The SECAS Third Thursday Web Forum

Finding the core: Tools for identifying intact grasslands and tracking restoration outcomes

6-20-2024

Agenda

- Introduction
- Monthly topic
- Q&A and discussion
- Preview of next webinar
- Staff updates

Finding the core: Tools for identifying intact grasslands and tracking restoration outcomes

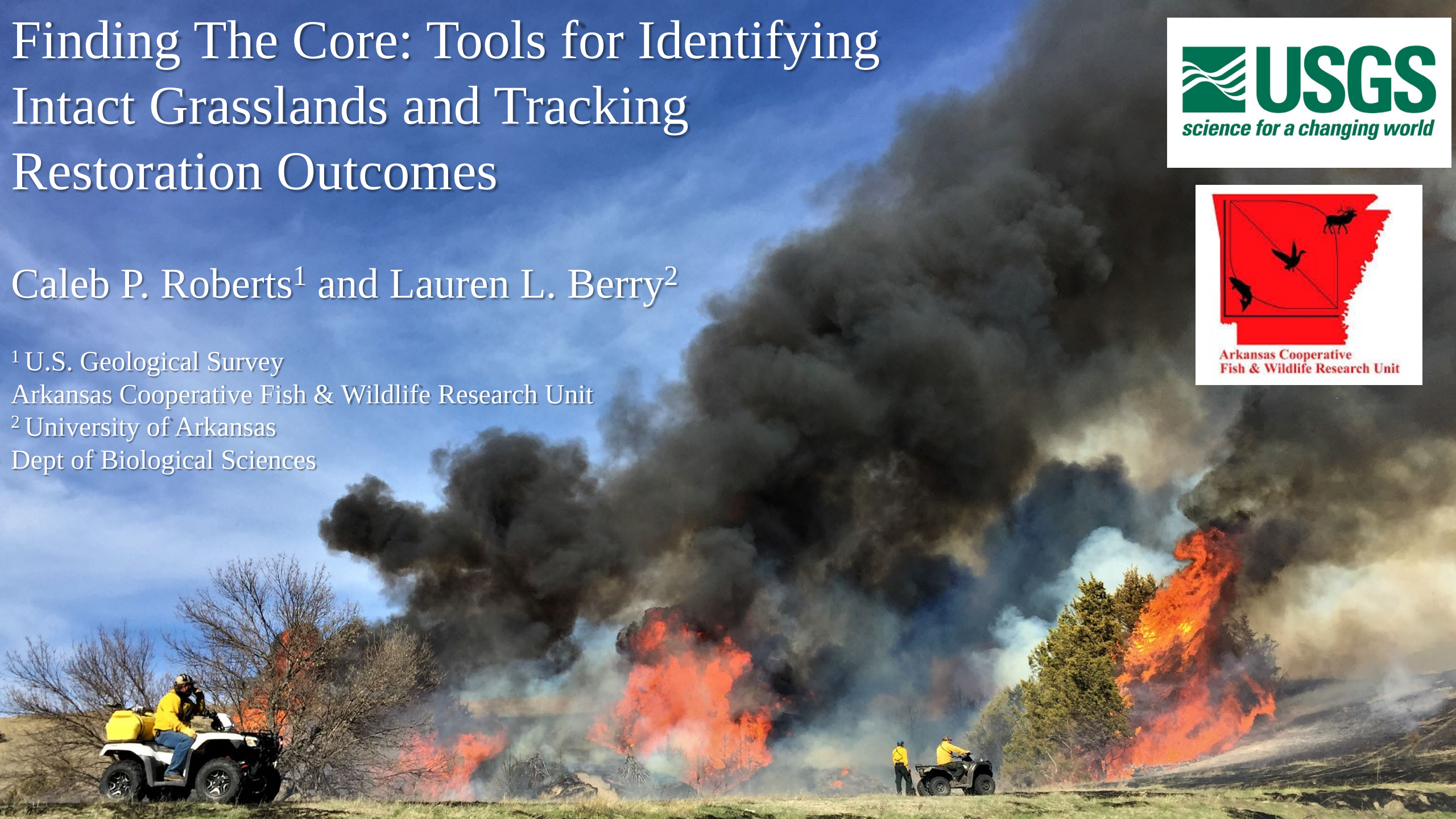
Lauren Berry, University of Arkansas
Caleb Roberts, Arkansas Cooperative Fish & Wildlife Research Unit

6-20-2024

Finding The Core: Tools for Identifying Intact Grasslands and Tracking Restoration Outcomes

Caleb P. Roberts[1] and Lauren L. Berry[2]

[1] U.S. Geological Survey
Arkansas Cooperative Fish & Wildlife Research Unit
[2] University of Arkansas
Dept of Biological Sciences



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Caleb P. Roberts

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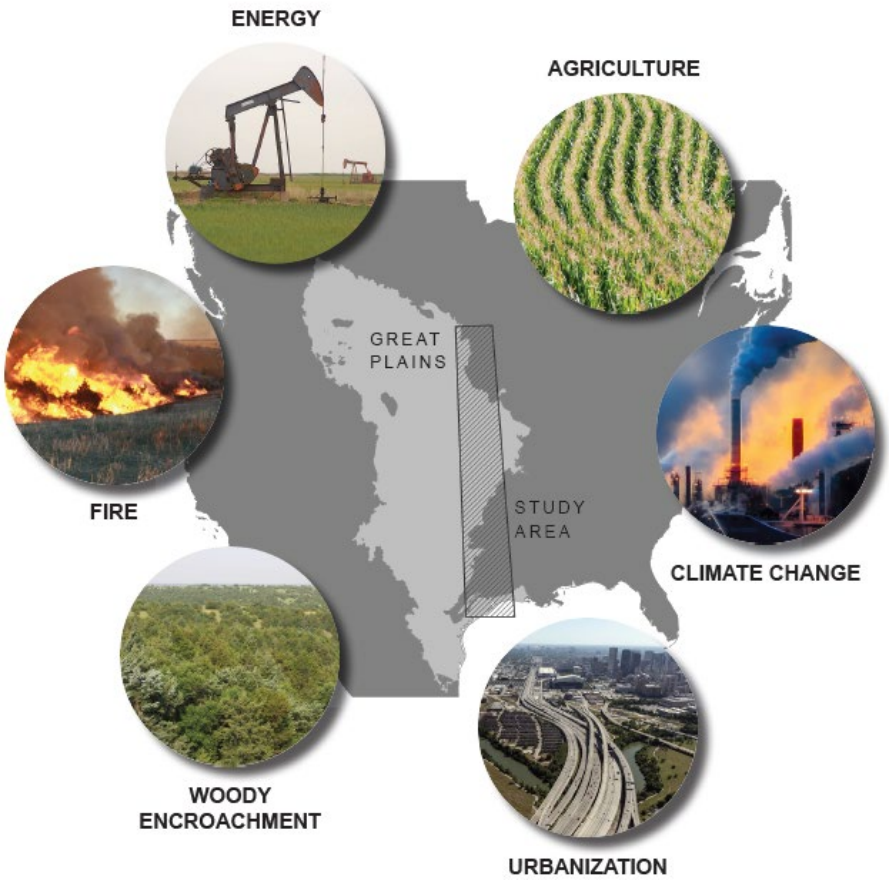

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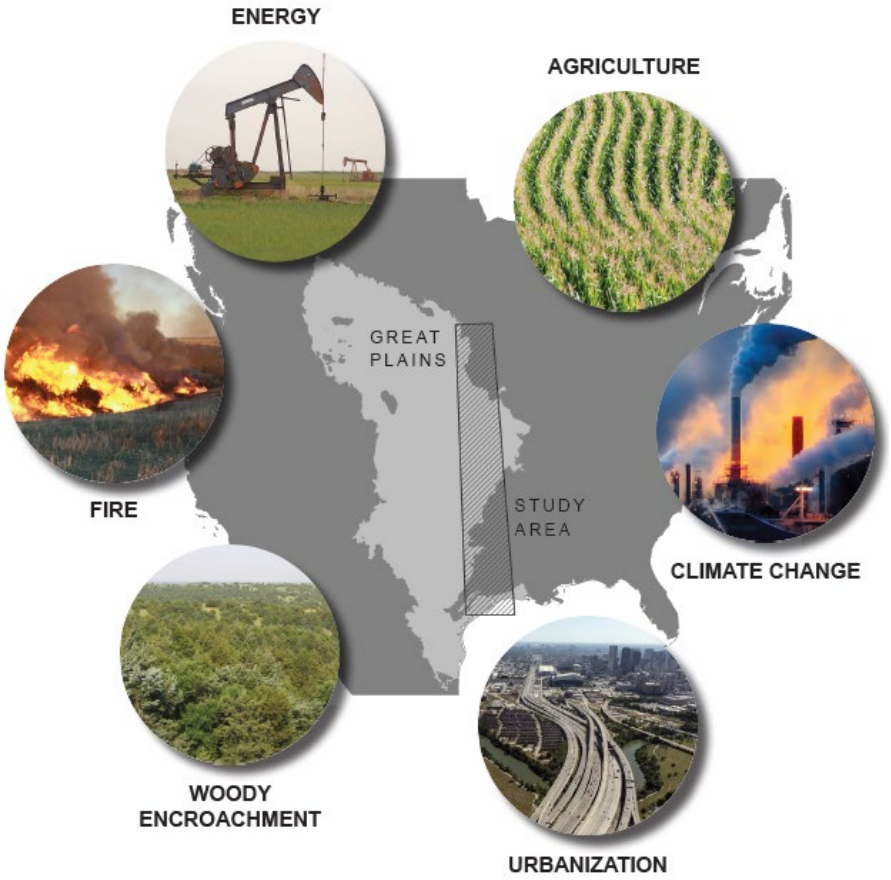
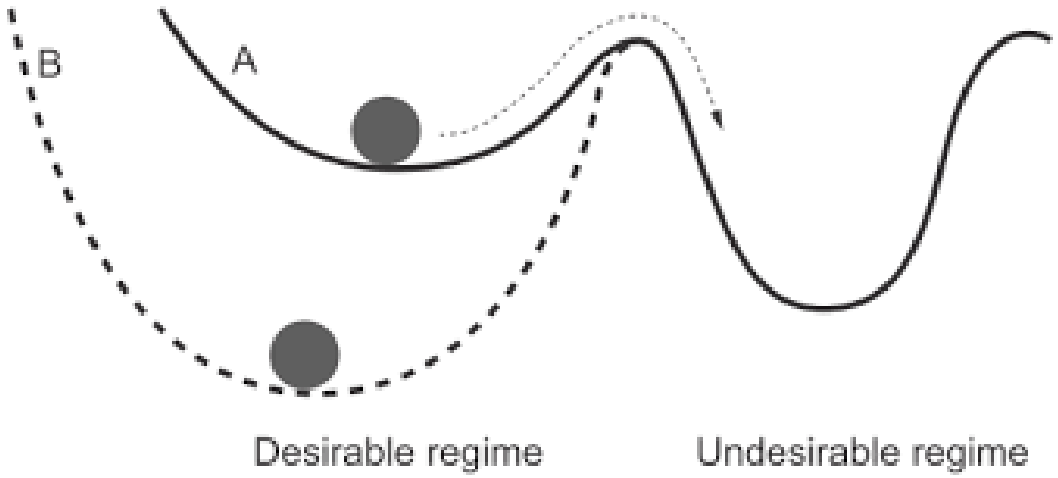
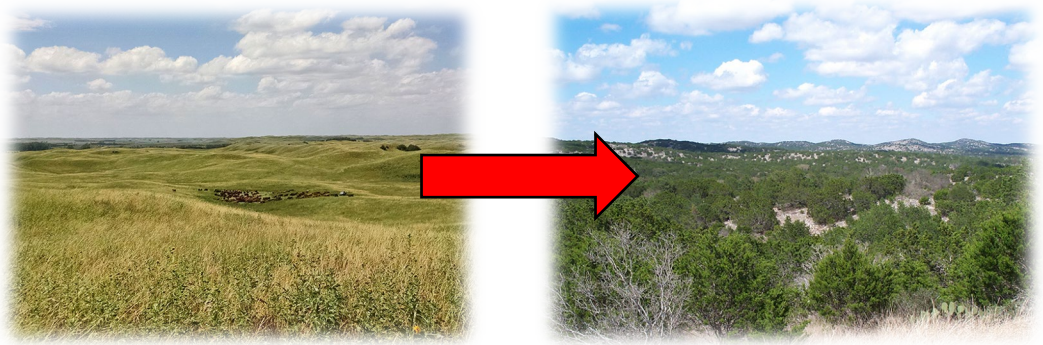
Roberts et al. 2019; Photo credits: Christine Chitwood, Dirac Twidwell







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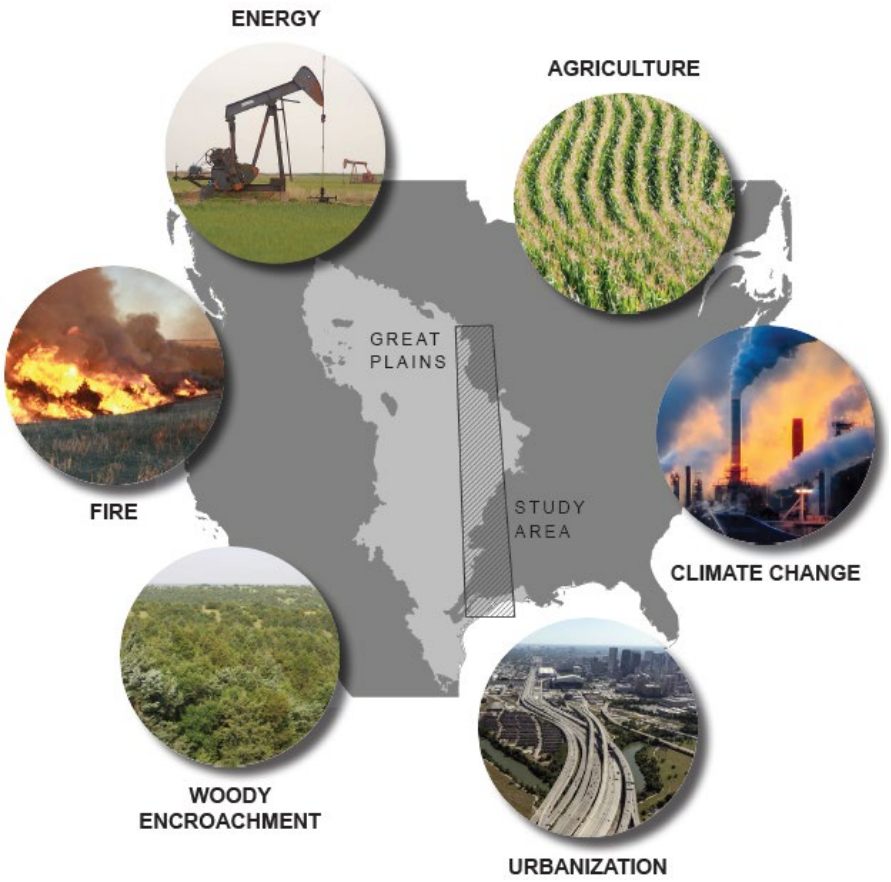
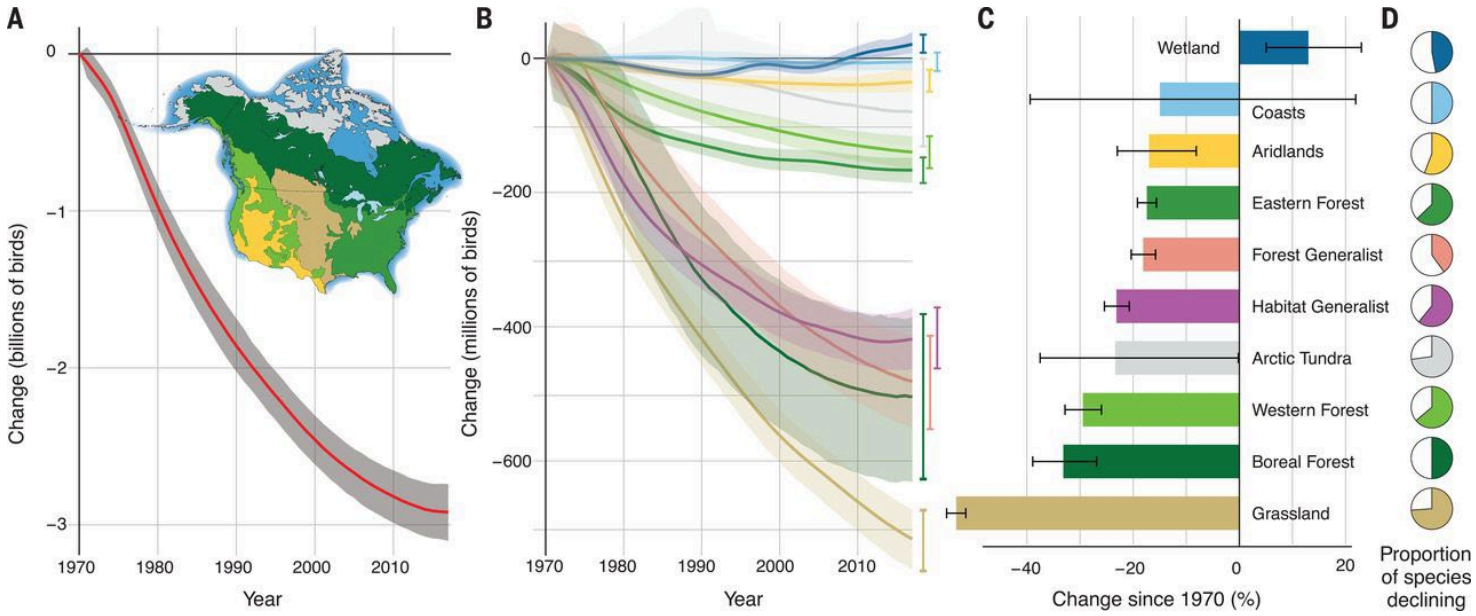
Liao 2012; Roberts et al. 2019; Photo credits: Christine Chitwood, Dirac Twidwell



BIODIVERSITY LOSS

Decline of the North American avifauna

Kenneth V. Rosenberg[1,2]*, Adriaan M. Dokter[1], Peter J. Blancher[3], John R. Sauer[4], Adam C. Smith[5], Paul A. Smith[3], Jessica C. Stanton[6], Arvind Panjabi[7], Laura Helft[1], Michael Parr[2], Peter P. Marra[8]†



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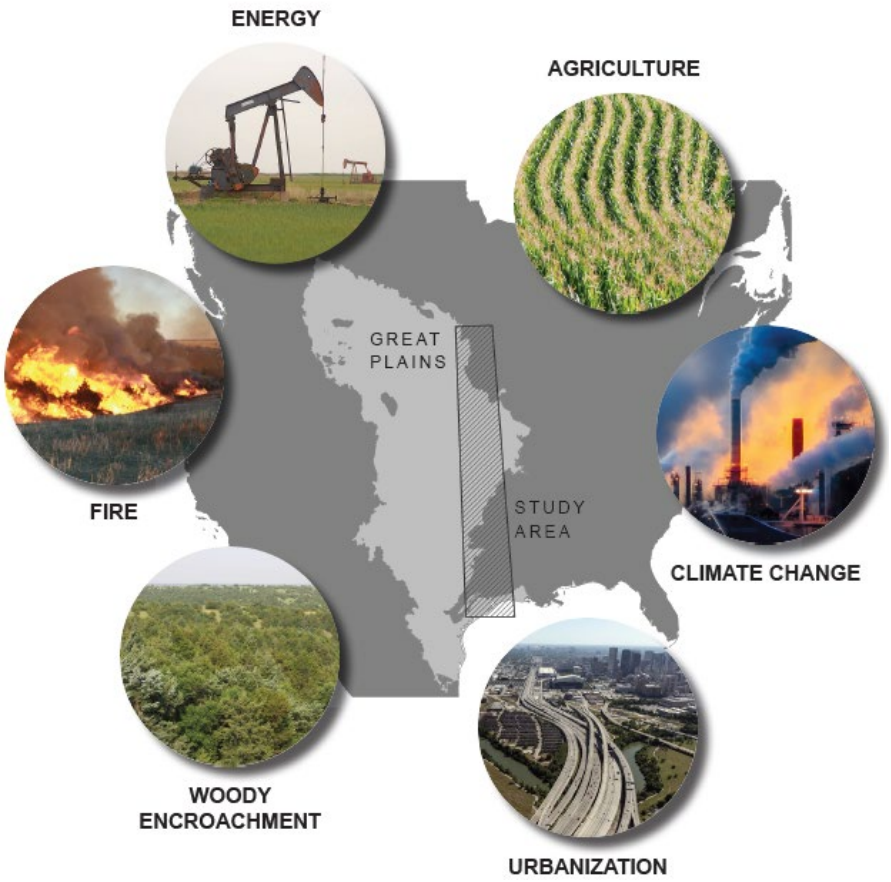

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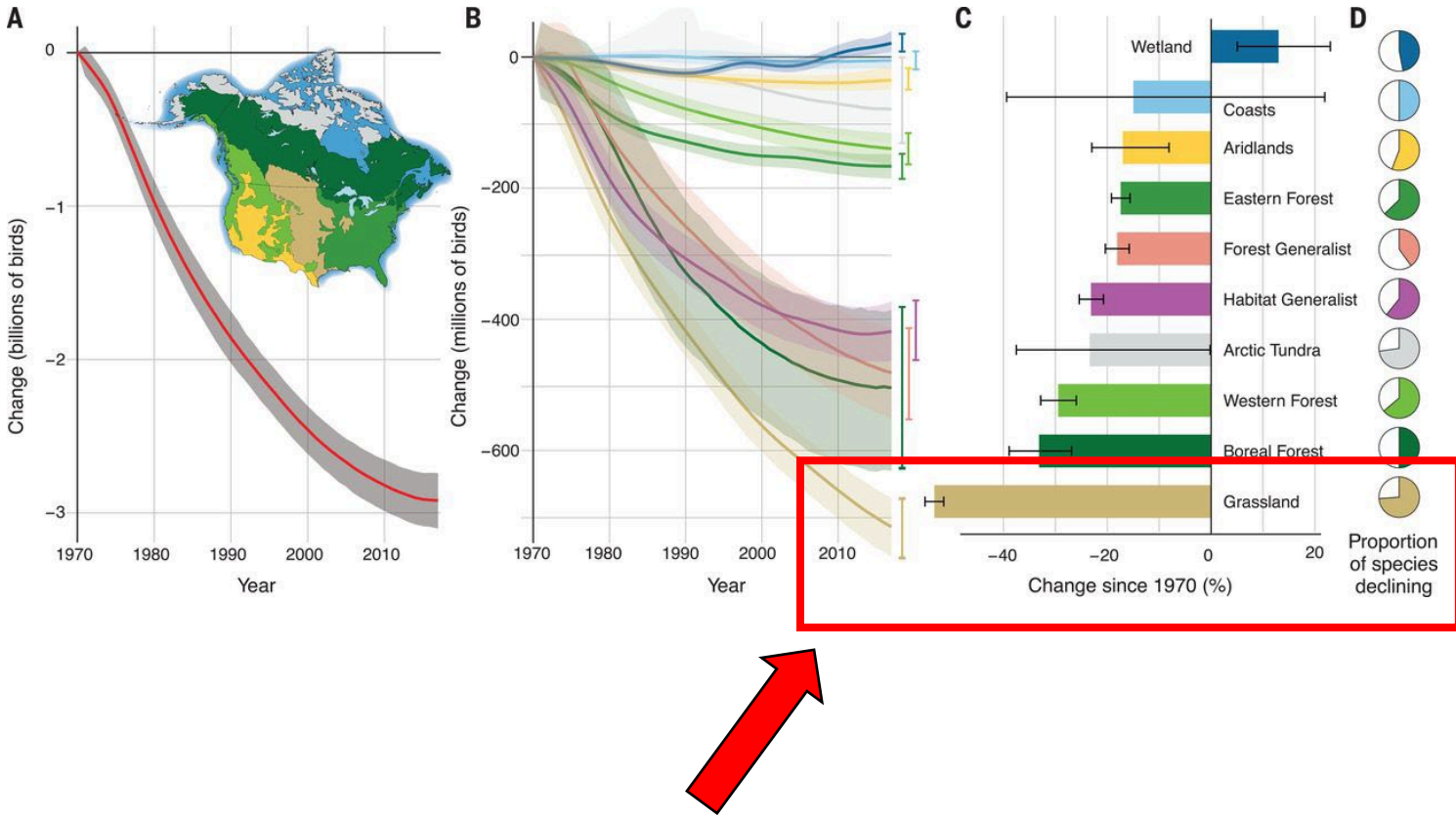

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Roberts et al. 2019; Photo credits: Christine Chitwood, Dirac Twidwell

If we want to restore and conserve grasslands, we need to:

1. Understand the scope and scale of challenges

2. Meet challenges with strategies that scale

Outline

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Outline

1. Challenge: Regime shifts

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Outline

1. Challenge: Regime shifts

2. Strategy that scales: Finding and defending cores

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Outline

1. Challenge: Regime shifts

2. Strategy that scales: Finding and defending cores

3. Does “finding the core” work in the Southeast?

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Outline

1. Challenge: Regime shifts

2. Strategy that scales: Finding and defending cores

3. Does “finding the core” work in the Southeast?

4. What have we learned?

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Challenge: Regime shifts

Photo credit: Eastern Redcedar Literacy Project

Challenge: Regime shifts

Cornell Lab All About Birds

GET INVOLVED GET ENEWS DONATE

Birds Live Cams Courses Merlin Bird ID Search

Battling A Green Glacier: How A Native Tree Became A Threat To Nebraska's Grasslands

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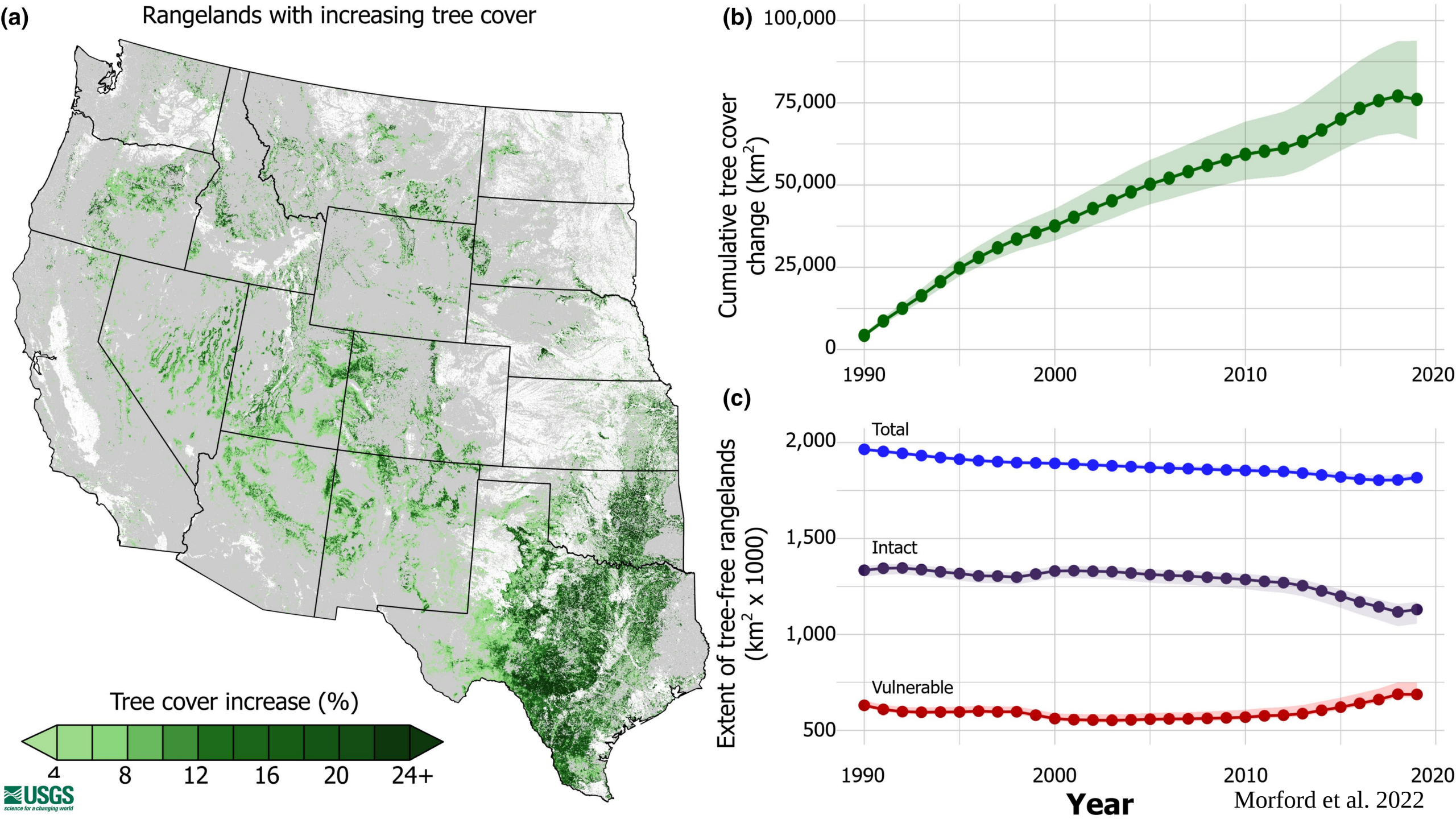
Photo credit: Eastern Redcedar Literacy Project


(a)
Rangelands with increasing tree cover
Tree cover increase (%)
4
8
12
16
20
24+
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(b)
100,000
75,000
50,000
25,000
0
Cumulative tree cover change (km²)
1990
2000
2010
2020
(c)
2,000
1,500
1,000
500
Extent of tree-free rangelands (km² x 1000)
Total
Intact
Vulnerable
1990
2000
2010
2020
Year
Morford et al. 2022

Woody encroachment in the Southeast

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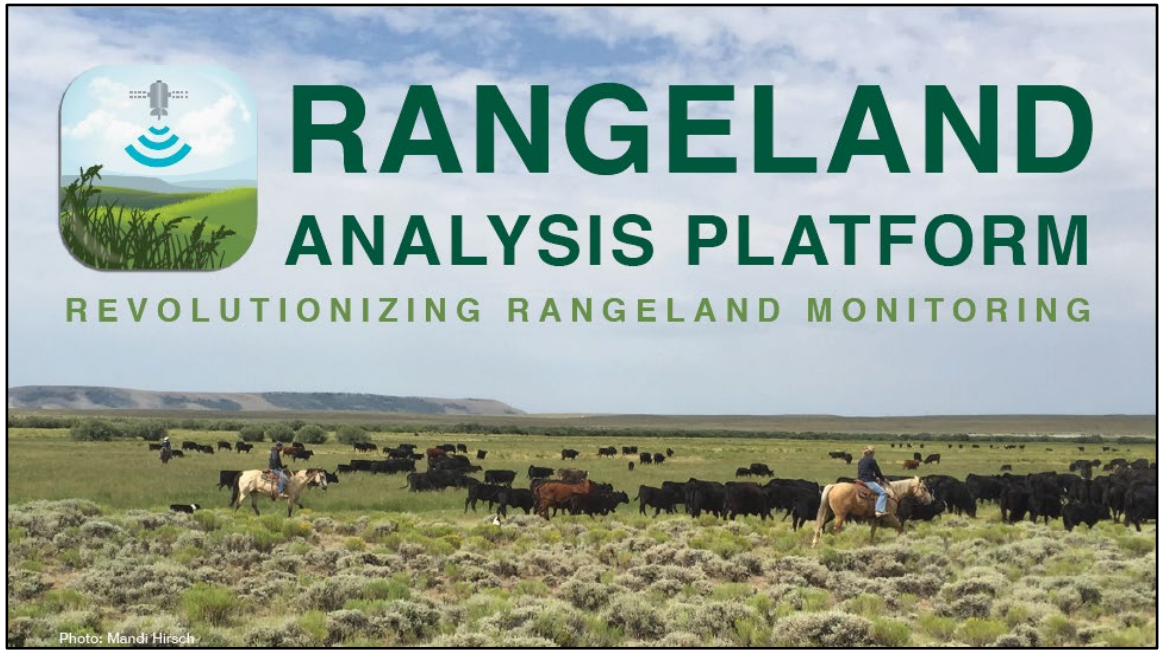
ABC’s of woody plant encroachment in Arkansas

ABC’s of woody plant encroachment in Arkansas



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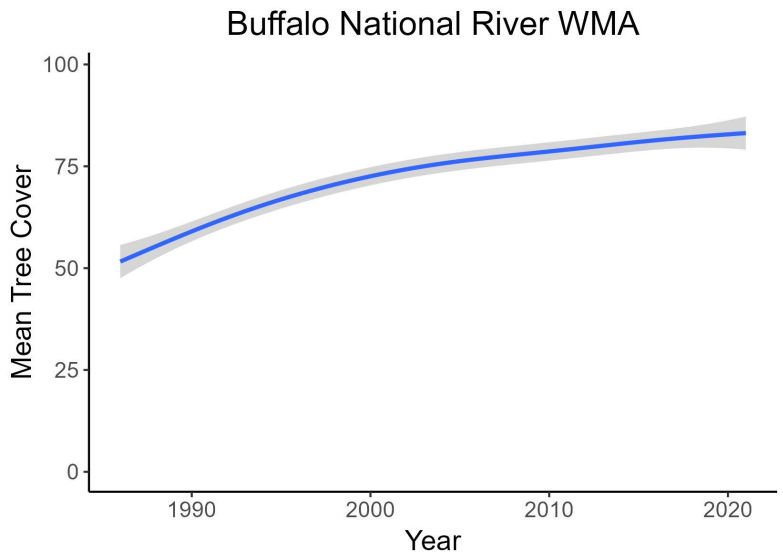
ABC’s of woody plant encroachment in Arkansas



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Roberts et al. 2023 in Restoration Ecology

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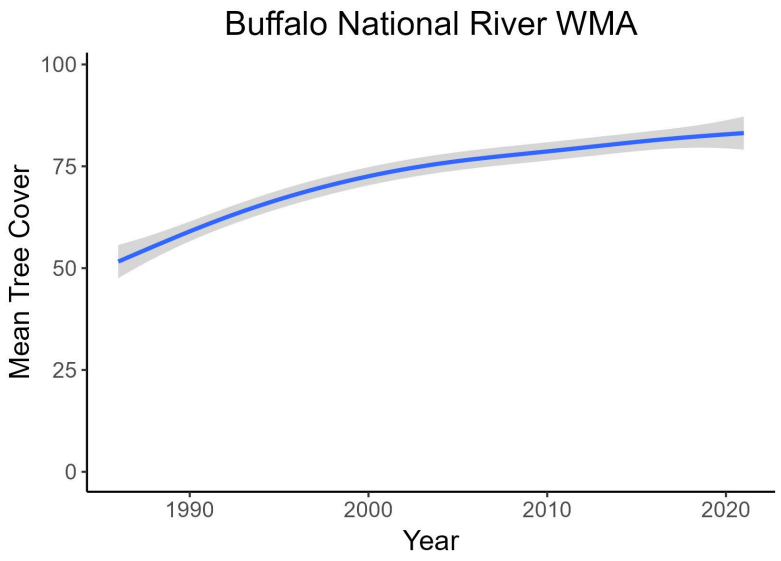

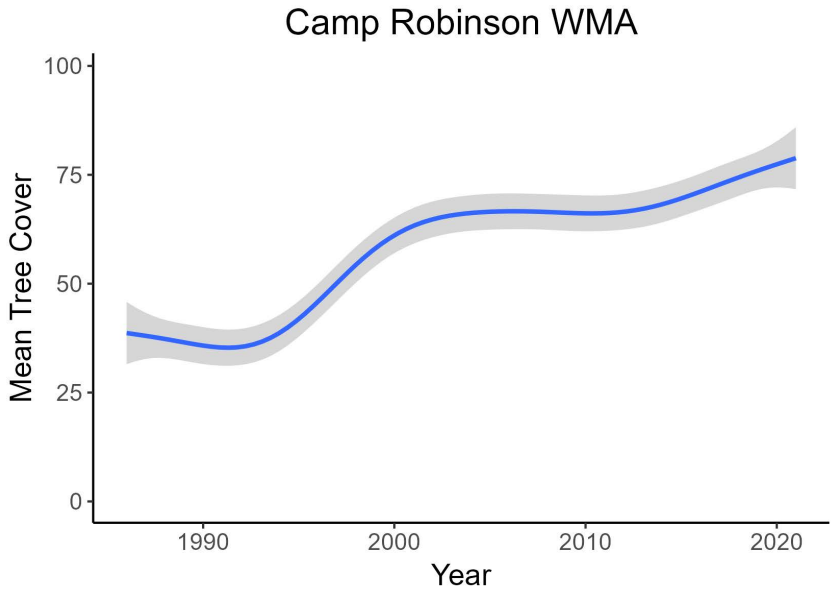

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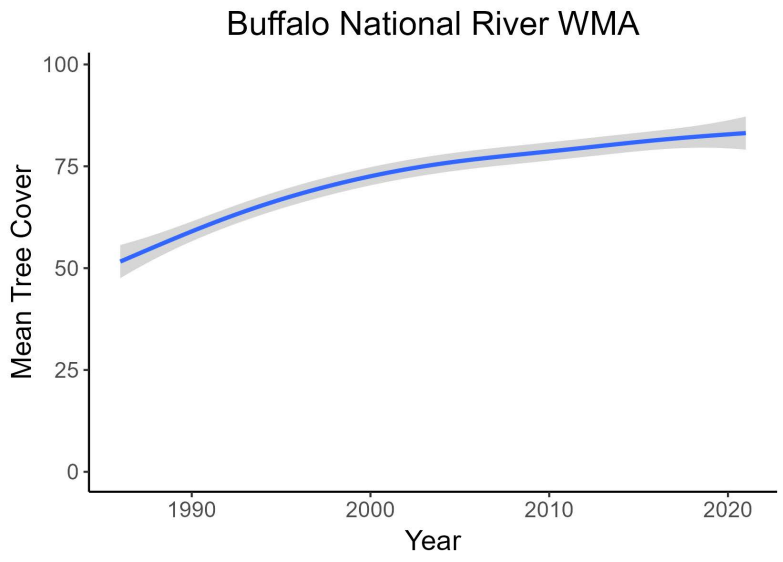

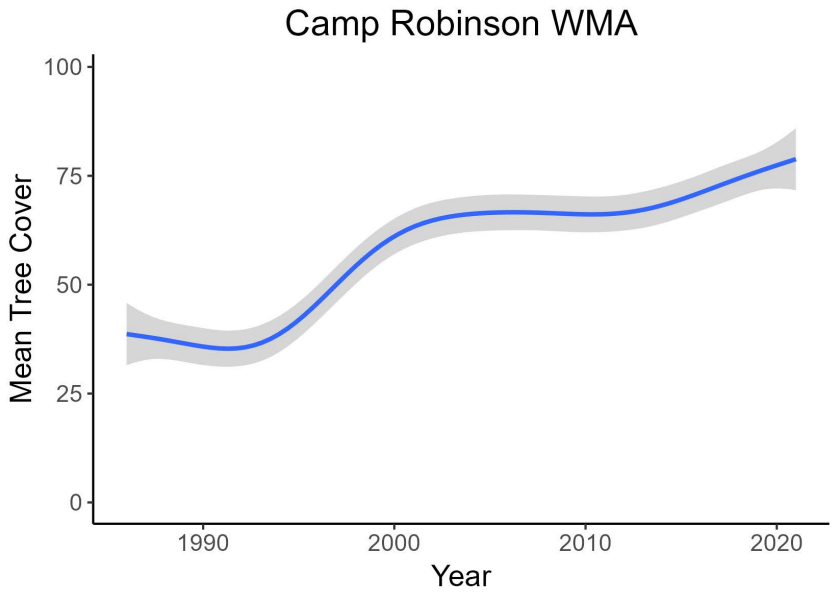

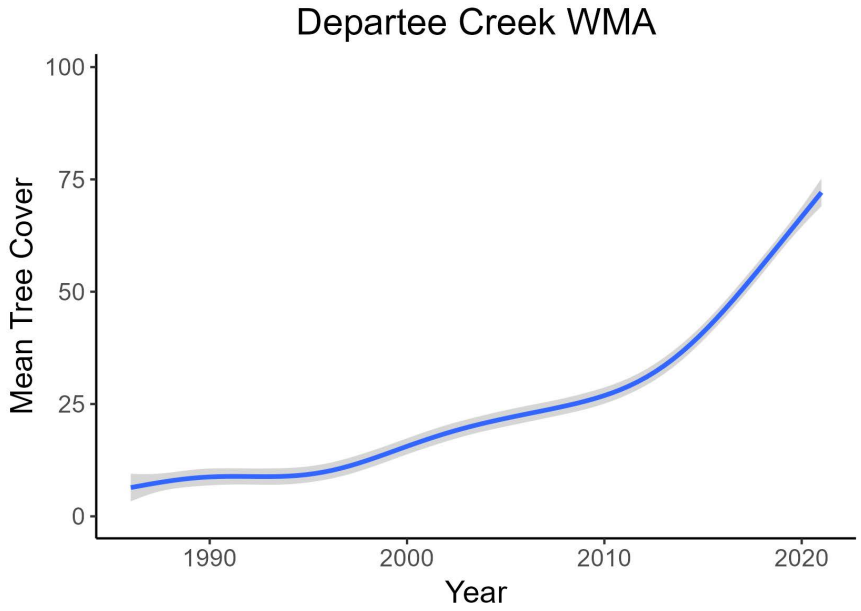

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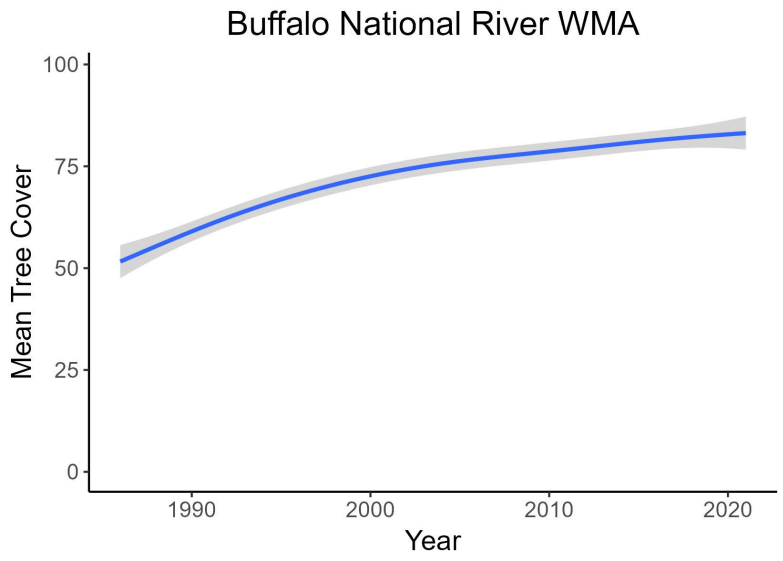

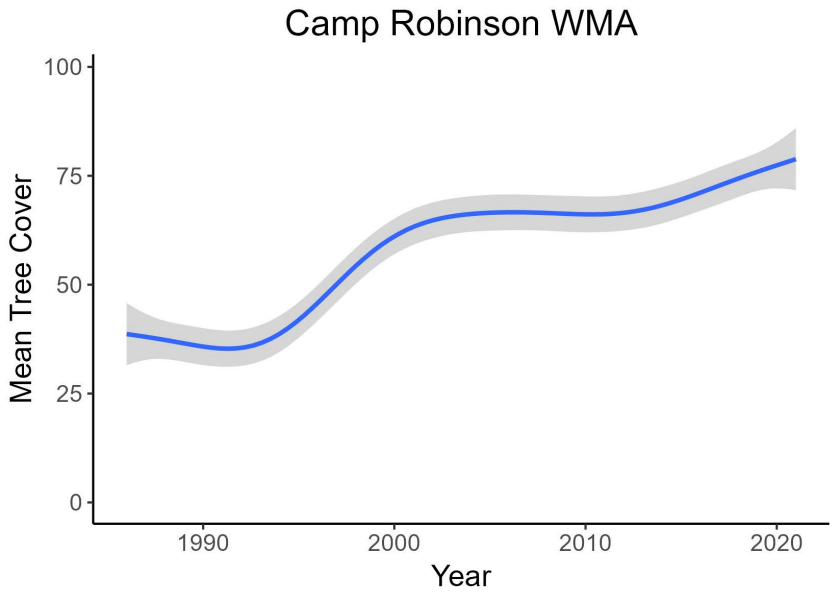

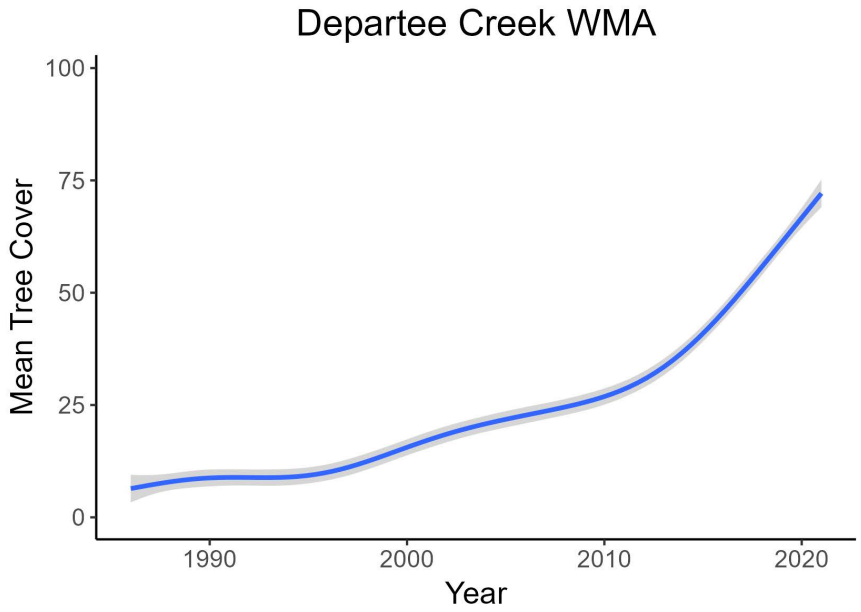

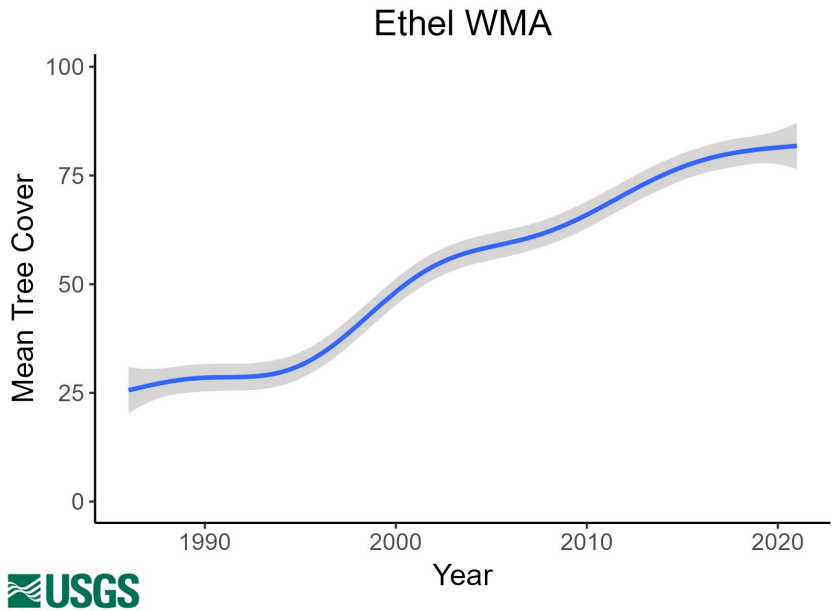

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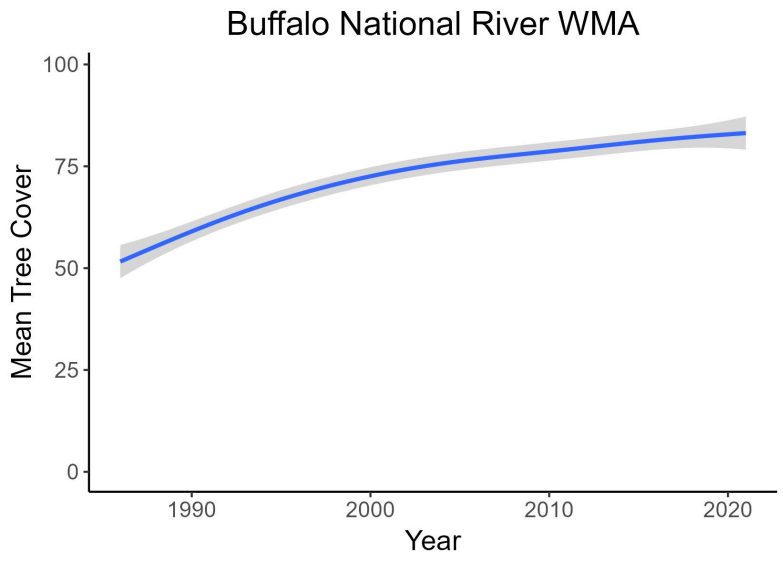

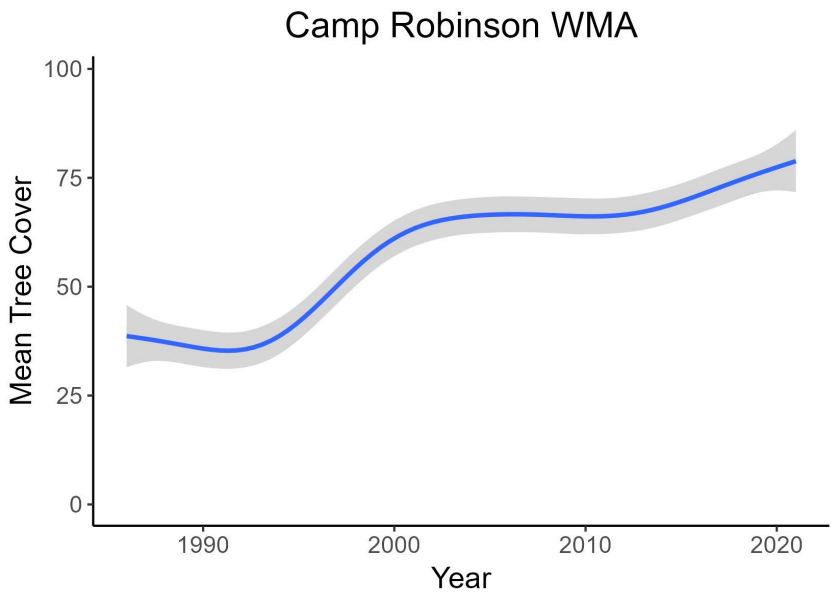

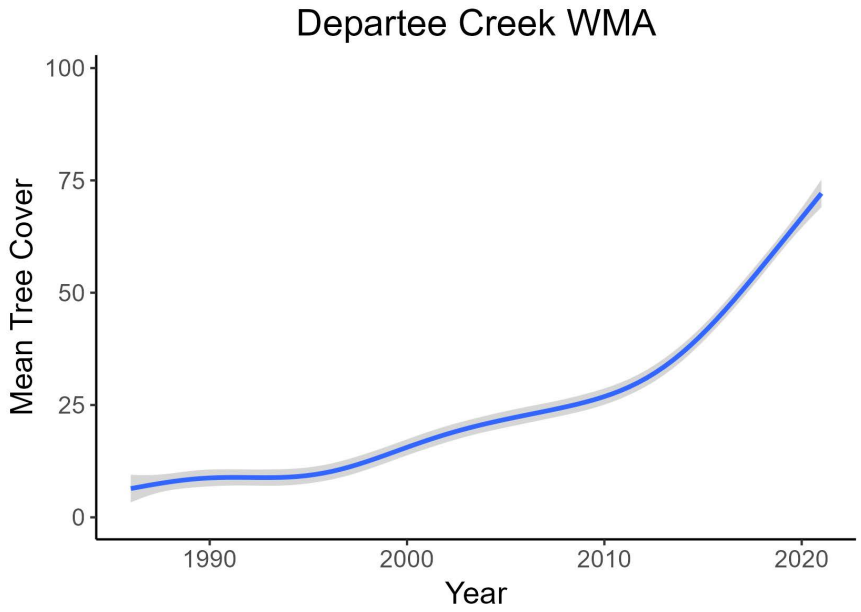

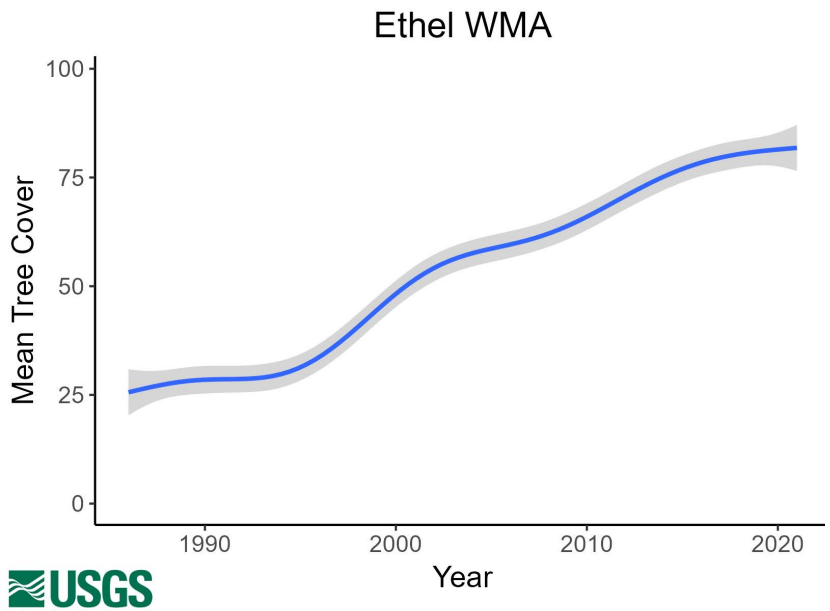

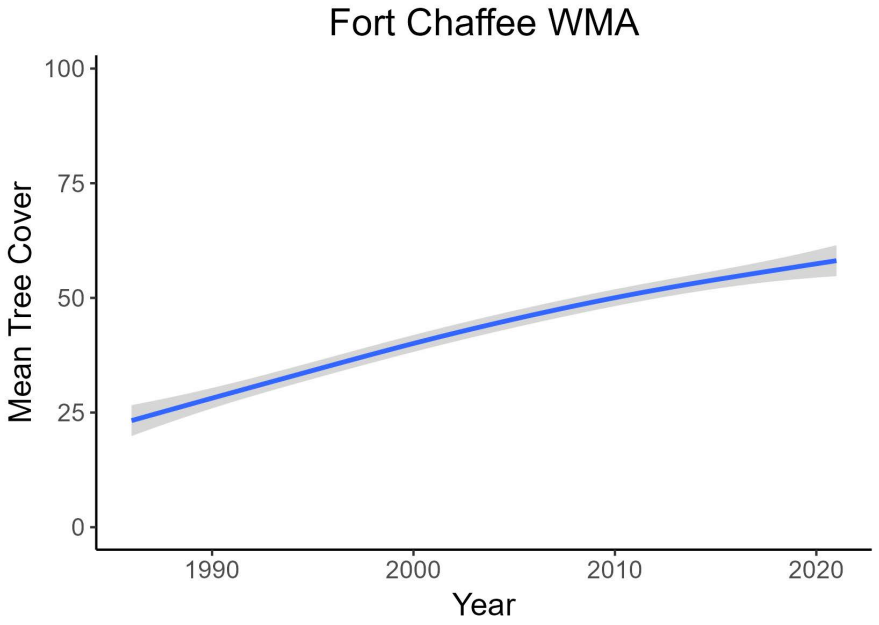

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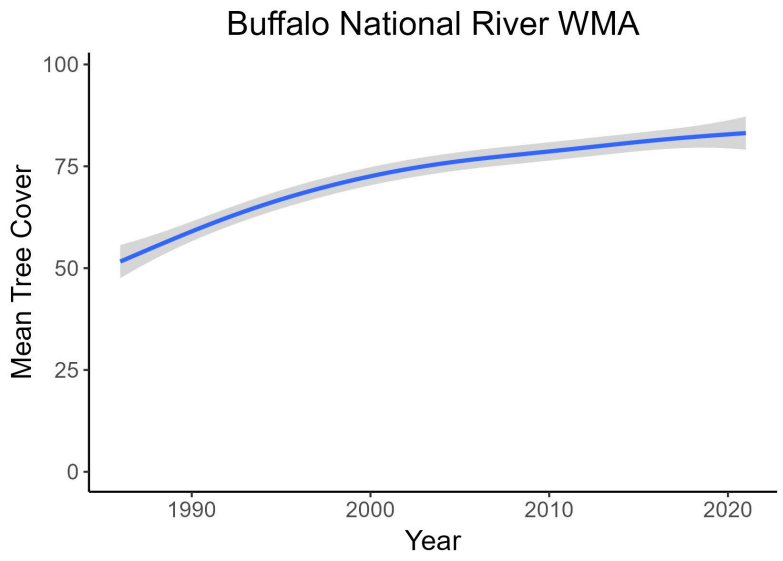

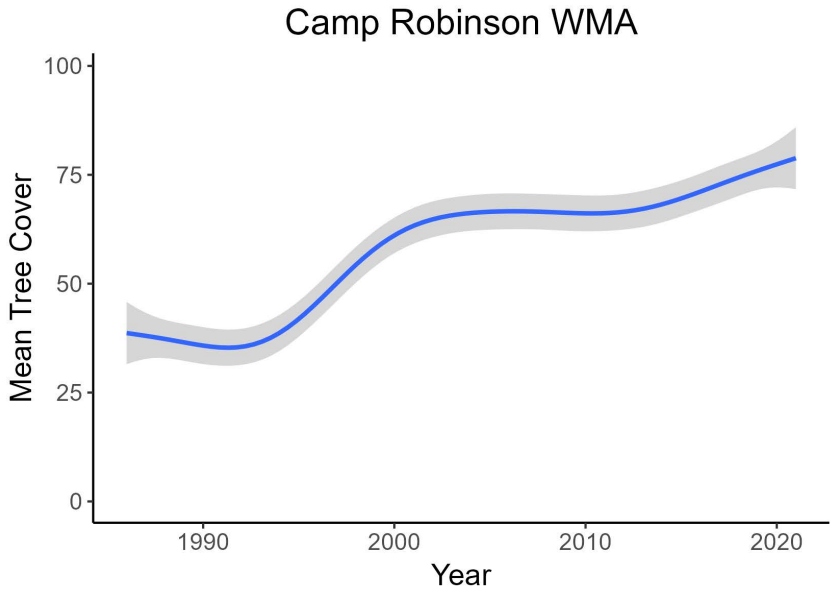

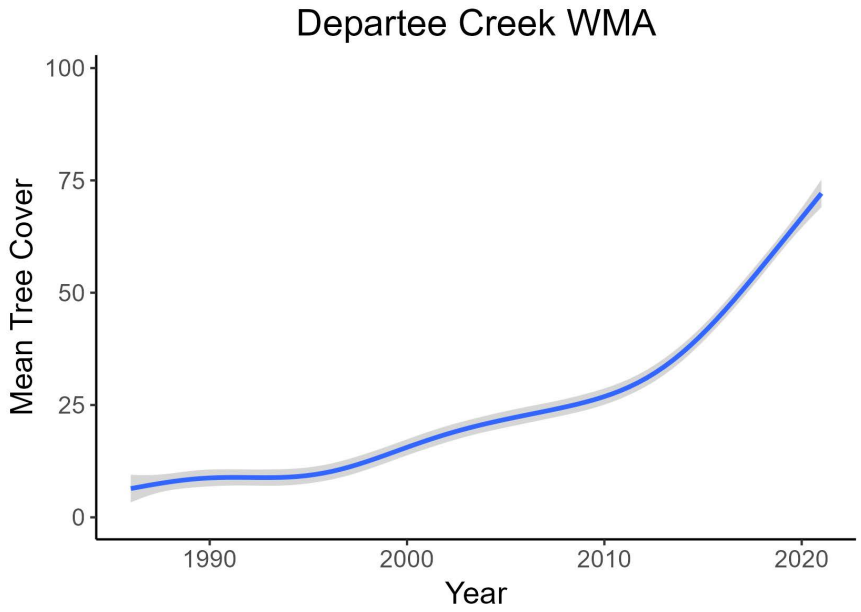

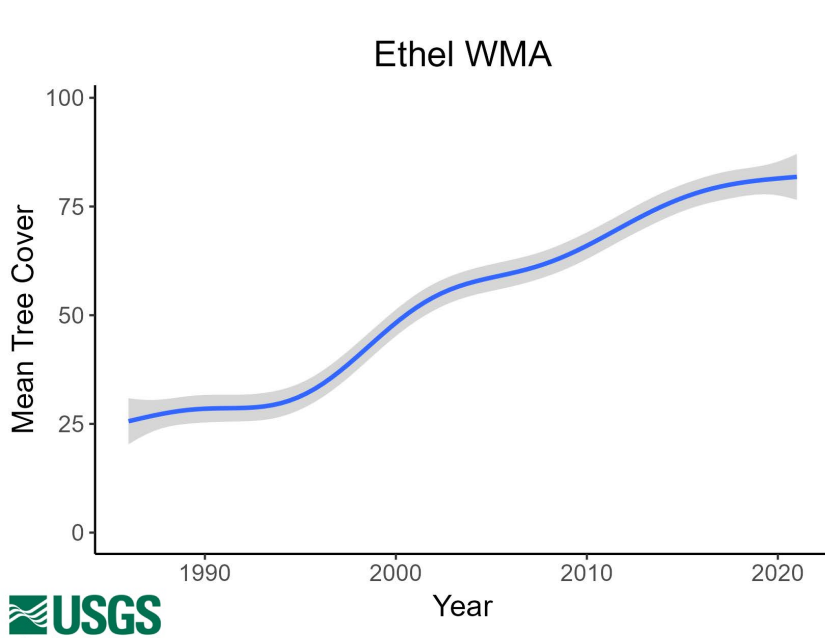

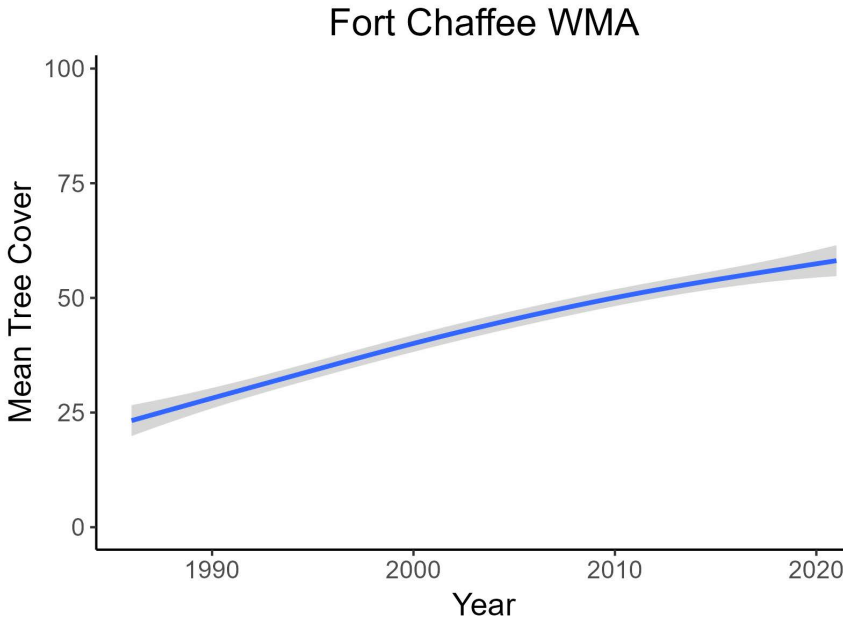

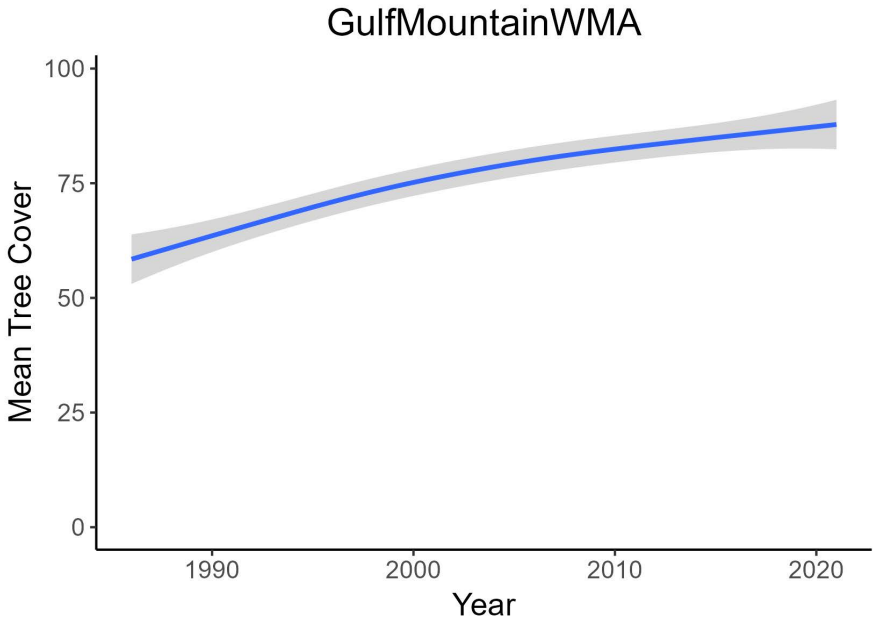

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Strategy that scales: Finding and defending the core

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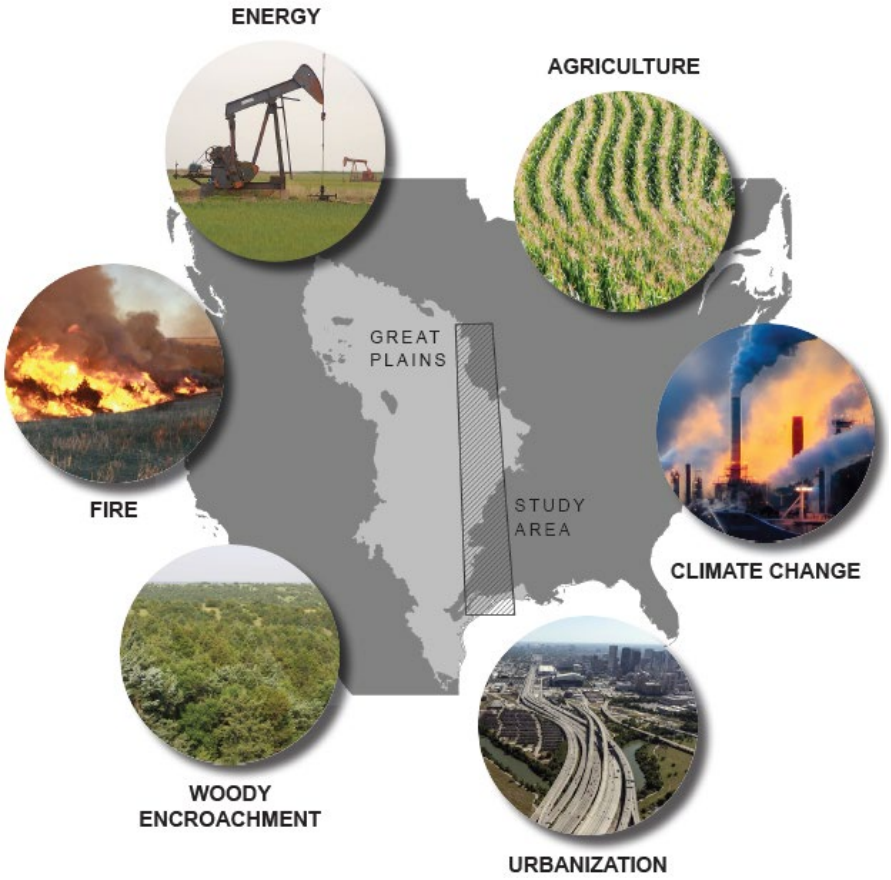
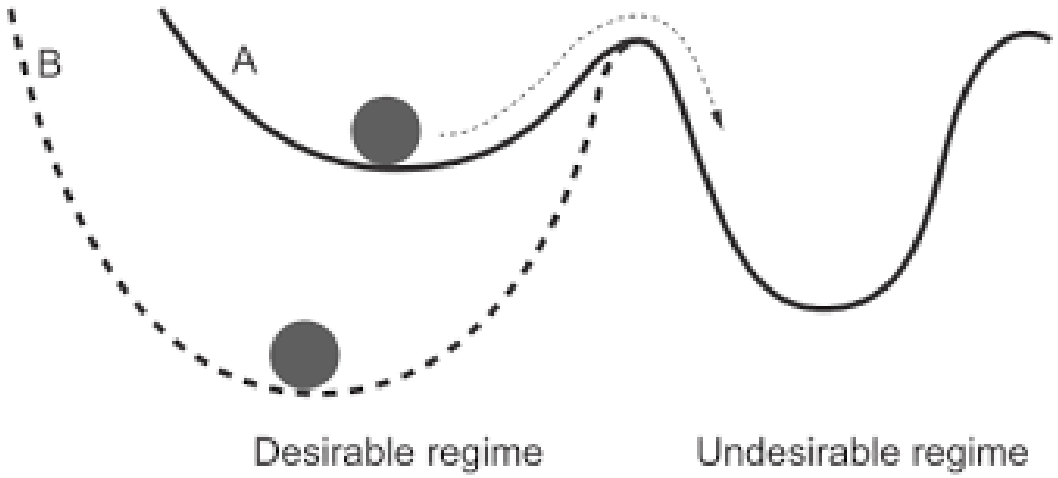
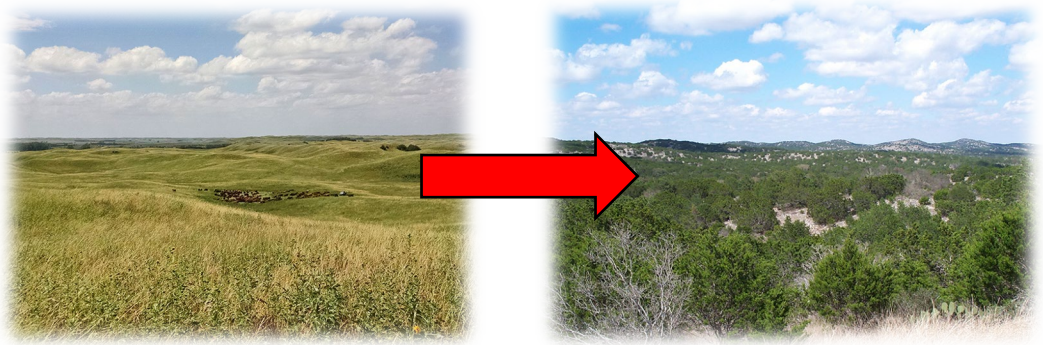
Crash course in spatial regimes theory







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Liao 2012; Roberts et al. 2019; Photo credits: Christine Chitwood, Dirac Twidwell

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https://doi.org/10.1038/s41558-019-0517-6
nature climate change

Shifting avian spatial regimes in a changing climate

Caleb P. Roberts[1,2*], Craig R. Allen[2], David G. Angeler[3,4] and Dirac Twidwell[1]

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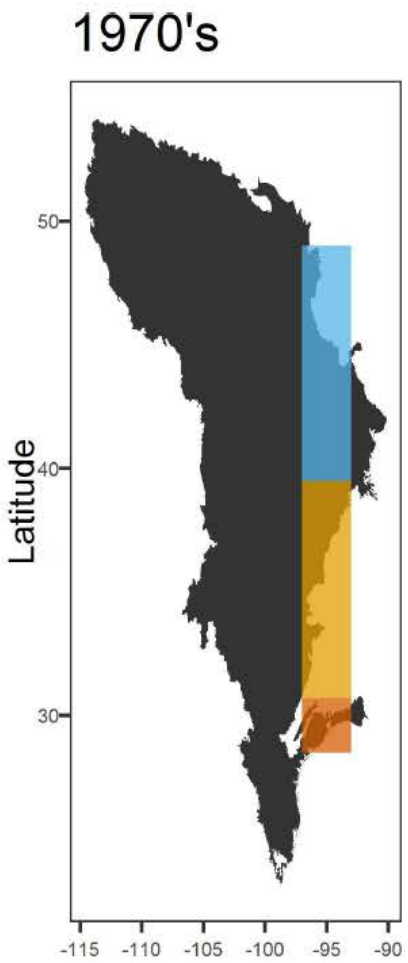
Bird regimes moved northward >500 km in 46 years.



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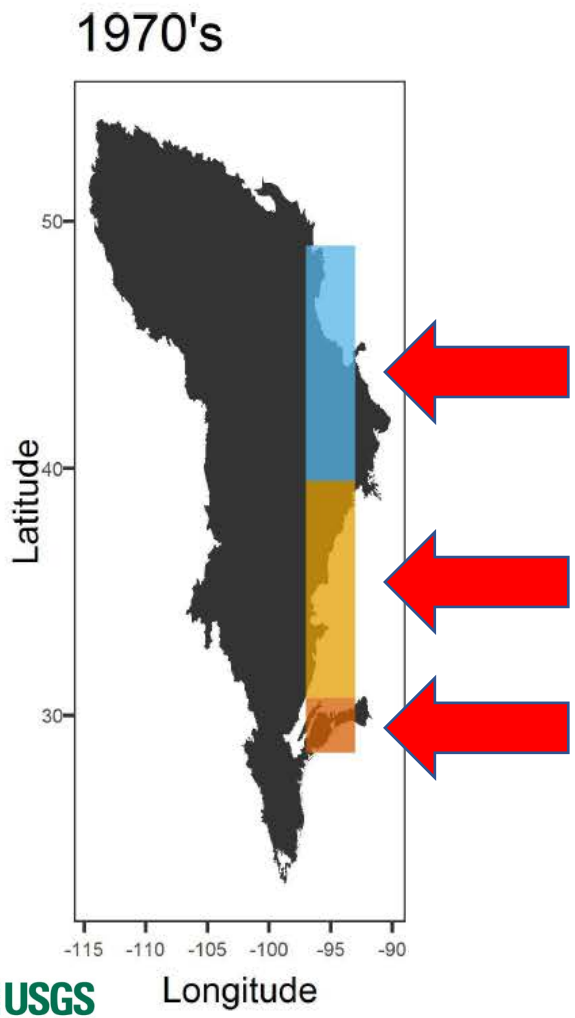

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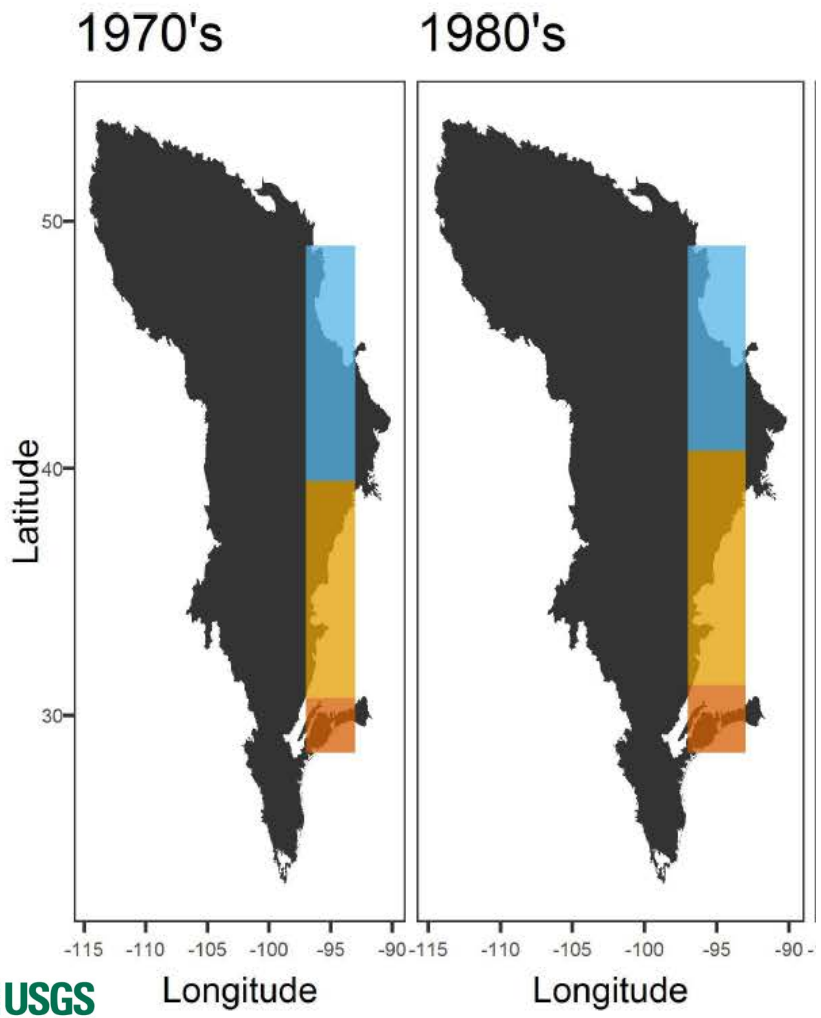

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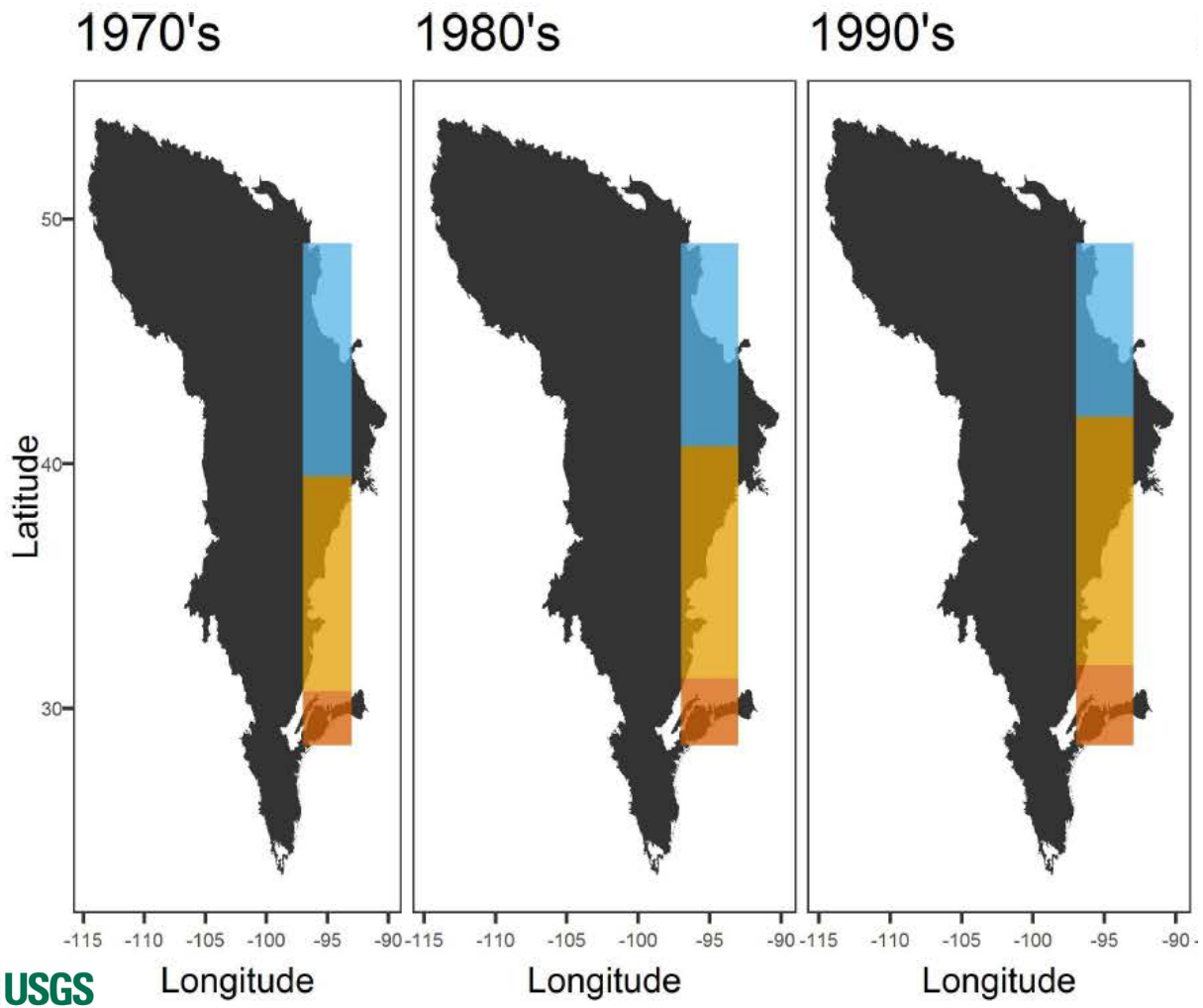

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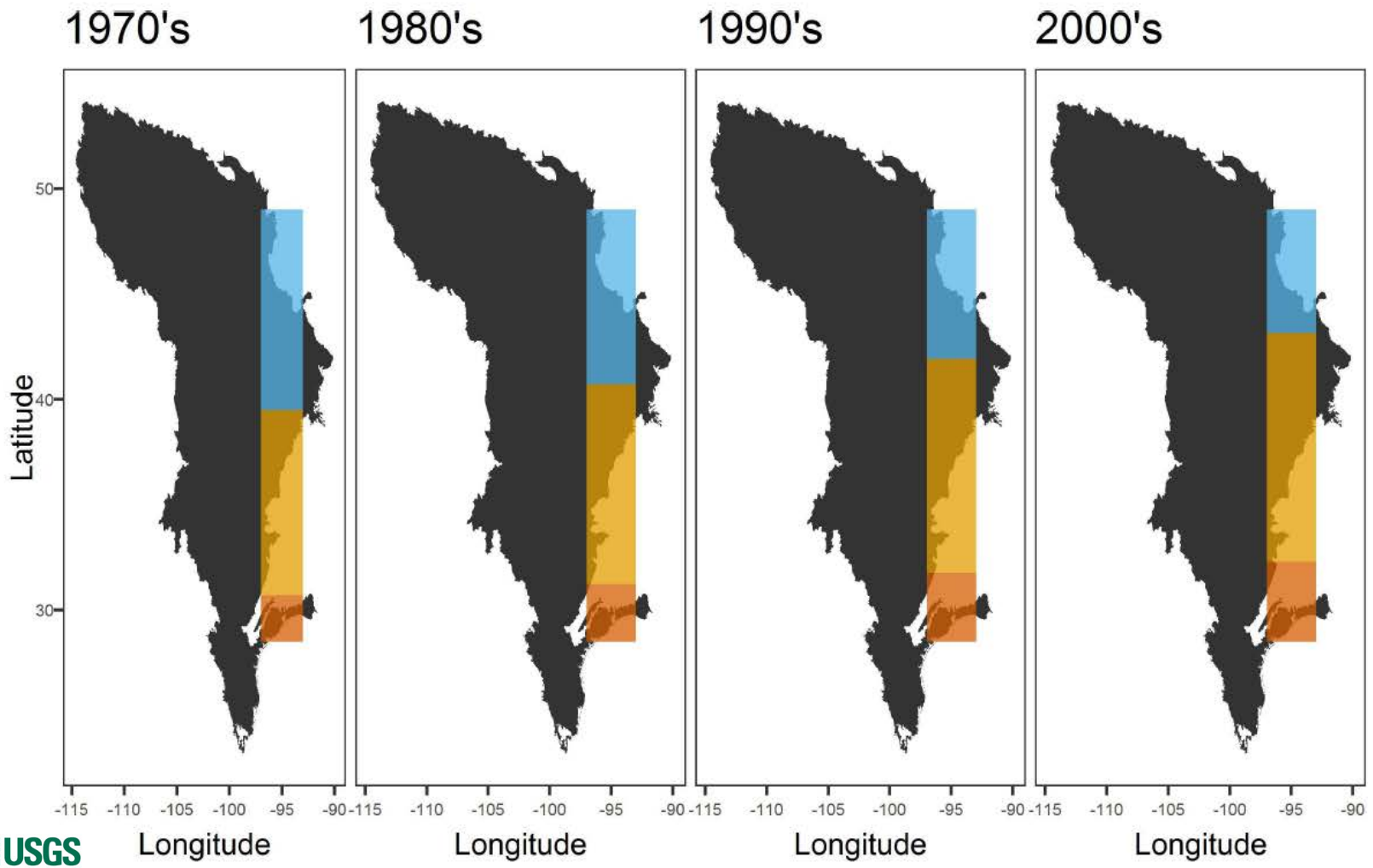

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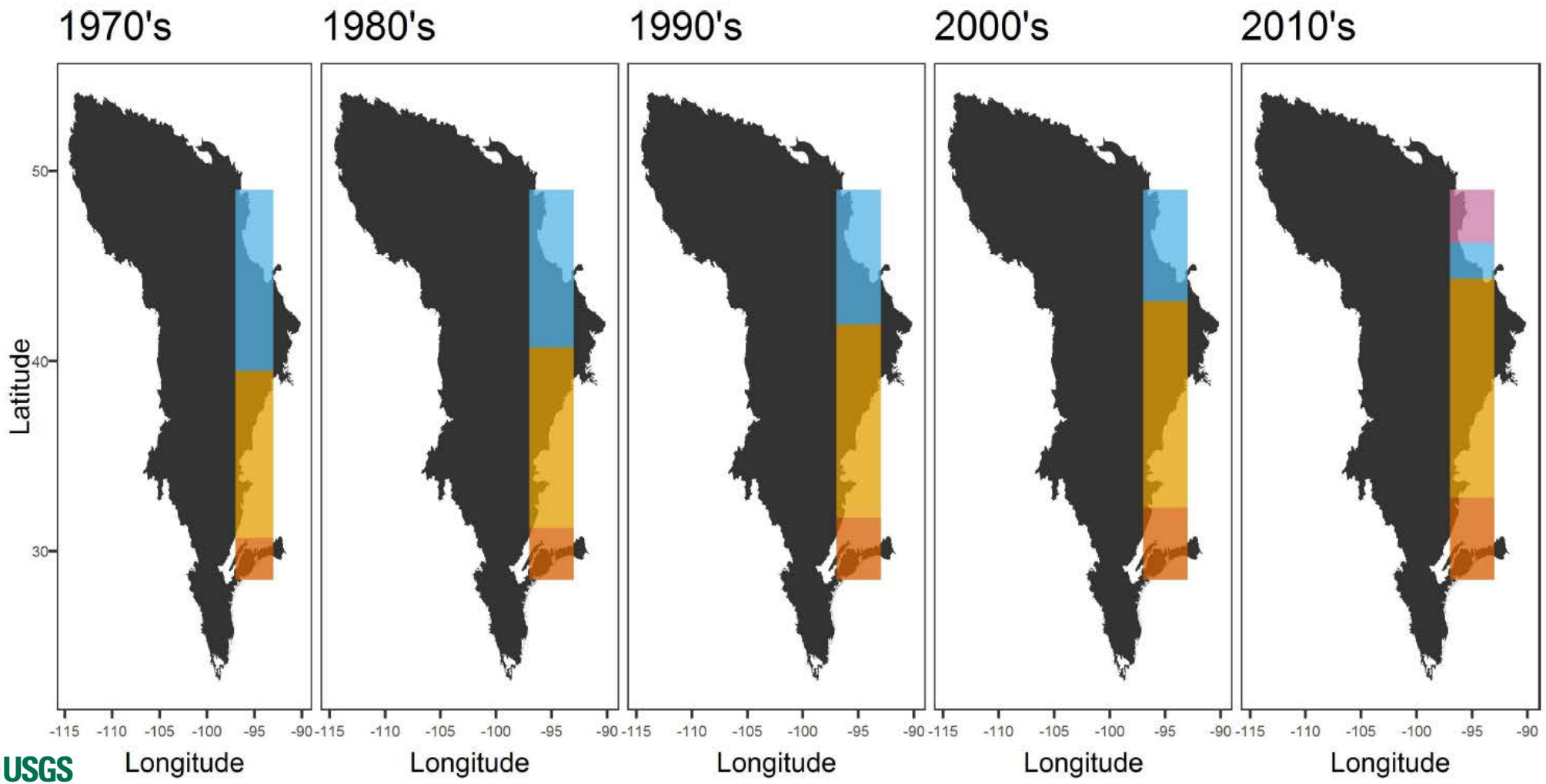

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Regime shifts exhibit strong spatial order.

Shifting avian spatial regimes in a changing climate

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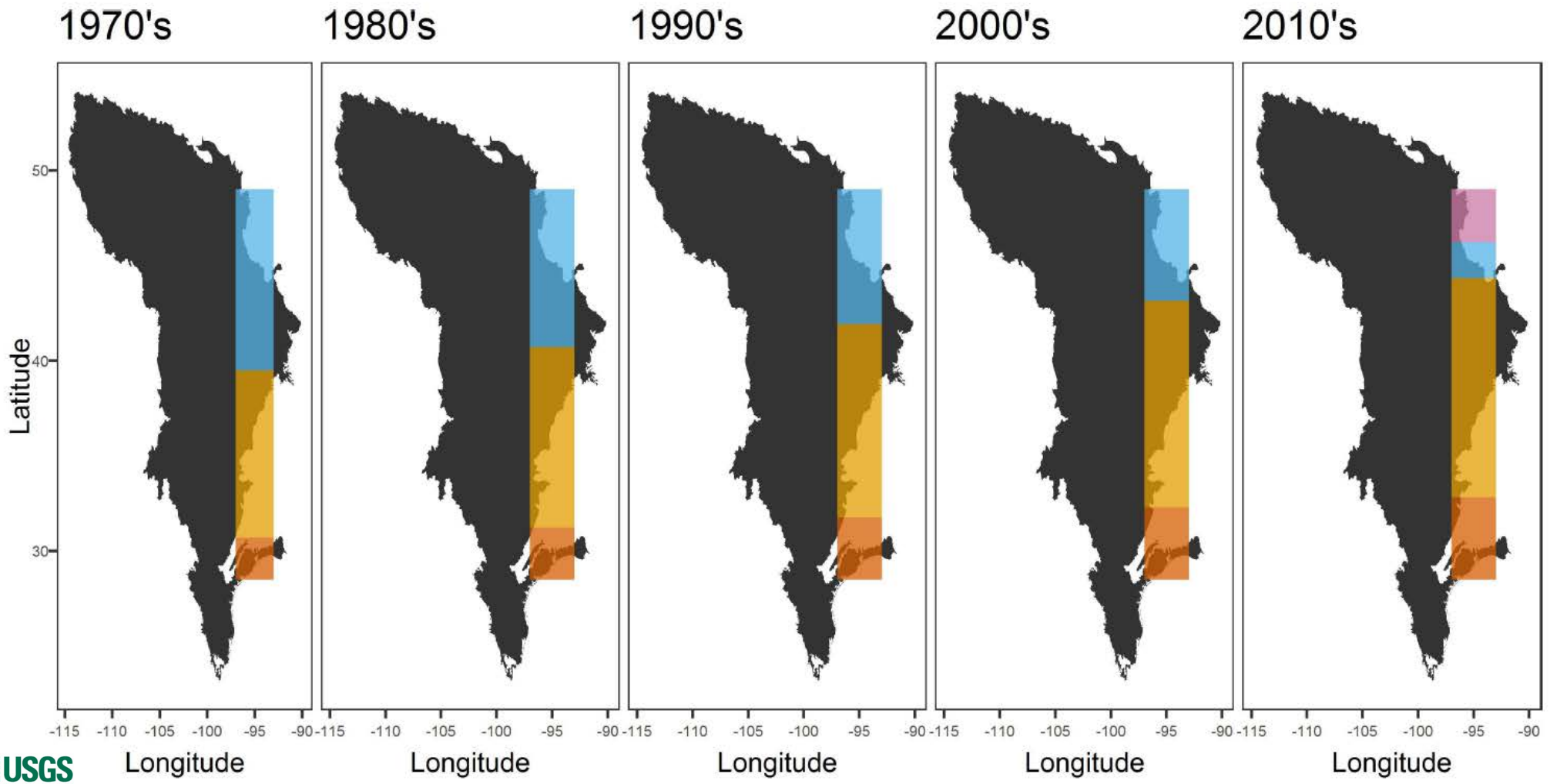

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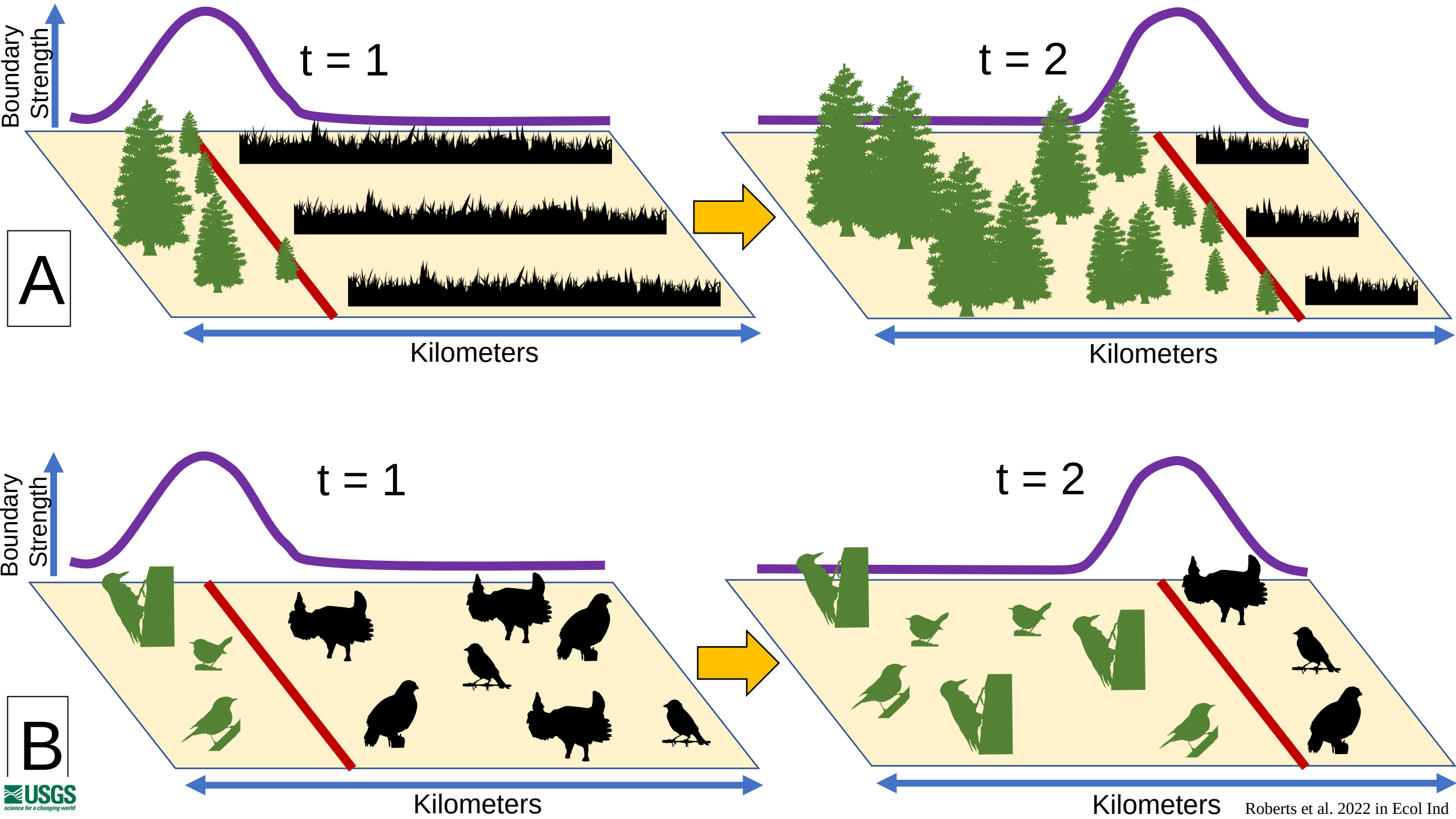
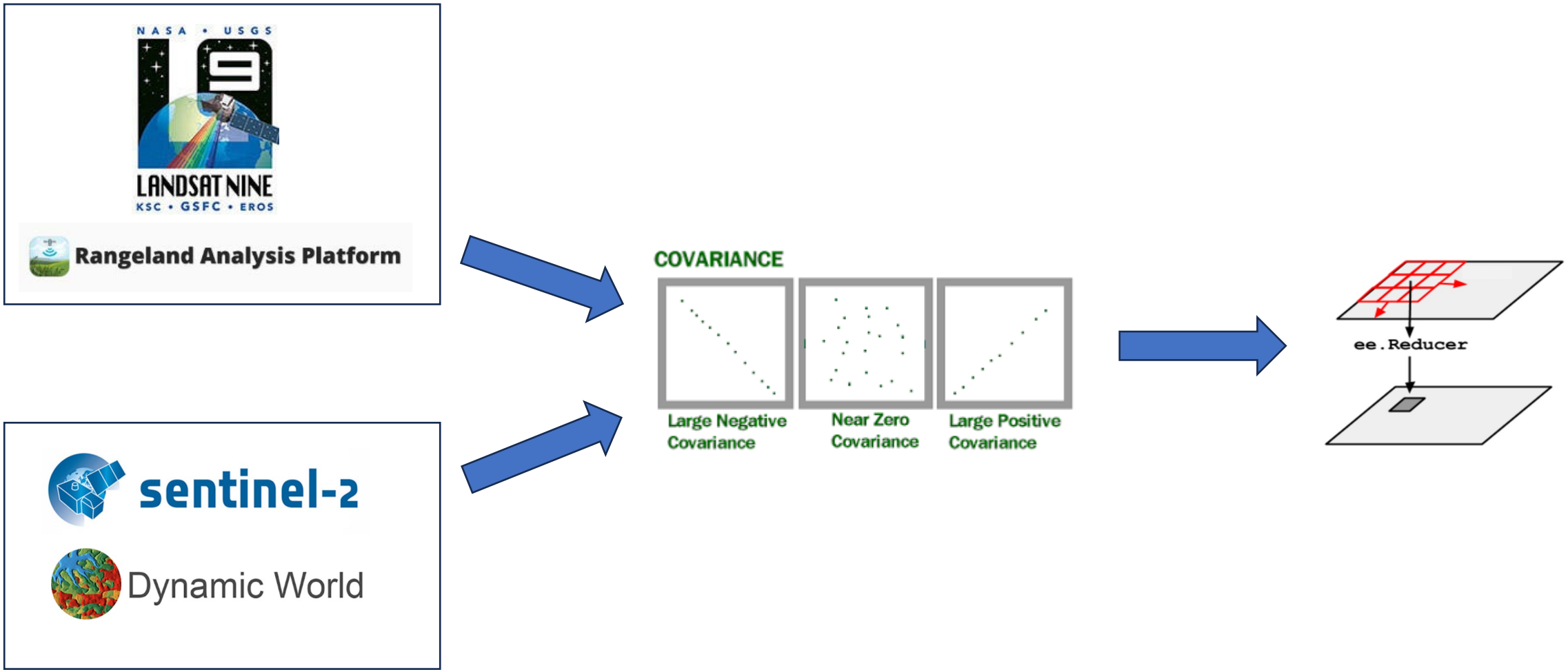


Roberts et al. 2022 in Ecol Ind

Spatial covariance: a tool for finding cores



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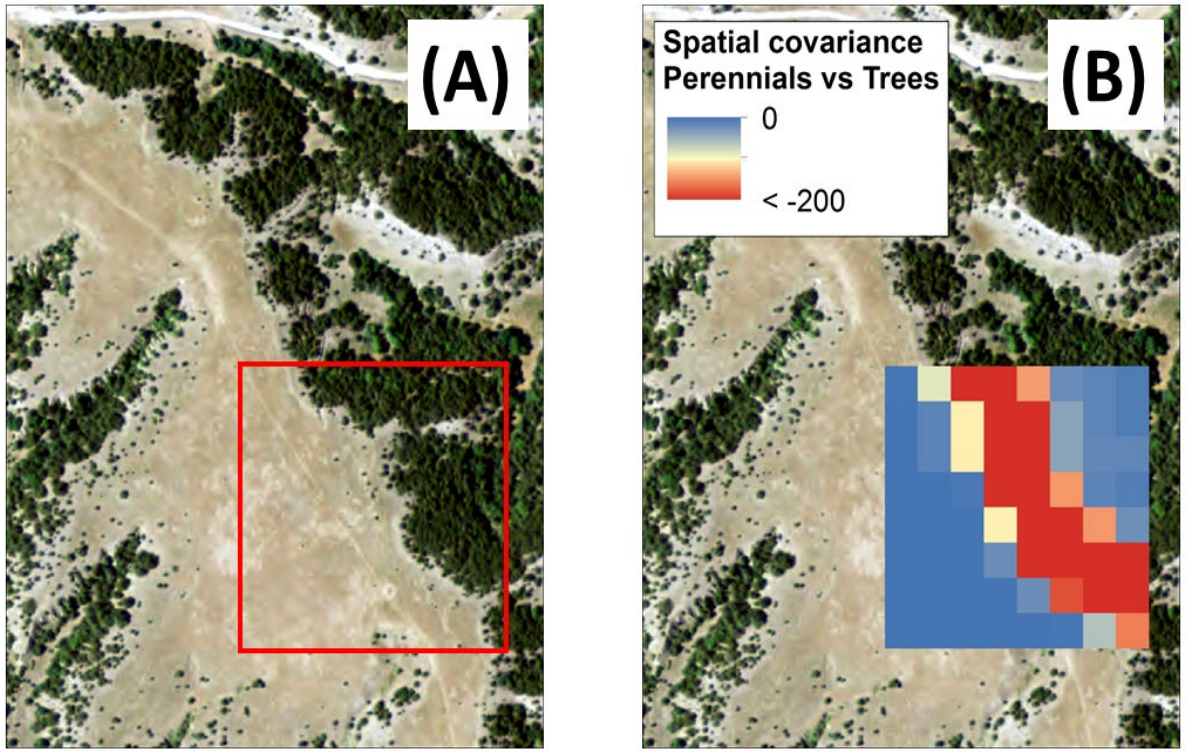

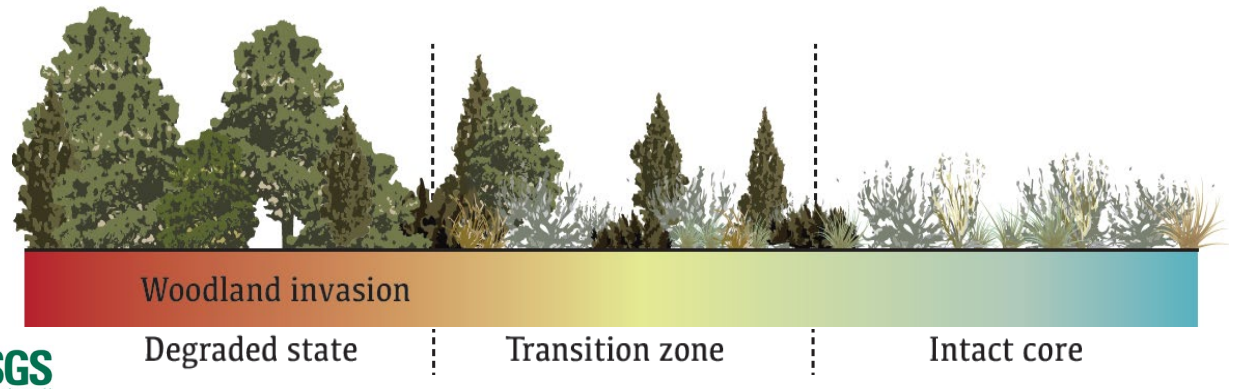

USGS science for a changing world

Uden et al. 2019

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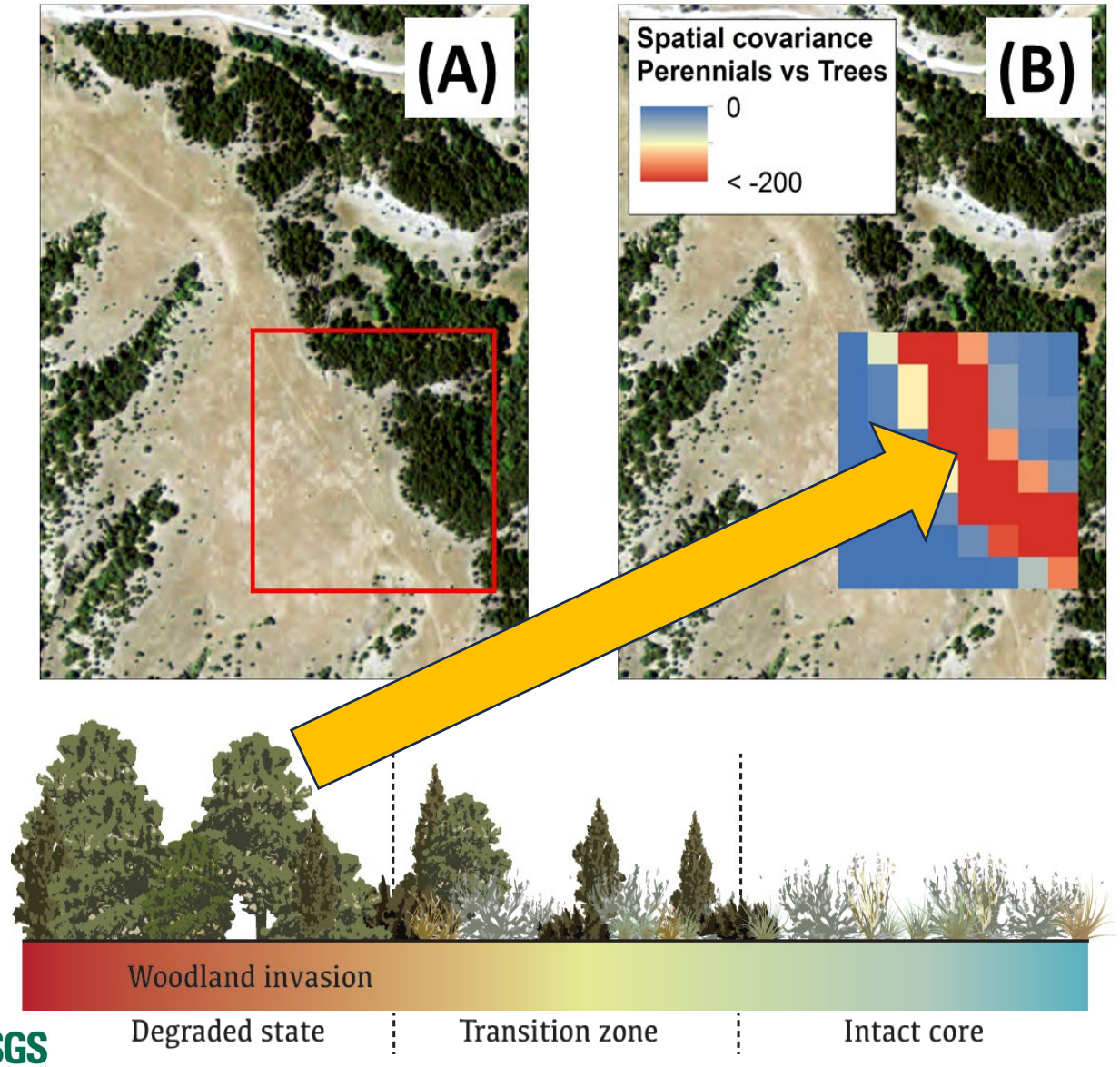

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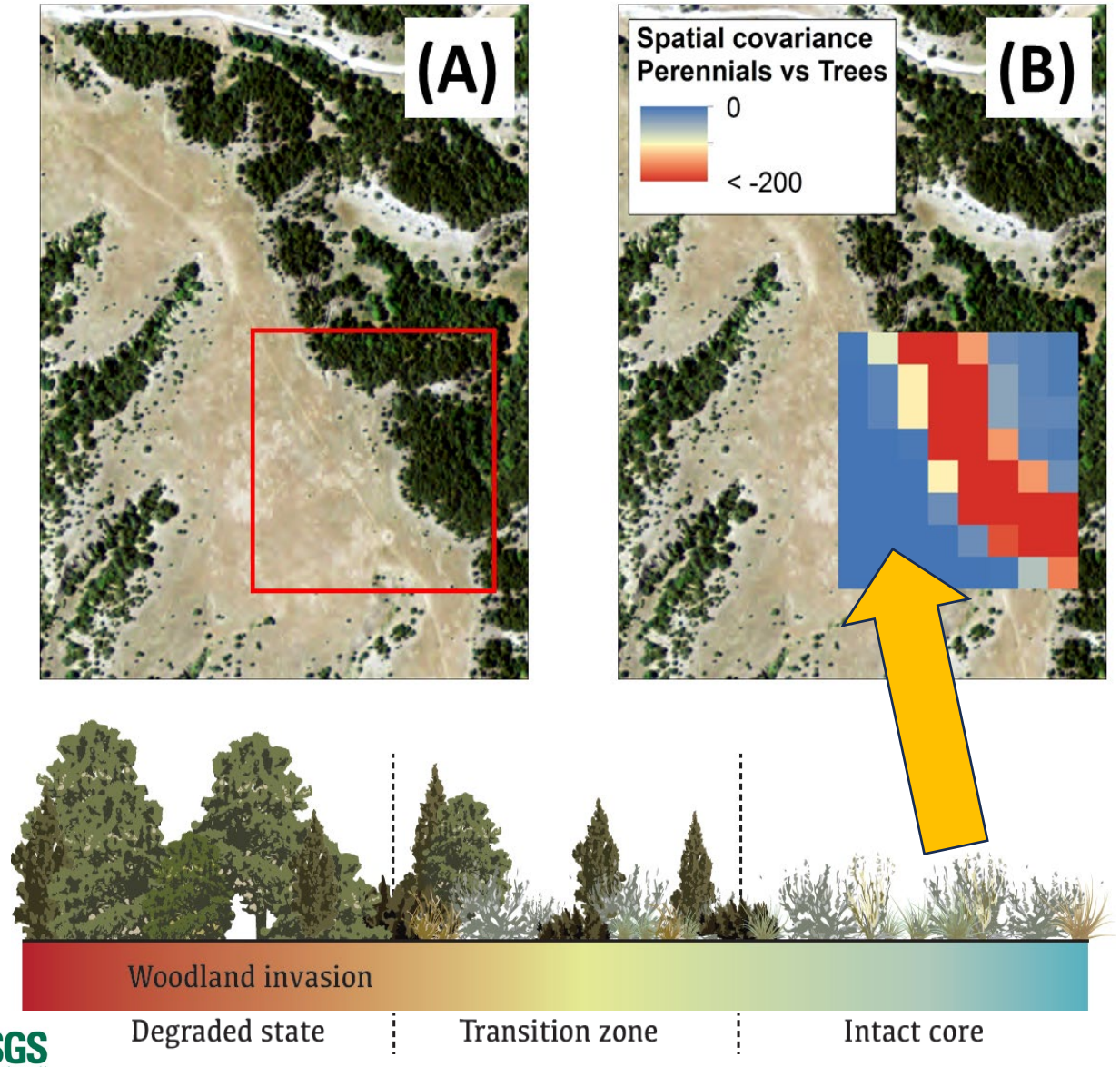
Spatial covariance



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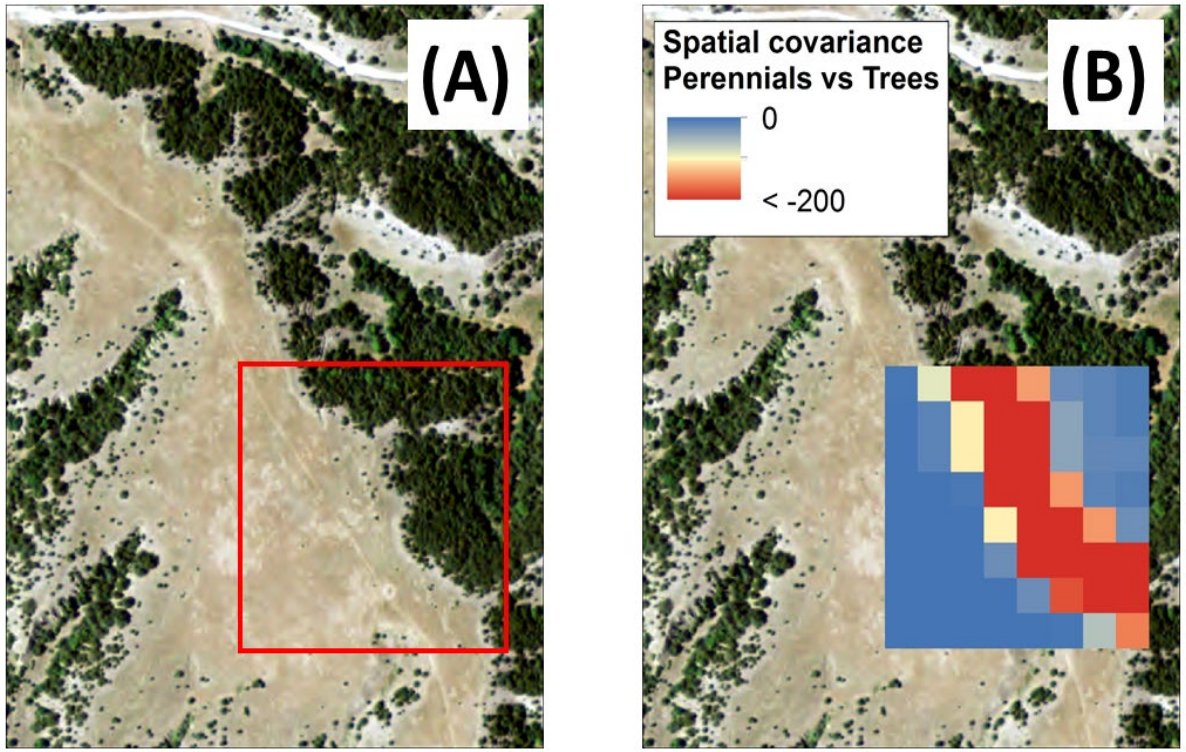
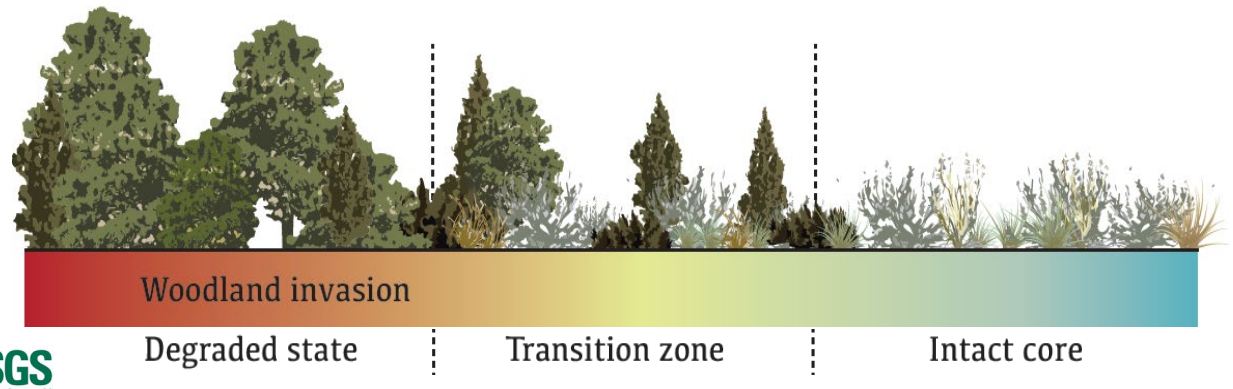
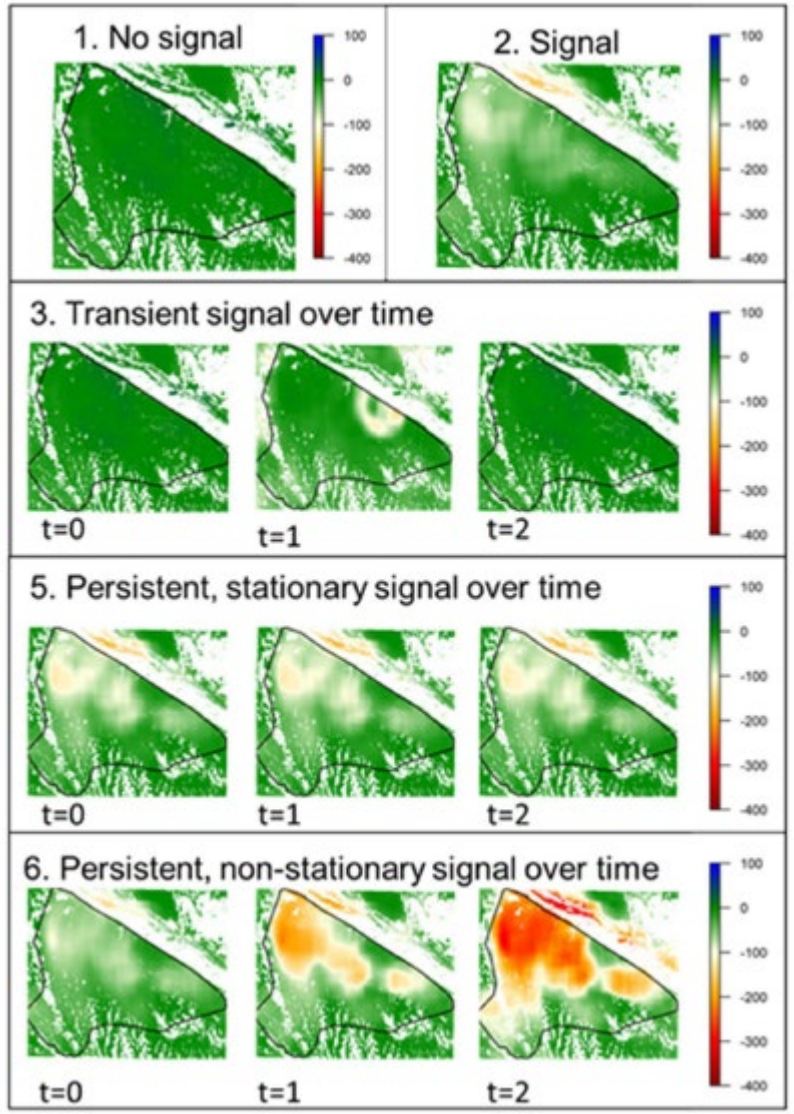
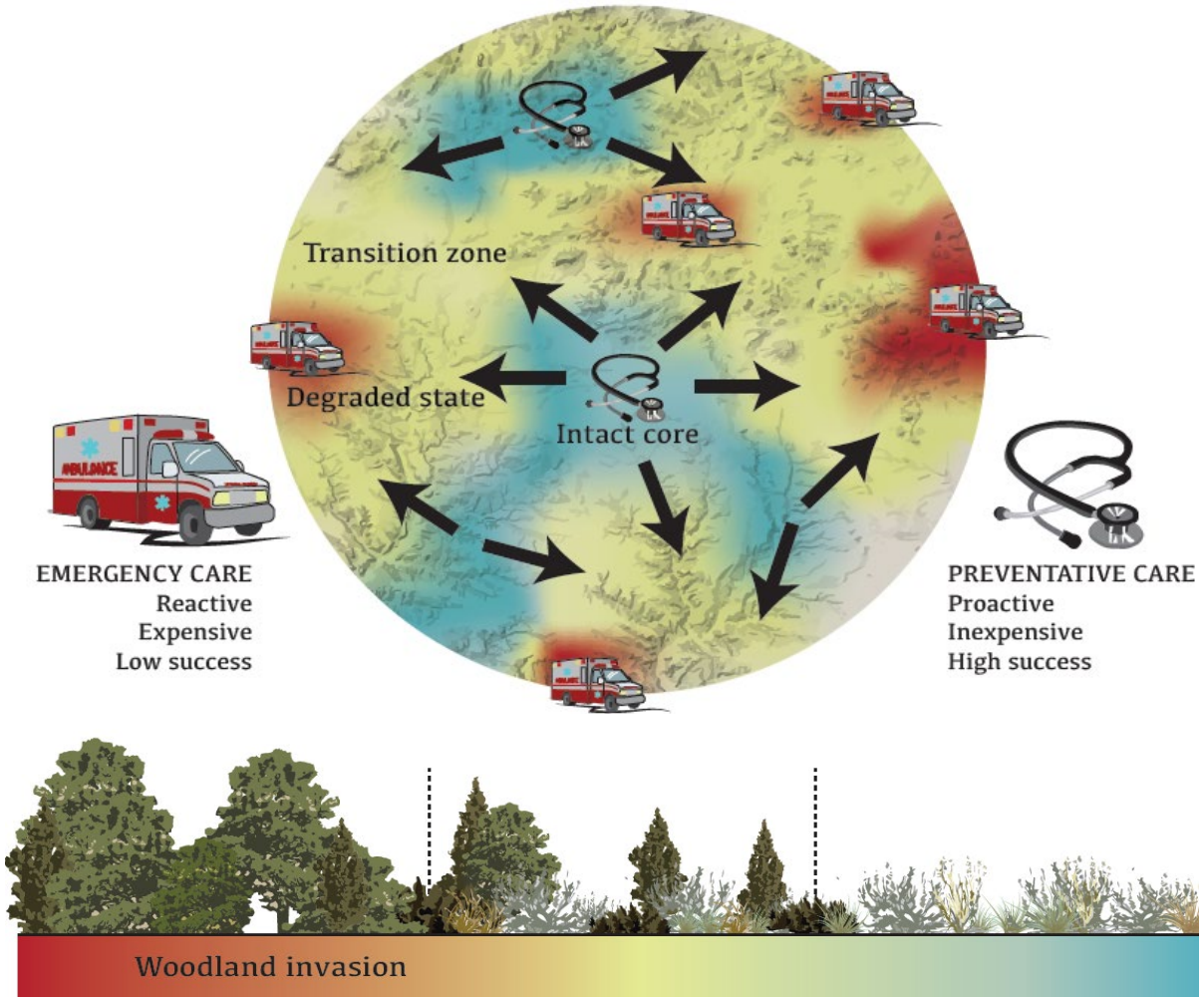




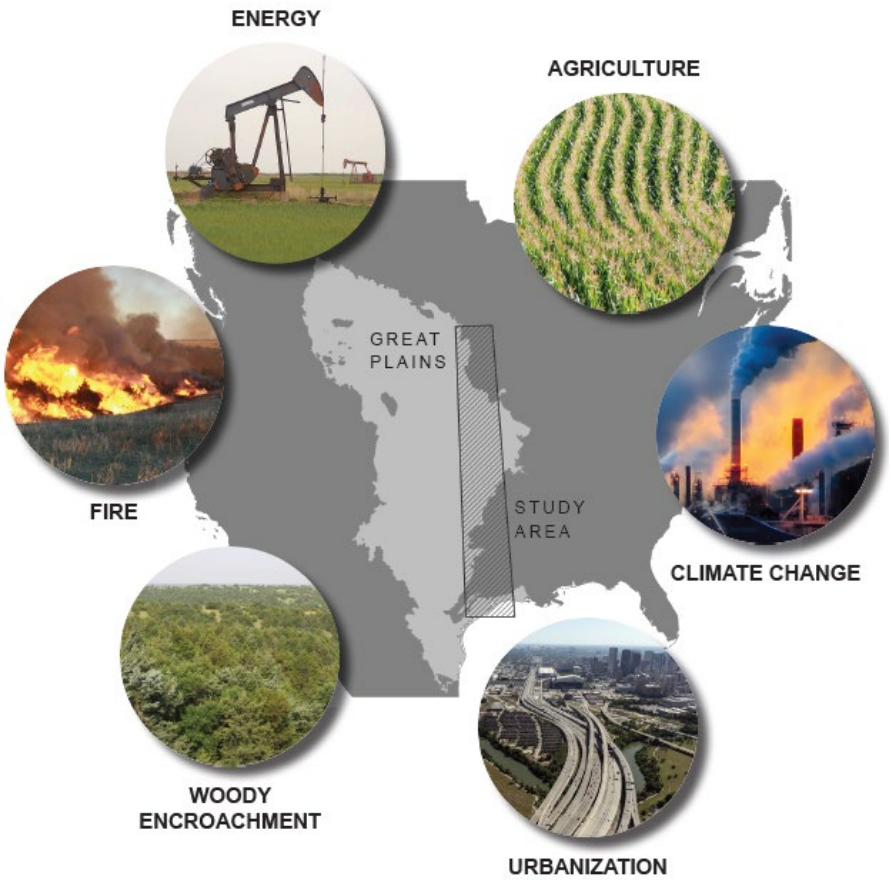


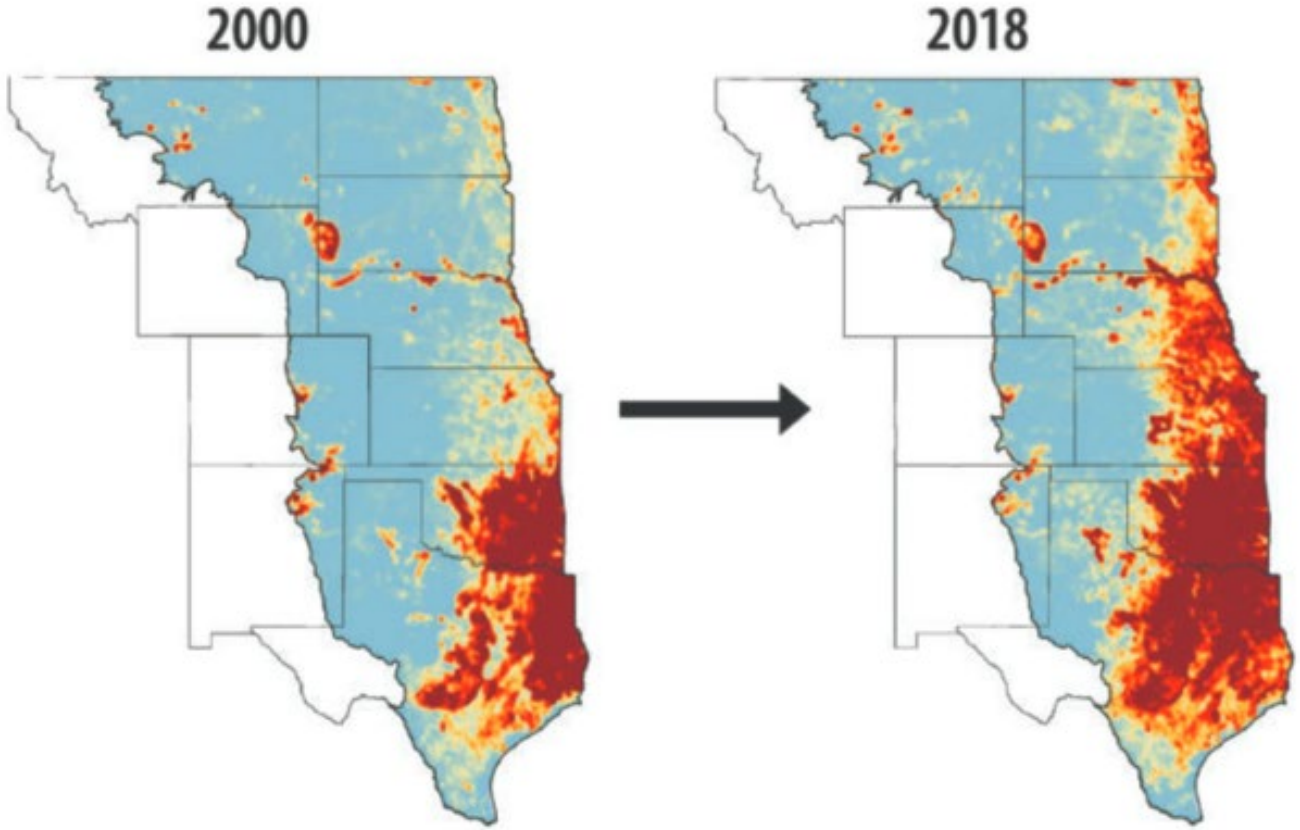
Uden et al. 2019

Strategy that scales: Finding and defending the core



Maestas et al. 2022; Working Lands for Wildlife; NRCS





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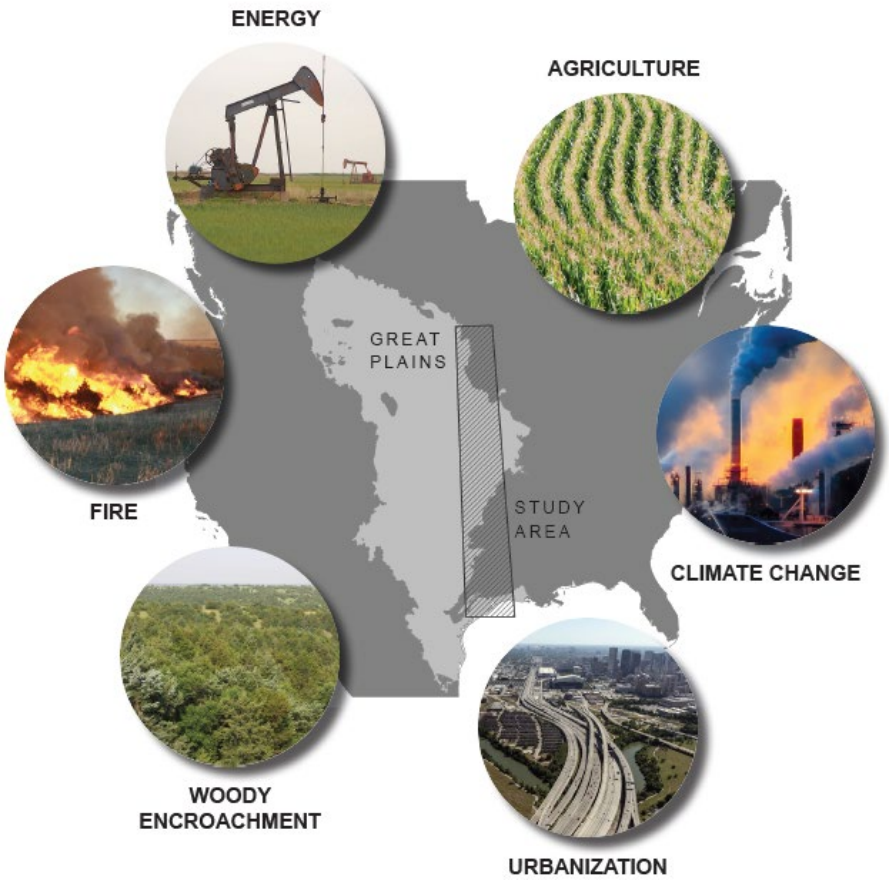
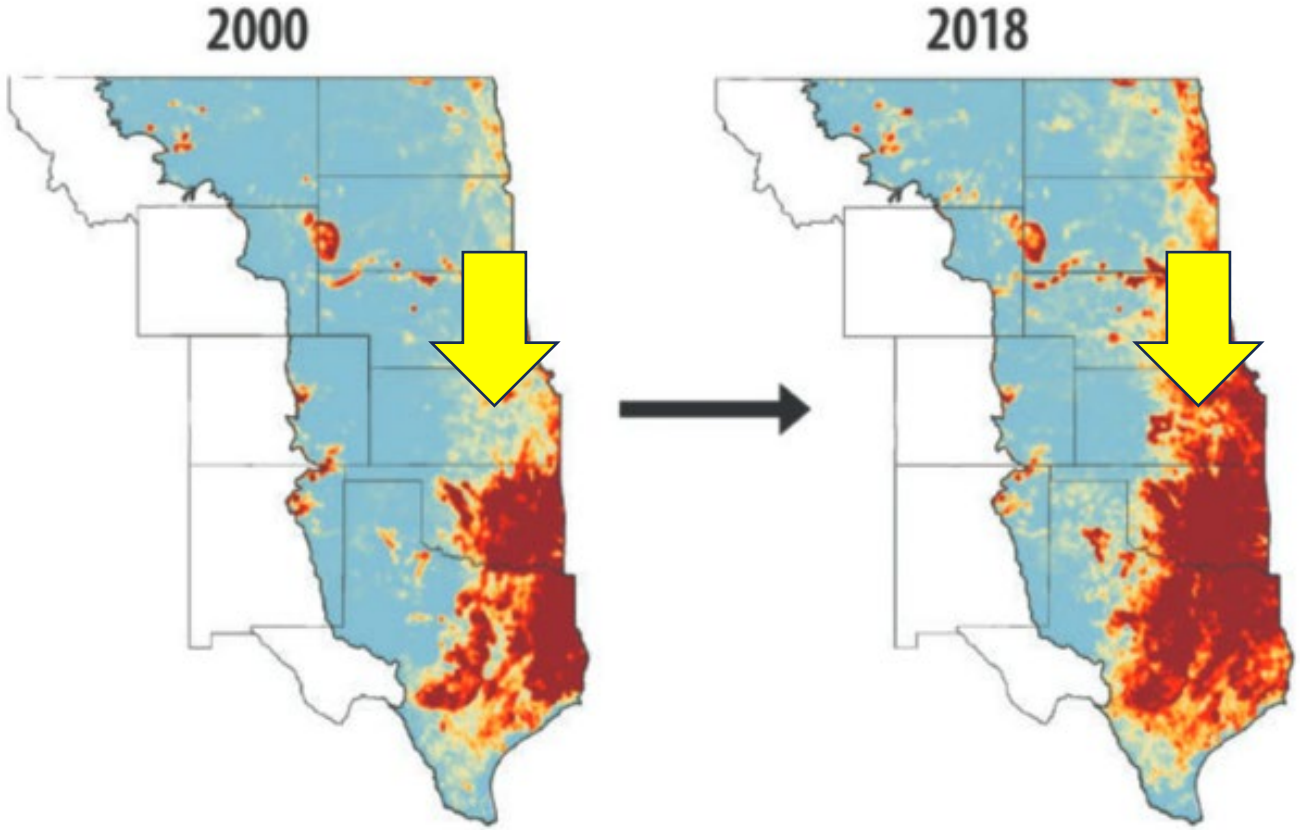
Uden et al. 2019; USDA NRCS 2021





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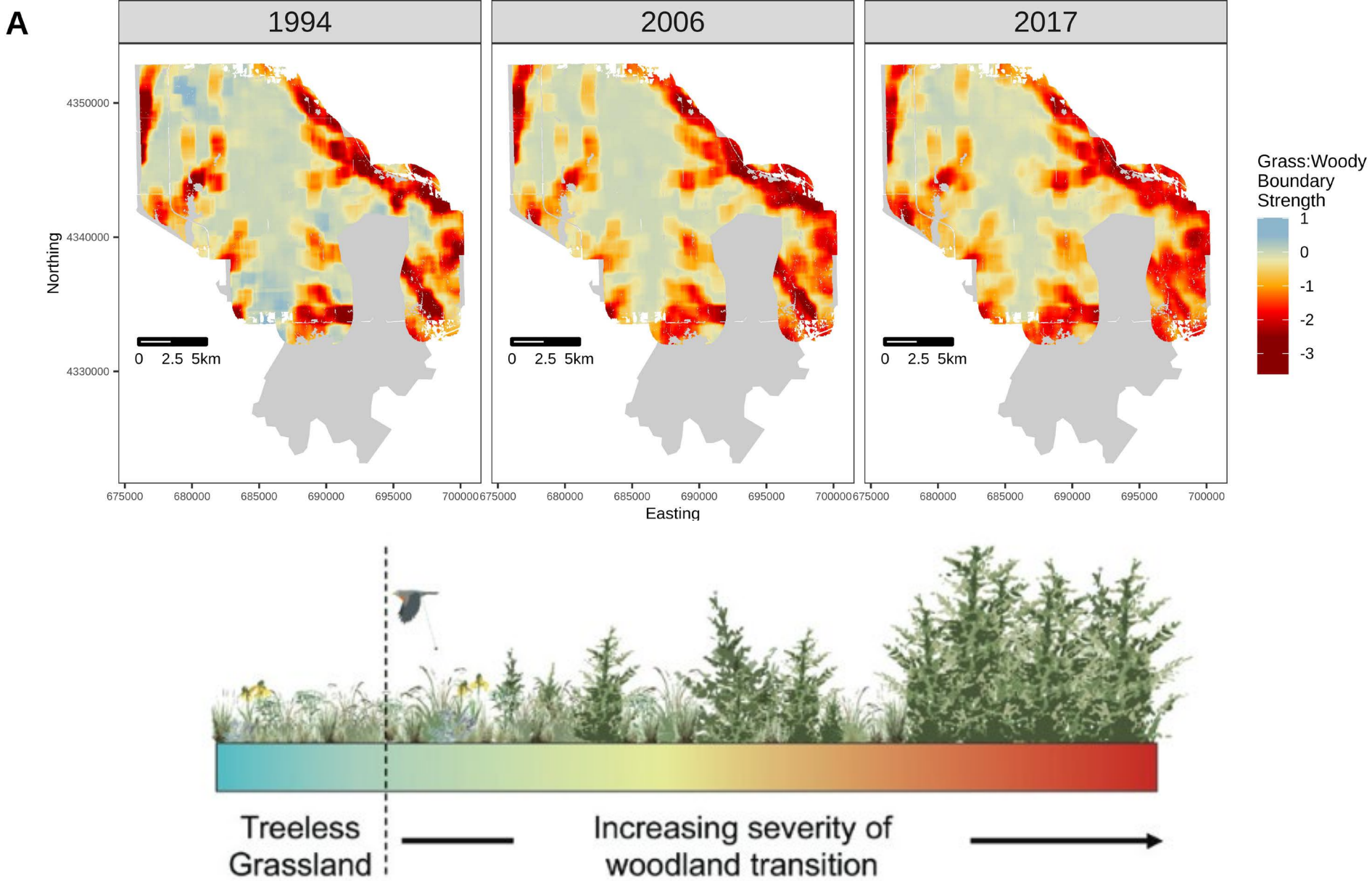
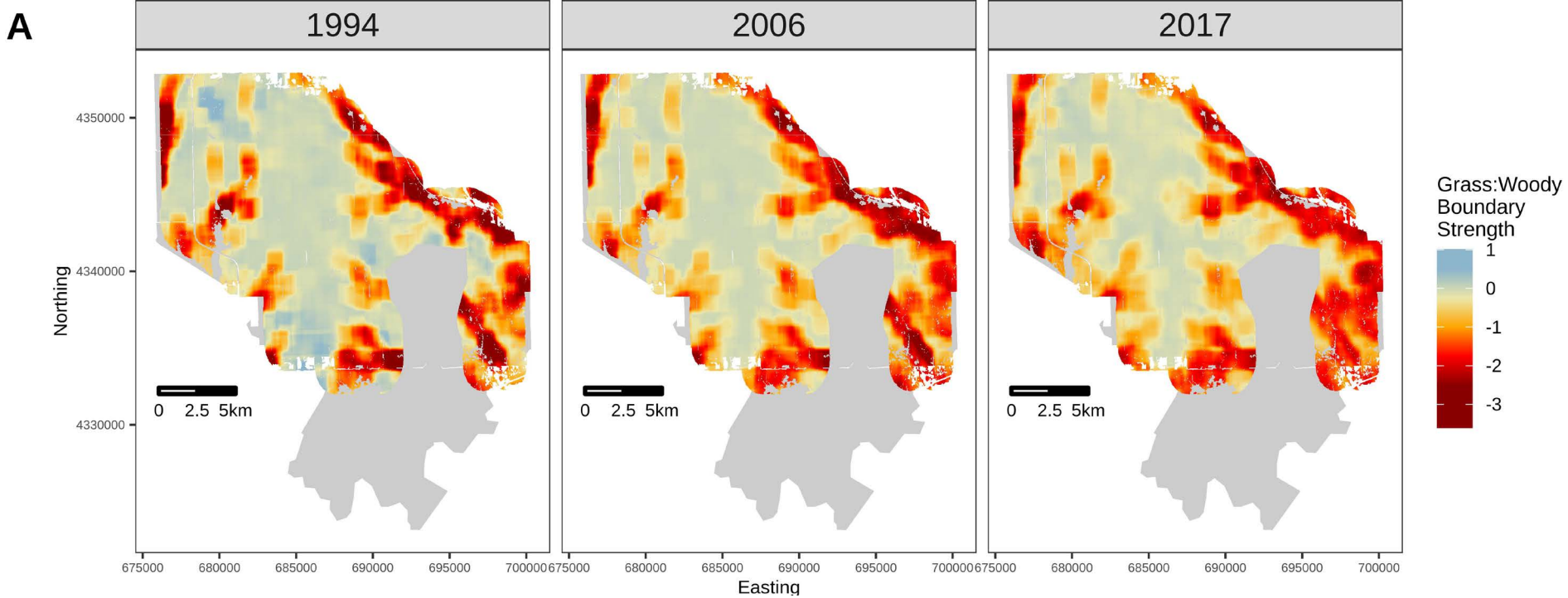


Roberts et al. 2022 in Eco Apps; Photo credit: USFWS Mountain Prairie

Greater Prairie-Chicken



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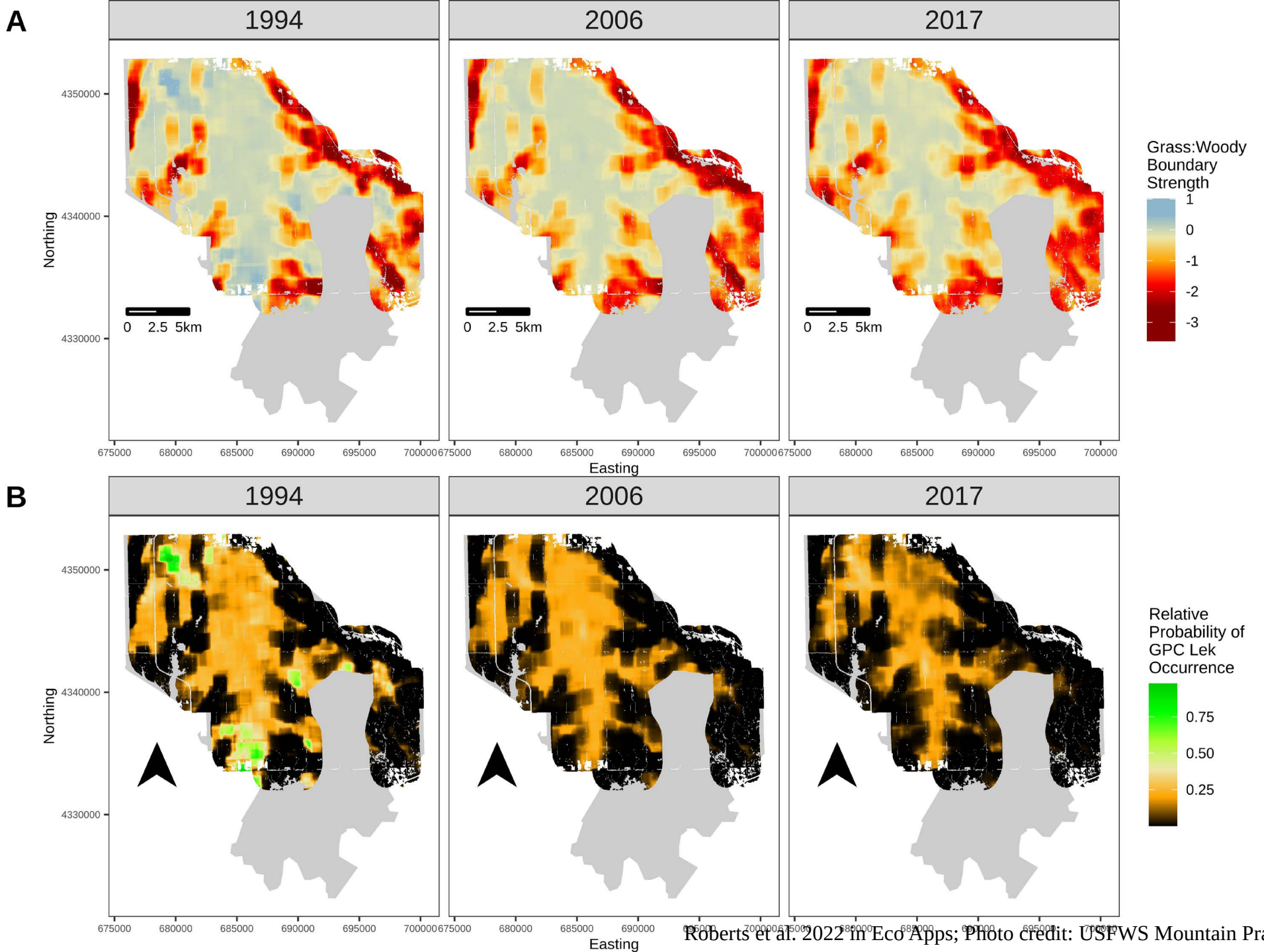

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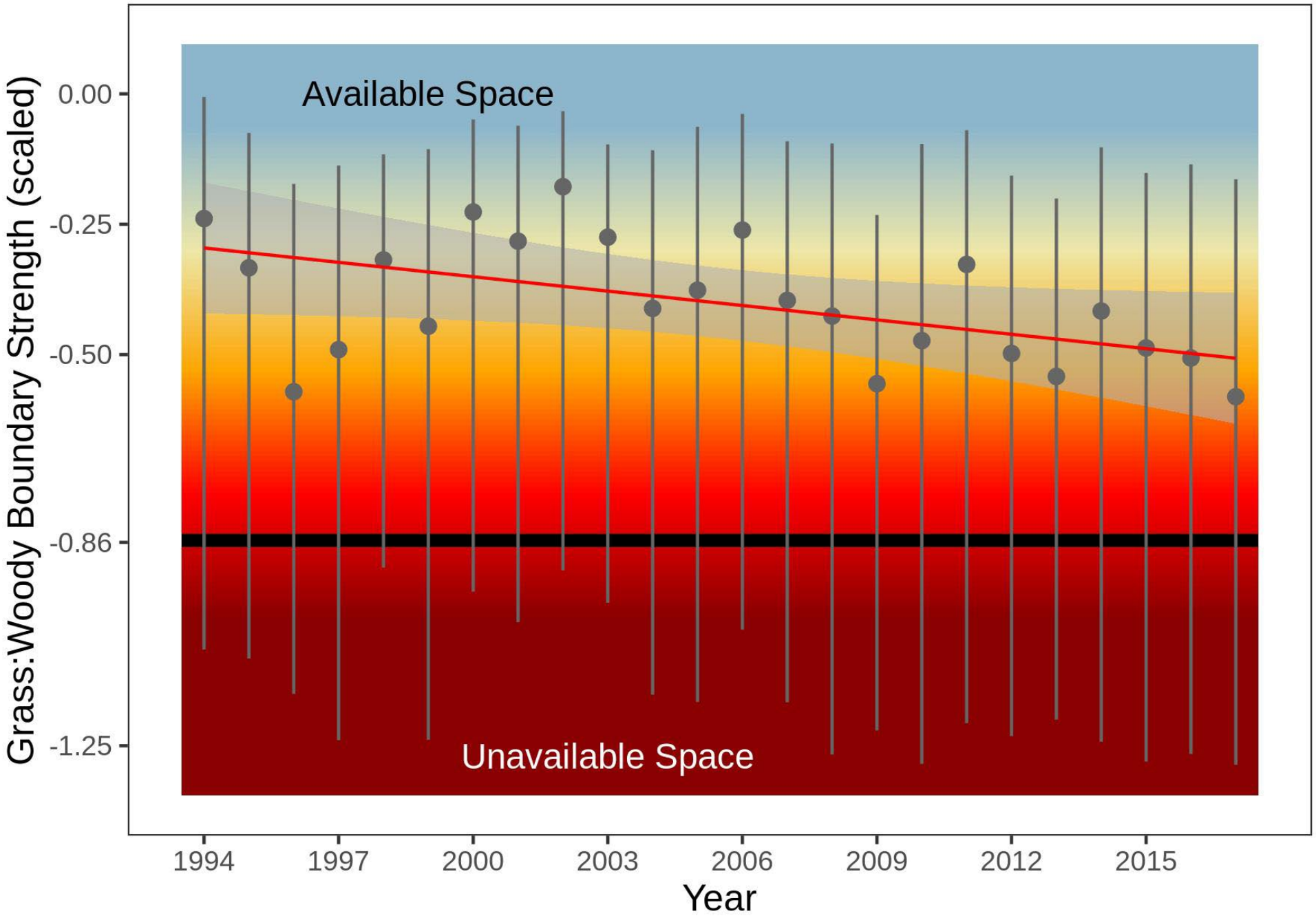

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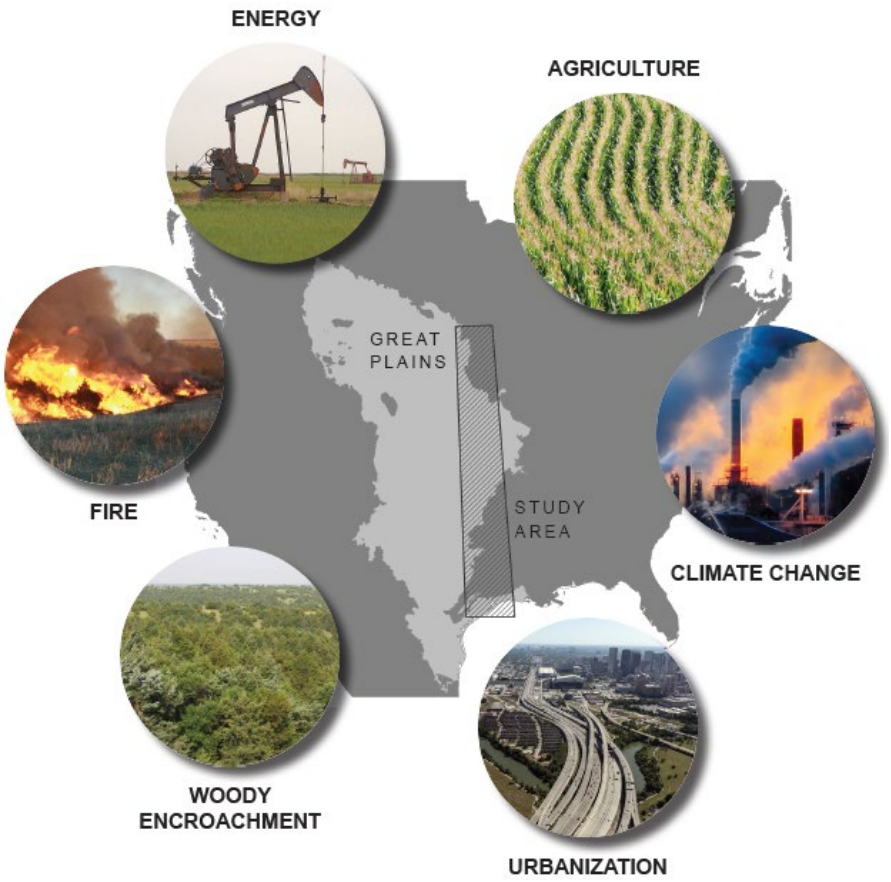

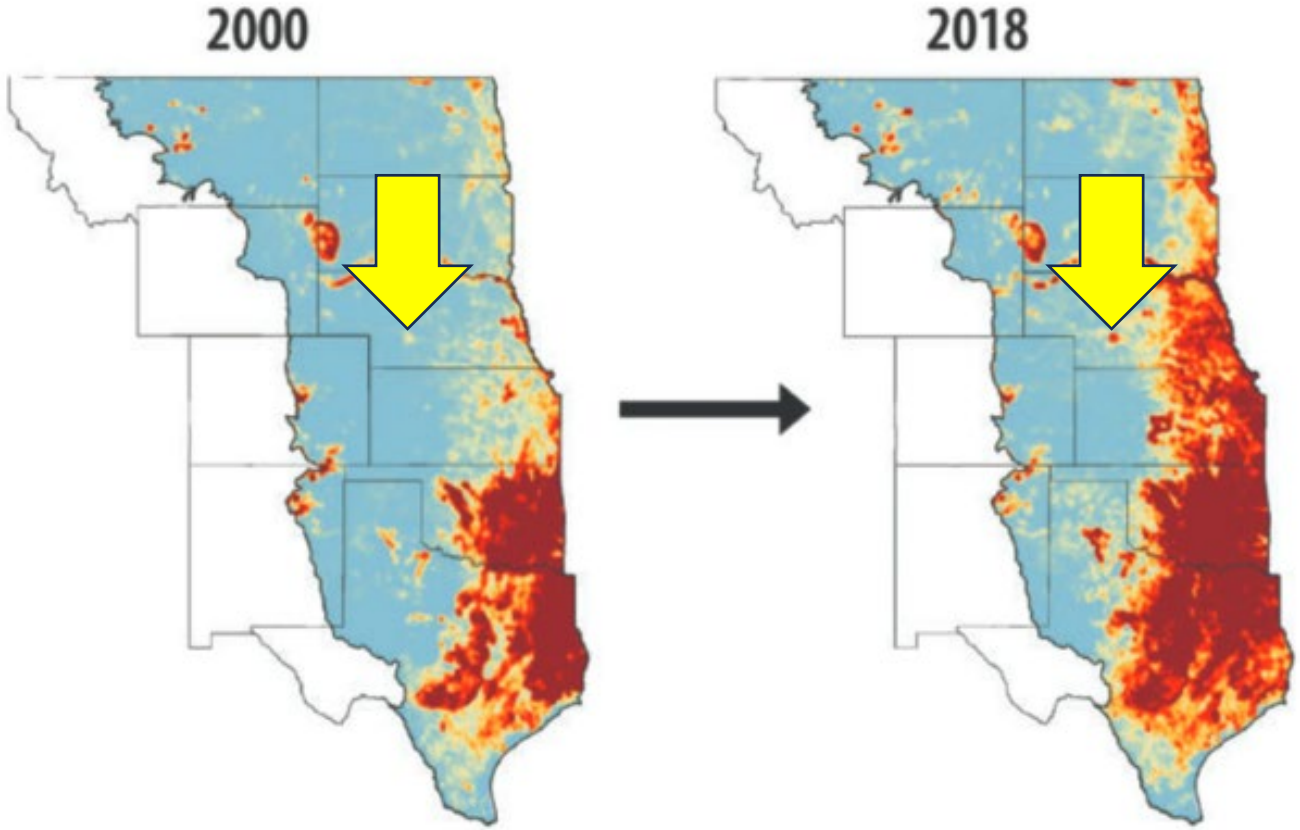

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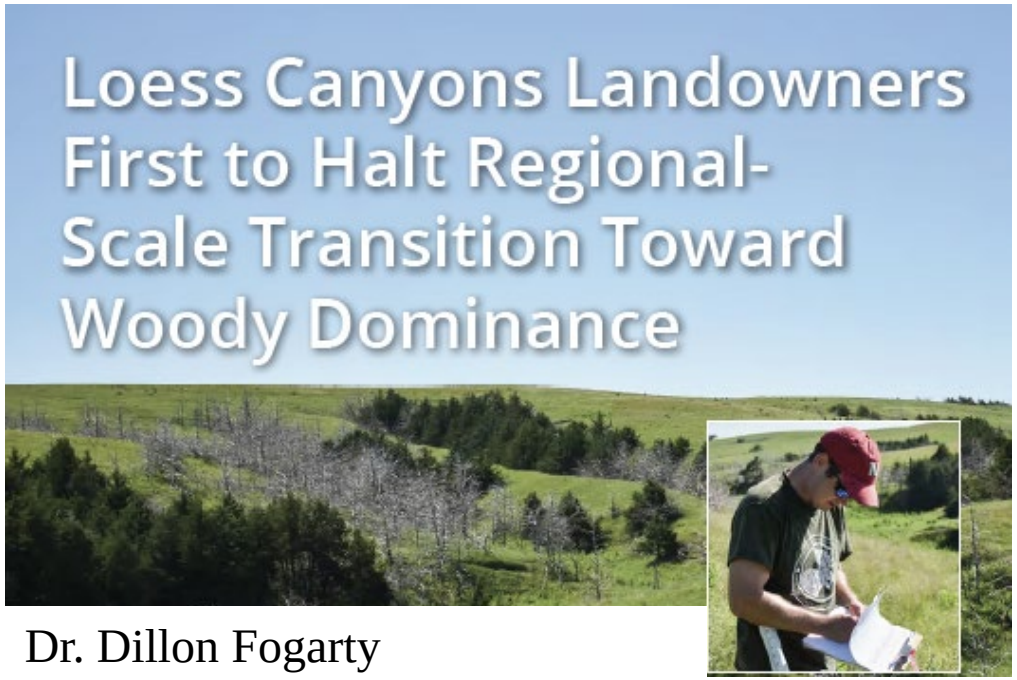

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sustainability

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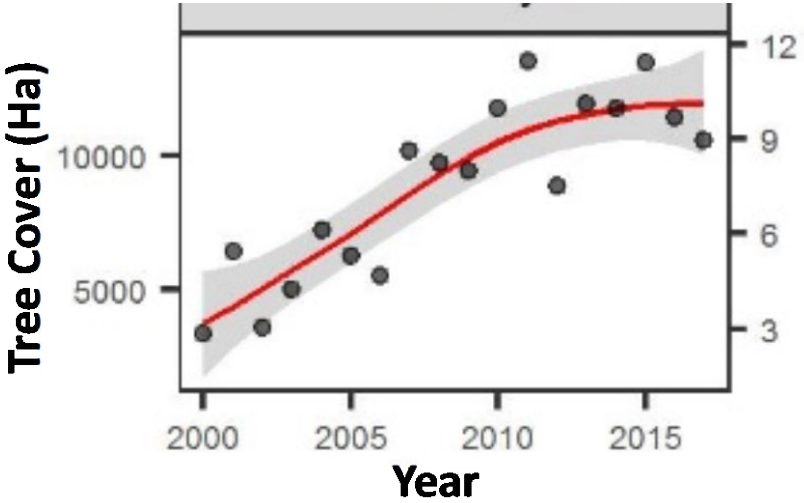
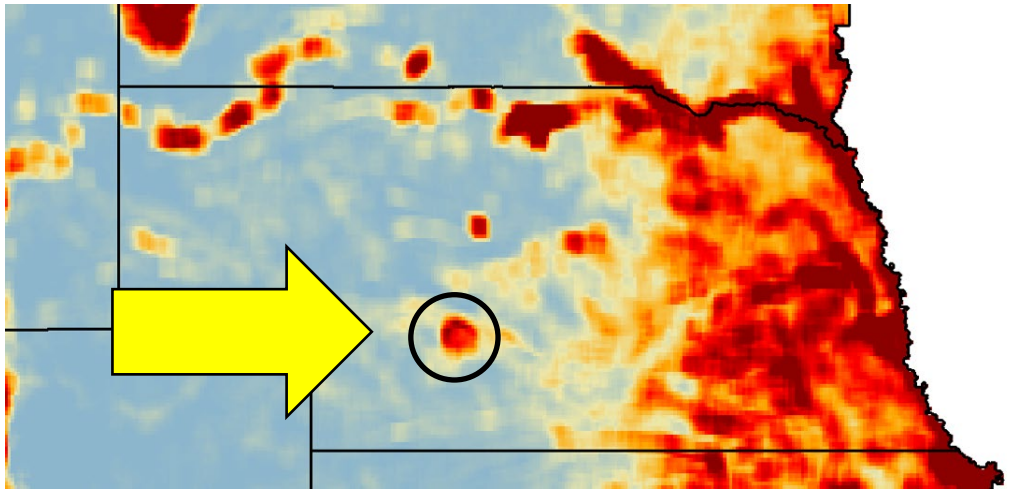
Article

Woody Plant Encroachment and the Sustainability of Priority Conservation Areas

Dillon T. Fogarty [1,2,*], Caleb P. Roberts [1], Daniel R. Uden [1,3,4], Victoria M. Donovan [1], Craig R. Allen [3,4], David E. Naugle [5], Matthew O. Jones [5,6], Brady W. Allred [5,6] and Dirac Twidwell [1,3]





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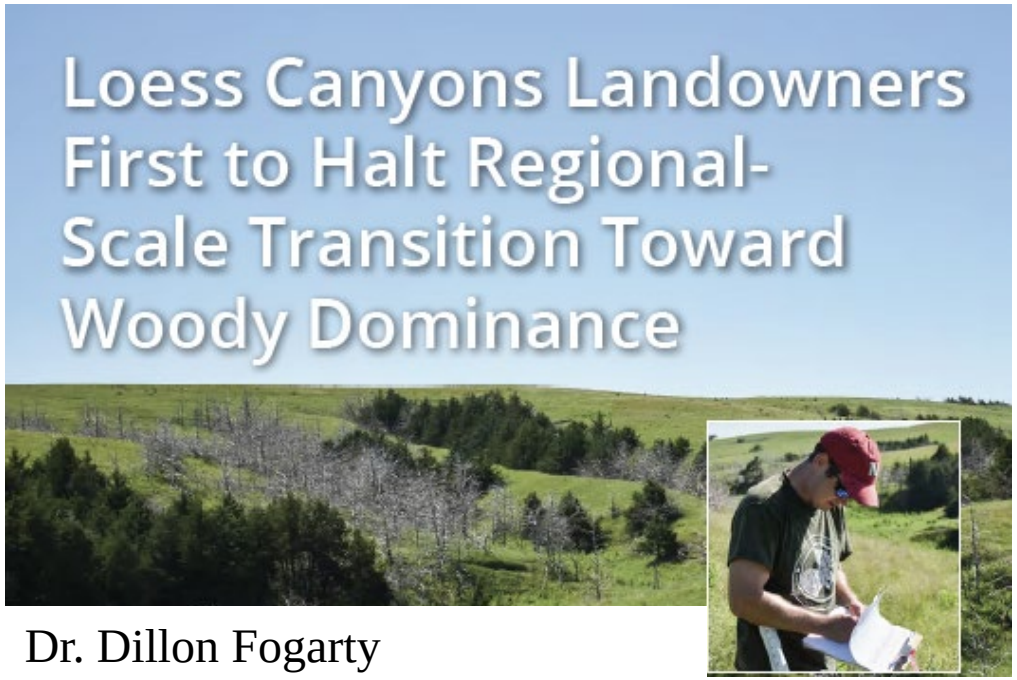

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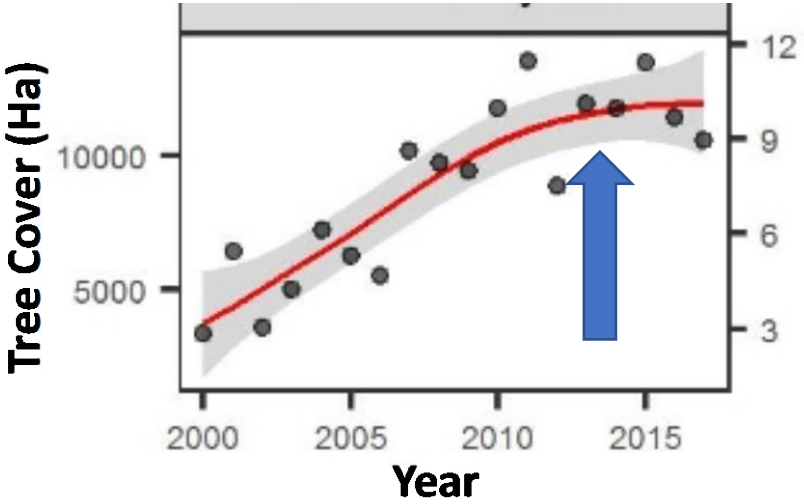

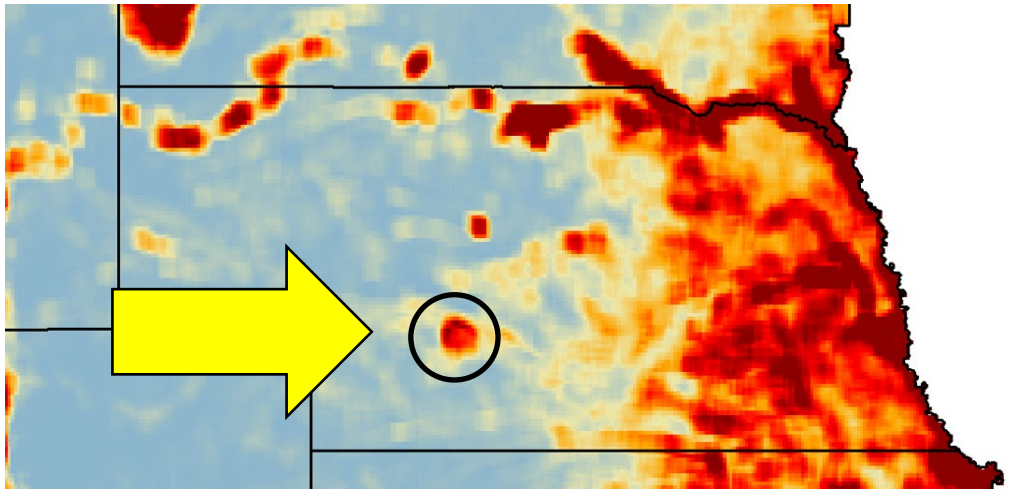

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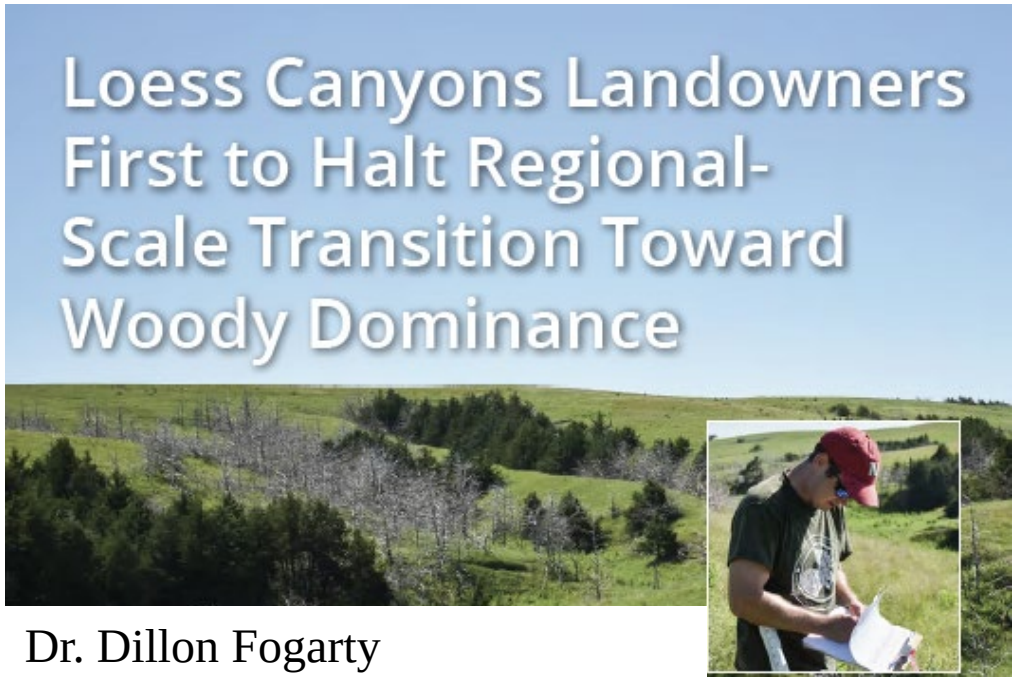

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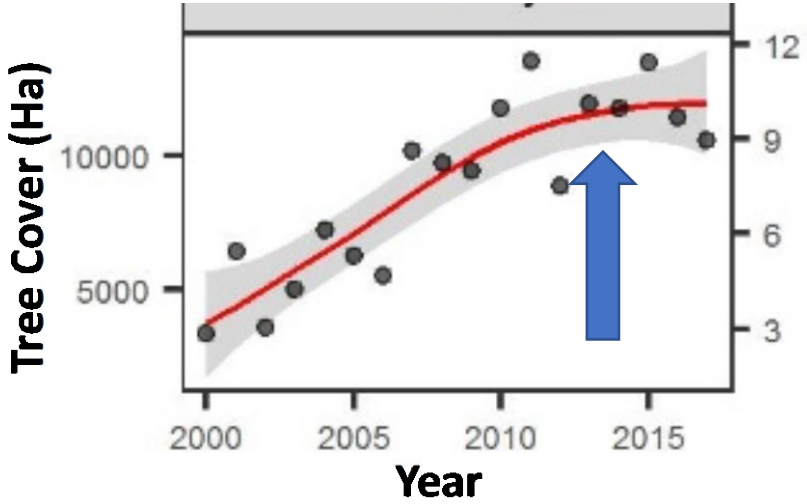

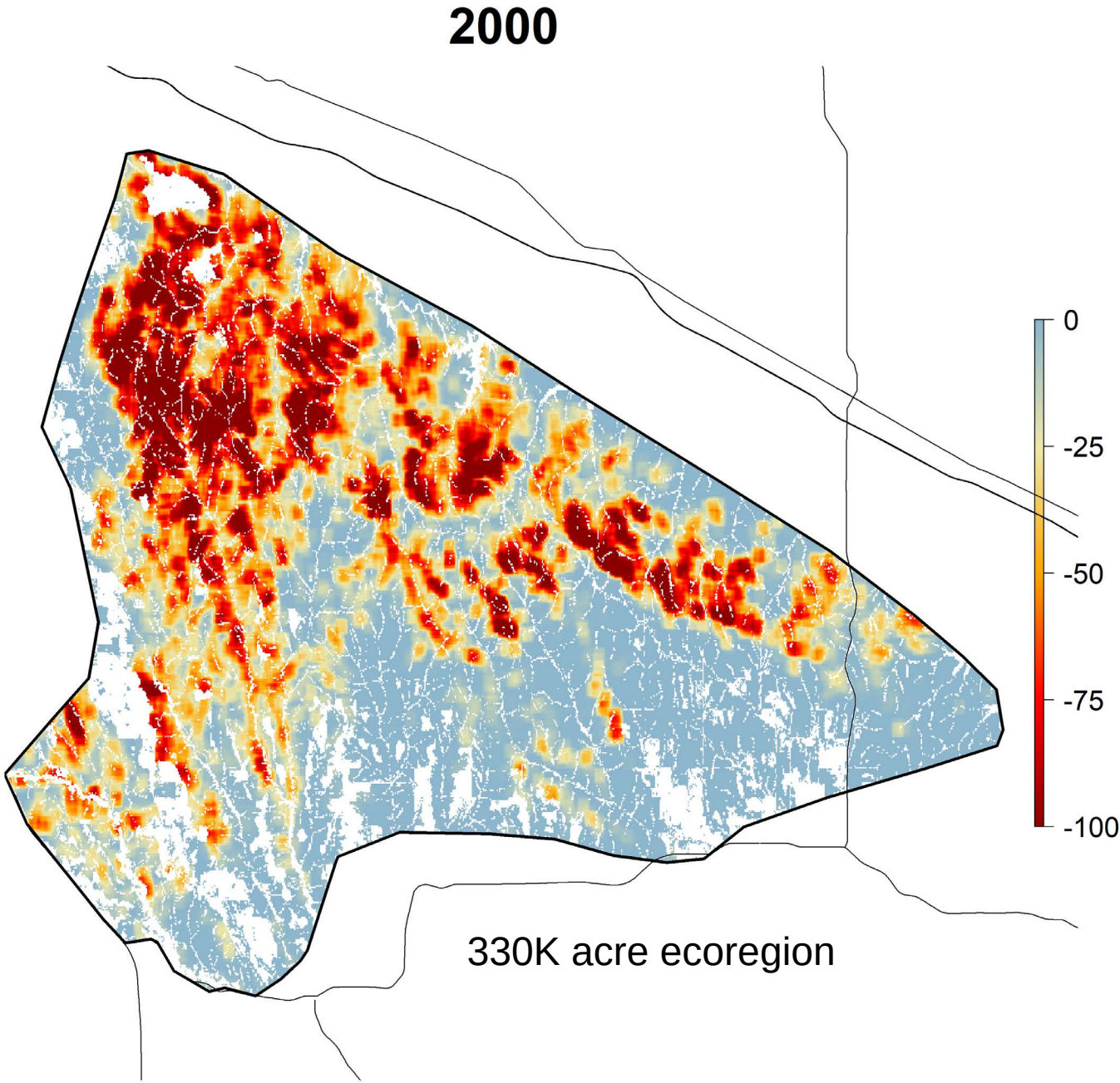

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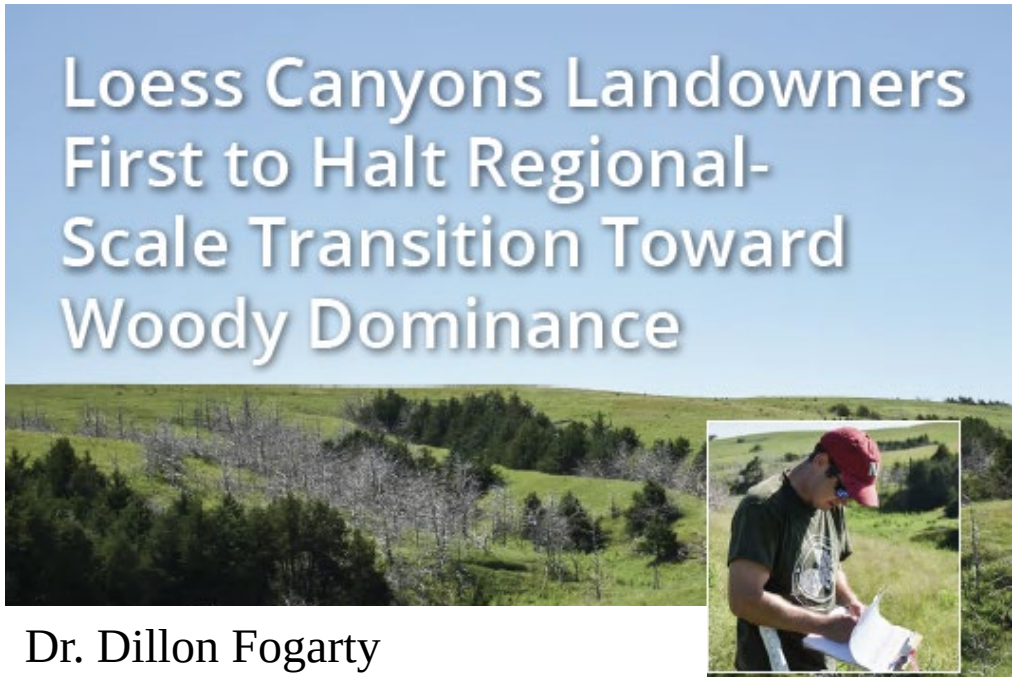

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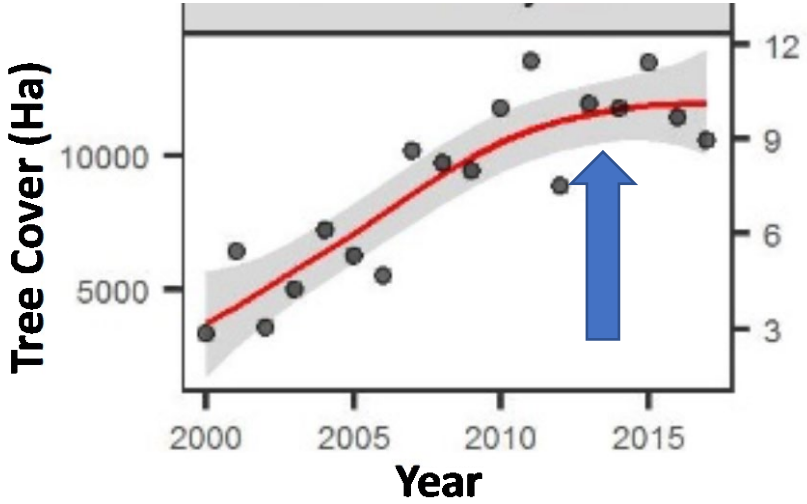

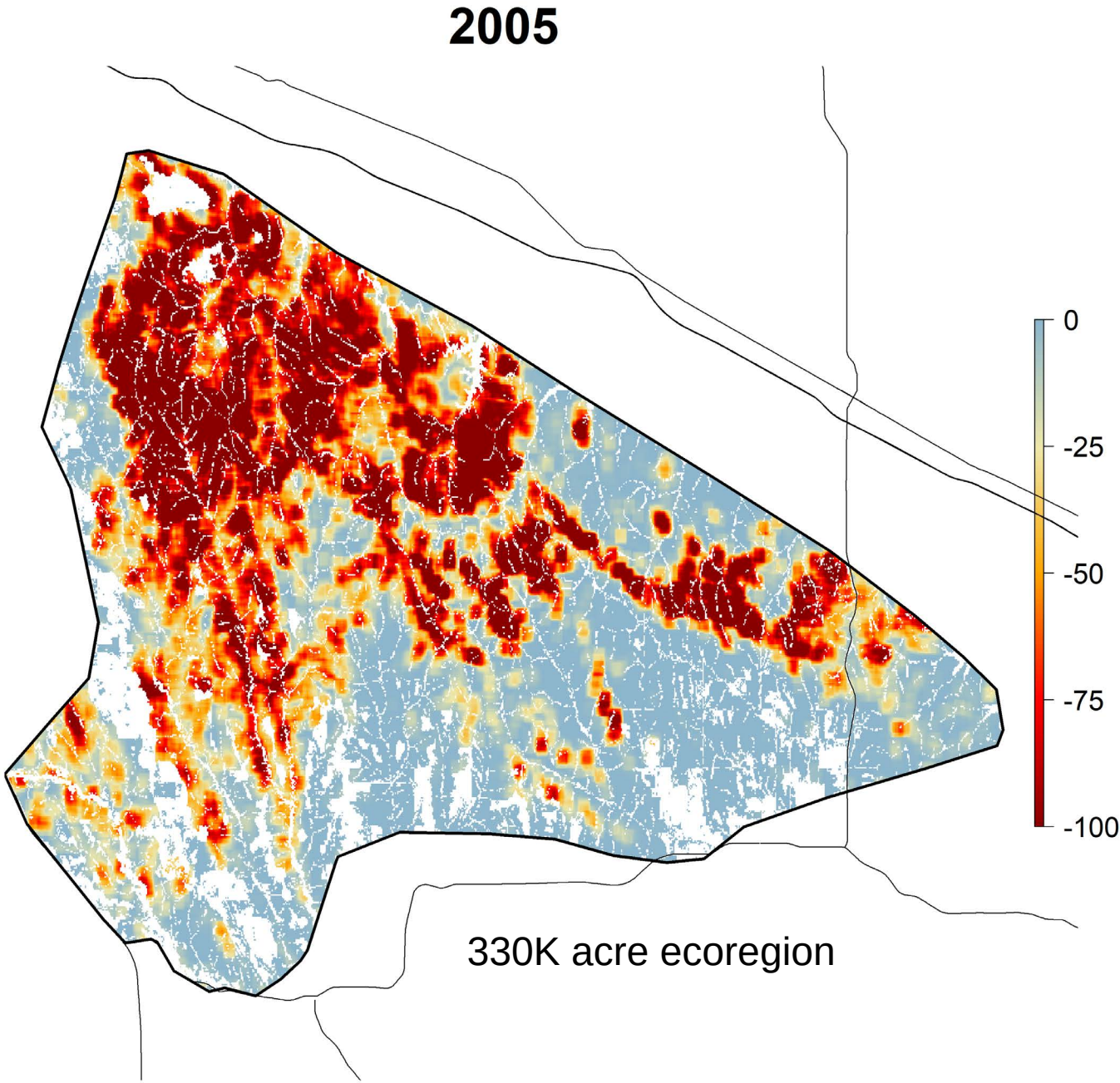

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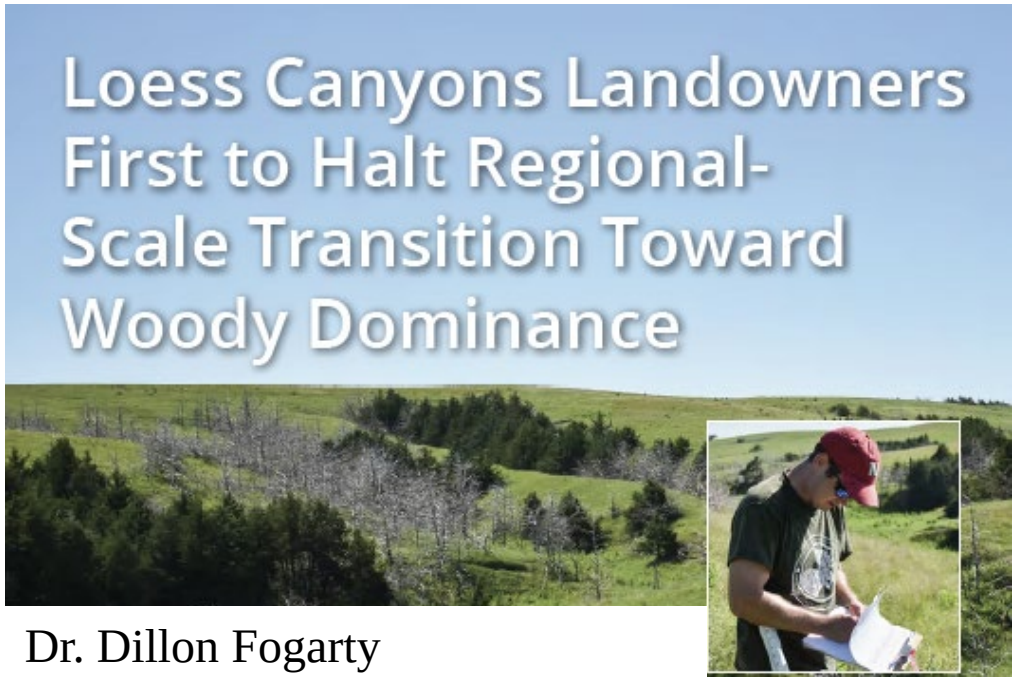

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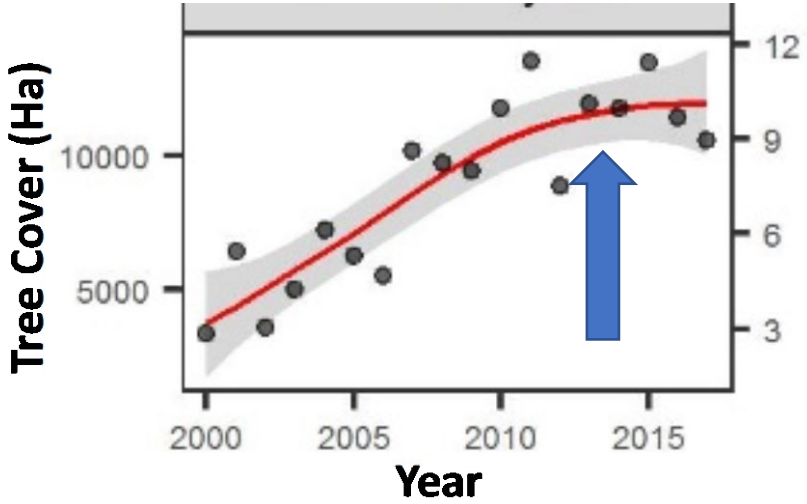

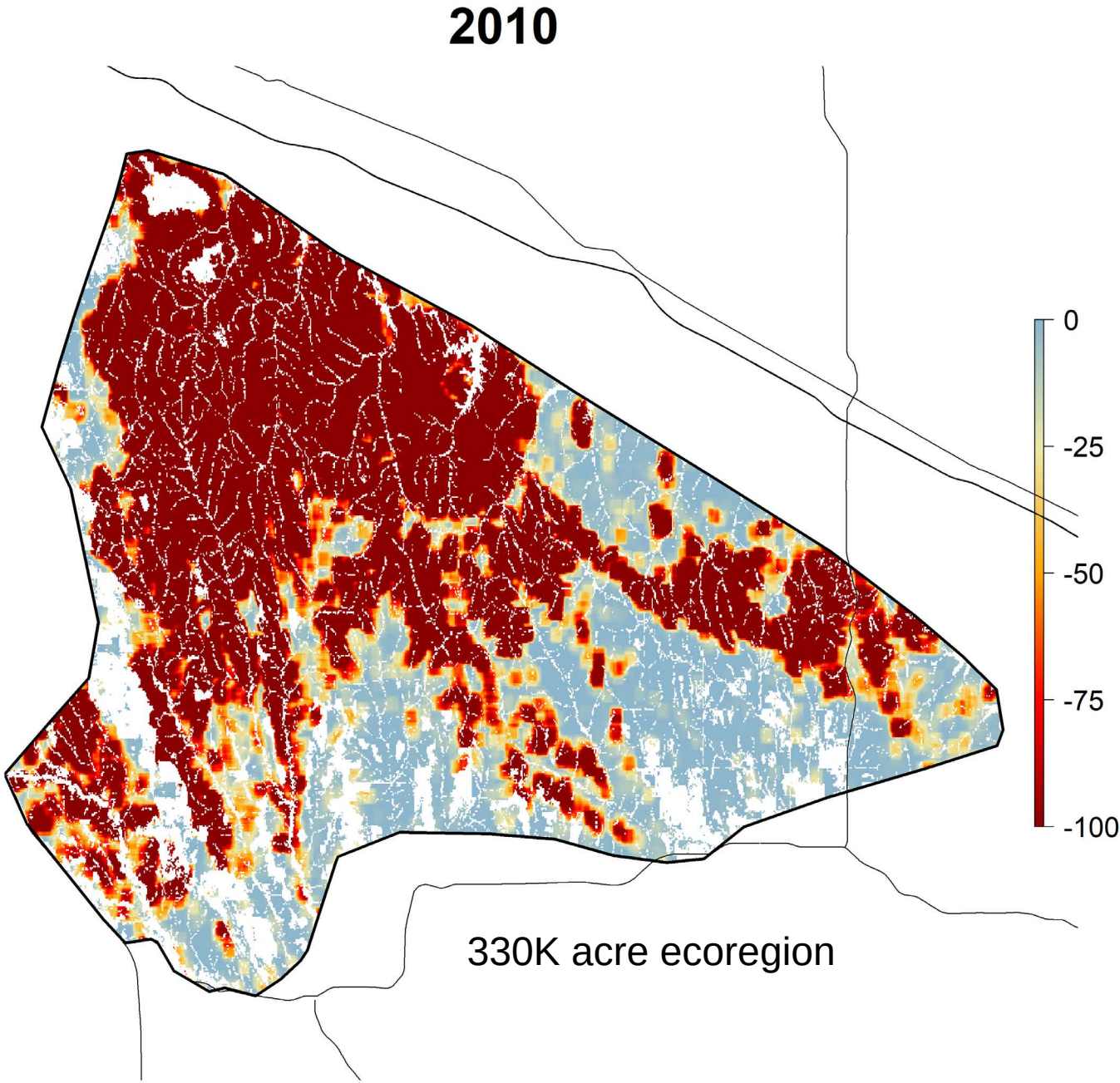

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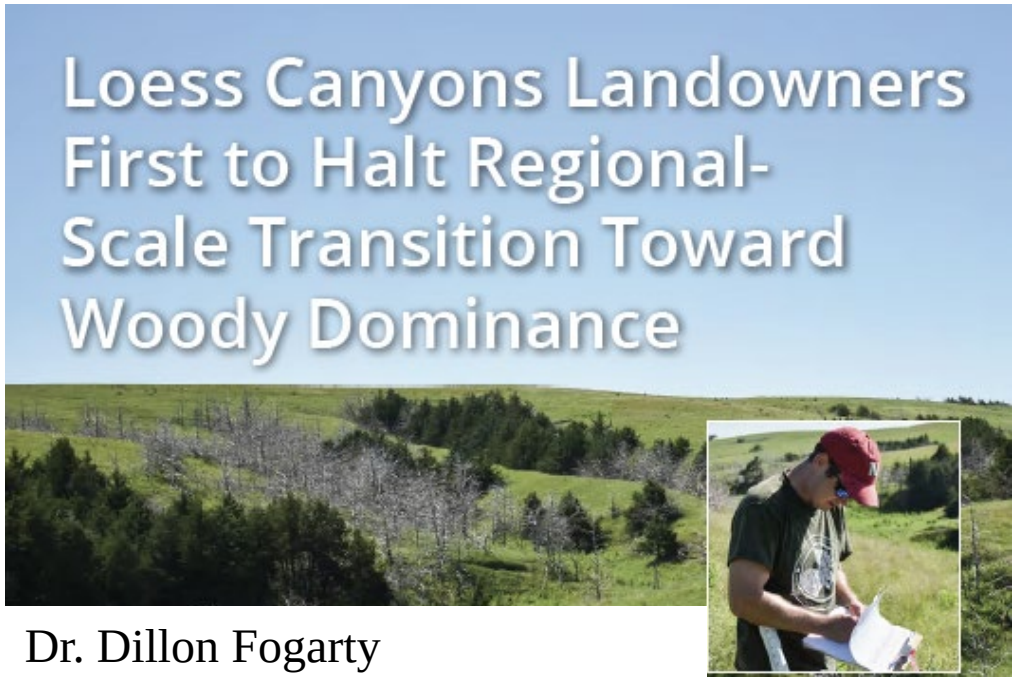

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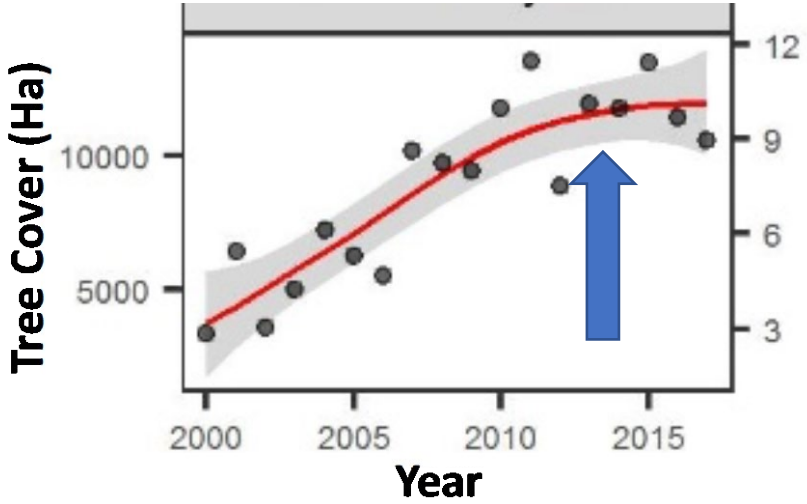

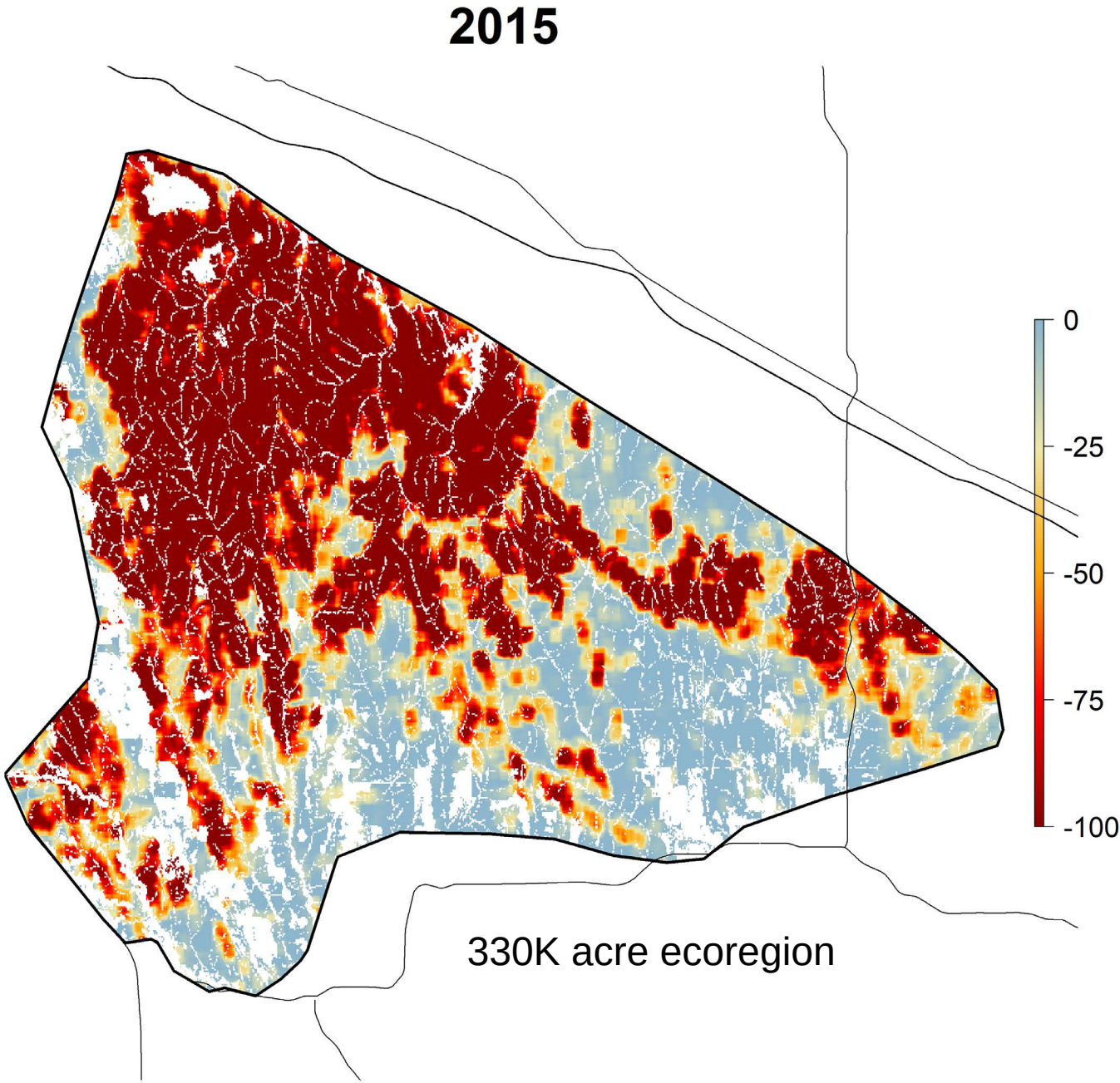

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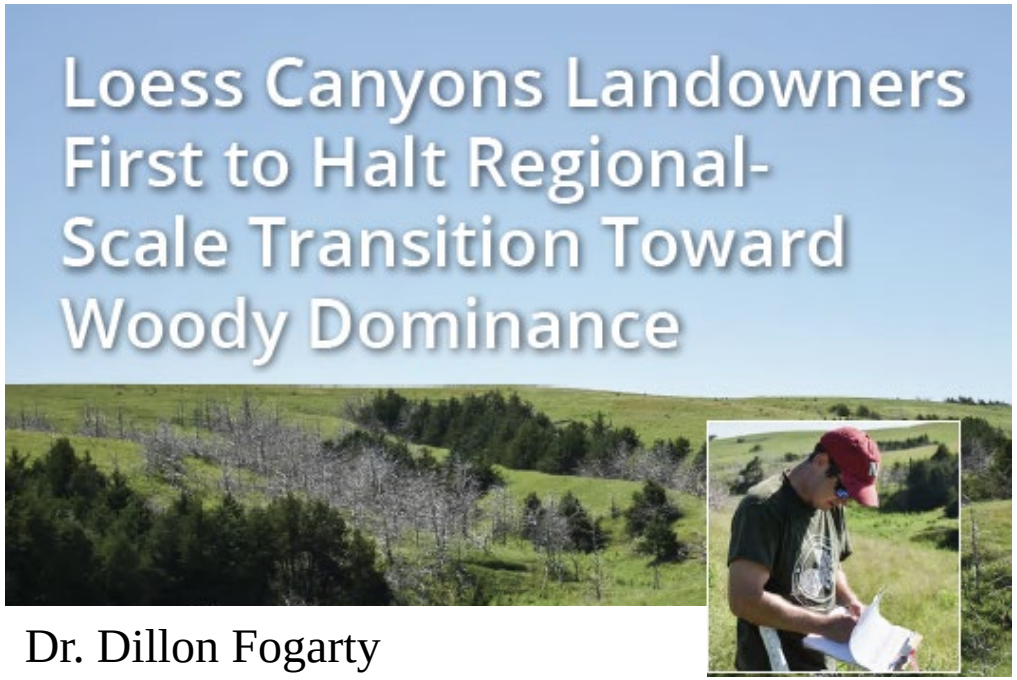

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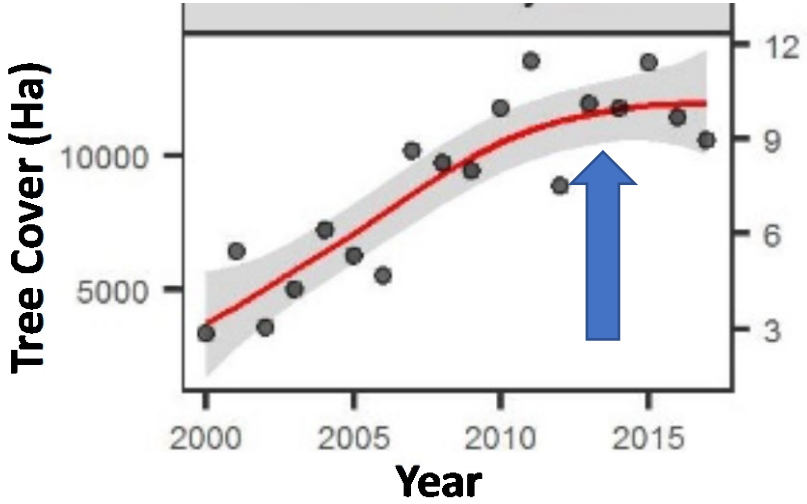

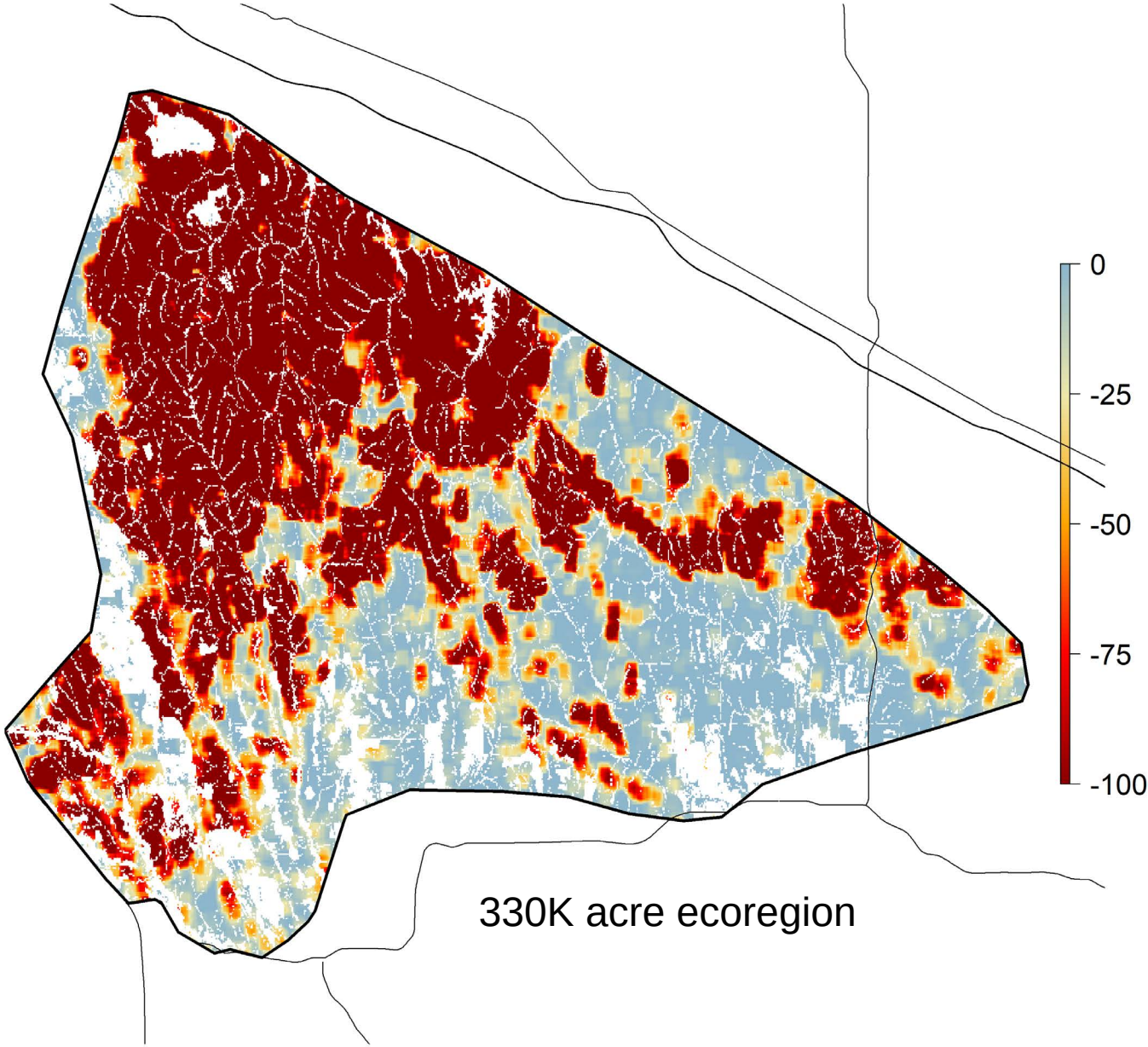

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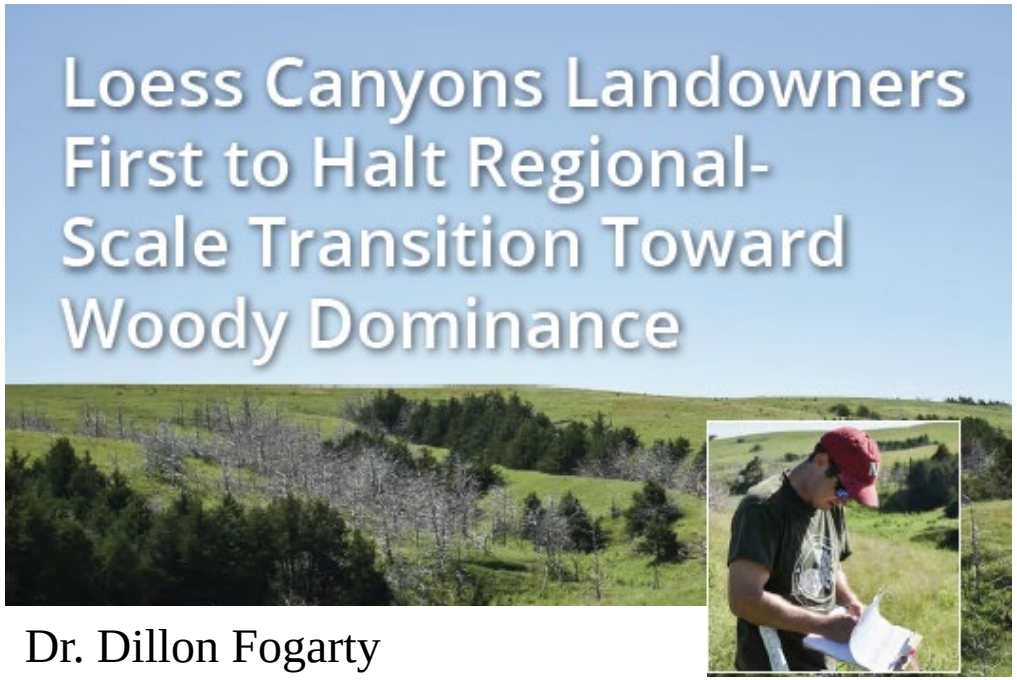

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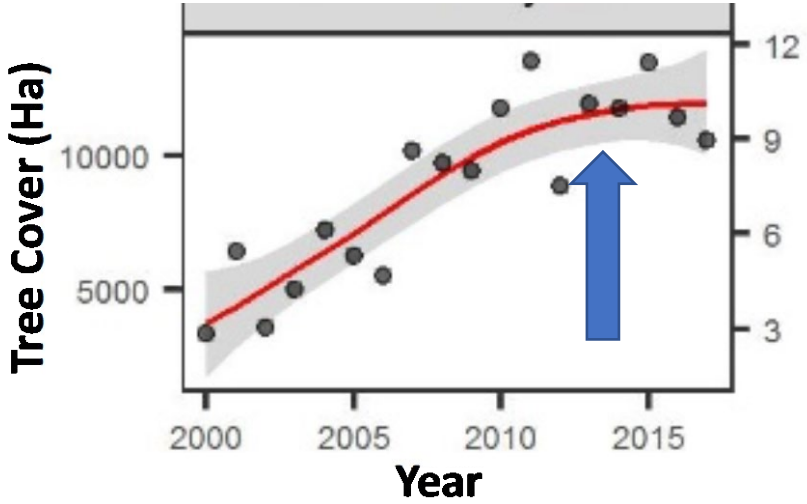

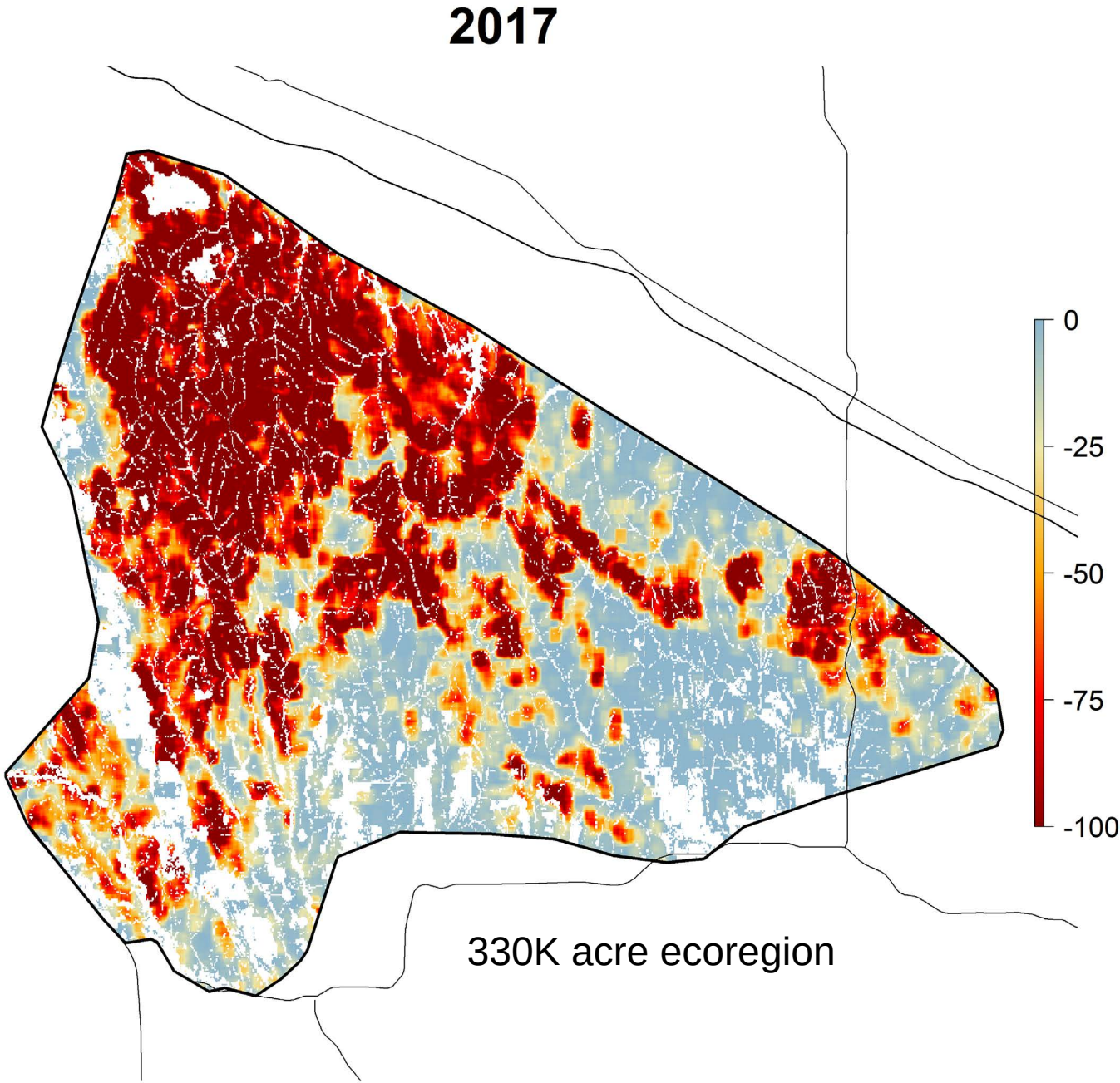

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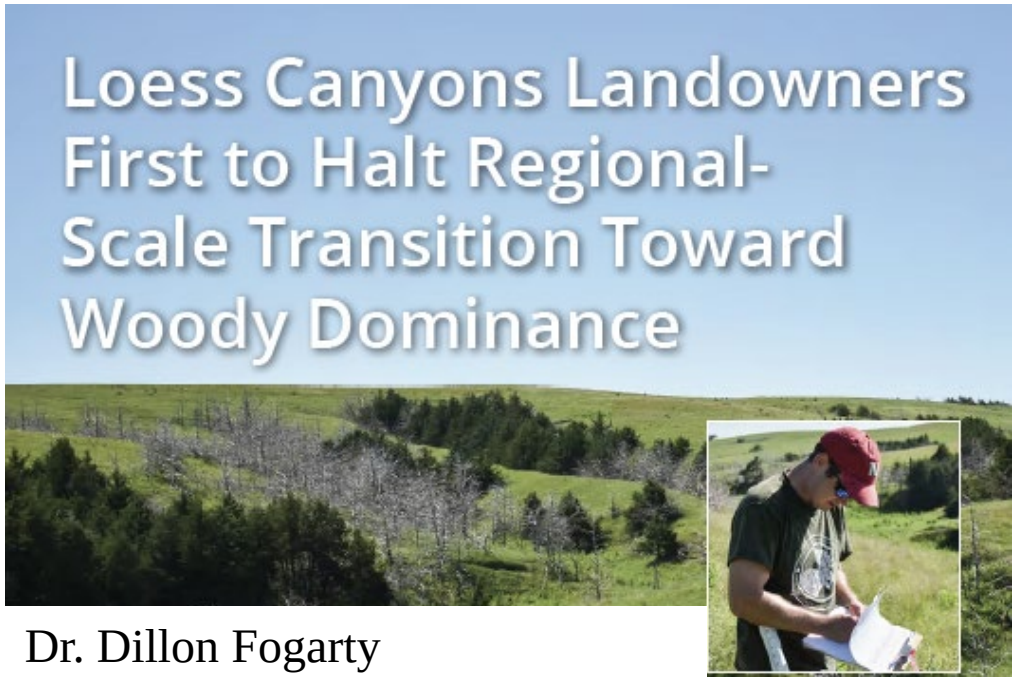

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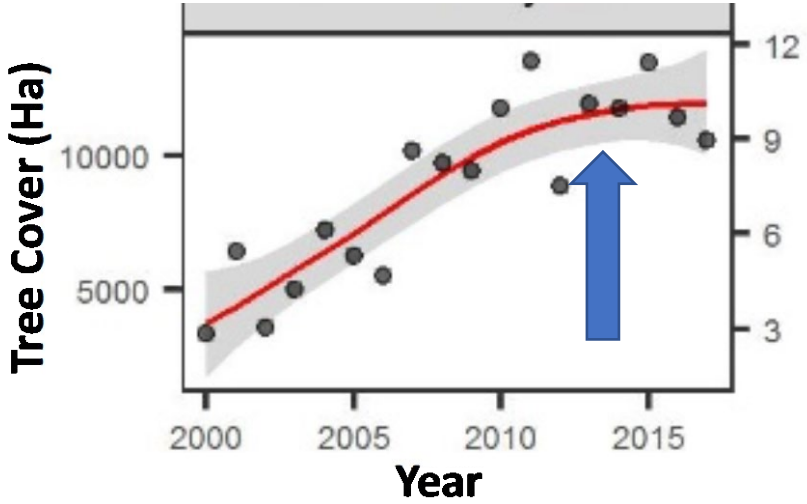

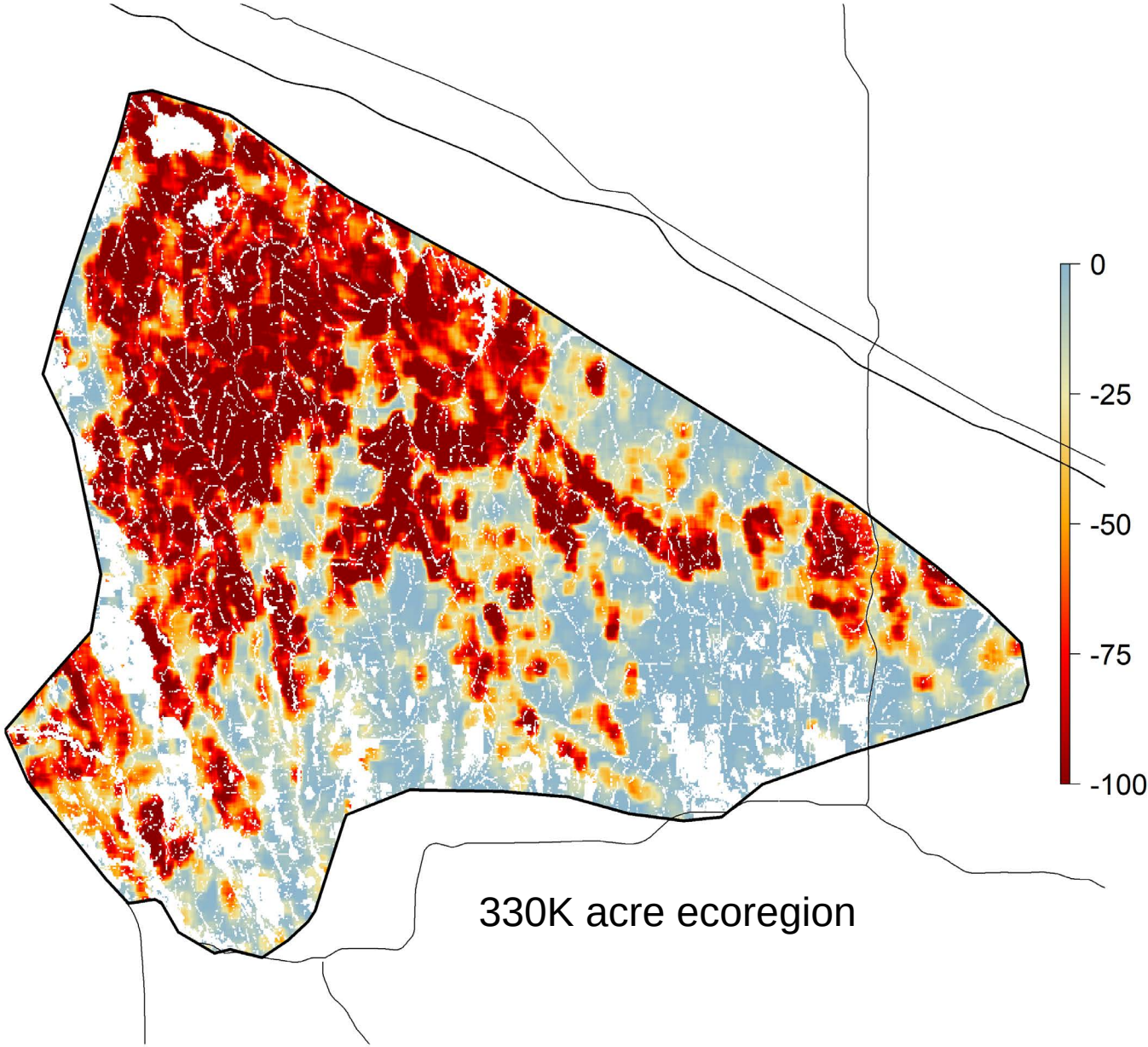

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Loess Canyons Landowners First to Halt Regional-Scale Transition Toward Woody Dominance

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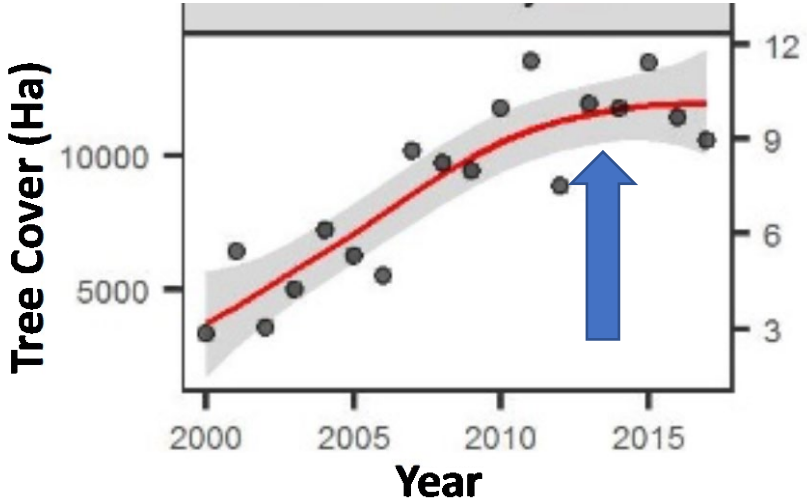

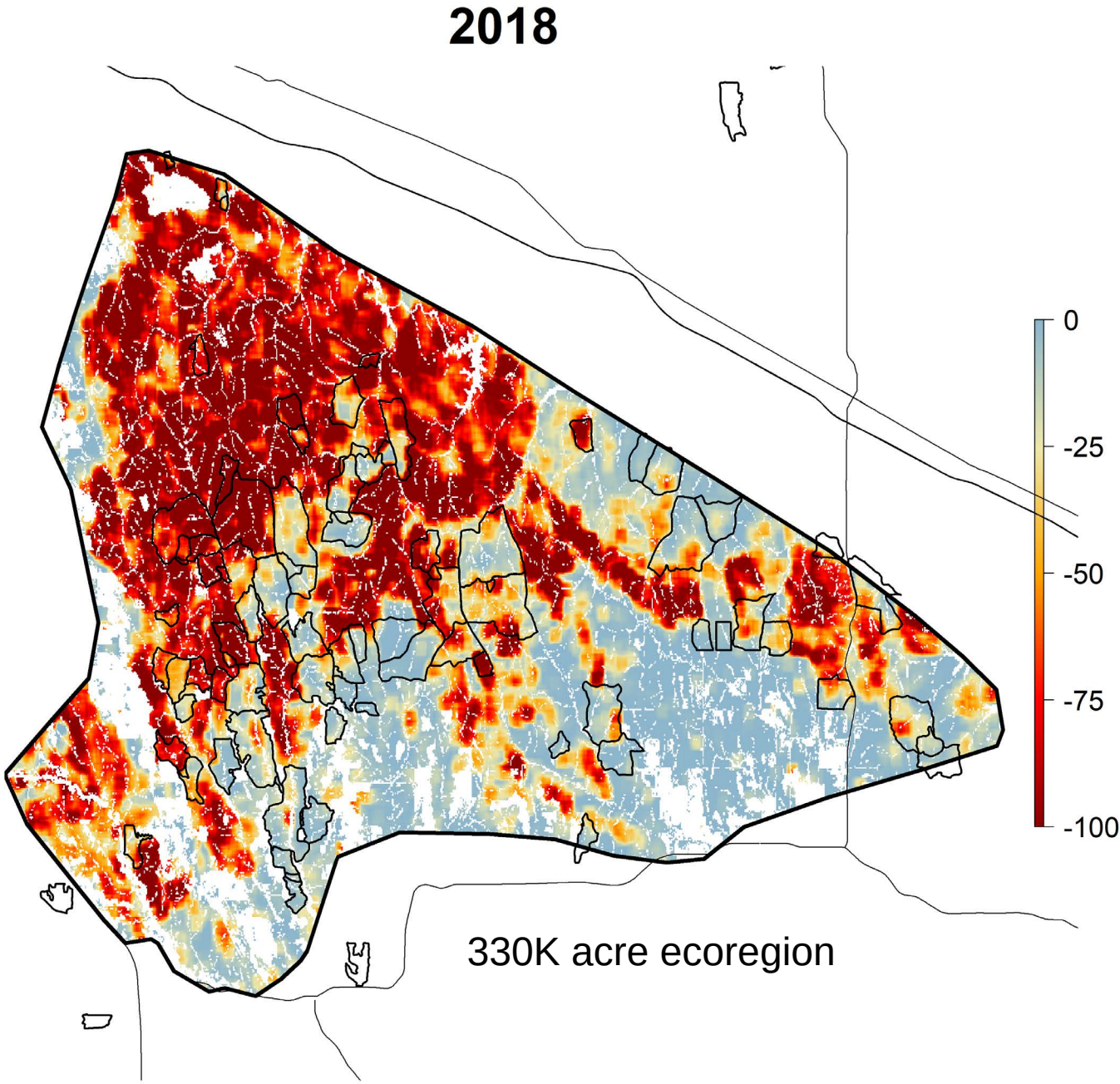

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Prescribed Burning Restores Grassland Bird Richness in the Loess Canyons

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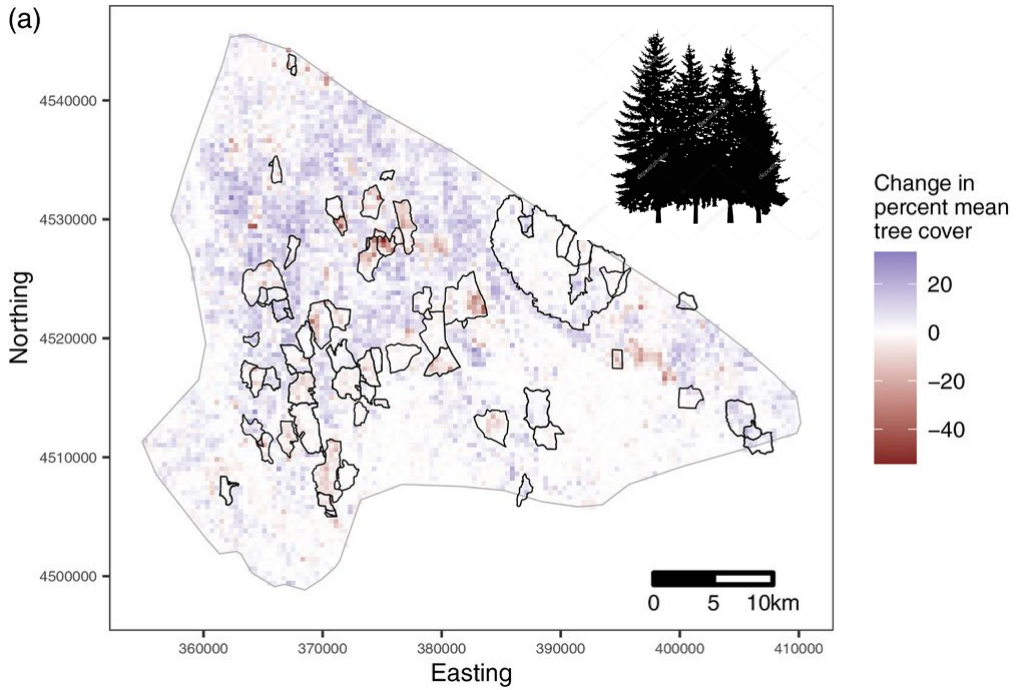

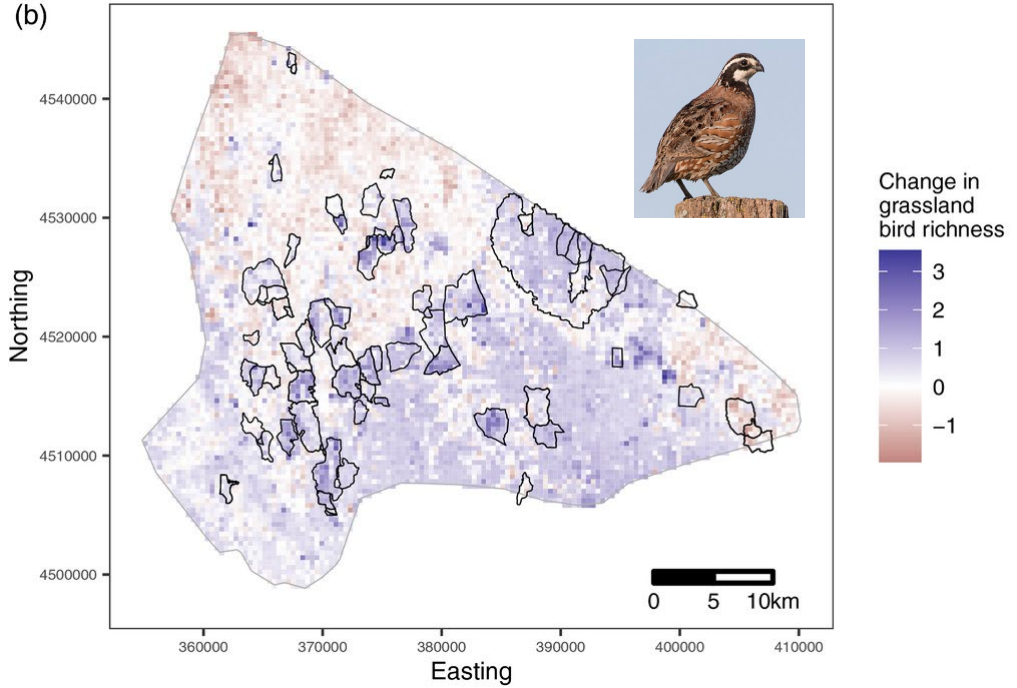

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Photo credit: Caleb Putnam

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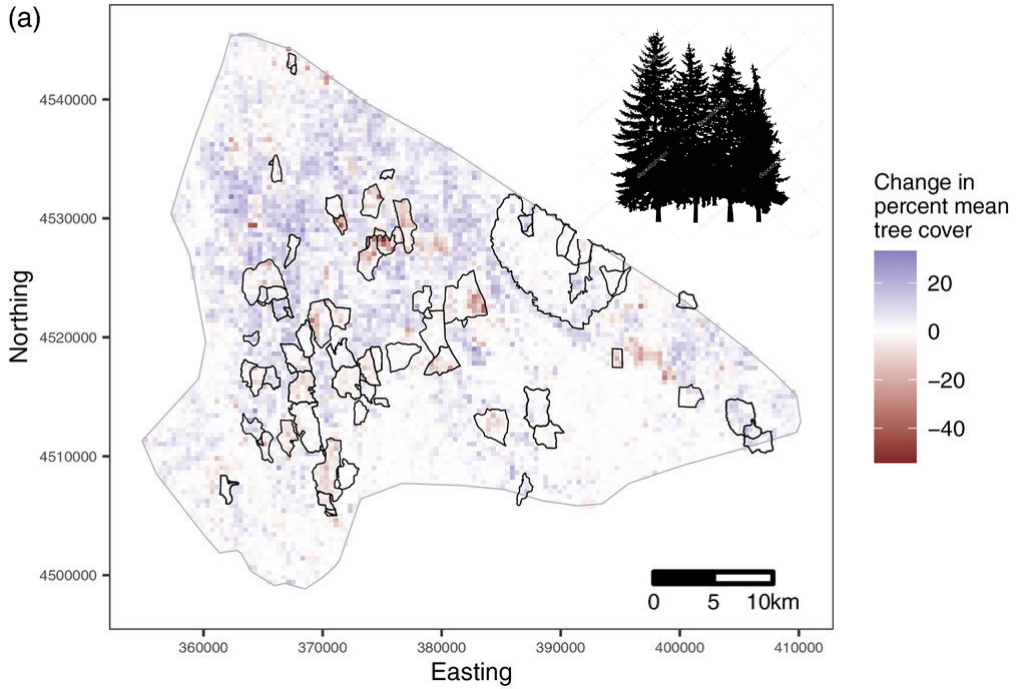

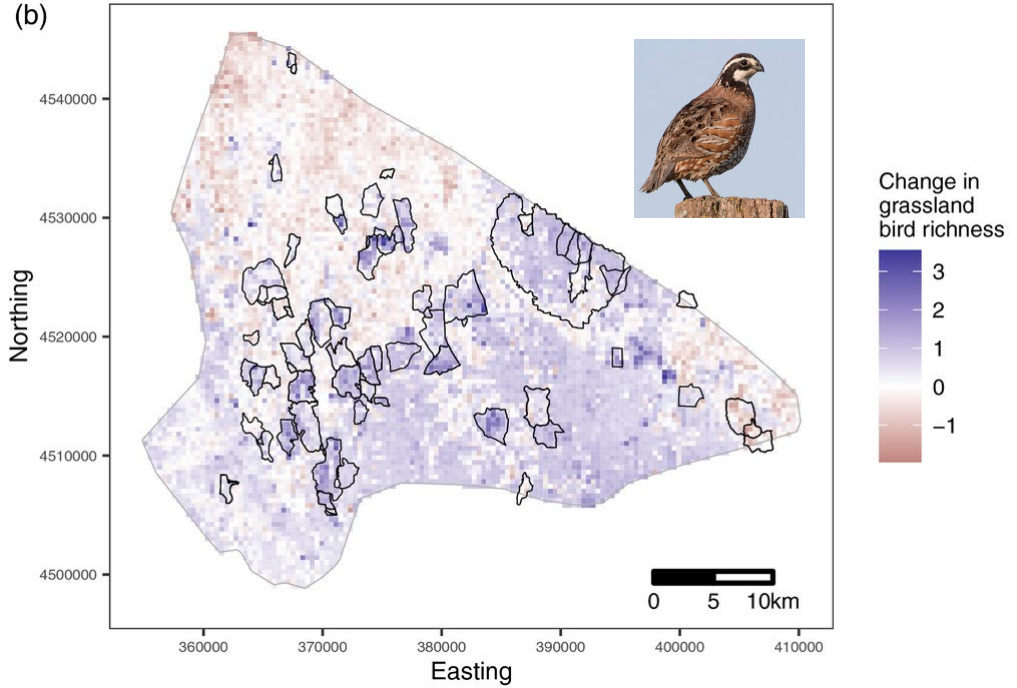

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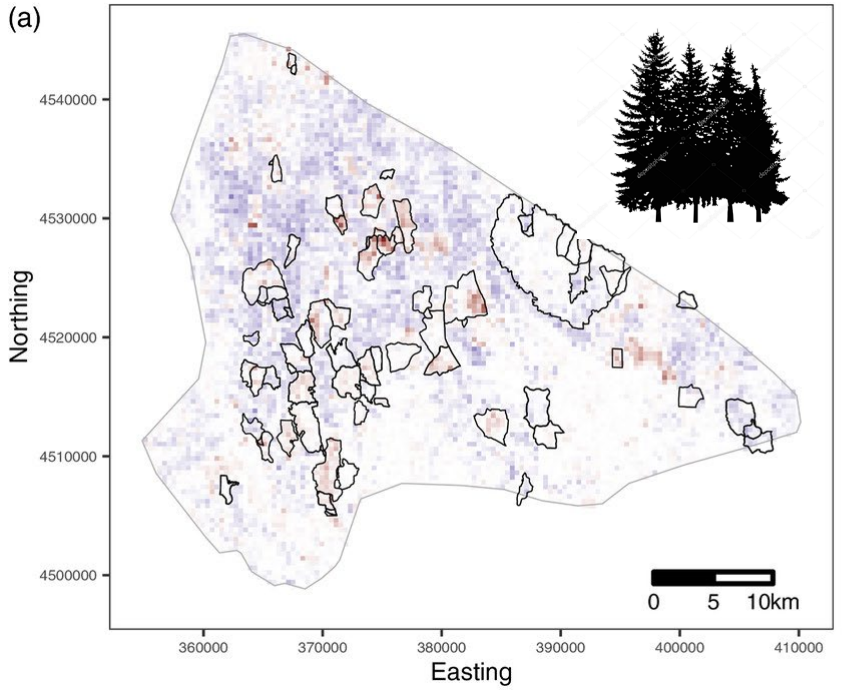
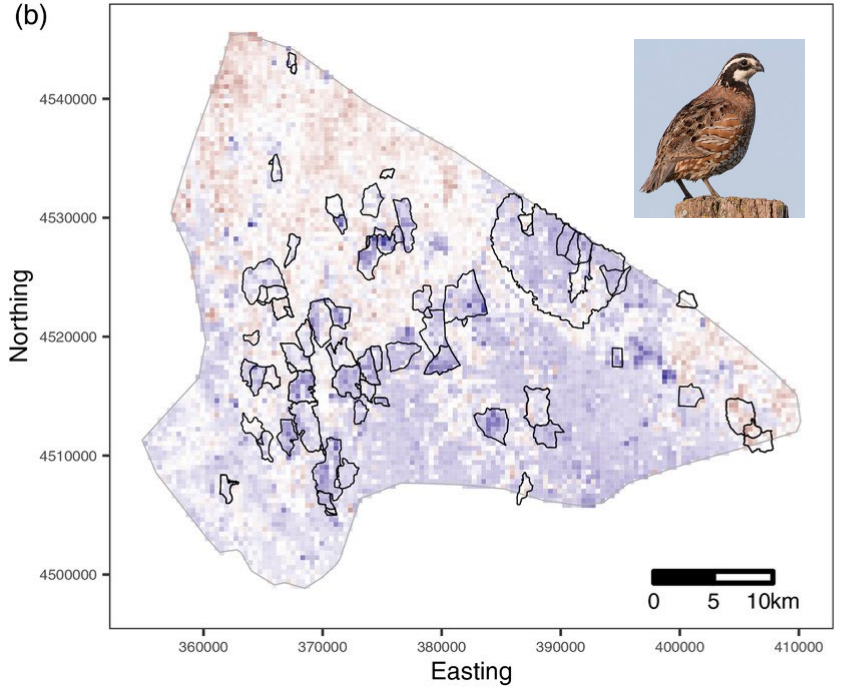
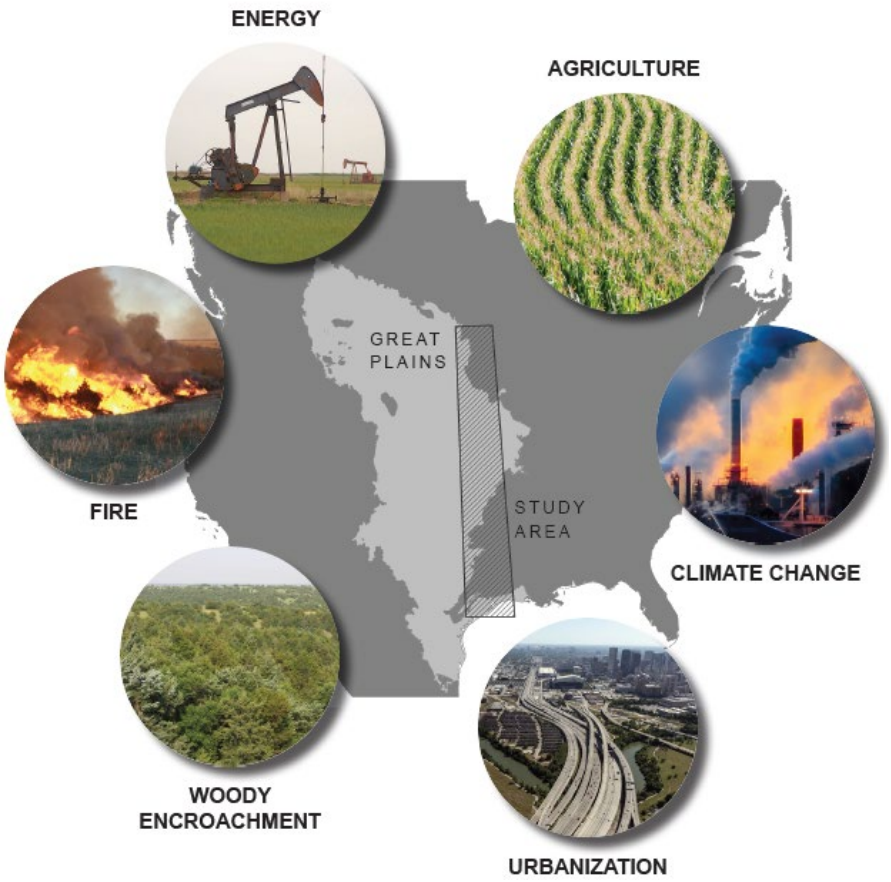
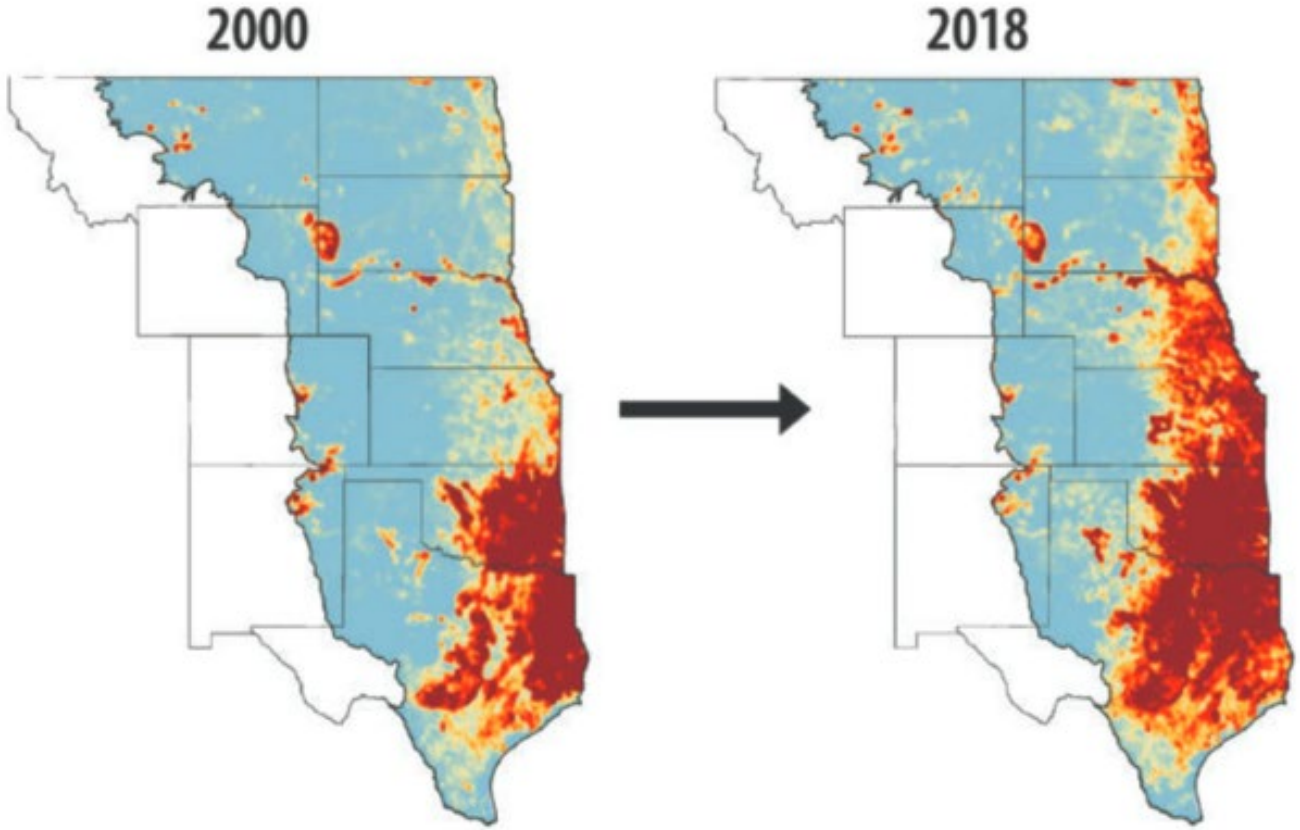
- Grassland bird richness increased more in fire treated areas that (1) strongly reduced woody cover and (2) where woody cover was already low.





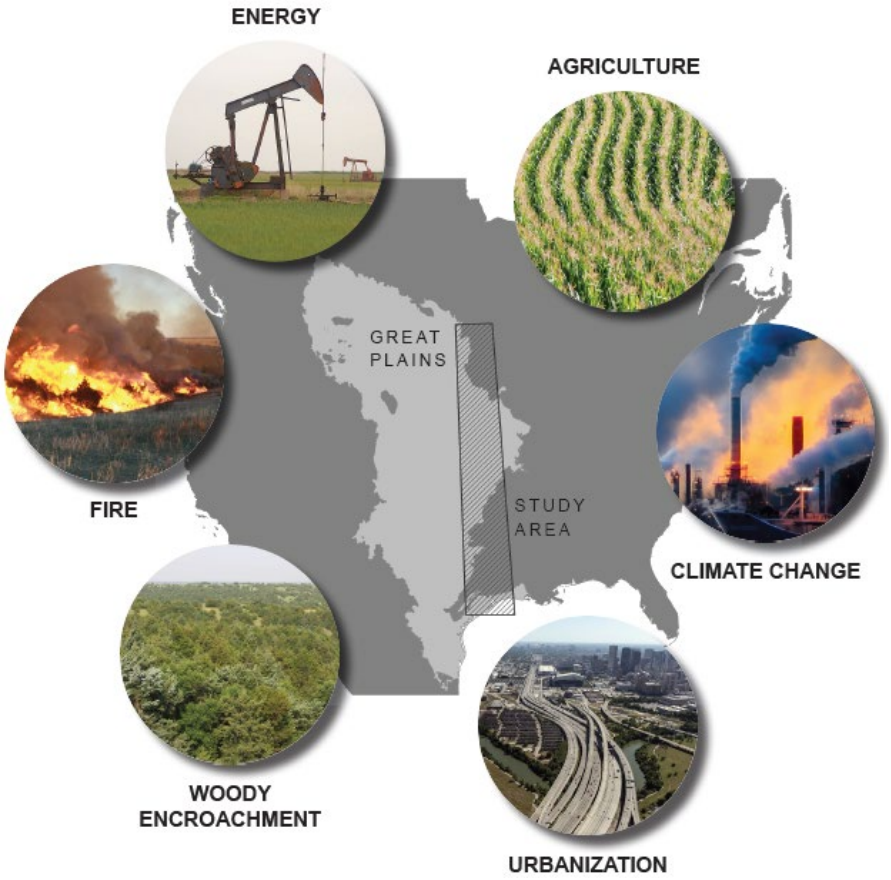
USGS science for a changing world

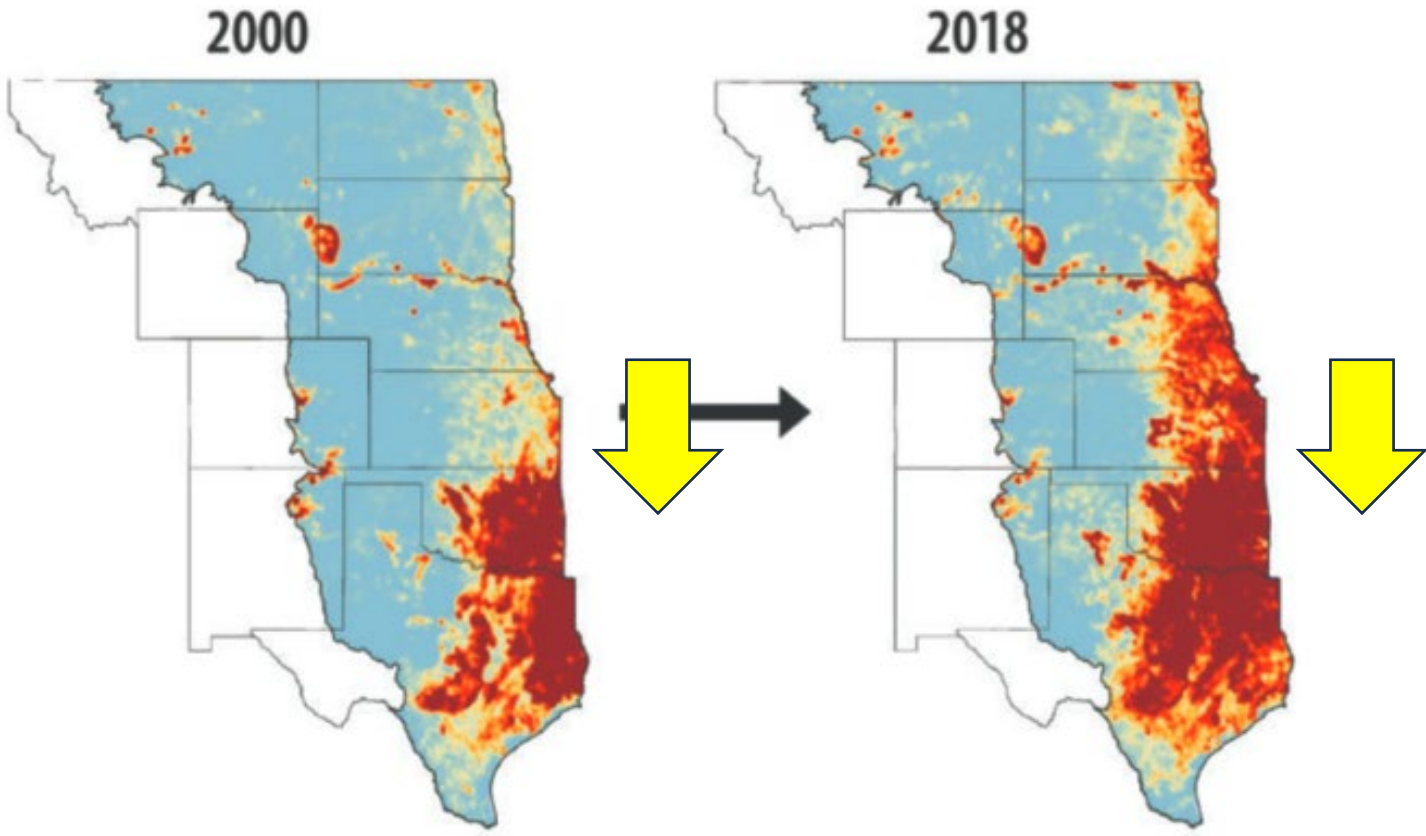




USGS science for a changing world

Uden et al. 2019; USDA NRCS 2021





USGS science for a changing world

Uden et al. 2019; USDA NRCS 2021

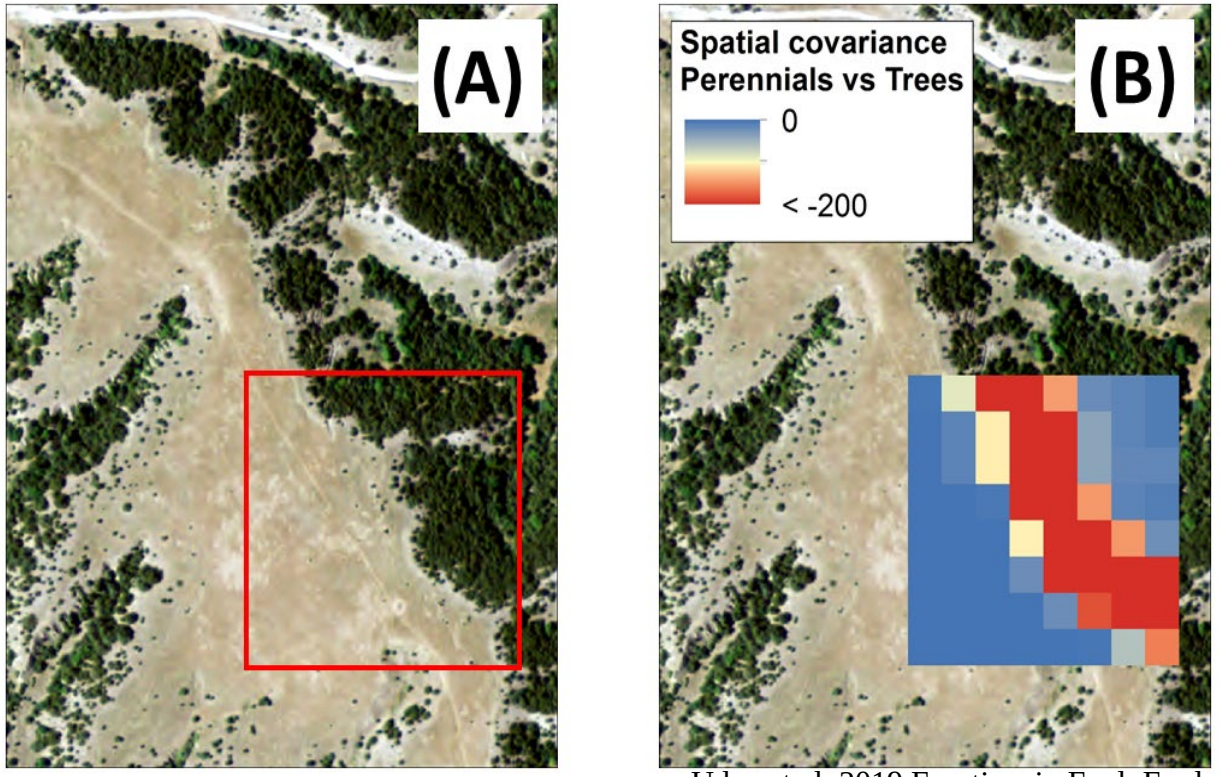
Mapping tool for quantifying grassland management outcomes (in the Southeast)

Grassland Birds Respond Negatively to Boundaries

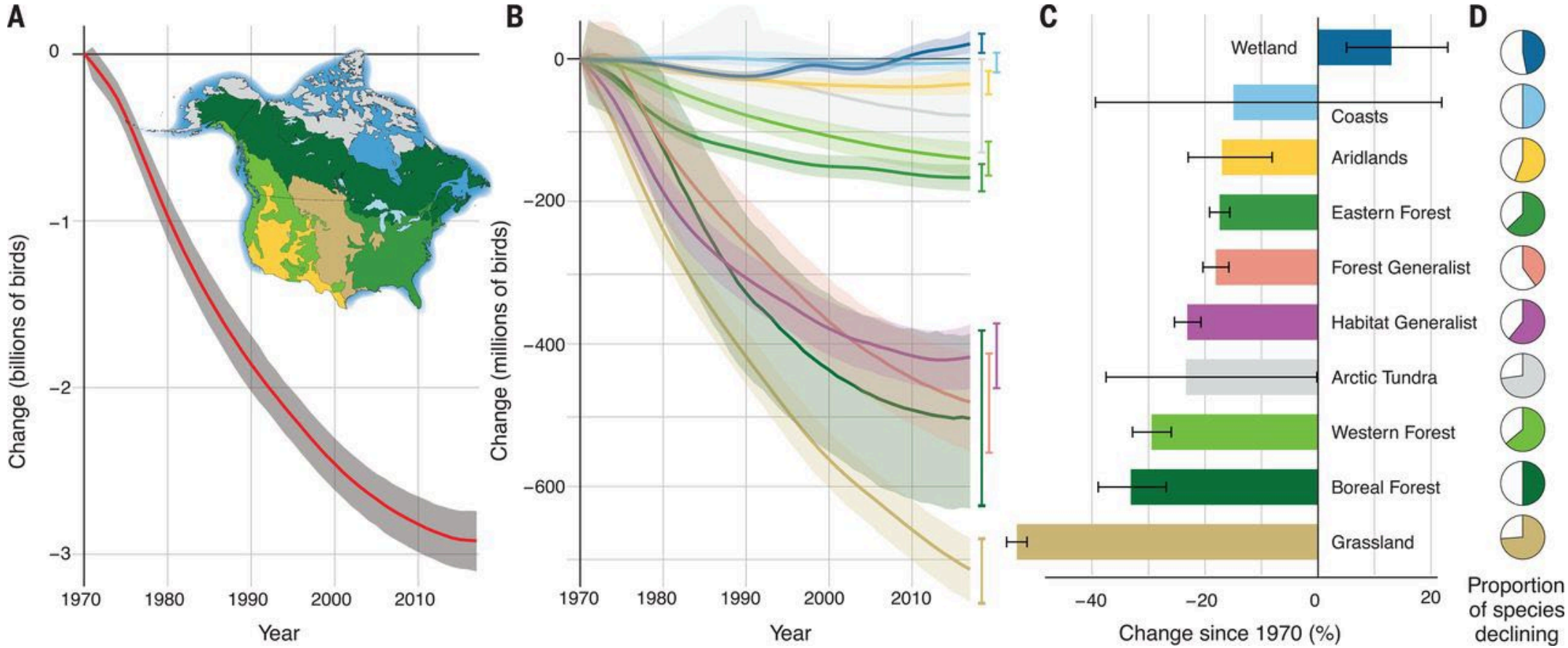
Testing Spatial Covariance in an Occupancy Framework

Objective:

Determine grassland bird community response to spatial covariance



Uden et al. 2019 Frontiers in Ecol. Evol.

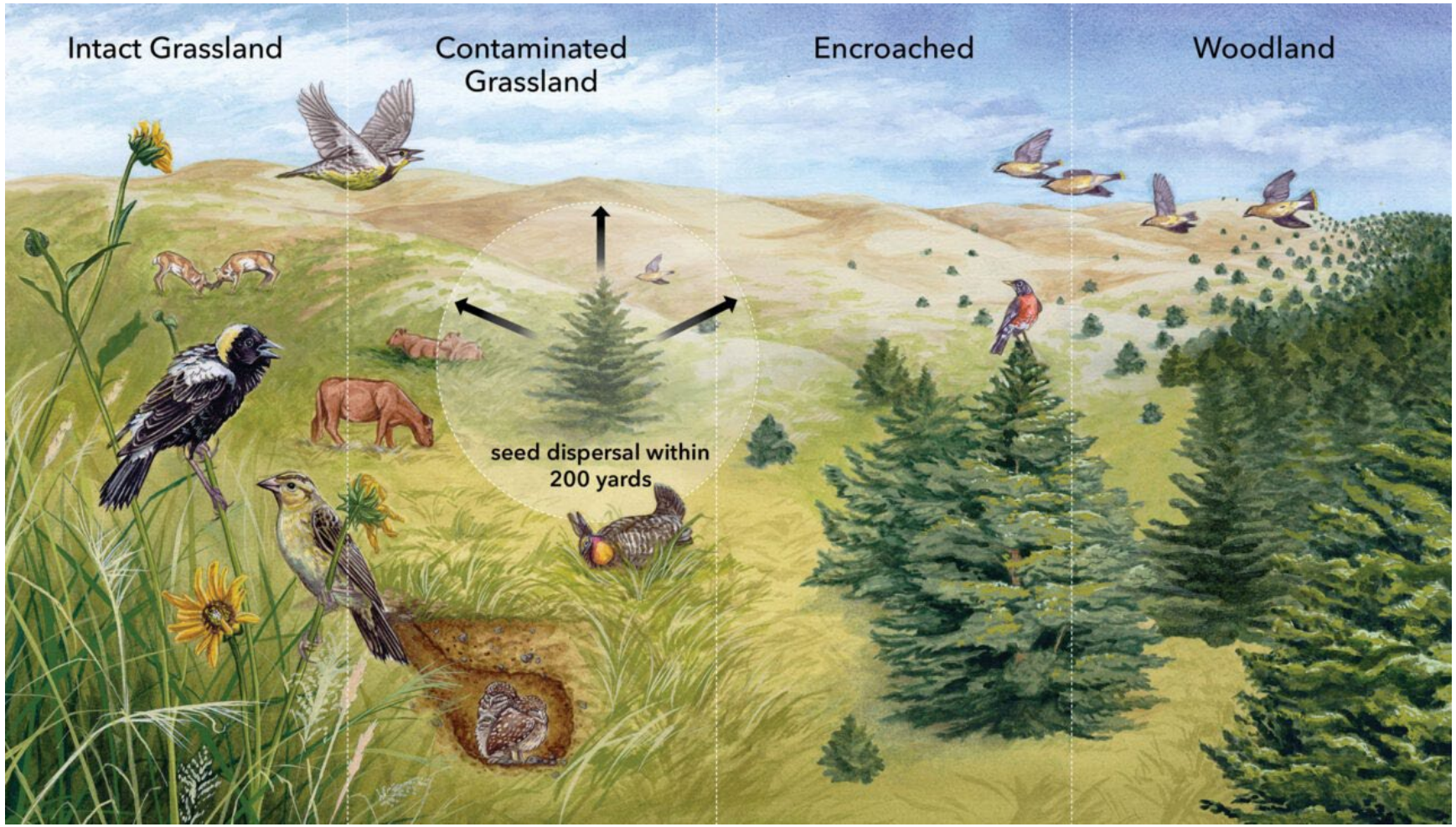


BIODIVERSITY LOSS

Decline of the North American avifauna

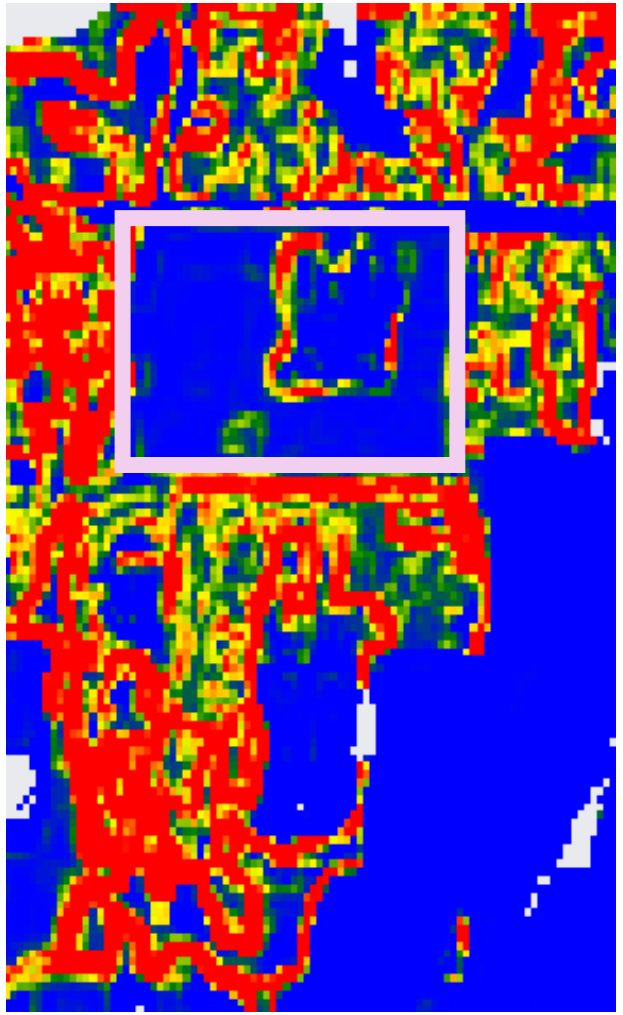
Kenneth V. Rosenberg[1,2]*, Adriaan M. Dokter[1], Peter J. Blancher[3], John R. Sauer[4], Adam C. Smith[5], Paul A. Smith[3], Jessica C. Stanton[6], Arvind Panjabi[7], Laura Helft[1], Michael Parr[2], Peter P. Marra[8]†

Woodland invasion and birds



Cornell Lab, allaboutbirds.com, 2023

Methods



Methods

Eastern Kingbird

Eastern Meadowlark

Northern Bobwhite

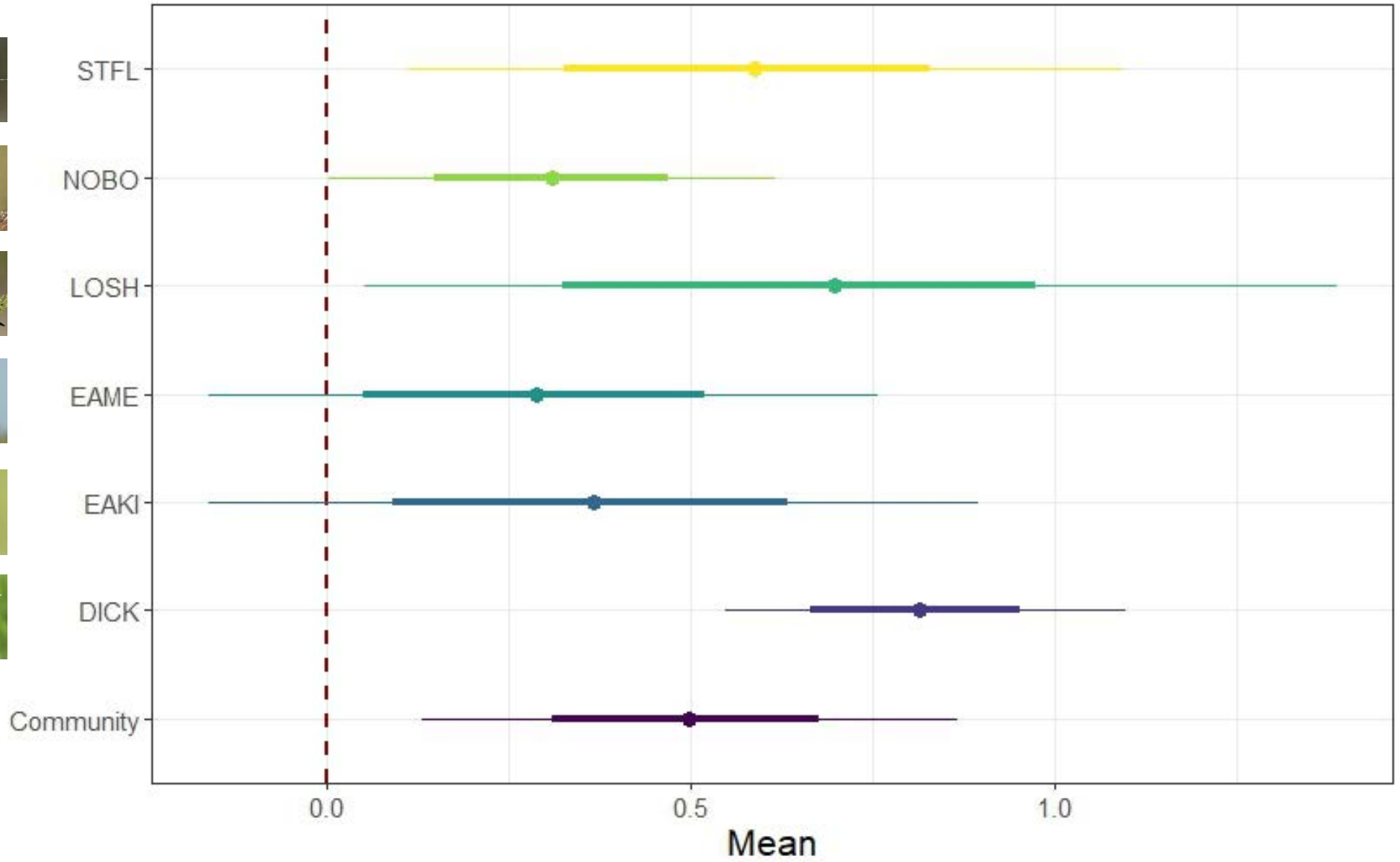
Scissortail Flycatcher

Loggerhead Shrike

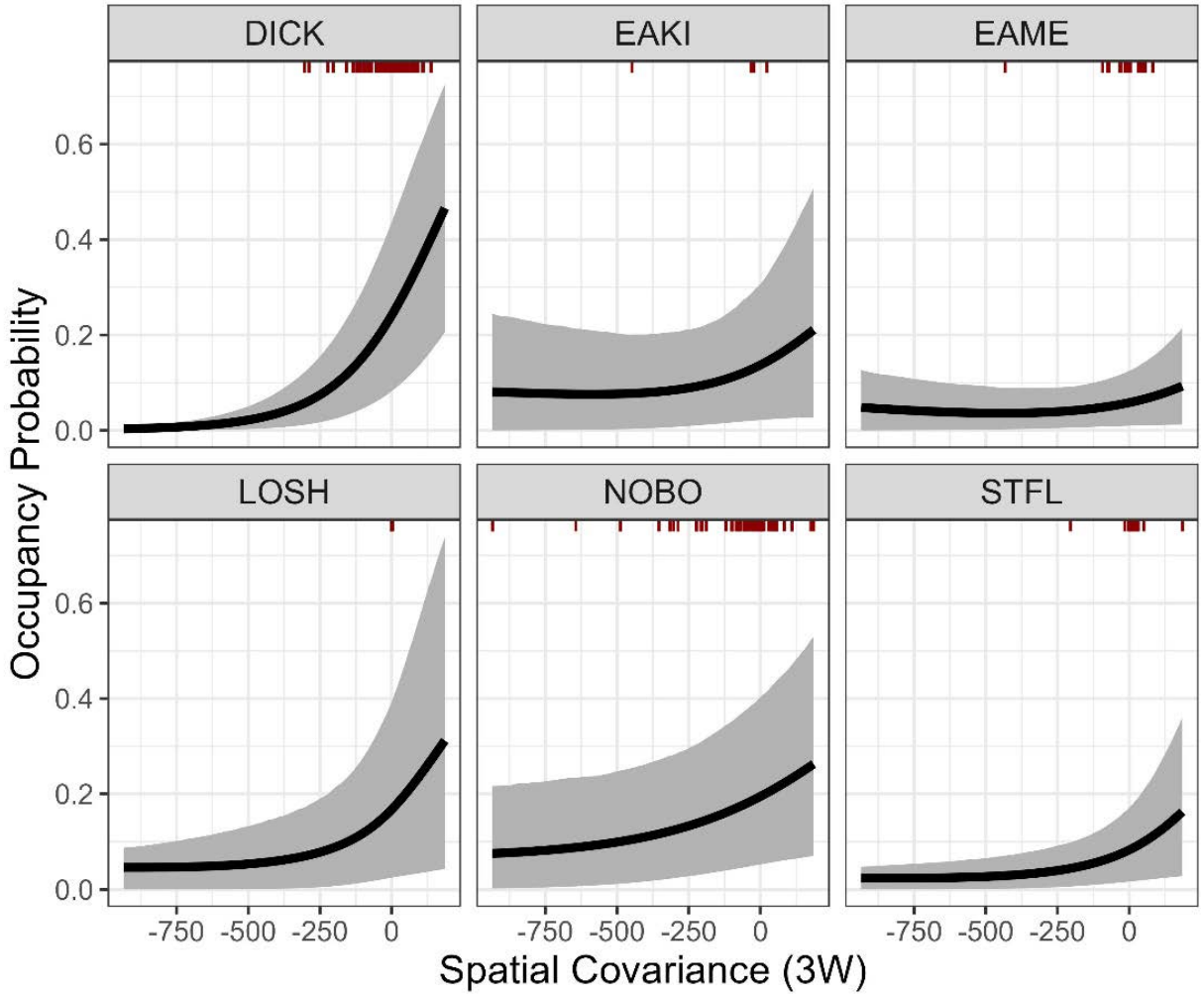
Dickcissel

sfMsPGOcc(Occupancy ~ SpatialCovariance + (1| Site))

Results

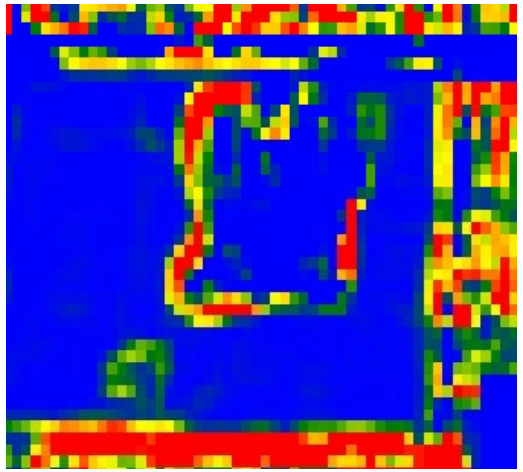


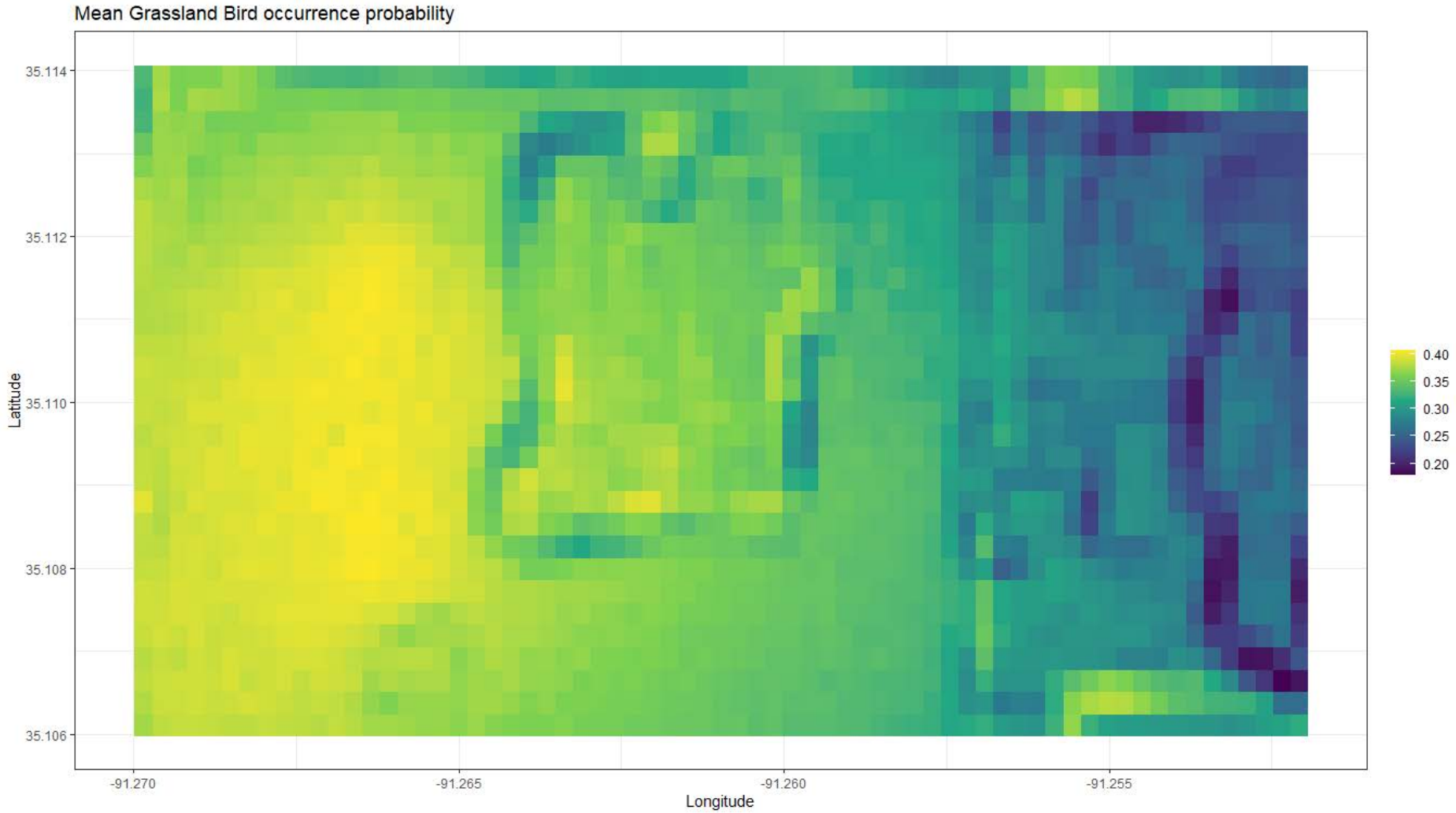
Results


DICK
EAKI
EAME
LOSH
NOBO
STFL
Occupancy Probability
0.0
0.2
0.4
0.6
-750
-500
-250
0
Spatial Covariance (3W)

Results

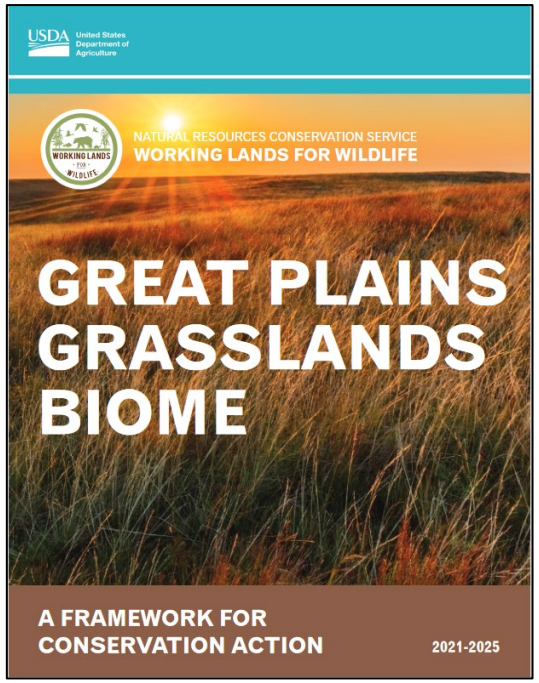

762




Mean Grassland Bird occurrence probability
35.114
35.112
35.110
35.108
35.106
Latitude
-91.270
-91.265
-91.260
-91.255
Longitude
0.40
0.35
0.30
0.25
0.20

What have we learned?

USGS
science for a changing world



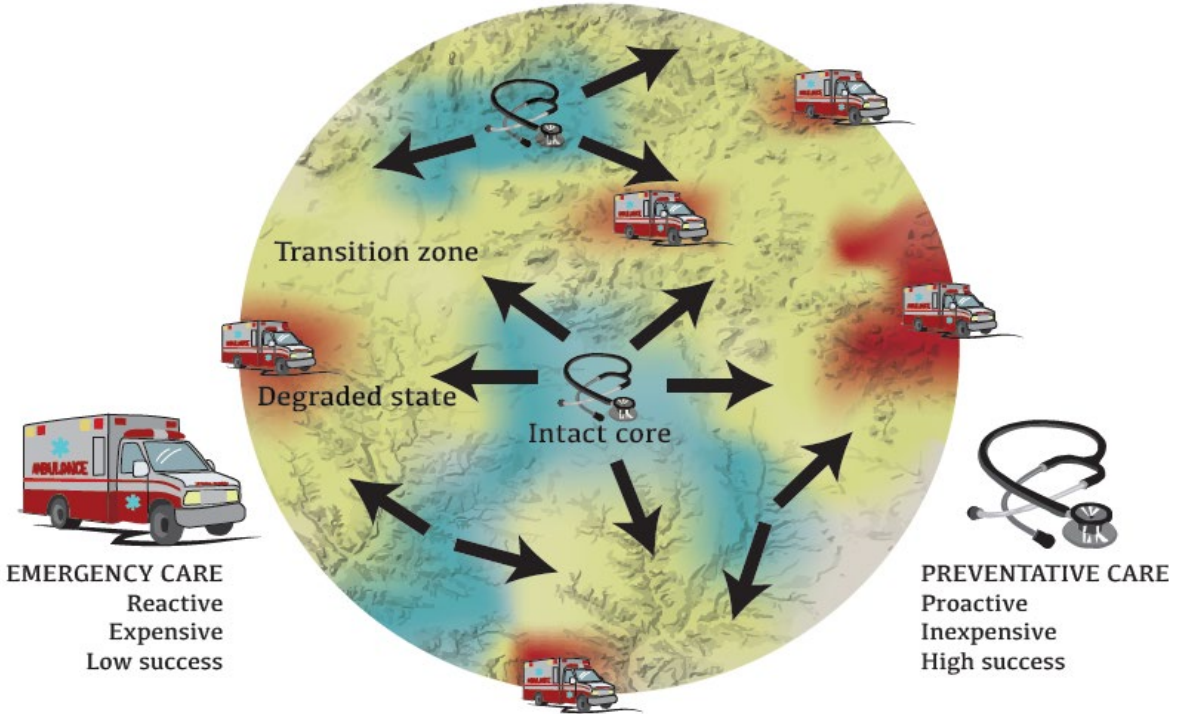
RALA-00330; No of Pages 186

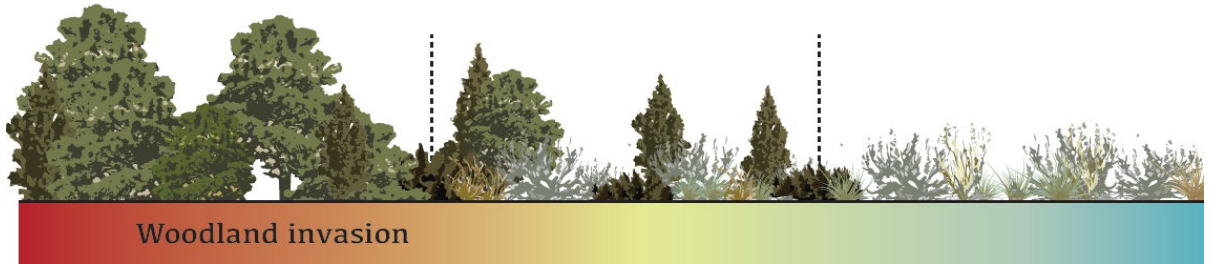
SRM Society for Range Management

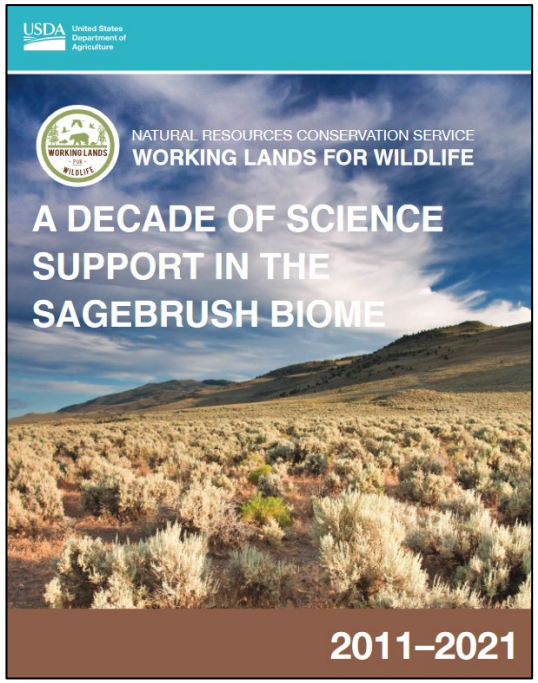
CrossMark

Defend the core: Maintaining intact rangelands by reducing vulnerability to invasive annual grasses

By Jeremy D. Maestas, Mark Porter, Matt Cahill, and Dirac Twidwell







USGS science for a changing world

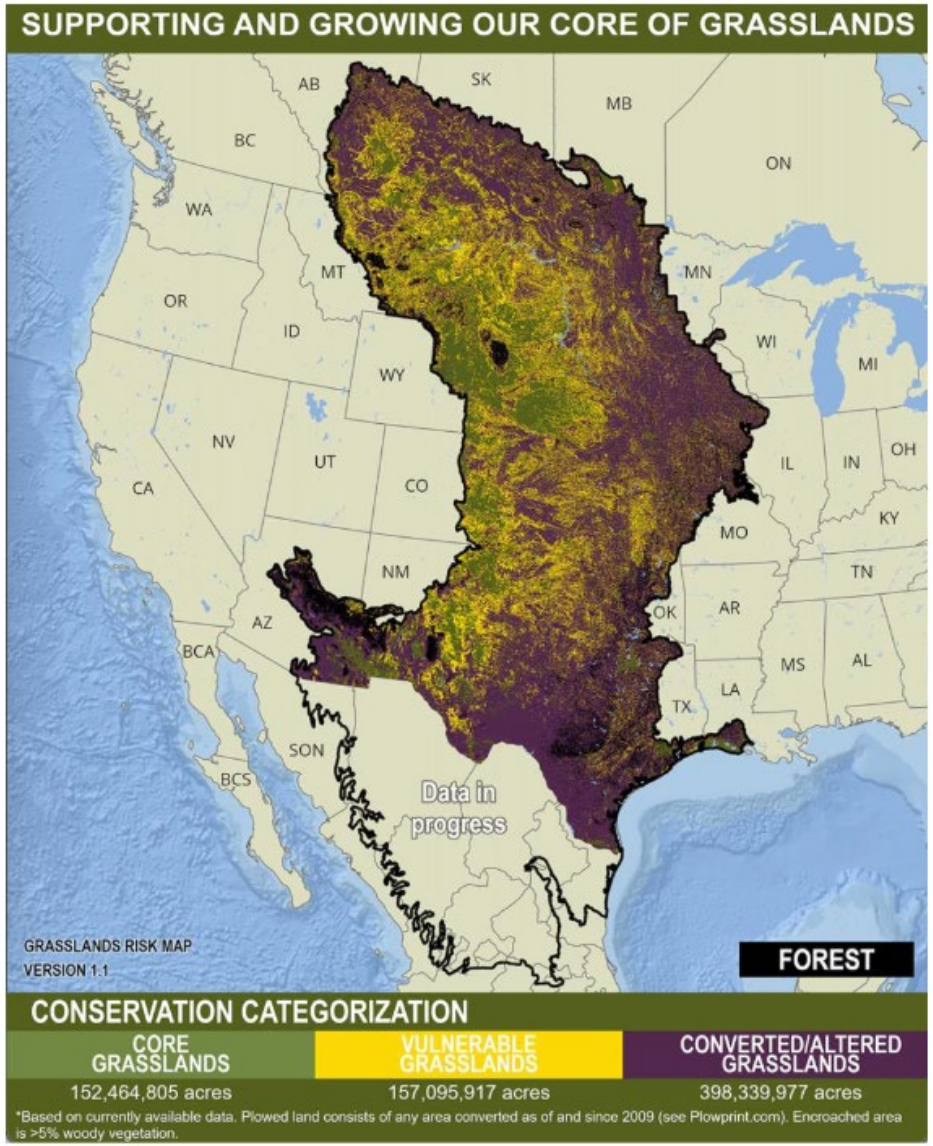
Uden et al. 2019; USDA NRCS 2021

1. Keep the green areas of existing grasslands "green-side up" (intact), by:
   - Ensuring food security, traditional values and land sovereignty for Indigenous/First Nations
   - Promoting grass-based economies to help rural communities thrive
   - Removing young cedars and invasive shrubs
   - Preventing seed trees from establishing
   - Addressing invasive grasses and forbs
   - Supporting sustainable range management practices

2. Work in yellow areas to
   - Address woody species encroachment
   - Remove other annual invasive species
   - Voluntarily retain vulnerable grasslands
   - Maintain connectivity with large blocks of existing grassland

3. Make strategic investments in the purple areas to:
   - Remove woody species
   - Convert cropland on marginal soils back to grassland
   - Improve productivity and ecosystem health, and
   - Connect to larger blocks of existing grassland.

The Central Grasslands Assessment Map



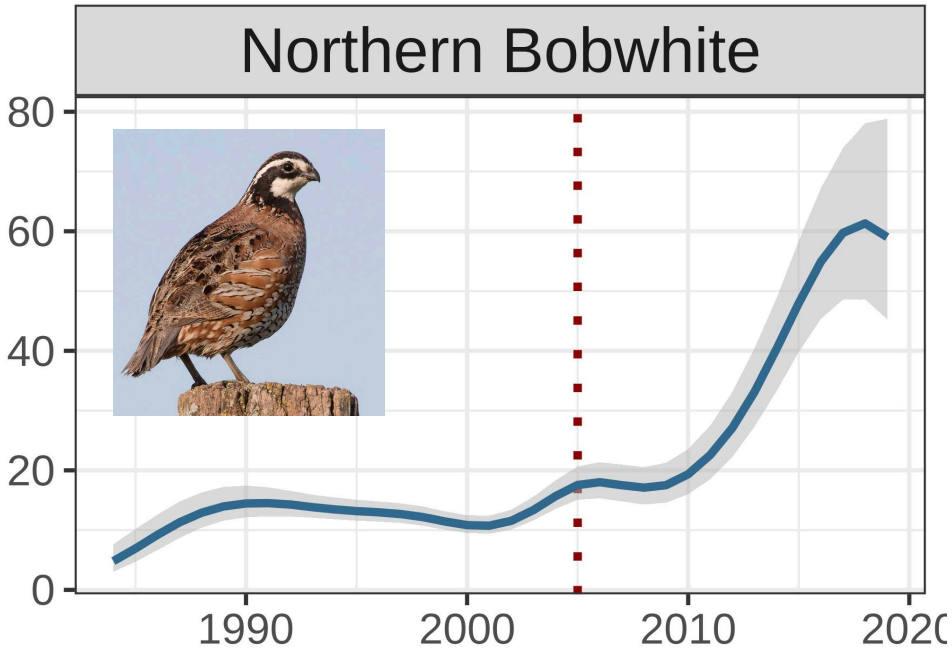
USGS science for a changing world

We can detect successes of the “defend the core” strategy at biome-scales

USGS science for a changing world

ts et al. In prep

We can detect successes of the "defend the core" strategy at biome-scales



<u>236% increase</u>
in relative Bobwhite abundance
after implementing "defend the core" strategy

USGS science for a changing world

Roberts et al. In prep; Photo credit: Caleb Putnam

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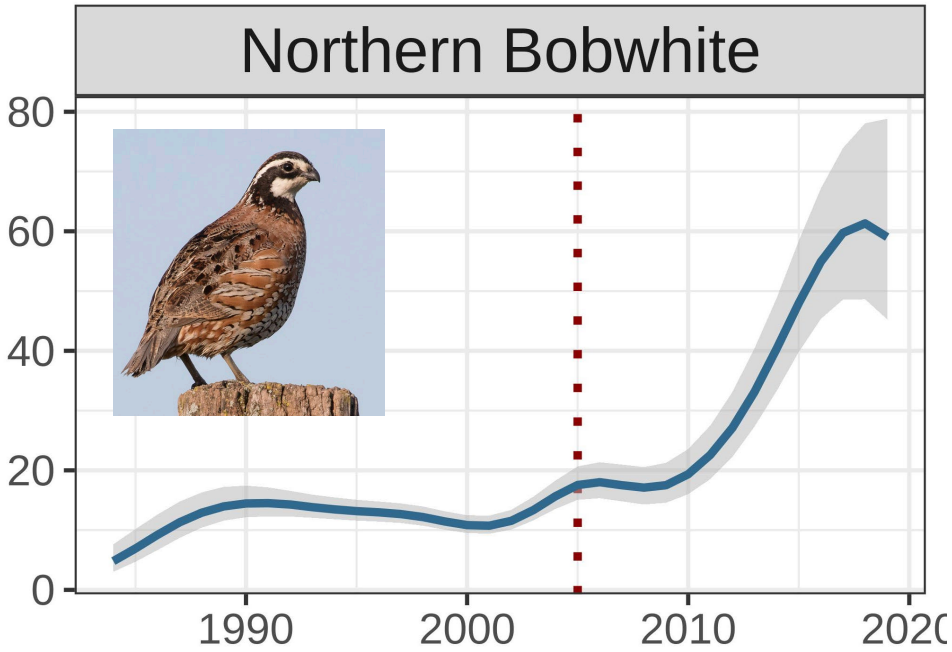

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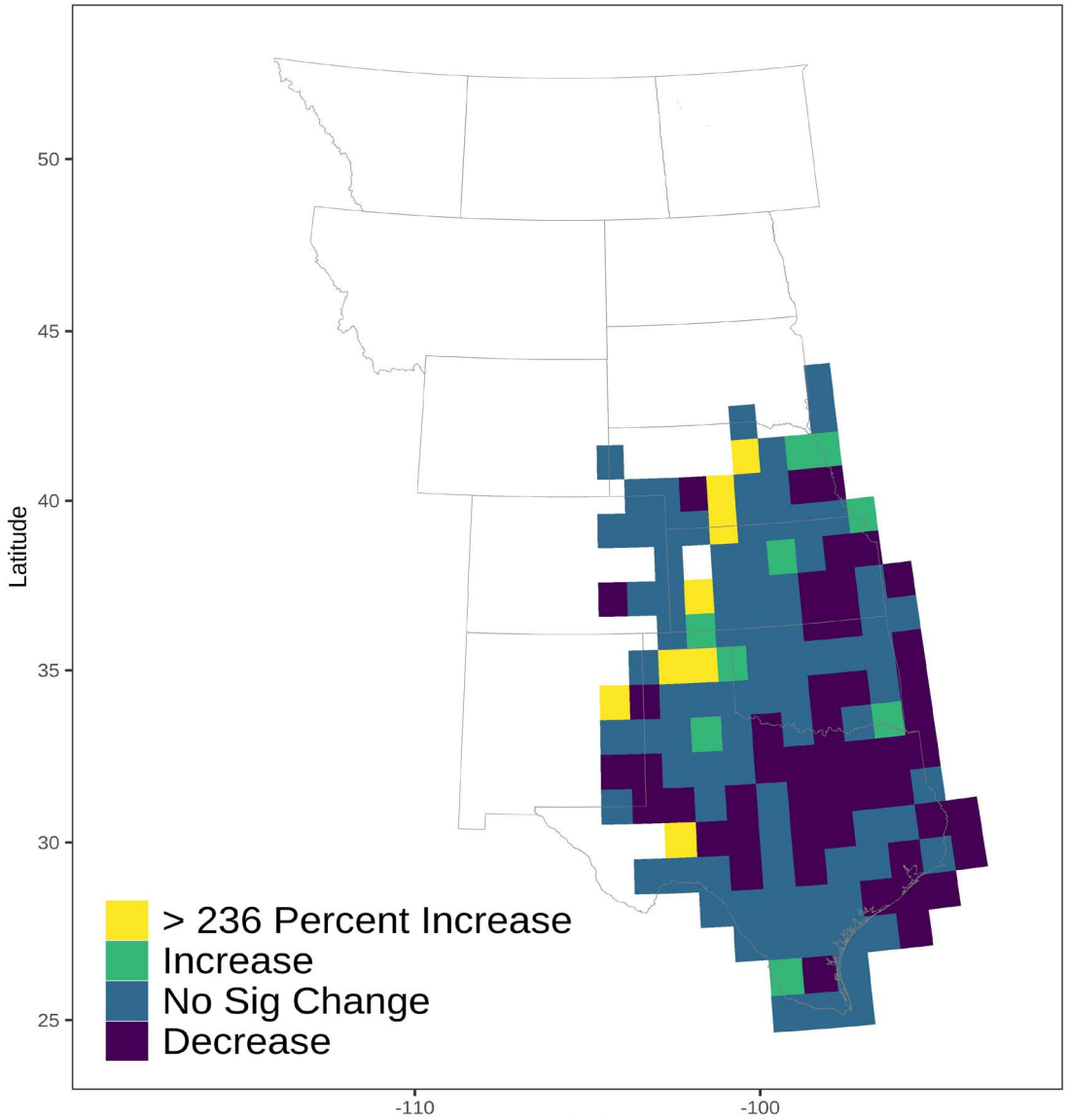

USGS science for a changing world

Roberts et al. In prep; Photo credit: Caleb Putnam

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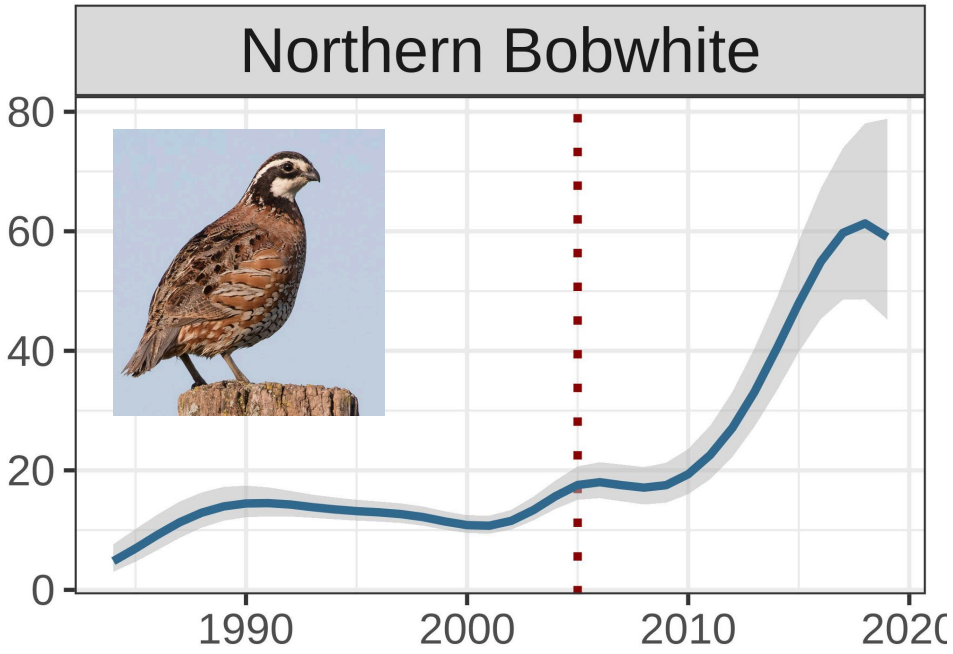

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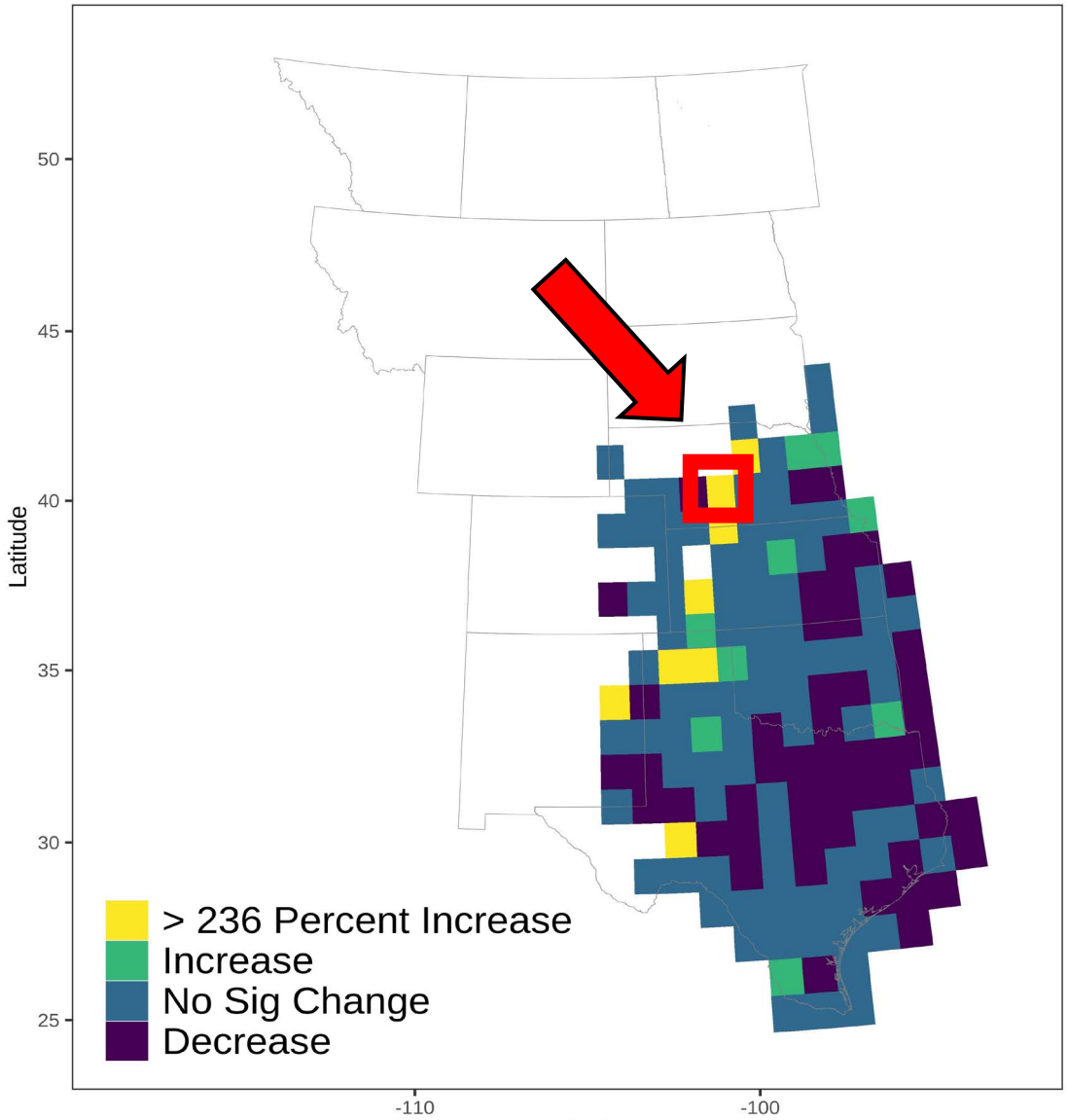

USGS science for a changing world

Roberts et al. In prep; Photo credit: Caleb Putnam

Finding The Core: Tools for Identifying Intact Grasslands and Tracking Restoration Outcomes

Caleb P. Roberts and Lauren L. Berry

cr065@uark.edu; cproberts@usgs.gov

https://livinglandscapes.github.io/LivingLandscapes_Website/

Next Third Thursday Web Forum

7-18-2024

10:00 am ET

Shan Cammack

Wildlife Biologist & Fire Management Office, Georgia Dept. of Natural Resources

Jennifer Fawcett

Extension Associate, NC State University & Prescribed Fire Work Group Coordinator, SERPPAS

secassoutheast.org

How do we conduct more prescribed fire, keep our air clean, and meet more strict national ambient air quality standards?

Staff updates

- 2024 goal report progress report

2024 goal report progress report

- 2024 update to *Recent trends in Southeastern ecosystems* report is underway

- Opportunity to review grasslands and savannas trends

How to get involved in SECAS

- Sign up for the SECAS newsletter

  secassoutheast.org

- Connect with SECAS staff or partners

  secassoutheast.org/staff

  secassoutheast.org/partners

- Explore the Southeast Conservation Blueprint

  secassoutheast.org/blueprint

Southeast Conservation Adaptation Strategy


Questions?