Prairie Strips in Agriculture: Impacts on Grassland Birds

Jordan C. Giese[1], Lisa A. Schulte[1], and Robert W. Klaver [1,2]

[1]Department of Natural Resource Ecology and Management, Iowa State University
[2]U.S. Geological Survey, Iowa Cooperative Fish and Wildlife Research Unit

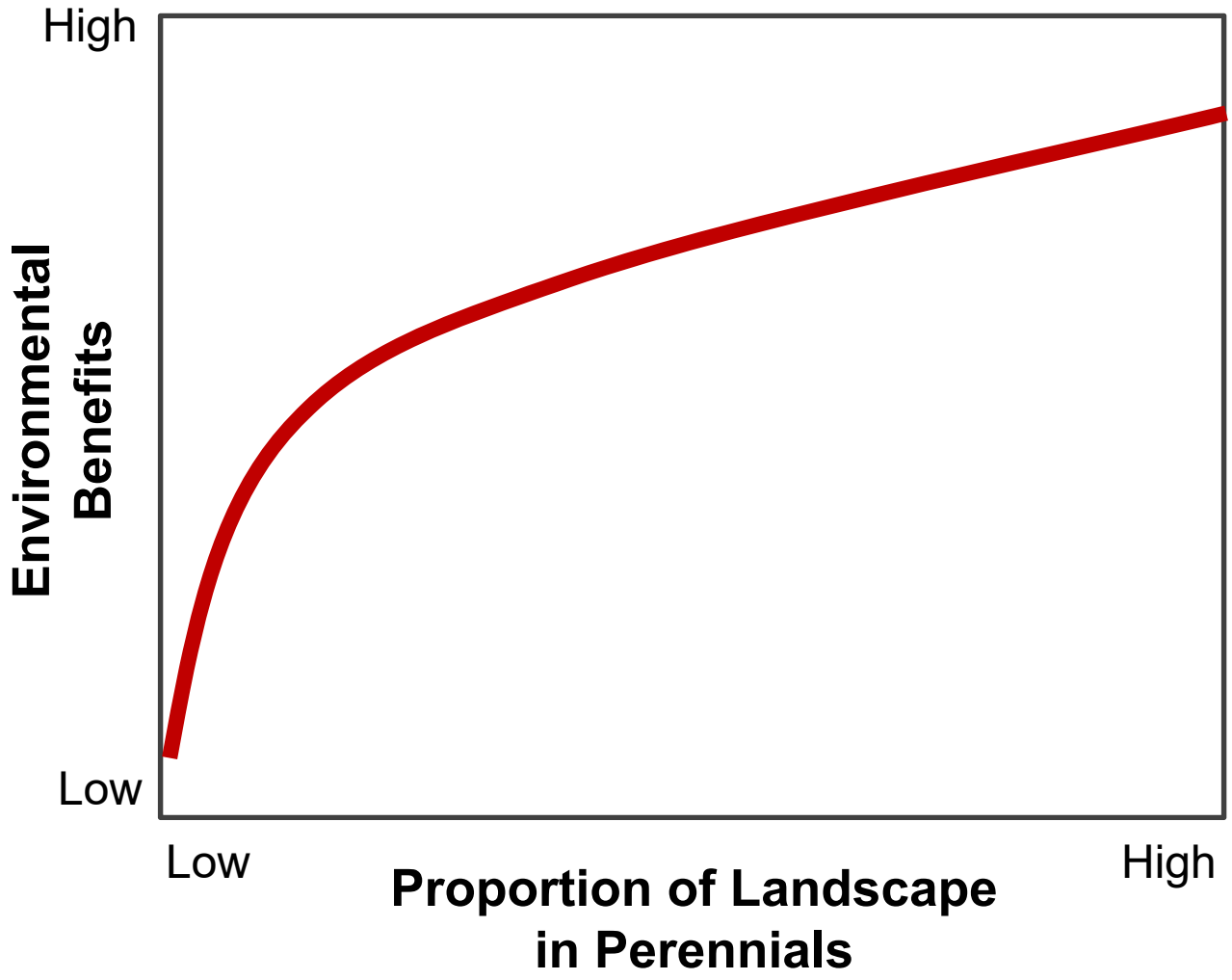
Iowa State University
Department of Natural Resource Ecology & Management

- Iowa was approximately 80% tallgrass prairie in the mid-1800's
- European settlers found the deep, rich prairie soils perfect for growing crops
- The landscape was systematically altered over the next 150 years
  - State is now 65% covered by row crop agriculture
  - Grass cover is around 5%
  - 0.1% of the original native tallgrass prairie remains, mostly in small patches

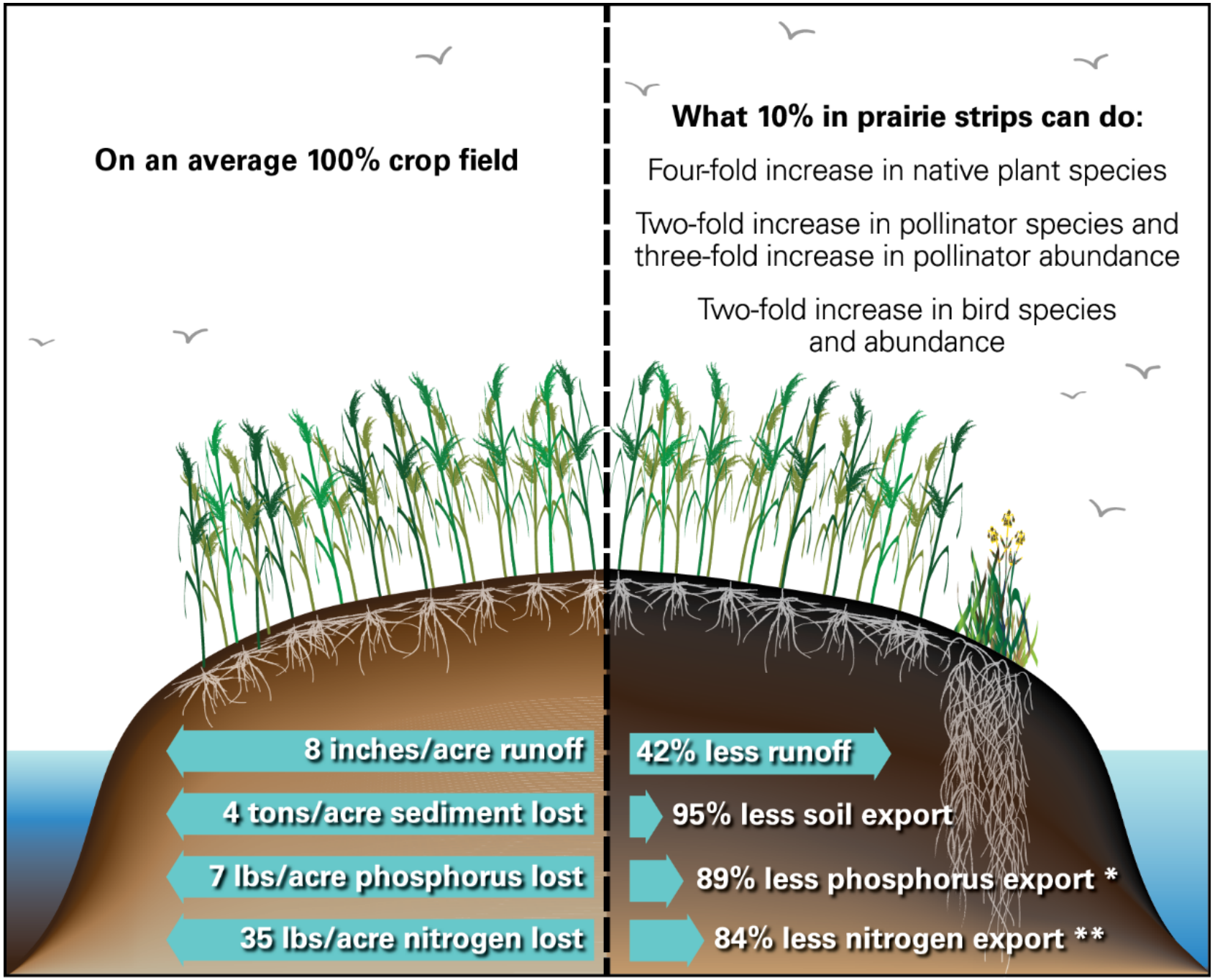
Image: Boone County; Todd Ontl

Science-based
Trials of
Row-crops
Integrated with
Prairie
Strips

Disproportionate Benefits Hypothesis



Source: Schulte et al. 2006, Asbjornsen et al. 2014



Source: Data collected by STRIPS team, 2007-2014 at Neal Smith National Wildlife Refuge

STRIPS II: Commercial Farms

Image: Tama County; Tim Youngquist


Image: Wright County; Lynn Betts

Introduction

- Hypothesis: Strong response of richness, diversity, density of birds in fields with high-diversity prairie strips. Intermediate response in fields with low-diversity grass strips
- Hypothesis: Strongest response from non-area sensitive birds (based on results from STRIPS I Experiment*)
  - Dickcissel (*Spiza americana*)
  - Red-winged blackbird (*Agelaius phoeniceus*)
- Iowa Species of Greatest Conservation Need (SGCN)
  - Grasshopper sparrow (*Ammodramus savannarum*)
  - Meadowlarks (*Sturnella* spp.)

***MacDonald, M.C. 2012. Blurring the lines between production and conservation lands: Bird use of prairie strips in row-cropped landscapes, Master's Thesis. Iowa State University**

Methods

- May – July, 2015-2017
- Each site consisted of a control field and an experimental field
- 8 sites: Control vs High Diversity Prairie Strips
- 2 sites: Control vs Low Diversity Grass Strips
- 200m fixed-radius point count stations
- 3 – 6 stations in each field

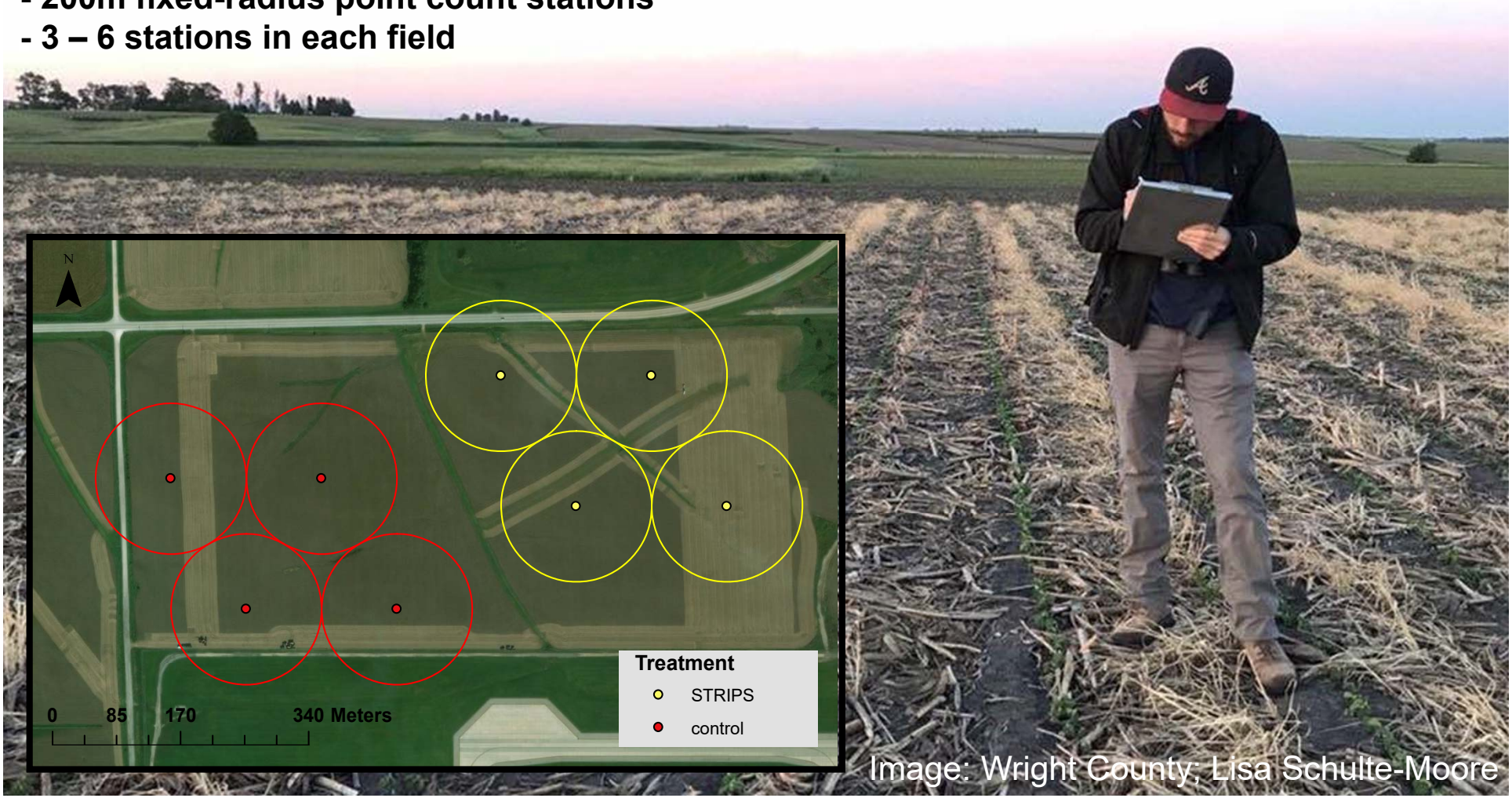


Image: Wright County; Lisa Schulte-Moore

Statistical Methods

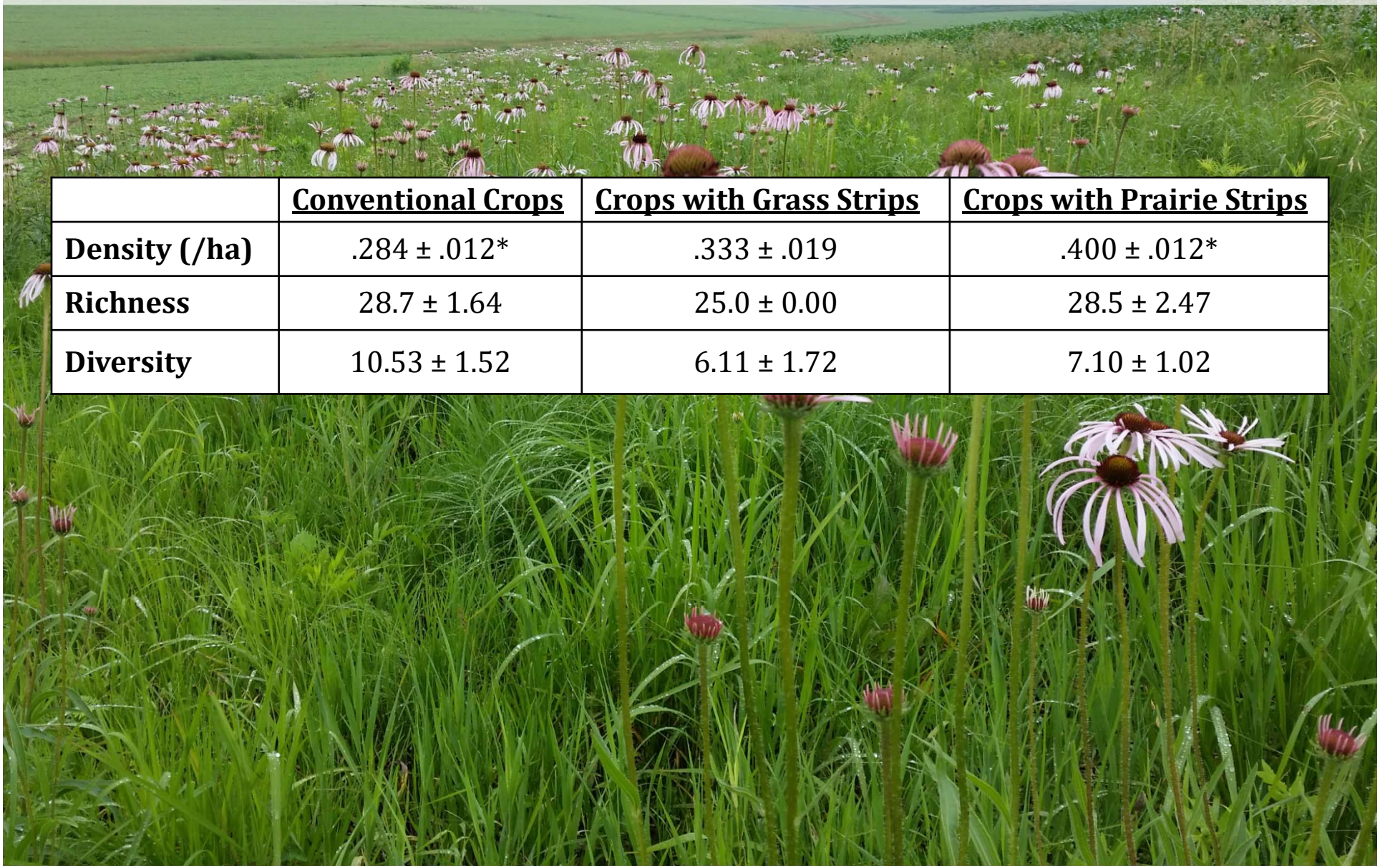
- Binned detections into 50 meter intervals
- Package ‘Distance’ (Miller et al. 2016) in R 3.4.3 (R Core Team 2017)
- Developed detection probability functions for entire community and then independently for each species with > 100 detections
- Tested for differences in means using ANOVA


Results

Community Level Response

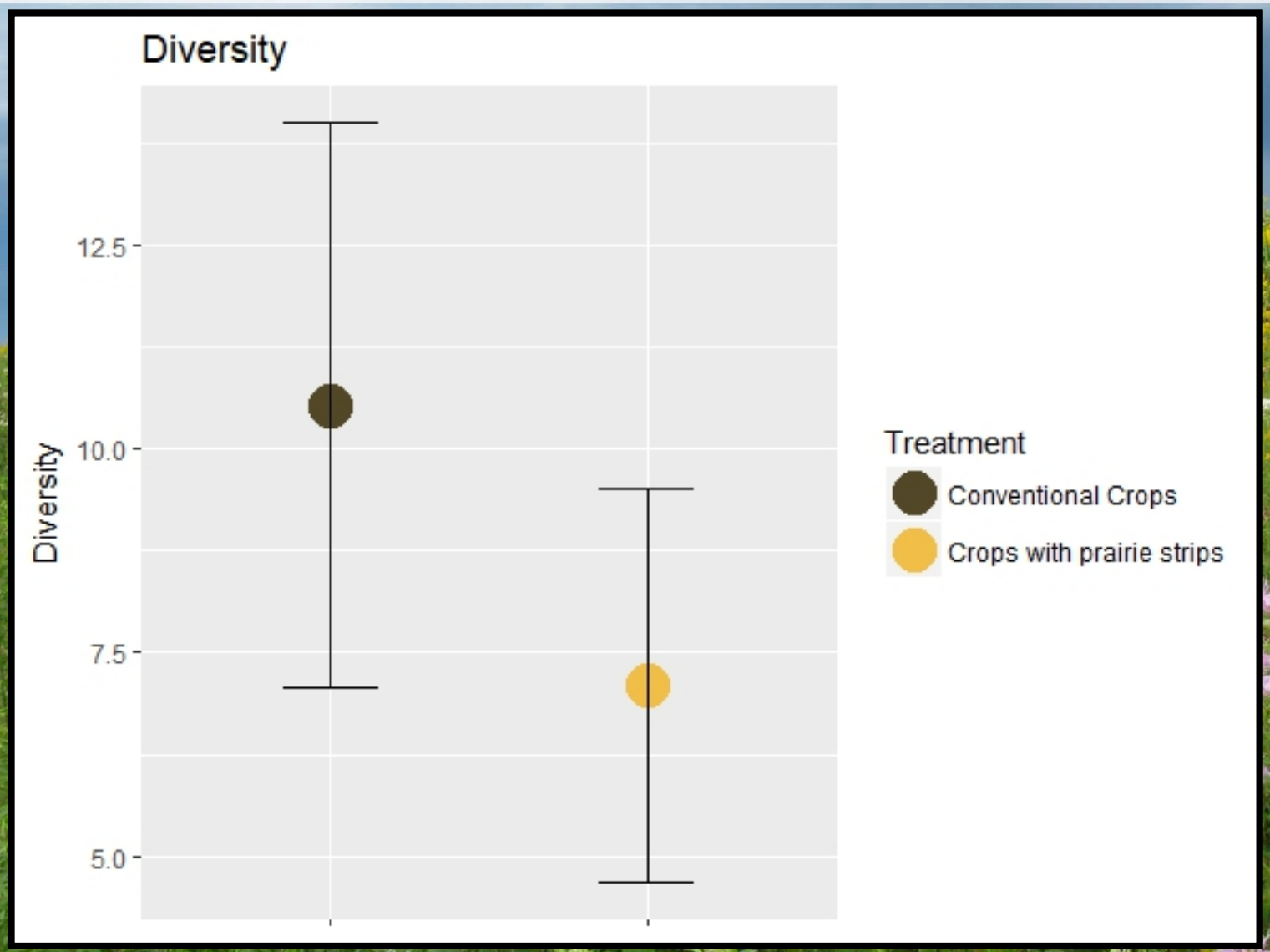
Mean (±SE)

	Conventional Crops	Crops with Grass Strips	Crops with Prairie Strips
Density (/ha)	.284 ± .012*	.333 ± .019	.400 ± .012*
Richness	28.7 ± 1.64	25.0 ± 0.00	28.5 ± 2.47
Diversity	10.53 ± 1.52	6.11 ± 1.72	7.10 ± 1.02



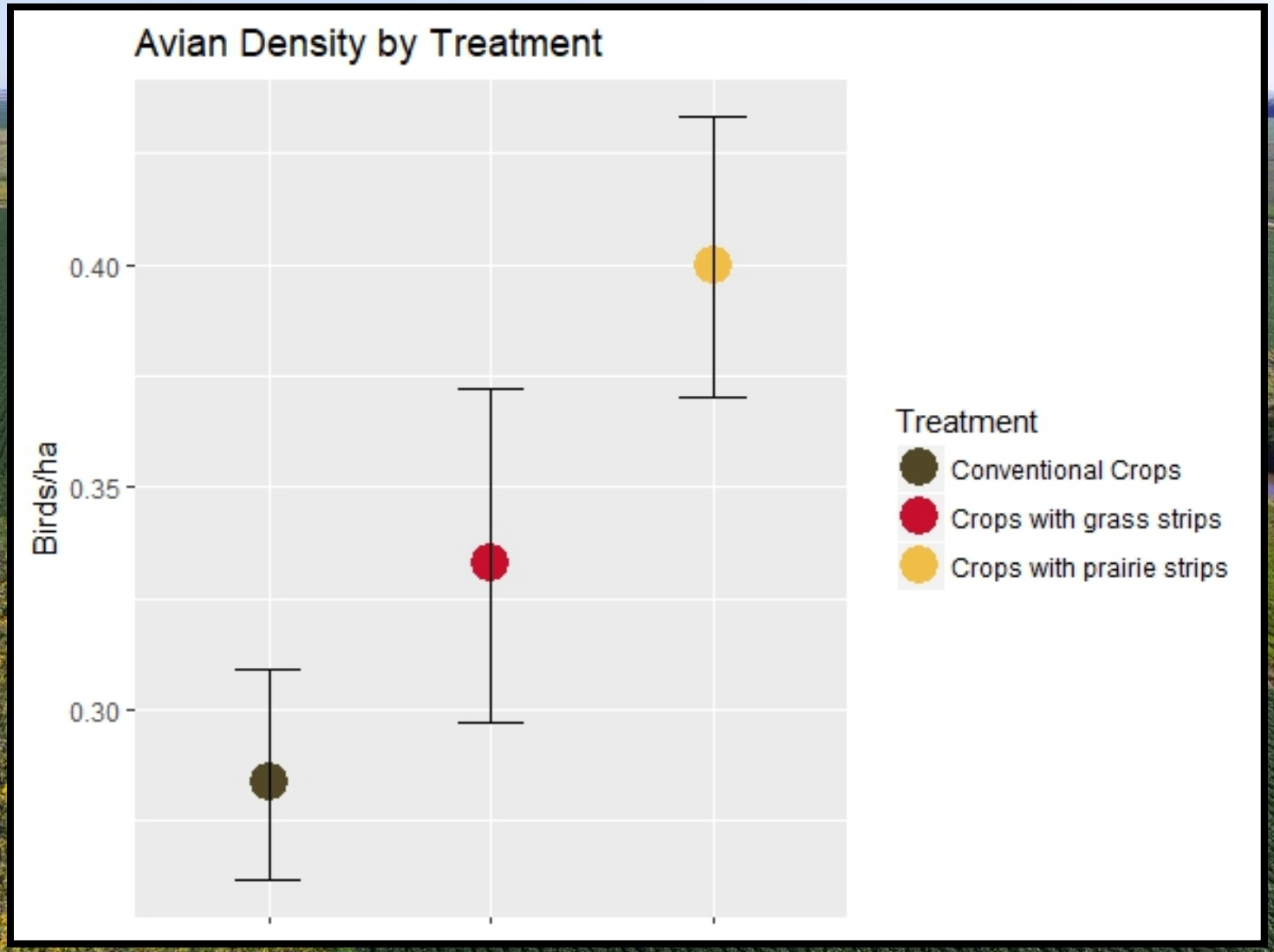
Species Diversity (SDI)

Crops vs. Prairie Strips



Community Density (/ha)

Conventional Crops	Crops with Grass Strips	Crops with Prairie Strips
.284 ± .012	.333 ± .019	.400 ± .012

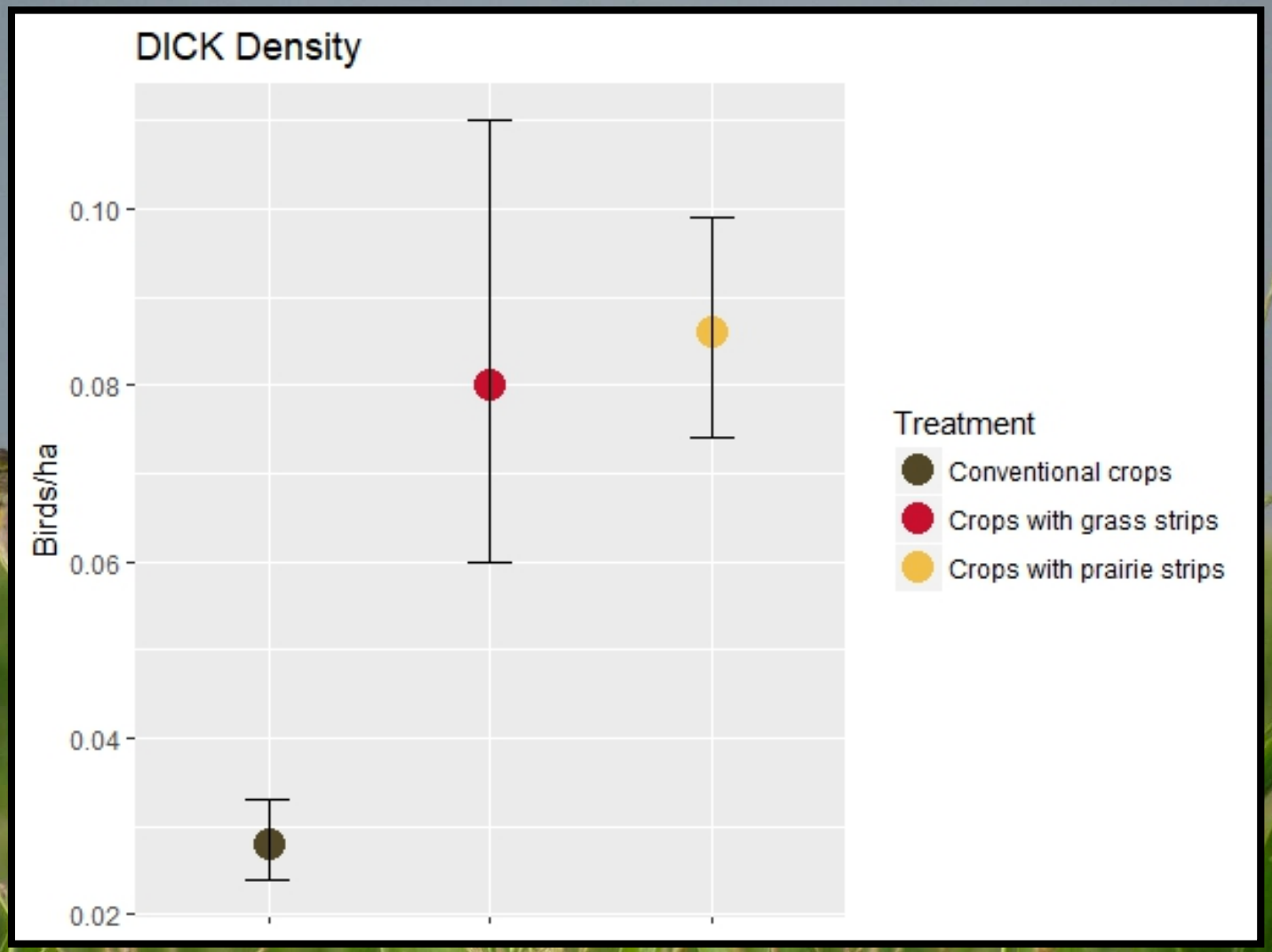


Species > 100 Detections

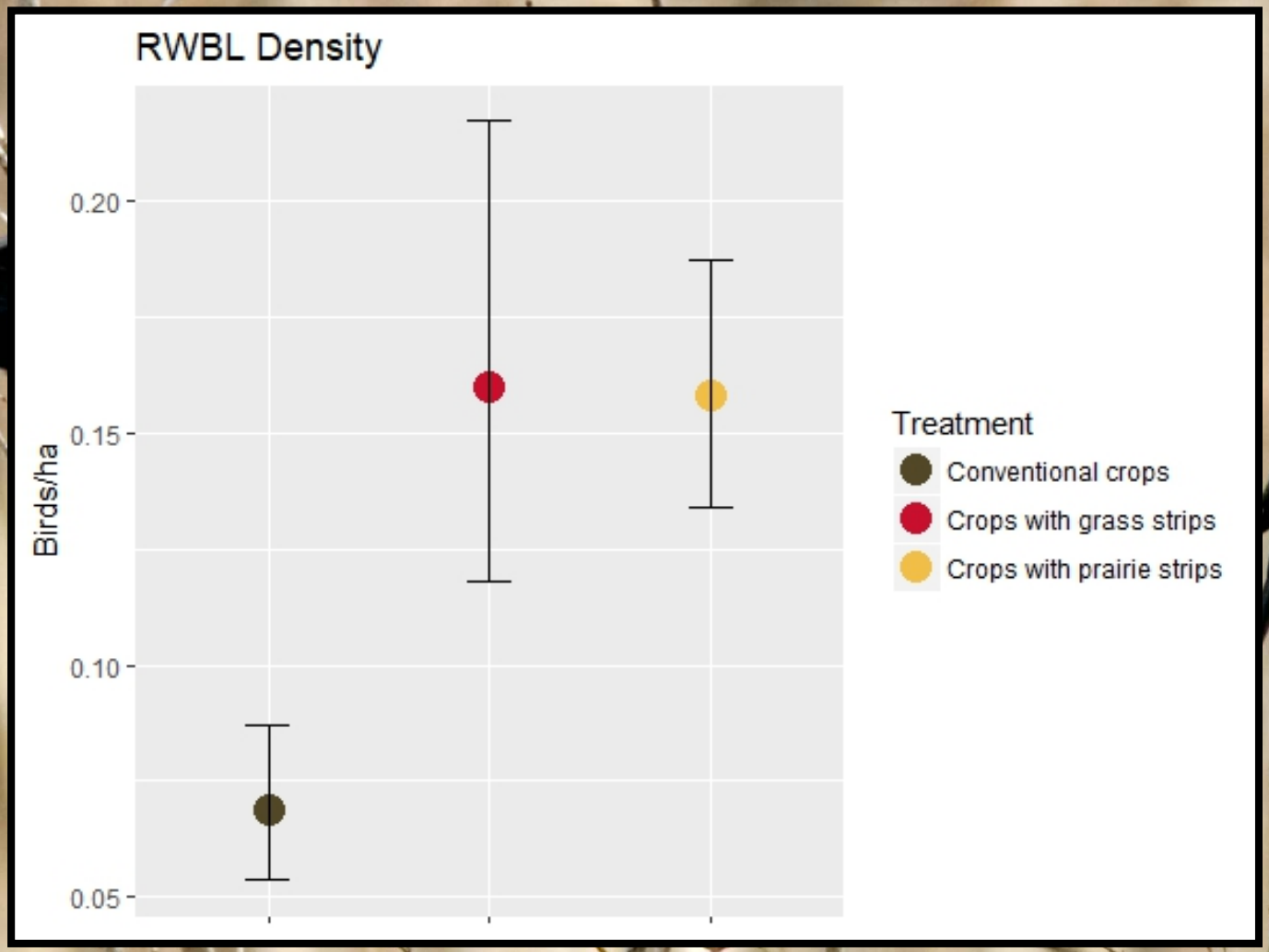
- Red-winged Blackbird
- Dickcissel*
- Common Yellowthroat
- Killdeer
- Brown-headed Cowbird
- Eastern Meadowlark*
- American Robin
- American Goldfinch
- Western Meadowlark
- Song Sparrow
- Barn Swallow
- Vesper Sparrow
- Common Grackle
- Grasshopper Sparrow*

*Iowa Species of Greatest Conservation Need

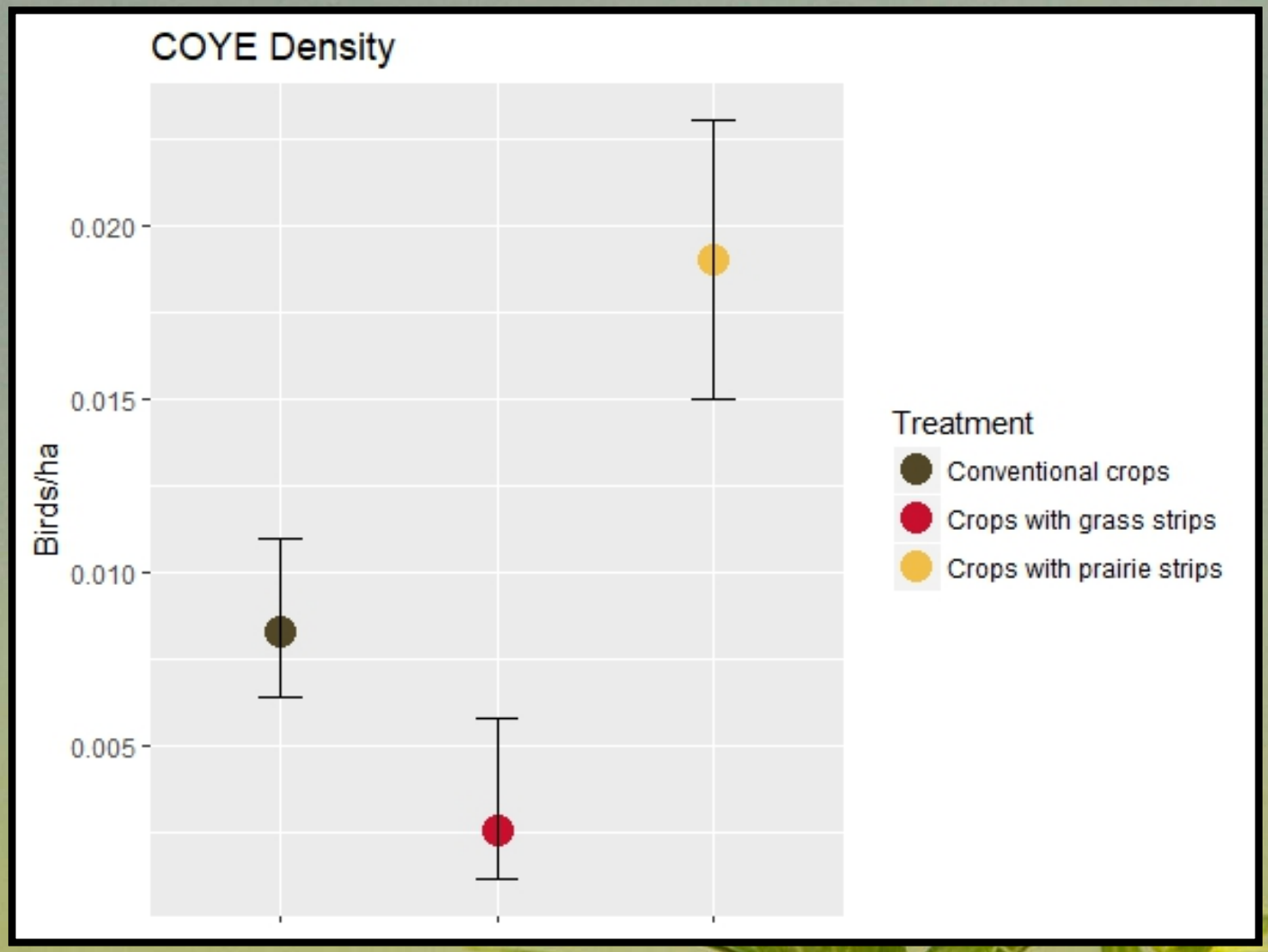
Dickcissel Response



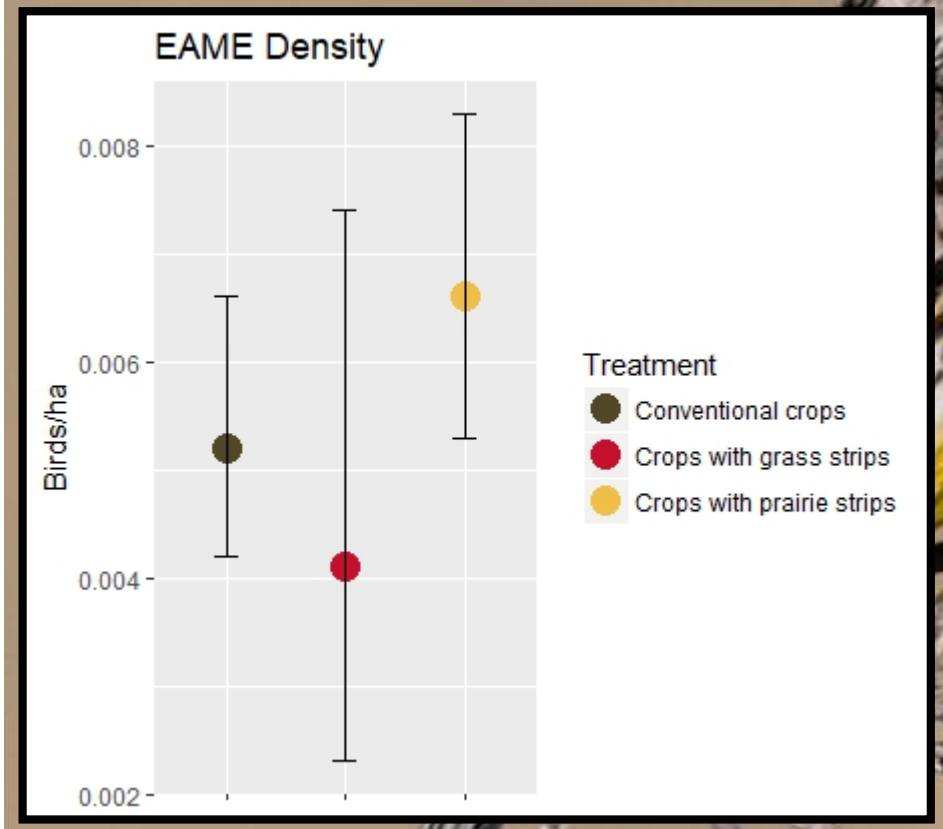
Red-winged Blackbird Response

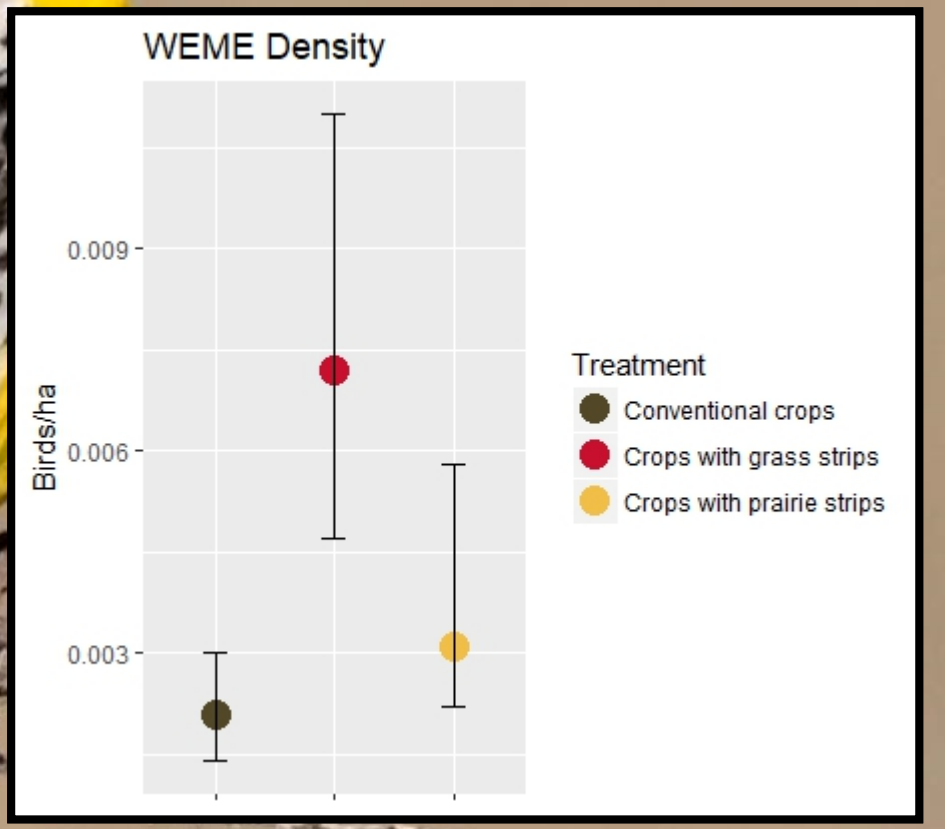


Common Yellowthroat Response

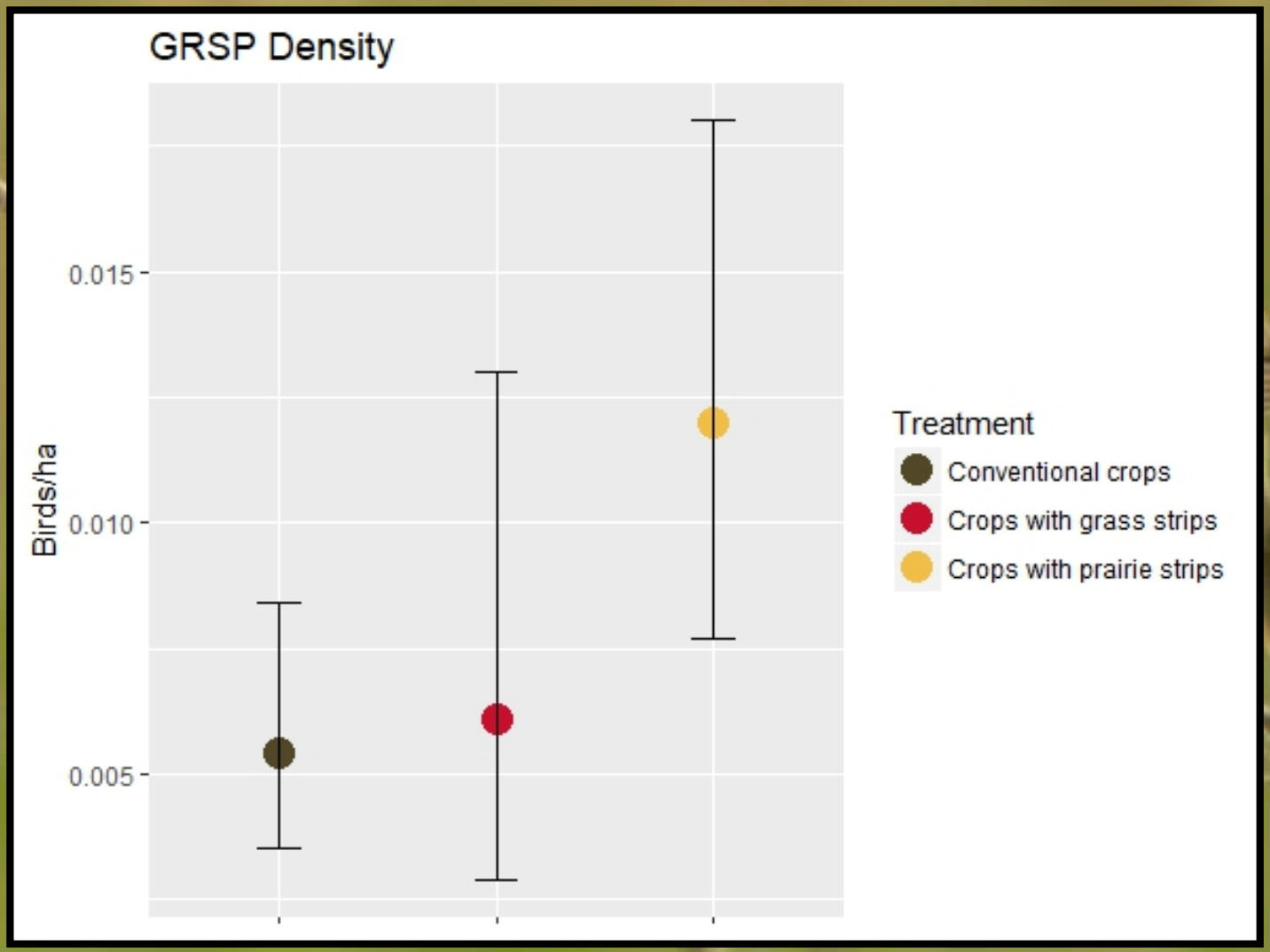


Meadowlark Response

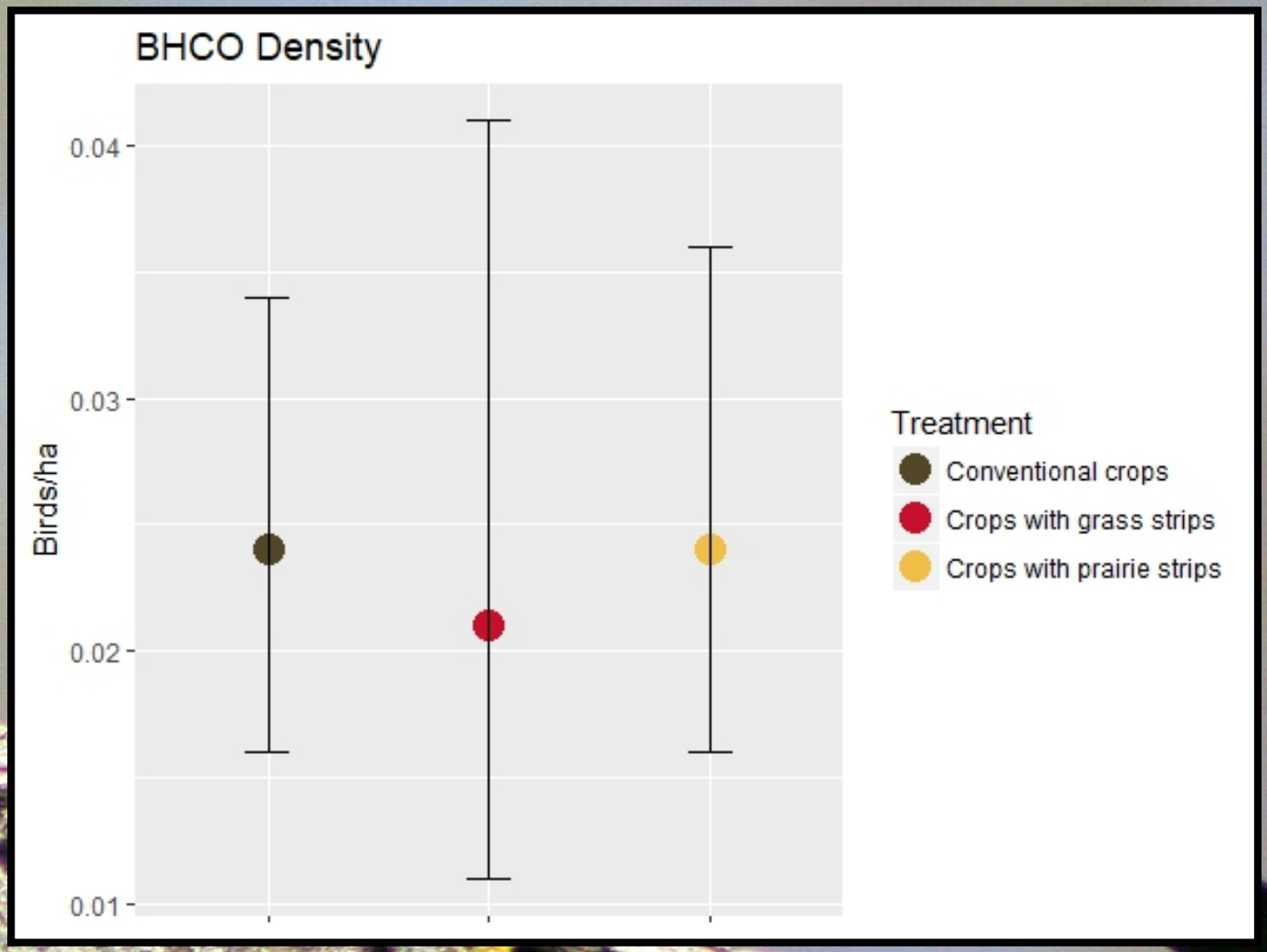




Grasshopper Sparrow Response



Brown-headed Cowbird Response



Species Densities (/ha)

Mean (±SE)

	Conventional Crops	Crops with Grass Strips	Crops with Prairie Strips
Dickcissel*	**.028 ± .002 A**	**.080 ± .012 B**	**.086 ± .006 B**
Red-winged Blackbird	.069 ± .008	.160± .024	.158 ± .013
Common Yellowthroat	**.008 ± .001 A**	**.002 ± .001 B**	**.019 ± .002 C**
Eastern Meadowlark*	.005 ± .001	.004 ± .001	.006 ± .001
Western Meadowlark	.002 ± .001	.007 ± .001	.003 ± .001
Grasshopper Sparrow*	.005 ± .001	.006 ± .002	.011 ± .003
Brown-headed Cowbird	.023 ± .004	.021 ± .007	.024 ± .005

* Iowa Species of Greatest Conservation Need.

[1]Estimates with different letters are significantly different ($P < .05$).

Discussion

1. Increase in density in fields with prairie strips but no difference in diversity or richness
2. Species of Greatest Conservation Need
3. Low-diversity grass strips benefit some species
4. Stay tuned!

www.prairiestrips.org

prairiestrips@iastate.edu

@prairiestrips

Agricultural Research Service

McIntire-Stennis Program

Committee on Agricultural Development

Iowa Natural Heritage Foundation