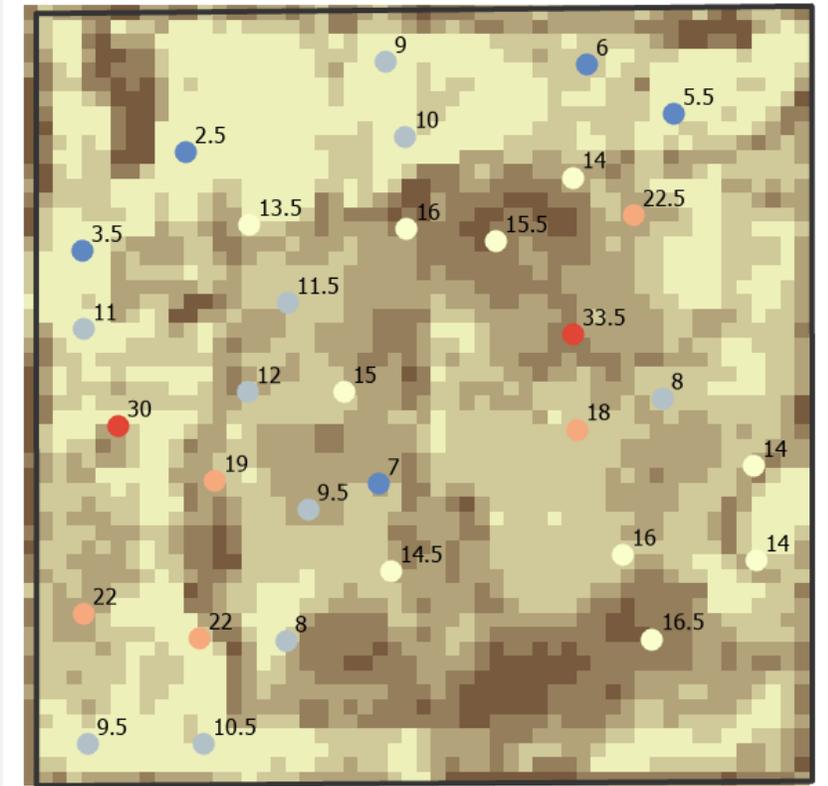
- Soil temperature

## Field-truthed data

Grasshopper density



Gleason



Prairie Dog

# Responses to wetland restoration?

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2025-current



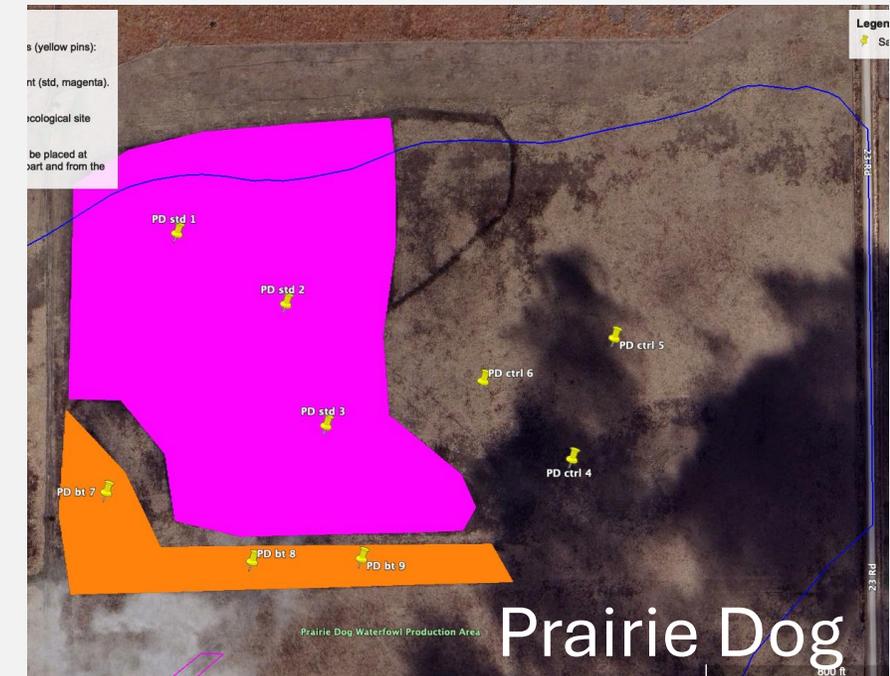
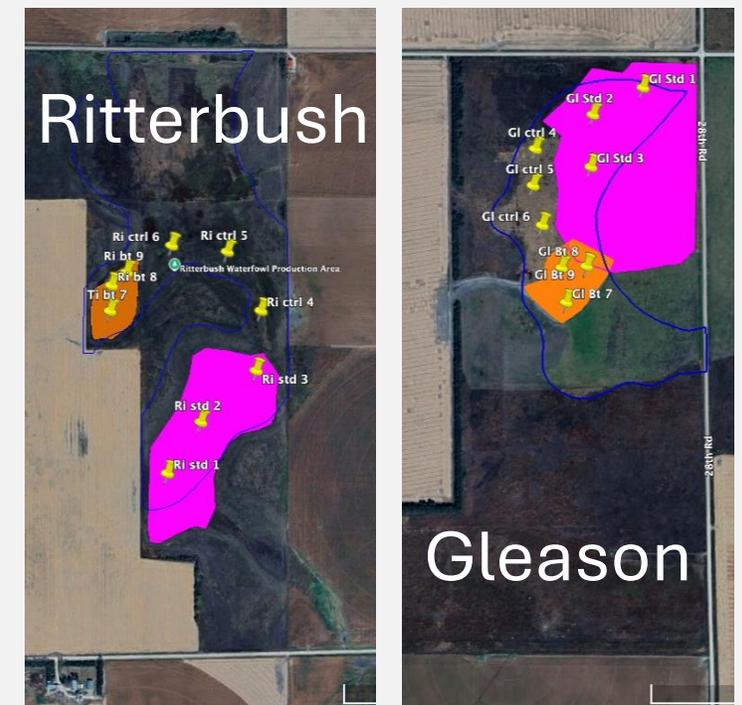
# Sediment excavation

## Areas within WPAs

- Deep excavation (orange)
- Shallow excavation (pink)
- Non-excavated

## WPAs (excavation years)

- Prairie Dog (2002, 2013)
- Ritterbush (2018)
- Gleason (2016, 2024)



# Plant communities

June to mid-July 2025

- Existing vegetation (Emma Dowhower)
- Soil seed bank (Darynee Palser)



# Soil seed bank study – moist conditions



# Soil seed bank study – flooded conditions



# Bird communities

Acoustic recorders (Connor Harrison, Dr. Jacob Cooper)

- Launched July 15, 2025
- Goal through spring migration



Letty Reichart & Emma

# LOTS of songs!

## **Prairie Dog July 15-31, 2025**

Deep excavation area

- >16,300 song recordings
- 57 species (>60% confidence)
  - Grasshopper sparrow (37%)
  - Mourning dove (20%)
  - Western meadowlark (12%)
  - Upland sandpiper (10%)

## **Next steps**

- Analyzing Aug – Nov songs
- Validating BirdNet output
- Bat songs (ultrasonic mic)



# Grassland restoration interests

- How does grasshopper herbivory shape plant establishment?
- Does seed origin matter – how local is local enough?
- Are restorations a field of dreams for insects?



Megan tenBensel