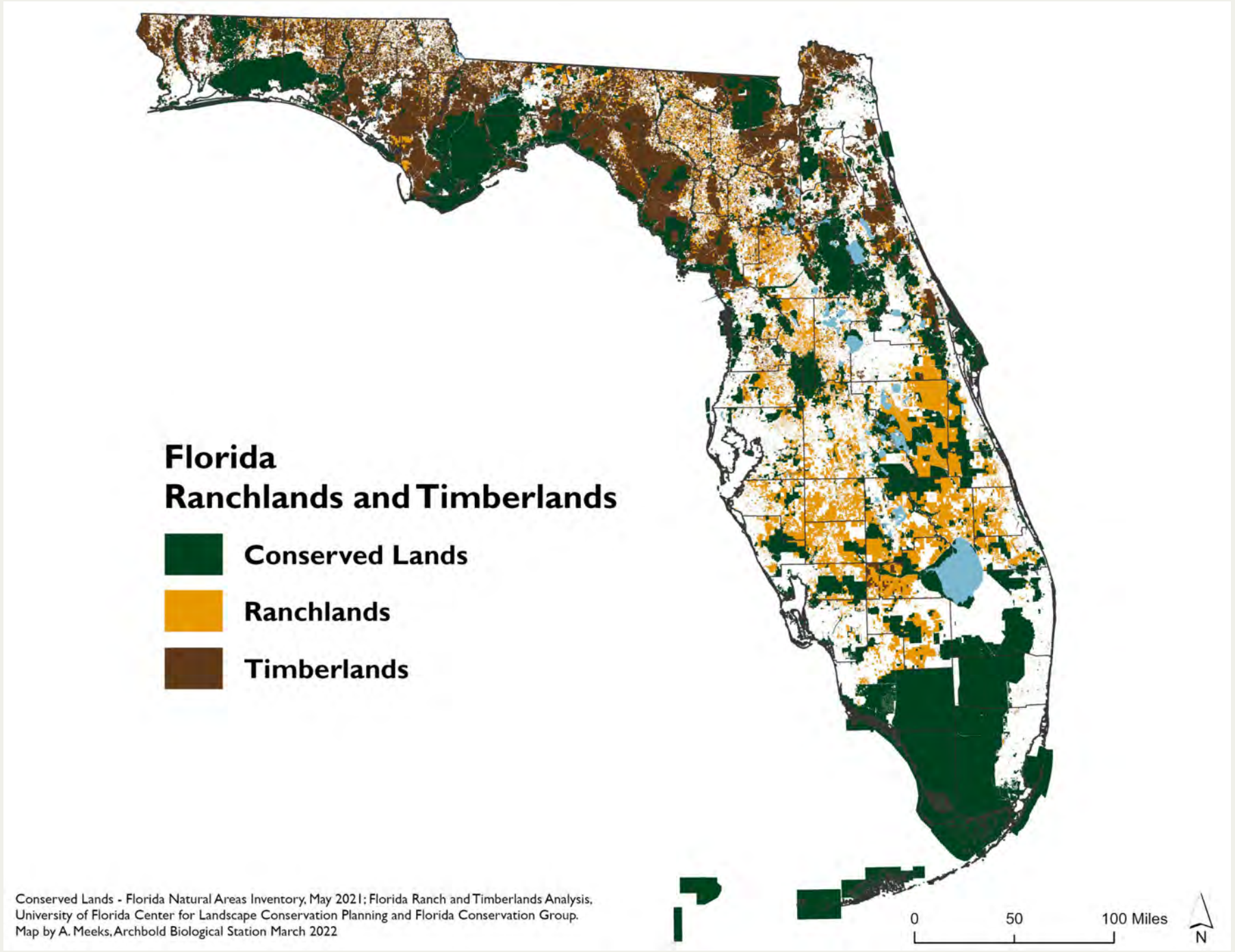
The relationship of Florida Grasshopper Sparrow habitat to cattle forage at DeLuca Preserve

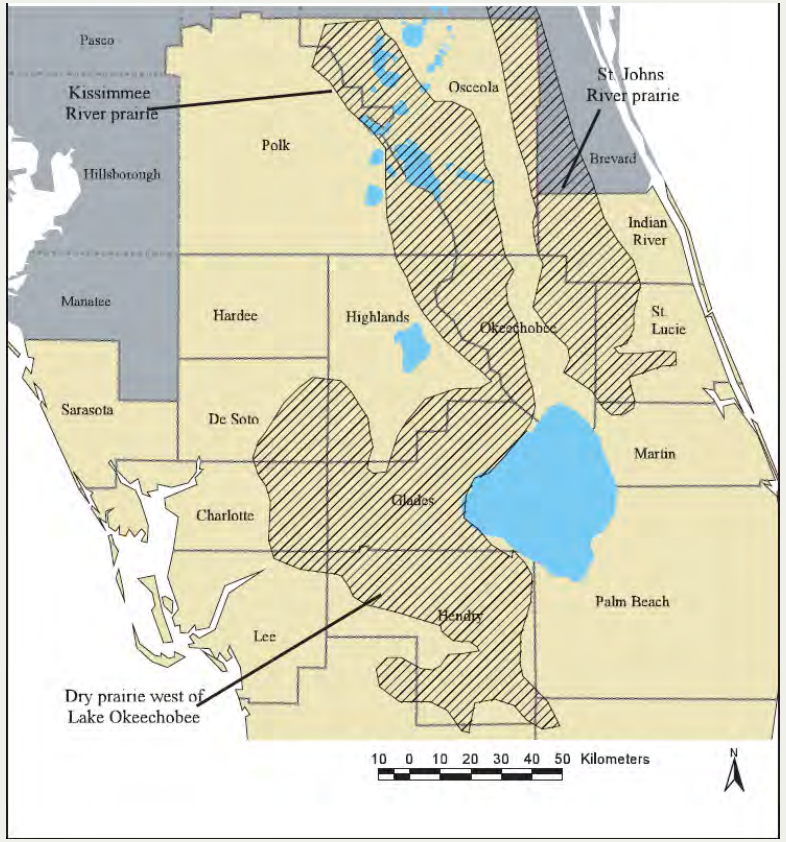
Dr. Betsey Boughton | Director of Agroecology
Dr. Todd Jones | Director of Conservation Science on Military Lands
Dr. Angela Tringali | Atlantic Flyway Conservation Delivery Specialist
Dr. Gregory Sonnier | Research Biologist
Mary Marine, MS| Research Assistant

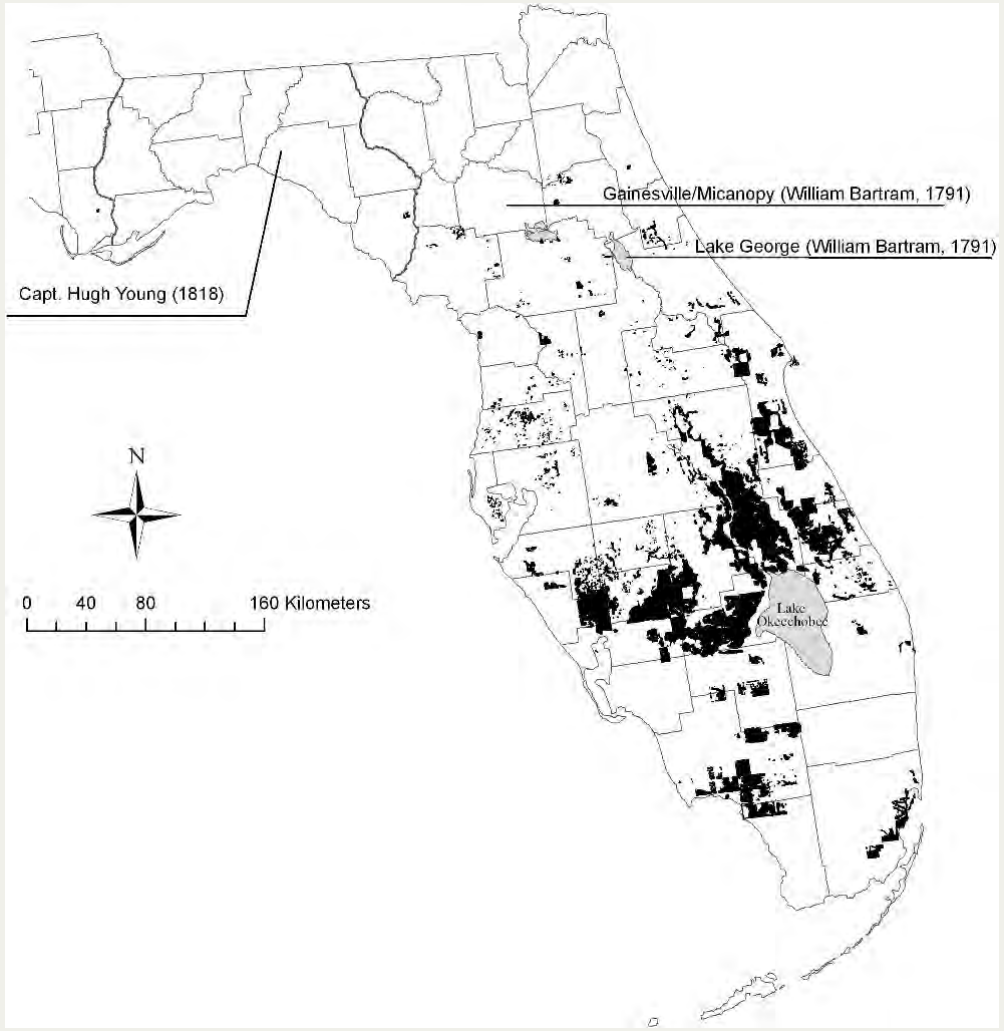
Many thanks to our partners



Conserved Lands - Florida Natural Areas Inventory, May 2021; Florida Ranch and Timberlands Analysis, University of Florida Center for Landscape Conservation Planning and Florida Conservation Group.
Map by A. Meeks, Archbold Biological Station March 2022

Florida's prairie region: Land of Fire and Water





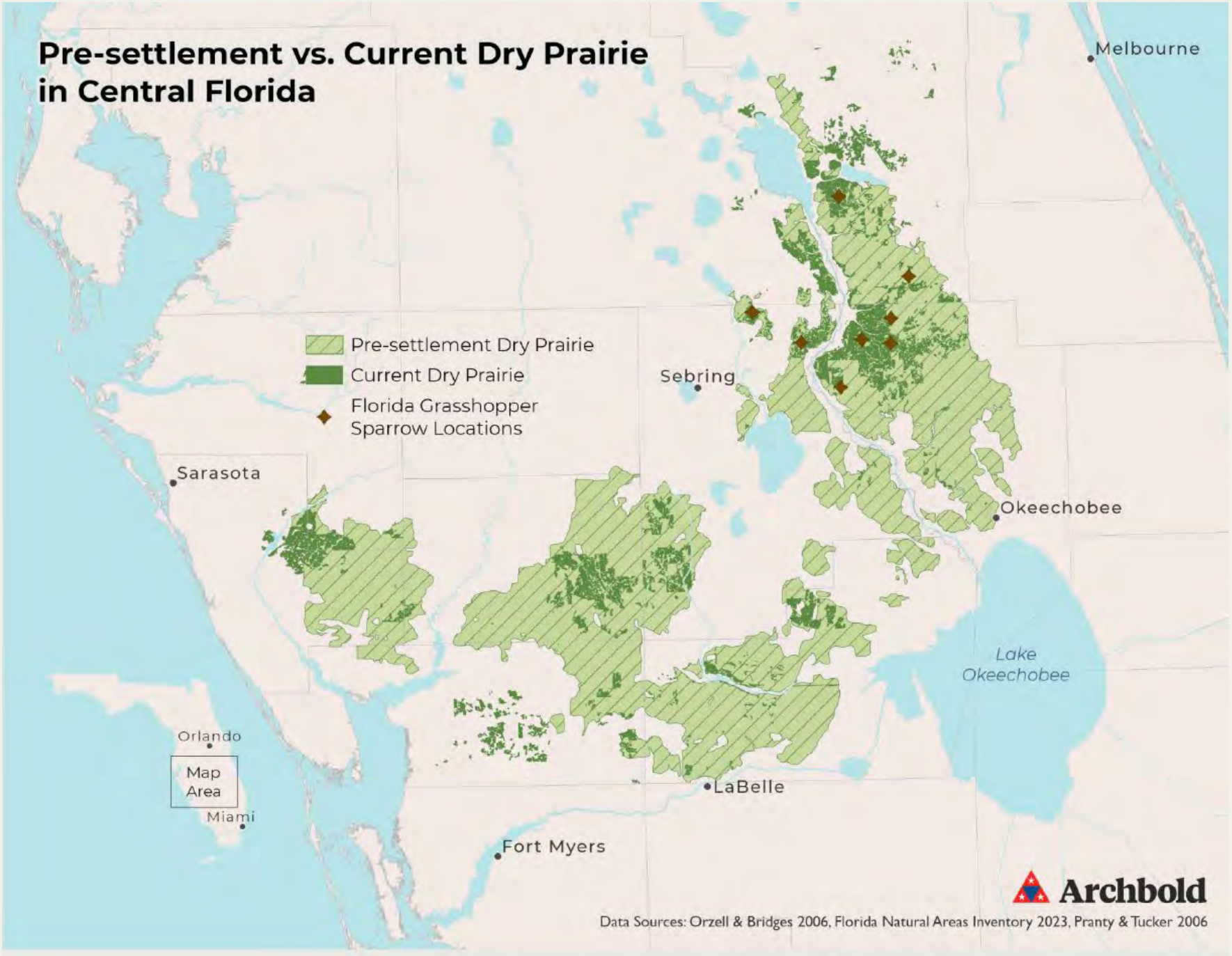
less than 20% of Florida's natural dry prairie remains

1.9 M acres of prairie pre-settlement

Orzell and Bridges 2004, Stephenson 2011

The Florida Grasshopper Sparrow (FGSP)

- Non-migratory subspecies endemic to grasslands of south-central FL
- Early records suggest FGSP was abundant and widespread across the region
- Decline of FGSP attributed to loss of native prairie
- However, FGSP were found on ranchlands and pastures in the 2010s


Pre-settlement vs. Current Dry Prairie in Central Florida
Melbourne
Pre-settlement Dry Prairie
Current Dry Prairie
Florida Grasshopper Sparrow Locations
Sebring
Sarasota
Okeechobee
Lake Okeechobee
Orlando
Map Area
Miami
LaBelle
Fort Myers
Archbold
Data Sources: Orzell & Bridges 2006, Florida Natural Areas Inventory 2023, Pranty & Tucker 2006

Our Goals

- Conserving ranchlands is a strategy to aid in recovering FGSP populations
- Goal of 12 stable or increasing populations (currently at 6)

DeLuca Preserve

- 27,000 acres
- 18,000 acres used for cattle
- Critical connector
- Florida Dry Prairie
- Improved and Semi-native Pasture
- Globally imperiled FL Grasshopper Sparrow
- University of Florida, Ducks Unlimited, UF IFAS
- Working cattle ranch serving as a natural laboratory

Pasture management at Deluca Preserve

- Approximately nine-hundred cow/calf units and 40 bulls are on site and are rotated among those units
- Divided into pasture units that are managed by burning or mowing every 1-2 years and roller-chopped to maintain optimal grazing conditions and remove woody vegetation.

Major Pasture Types

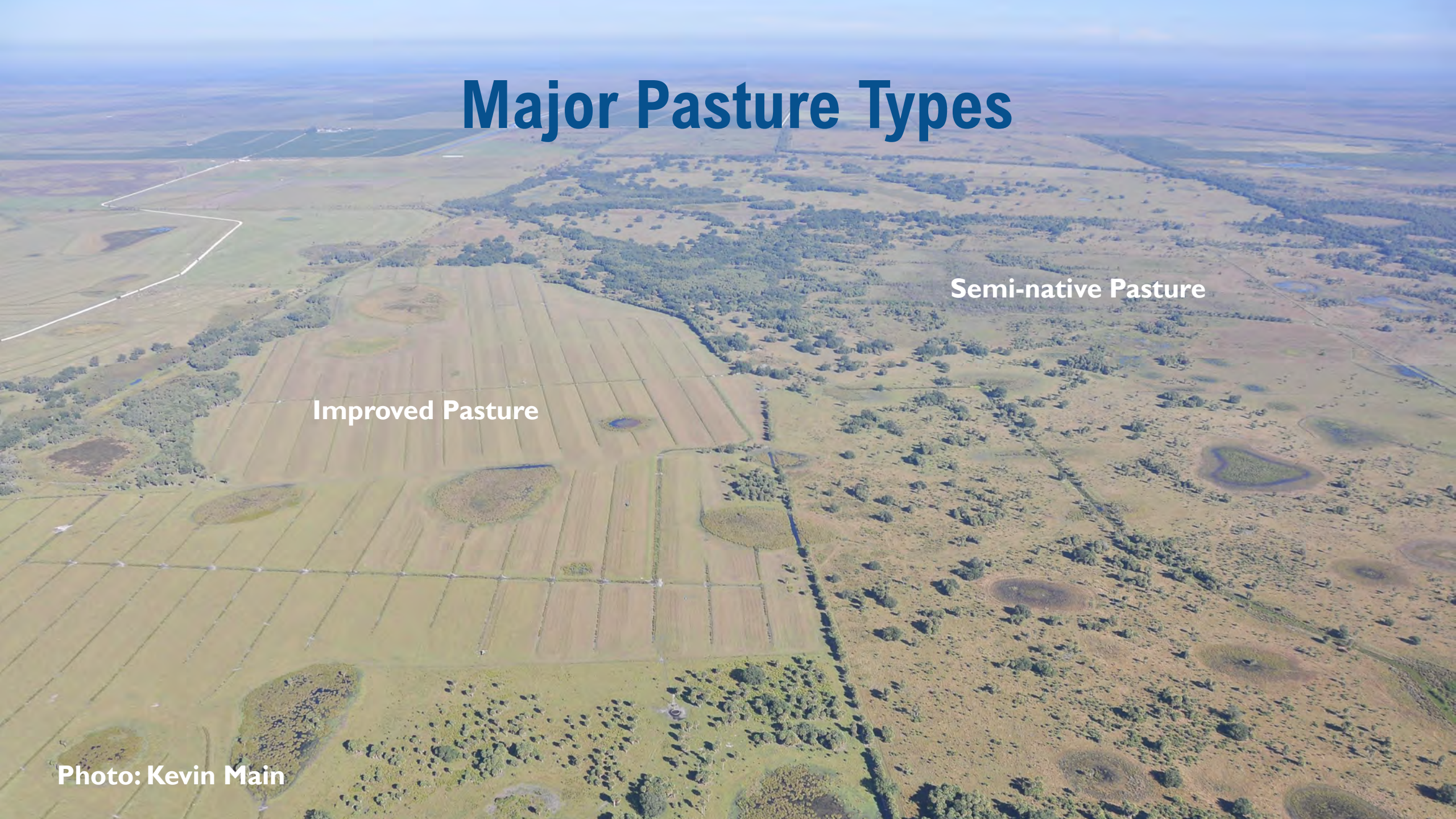
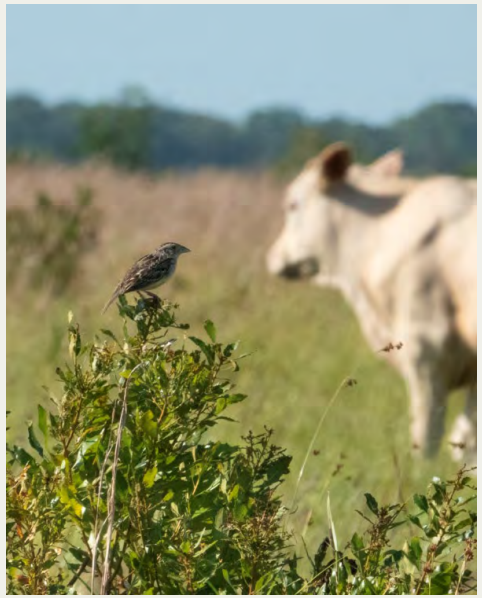


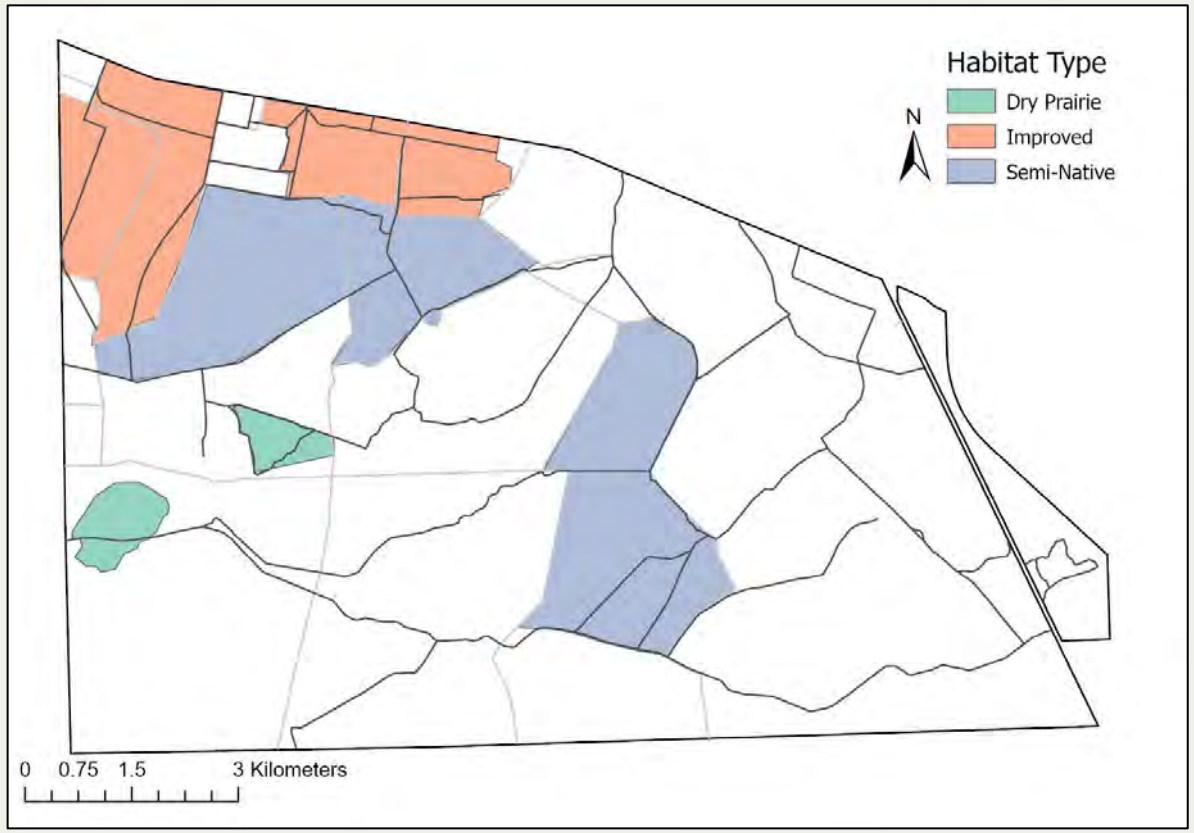
Photo: Kevin Main

Can land management benefit both cattle and Florida Grasshopper sparrows?

1. How does pasture type affect FGSP habitat quality?
2. How does pasture type affect cattle forage (growth and nutritive value)?
3. What is the association of vegetation structure with bird communities?



Study Design – Initiated in 2023



Methods

- 157 point counts in April 2023
- Habitat Assessments at each point or nest (April/Oct)
  - 13 habitat characteristics within 10 m of point
  - % cover of bare ground, woody plants, palmetto, grasses, forbs, presences of runways, average height of vegetation, presence of fire ants
  - Distance to nearest tree, tall shrub, man-made structure

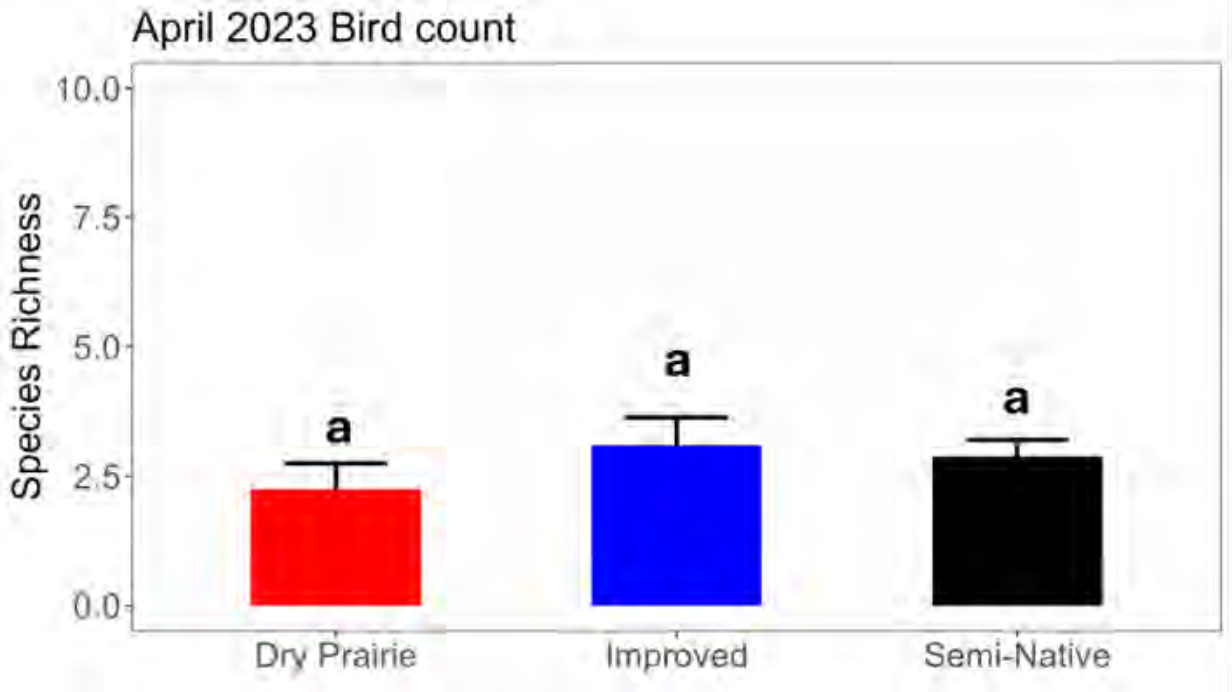
Methods

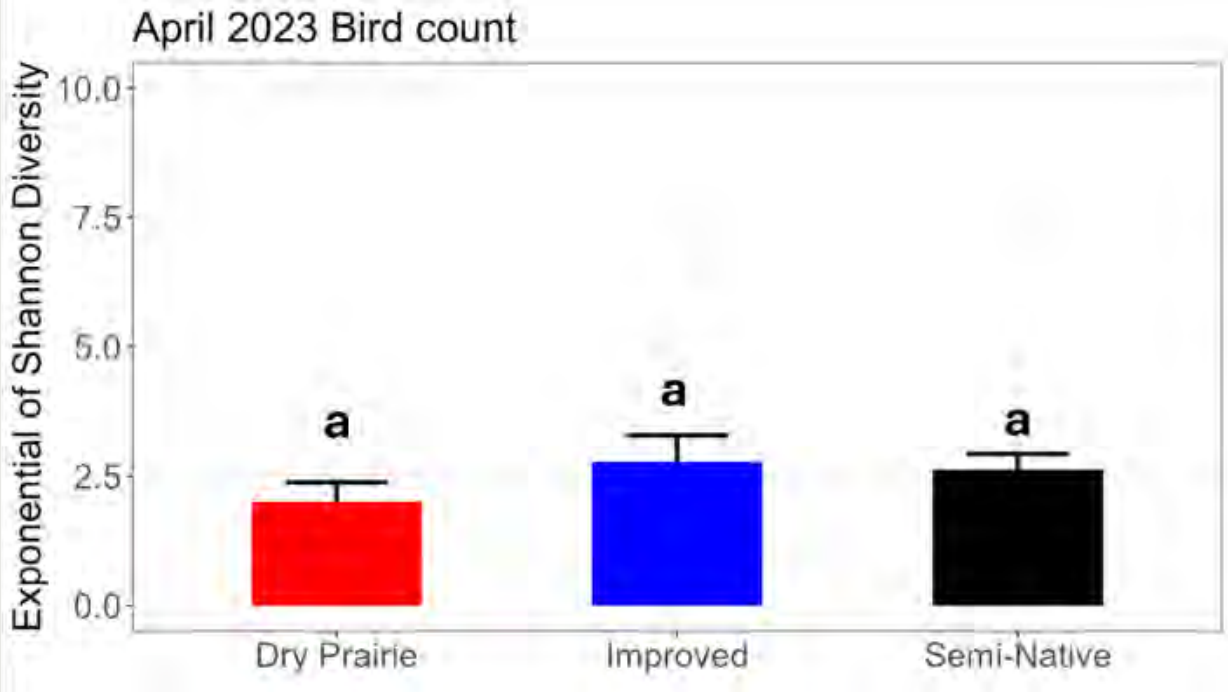
- Forage Assessments at each point or nest (April/Oct)
  - Identify most abundant grass species and percent composition within 10 m radius of point
  - Forage condition was characterized as excellent, good, fair or poor following NRCS methodology
  - NRCS methods for estimated lbs/acre based on data collection
  - Satellite data to estimate productivity index for each point
- Forage nutritive value
  - 78 locations with similar soils and hydrology
  - Hand collection within 10 m radius around points
  - Clip palatable grasses 3 inches above ground
  - Analyzed at UF Forage Evaluation Support Lab (digestibility, crude protein, and phosphorus)

Statistical analysis

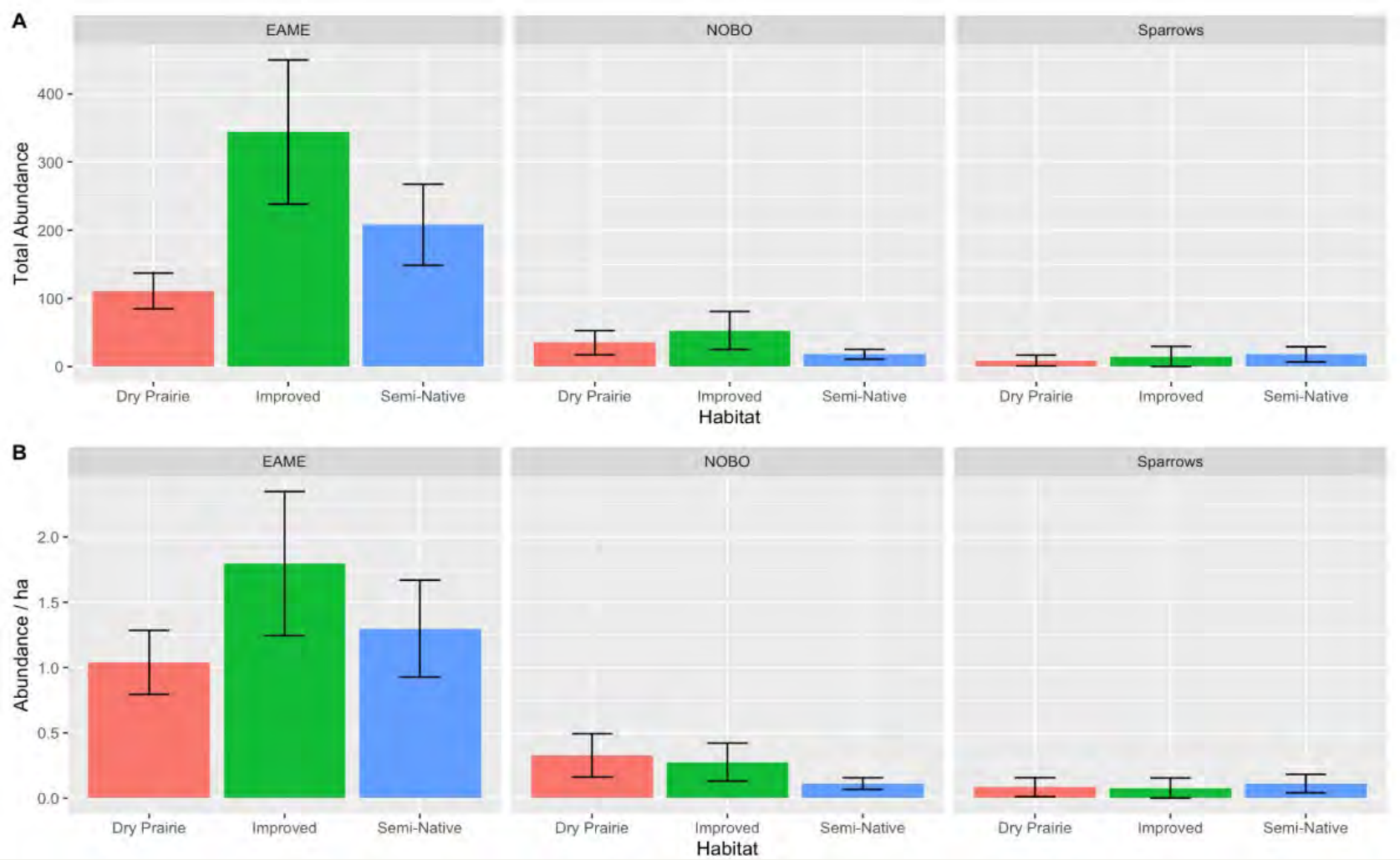
1. How does pasture type affect FGSP habitat quality?
    1. Total bird richness, diversity by pasture type
    2. Indicator species (Eastern Meadowlark, Bobwhite, Sparrows)
    3. Too few FGSP for robust analyses
2. How does pasture type affect cattle forage (growth and nutritive value)?
    1. Ordination to understand differences in plant composition among pasture types
    2. Forage digestibility, Nitrogen, and Phosphorus by pasture type
    3. Productivity by pasture type (Remote sensing derived and NRCS tool)
3. What is the association of vegetation structure with bird communities?
    1. Used distance based Redundancy Analysis of bird community in relation to bare ground, forb, Palmetto, woody cover, and bahiagrass cover

Avian diversity and abundance – no difference among pasture types





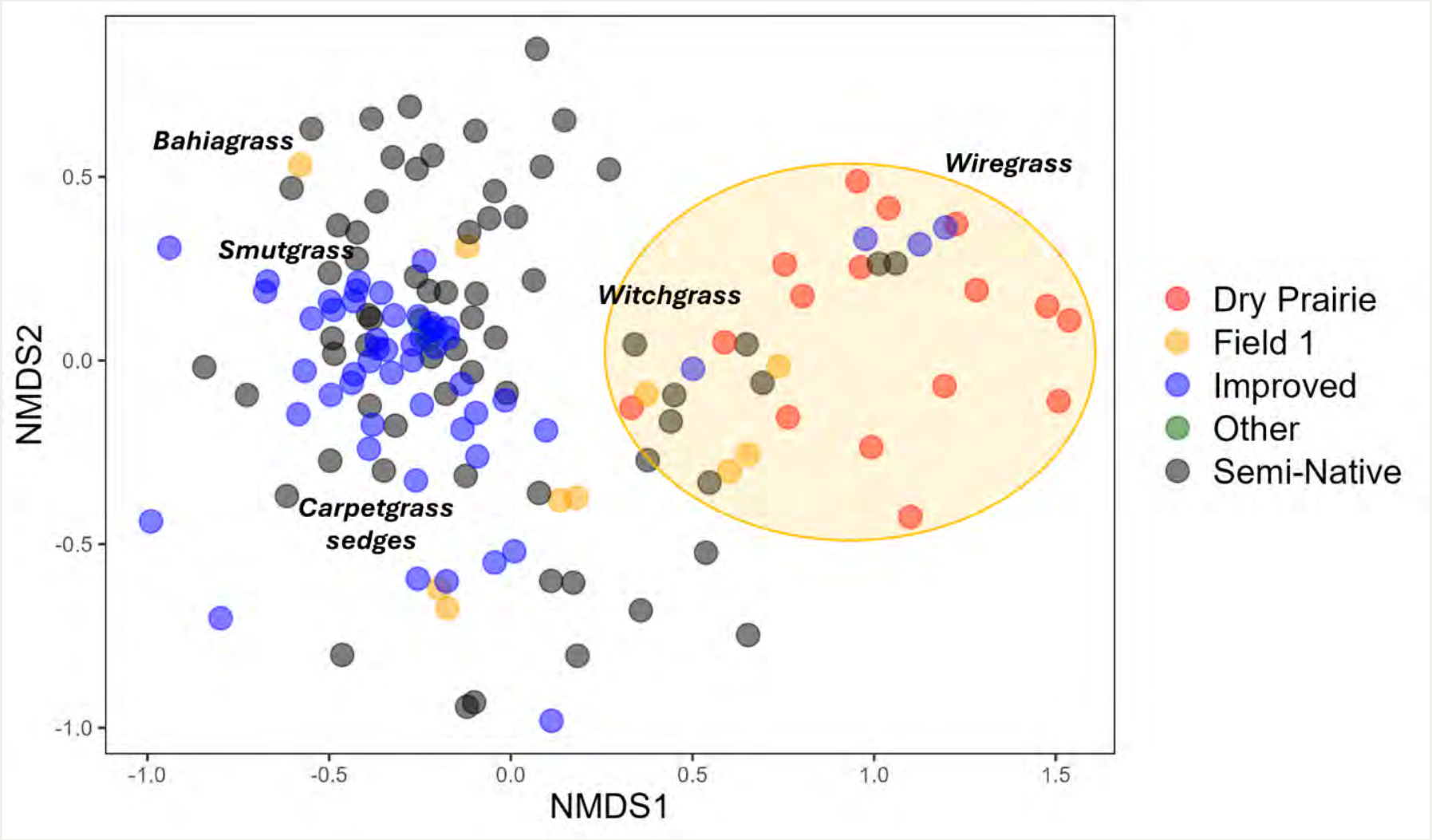
Improved pastures had > abundance and density of Eastern Meadowlarks



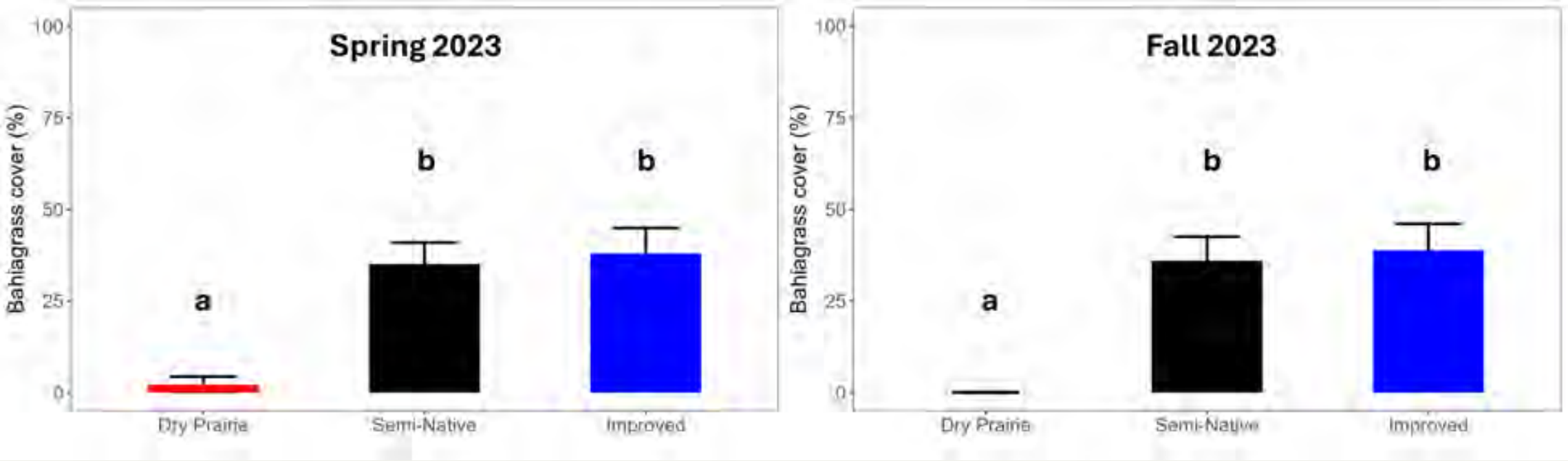
Summary of points where FGSP were found

Habitat Characteristic	Unit	Estimate	SE	Max	Min
Percent cover bare ground	%	3.11	2.55	23.0	0.0
Percent cover woody plants	%	6.11	2.00	20.0	0.0
Percent cover palmetto	%	1.11	0.73	5.0	0.0
Percent cover forbs	%	13.56	4.05	40.0	0.0
Percent cover grasses	%	76.11	6.22	95.0	45.0
Average grass height	cm	29.03	6.16	53.3	5.0
Average forb height	cm	16.56	4.68	40.0	0.0
Average shrub height	cm	44.89	10.61	89.0	0.0
Presence of runways	Presence/absence	0.17	0.14	na	na
Presence of RIFA	Presence/absence	0.33	0.17	na	na
Distance to nearest tree	m	249.33	19.64	320.0	140.0
Distance to nearest shrub	m	27.00	10.52	100.0	2.0
Distance to man-made structure	m	224.11	61.53	675.0	55.0

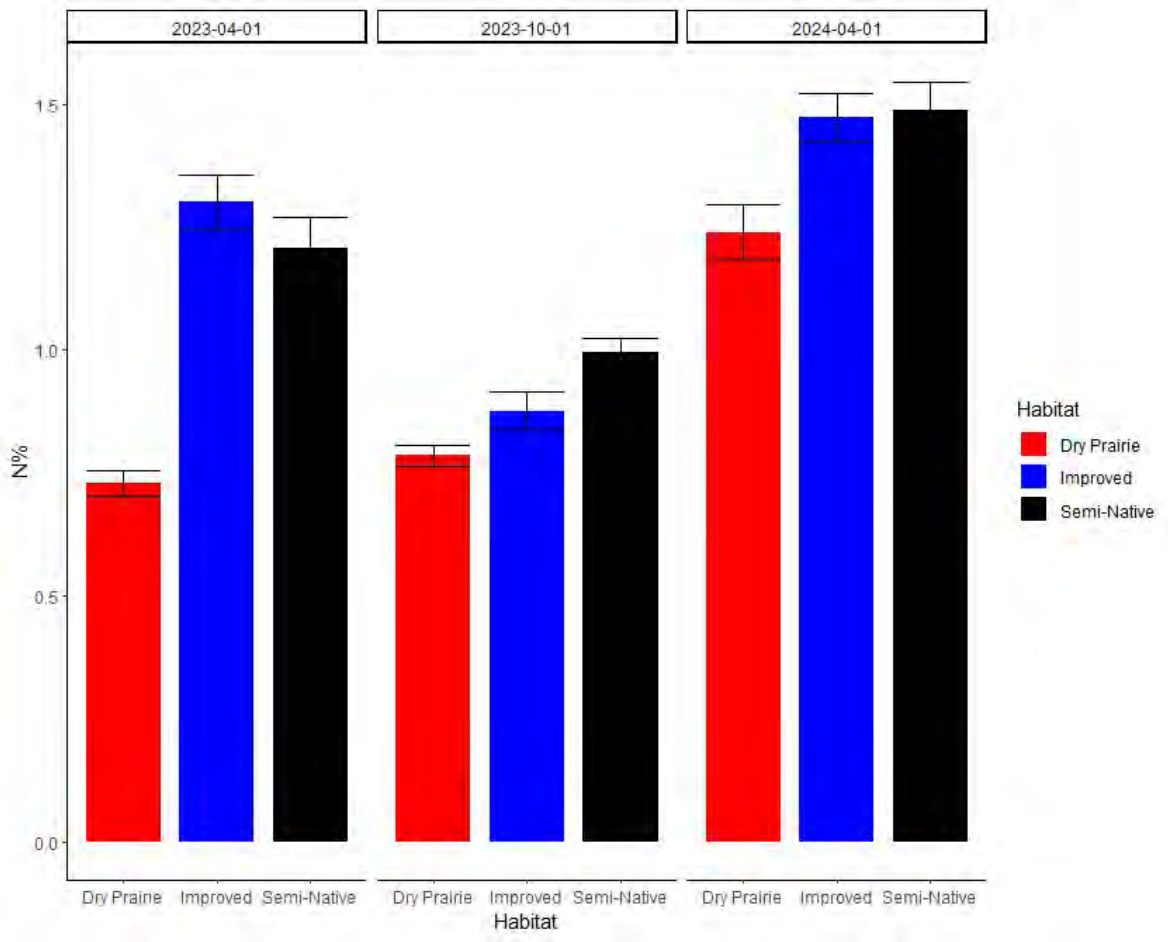
Forage Composition

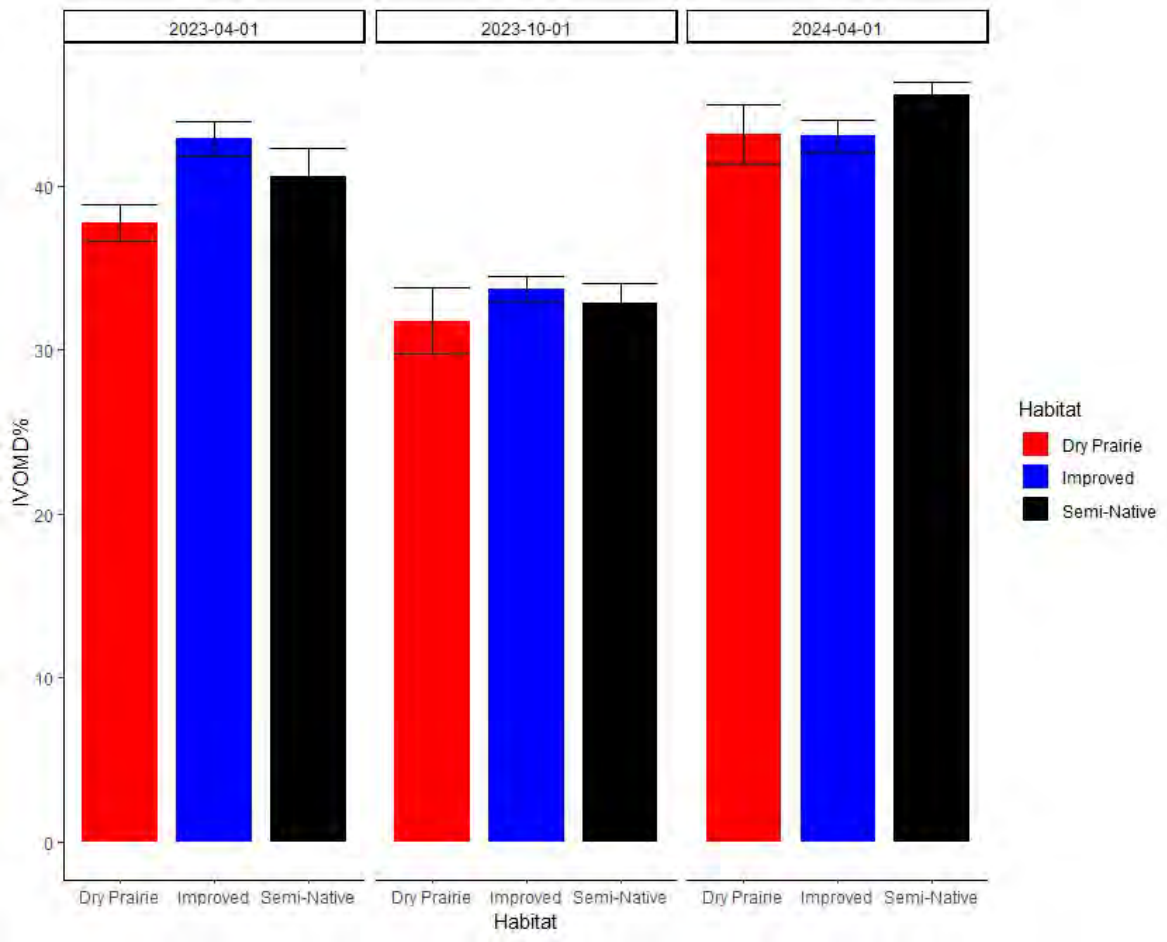


Similar amounts of bahiagrass in Semi-native and Improved pastures

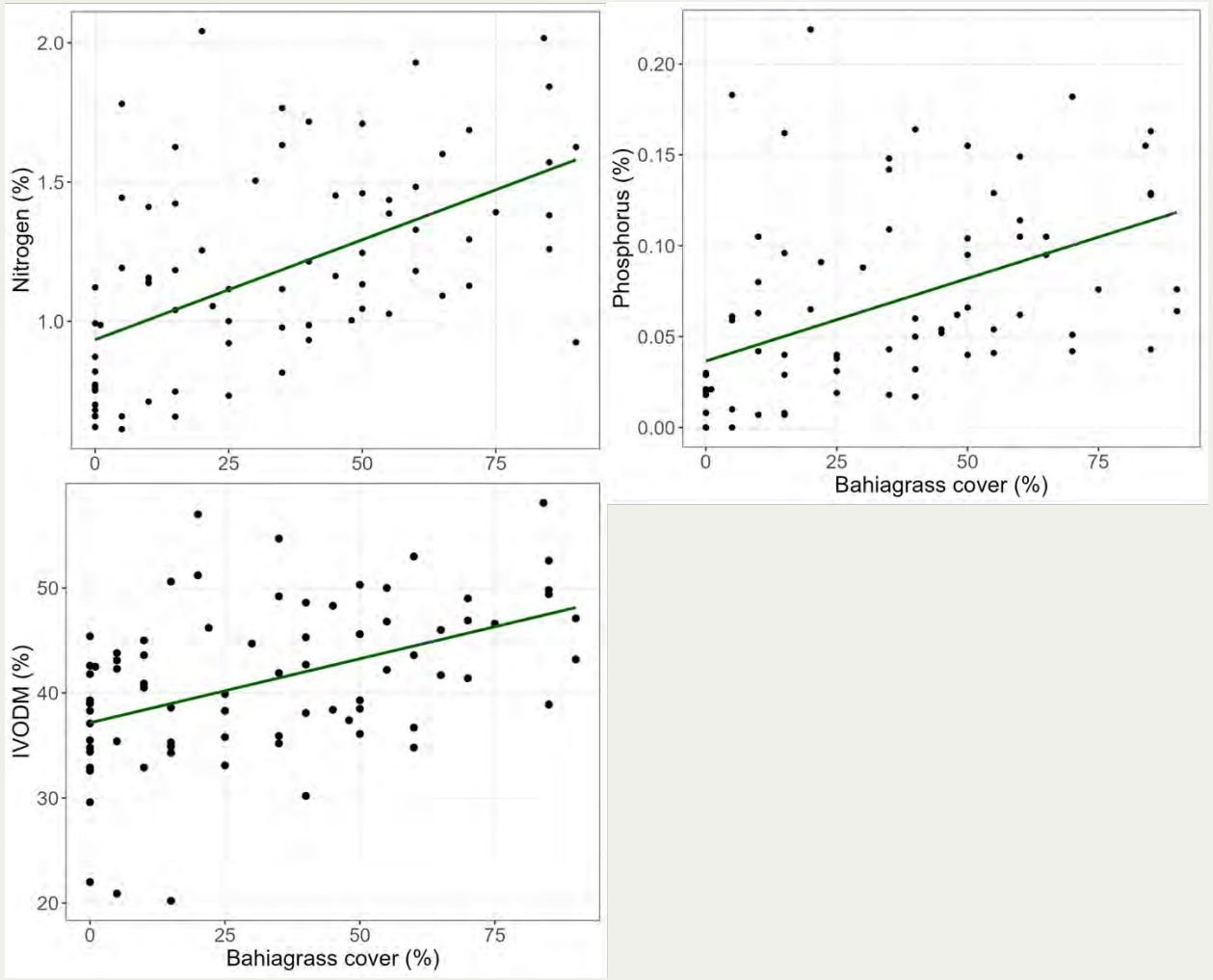


Pastures have higher Nitrogen (Crude Protein) than Dry Prairie

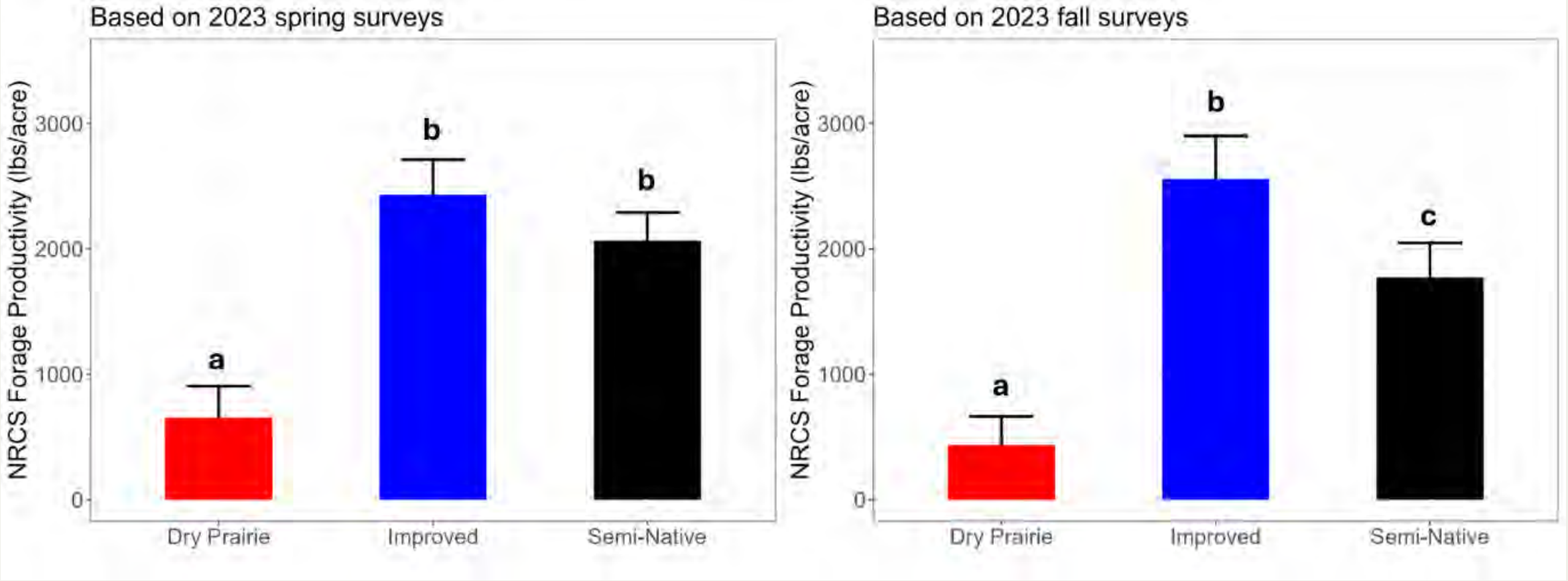




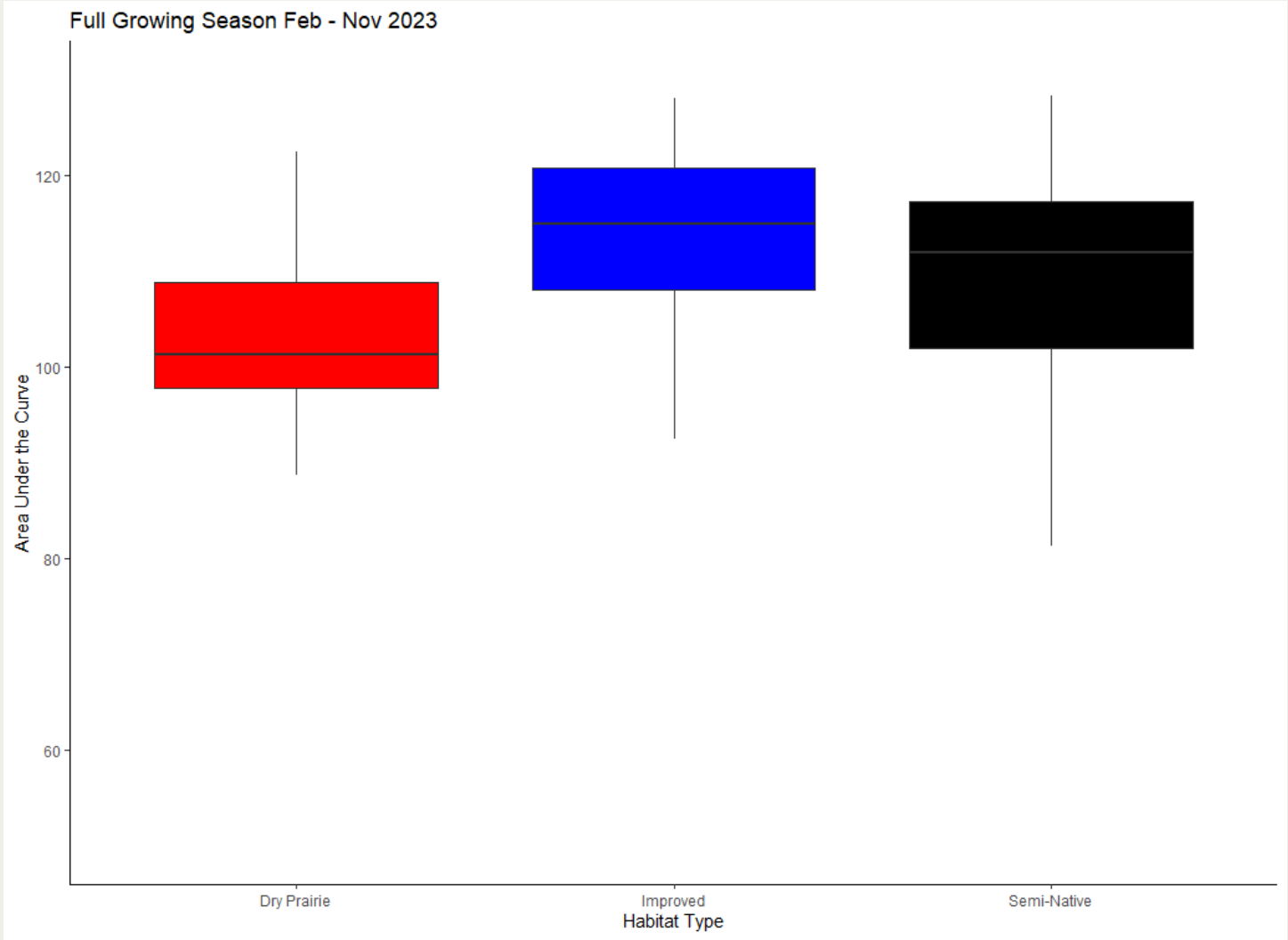
Points with higher bahiagrass cover had significantly greater nutritive value

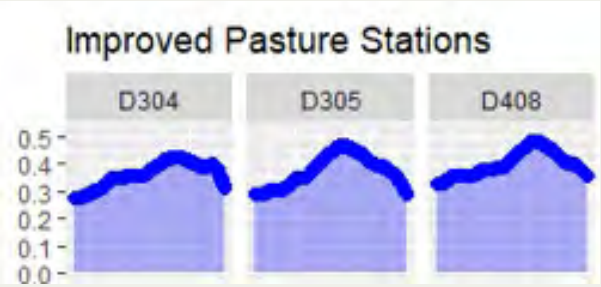


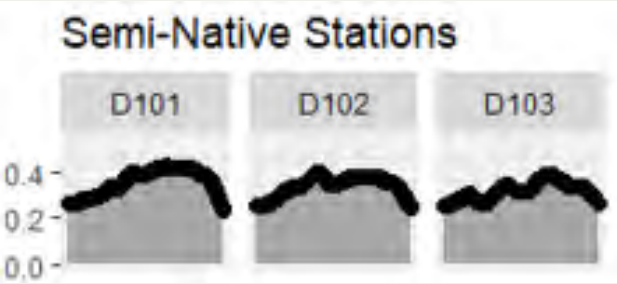
Lower forage production (growth) in dry prairie

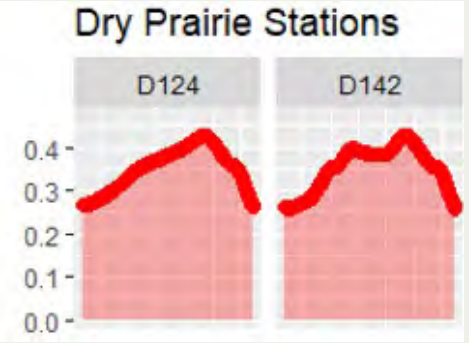


Satellite remote sensing showed Imp > Sn > Dry prairie

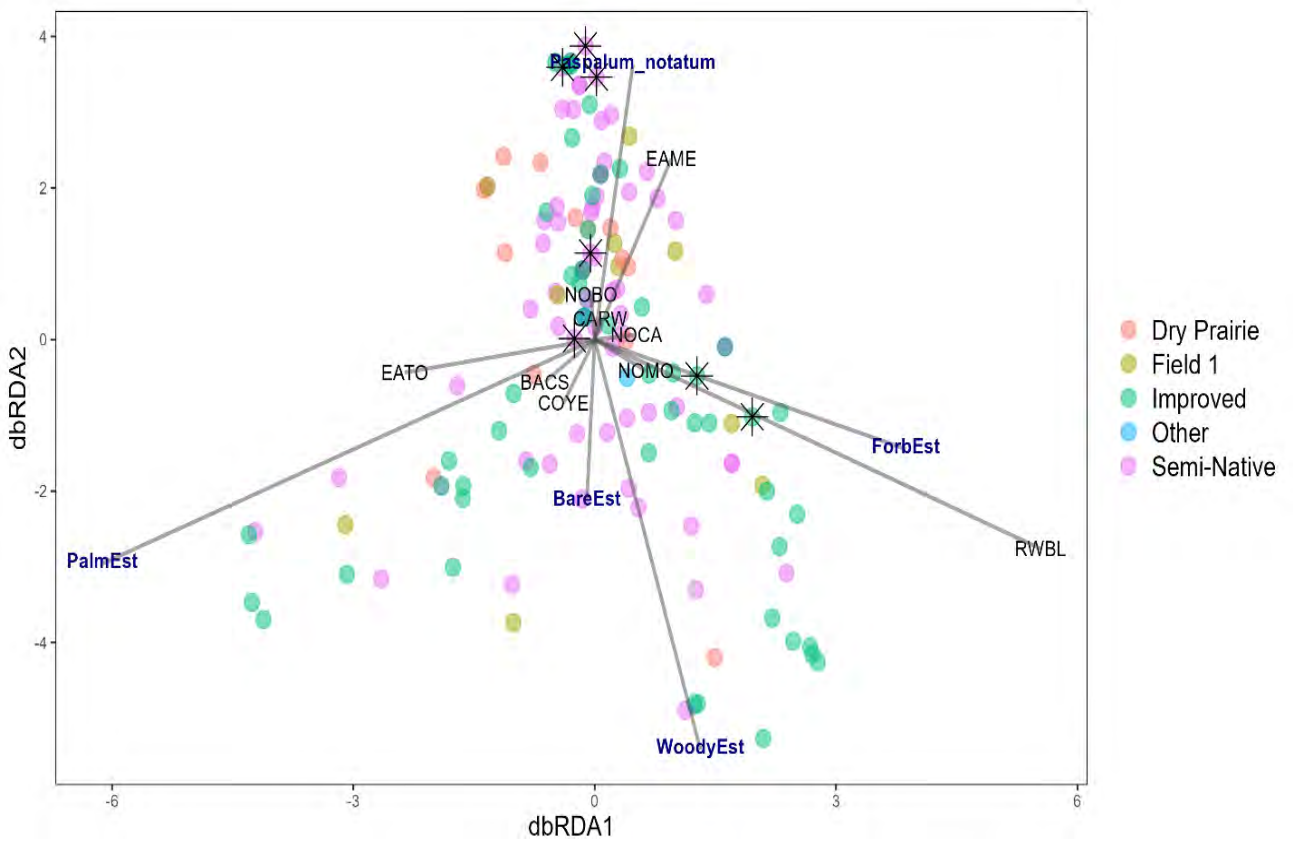








Bird Community and Vegetation Structure



Jones, Tringali, Marine, Boughton, Sonnier, 2025 report to USFWS
Sonnier: Analysis

What does it all mean for FGSP and cattle production?

- Ranchlands have promise for grassland bird conservation
- Increased plant productivity and forage value in pastures may increase insect abundance
- Maintaining low woody plant cover and high grass cover is beneficial for FGSP

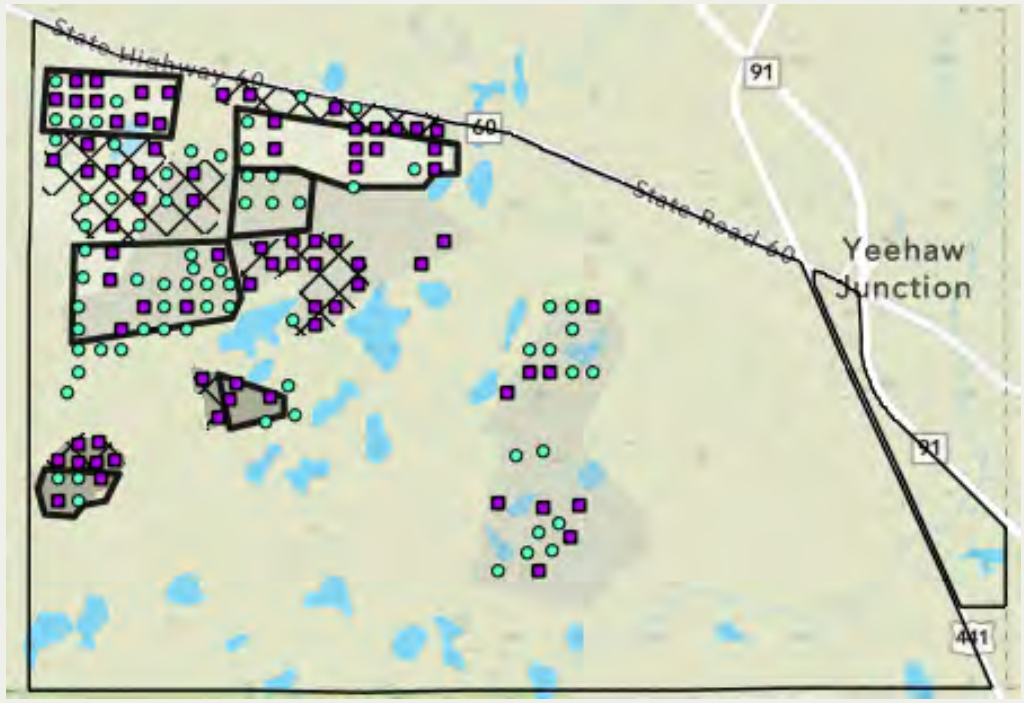
- Improved pastures at Deluca seem low quality
  - Forage crude protein on average 57.4 g/kg in Dry Prairie, 76.7 and 76.5 g/kg in Improved and Semi-native.
  - Total digestible nutrients were less than 52%
  - What would happen with grassland birds if forage was improved at Deluca?

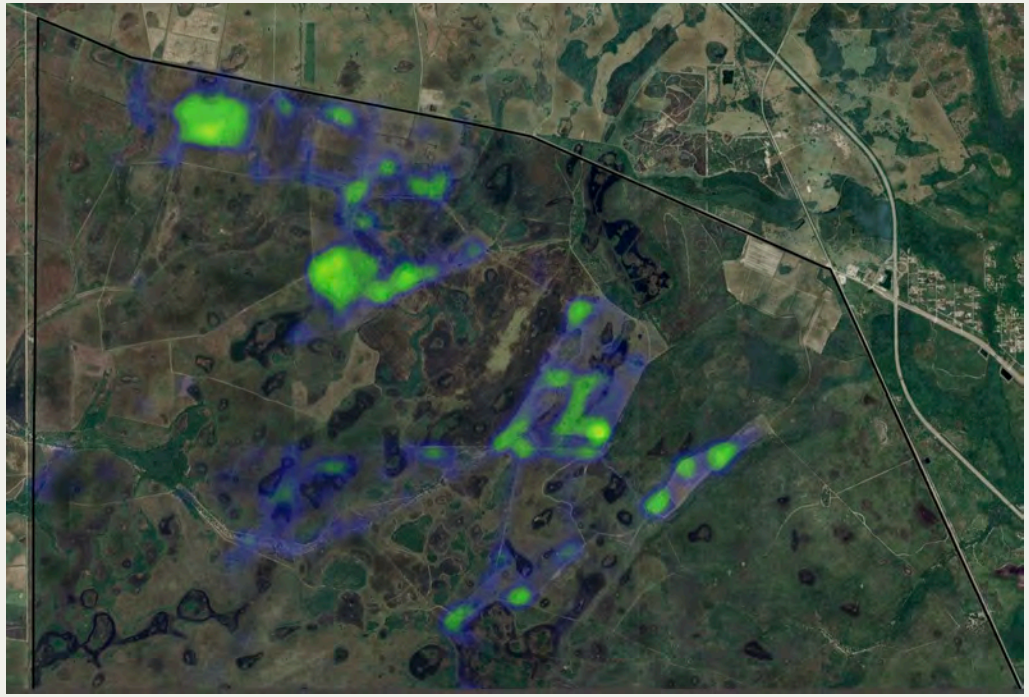
Preliminary Management Recommendations

- Continuation of land management practices that favor population growth for the species. Specifically, we recommend:
  1. grasslands be maintained on a 1-to-2-year fire return interval where possible using prescribed fire;
  2. where FGSP habitat is located close to roads, annual mowing be a substitute for prescribed fire; and
  3. remove trees and other woody encroachment to restore grassland habitat where possible.
- Maintain a variety of pasture-types
- Maintain detailed information of ranch management practices, spatially explicit, so we can link practices to grassland birds and forage

More research needed

- Just one year data collection – we continued in 2024 and 2025
- Continue to monitor Deluca FGSP population.
- Pursue funding for data collection on other grassland birds.
- Incorporate management and grazing intensity into the study (America the Beautiful Funding)
- The Future – Incentive payments for grassland birds?






wildpath × CornellLab
PRESENT
THE LITTLE
BROWN BIRD

Many thanks to our partners

Questions?

eboughton@archbold-station.org

Photo: Haoyu Li