Bird Conservancy
of the Rockies

Monitoring conservation outcomes for grassland birds

David Pavlacky

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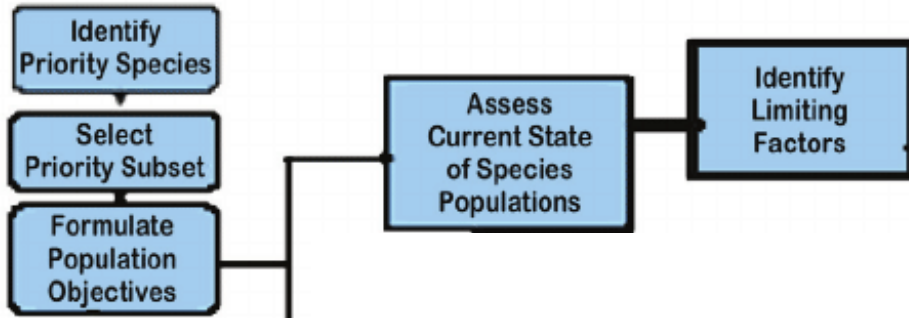# Why monitor grassland birds?

- **Central Grasslands Roadmap**
  - Support biodiversity and arrest declining wildlife population trends

- **Working Lands for Wildlife**
  - Conserve Great Plains grasslands at a biome scale

- **North American Bird Conservation Initiative (NABCI)**
  1. Inform management and policy to achieve conservation
  2. Set population objectives and management priorities
  3. Inform conservation design
  4. Evaluate conservation efforts
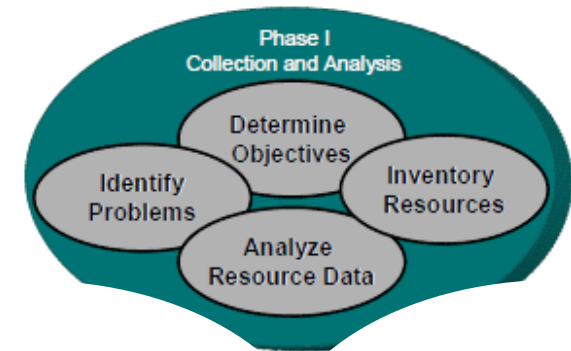
US NABCI Monitoring Subcommittee, 2007, USFWS

Monitoring for *objectives setting* (NABCI)

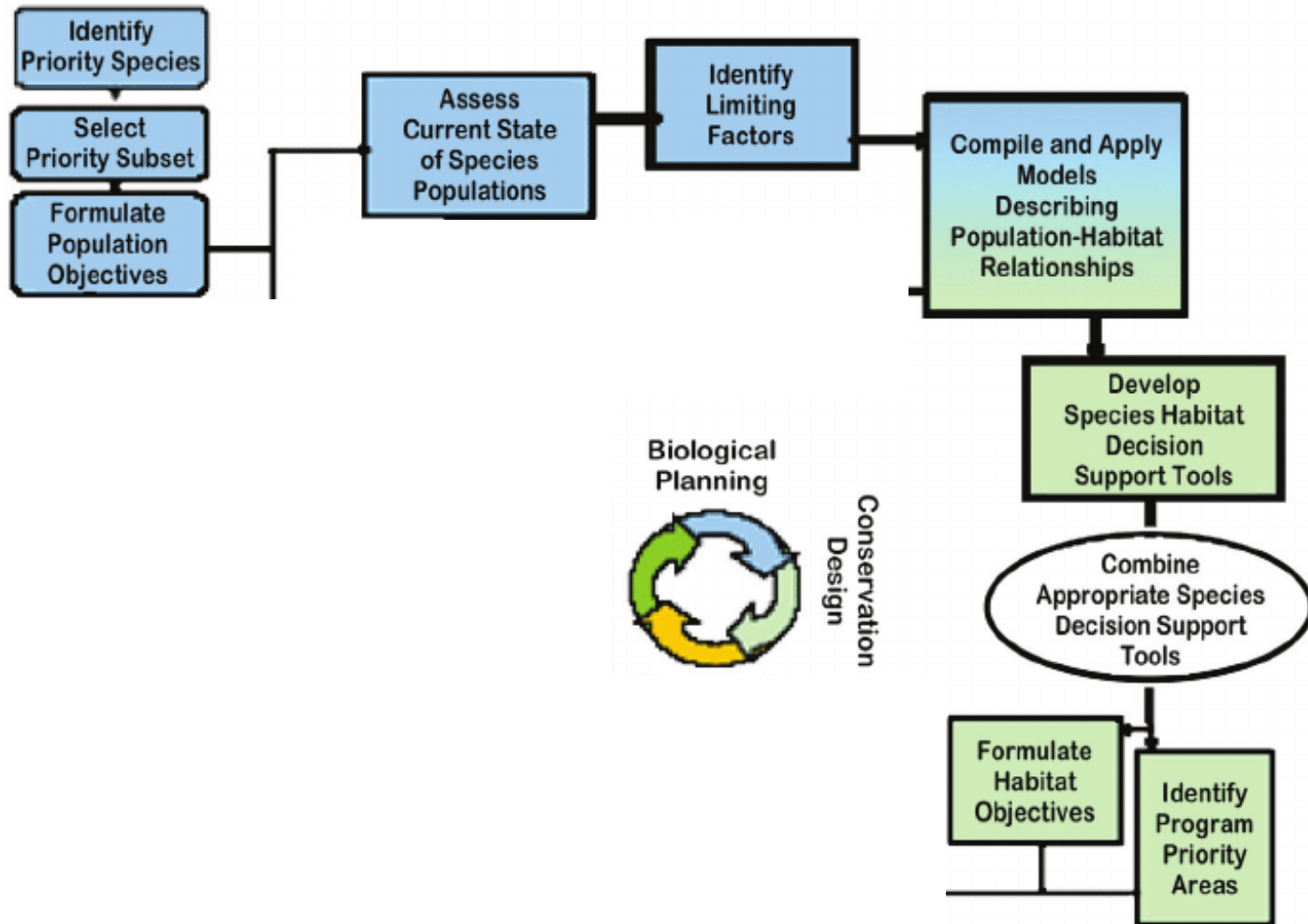## Strategic Habitat Conservation (USFWS)

Identify Priority Species

Select Priority Subset

Formulate Population Objectives

Assess Current State of Species Populations

Identify Limiting Factors

Biological Planning

Nine Step Conservation Planning (NRCS)

Phase I Collection and Analysis

Determine Objectives

Identify Problems
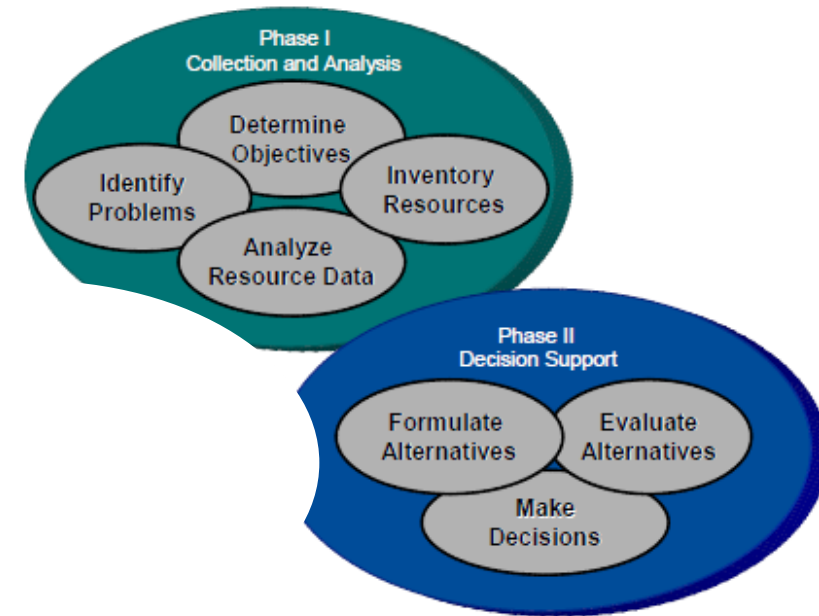
Inventory Resources

Analyze Resource Data

Monitoring for *conservation design* (NABCI)

Strategic Habitat Conservation (USFWS)

Nine Step Conservation Planning (NRCS)

Monitoring to *evaluate conservation* (NABCI)

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Strategic Habitat Conservation (USFWS)

Nine Step Conservation Planning (NRCS)
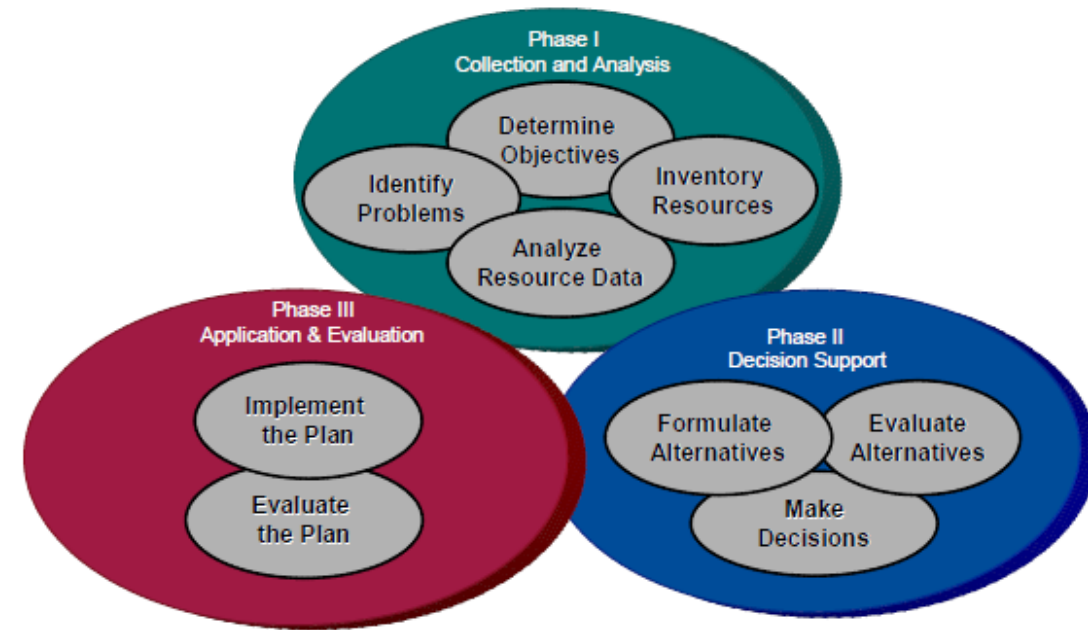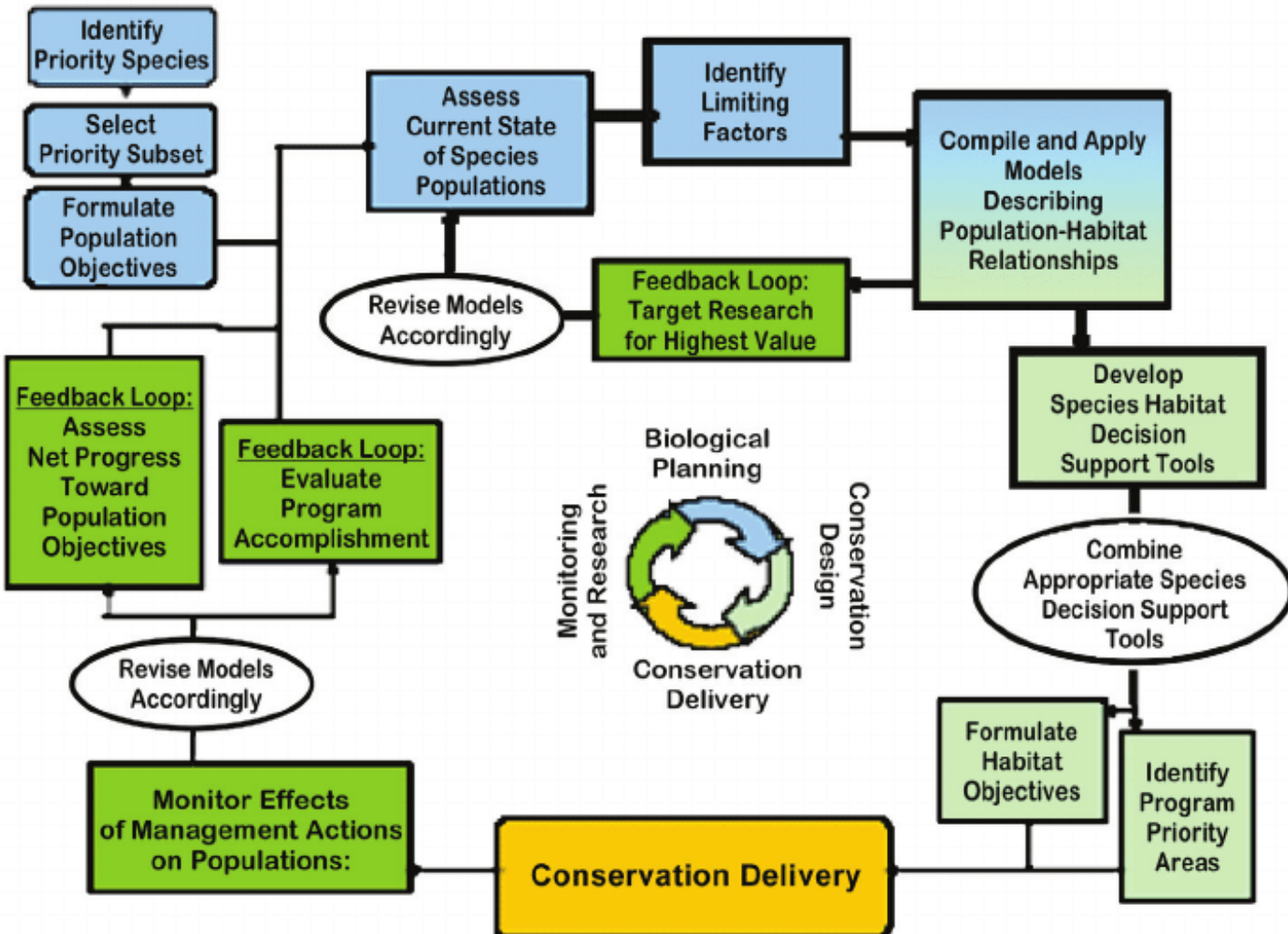
Working Lands in the Great Plains

- Private land ownership 90%

- Agricultural production landscapes
  - 31% of US cereal crop
  - 50% of US beef production

- Grassland bird biodiversity
  - Habitat loss & degradation
  - Population declines
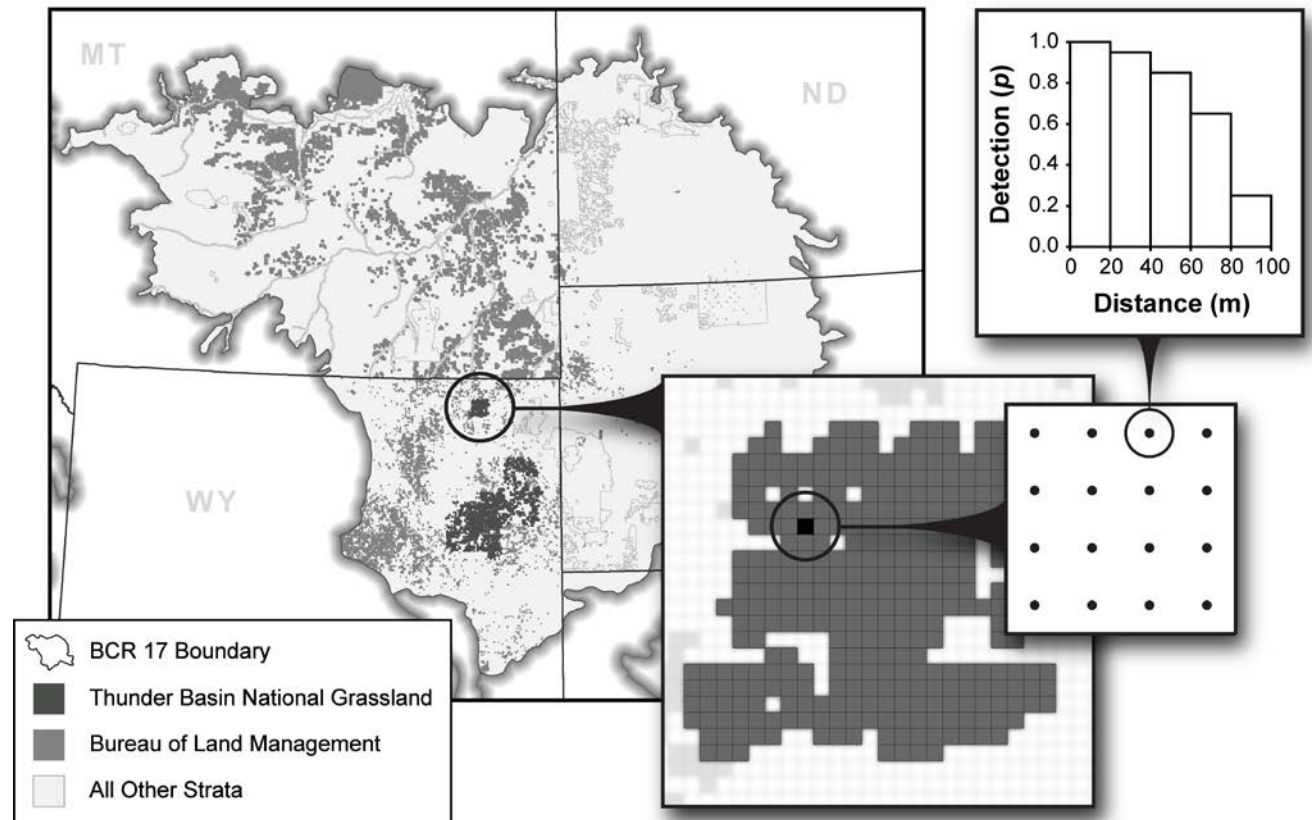

Great Plains Grasslands

Working Lands for Wildlife: a Farm Bill framework for social-ecological systems

- Co-production between private producers and resource professionals

- Financial incentives to support traditional livelihoods

- Resource concerns → conservation practices
  - Woody encroachment → brush management
  - Grassland conversion to cropland → Conservation Reserve Program
  - Rangeland heterogeneity → prescribed grazing

Integrated Monitoring in Bird Conservation Regions

- Abundance and population size
- Biodiversity ~80 grassland bird species
  - Spatially balanced sampling to set population objectives
  - Hierarchical design to set management priorities
  - Alternate stratification to evaluate conservation practices

BCR 17 Boundary

Thunder Basin National Grassland

Bureau of Land Management

All Other Strata

Pavlacky et al., 2017, PLOS ONE, Vol. 12.

Bird Conservancy of the Rockies

USDA
United States Department of Agriculture
Natural Resources Conservation Service

Oregon State University

LESSER PRAIRIE-CHICKEN INITIATIVE

FSA
FARM SERVICE AGENCY

PLAYA LAKES
JOINT VENTURE

Colorado State University

UNIVERSITY OF
MONTANA

Private land conservation scales-up to meet population recovery goals for the most vulnerable grassland birds

Christian Hagen; *Oregon State University*
Rich Iovanna; *Farm Service Agency*
Anne Bartuszevige; *Playa Lakes Joint Venture*
Luke George; *Colorado State University*
David Naugle; *University of Montana*

Farm Bill practices to address resource concerns

- Prescribed Grazing
  - Habitat condition and degradation
    - Conservative stocking rates (25% - 40% utilization)
    - Rest-rotation schedules (practice 528)

USFWS, 2011, U. S. Dept. of Interior.

Farm Bill practices to address resource concerns

- Prescribed Grazing
  - Habitat condition and degradation
    - Conservative stocking rates (25% - 40% utilization)
    - Rest-rotation schedules (practice 528)

- Conservation Reserve Program (CRP)
  - Habitat loss and fragmentation
    - Native grasses (practice CP2)
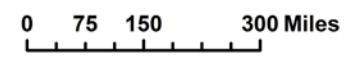   - Introduced grasses and legumes (practice CP1)

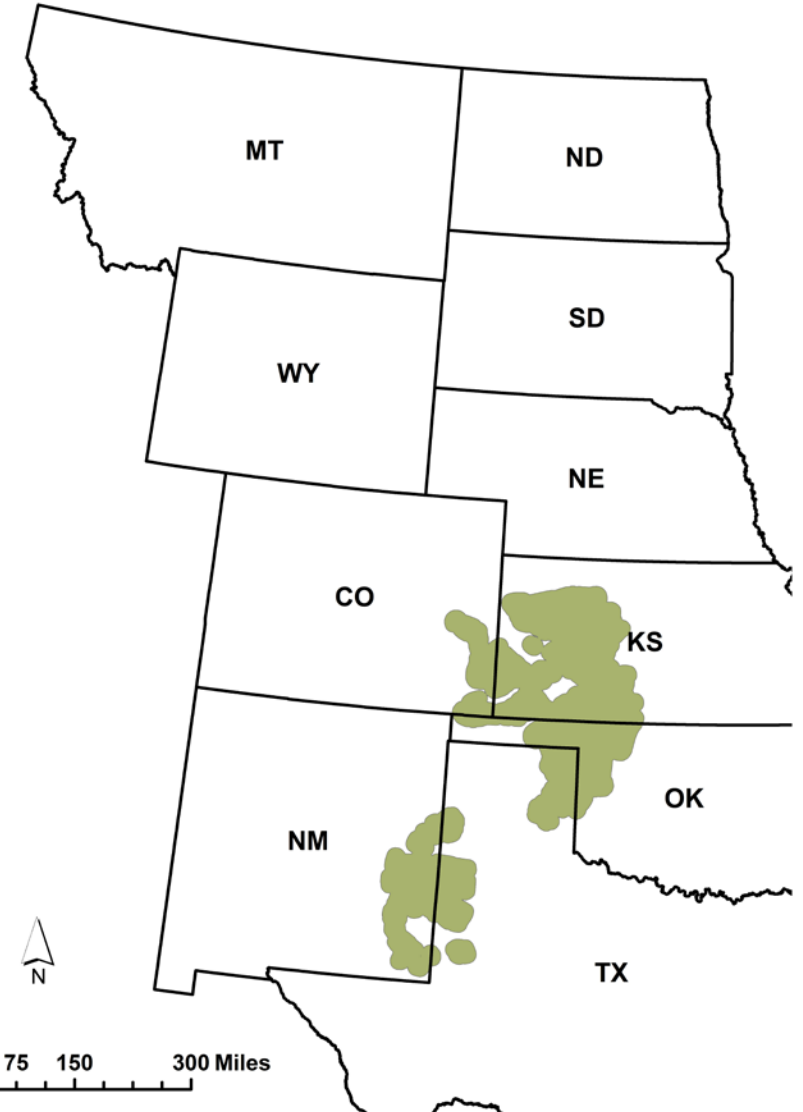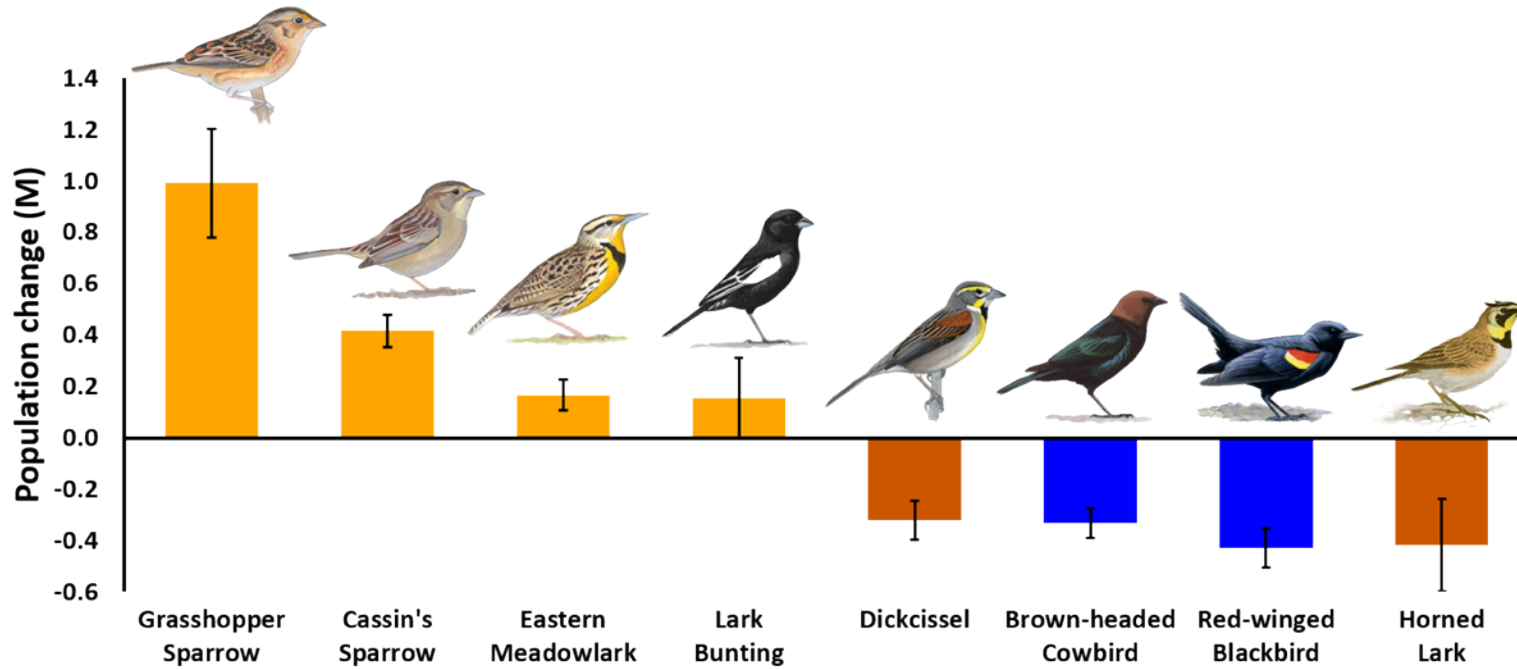*USFWS, 2011, U. S. Dept. of Interior.*

Farm Bill prescribed grazing and CRP conserves breeding habitat for 4.5 million birds / year
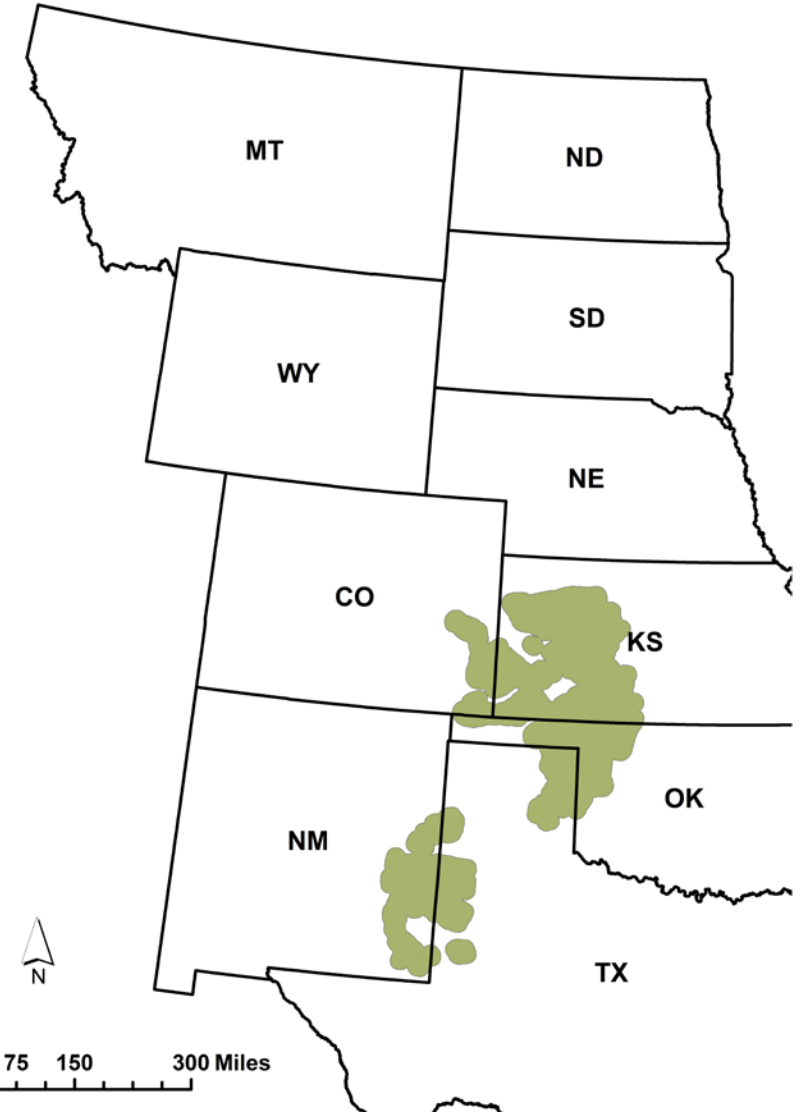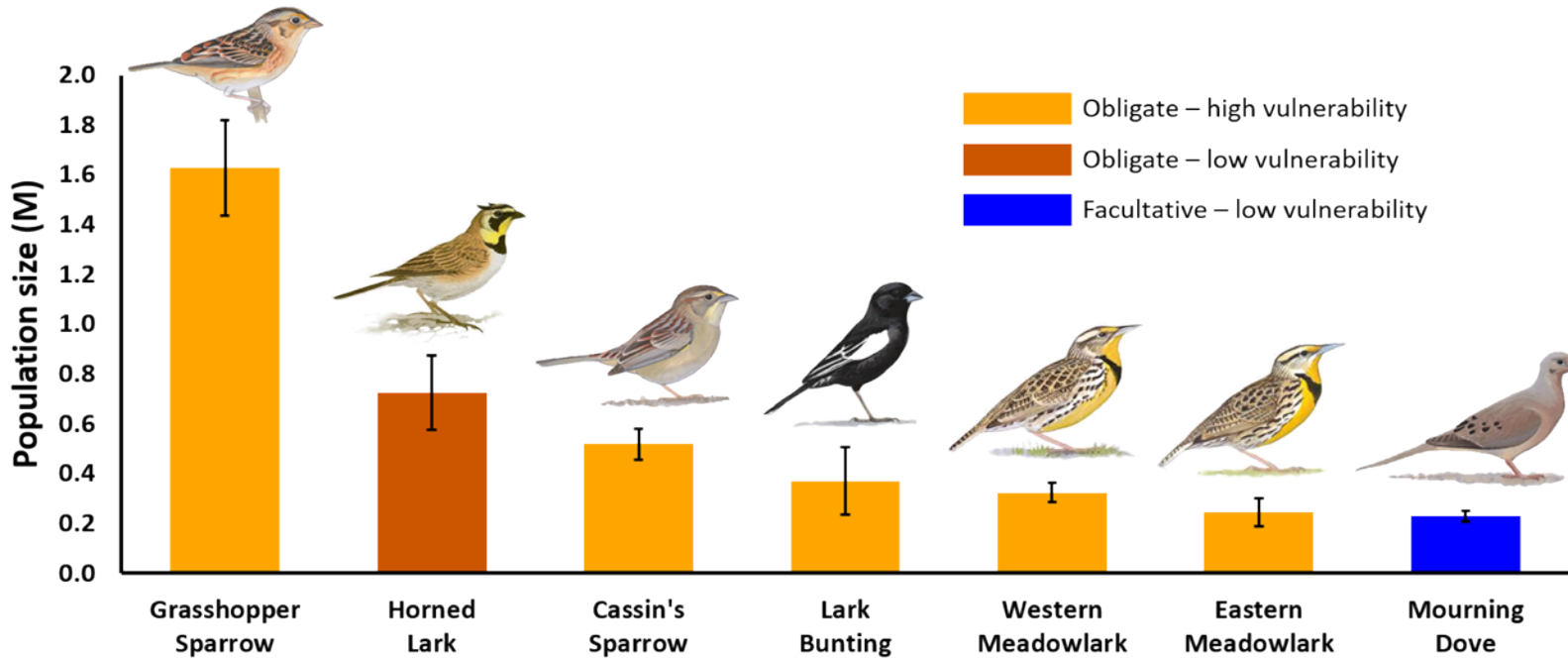
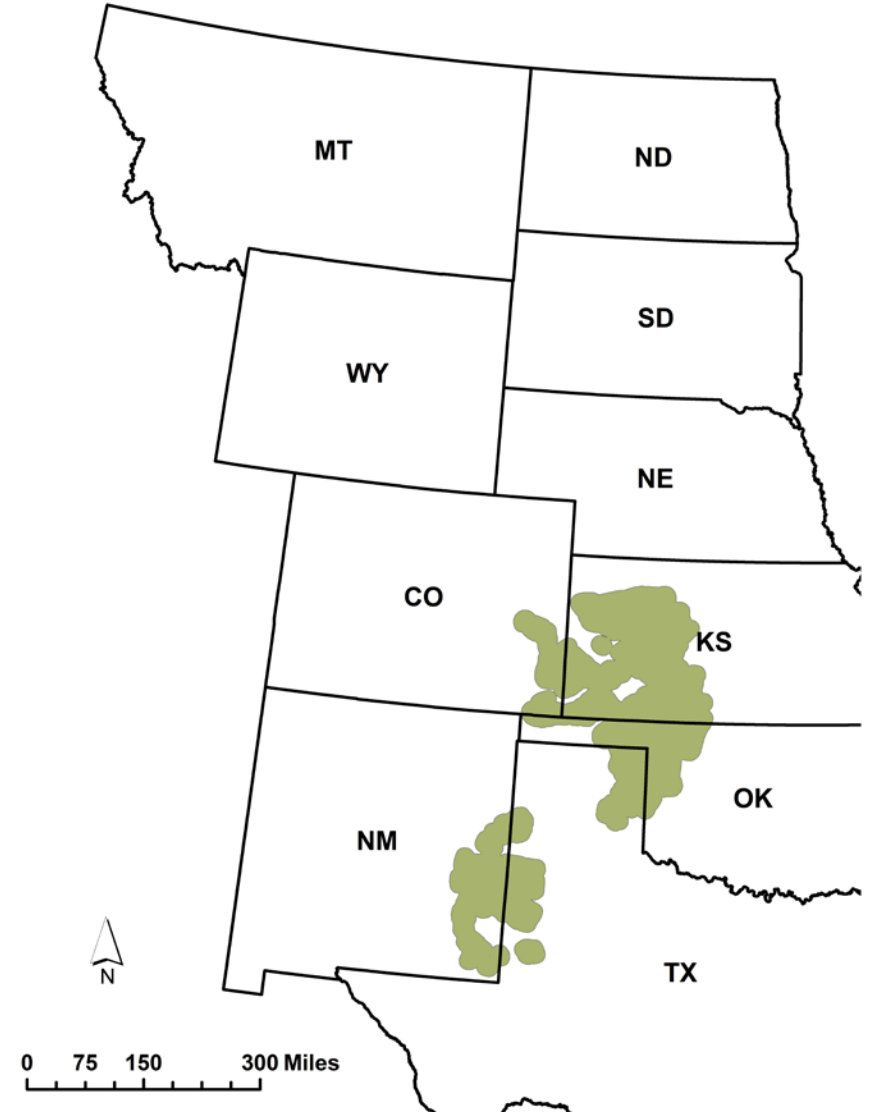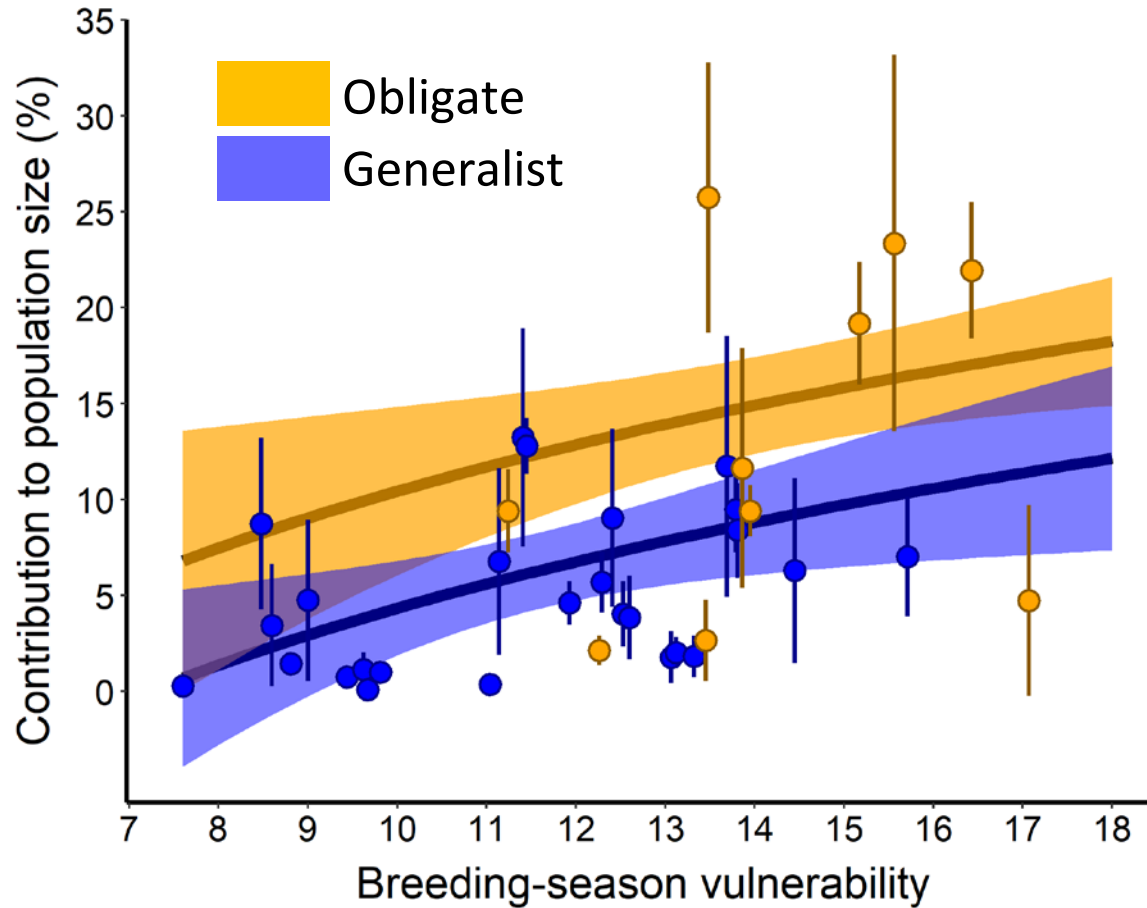*Pavlacky et al., 2021, Conserv. Biol.*

Farm Bill prescribed grazing and CRP increases population size for 1.8 million birds / year

Pavlacky et al., 2021, Conserv. Biol.

Farm Bill conservation for the most vulnerable species

Landscape-scale conservation mitigates biodiversity loss of grassland birds

Mo Correll, Arvind Panjabi, Brandt Ryder;
Bird Conservancy of the Rockies

Anne Bartuszevige; *Playa Lakes Joint Venture*
Rich Iovanna; *Farm Service Agency*
Luke George; *Colorado State University*

Matching conservation solutions to biological threats

Threatening process

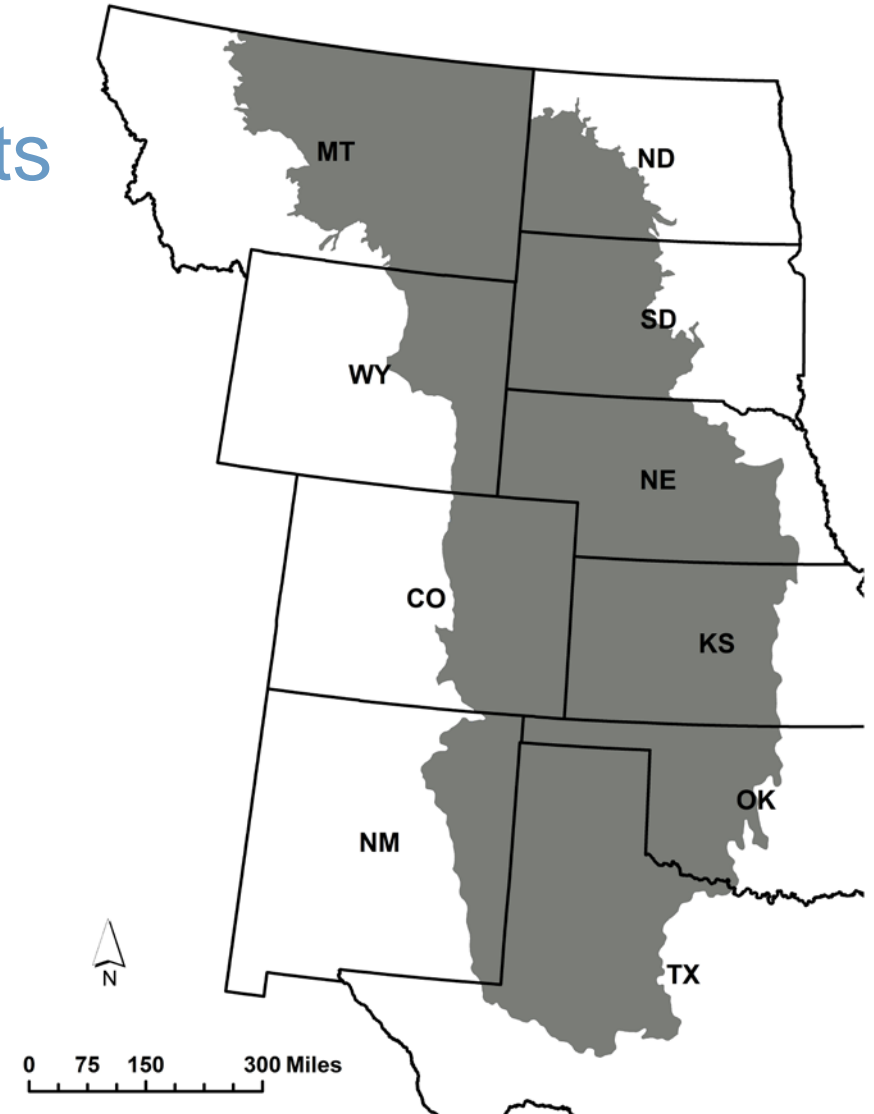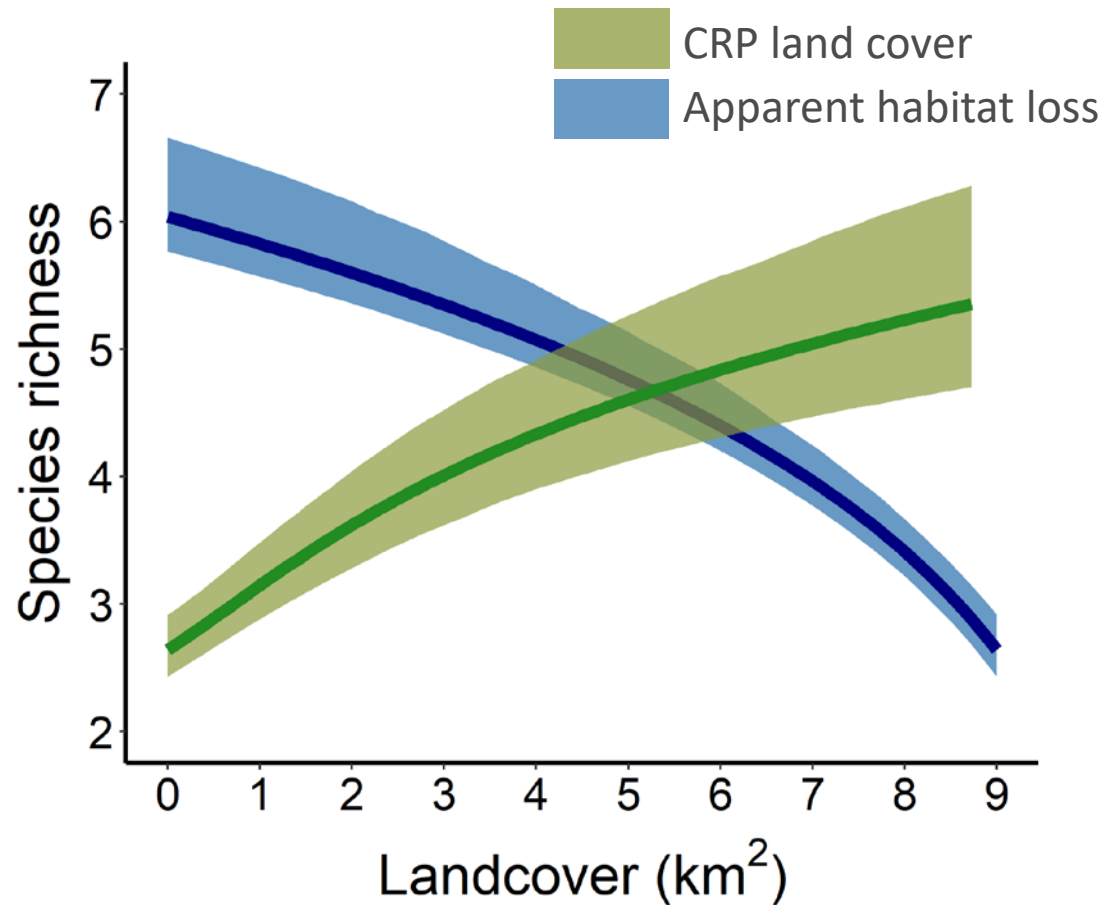- Habitat loss
  - $\log_e$(grassland area)

Conservation solution

- Landscape restoration
  - $\log_e$(CRP area)

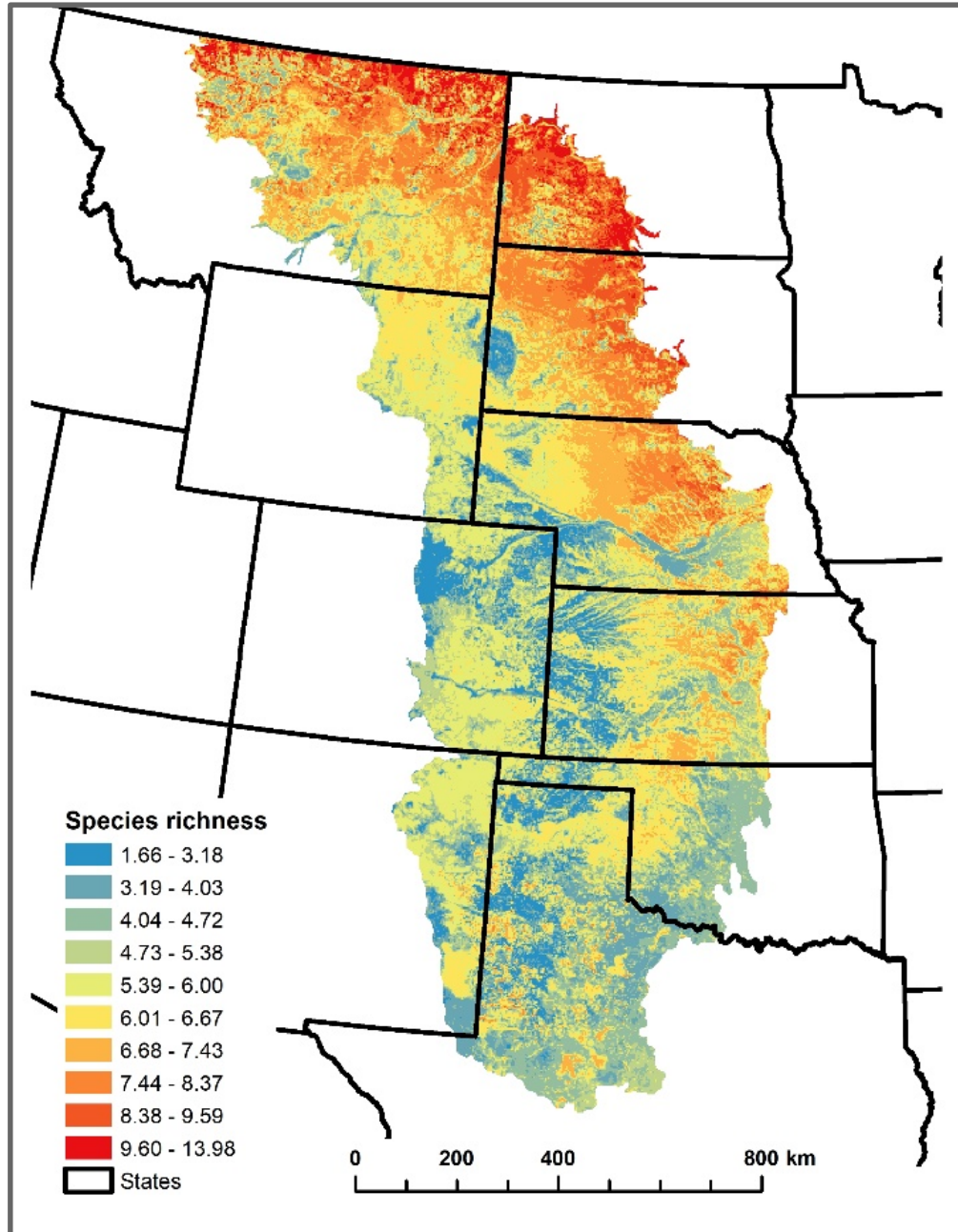## Spatially explicit outcomes

- Shrubland heterogeneity
  - $\log_e$(Shrubland area)
- Latitude - longitude
  - Latitude + Longitude + Longitude^2

3 km

Conservation Reserve Program (CRP) offsets habitat loss for grassland specialists

Pavlacky et al., In press, Ecol. Appl.

Overall species richness

Species richness
- 1.66 - 3.18
- 3.19 - 4.03
- 4.04 - 4.72
- 4.73 - 5.38
- 5.39 - 6.00
- 6.01 - 6.67
- 6.68 - 7.43
- 7.44 - 8.37
- 8.38 - 9.59
- 9.60 - 13.98
- States

0   200   400   800 km

Predicted CRP response (1 km^2)

Marginal species richness
- 0.00 - 0.13
- 0.14 - 0.37
- 0.38 - 0.59
- 0.60 - 0.80
- 0.81 - 1.01
- 1.02 - 1.21
- 1.22 - 1.40
- 1.41 - 1.59
- 1.60 - 1.81
- 1.82 - 2.20
- States

0   200   400   800 km
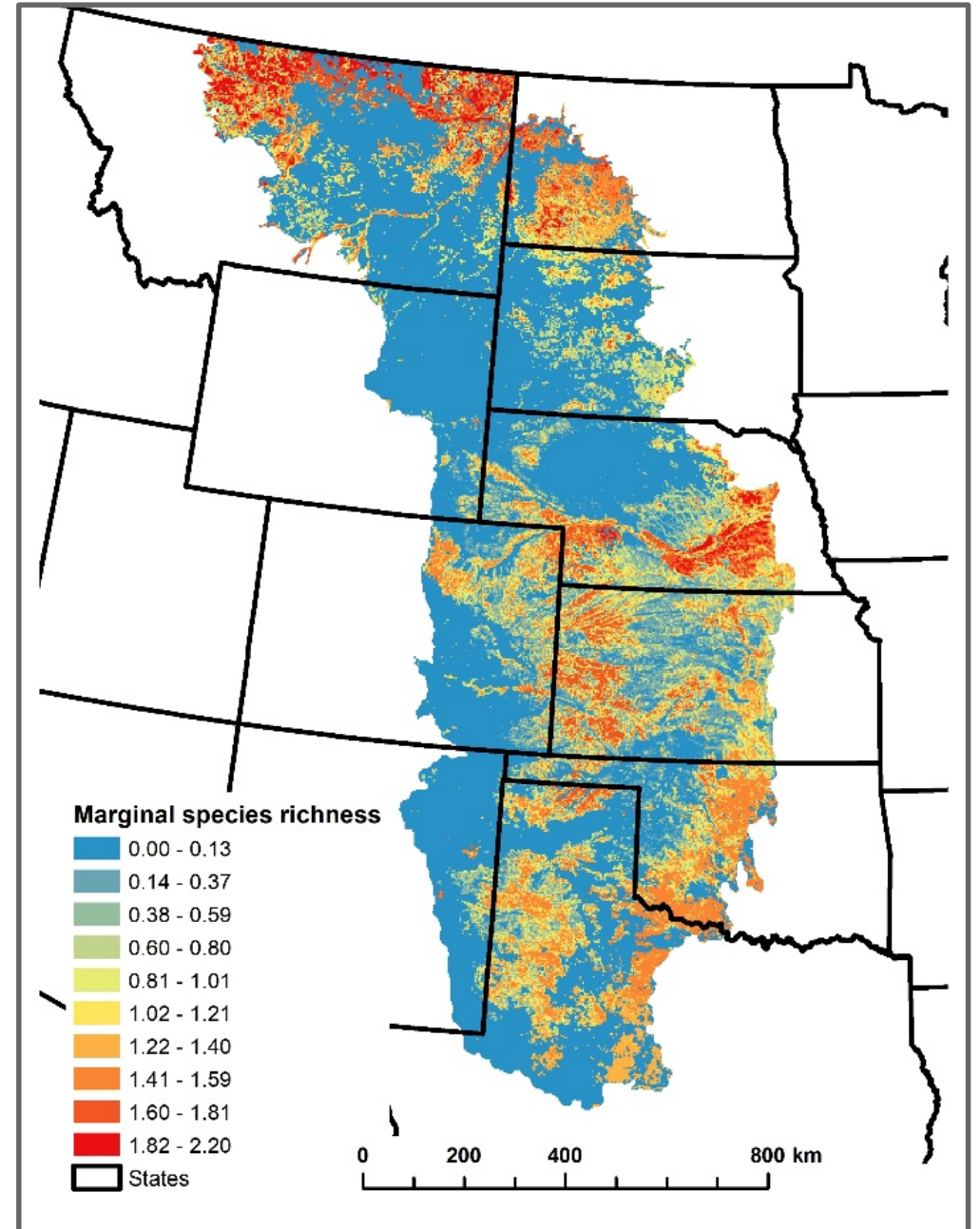
Individual species responses

- 28 of 44 species showed declines consistent with habitat loss ($P > 0.9$)
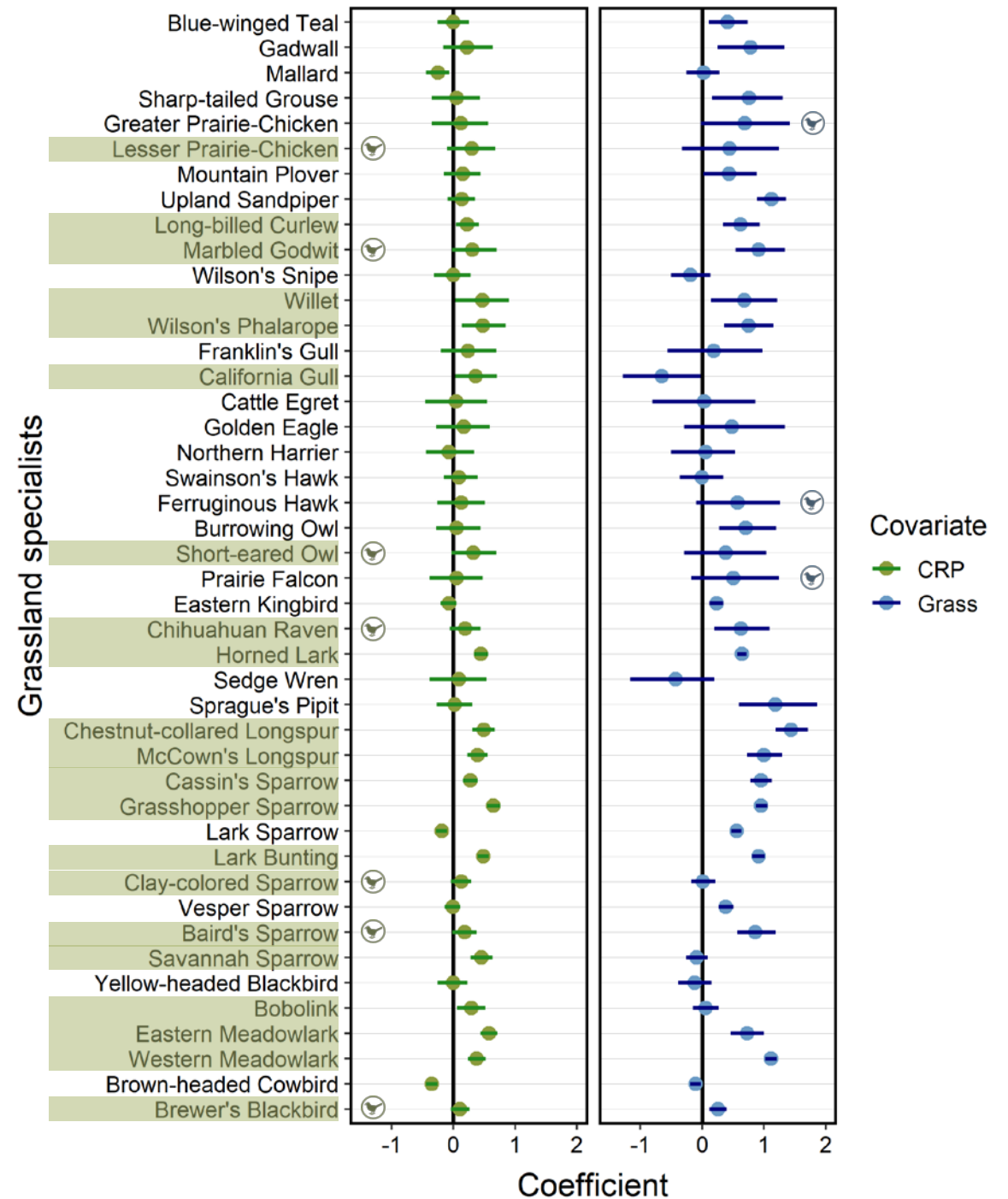
- 21 of 44 species showed positive responses to CRP ($P > 0.9$)
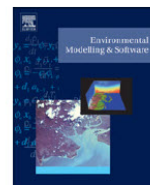
Systematic Conservation Planning

Contents lists available at ScienceDirect

Environmental Modelling & Software

journal homepage: www.elsevier.com/locate/envsoft

Optimal restoration of altered habitats

Mark R. Lethbridge [a,*], Michael I. Westphal [b,c], Hugh P. Possingham [c,d], Megan L. Harper [a], Nicholas J. Souter [a], Nicole Anderson [a]

[a] School of Geography, Population and Environmental Management, Faculty of Social Sciences, Flinders University, Adelaide, SA 5001, Australia
[b] Department of Environmental Science, Policy and Management, University of California, Berkeley, CA 94720, USA
[c] The Ecology Centre, School of Integrative Biology, University of Queensland, St. Lucia, QLD 4072, Australia
[d] Centre for Applied Environmental Decision Analysis, School of Integrative Biology, University of Queensland, St. Lucia, QLD 4072, Australia
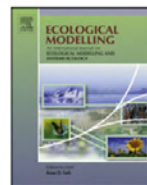
Contents lists available at ScienceDirect

Ecological Modelling

journal homepage: www.elsevier.com/locate/ecolmodel

Mathematical problem definition for ecological restoration planning

Marissa F. McBride [a,*], Kerrie A. Wilson [b], Jutta Burger [c], Yi-Chin Fang [c], Megan Lulow [c], David Olson [c,d], Mike O'Connell [c], Hugh P. Possingham [b]
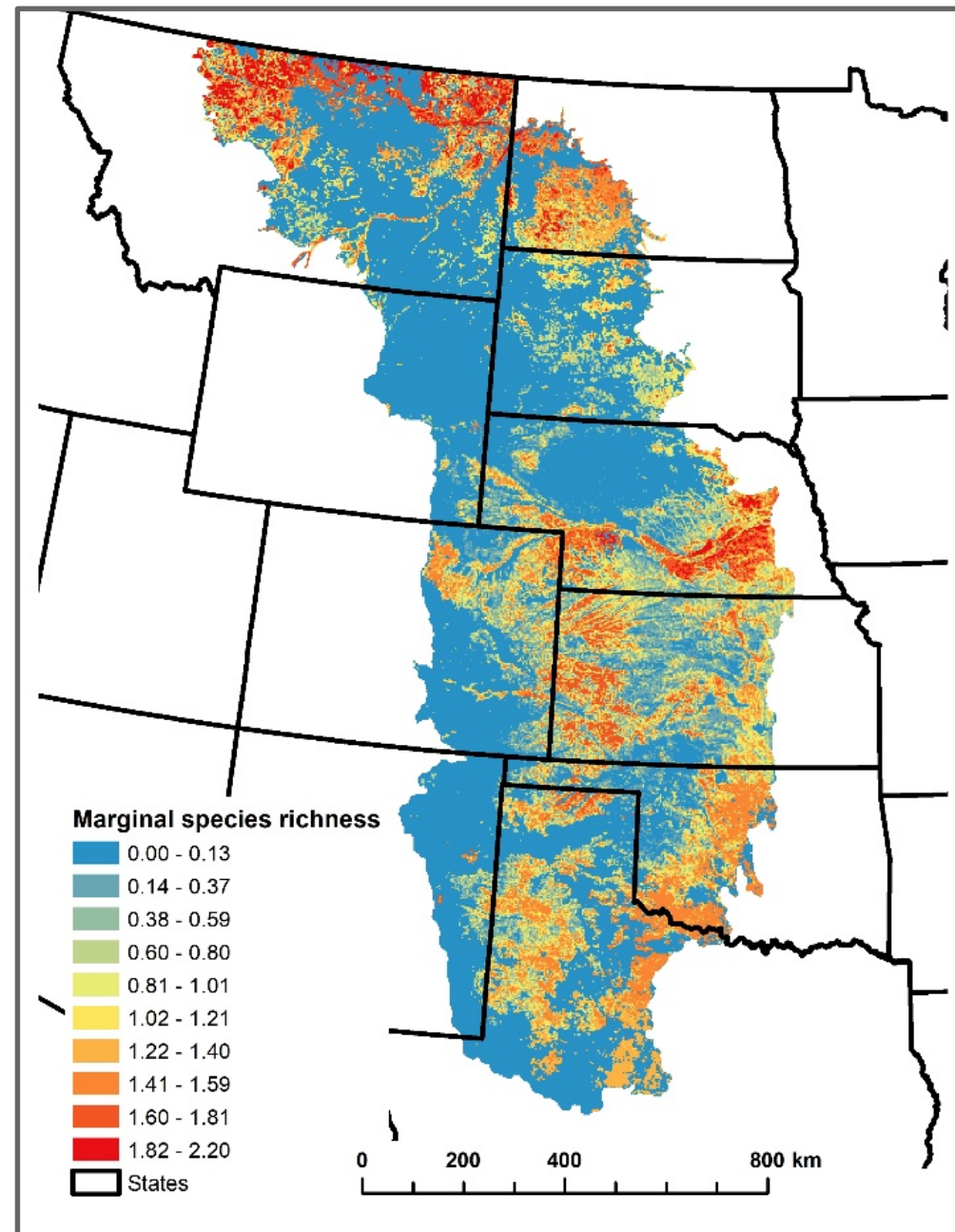
[a] University of Melbourne, School of Botany, Melbourne, Victoria 3010, Australia
[b] University of Queensland, School of Biological Sciences, St. Lucia, Queensland 4072, Australia
[c] Irvine Ranch Conservancy, 4727 Portola Parkway, Irvine, CA 92620-1914, USA
[d] Conservation Earth Consulting, 4234 McFarlane Avenue, Burbank, CA 91505, USA

Predicted CRP response (1 km²)

Marginal species richness
- 0.00 - 0.13
- 0.14 - 0.37
- 0.38 - 0.59
- 0.60 - 0.80
- 0.81 - 1.01
- 1.02 - 1.21
- 1.22 - 1.40
- 1.41 - 1.59
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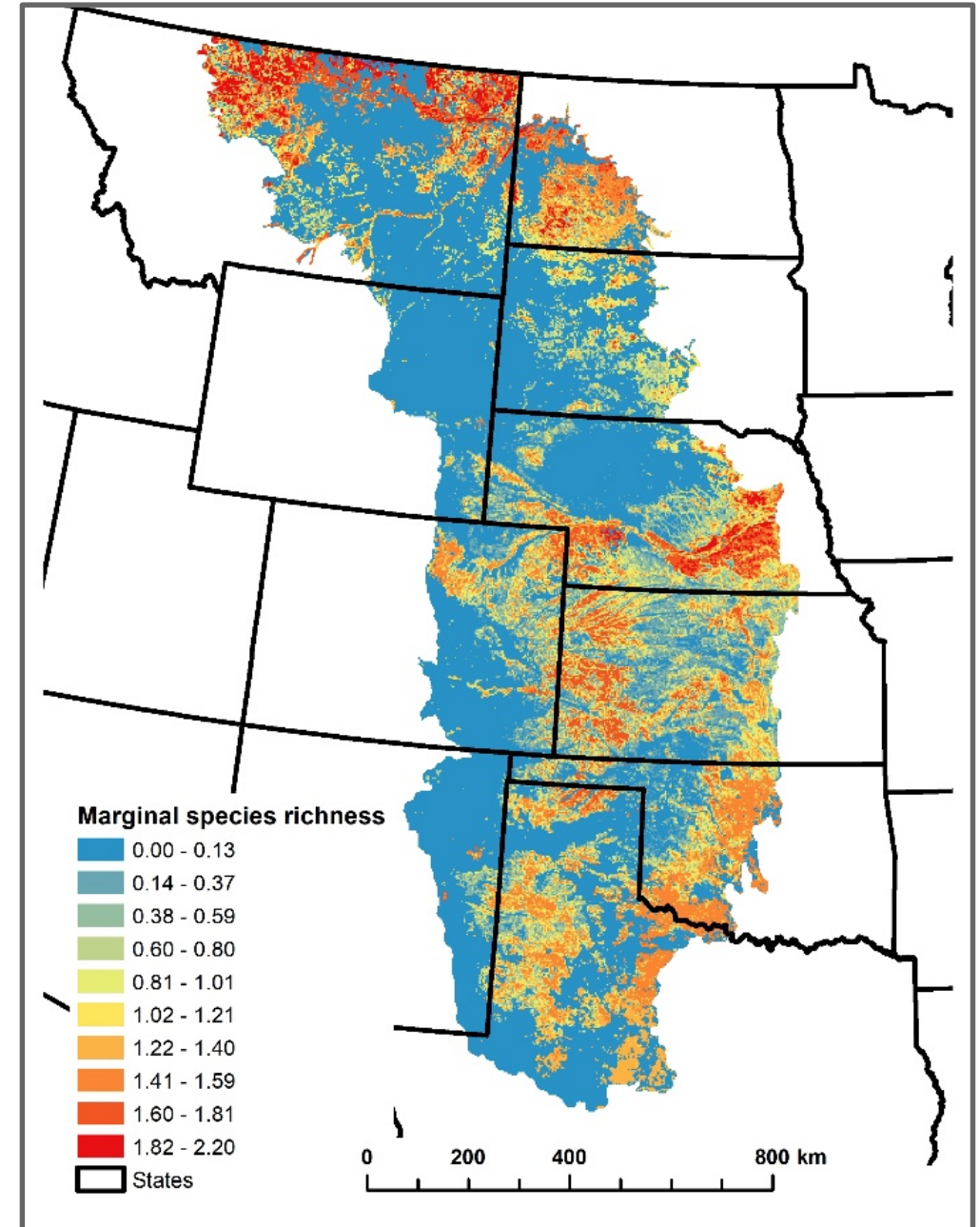- States

0   200   400   800 km

Systematic Conservation Planning

Prioritize conservation actions | fixed budget for enrollment cap

- Conservation Science
  - US Farm Bill practices & incentives
  - Financial sustainability of small farms
  - Ecosystem Services

- Agro-ecology
  - Livestock & crop yields - economics
  - Water quality & erosion

- Restoration Ecology
  - Restore habitat loss & degradation
  - Grassland bird biodiversity

Predicted CRP response (1 km²)

Marginal species richness
- 0.00 - 0.13
- 0.14 - 0.37
- 0.38 - 0.59
- 0.60 - 0.80
- 0.81 - 1.01
- 1.02 - 1.21
- 1.22 - 1.40
- 1.41 - 1.59
- 1.60 - 1.81
- 1.82 - 2.20
- States

0   200   400   800 km

The effectiveness of CRP, prescribed grazing, and brush management for conserving grassland birds

Eric Chabot, Lauren Connell, Chris Latimer, Jen Timmer; *Bird Conservancy of the Rockies*

Anne Bartuszevige; *Playa Lakes Joint Venture*

Catherine Wightman; *Northern Great Plains JV*

Dirac Twidwell; *University of Nebraska*

Brady Allred, David Naugle; *University of Montana*

Objectives

1. Responses of grassland birds to threats (~80 spp.)
   a. Habitat loss from agricultural conversion
   b. Habitat loss from tree and shrub encroachment
   c. Habitat degradation from reduced heterogeneity

2. Effectiveness of conservation practices
   a. CRP grassland restoration
   b. Brush management (528)
   c. Prescribed grazing (314)

3. Spatially explicit maps for prioritizing conservation of grassland birds

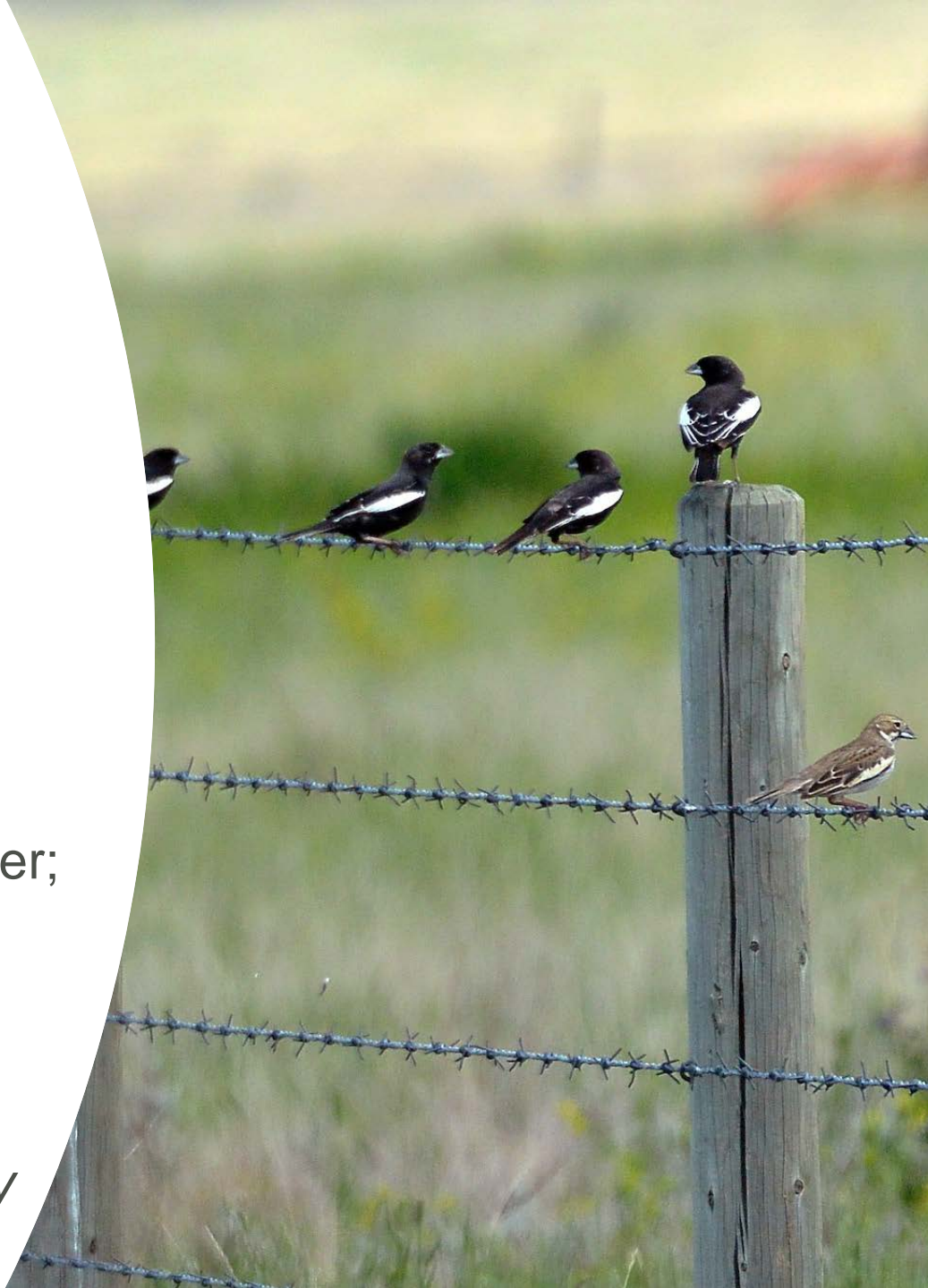# Collaborative conservation for managing resilient rangelands

Five private livestock producers in eastern Colorado

Eugene Backhause, Rachel Mead; *NRCS*

Trent Delehanty, Justin Lambert, Katherine Merewether; *NRCS – Bird Conservancy*

Lauren Connell, Brandt Ryder, Jen Timmer; *Bird Conservancy of the Rockies*

Reid Hensen, Dan Mooney; *Colorado State University*

# Collaborative Natural Resource Conservation

Problem Statement

Evaluate the effectiveness of alternate grazing and drought management strategies for low and high precipitation years to maximize livestock producer objectives

Producer objectives

1. Ranch profitability
2. Rangeland condition and heterogeneity
3. Avian biodiversity

Structured Decision Making
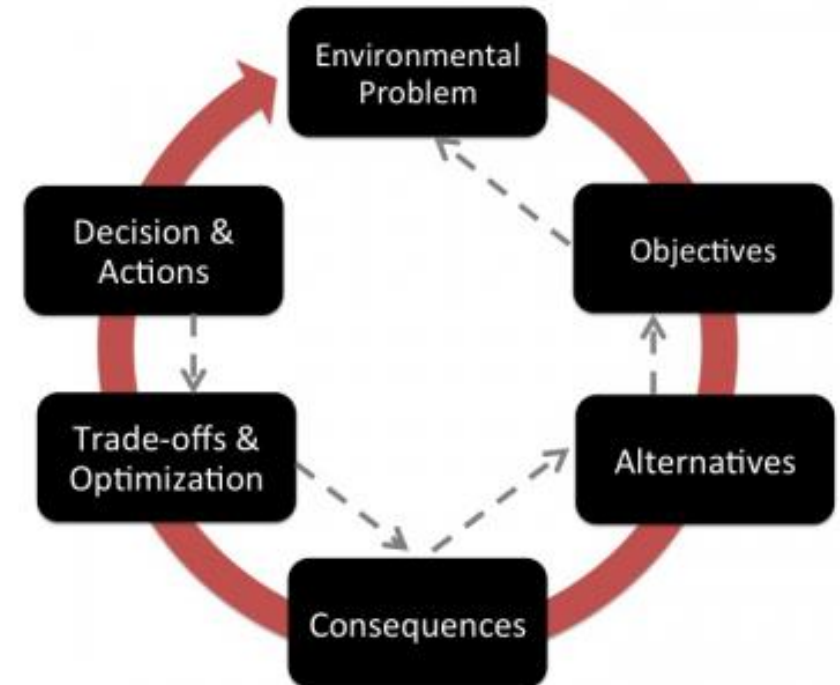
Great Plains horizons

- Effectiveness monitoring to prioritize management actions for the greatest conservation outcomes

- Working Lands for Wildlife
  - Co-production to connect private producers and Farm Bill practices
  - Geospatial technology to link rangeland condition and biodiversity outcomes

- Voluntary conservation on private land addressing critical habitat needs provides an emerging solution to the decline of grassland birds

Questions on the horizon

How can we prioritize local conservation actions to maximize outcomes for:

- Sustainable private farming and ranching operations
- Food production for human well-being
- Conservation of grassland bird biodiversity

Thank you very much!