

WESTERN WORKING LANDS FOR WILDLIFE WORKSHOP

AGENDA - DAY 1

7 - 8:30 a.m.

BREAKFAST

8:30 a.m. -
12 p.m.

GENERAL SESSION

WELCOME & HOUSEKEEPING

Dean Krehbiel, State Resource Conservationist, Kansas NRCS - Moderator

INTRODUCTION OF KEYNOTE SPEAKER

Clint Evans, State Conservationist, Colorado NRCS

Cade Rensink, Great Plains Grasslands Initiative Landowner Board

KEYNOTE ADDRESS: *Importance of Private Lands to Conservation*

Robert Bonnie, Under Secretary for Farm Production and Conservation, USDA

PANEL: *Landowners on the Front Lines*

Shelly Kelly, Executive Director, Sandhills Task Force - Moderator

Landowner Panelists:

Sara Grimm, South Dakota

Russell Blew, Kansas

Tell Dadrach, Nebraska

BREAK

WLFW PANEL: *How Did We Get Here and Where Are We Going?*

Steve Jester, Executive Director, Partnerscapes

Tim Griffiths, National Coordinator, West Working Lands for Wildlife, USDA

David Naugle, WLFW Science Advisor, Wildlife Biology Professor, University of Montana

DEFEND THE CORE, GROW THE CORE: A Winning Strategy

Jeremy Maestas, National Sagebrush Ecosystem Specialist, USDA-NRCS West National Technology Support Center

12 - 1:15 p.m.

LUNCH



WESTERN WORKING LANDS FOR WILDLIFE WORKSHOP

AGENDA - DAY 1

1:30 - 2:15 p.m. **GENERAL SESSION**

**REDUCING WOODY ENCROACHMENT TO CONSERVE RANGELAND
PRODUCTION IN THE GREAT PLAINS**

Dirac Twidwell, WLFW Science Advisor, Professor, University of Nebraska-Lincoln

2:30 - 3:30 p.m. **BREAKOUT SESSIONS REDUCING VULNERABILITY TO WOODY ENCROACHMENT**

Northern Great Plains - Konza Prairie ABC

Ritch Nelson, State Wildlife Biologist, Nebraska NRCS - Moderator

Southern Great Plains - Kaw Nation / Big Basin

Brandon Reavis, State Range Management Specialist, Oklahoma NRCS - Moderator

Sagebrush Steppe - McDowell / Tuttle / Alcove

Connor White, Range and Wildlife Conservationist, Pheasants Forever and Quail Forever - Moderator

3:30 - 4 p.m. **BREAK**

4 - 5 p.m. **GENERAL SESSION**

TECHNICAL TRANSFER: MOVING FROM AWARENESS TO ACTION

Jeremy Maestas, National Sagebrush Ecosystem Specialist, USDA-NRCS West National Technology Support Center - Moderator

Panelists:

Dillon Fogarty, University of Nebraska-Lincoln

Doug Spencer, State Grazing Land Management Specialist, Kansas NRCS

Dusty Tacha, Area Range Specialist, Kansas NRCS

5:30 - 7 p.m. **EVENING RECEPTION**

Flint Hills Discovery Center

WESTERN WORKING LANDS FOR WILDLIFE WORKSHOP

AGENDA - DAY 2

7 - 8 a.m.

BREAKFAST

8 a.m. -
10:15 a.m.

GENERAL SESSION

OPENING REMARKS

Dean Krehbiel, State Resource Conservationist, Kansas NRCS - Moderator

NEW TECHNOLOGY ALERT: LANDSCAPE EXPLORER AVAILABLE!

Scott Morford, Associate Director, WLFW Science Team, Research Scientist, University of Montana

PANEL: *Spotlight on Wyoming Migratory Big Game Project*

Moderator: Tim Griffiths, National Coordinator, West Working Lands for Wildlife, USDA

Panelists:

Arthur Middleton, Senior Advisor, Wildlife Conservation, USDA

Jackie Byam, State Conservationist, Wyoming NRCS

TJ Wilson, Deputy Director, Conservation Division, USDA Farm Service Agency

BREAK

KEEPING GRASS GREEN-SIDE UP: USING BOTH SHORT-TERM AND LONG-TERM CONSERVATION OPPORTUNITIES

Alan Lange, Natural Resources Specialist, Farm Services Agency

David Naugle, WLFW Science Advisor, Wildlife Biology Professor, University of Montana

CLOSING REMARKS

Dean Krehbiel, State Resource Conservationist, Kansas NRCS - Moderator

11 a.m. -
6:30 p.m.

FLINT HILLS GRASSLAND TOUR

Mushrush Red Angus

Tallgrass Prairie Preserve

Spring Creek Ranch

6:30 p.m. -
9 p.m.

EVENING EVENT

Clover Cliff Ranch



Scan here to go directly
to the Working Lands For
Wildlife Workshop Website



United States
Department of
Agriculture



WESTERN WORKING LANDS FOR WILDLIFE WORKSHOP

Landowners on the Front Line





Landowners on the Front Line

- Shelly Kelly
Executive Director, Sandhills Task Force
- Tell Deatrich
Nebraska
- Russell Blew
Kansas
- Sara Grim
South Dakota



Shelly Kelly

Sandhills Task Force

Broken Bow, Nebraska







Tell Deatrich

Loess Canyons Rangeland Alliance

Curtis, Nebraska



Vision: Regenerating the land, with cattle, to create human flourishing.





Russell Blew

Red Hills, Kansas





Reclamation Burn



November 2022



July 2023



2019 *Before*
Native Prairie Restoration



2021 *After*

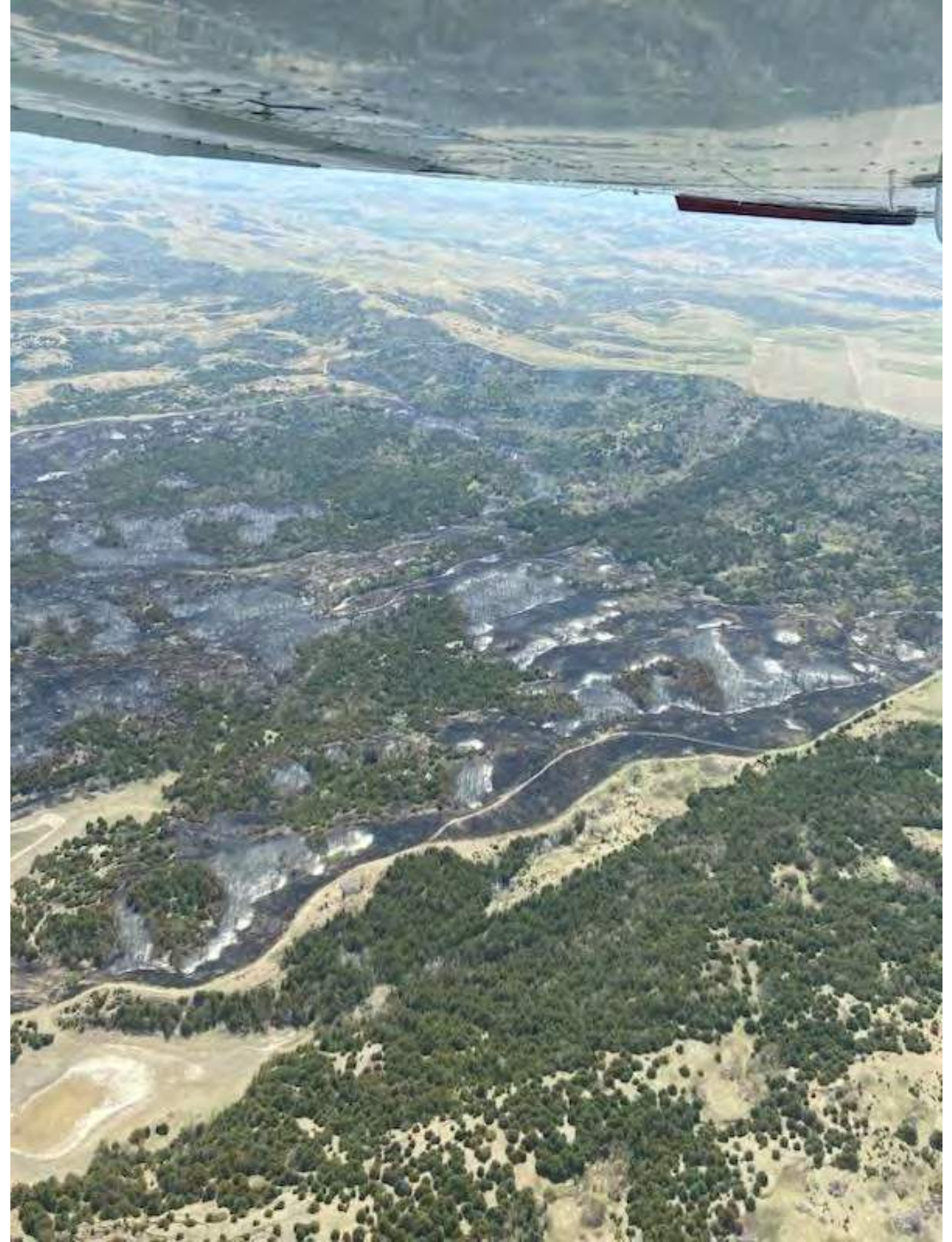


Sara Grim

Bonesteel, South Dakota

<https://www.youtube.com/watch?v=UagyMHht9AY>





2023 WESTERN WORKING LANDS FOR WILDLIFE WORKSHOP

DEFENDING AMERICA'S GRASSLANDS



WESTERN WORKING LANDS FOR WILDLIFE WORKSHOP

How Did We Get Here and Where Are We Going?





Working Lands for Wildlife

- Steve Jester
Executive Director, Partnerscapes
- Tim Griffiths
National Coordinator, West Working Lands for Wildlife, USDA
- David Naugle
WLFW Science Advisor, Wildlife Biology Professor, University of Montana



Working Lands for Wildlife:

Where have We Been, Where are We Going





Working Lands for Wildlife (WLFW)

1. Where have we been?

- A. Birth of Sage Grouse Initiative (SGI)
- B. Expansion to other species
- C. Creation of Frameworks
- D. Proven ingredients for success

2. Where are we going?

- A. Alignment with FSA
- B. Expansion of geographies

USDA and Interior Announce Wildlife Conservation Efforts to Support Local Economies and Preserve Farm and Ranch Traditions

2012

Innovative partnership preserves working lands and supports efforts of private landowners to conserve habitat for at-risk species

WASHINGTON, March 8, 2012—Agriculture Secretary Tom Vilsack and Secretary of the Interior Ken Salazar today announced a new \$33 million partnership with farmers,



Press Release
Release

USDA Announces Historic Investment in Wildlife Conservation, Expands Partnership to Include Additional Programs

2023

\$500 Million from Farm Bill Is Part of Broader Commitment from FSA and NRCS to Working Lands Conservation that Benefits Wildlife and Supports Agriculture and Rural Communities

BOULDER, Colo., June 27, 2023 – Today, the U.S. Department of Agriculture (USDA) is announcing that it will expand its work on wildlife conservation by investing at least \$500 million over the next five years and by leveraging all available programs, including the [Conservation Reserve Program](#) (CRP), through its [Working Lands for Wildlife](#) commitments, which align with President Biden's Investing in America agenda, will ramp up the

Contact:
FPAC.BC.Press@usda.gov

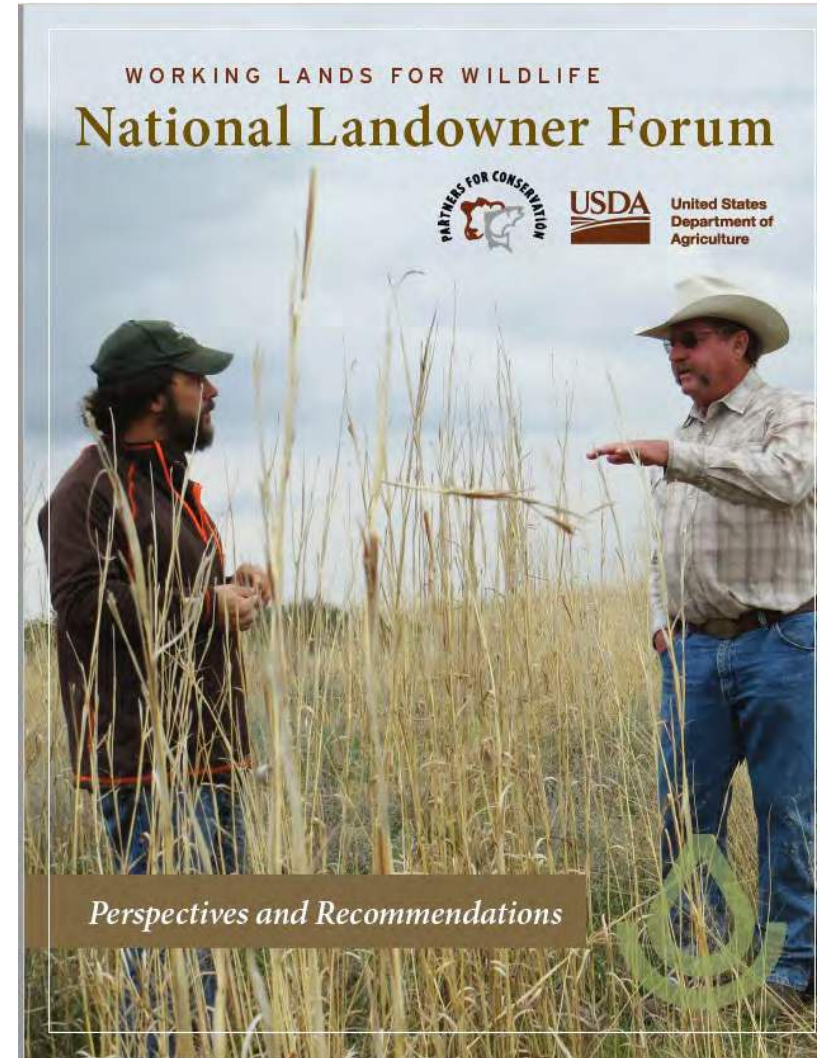


PARTICIPANT WORKBOOK

Operational Workshop
May 8-10, 2017
Greensboro, NC



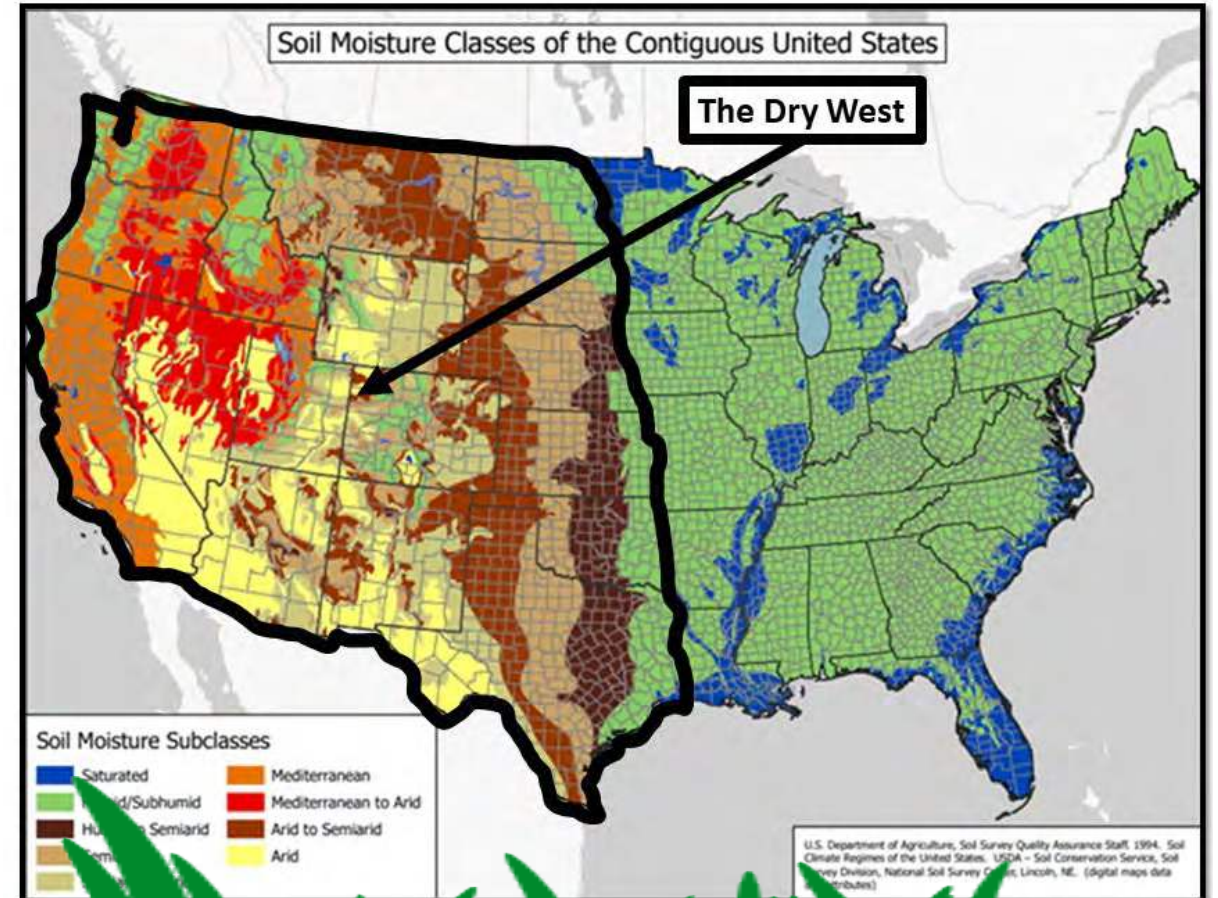
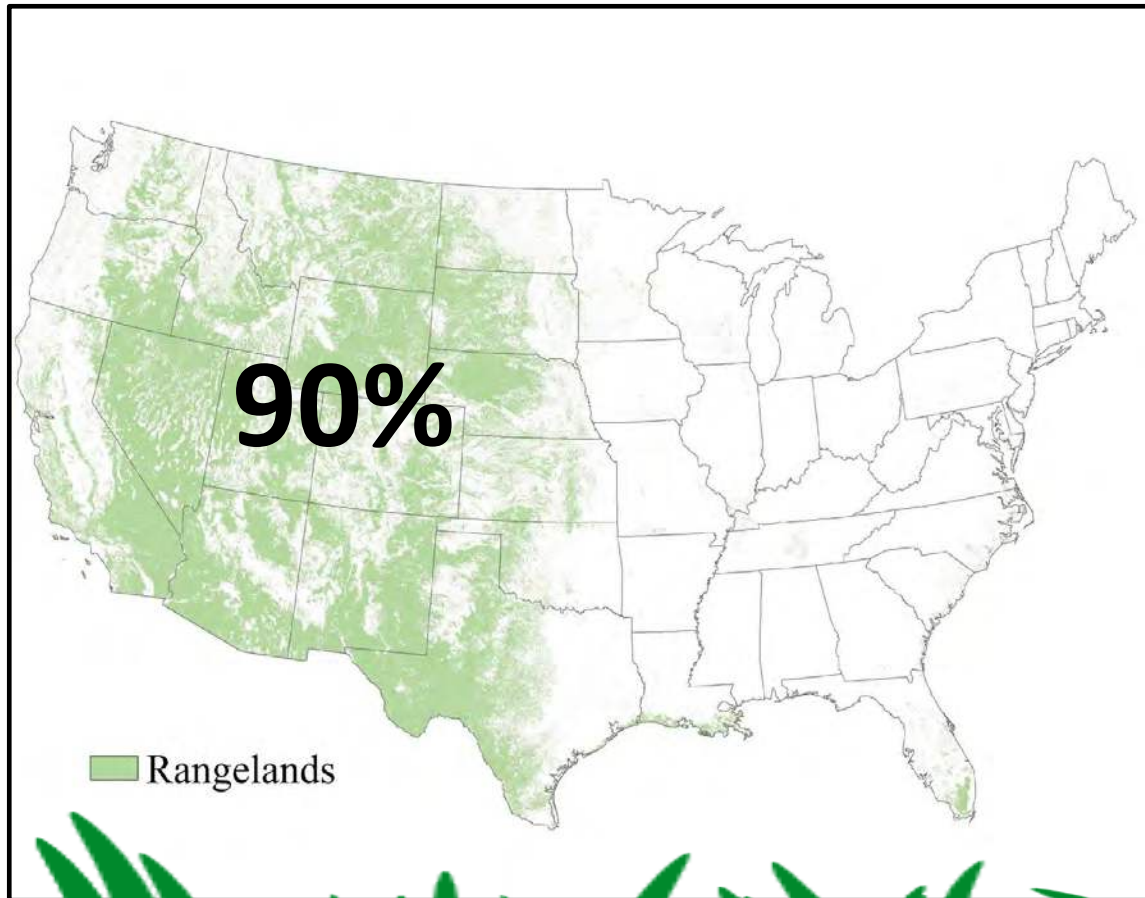
NATURAL RESOURCES CONSERVATION SERVICE





WLFW in the West...

Is Synonymous with Grasslands





How to be successful working with ranchers

**Viewing producer as part of the
solution instead of the problem**

**Developing strategies that work for
wildlife and agriculture**

**Helping the agricultural community
tell their success stories**



Sage Grouse Initiative



From a Bird to an Ecosystem

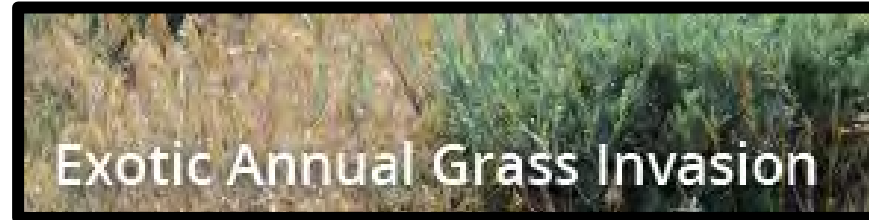
Nailed the Shared Vision

Wildlife conservation through sustainable agriculture

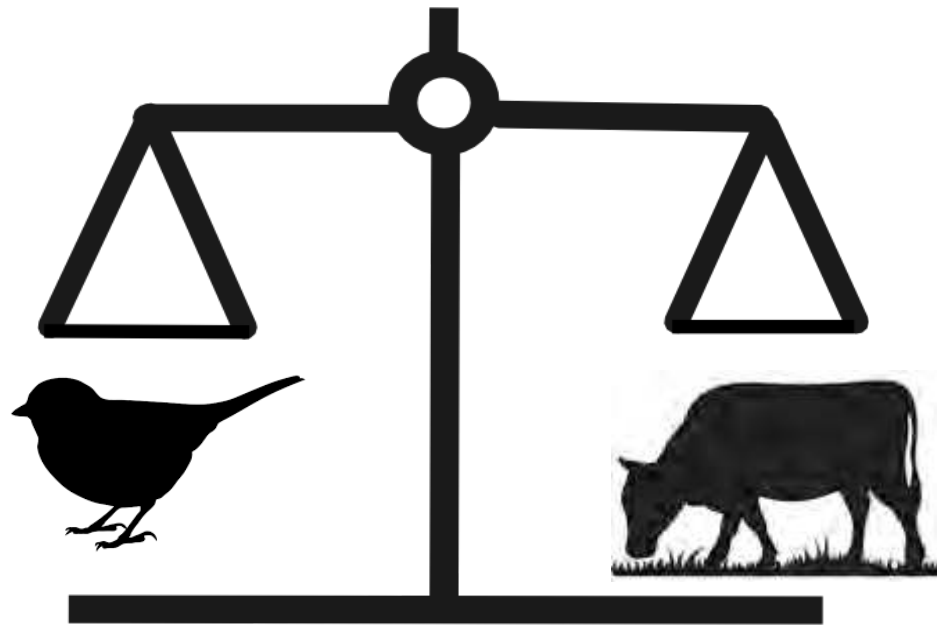


“What’s good for the herd is good for the bird”

Focused on the Big Rocks



Balanced Benefits for Wildlife & People



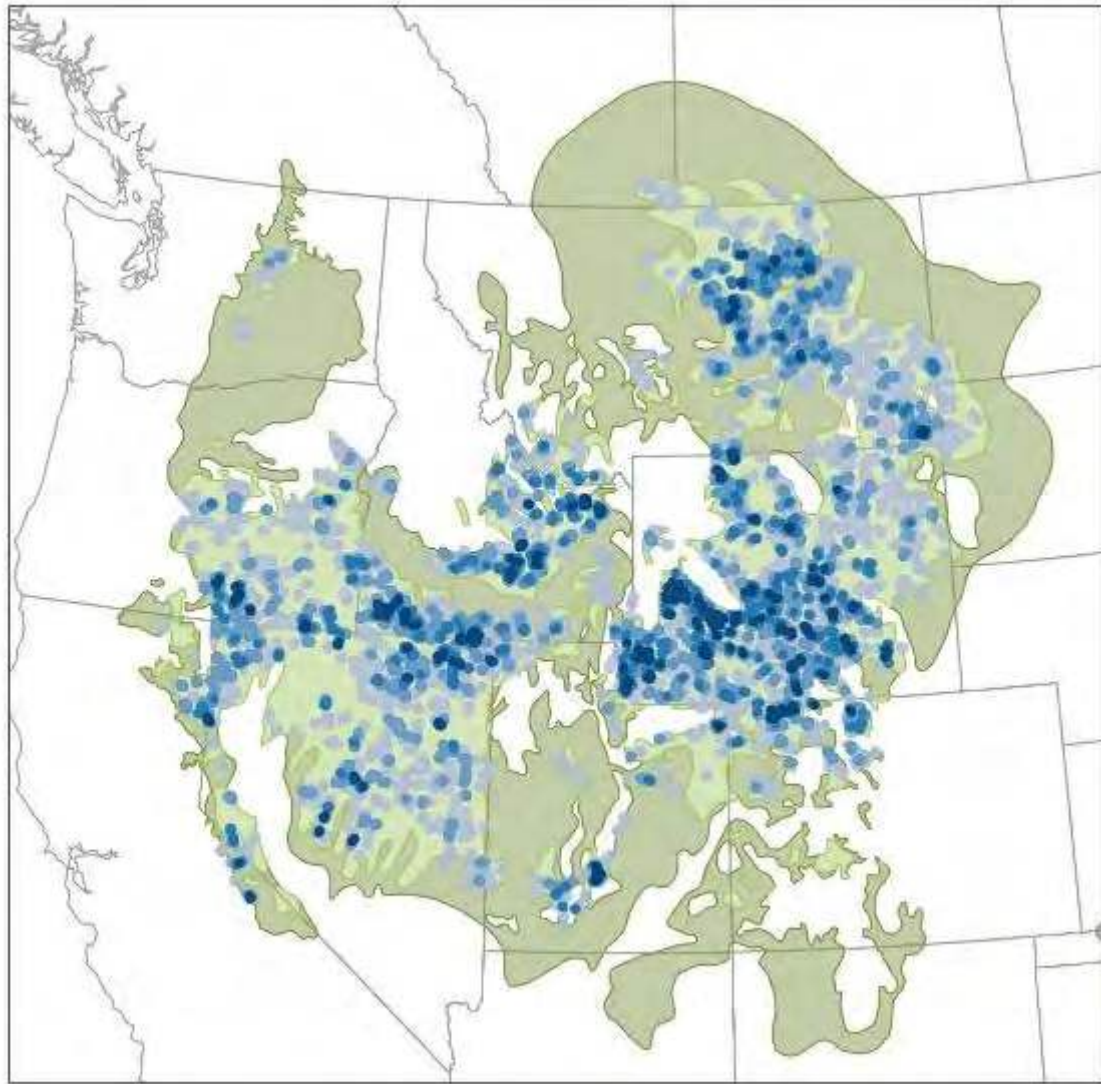


Shared Vision: Wildlife conservation through sustainable agriculture

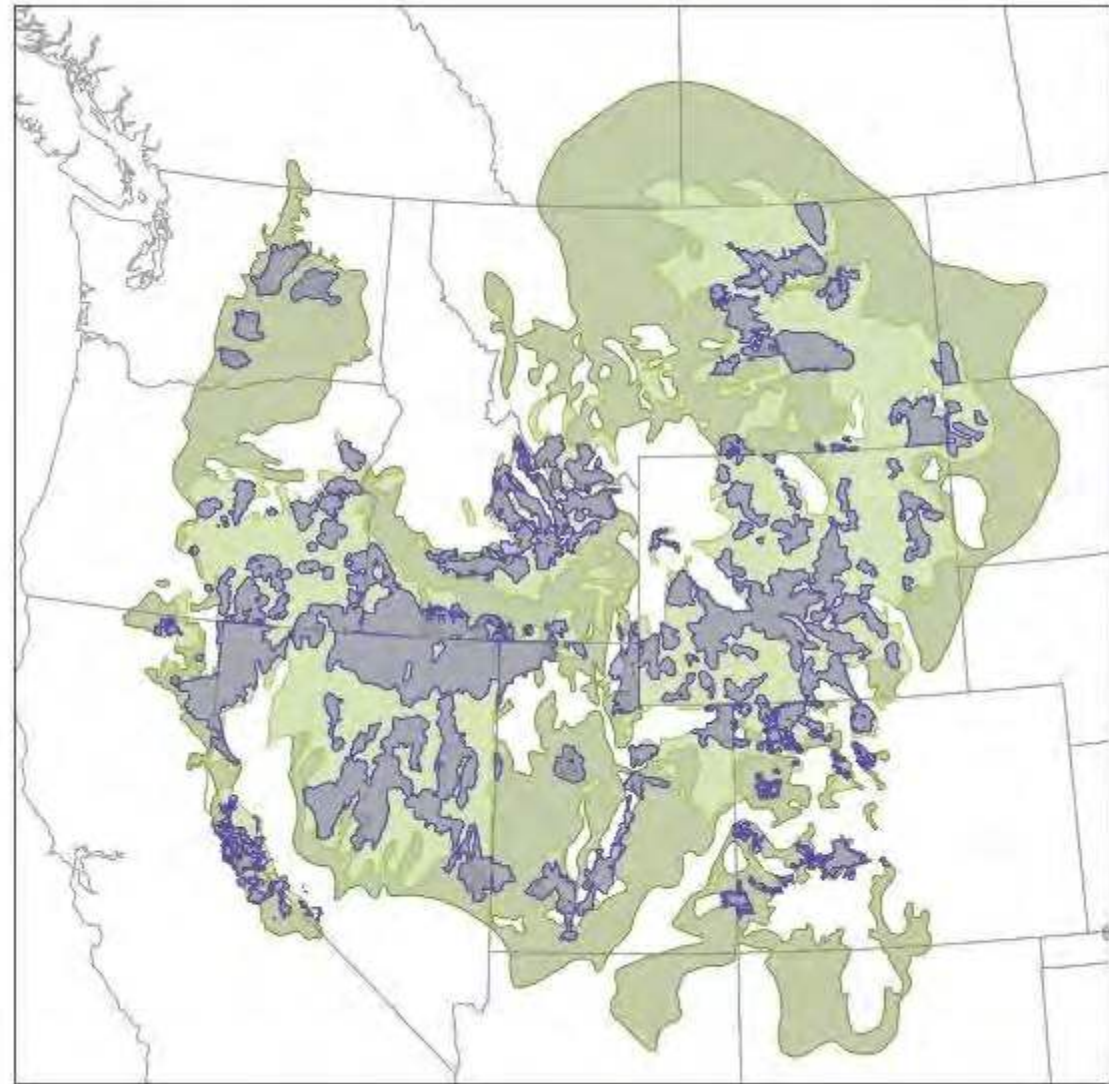
1. Remove threats to wildlife and improve sustainability of working lands
2. Implement enough of the right practices in the right places to benefit populations
3. Assess effectiveness, quantify benefits, adapt program delivery, and tell the story



The Right Location

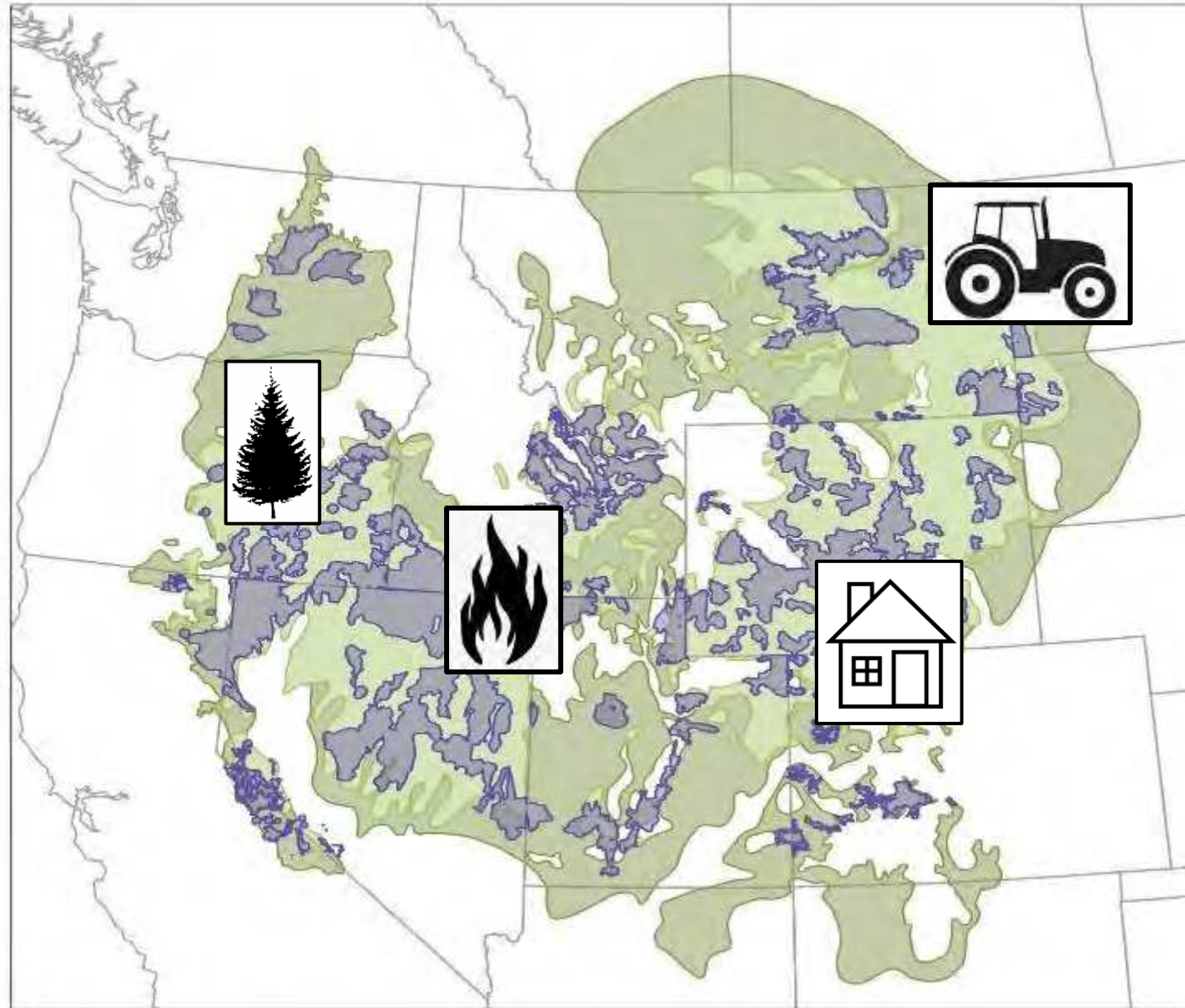


75% of birds in 25% of area



Priority Areas for Conservation

The Right Practices

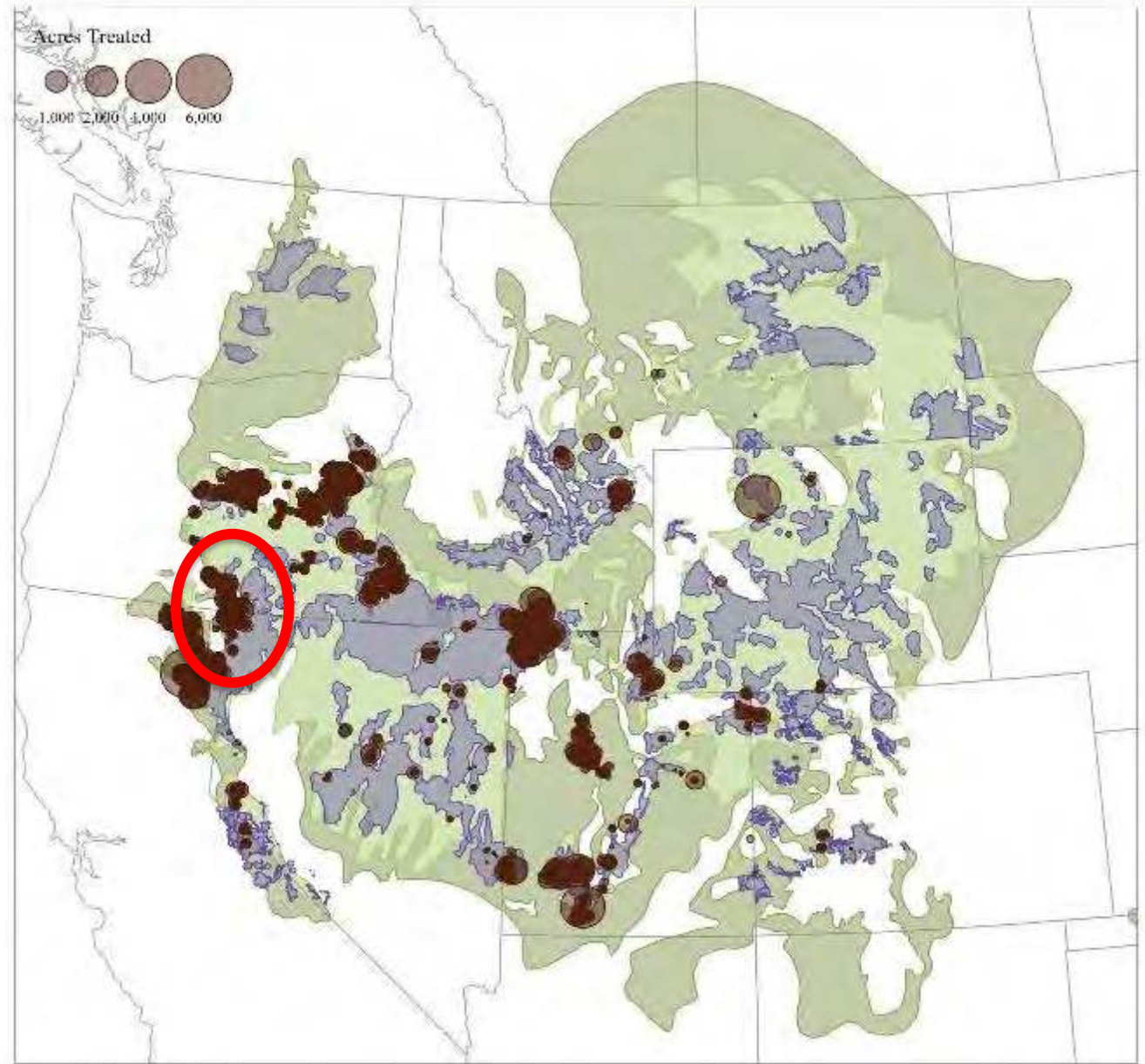


The Right Scale

Degraded

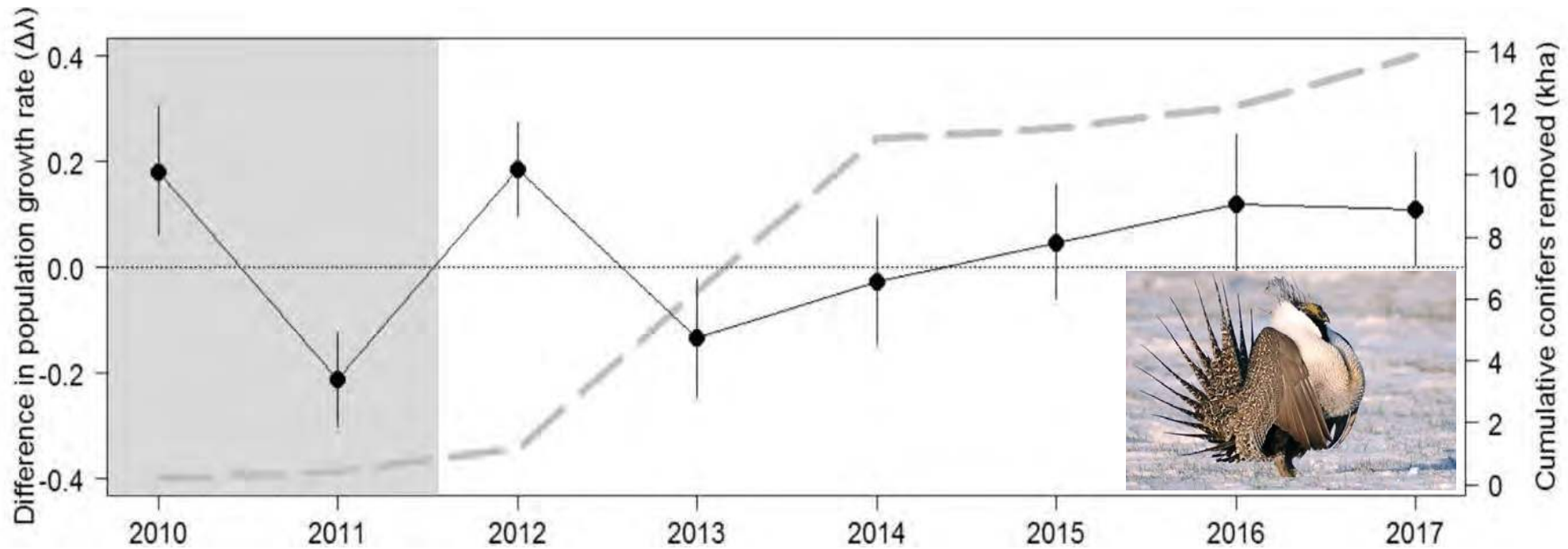


Restored



Producing measurable benefits to sage grouse!

12%↑ population growth rate



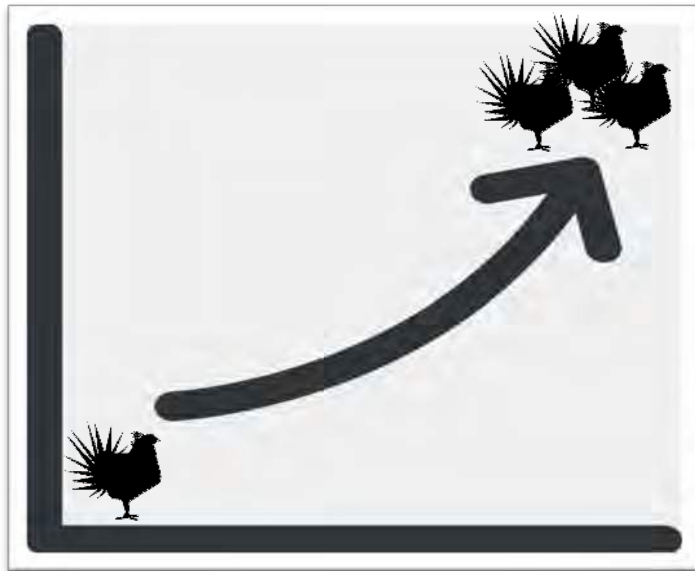
And so much more



2 more weeks of water



60% more forage

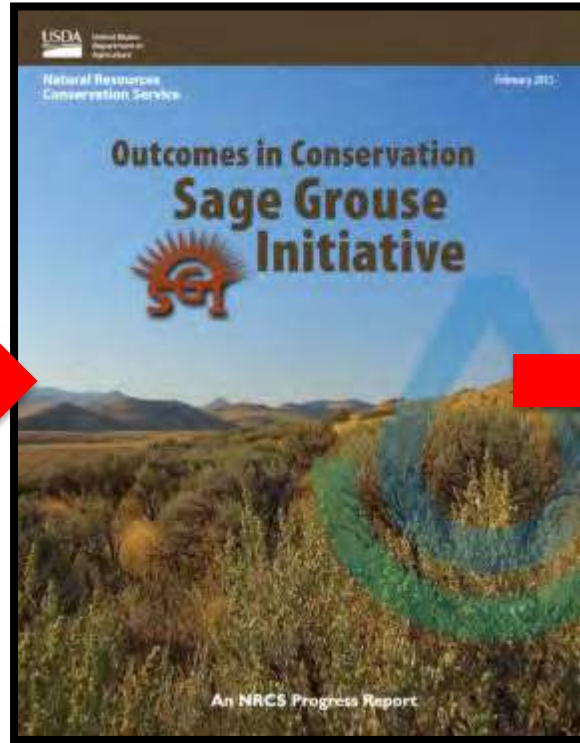


+12% population growth



50-80% more songbirds

Voluntary Conservation on Par with Regulatory Mechanisms



Historic Outcome



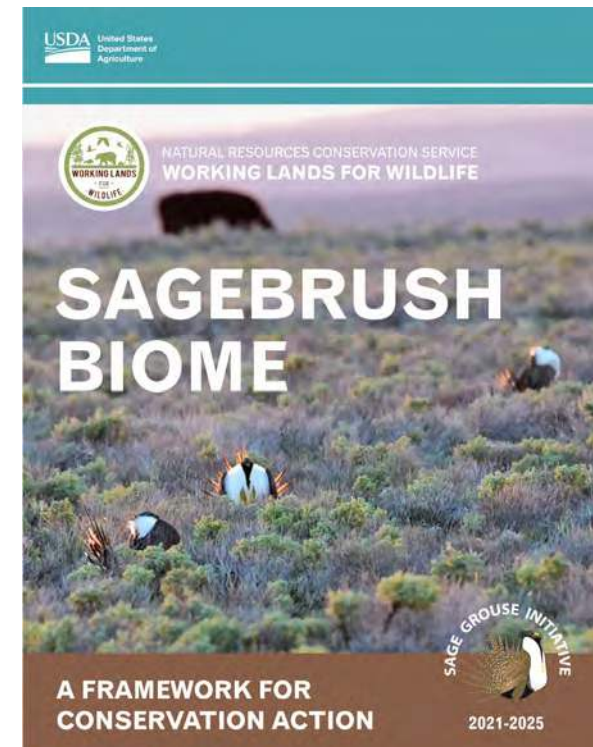
From Short-Term Initiative to Primary Mechanism



2010-2015



2016-2020



2021-Today

Facilitates linkages to other regional efforts

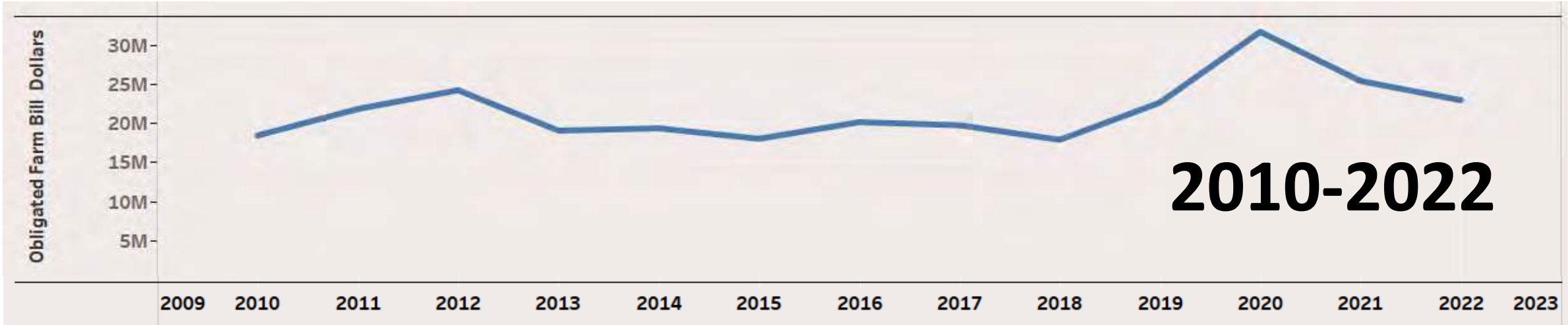




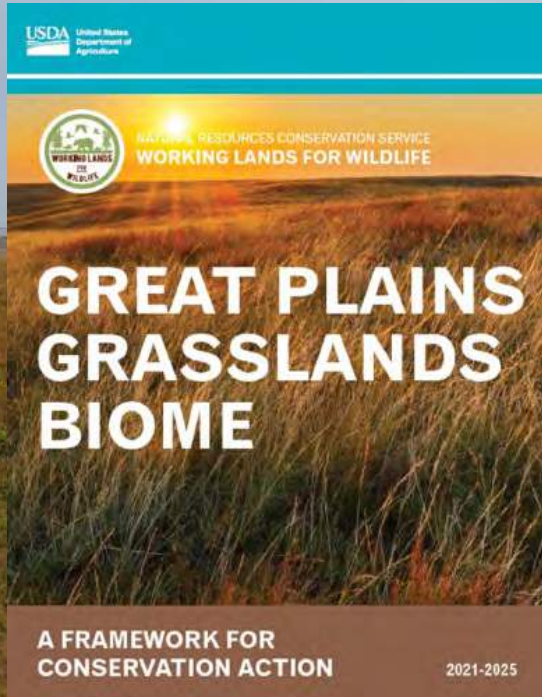
Fast Forward 13 Years...

2,813 Ranches

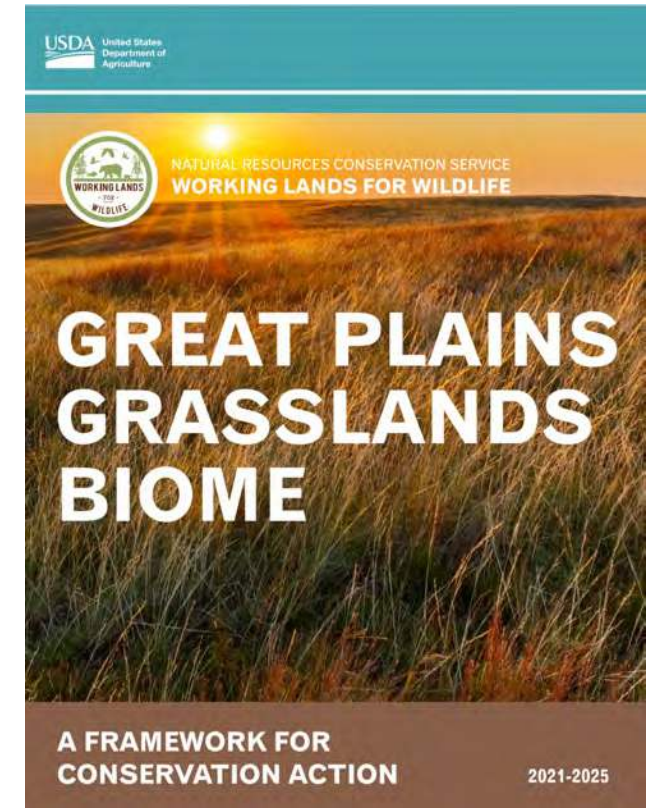
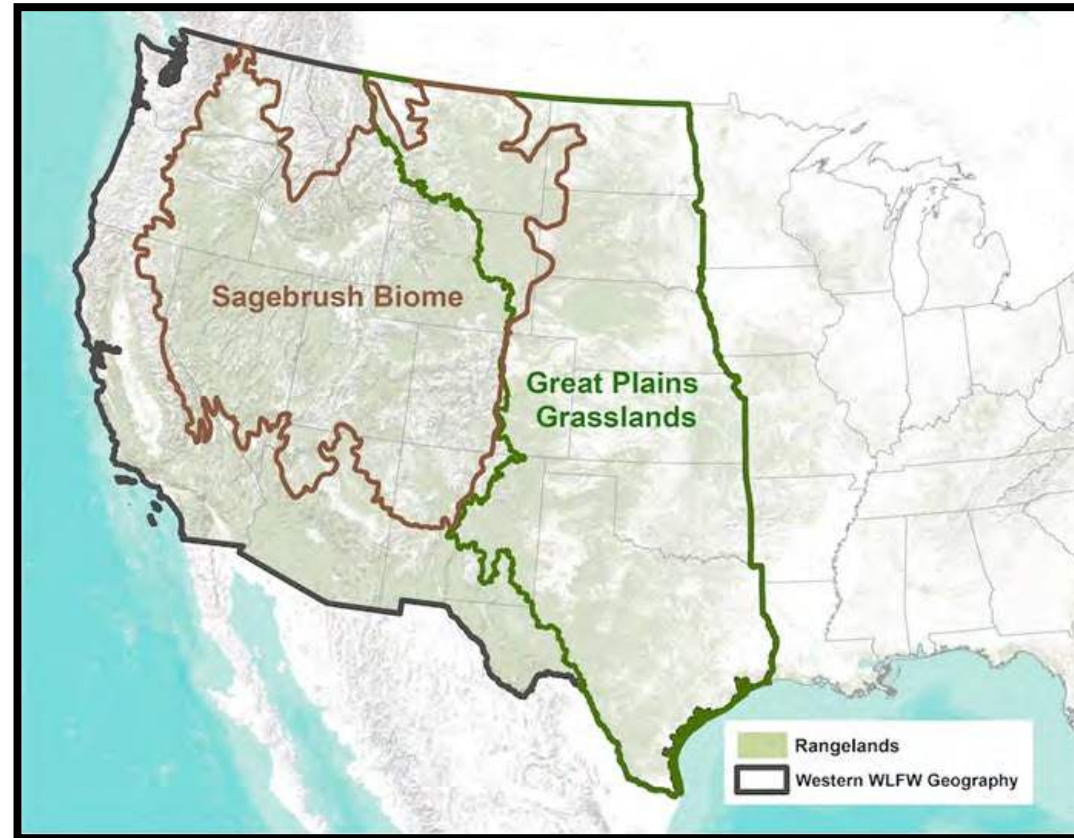
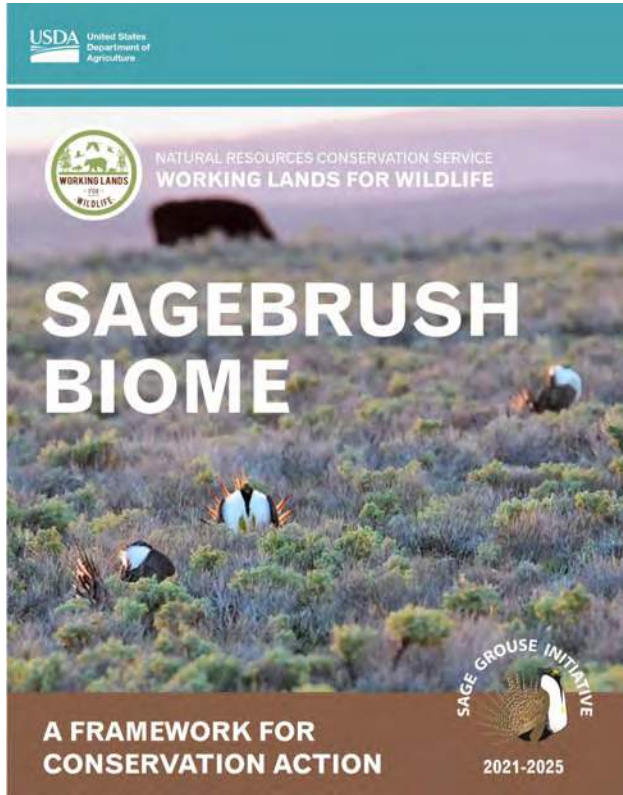
9,701,598 Acres



Cross-pollination Expands Geography



1. First half of both frameworks are identical
2. 'Defend the Core' branding from the Great Plains
3. GPGL innovates funding diversity and extension



Updating Frameworks for
Another Five Years



Frameworks
include FSA as
equal sister agency

Conservation Reserve Program



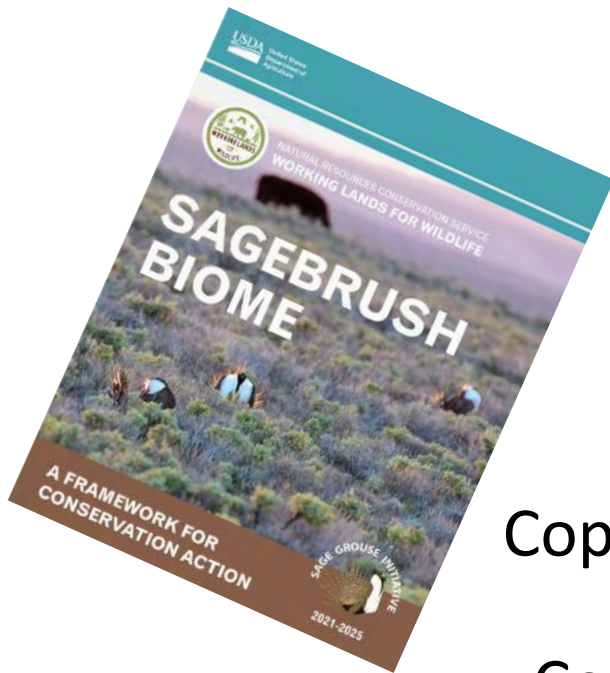
Framework for
Big Game
Migrations
rounds out
portfolio



... following
successful pilot in
Wyoming



Framework for Action



Spatial game plan for targeted delivery
Coproduct science for targeting and outcomes
Communicating conservation success stories



New 5-year Agreement to Support Frameworks

Science

Technology transfer

Operations

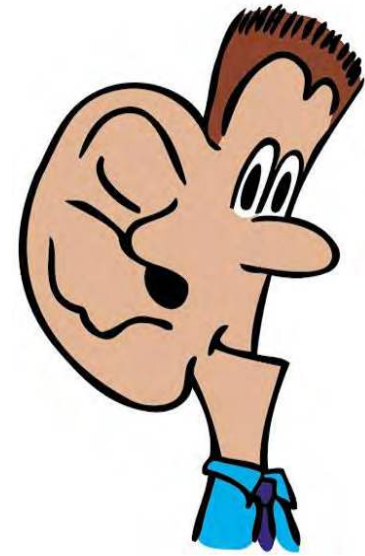
Communications



Science

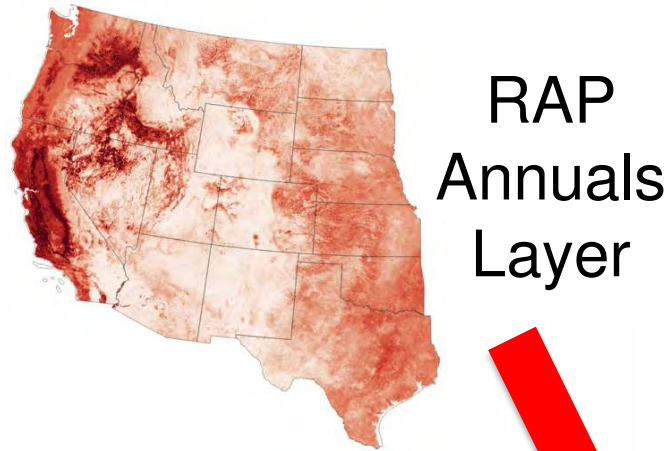
Scientists embedded as members of larger team

1. Build targeting tools to prioritize where we work
2. Conduct outcome-based evaluations to assess effectiveness



No Loading dock

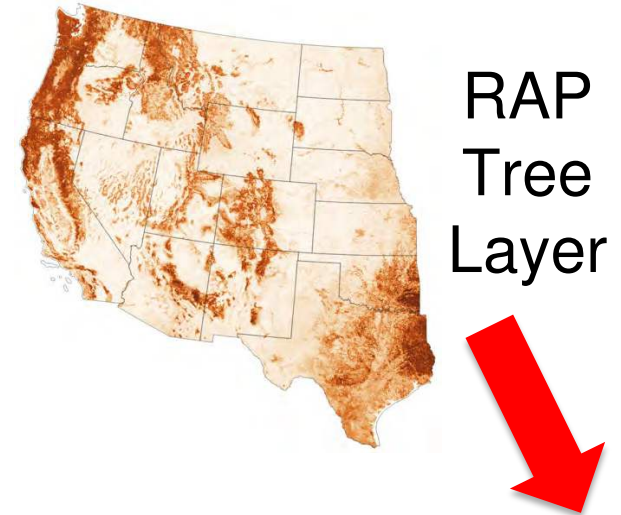
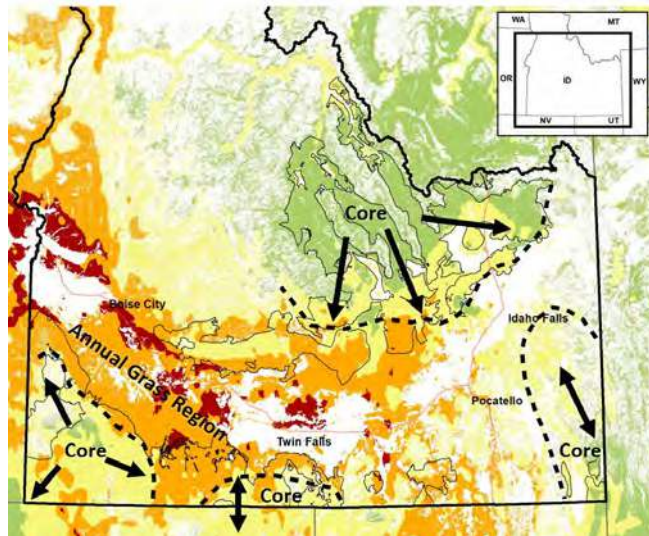
New Targeting Tools RAP Applications



Cheatgrass Challenge



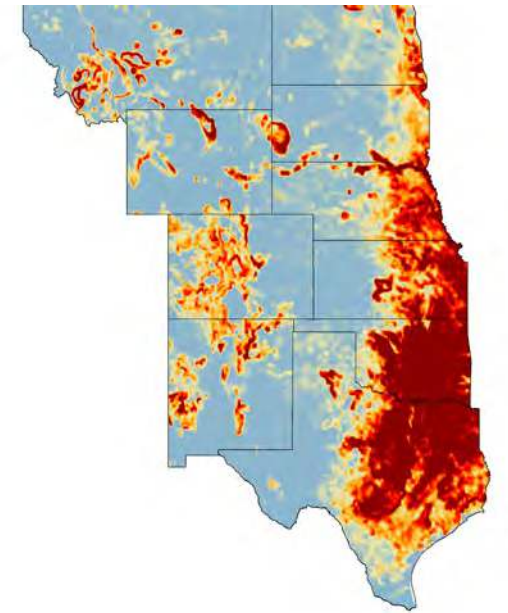
**Invasive
Annuals
Threat**



Redcedar Transitions



**Woodland
Expansion
Threat**





NATURAL RESOURCES CONSERVATION SERVICE
WORKING LANDS FOR WILDLIFE

A DECADE OF SCIENCE SUPPORT IN THE SAGEBRUSH BIOME

2011–2021



A decade of science is
baked into our current
5-year Framework



Dr. Dirac Twidwell
Rangeland Ecologist
University of Nebraska



Dr. Jerod Merkle
Big Game Ecologist
University of Wyoming



UNIVERSITY OF WYOMING

Technology transfer

>2,500 trained professionals since 2016



Technical materials and guides



Trainings across Framework boundaries



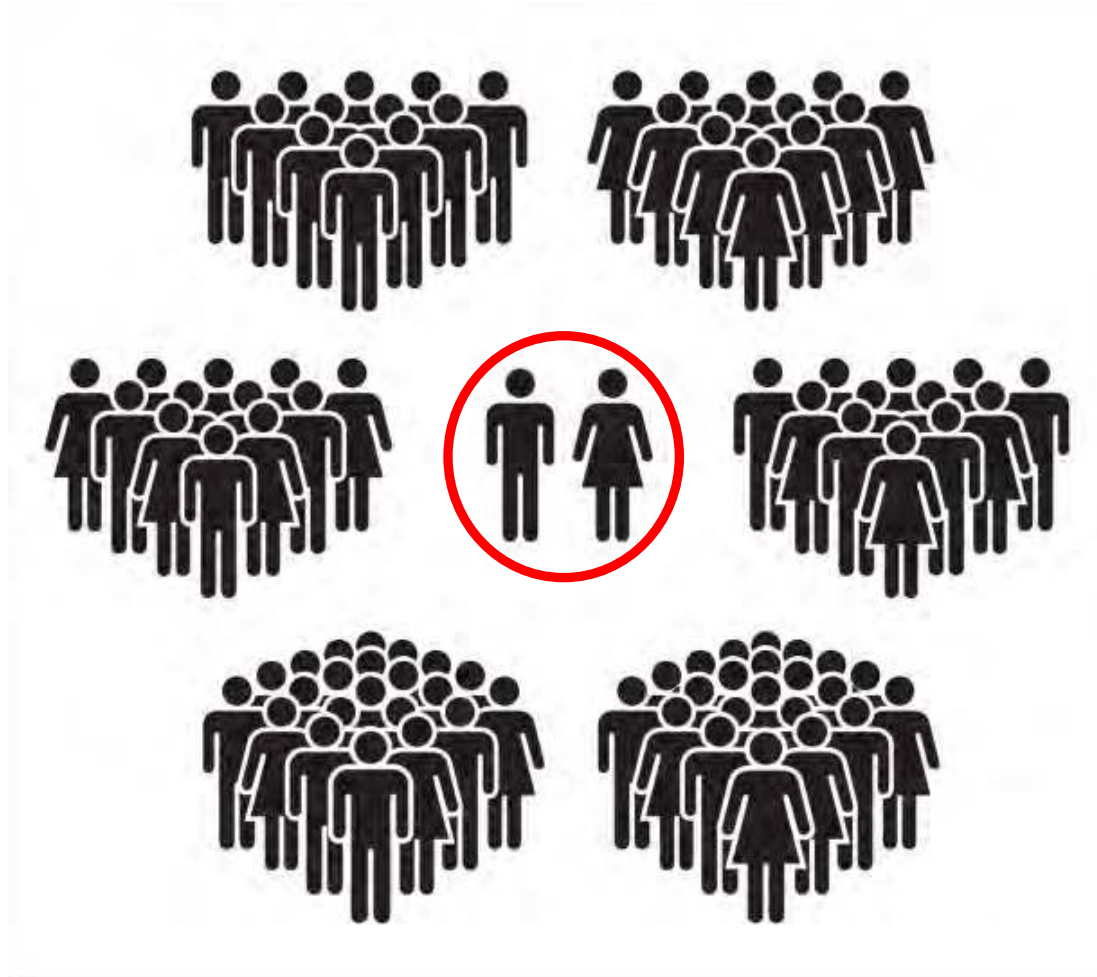
Workshops to learn from one another

Enlisting the help of leading experts

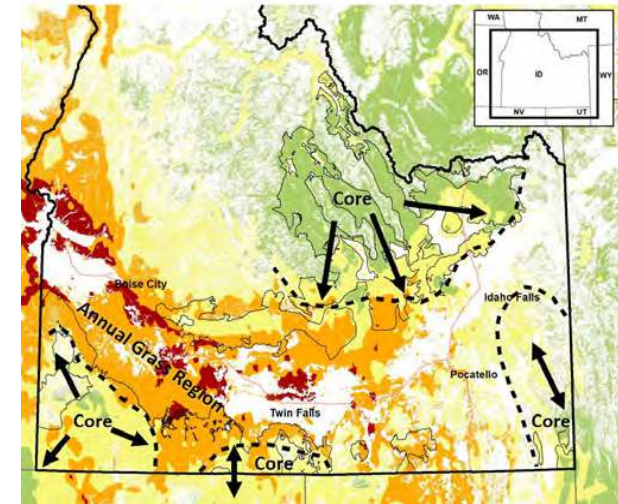


Operations

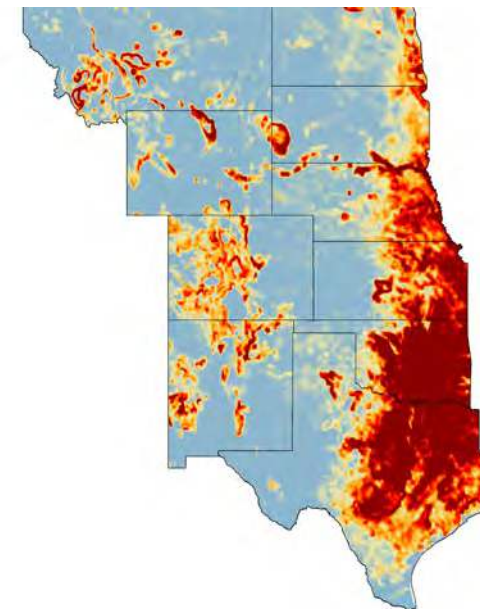
Filling
pinch
points in
human
capacity



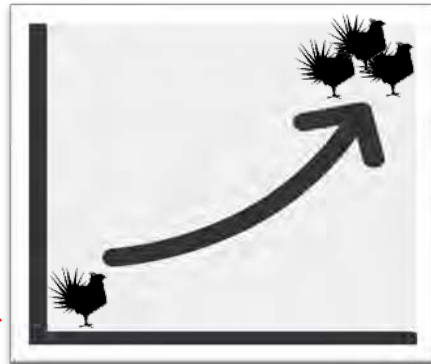
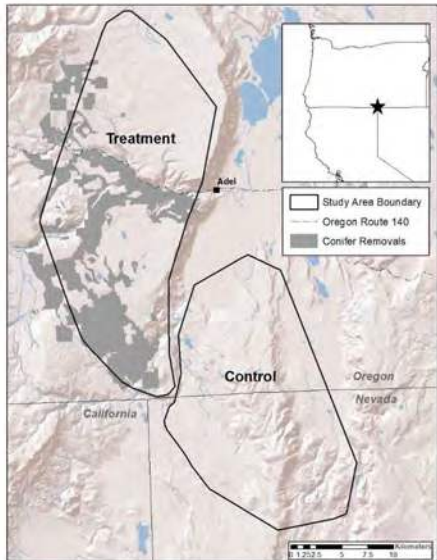
Cheatgrass Challenge



GPGI



Communications



**53 sq miles
restored**

The New York Times

A Shifting Approach to Saving Endangered Species

**NATIONAL
GEOGRAPHIC**

**How An Iconic Western Bird Is
Stepping Back From the Brink**

The **CHRISTIAN SCIENCE
MONITOR**

**As biodiversity dwindles, a shift in
thought on conservation**

Enhanced Communications

Capacity ratchets
up communications
for Frameworks

Heightened
coordination to
share working lands
messages



JULIA DEBES

Director of Agricultural Communications

Working Lands for Wildlife

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WLFW.org

Moving a Shared Vision Forward

Working Lands for Wildlife empowers America's farmers, ranchers and foresters to conserve wildlife through sustainable agricultural practices.

[LEARN MORE ABOUT WLFW](#) >

E-News



Wildlife Conservation Through Sustainable Ranching



Photo: Ken Miracle

USDA Announces Historic Investment in Wildlife Conservation, Expands Partnership to Include Additional Programs

NCBA Cattlemen to Cattlemen

People, Programs, and Initiatives Fighting Woody Plant Encroachment in the Great Plains

Nov 29, 2022

This special, hour-long episode of the National Cattlemen's Beef Association's flagship TV show, *Cattlemen to Cattlemen*, focuses on how the NRCS is working with landowners and partners in the Great Plains to reduce the threat and impacts of woody species expansion.



Watch the complete episode of C2C's show focused on NRCS woody species reduction efforts in the Great Plains.



Have a Great Workshop!



WESTERN WORKING LANDS FOR WILDLIFE WORKSHOP

Jeremy Maestas

National Sagebrush Ecosystem Specialist
USDA-NRCS West National



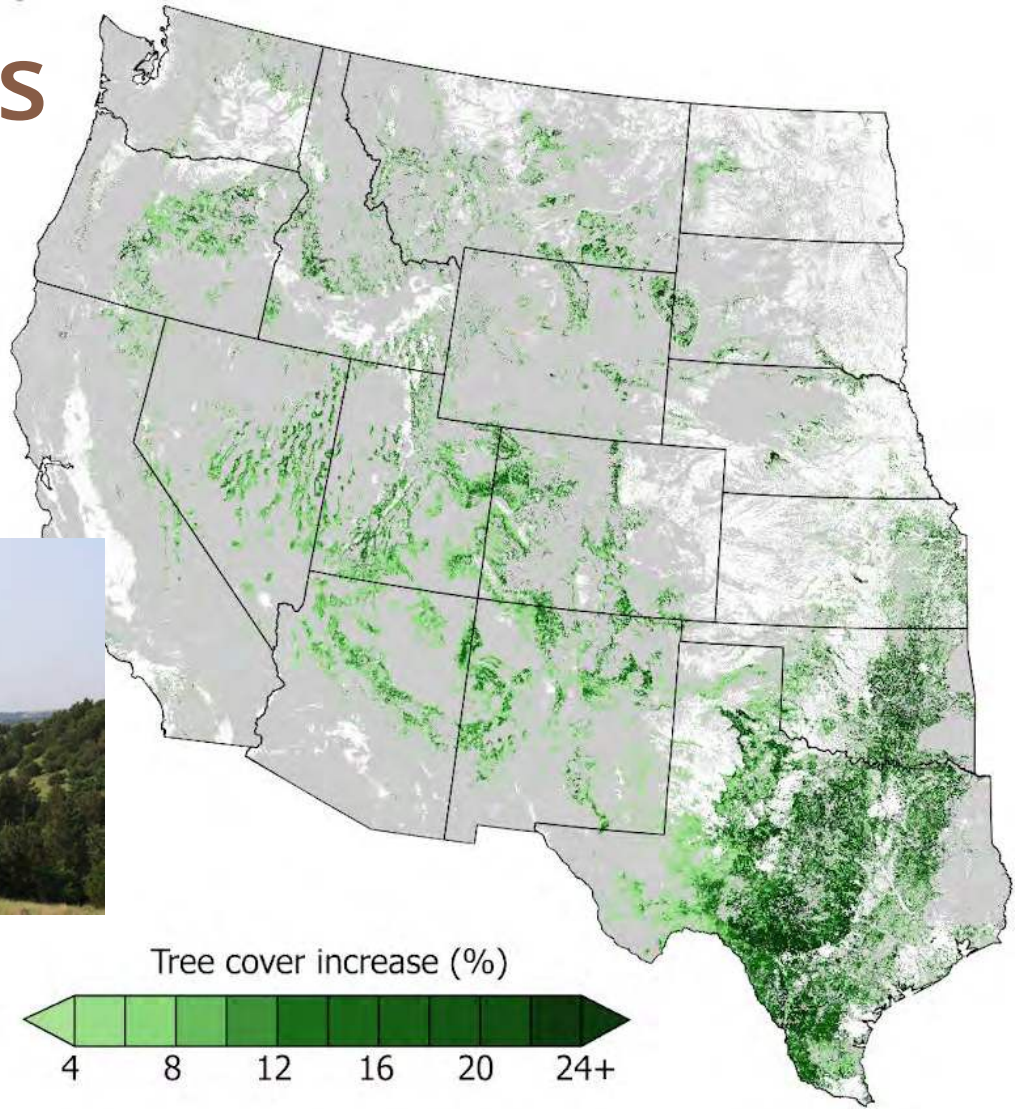
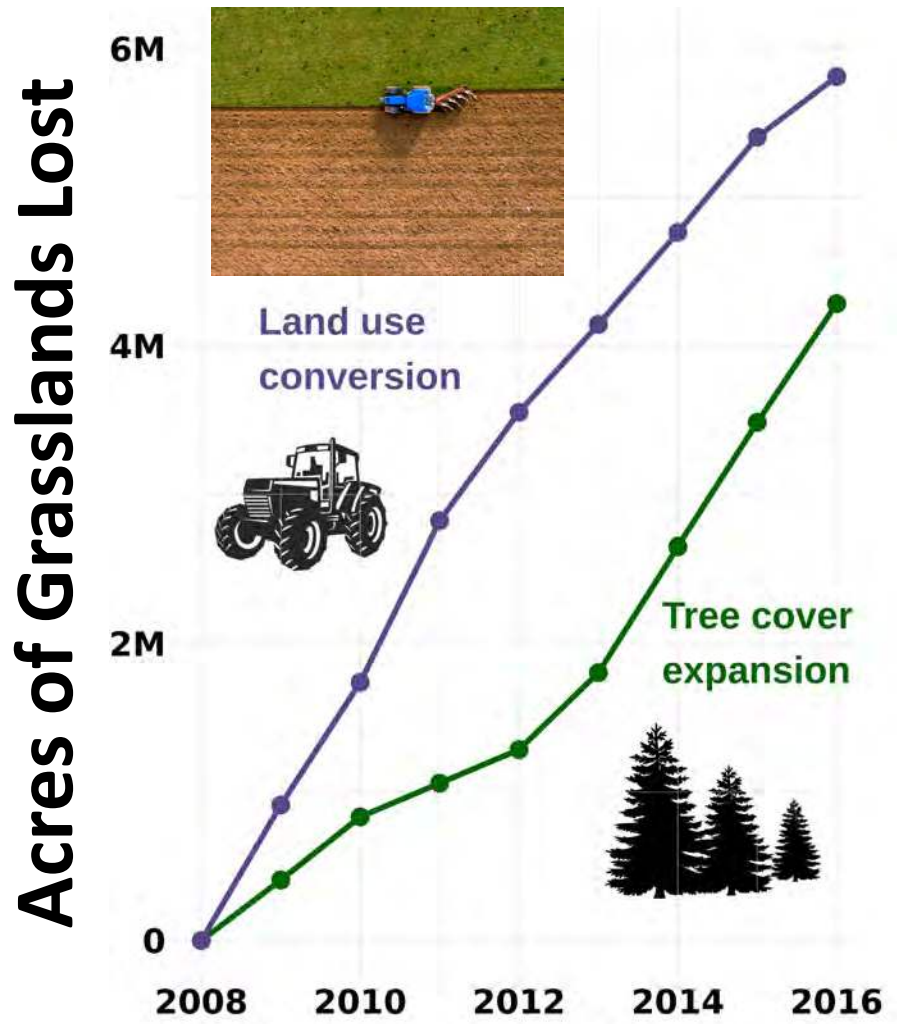
Defend the Core, Grow the Core: A Winning Strategy



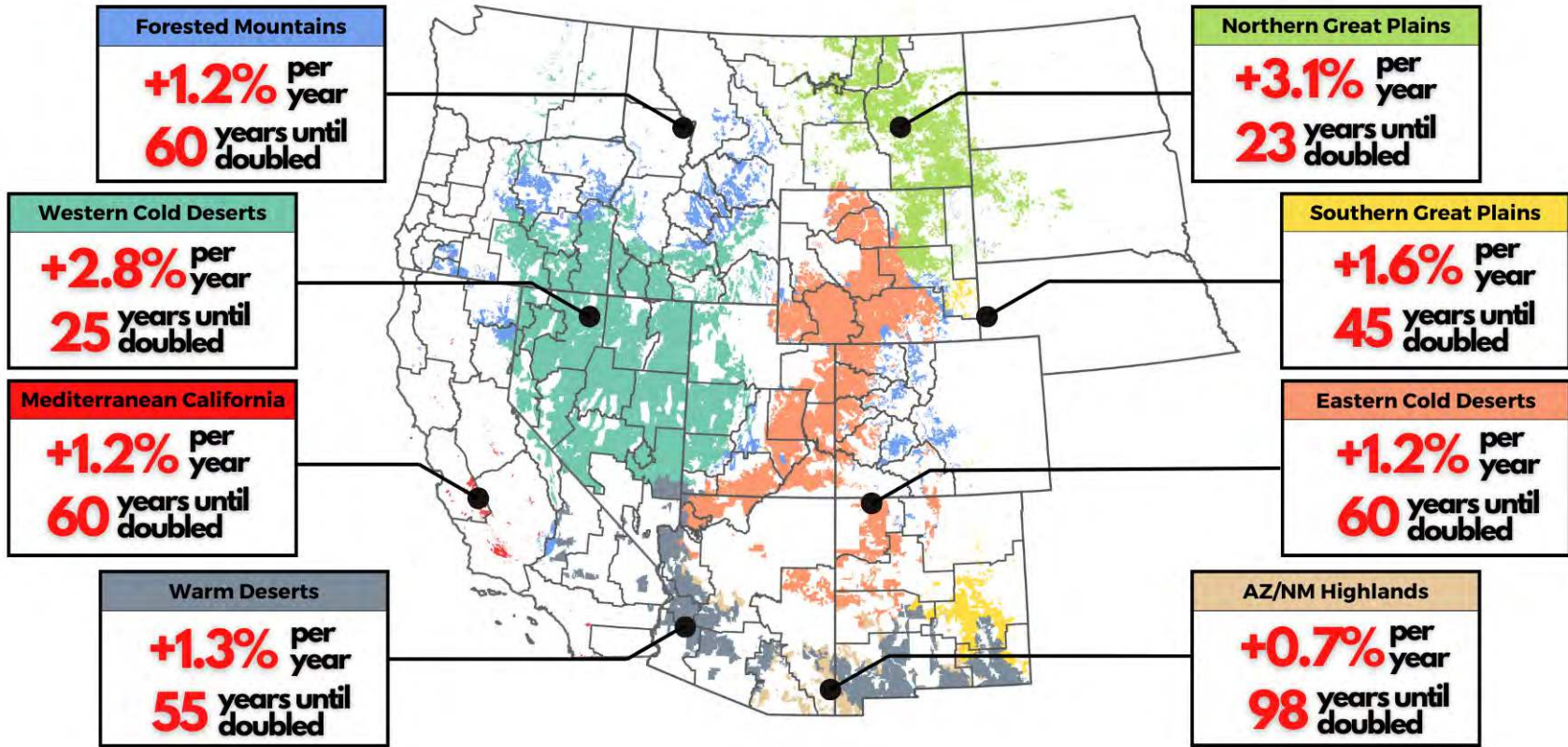




We're still losing rangelands



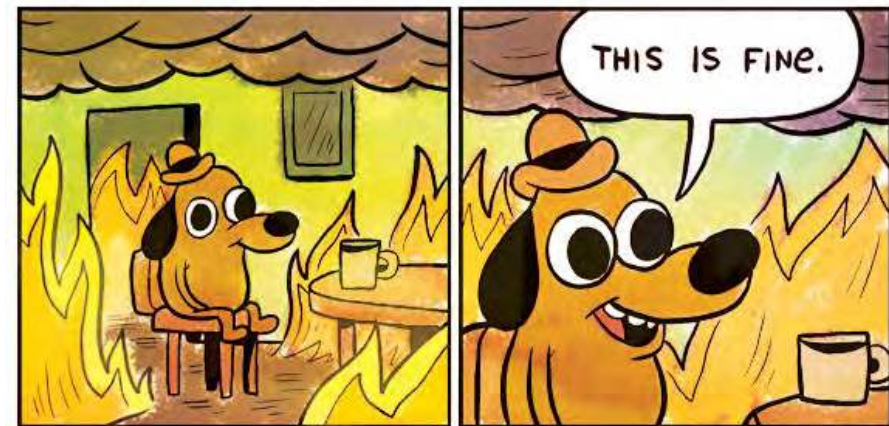
Morford et al. 2022

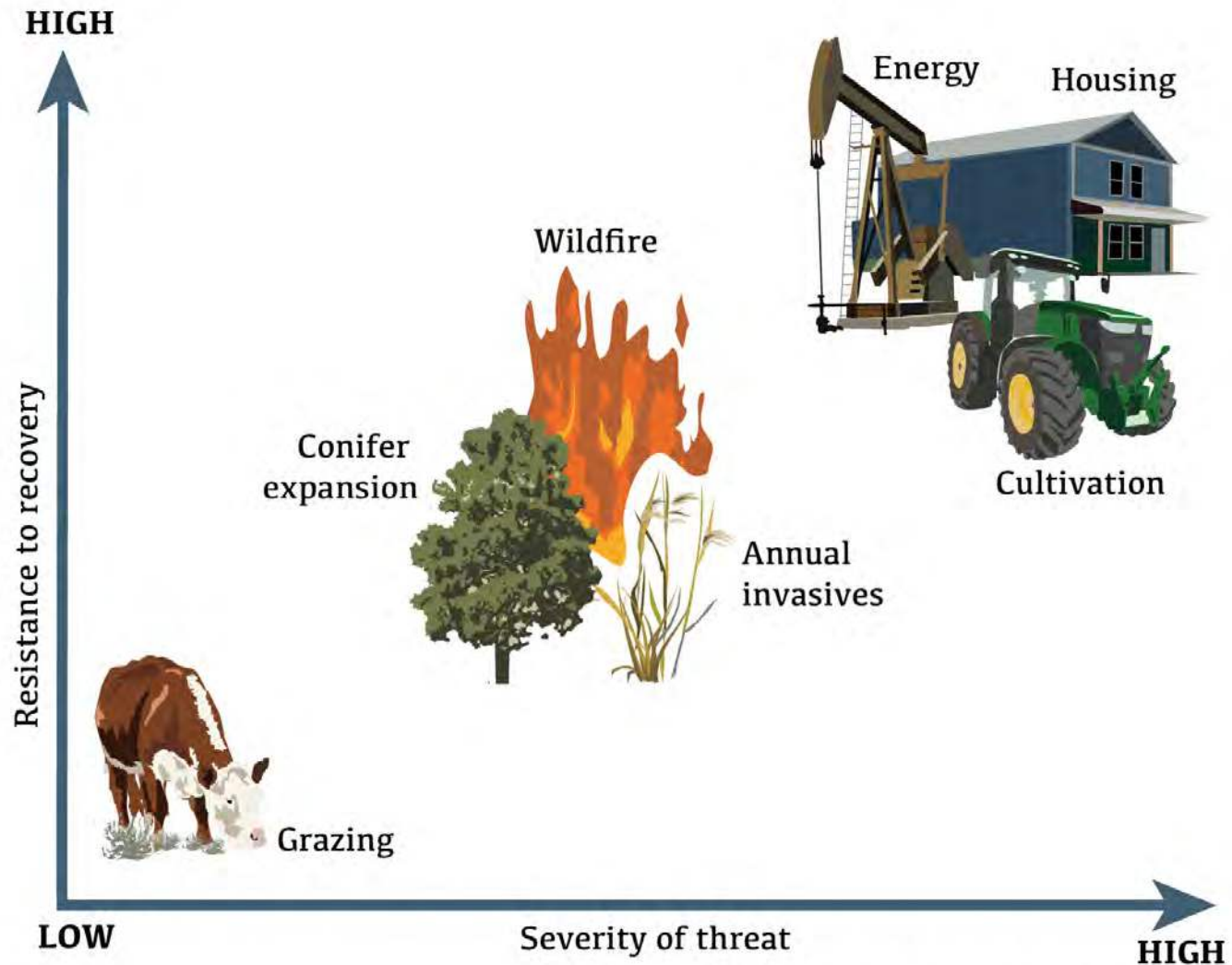


1/2 million acres per year lost to
invasive annual grass dominance

Smith et al. 2021, Kleinhesselink et al. 2022

Are we just rearranging furniture in a house that's burning down?

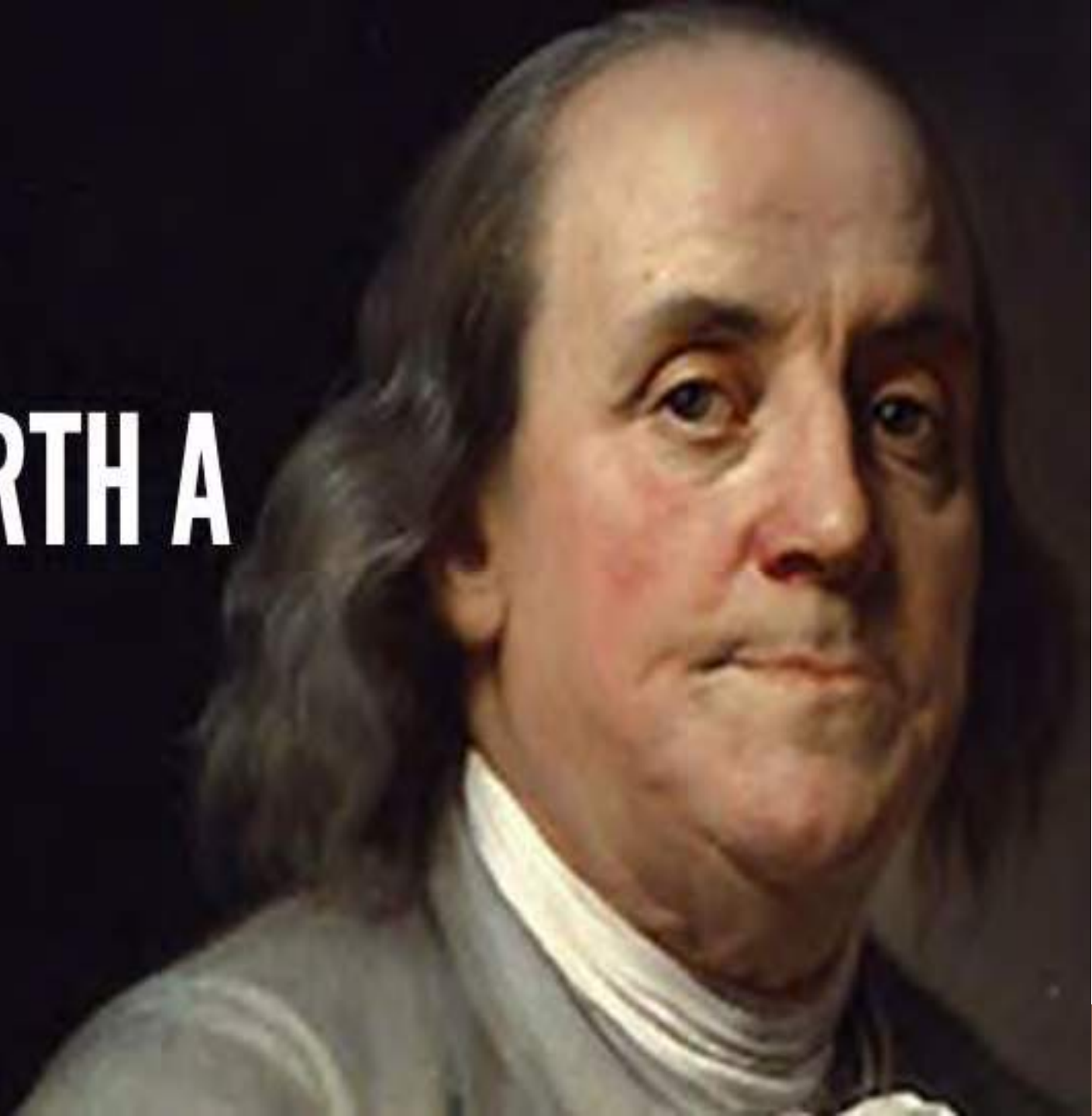




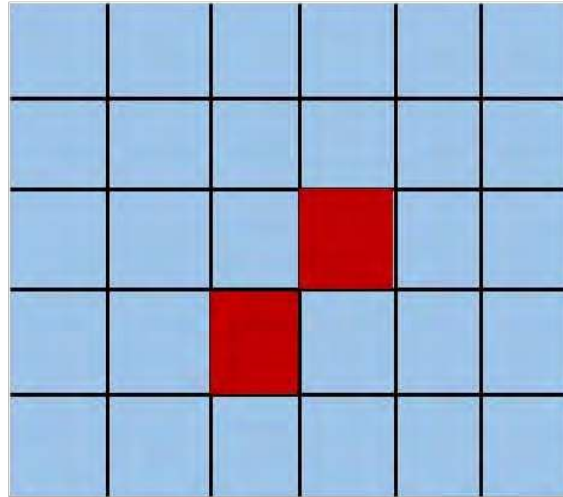
Credit: USDA-NRCS, Working Lands for Wildlife

**AN OUNCE OF
PREVENTION IS WORTH A
POUND IN CURE**

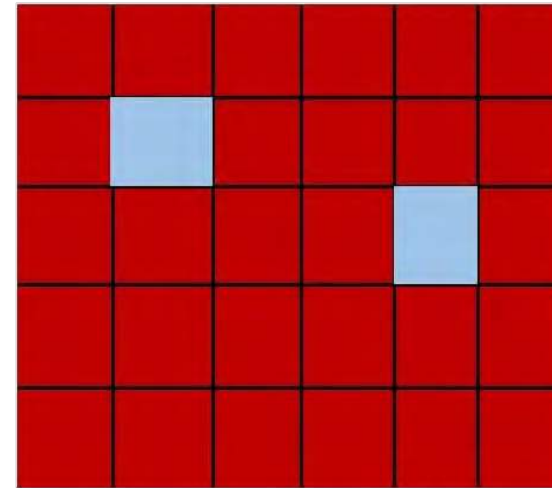
Benjamin Franklin



In which of these landscapes is management more likely to be effective?



Proactive



Reactive

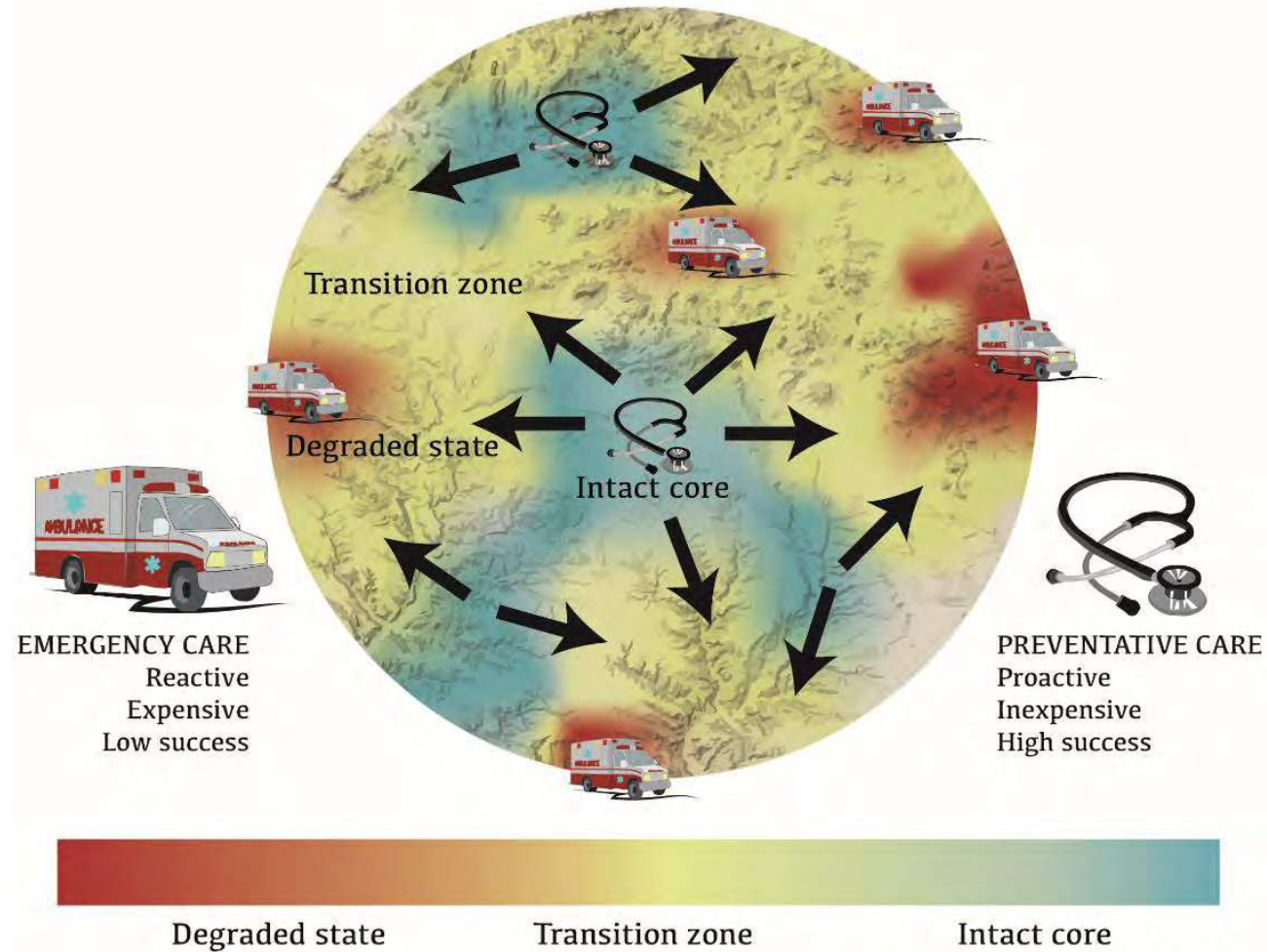


No/low threats



Threat dominated

A New Spatial Game Plan is Born: Defend the Core, Grow the Core

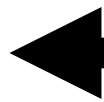
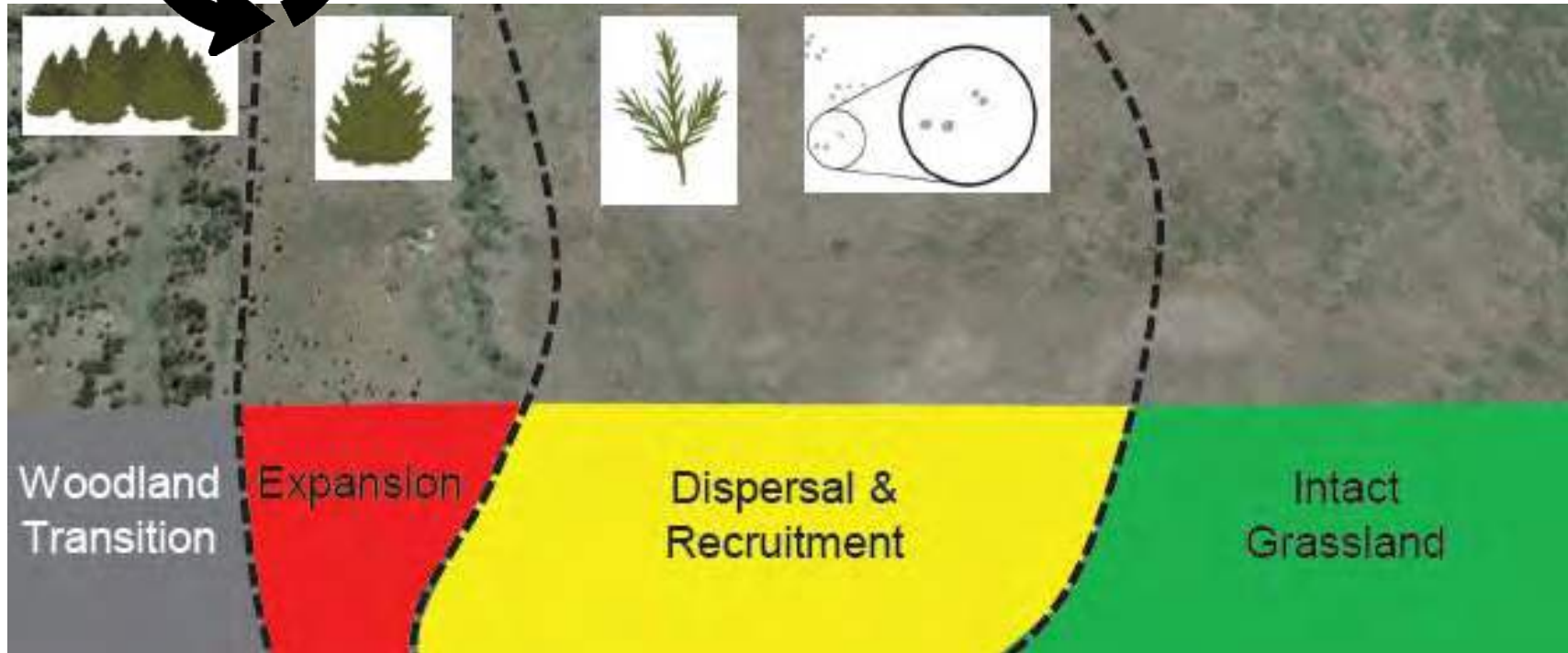
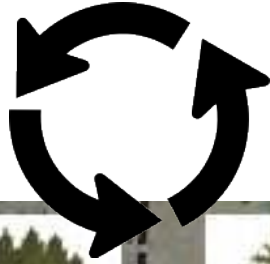


Credit: USDA-NRCS, Working Lands for Wildlife

Flipping the script



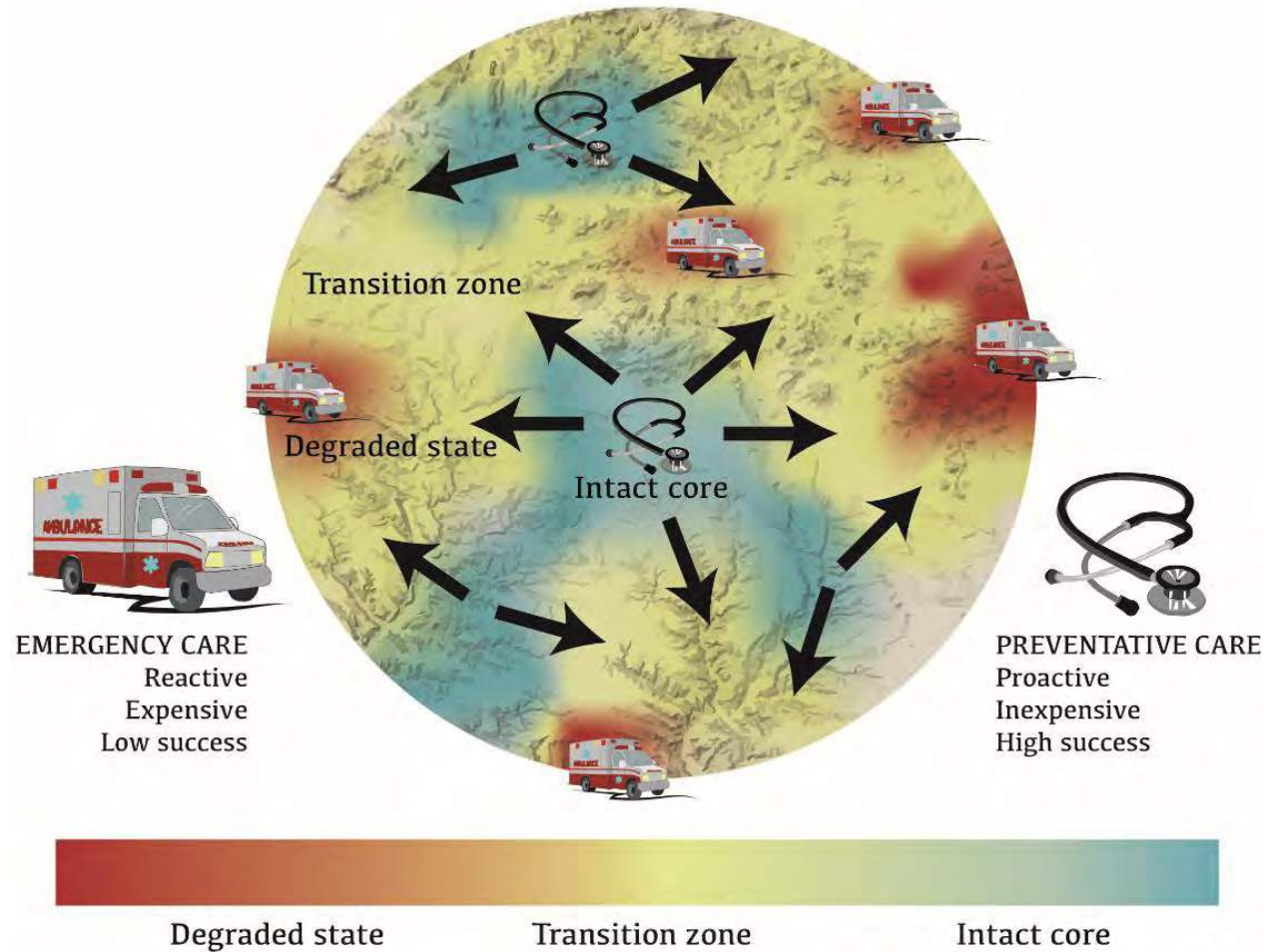
Old Way



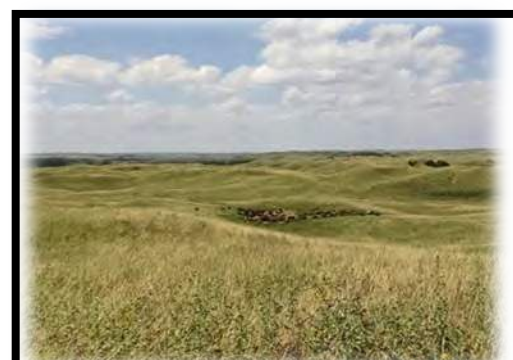
New Way



Broadly applicable to large-scale threats

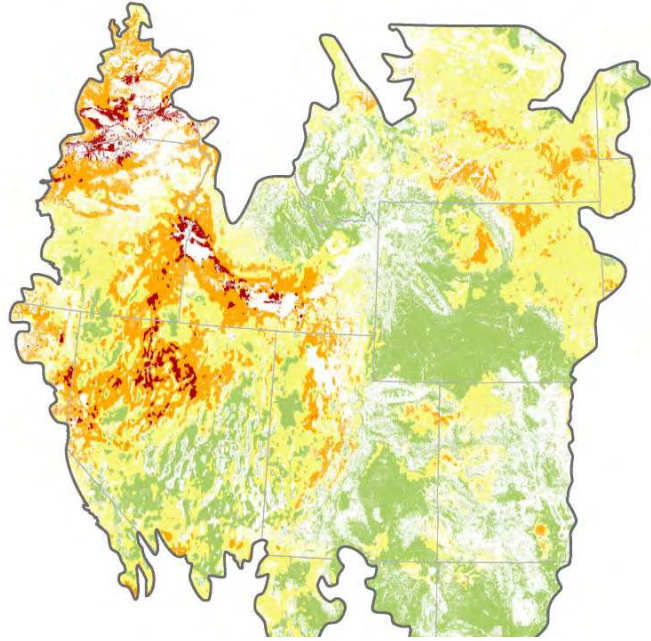


Credit: USDA-NRCS, Working Lands for Wildlife

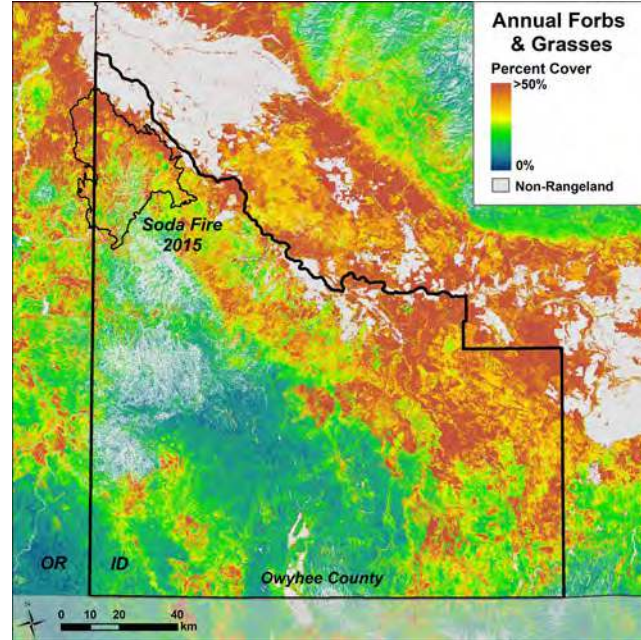


This way of thinking is scalable

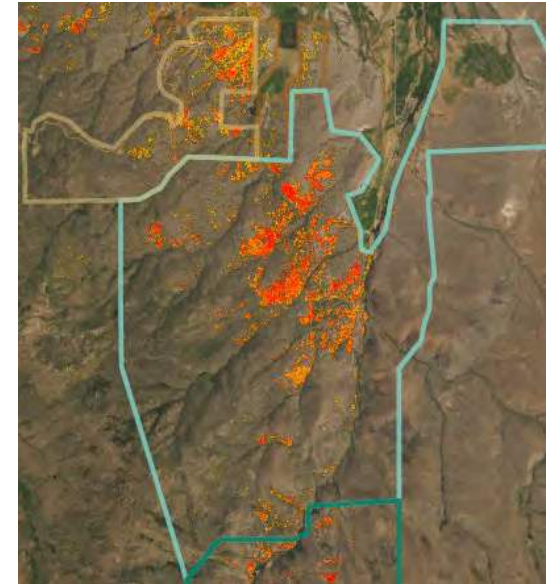
Identify cores to anchor conservation efforts!



Biome/Region/State

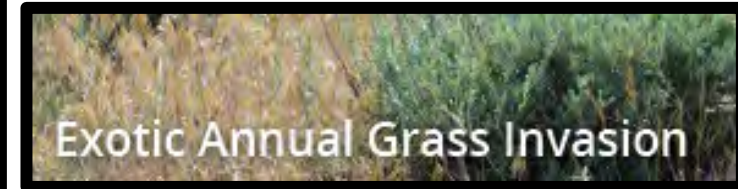
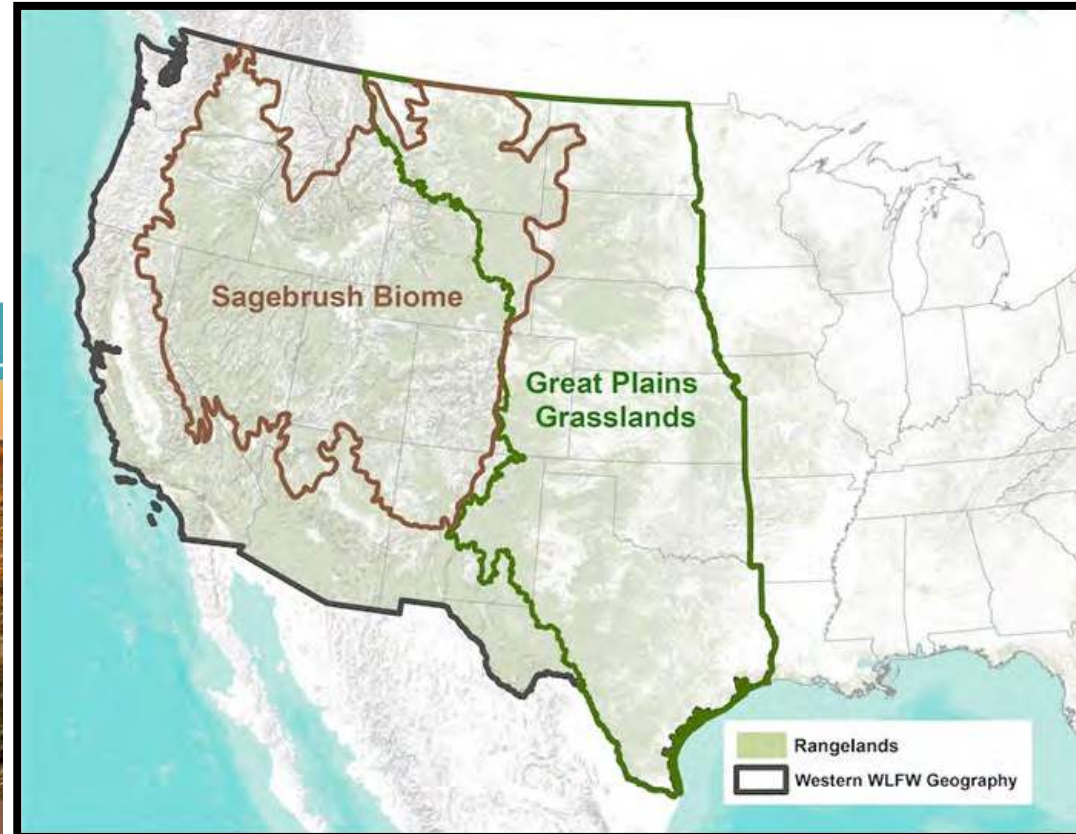
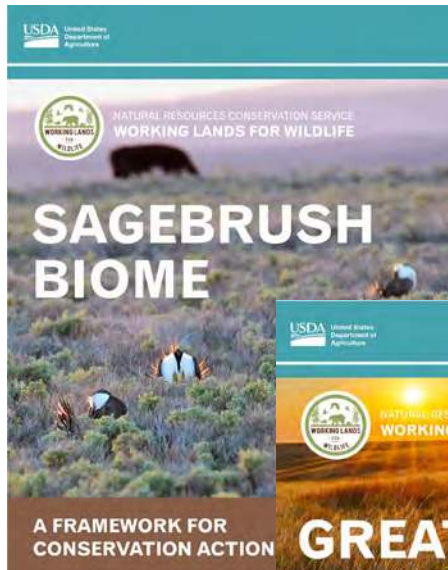


County/District/Watershed

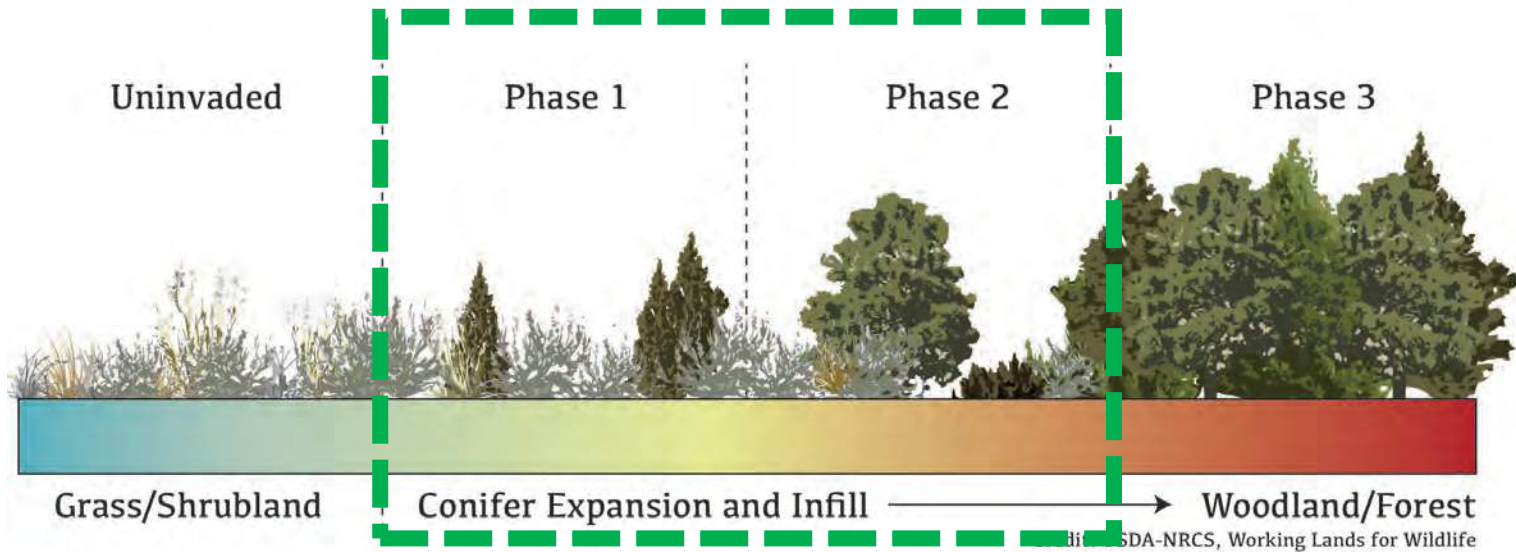


Ranch/Pasture

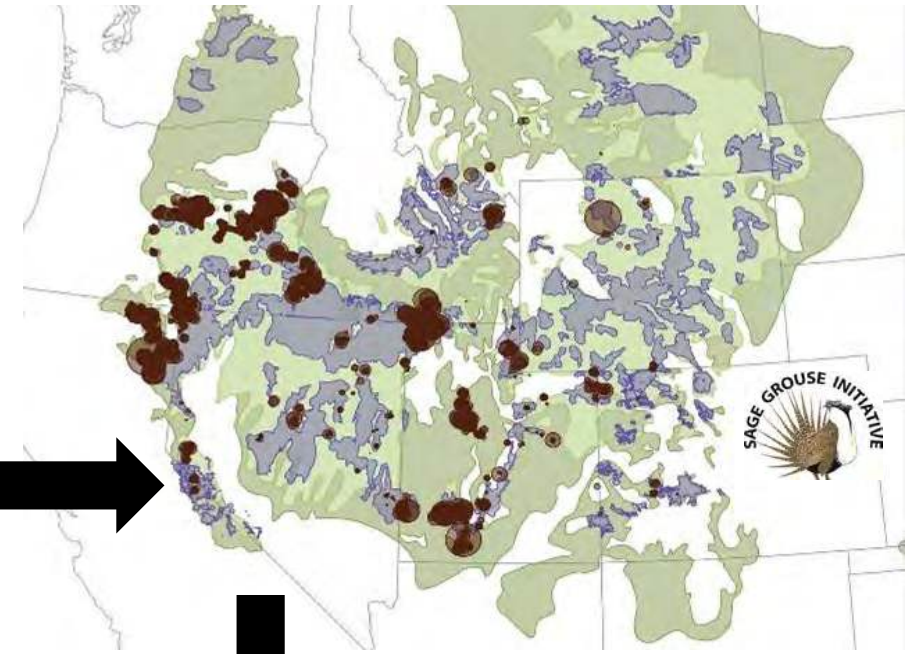
WLFW Frameworks for Conservation Action



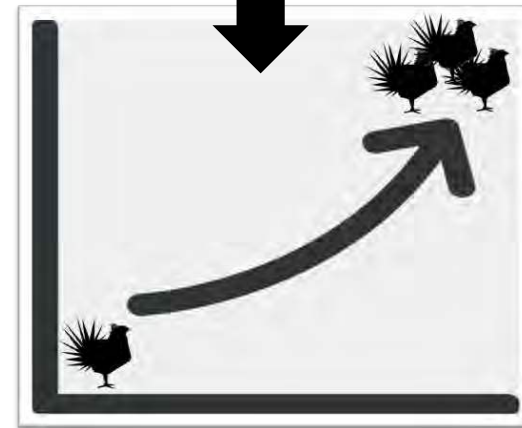
Woodland Expansion in Sagebrush Biome



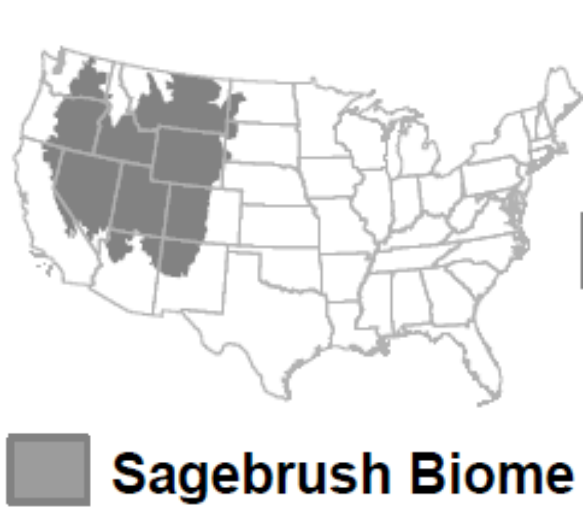
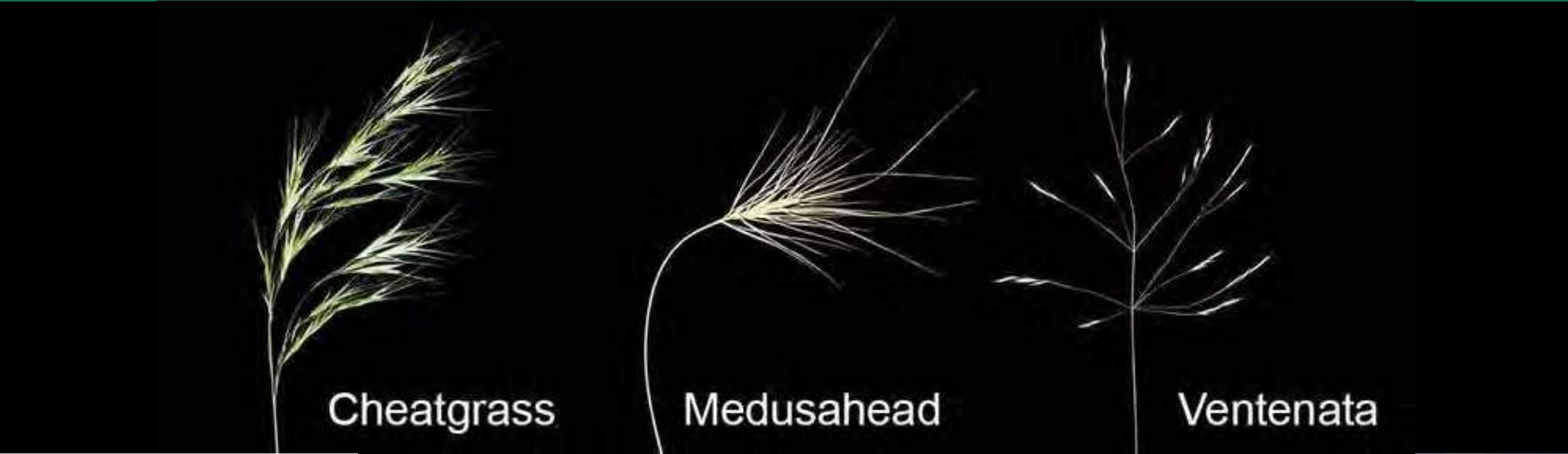
NRCS-Funded Conifer Removal

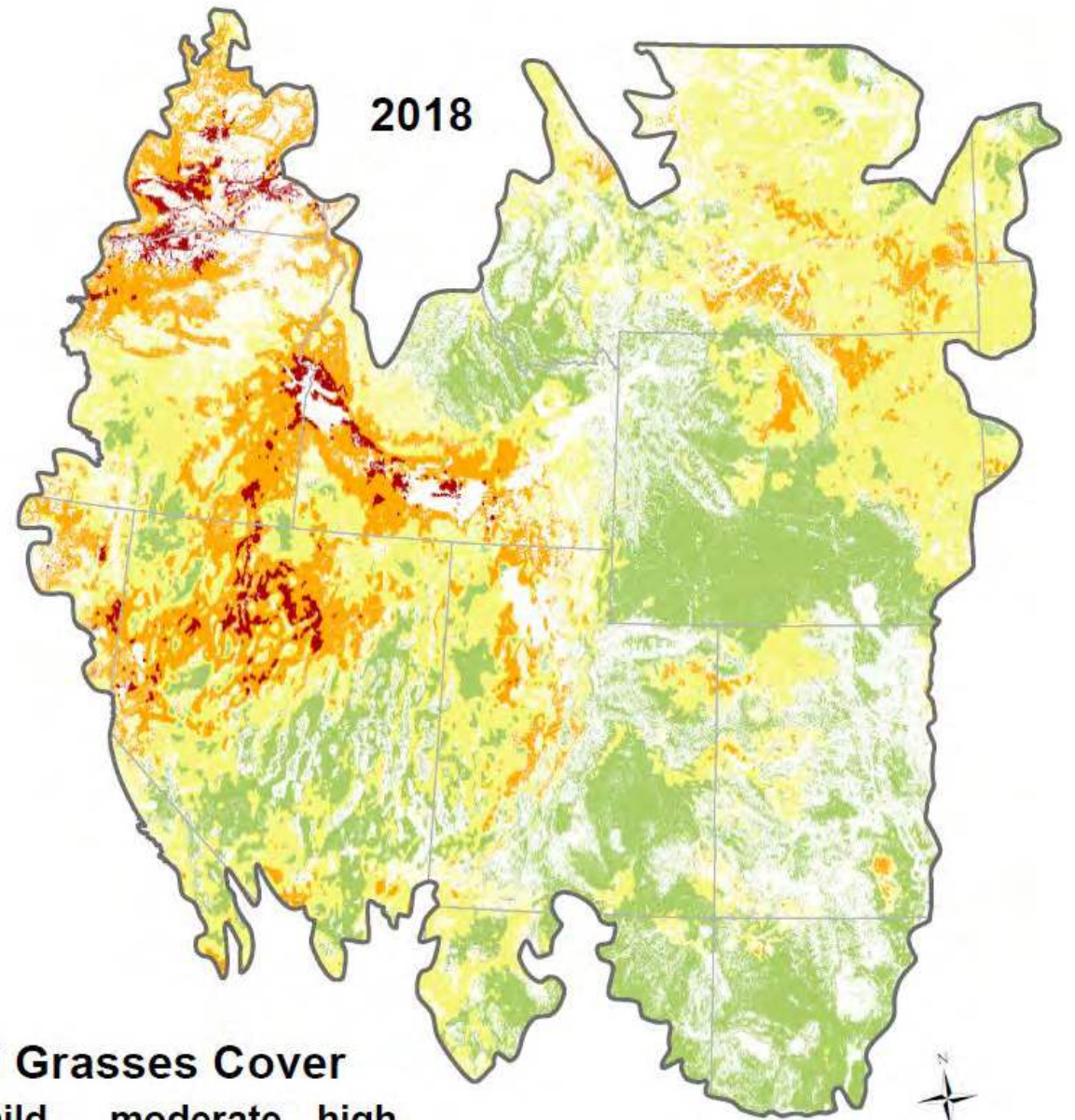
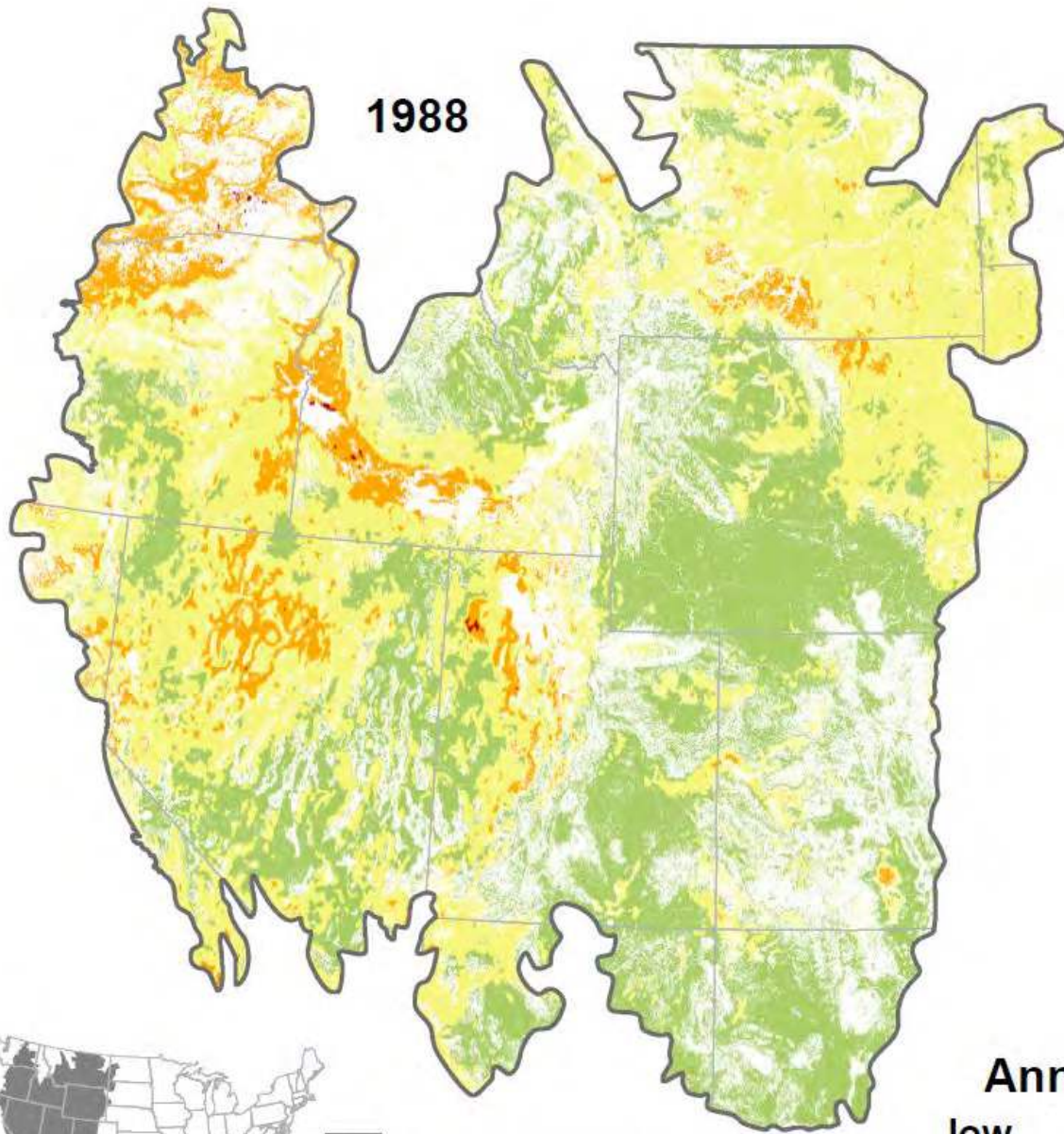


>1 Million Acres Treated



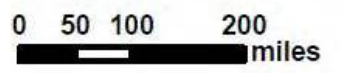
Exotic Annual Grass Invasion in Sagebrush Biome





■ Sagebrush Biome

Annual Grasses Cover

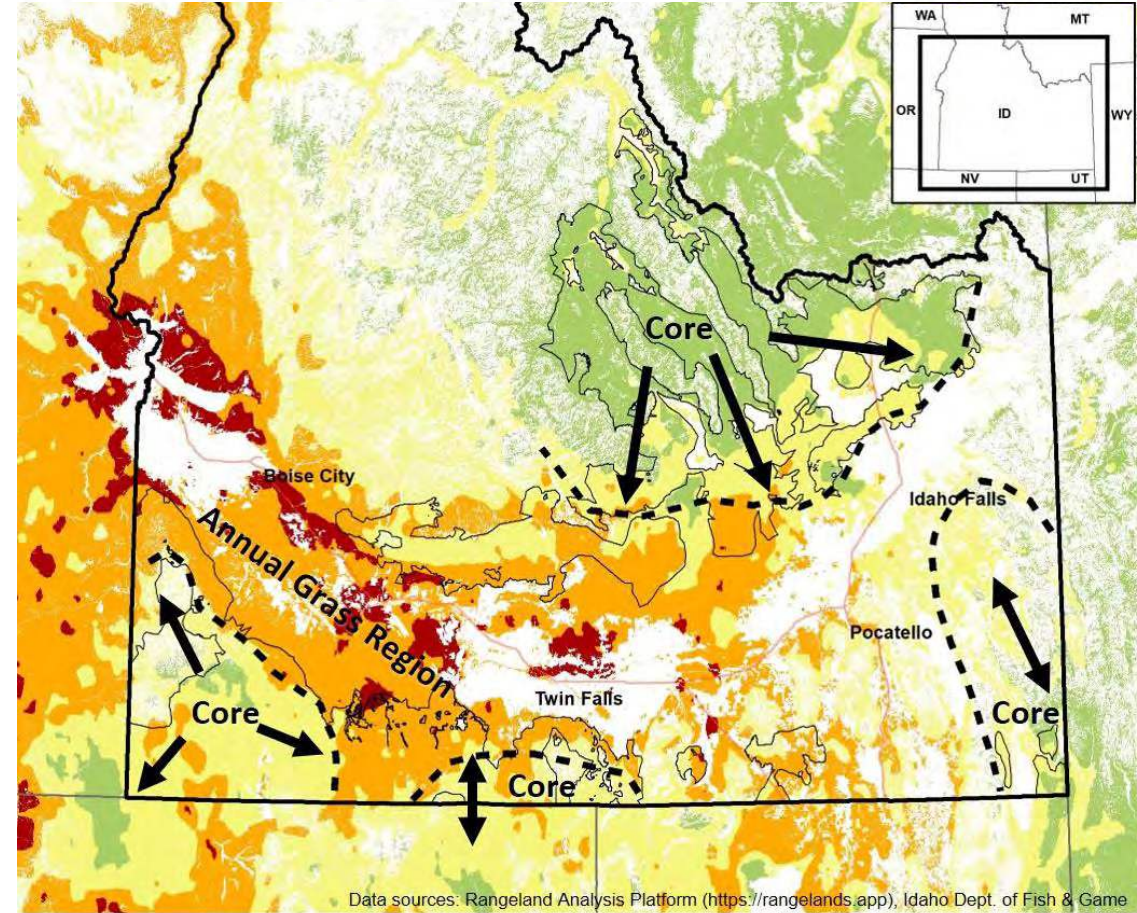


ranglands.app



Idaho Cheatgrass Challenge

Defend the core → Grow the core → Mitigate impacts



Data sources: Rangeland Analysis Platform (<https://rangelands.app>), Idaho Dept. of Fish & Game

Landscape Cover of Annuals on Rangelands

Low (<10%) Mild (11-25%) Moderate (26-50%) High (>50%)



Core → Transition Zone → Annual Grass Region



□ Sage Grouse Priority Areas





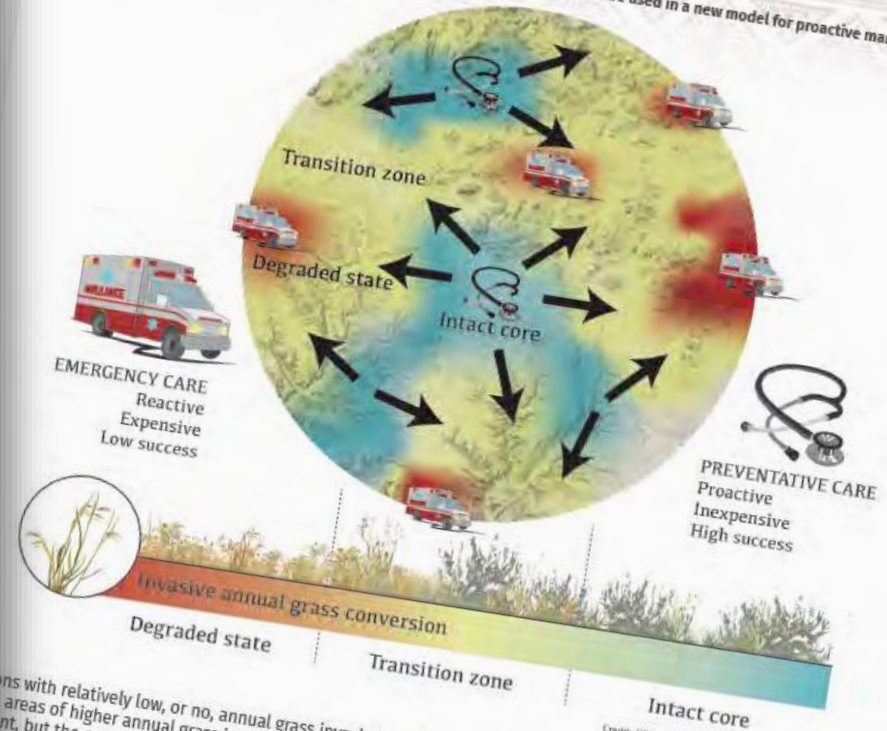
WESTERN GOVERNORS' ASSOCIATION



A Toolkit for Invasive Annual Grass Management in the West

JULY 2020

Fig. 1. Conceptual illustration of how the extent of annual grass invasion can be used in a new model for proactive management.



ons with relatively low, or no, annual grass invasion. All areas of higher annual grass invasion may be present, but the overall level of invasion in the area is relatively low. Core areas serve as anchor points for conservation and restoration. Local management in these areas will be less costly and more successful in the long run because of favorable landscape context.

esely, heavily invaded regions dominated by moderate-to-high amounts of invasive annual grasses are already converted to a degraded state. Local conservation integrity is compromised by occurring in areas of higher invasive annuals. Frequent fires and grazing from neighboring areas makes it difficult and expensive to maintain these areas as healthy rangelands.

gressive management, zones between degraded and heavily invaded areas are vulnerable to

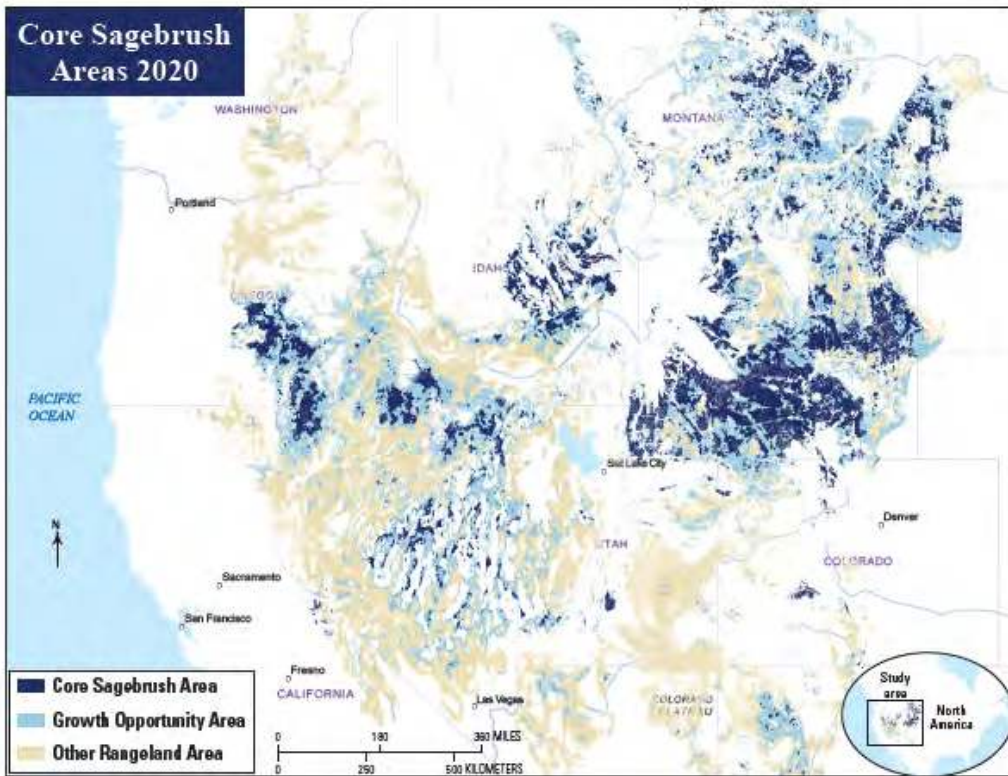
transitioning into degraded states. Addressing these important areas is critical to stem the tide of annual grass conversion, but they are also areas of high unpredictability for management success due to site conditions, disturbance, and the rapid change that may be occurring.

The new data layer is primarily designed to illustrate the distribution of cheatgrass and other invasive annuals. Detecting very early invasions in areas where species were not known to previously exist requires more intensive surveys and monitoring. Invasive annual grasses such as medusahead and ventenata may not yet exist in certain states or counties. Still, a similar proactive approach can be applied to address these more narrowly distributed species where detailed inventories of those invasions are available. Eradication, containment and aggressive management of new invasions is essential to protect healthy cores. In such situations, adapting Early Detection-Rapid

WESTERN GOVERNORS' ASSOCIATION

Prepared in cooperation with the Western Association of Fish and Wildlife Agencies and the U.S. Fish and Wildlife Service

A Sagebrush Conservation Design to Proactively Restore America's Sagebrush Biome



Open-File Report 2022-1081



Bipartisan Infrastructure Law Funding through the Sage - Steppe Ecosystem Project Dashboard

By the Numbers

BIL Funding Requested

\$9.1M

Partner Match

\$29.4M

Total Number of Projects

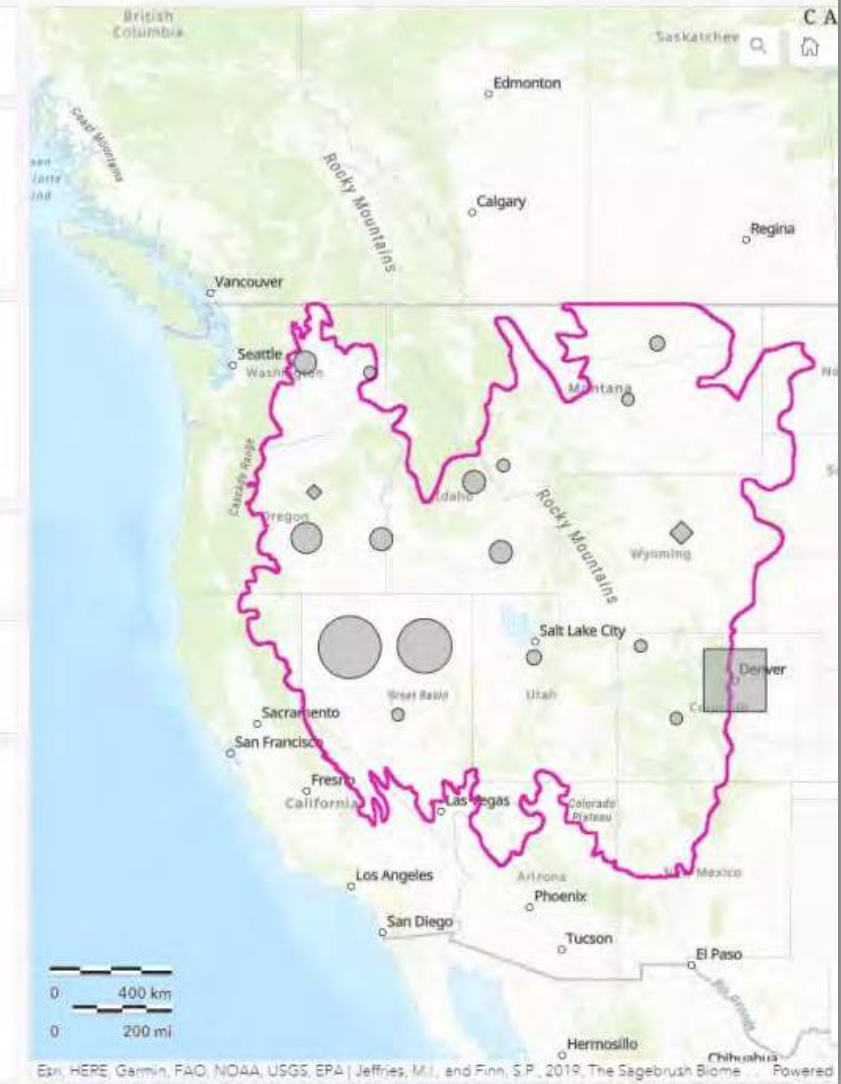
53

Number of Project Partners

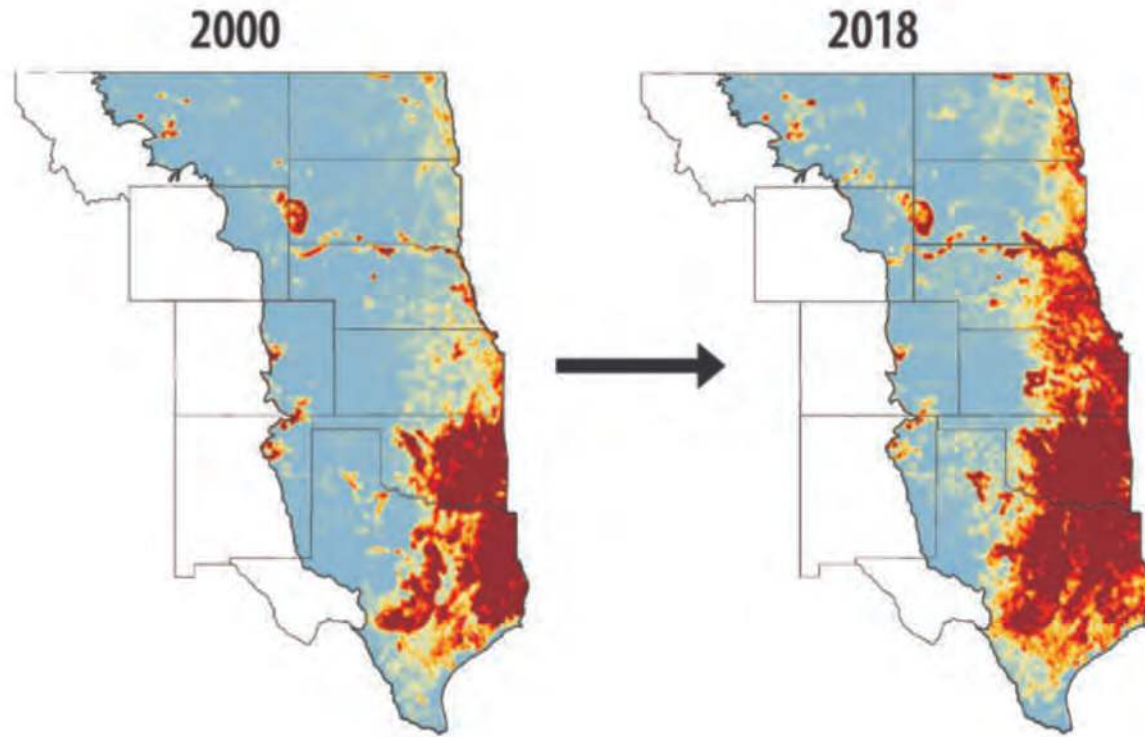
State **41**

Tribal **8**

Federal **35**

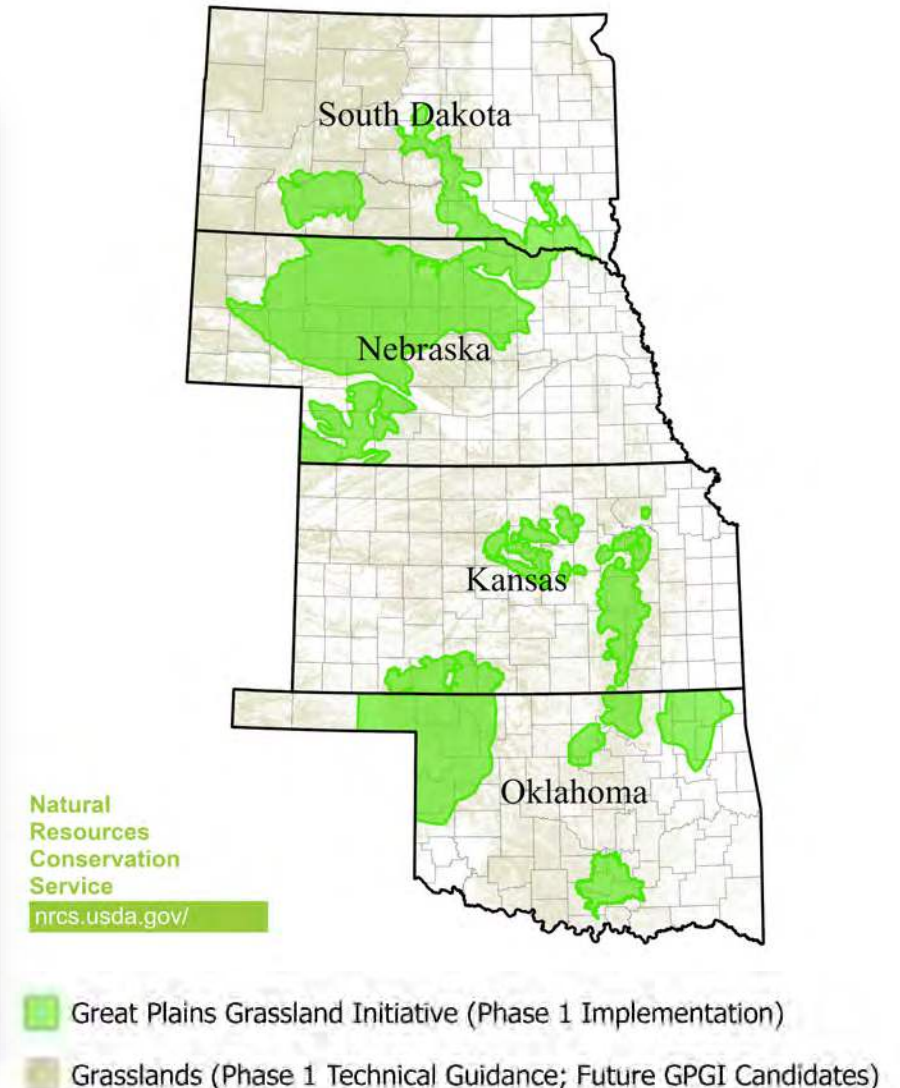
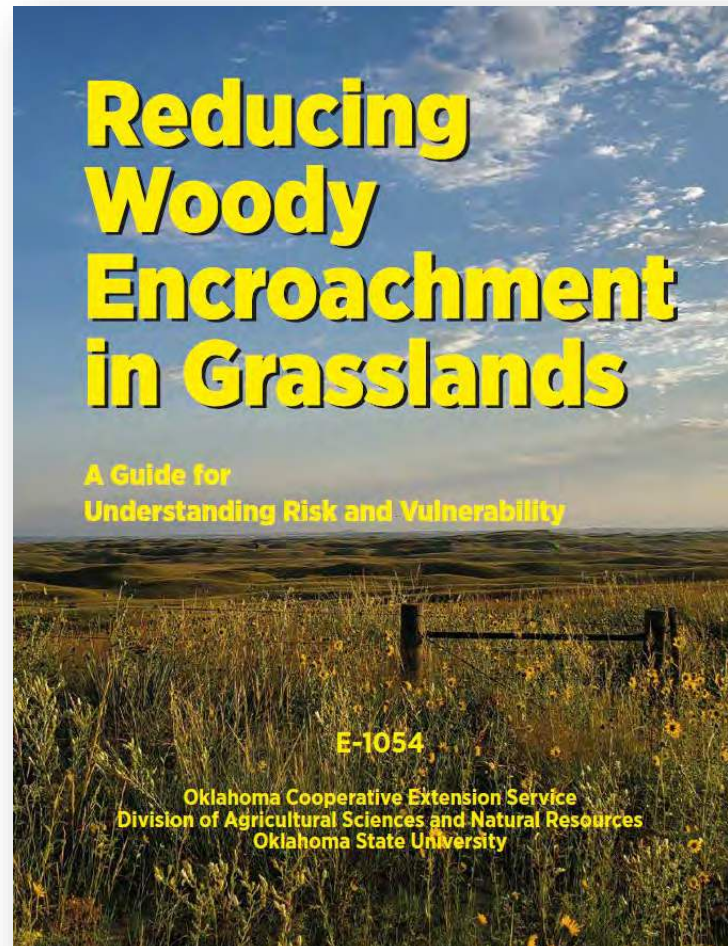


Woody Encroachment in the Great Plains



Great Plains Grassland Initiatives (GPGI)

“Rancher driven, science informed, agency supported”



THE CENTRAL GRASSLANDS ROADMAP

A Collaborative Strategy for a Working Lands Biome

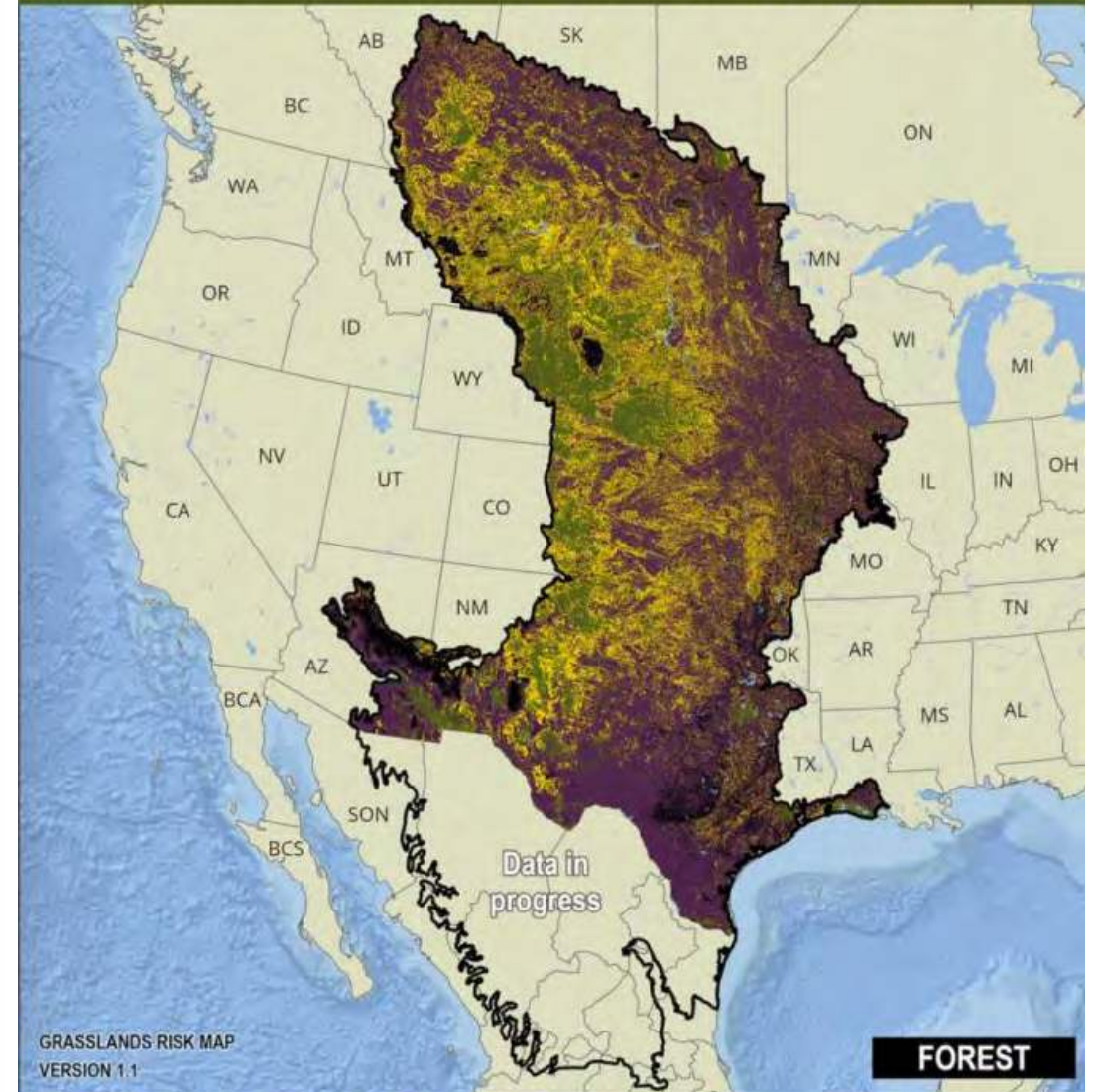


**GUIDING US TOWARDS RESILIENT AND CONNECTED
GRASSLANDS AND HUMAN COMMUNITIES**

Updated June 21, 2022

The Central Grasslands Assessment Map

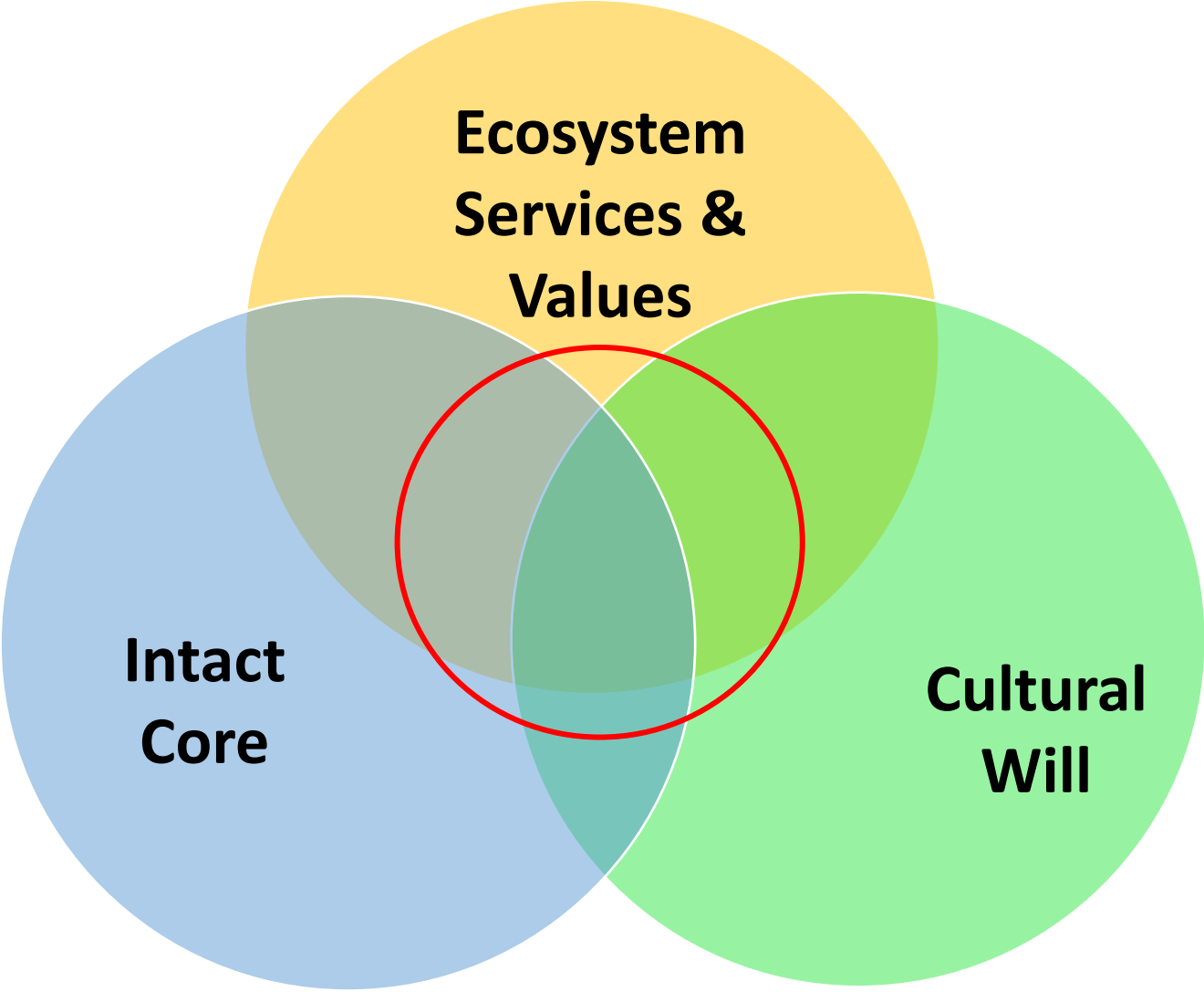
SUPPORTING AND GROWING OUR CORE OF GRASSLANDS



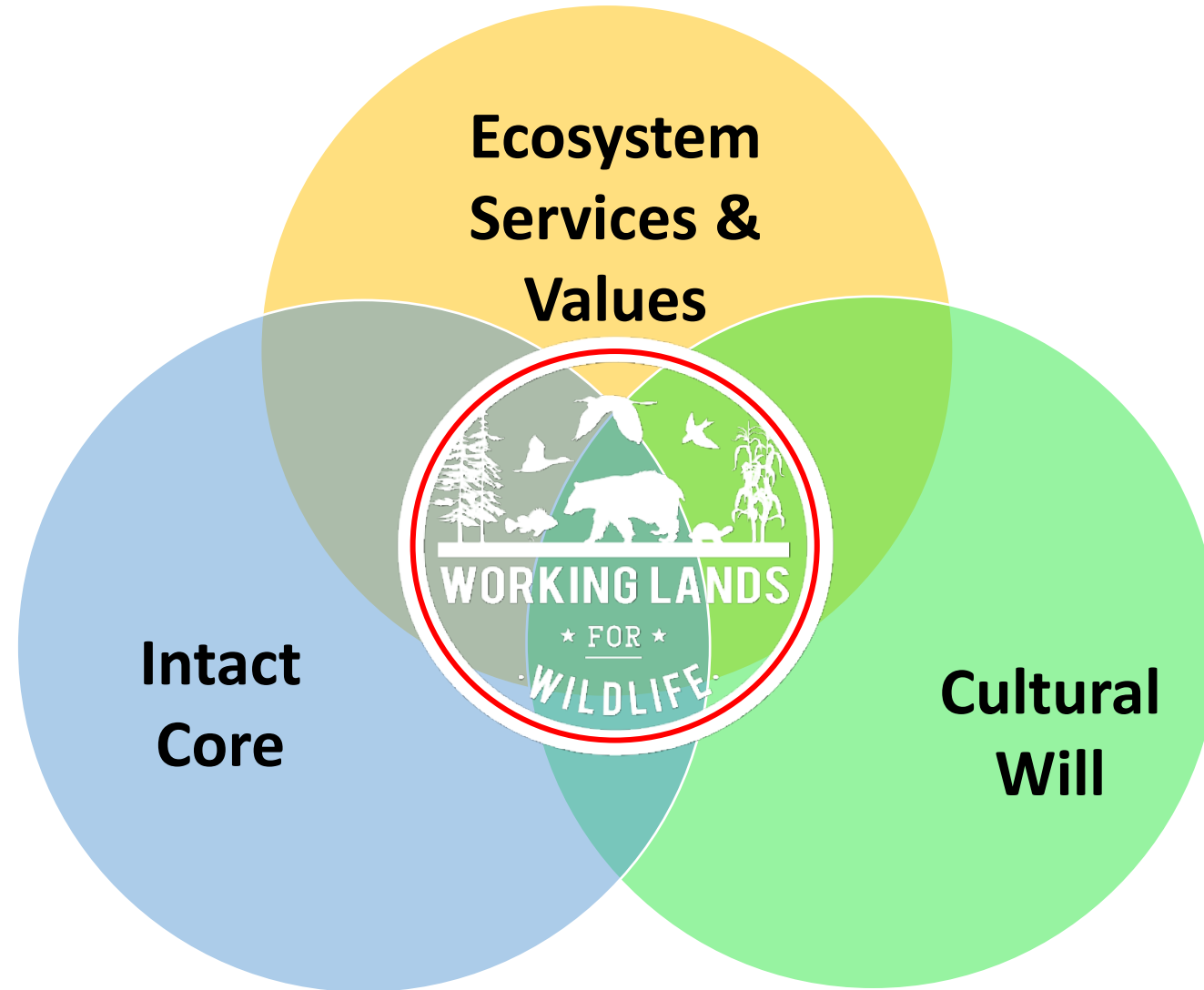
CONSERVATION CATEGORIZATION

CORE GRASSLANDS	VULNERABLE GRASSLANDS	CONVERTED/ALTERED GRASSLANDS
152,464,805 acres	157,095,917 acres	398,339,977 acres

Bringing it all together for societal wins



Bringing it all together for societal wins



WESTERN WORKING LANDS FOR WILDLIFE WORKSHOP

Dirac Twidwell

WLFW Science Advisor, Professor
University of Nebraska-Lincoln





Reducing Woody Encroachment to Conserve Rangeland Production in the Great Plains



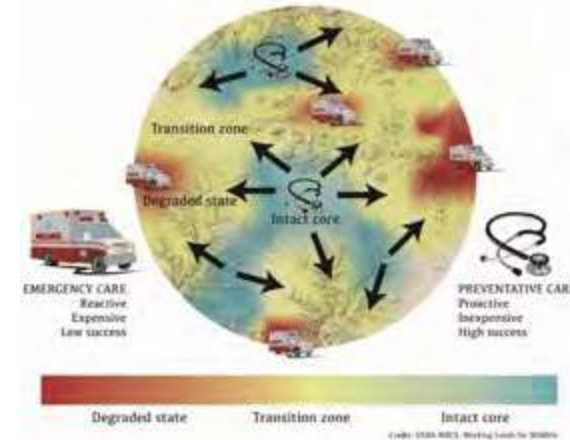
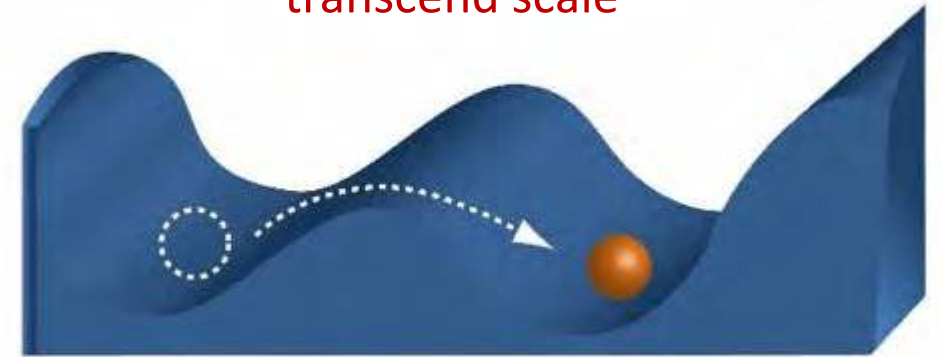
Dirac Twidwell
University of Nebraska

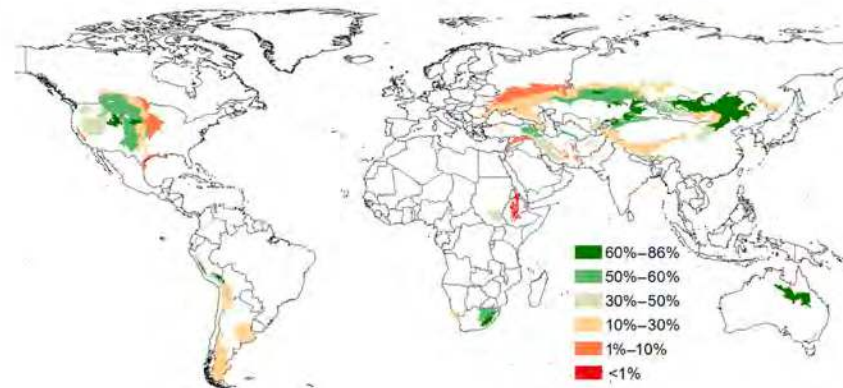


A grand challenge for the 21st century is to avoid transitions in nature that are so severe their consequences go beyond the traditions of any single discipline.



Scientists now hypothesize that the most catastrophic transitions are those that transcend scale





The last continuous grasslands on Earth: Identification and conservation importance

TABLE 1 The largest and most intact grasslands remaining on Earth

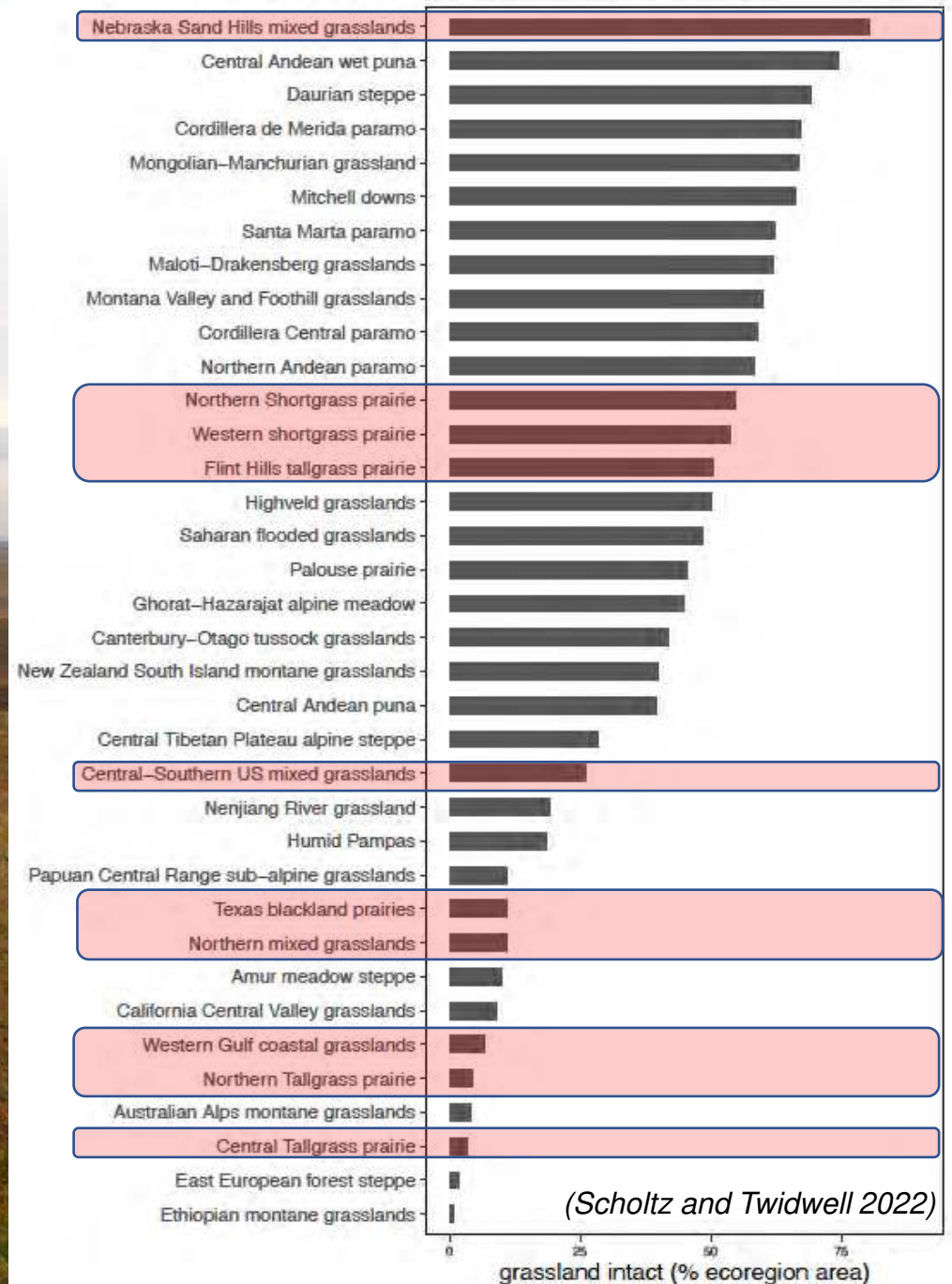
	Selenge-Altai and surrounding steppes (Emin Valley, Tian Shan, Kazakh)	Nebraska Sand Hills grassland	Central Andean wet Puna	Wyoming Basin steppe	Mongolian-Manchurian and Daurian grasslands	Mitchell grasslands	Maloti-Drakensberg grasslands
							
Continent	Asia	North America	South America	North America	Asia	Australia	Africa

- Only seven grassland regions remain relatively intact at large scales
- More grassland regions are nearly entirely converted than remain intact
- All remaining grassland regions share similar threats

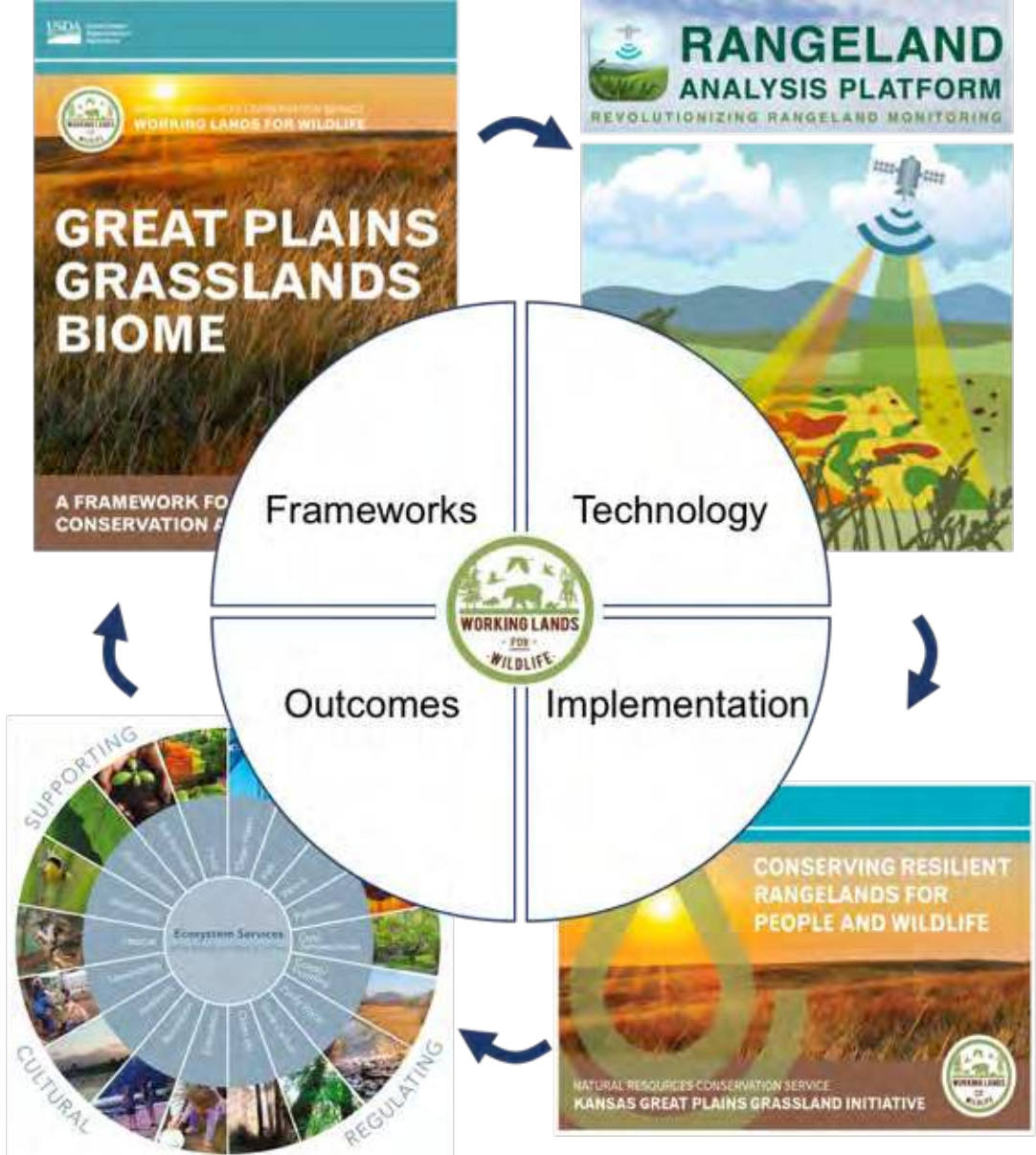
The Last Remaining Grassland Regions of the Great Plains



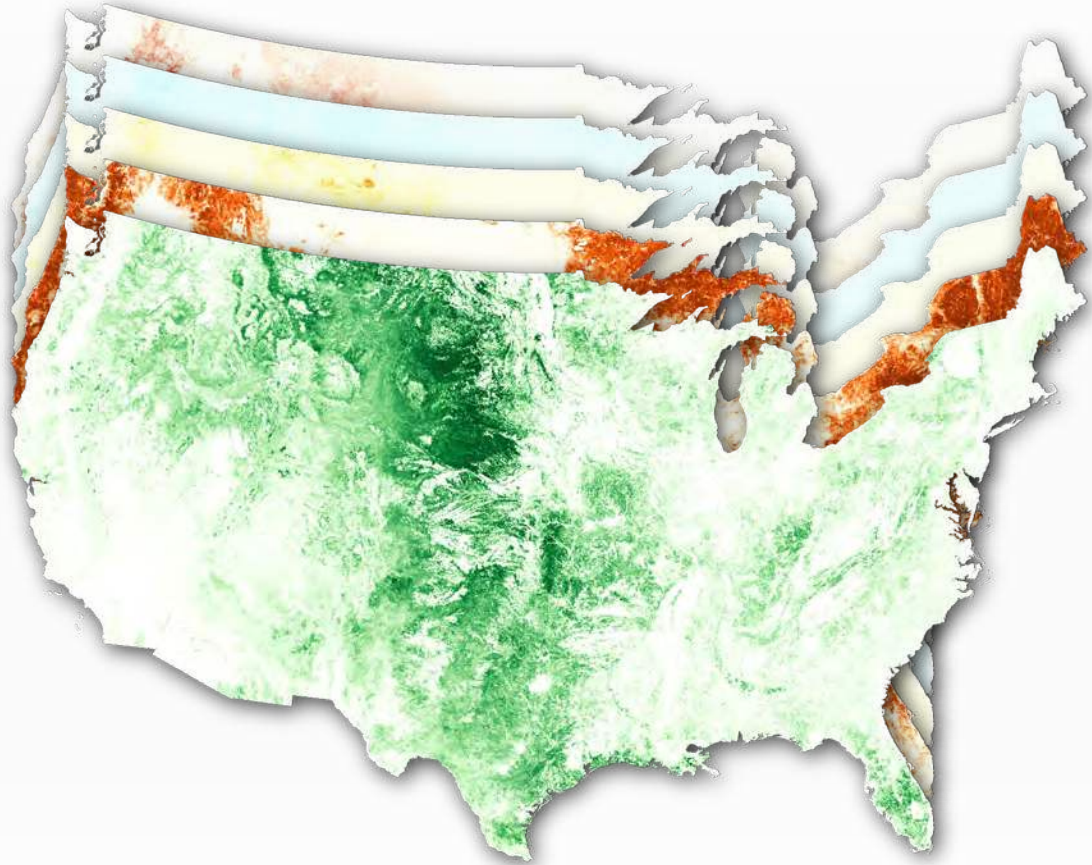
Temperate/Tropical Grasslands



For grasslands to have a future, the profession needs to support the scaling-up of conservation in the Great Plains

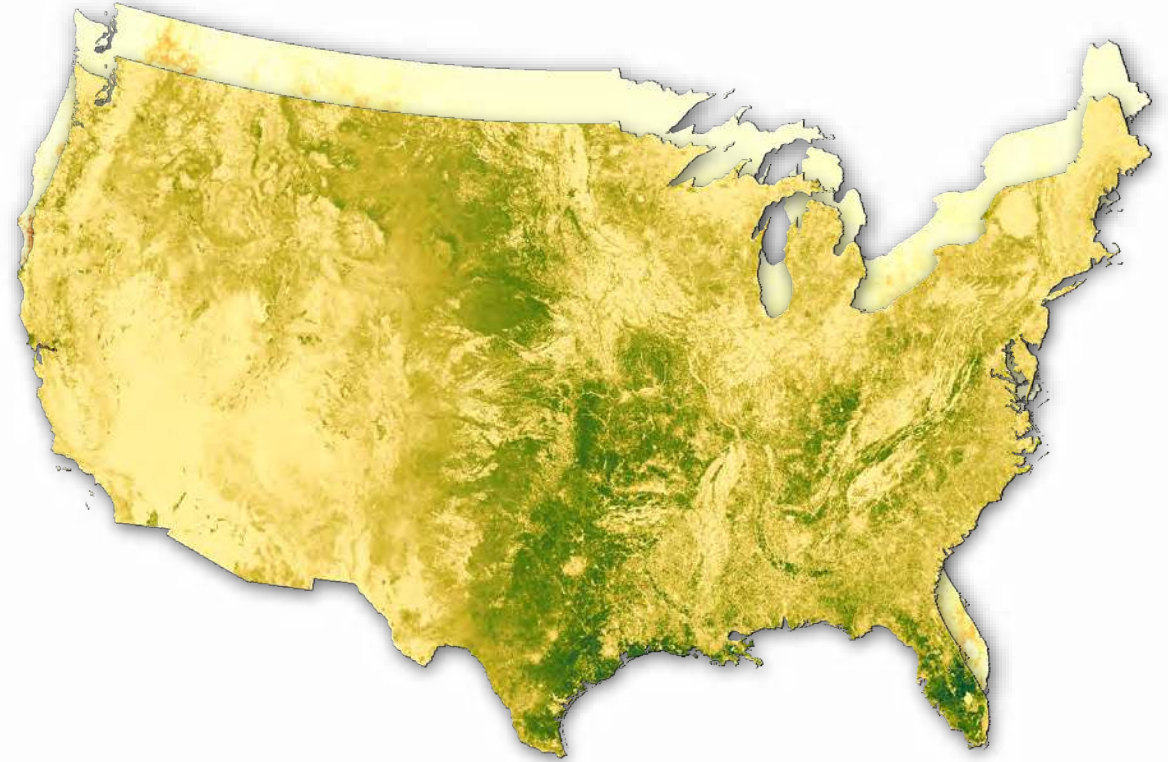


Rangeland Analysis Platform



Rangeland Cover

- 0-100% aerial cover
- 5 vegetation groups
- Annual time-step

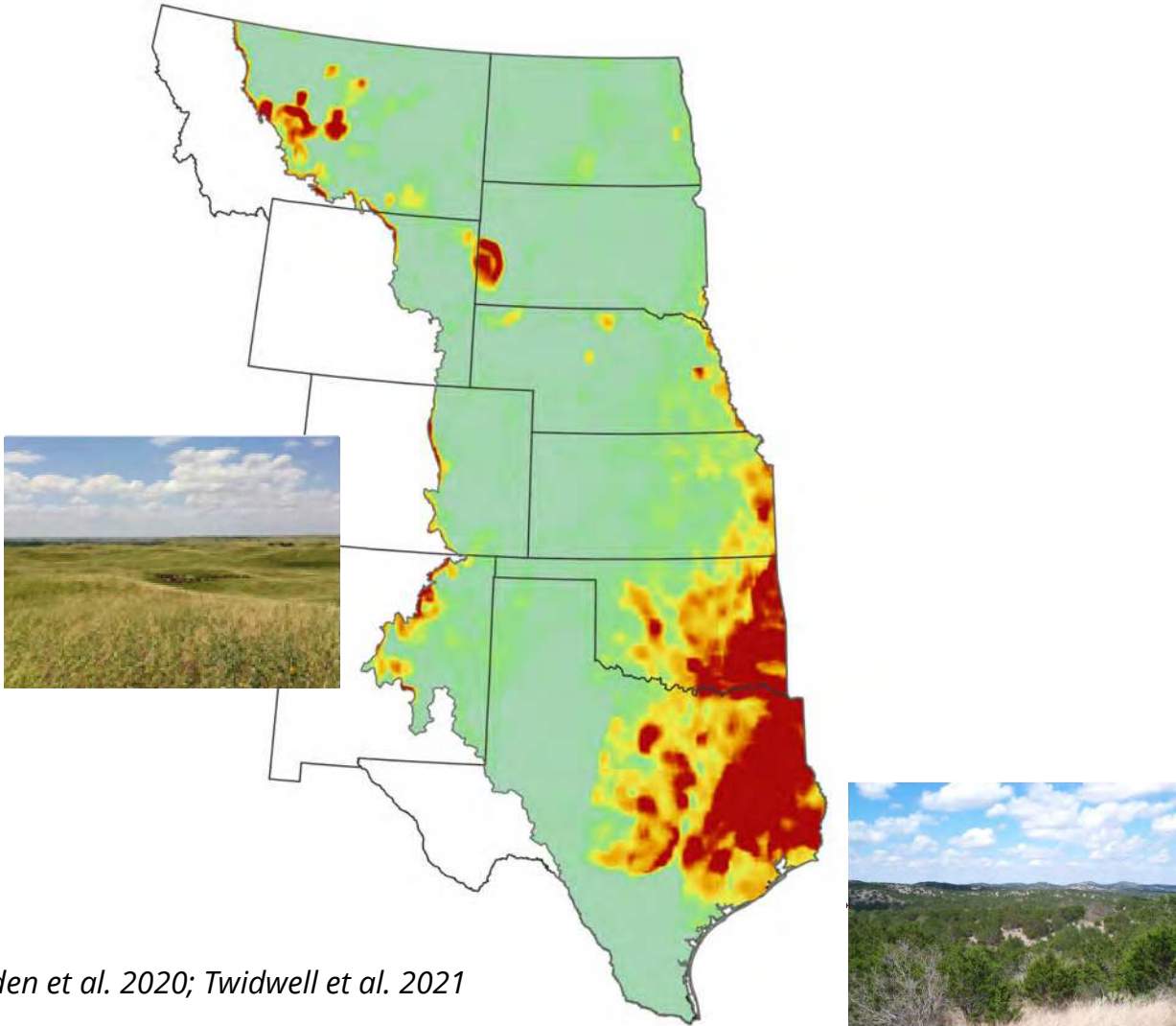


Rangeland Production

- lbs/acre
- 2 vegetation groups
- Annual time-step
- 16-day time-step

The Great Plains Biome is Collapsing

1990



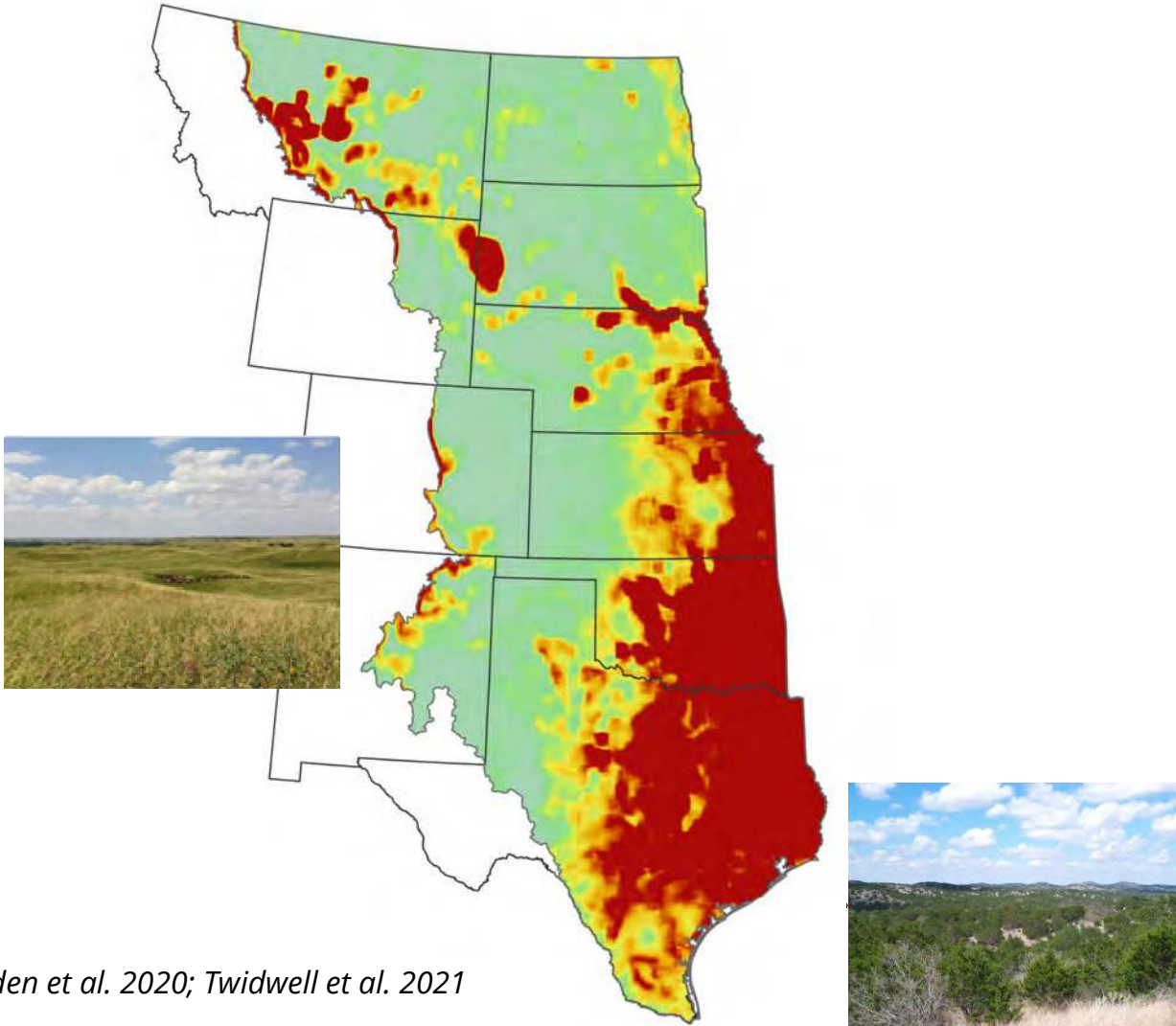
\$177M spent in last Farm Bill



Southern Plains:	\$164.5 M
Southern Mountain:	\$59.6 M
Pacific:	\$25.9 M
Northern Plains:	\$12.5 M
Northern Mountain:	\$8.5 M

The Great Plains Biome is Collapsing

2020

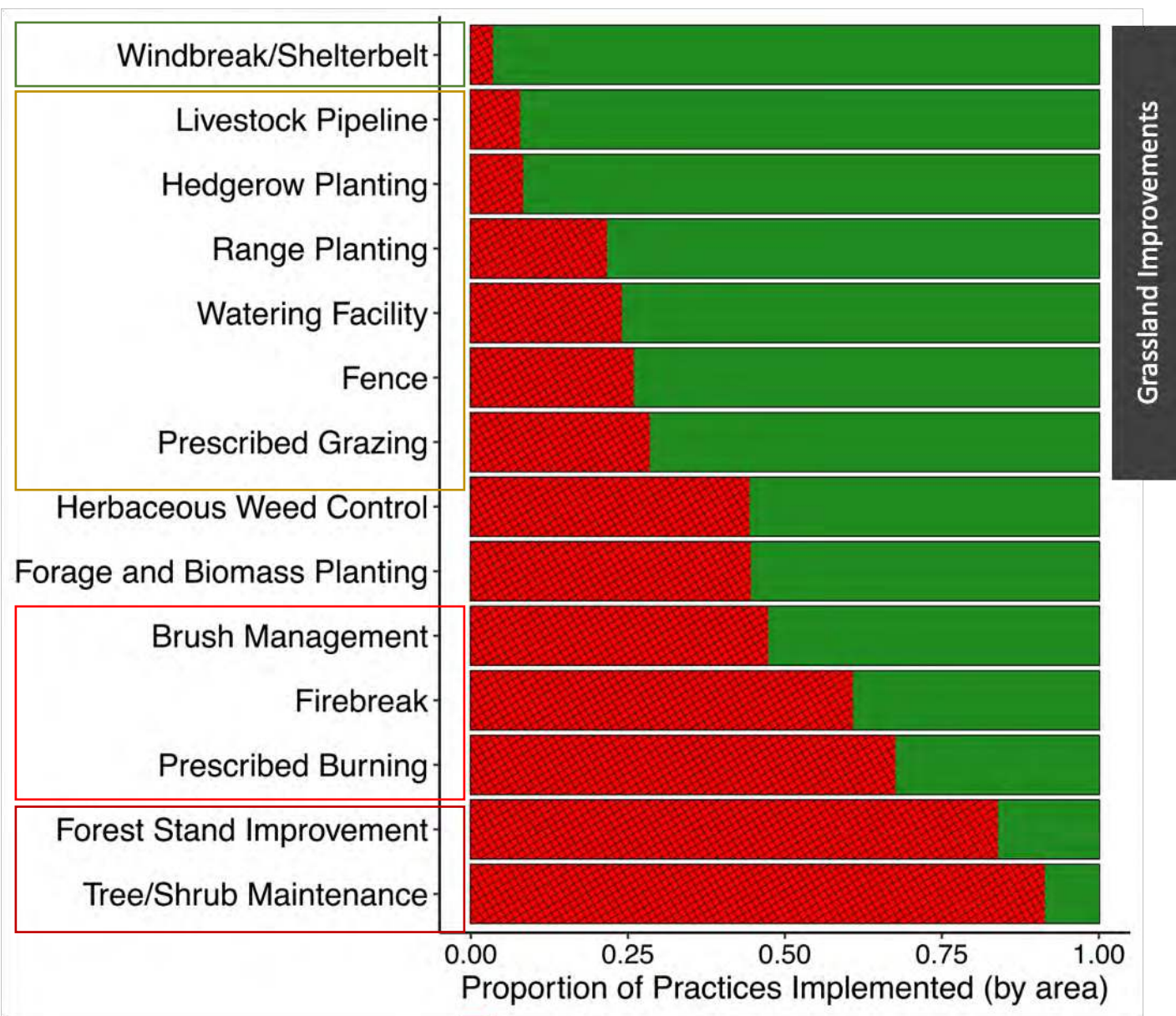


\$177M spent in last Farm Bill



Southern Plains:	\$164.5 M
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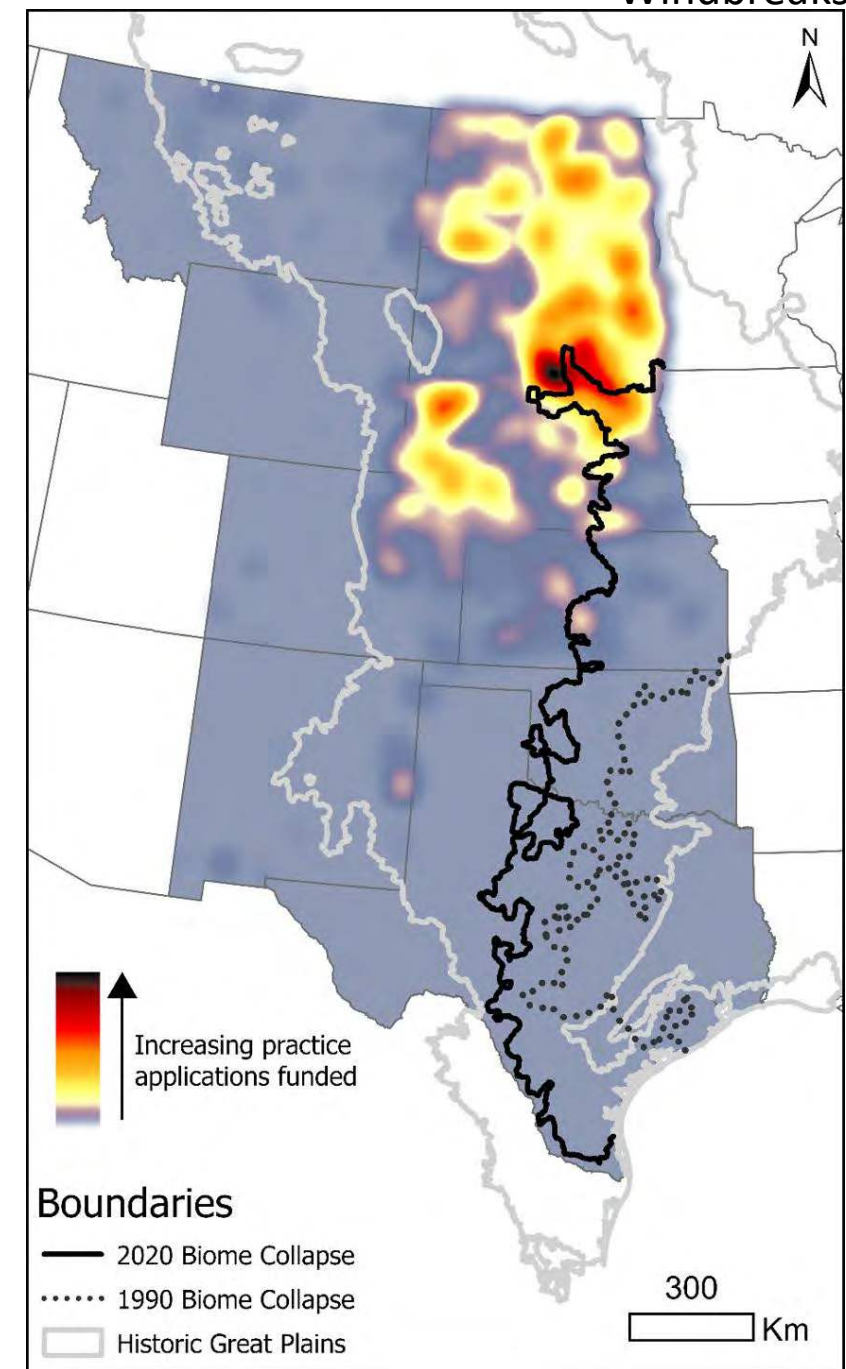
The Problem of the "Improvement *then* Restoration" Paradigm



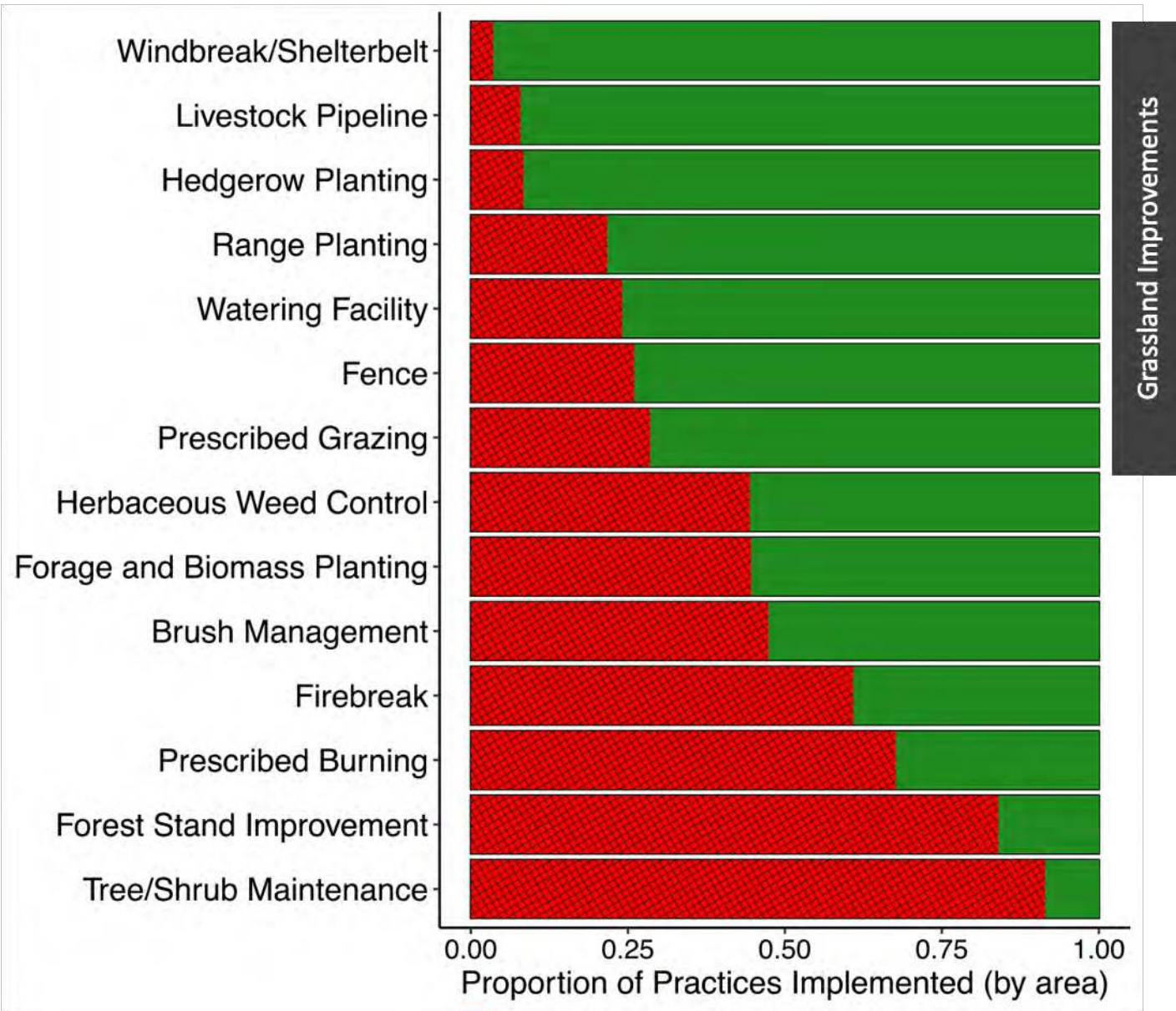
1.14M NRCS practices;
Cady et al. in prep

■ Ahead of Biome Collapse Boundary
■ Behind Biome Collapse Boundary

Grassland Improvements
Grassland Restoration
Forest Improv.



The Problem of the "Improvement *then* Restoration" Paradigm



Proportion of Practices Implemented (by area)

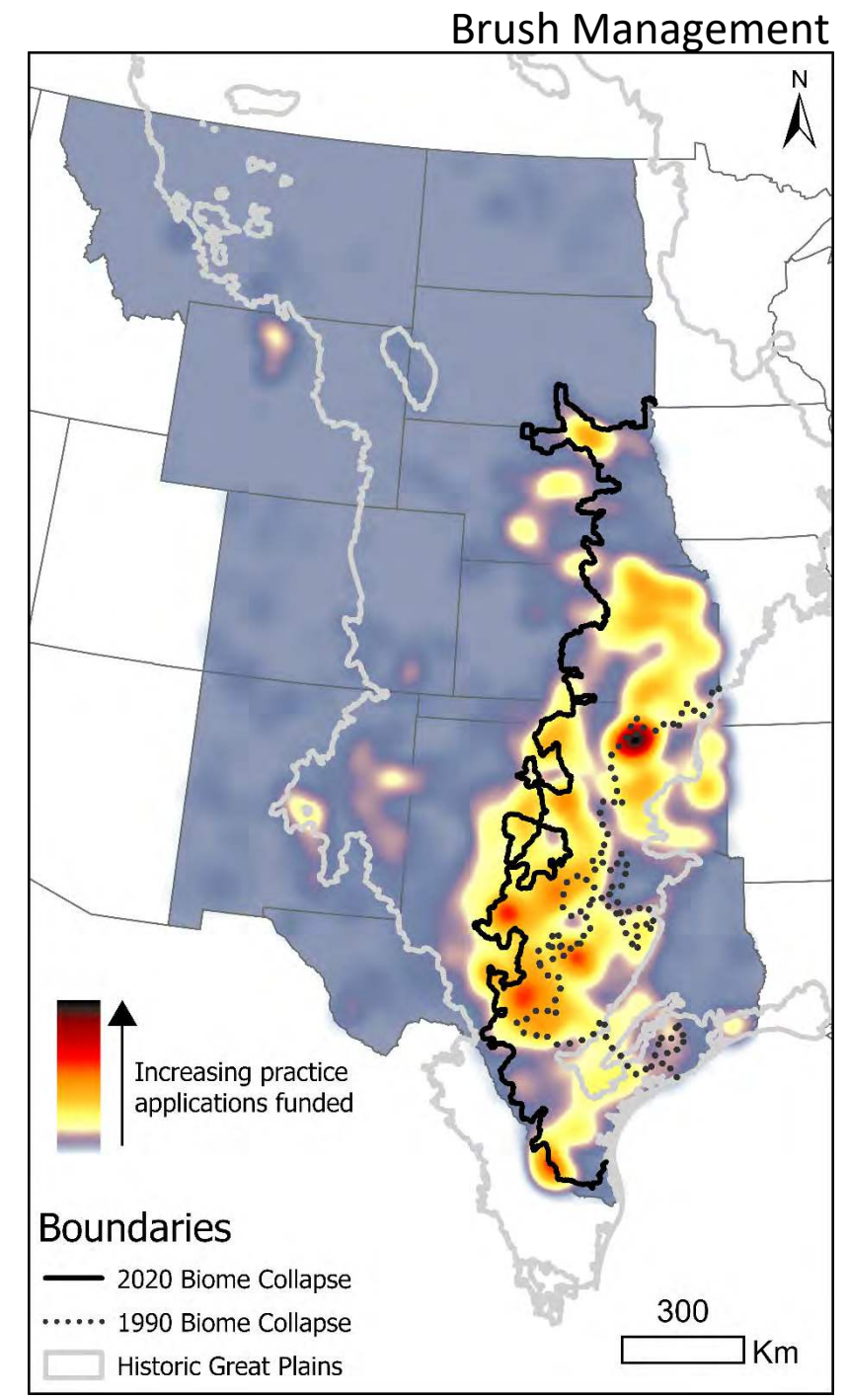
■ Ahead of Biome Collapse Boundary
■ Behind Biome Collapse Boundary

1.14M NRCS practices;
Cady et al. in prep

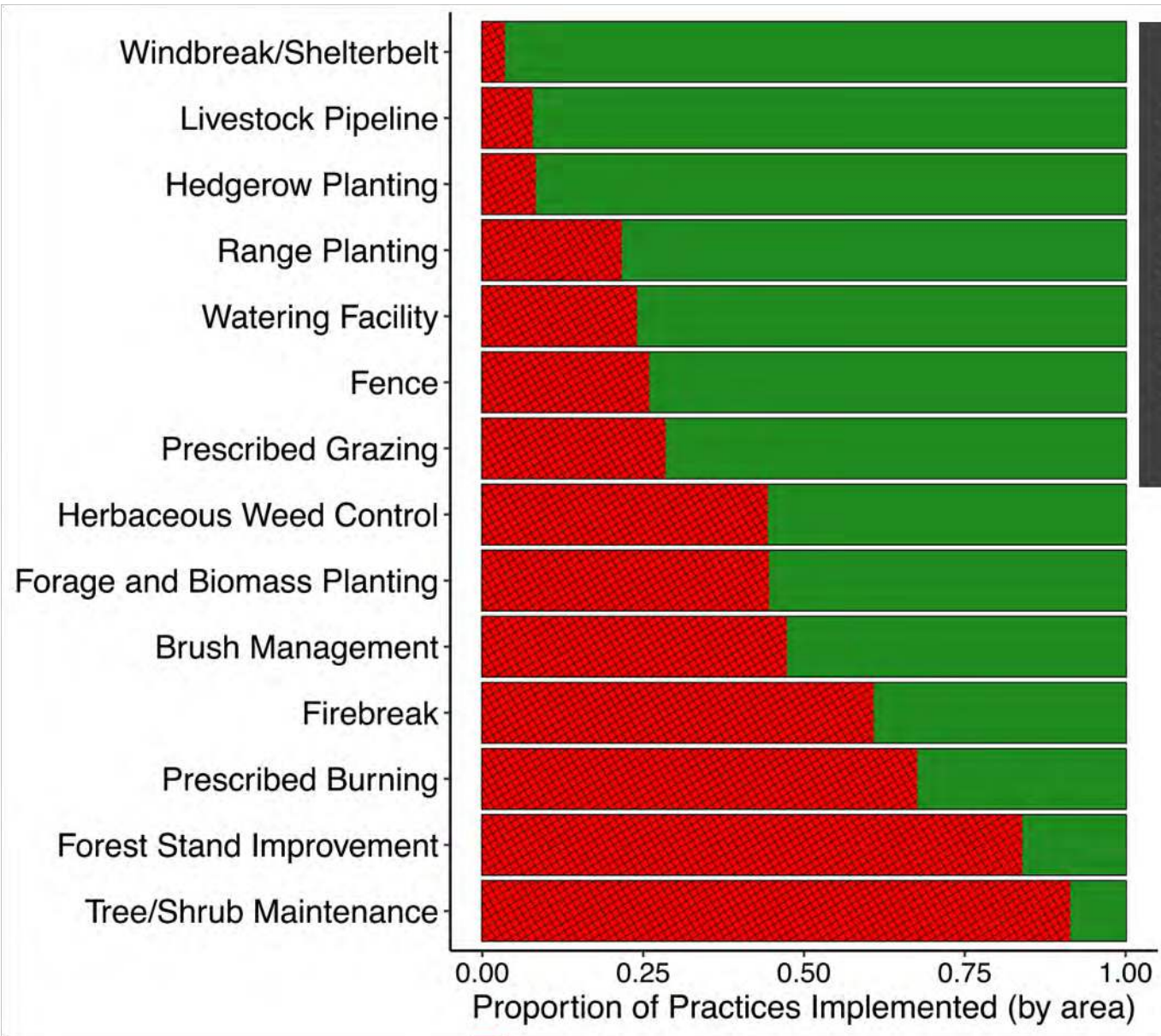
Grassland Improvements

Grassland Restoration

Forest Improv.



The Problem of the "Improvement *then* Restoration" Paradigm

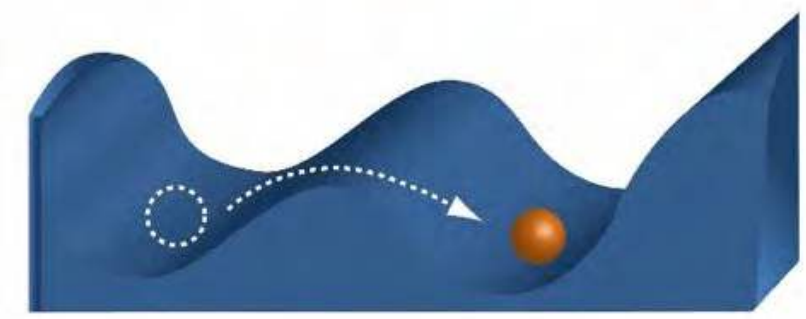
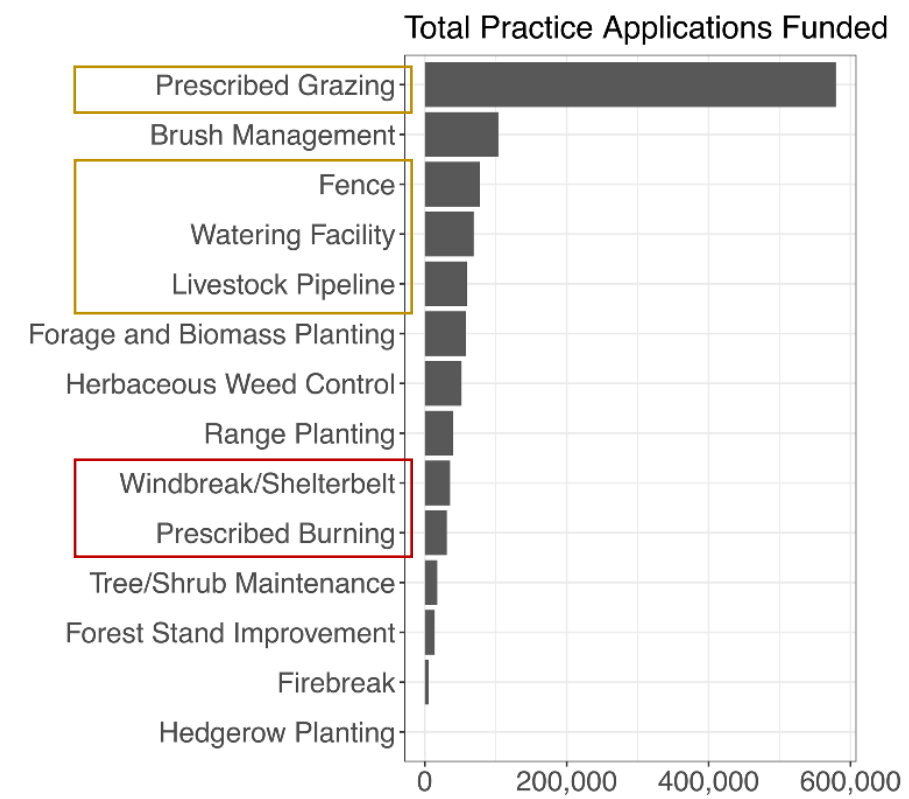


■ Ahead of Biome Collapse Boundary
■ Behind Biome Collapse Boundary

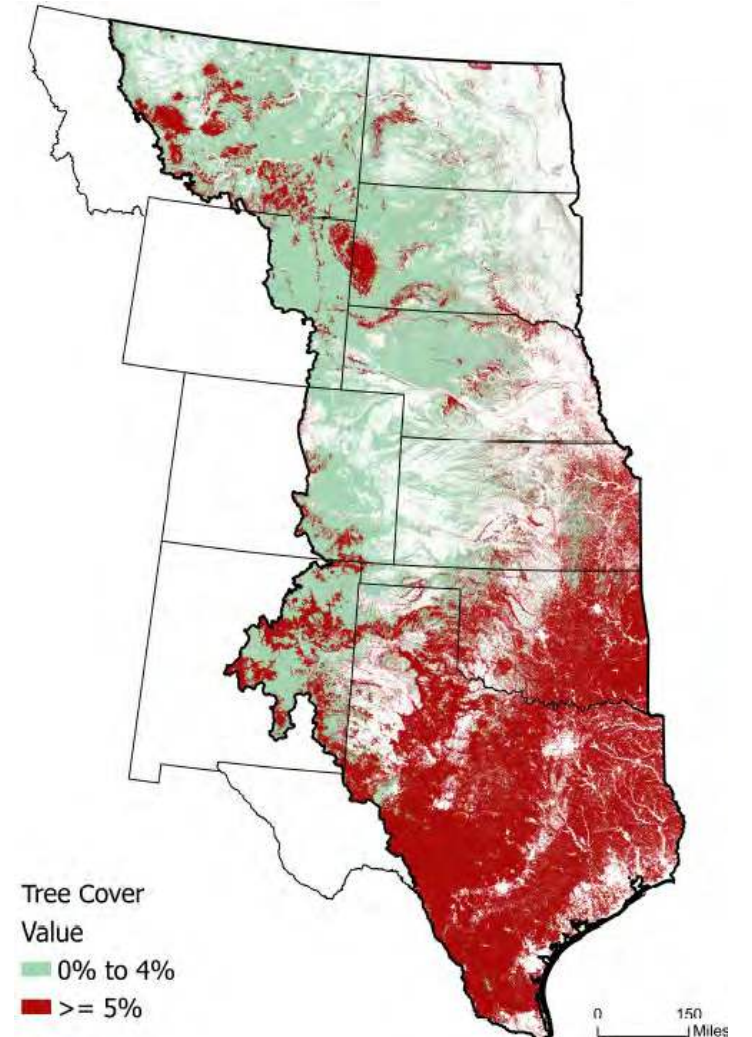
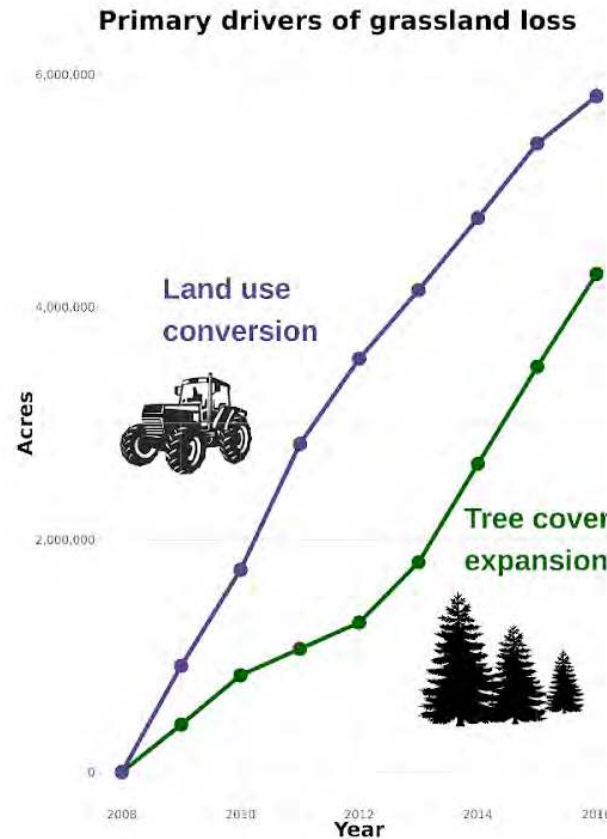
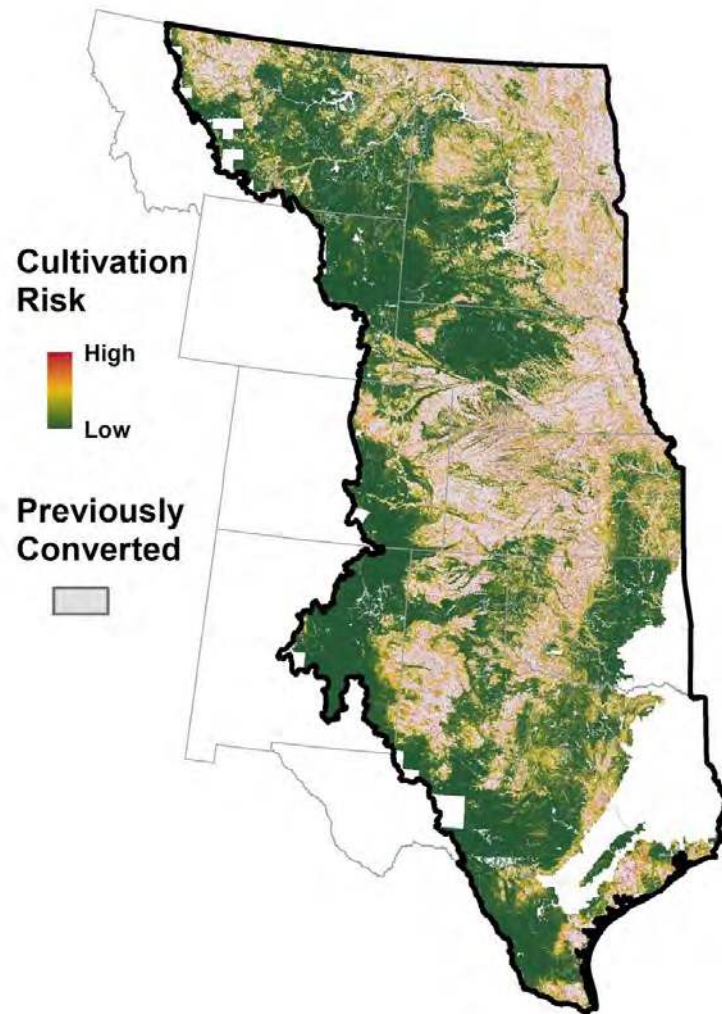
Grassland Improvements

Grassland Restoration

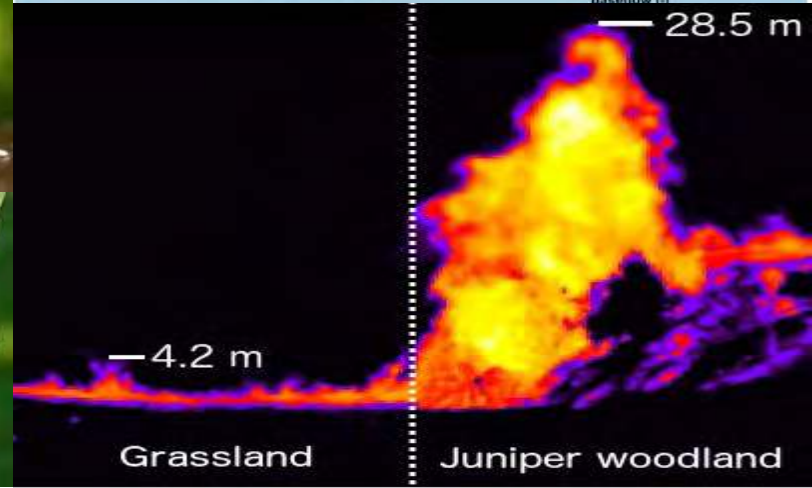
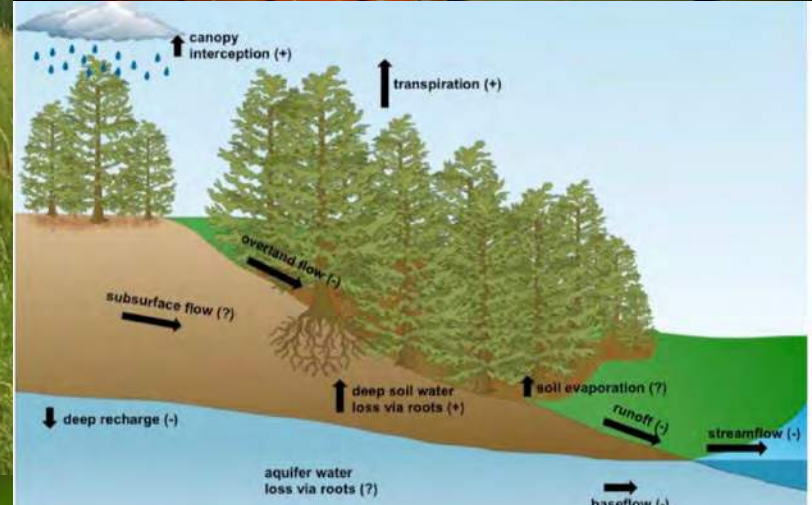
Forest Improv.



The Top Drivers of Grassland Loss in the Great Plains Biome: Land Use Conversion & Woody Encroachment



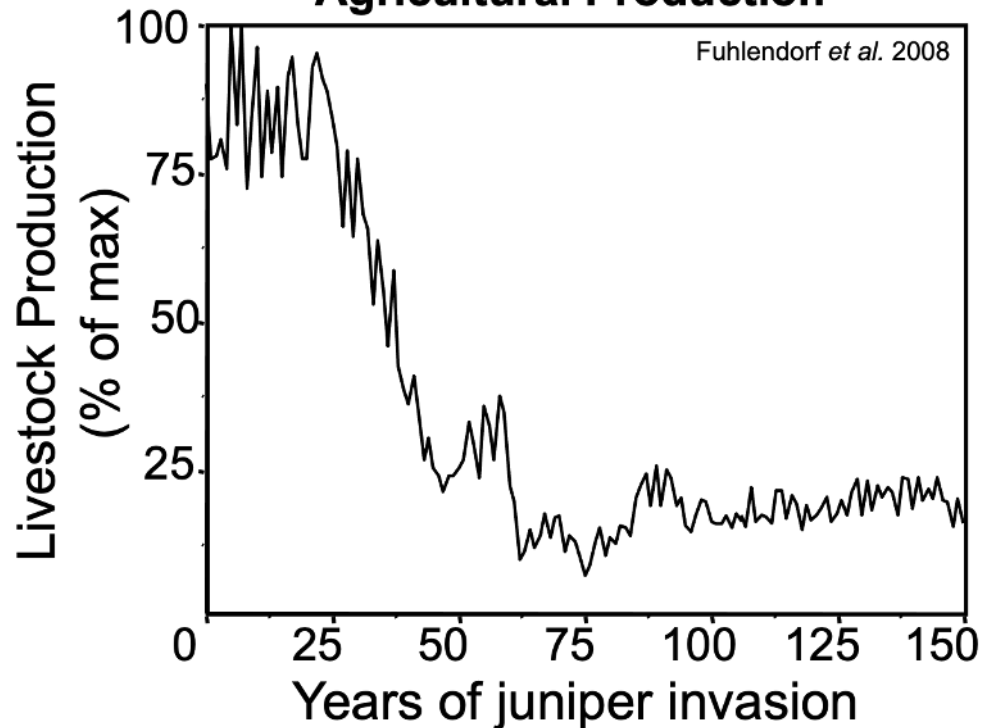
Biome-level consequences: Rancher livelihoods, Wildfire danger, Human health, Water, Endangered species, School funding, Regulatory pressure



Herbaceous production lost to tree encroachment in United States rangelands

Scott L. Morford¹  | Brady W. Allred^{1,2}  | Dirac Twidwell³  | Matthew O. Jones^{1,4}  |
Jeremy D. Maestas⁵  | Caleb P. Roberts⁶  | David E. Naugle^{1,2} 

Woody Encroachment Takes Land Out of Agricultural Production



The Great Plains Lost 22.4 Million Tons of Rangeland Production to Woody Encroachment in 2019

Rangelands are the economic and cultural backbone of the Great Plains. Healthy, resilient rangelands power rural communities, host diverse wildlife, support recreation, and provide critical services like water and carbon storage.

Grazing is the common thread that sustains these rangelands for people and wildlife. In 2019, rangelands in the 10-state Great Plains region produced 292.4 million tons of forage.

Today, woody encroachment is one of the greatest threats facing rangelands in the Great Plains. Invading trees

outcompete and displace grasses and forbs, reducing rangeland production by up to 75 percent. Scattered woody plants may look harmless, but their expansion in rangelands results in major consequences to livestock production and wildlife. When we lose healthy rangelands, we lose the cultural, economic, and life-sustaining resources they provide.

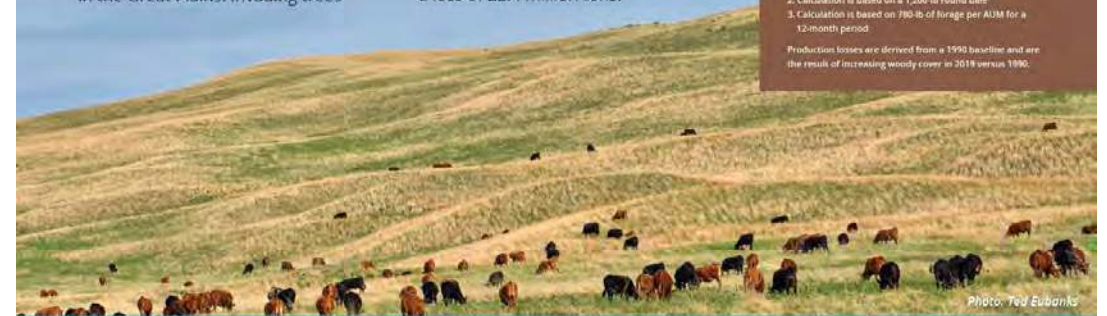
According to scientists working alongside the NRCS's Working Lands for Wildlife efforts, every state in the Great Plains lost rangeland production due to woody encroachment in 2019 – a loss of 22.4 million tons.

RANGELAND PRODUCTION LOST TO TREES EQUATES TO:

- \$323+ million in lost forage¹
- 37.3 million round bales² – enough to circle the globe 1.4 times!
- Forage for 4.8 million cows³

1. Calculation is based on cash rental rates.
2. Calculation is based on a 1,200 lb round bale.
3. Calculation is based on 780-lb of forage per AUM for a 12-month period.

Production losses are derived from a 1990 baseline and are the result of increasing woody cover in 2019 versus 1990.



NEW GUIDANCE FOR REVERSING AND PREVENTING WOODY ENCROACHMENT

Reacting to woody encroachment after trees have taken over makes it impossible to avoid rangeland production losses, perpetuating the problem as trees simply keep expanding into formerly treeless grasslands.

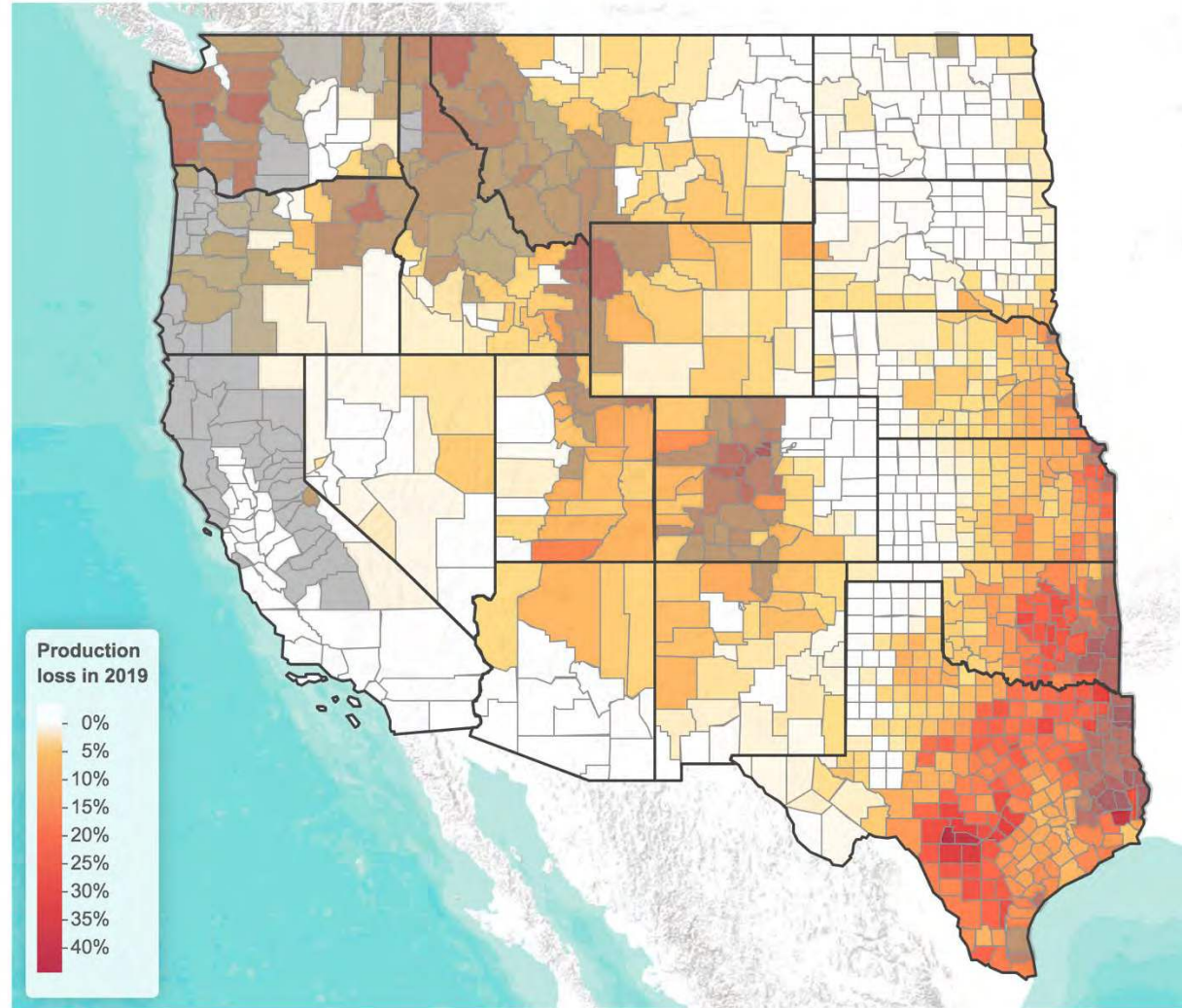
New guidance, developed as a collaborative effort among rangeland scientists in the Great Plains, outlines a more cost-efficient and proactive strategy to keep rangelands productive and reverse losses due to woody encroachment.

Learn more at: <https://www.wfw.org/great-plains/woodland-expansion/>



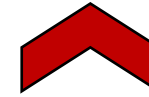
National Rangeland Statistics

Rangeland Productivity Lost to Woody Encroachment



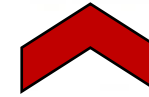
South Dakota

Productivity lost to woody encroachment in 2019	Cumulative productivity lost to woody encroachment (1990-2019)
145,352 tons	2,076,178 tons



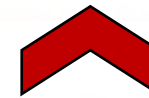
Nebraska

Productivity lost to woody encroachment in 2019	Cumulative productivity lost to woody encroachment (1990-2019)
419,328 tons	3,881,756 tons



Kansas

Productivity lost to woody encroachment in 2019	Cumulative productivity lost to woody encroachment (1990-2019)
2,060,106 tons	28,902,217 tons



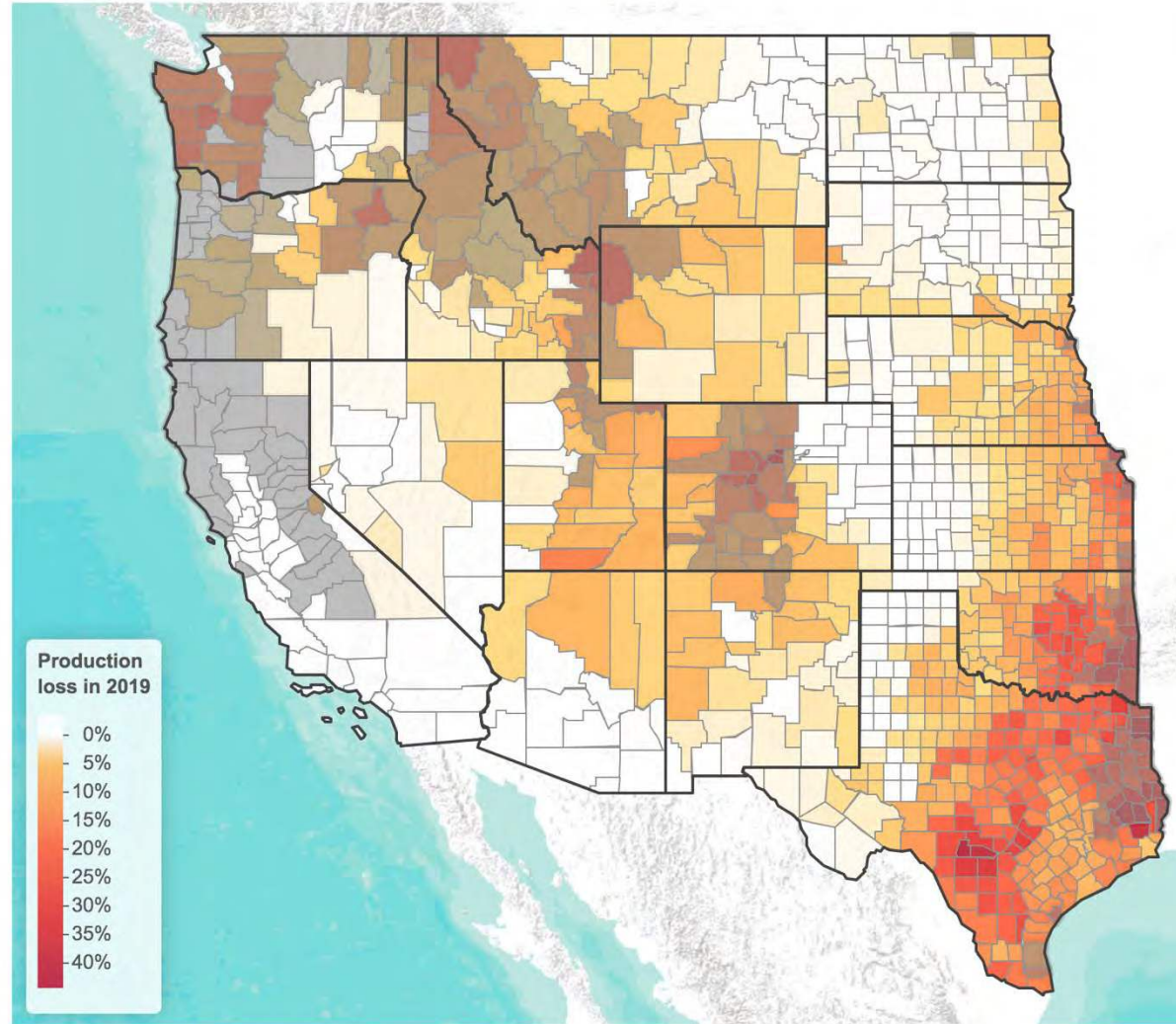
Oklahoma

Productivity lost to woody encroachment in 2019	Cumulative productivity lost to woody encroachment (1990-2019)
4,491,096 tons	76,529,801 tons

The productivity loss data is based on the 2019 National Rangeland Inventory (NRI) and the 1990 National Rangeland Inventory (NRI). The data is based on the 2019 NRI and the 1990 NRI. The data is based on the 2019 NRI and the 1990 NRI.

National Rangeland Statistics

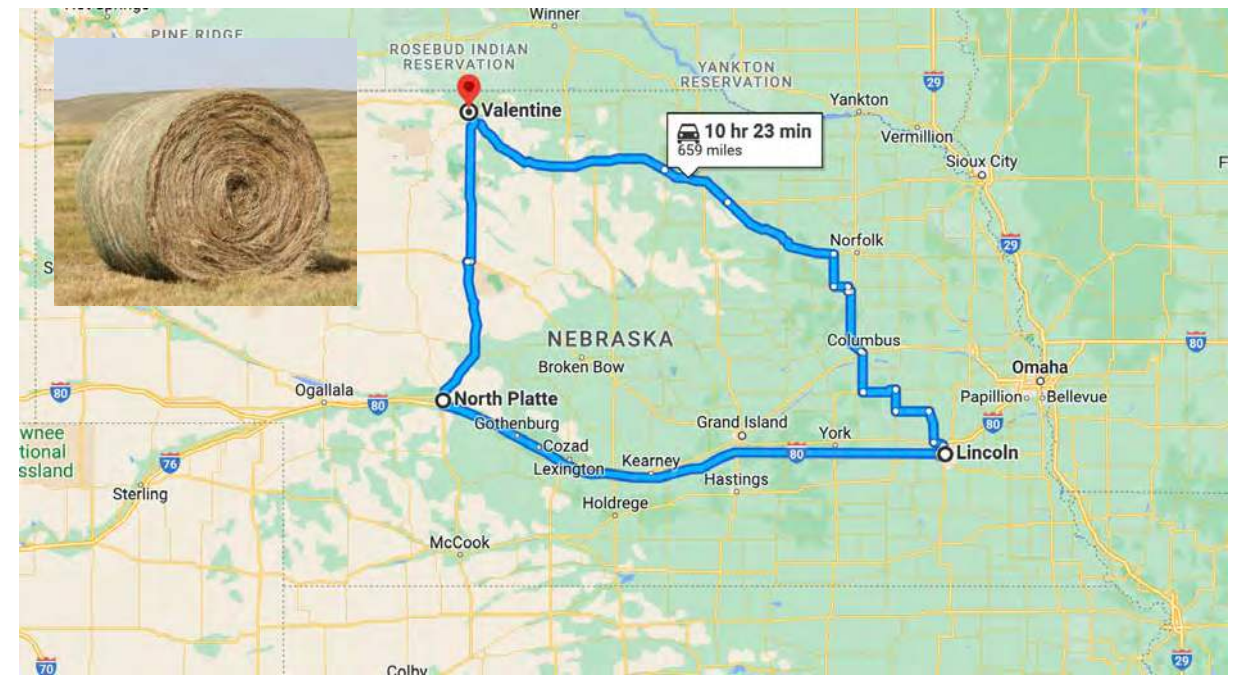
Rangeland Productivity Lost to Woody Encroachment



Equivalent to 698K Round Bales

Nebraska

Productivity lost to woody encroachment in 2019	Cumulative productivity lost to woody encroachment (1990-2019)
419,328 tons	3,881,756 tons



The productivity loss is based on data from the 2010 National Rangeland Inventory and is an estimate. The loss is based on the productivity of the rangeland in 1990. The loss is based on the productivity of the rangeland in 1990.

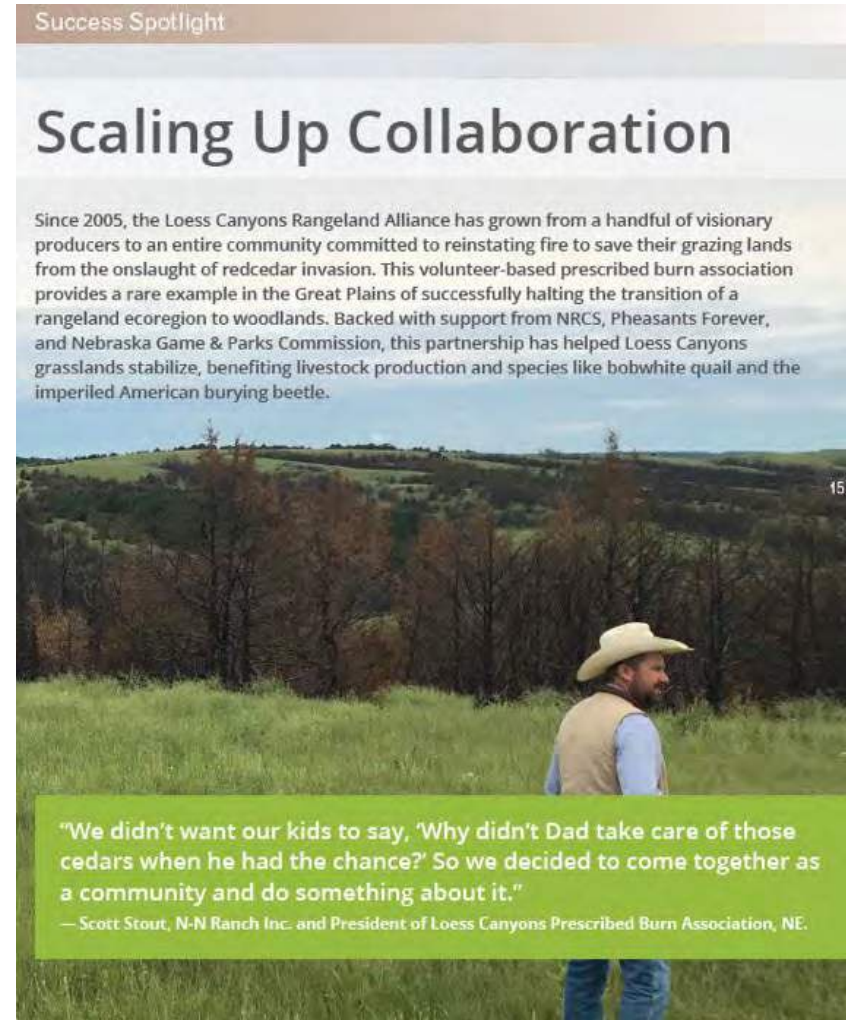
We are working with landowner groups, agencies, and industry across the Great Plains to demonstrate the 1st large-scale solutions to biome collapse



**LOESS CANYONS
EXPERIMENTAL
LANDSCAPE**

SCIENCE REPORT
University of Nebraska

RESEARCH HIGHLIGHTS - 2016-2021



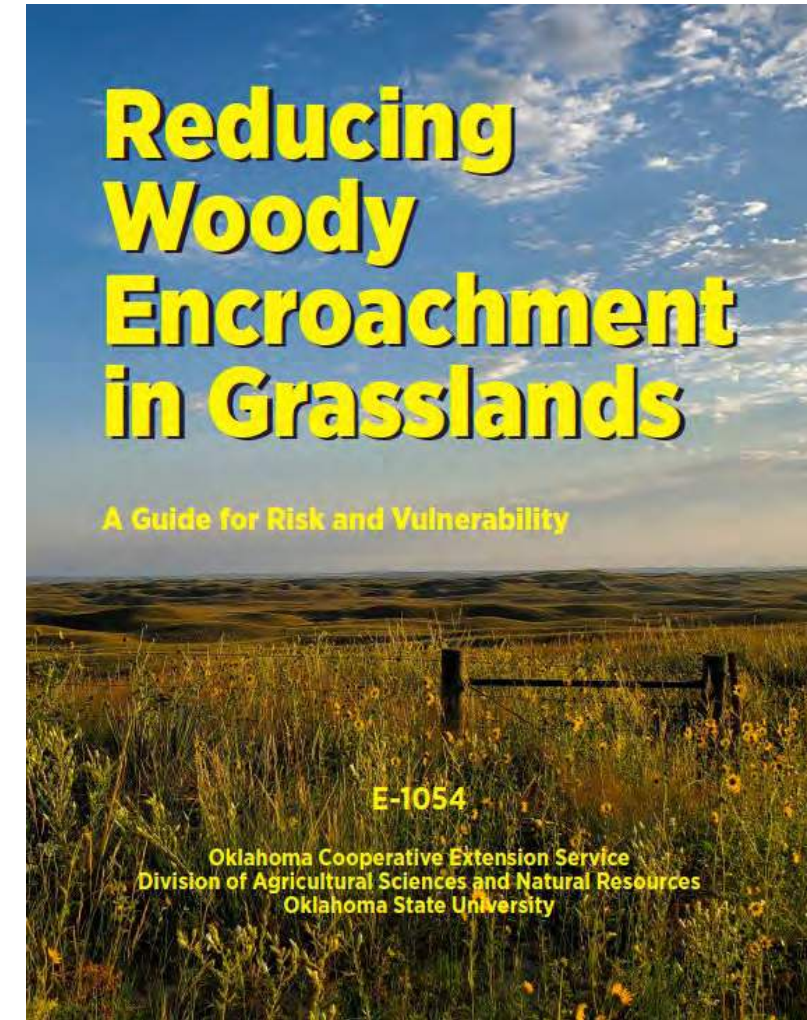
Success Spotlight

Scaling Up Collaboration

Since 2005, the Loess Canyons Rangeland Alliance has grown from a handful of visionary producers to an entire community committed to reinstating fire to save their grazing lands from the onslaught of redcedar invasion. This volunteer-based prescribed burn association provides a rare example in the Great Plains of successfully halting the transition of a rangeland ecoregion to woodlands. Backed with support from NRCS, Pheasants Forever, and Nebraska Game & Parks Commission, this partnership has helped Loess Canyons grasslands stabilize, benefiting livestock production and species like bobwhite quail and the imperiled American burying beetle.

15

"We didn't want our kids to say, 'Why didn't Dad take care of those cedars when he had the chance?' So we decided to come together as a community and do something about it."
— Scott Stout, N-N Ranch Inc. and President of Loess Canyons Prescribed Burn Association, NE.



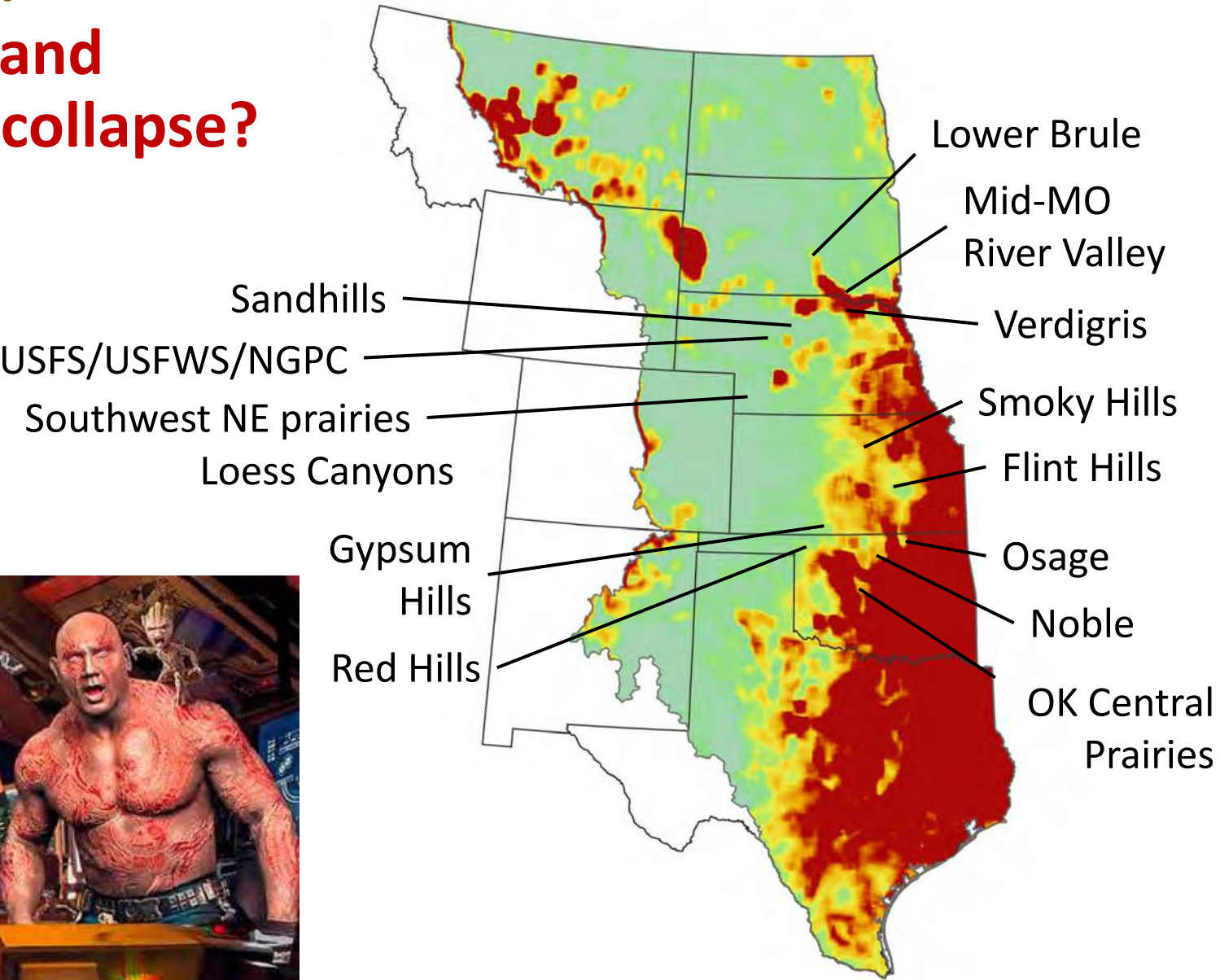
Reducing Woody Encroachment in Grasslands

A Guide for Risk and Vulnerability

E-1054

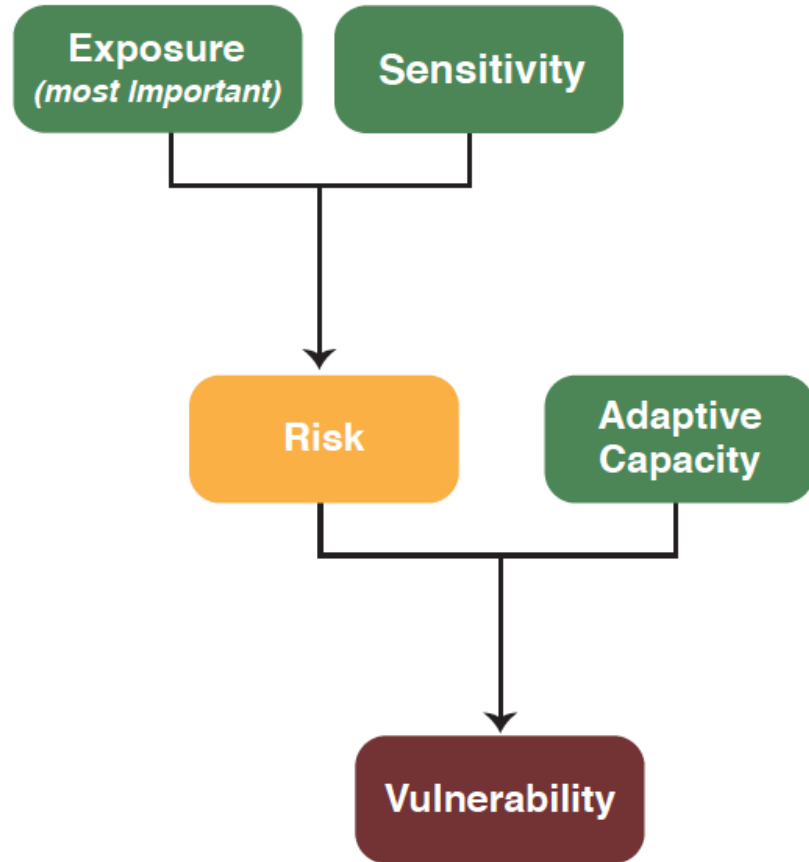
Oklahoma Cooperative Extension Service
Division of Agricultural Sciences and Natural Resources
Oklahoma State University

THE ULTIMATE EXPERIMENT: Is it possible for some grassland regions to withstand biome collapse?



Guardians of the Grasslands Project

Grasslands are More Vulnerable to Woody Encroachment Today Than in the Past

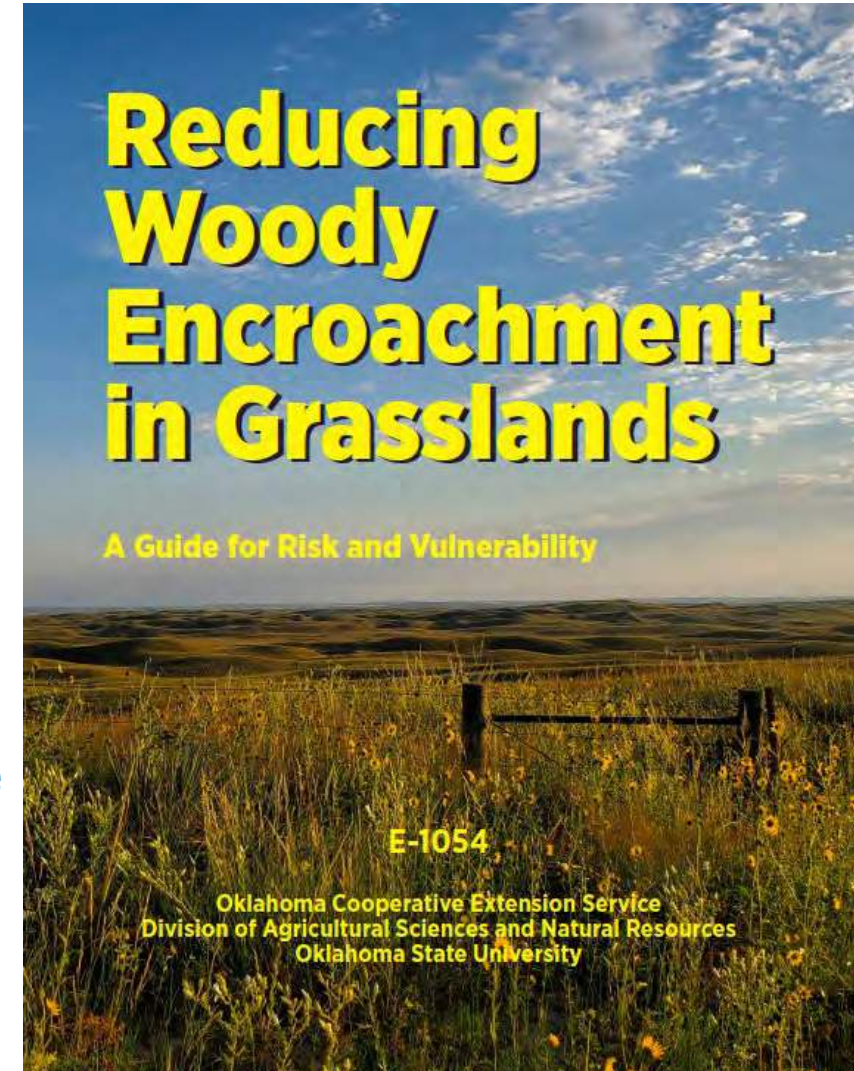


Exposure is driven by proximity to seed sources, which contaminate nearby areas. Exposure is the most important consideration for successful planning.

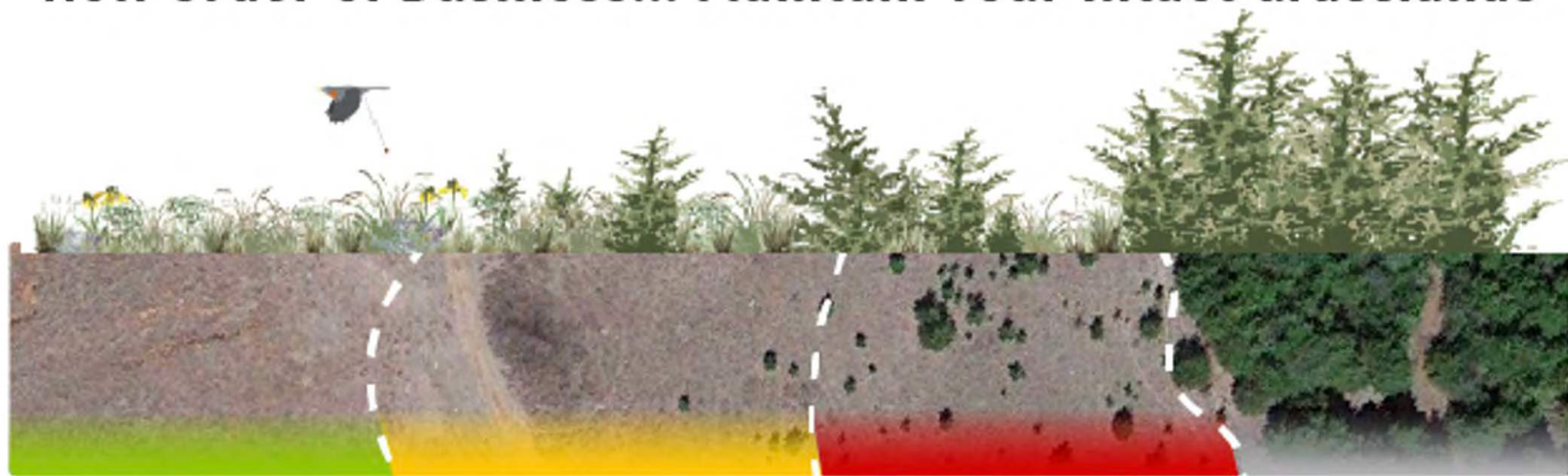
Sensitivity is the relative ease that woody plants establish and the speed at which they spread in grasslands.

Adaptive capacity is the ability to increase collaborative partnerships and resources to reduce the risk of woody encroachment.

What is vulnerability?
The degree to which a grassland is susceptible to, or unable to cope with, the risk of woody encroachment. All grasslands are vulnerable to encroachment. More arid and sandier sites are less sensitive than other grasslands, but encroachment still happens when exposed to seed sources.



New Order of Business... Maintain Your Intact Grasslands



STAGE & DESCRIPTION

Intact Grassland



Treeless with no seeds or tree seedlings

Seed Dispersal & Recruitment



Grassland with incoming seeds & tree seedlings

Mature Tree Encroachment



Seed producing trees (6+ years, 5+ ft. tall)

Transitioned to Woodland



Trees dominate

MANAGEMENT ACTION

Avoid Introducing Seed
Fire

Remove Young Trees
Fire, cutting, haying, browsers

Remove Scattered, Seed
Producing Trees
Hand tools, machinery, fire

Remove Large Trees
Heavy machinery, fire

MANAGEMENT PRIORITY

1

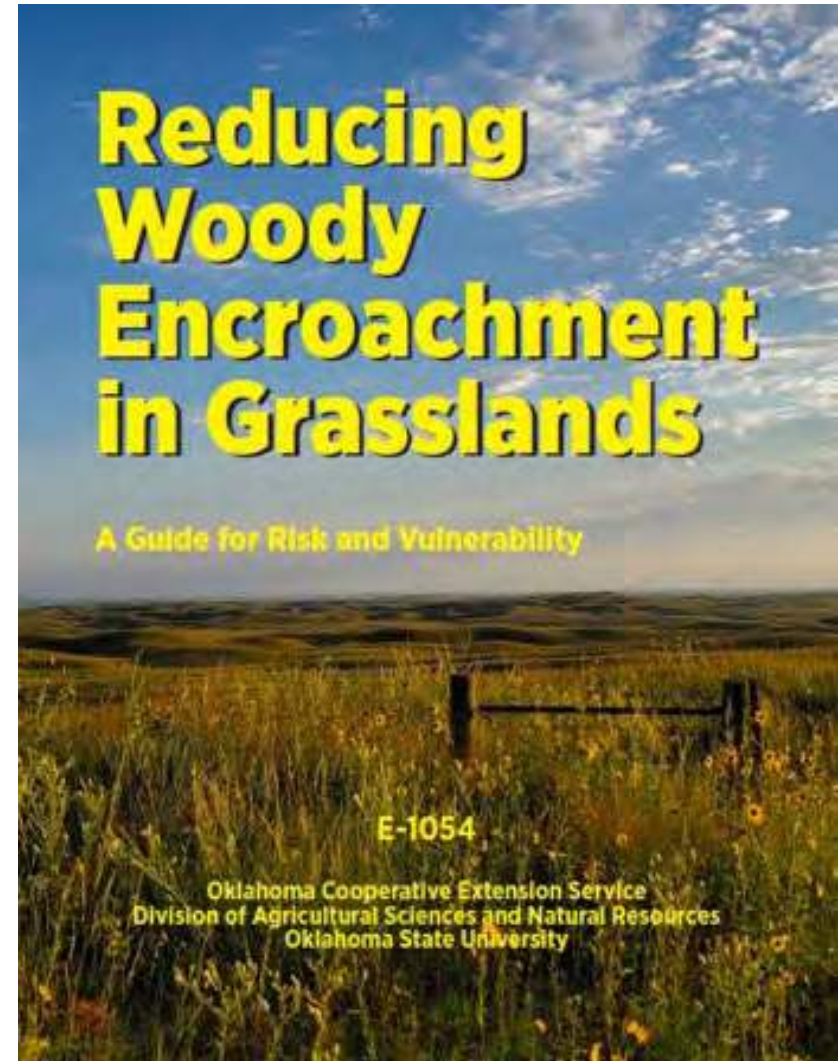
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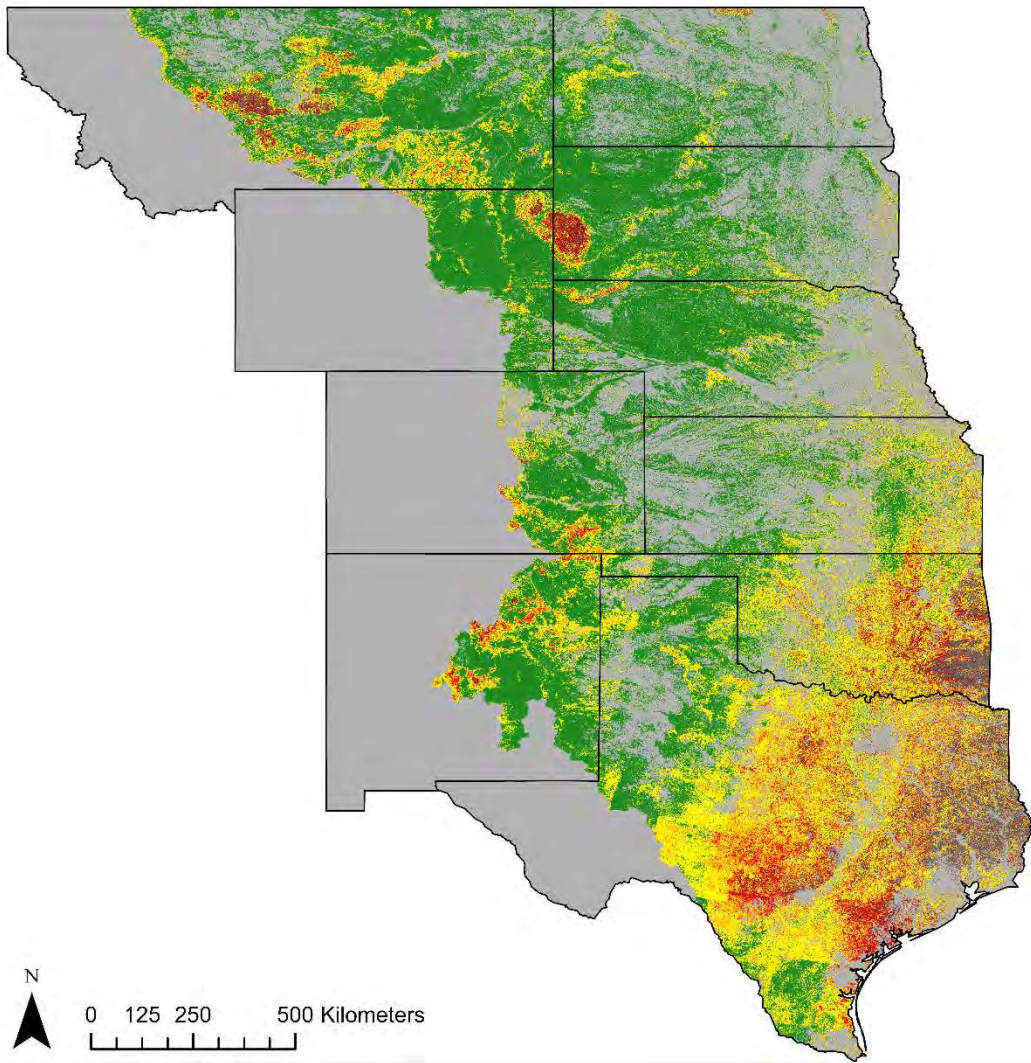
4

Early Outcomes

- 1st evidence of halting regional transitions to woody dominance in temperate grasslands (Fogarty et al. 2021)
- Ecoregion-scale increase in grassland bird richness (Roberts et al. 2022)
- Increased population abundance of the American burying beetle (previously endangered; Ludwig et al. *in prep*)
- Increased plant species richness (Ludwig et al. *in prep*)
- Reduced wildfire danger (Donovan et al. 2023)
- Restoration of grassland productivity following juniper woodland collapse with fire (Bielski et al. 2021)
- \$226K increased revenue potential on 76K acres (2019 vs. 2015) in Loess Canyons, NE (Twidwell et al. *in prep*)
- 1st evidence of ecoregion-scale restoration of grassland productivity in Gypsum Hills, KS (Twidwell et al. *in prep*)
- **National/International Communication of Success Stories (National Geographic, Wired, BEEF, Fence Post)**



1991



Intact Stage

■ > 200m From Seed Source

Dispersal/Recruitment Stage

■ < 200m From Seed Source

Encroachment Stages

■ 5-10% Tree Cover

■ 10-15% Tree Cover

■ 15-30% Tree Cover

■ 30-45% Tree Cover

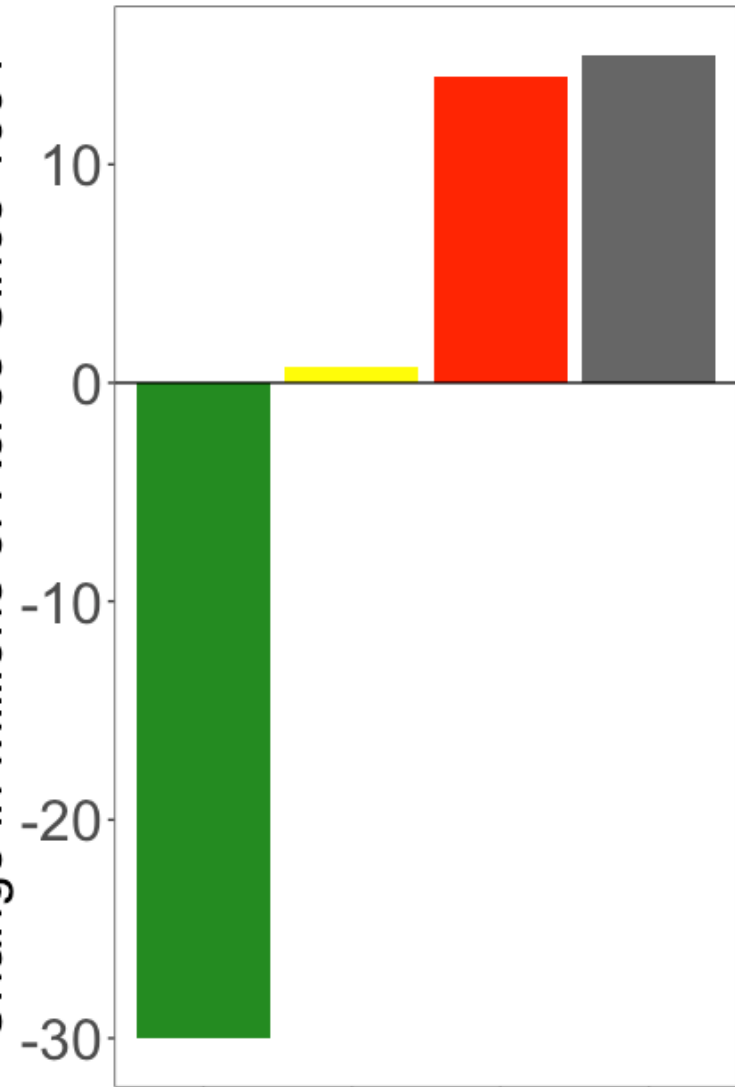
Woodland Transition/Forest

■ > 45% Tree Cover

Other Land Uses

□ Cropland, Developed, Water, etc. (NLCD 2019)

Change in Millions of Acres Since 1991



Cost to Treat

Dispersal Zone Once

1991: \$1.2 billion

2021: \$1.2 billion

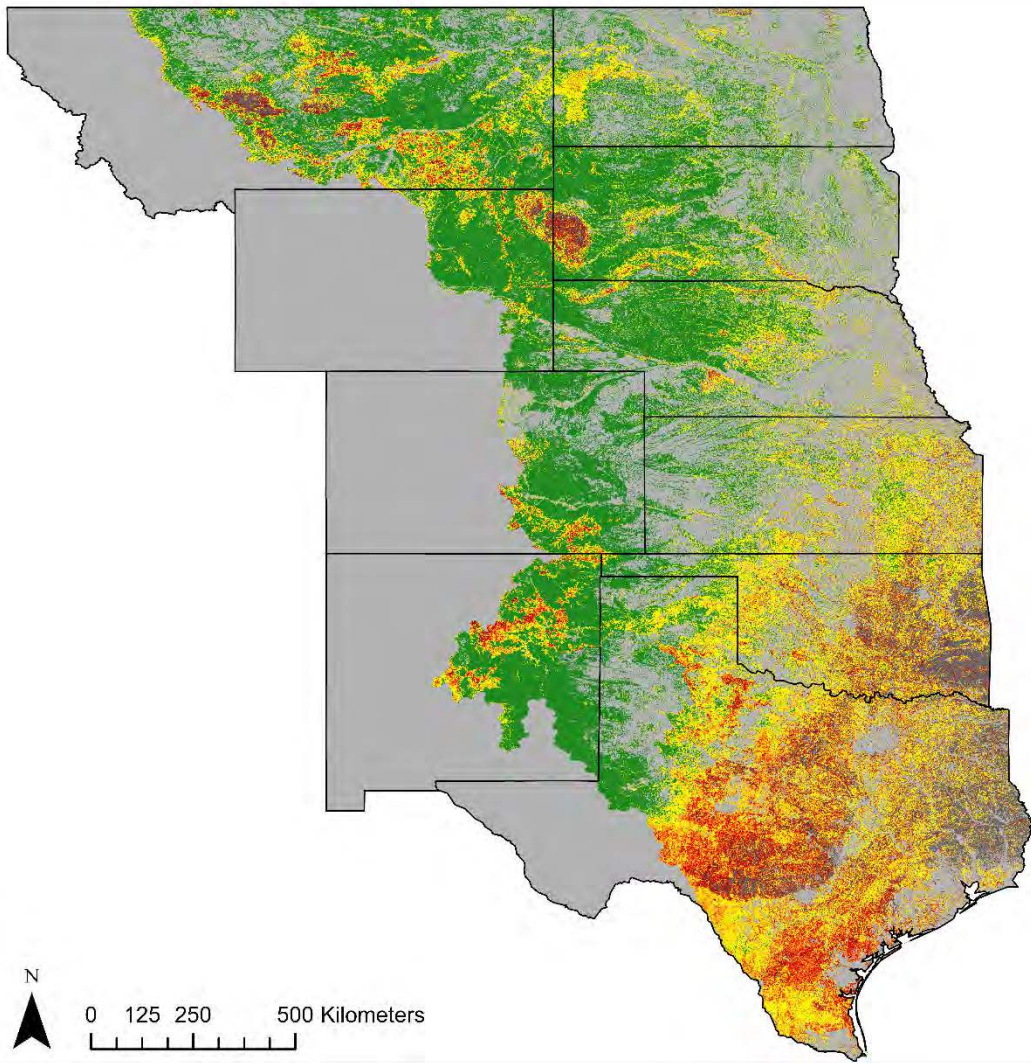
Cost to Treat

Encroached/Woodland Zone Once

1991: \$16.4 billion

2021: \$25.8 billion

2021



Intact Stage

■ > 200m From Seed Source

Dispersal/Recruitment Stage

■ < 200m From Seed Source

Encroachment Stages

■ 5-10% Tree Cover

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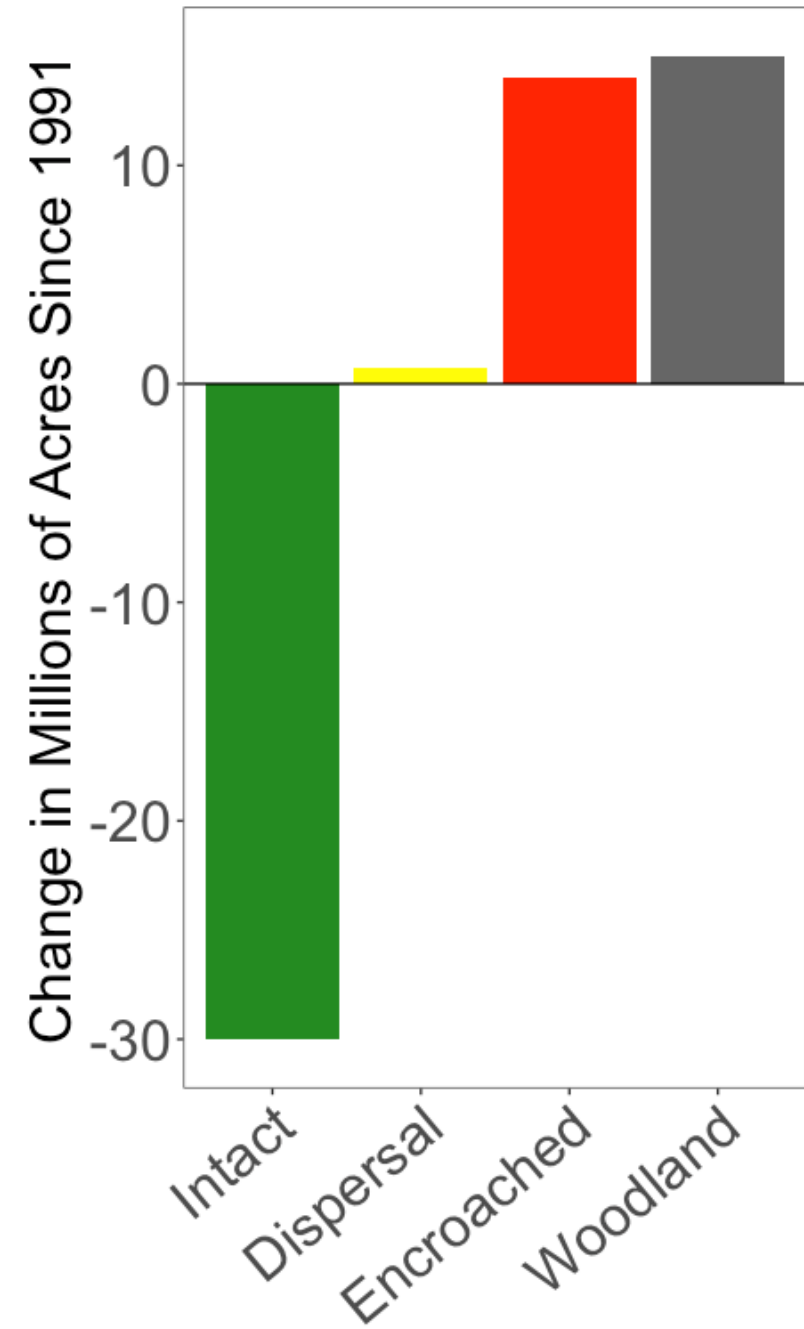
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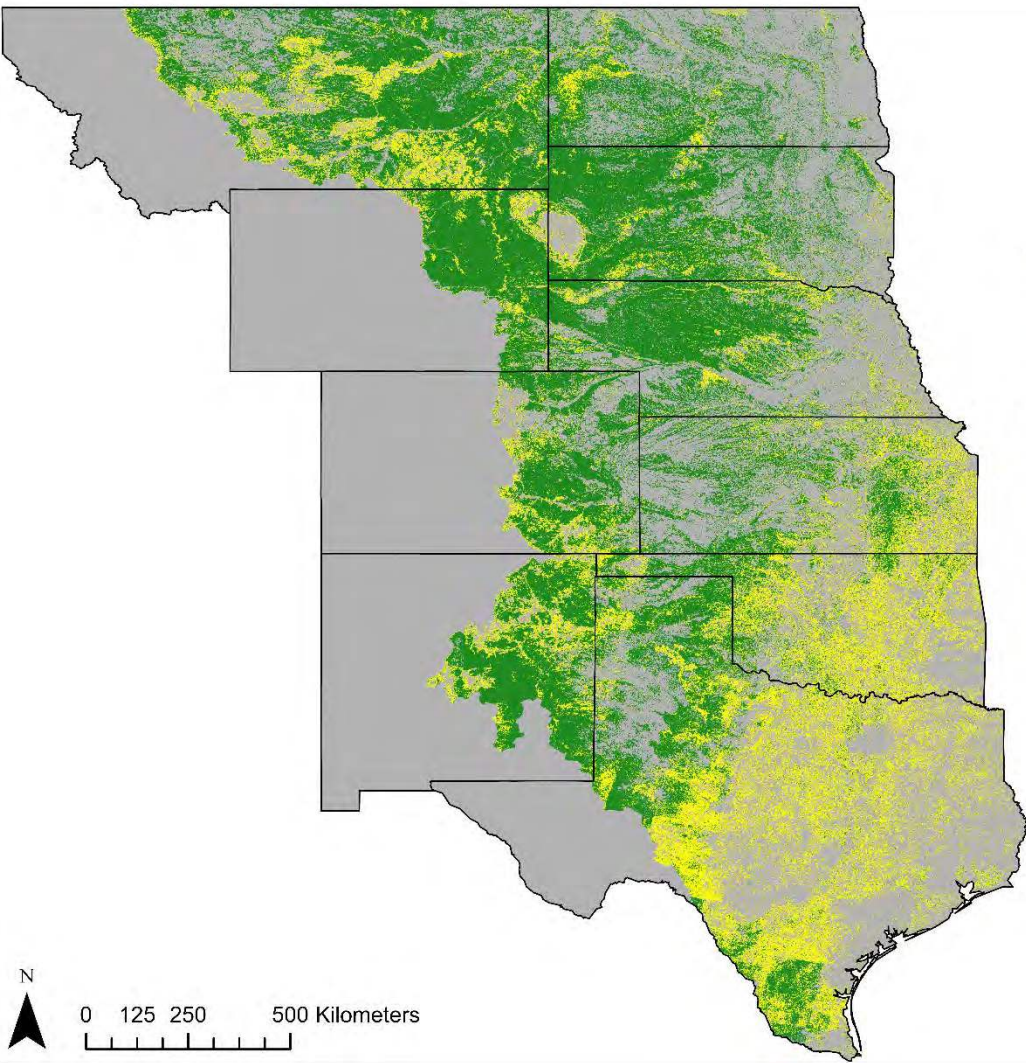
1991

Intact Stage

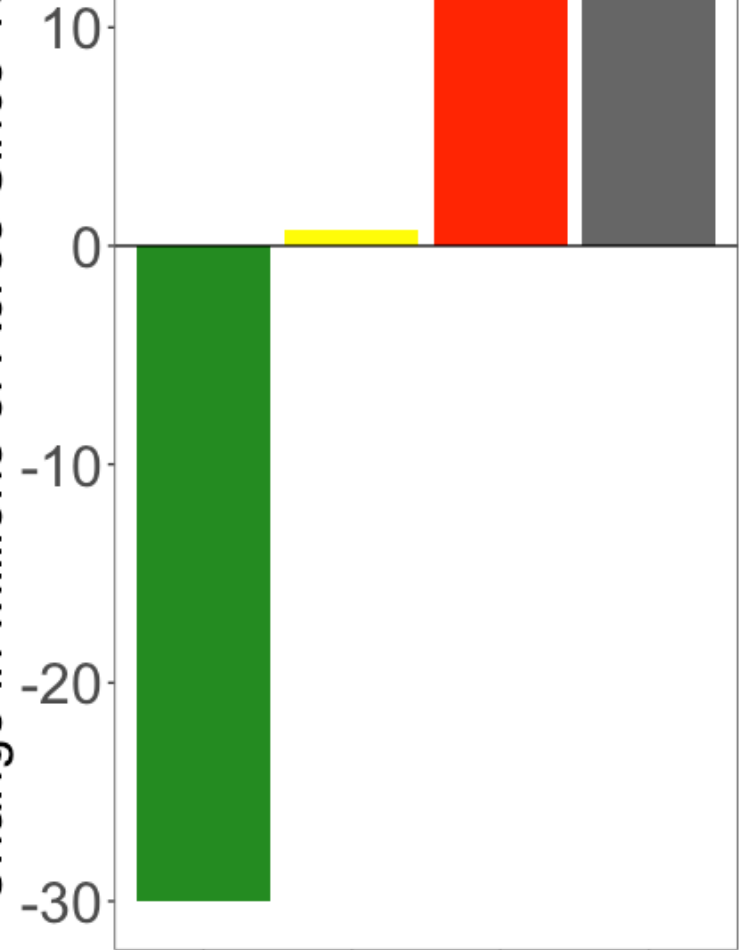
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Dispersal/Recruitment Stage

■ < 200m From Seed Source



Change in Millions of Acres Since 1991



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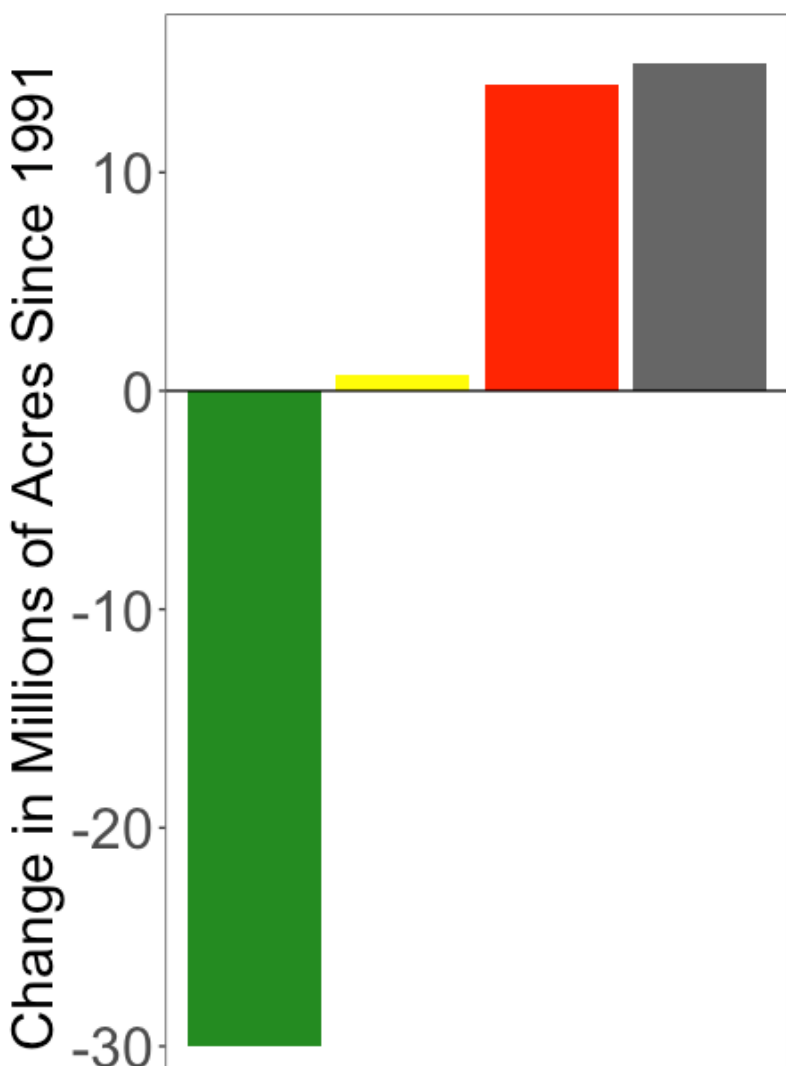
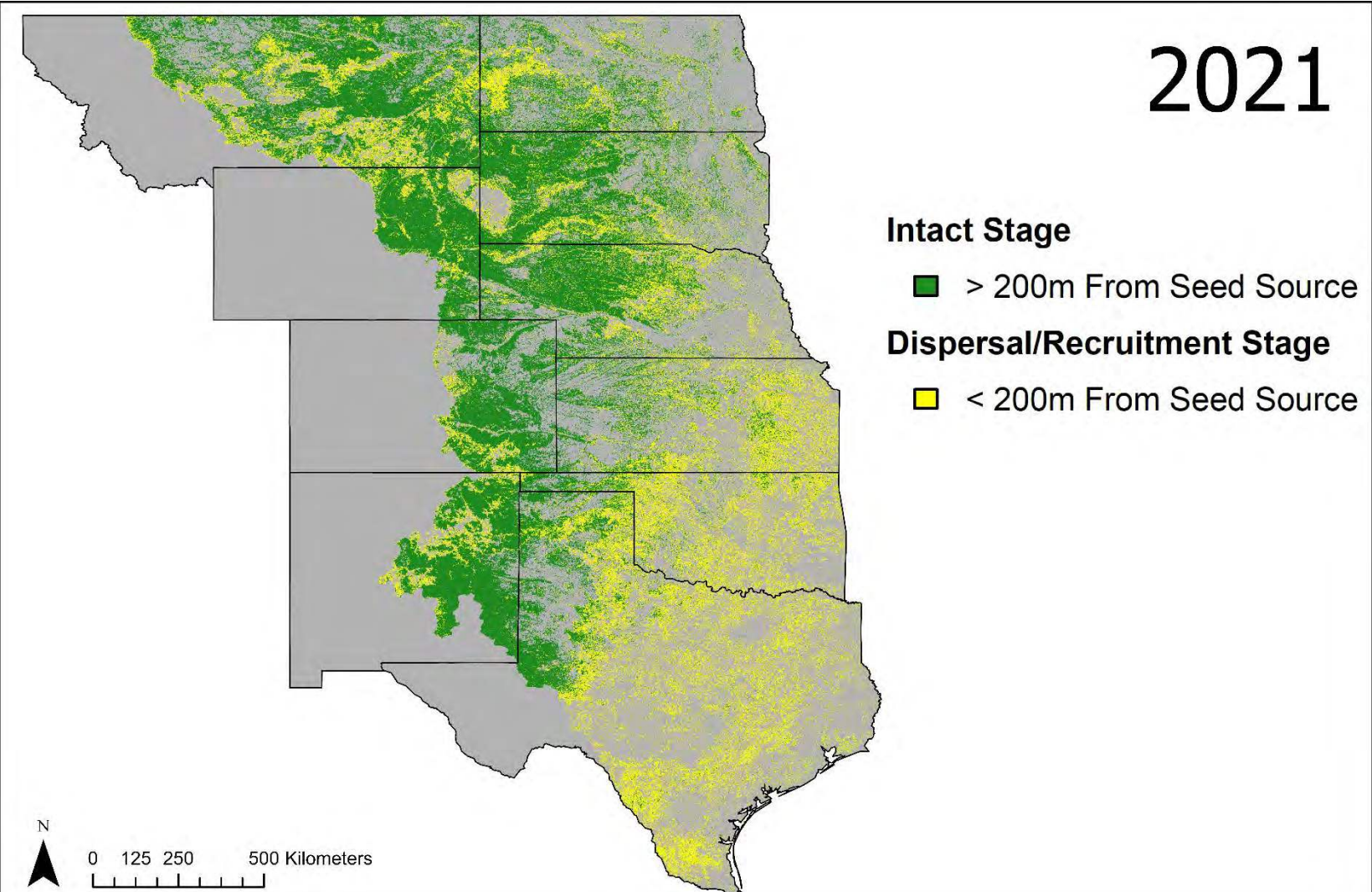
Cost to Treat

Encroached/Woodland Zone Once

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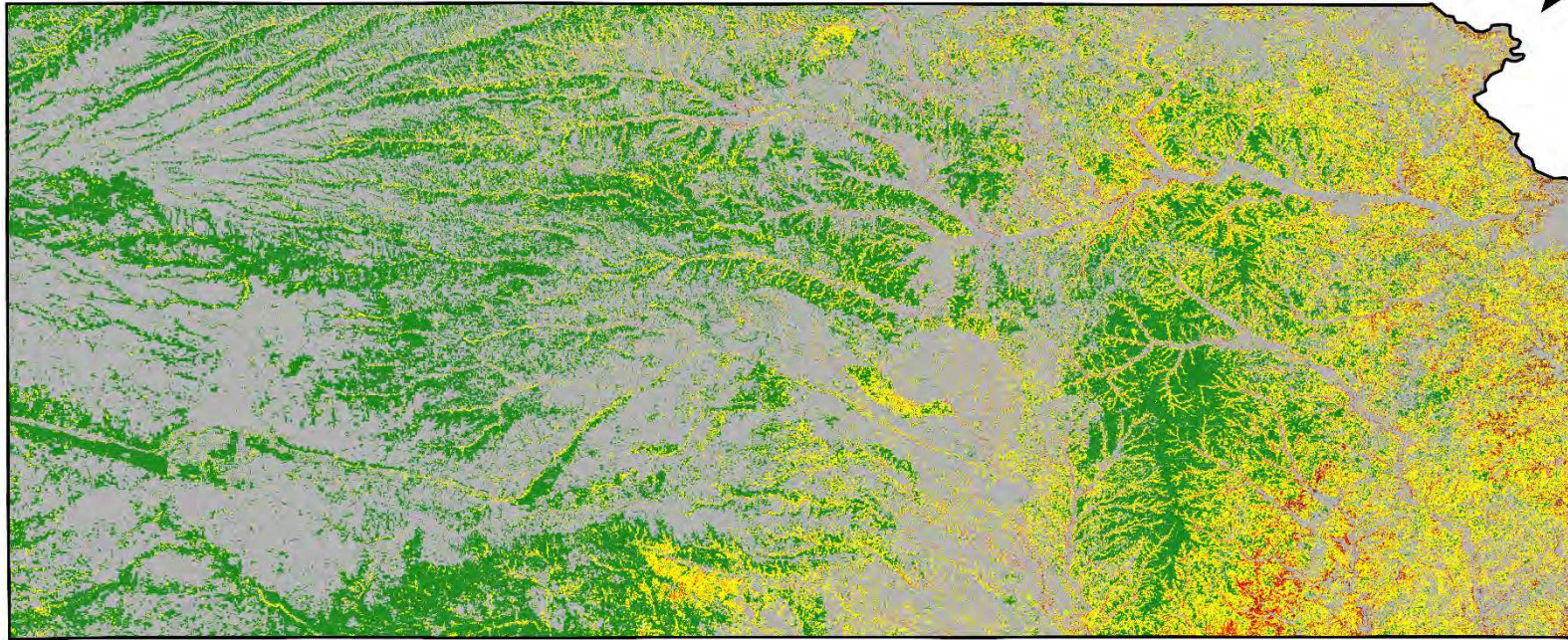
2021



Cost to Treat Dispersal Zone Once
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Cost to Treat Encroached/Woodland Zone Once
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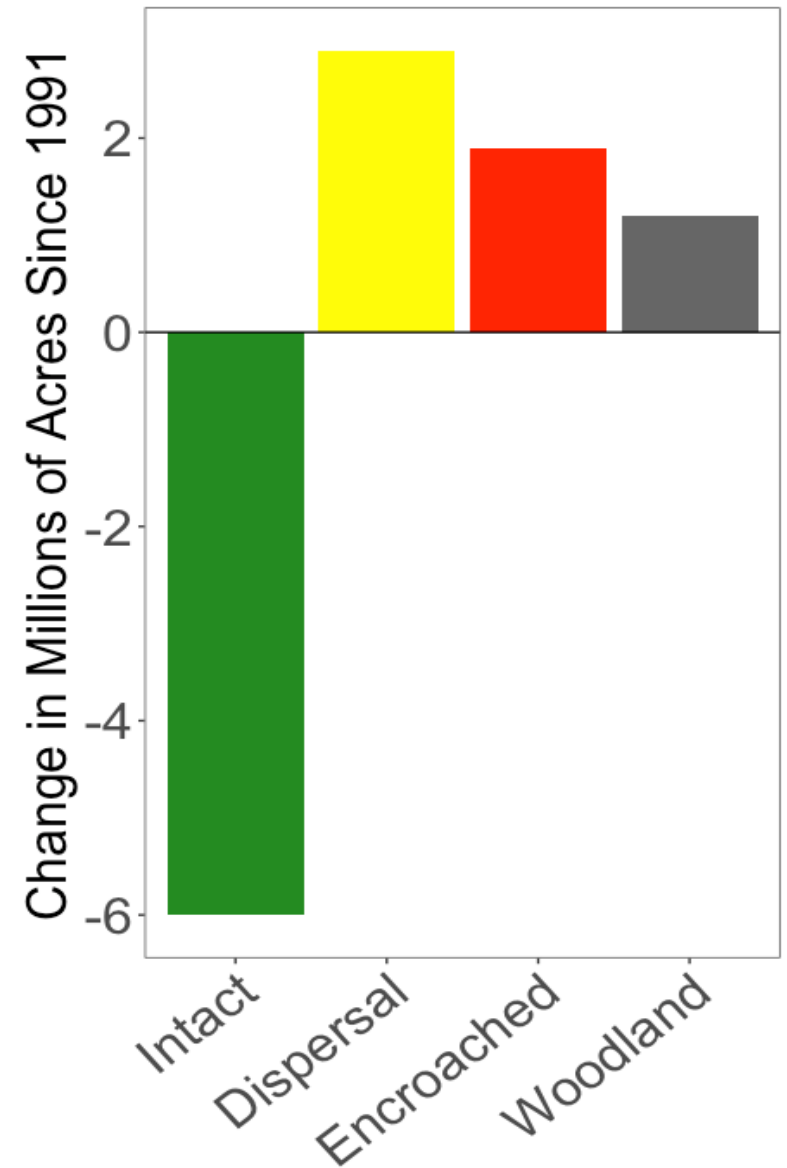
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Woodland Transition/Forest

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Other Land Uses

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Cost to Treat

Dispersal Zone Once

1991: \$88 million

2021: \$117 million

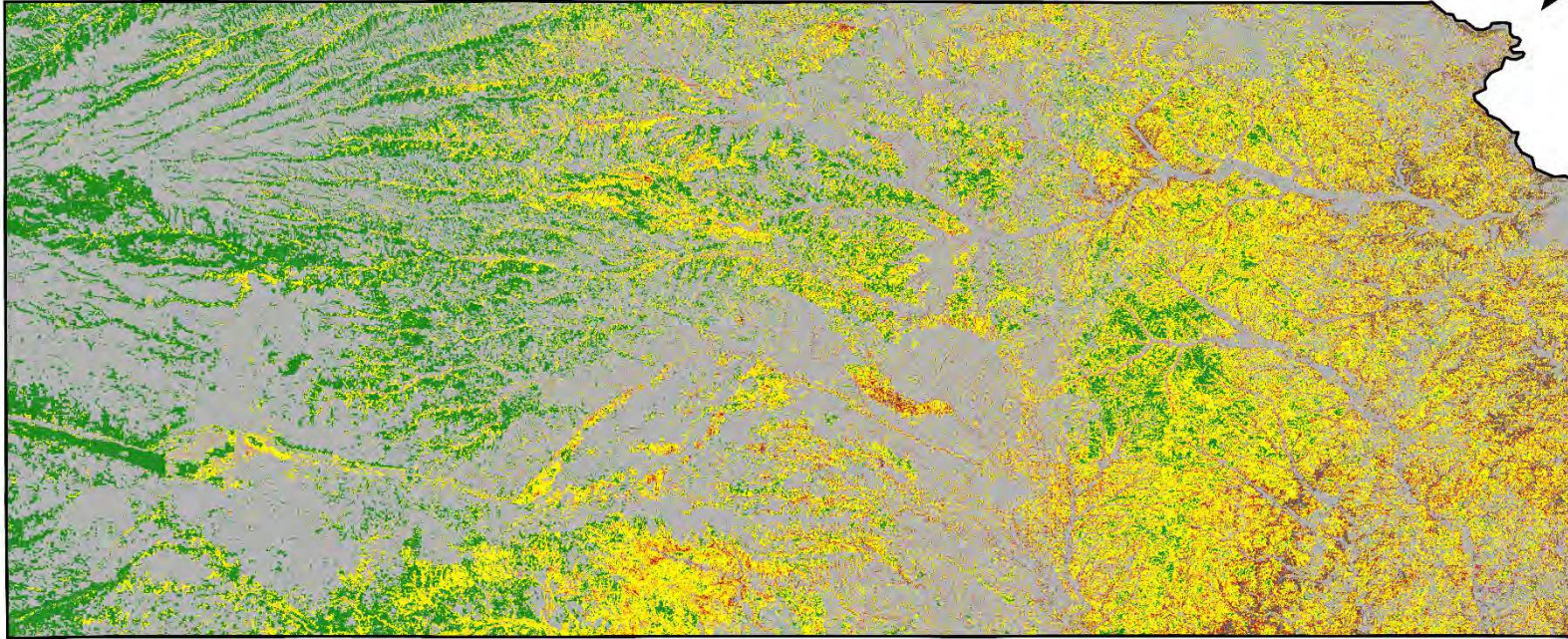
Cost to Treat

Encroached/Woodland Zone Once

1991: \$661 million

2021: \$1.8 billion

2021



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Dispersal/Recruitment Stage

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Encroachment Stages

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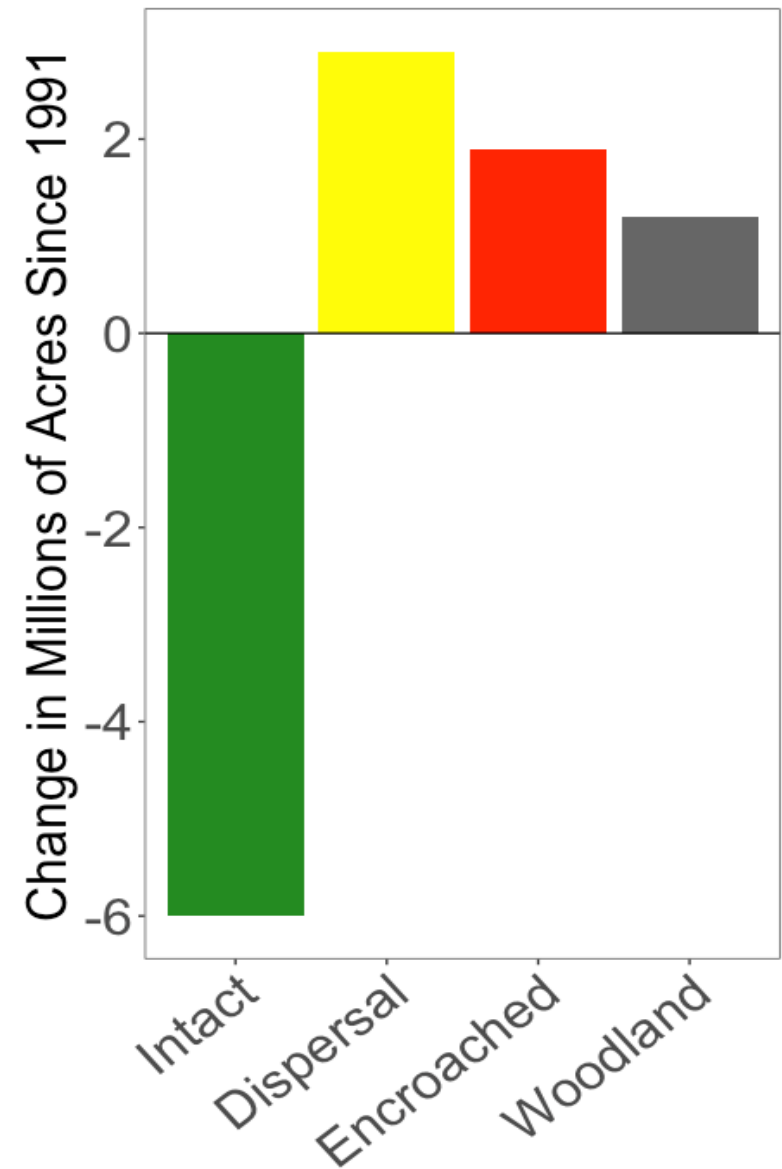
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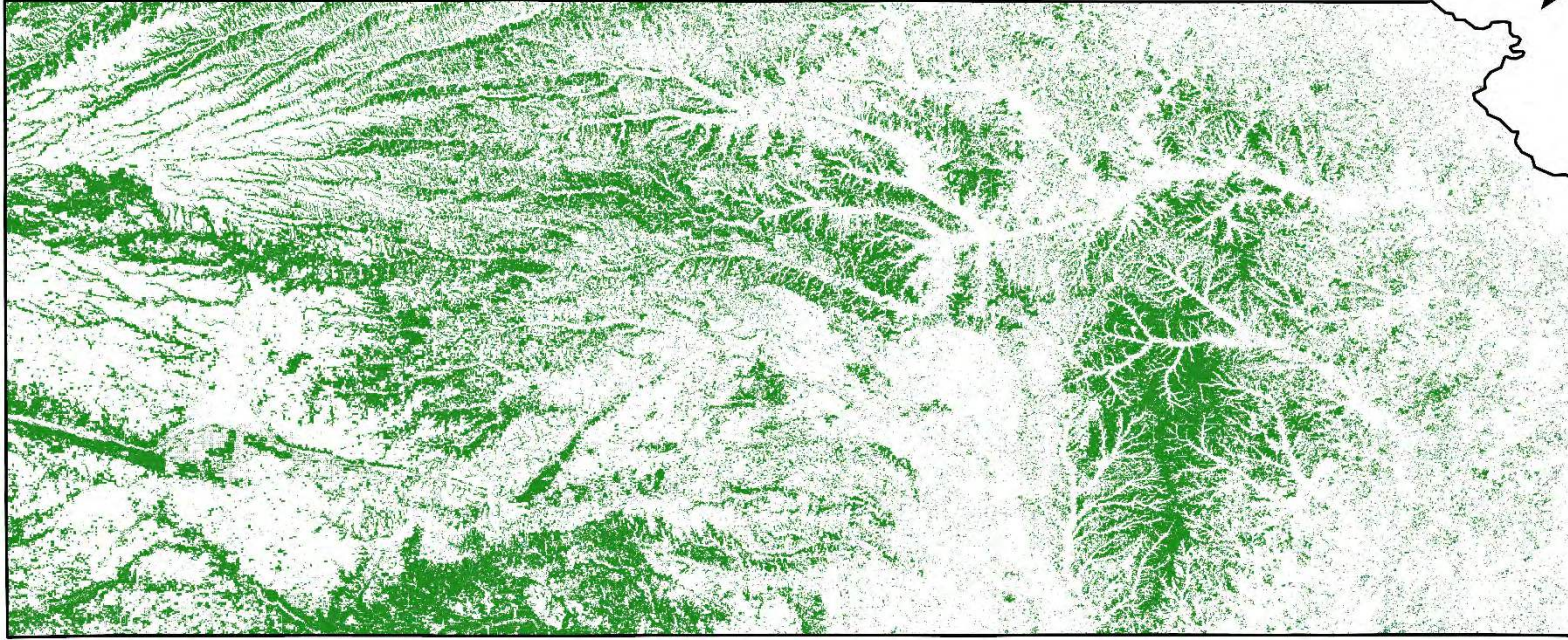
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2021: \$1.8 billion

1991

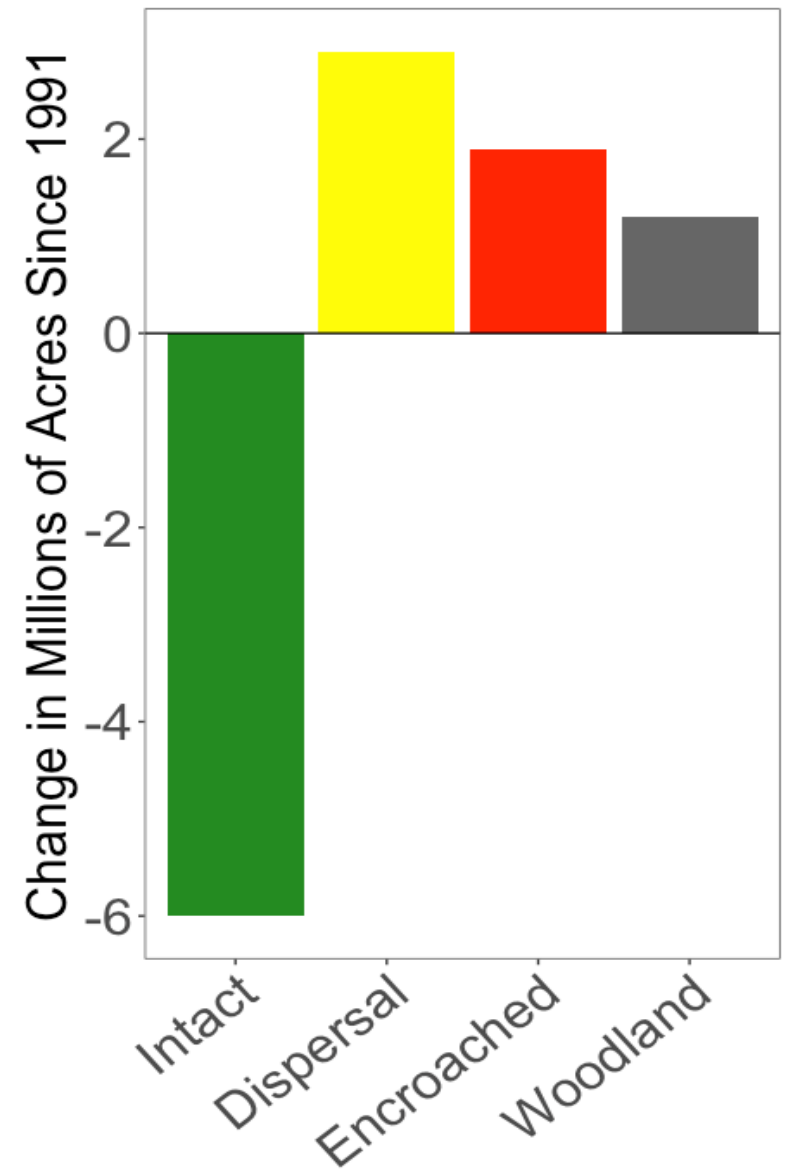


Intact Stage

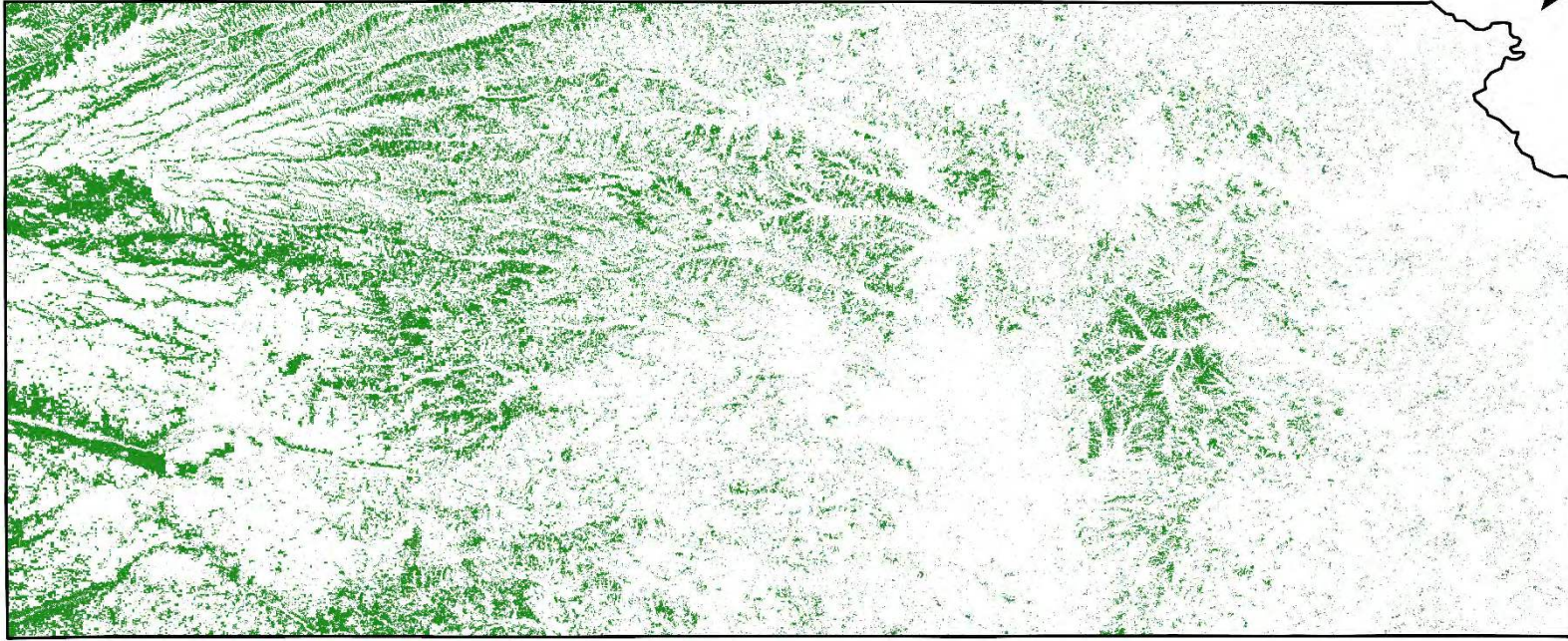
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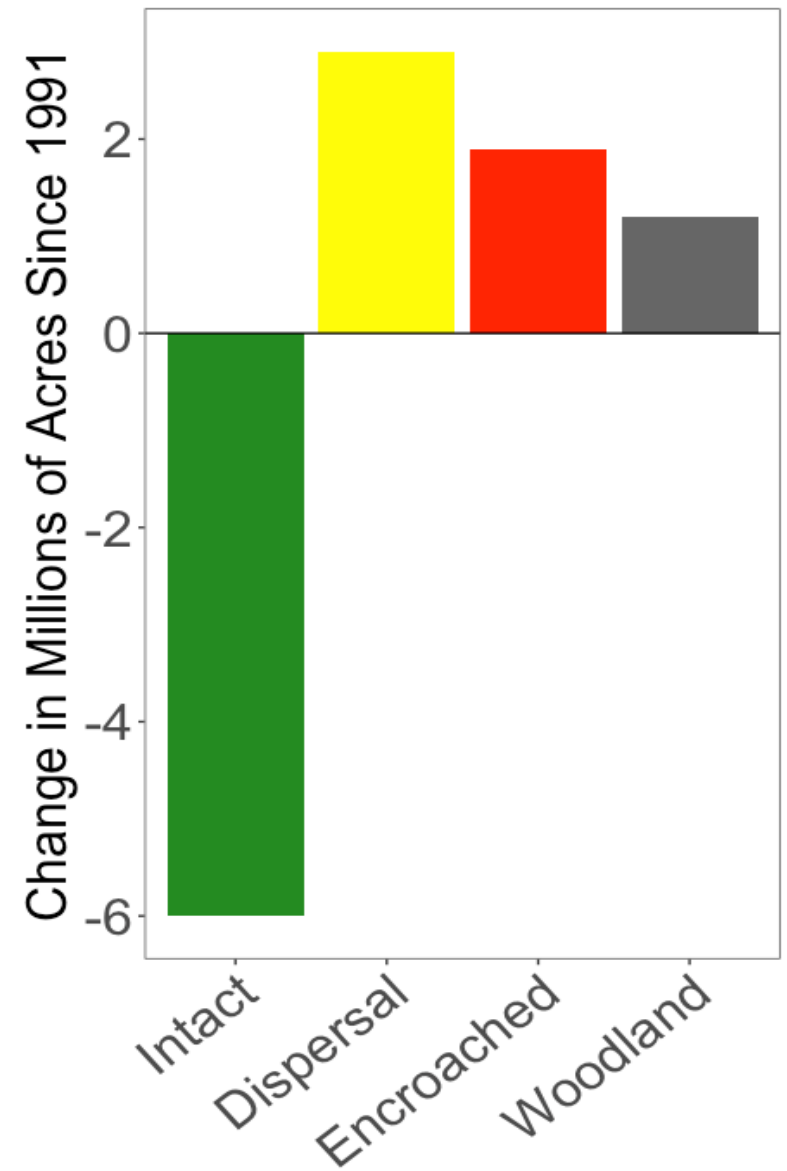


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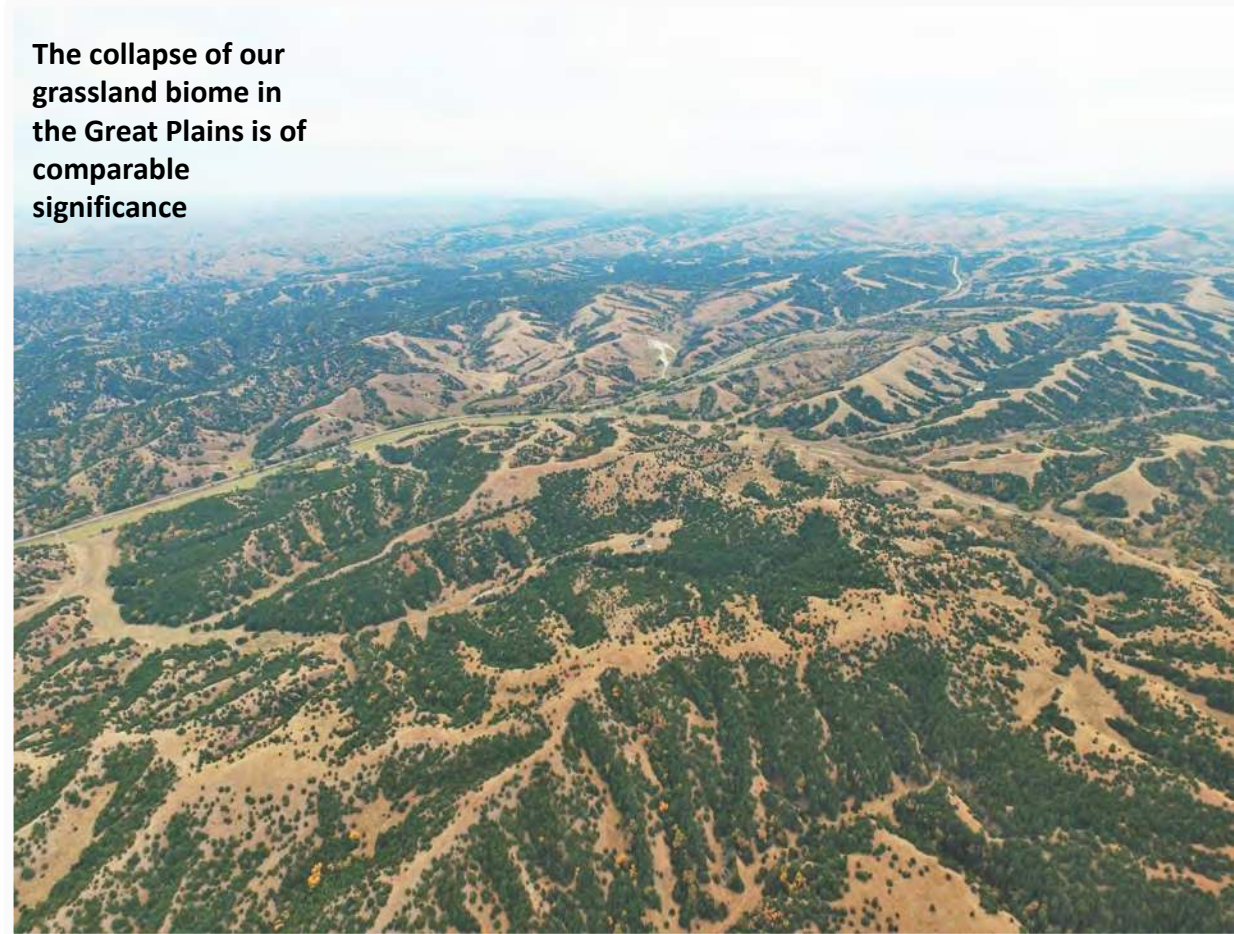
Dealing with Large-Scale Collapse Requires Bold Actions, Collective Action, and Unity across the entire Natural Resource Profession



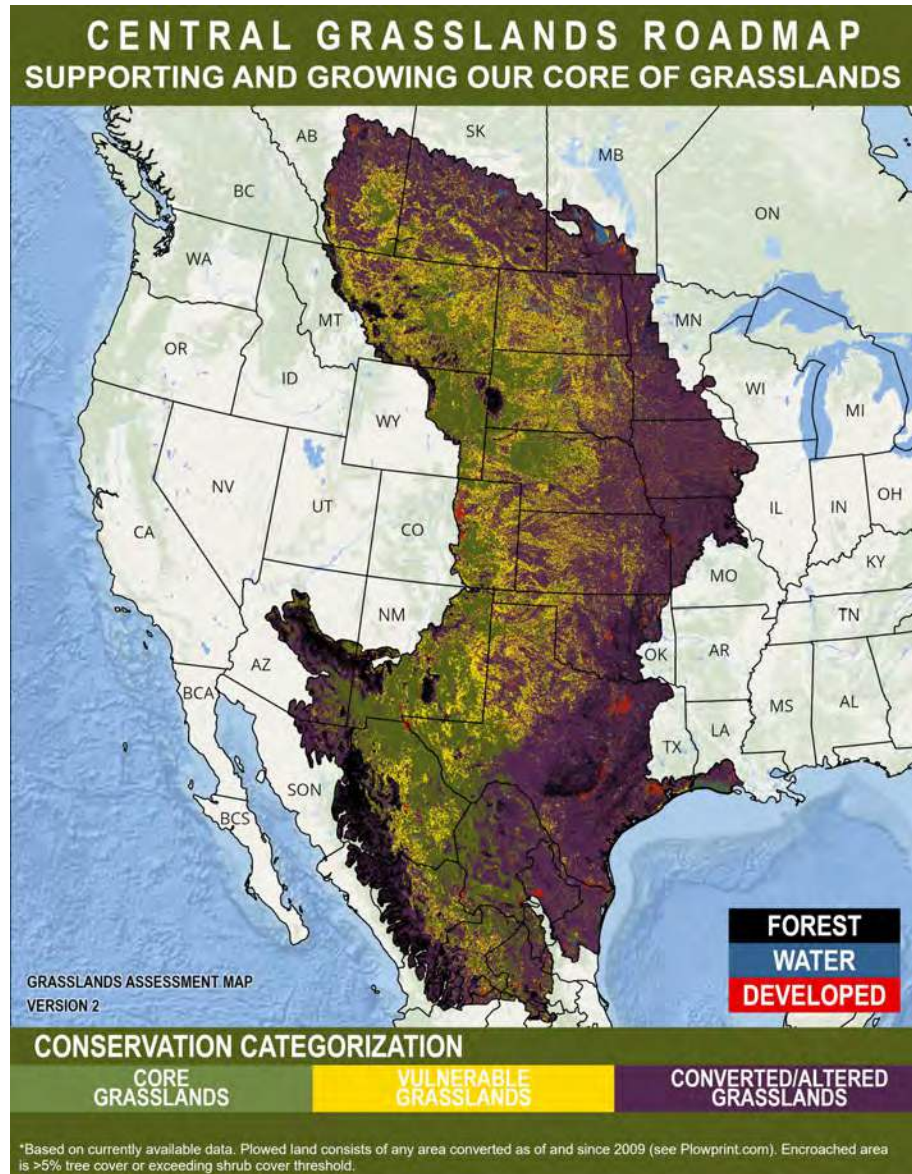
Hugh Hammond Bennett helped establish Conservation Districts and SCS/NRCS in the 1930's due to extensive soil erosion in the Great Plains



The collapse of our grassland biome in the Great Plains is of comparable significance



For the 1st Time in America's History, We Now have a Grassland Conservation Movement



USDA United States Department of Agriculture

NATURAL RESOURCES CONSERVATION SERVICE
WORKING LANDS FOR WILDLIFE

GREAT PLAINS GRASSLANDS BIOME

A FRAMEWORK FOR CONSERVATION ACTION
2021-2025

USDA United States Department of Agriculture

CONSERVING THE LEGACY OF NEBRASKA'S GRASSLANDS

NEBRASKA GREAT PLAINS GRASSLAND INITIATIVE

Reducing Woody Encroachment in Grasslands

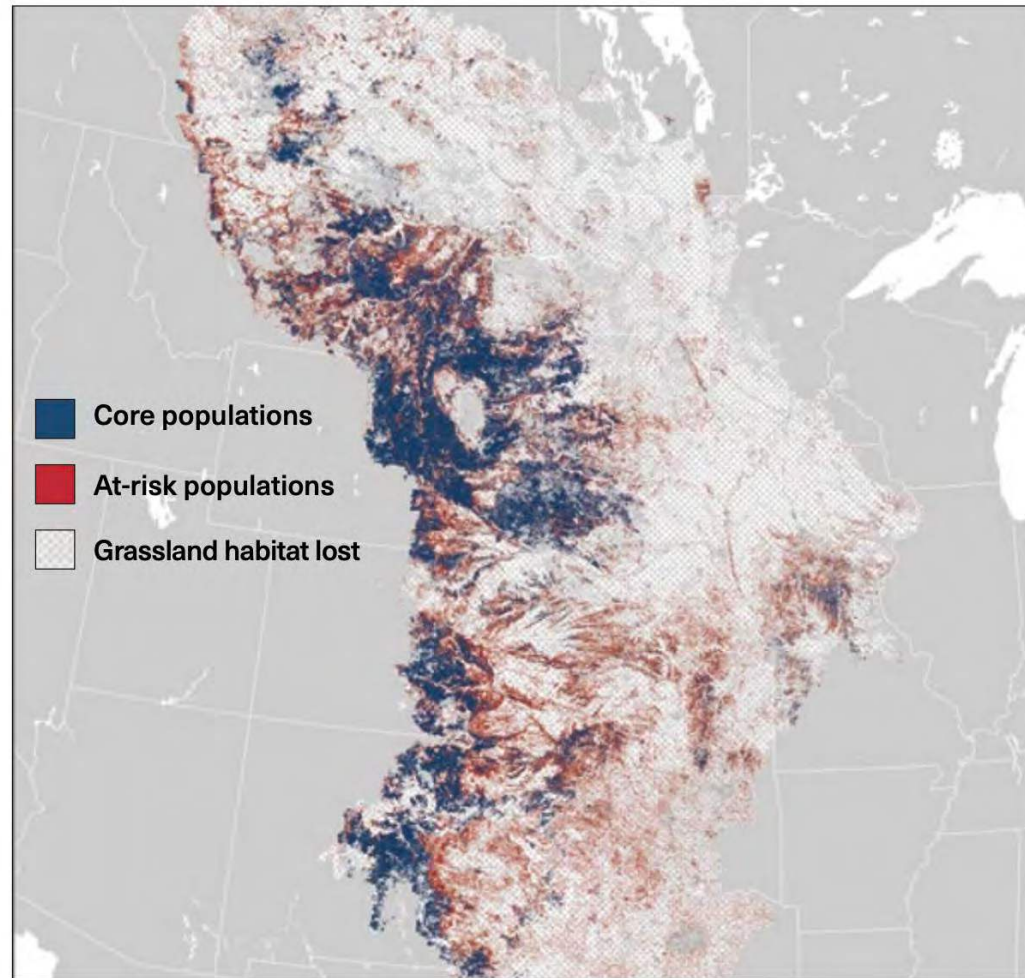
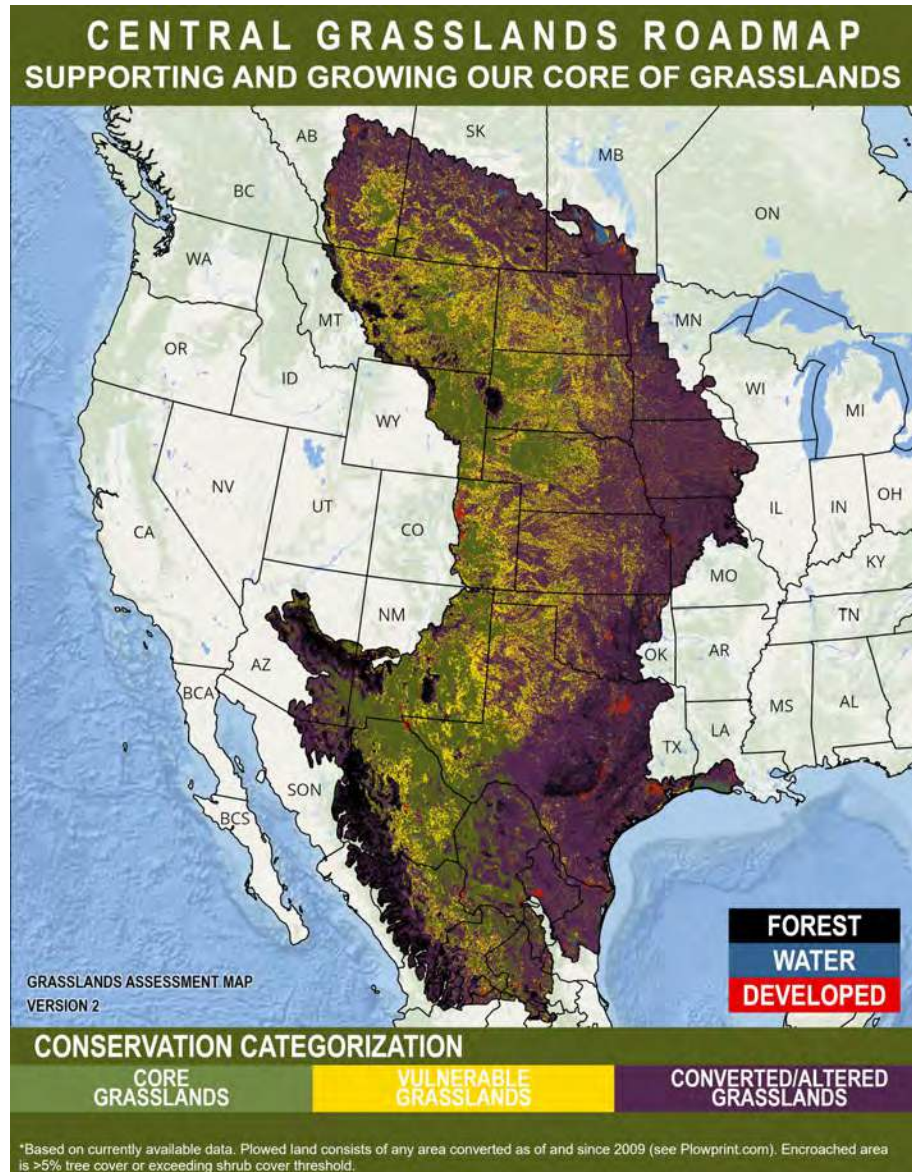
A Guide for Risk and Vulnerability

E-1054

Oklahoma Cooperative Extension Service
Division of Agricultural Sciences and Natural Resources
Oklahoma State University

State of the Birds 2022

Highlights Importance of Defending the Core for Biodiversity



CORE AND AT-RISK GRASSLAND BIRD POPULATIONS

The Central Grassland Roadmap Initiative has identified core and at-risk grassland bird populations across the central Great Plains in order to focus conservation and restoration on the best remaining grassland habitat.

Source: Central Grassland Roadmap Initiative.



1st ever national policy in ag industry (2022)



National Cattlemen's
Beef Association

PROPERTY RIGHTS & ENVIRONMENTAL MANAGEMENT COMMITTEE (PREM)

Grazing Land Conservation – Amended

WHEREAS, rangelands include a rich and varied landscape of grasslands, woodlands, vernal pools, riparian areas, and wetlands which support numerous imperiled and native plant and animal species, and

WHEREAS, many rangelands are today at significant risk of conversion to development and other uses, and

WHEREAS, these rangelands and the species that rely on these habitats largely persist today due to grazing and other land stewardship practices of the ranchers that have owned and managed these lands and committed to their health, and

WHEREAS, these rangelands are a critical foundation of the economic and social fabric of the U.S. ranching industry and rural communities and will only continue to provide these societal benefits if rangelands remain in ranching, and

WHEREAS, woody encroachment is quickly consuming rangelands,

THEREFORE BE IT RESOLVED, NCBA shall work aggressively to accomplish the following:

Educate the public regarding the environmental benefits associated with grazing and rangeland agriculture

Streamline processes regarding consultations and other regulatory requirements to eliminate current disincentives to voluntary conservation efforts

Provide tax incentives and other benefits to those ranchers actively working to benefit the environment


Pursue the expansion of the use of safe harbor agreements, exclusion of critical habitat, and use of the 4(d) rule for the listing of habitat and species

Seek more funding through willing partners for removal of invasive woody species and research for long term solutions

BE IT FURTHER RESOLVED, NCBA shall work on a national level to partner with state affiliates, conservation, and agricultural organizations to achieve these goals.

Red Cedar Water Conservation Bill Signed into Law

Jun 12, 2023

 Recent Posts



"Eastern red cedars and other invasive trees are harming our environment and our economy," Dobrinski said.

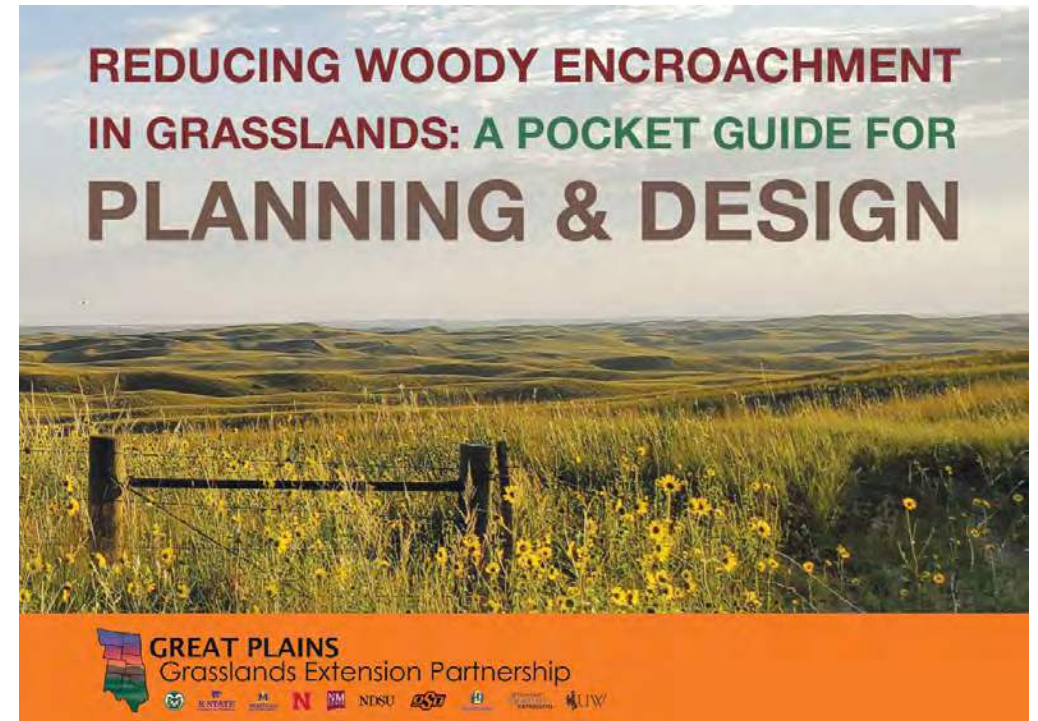
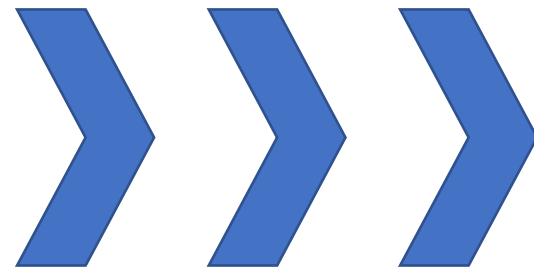
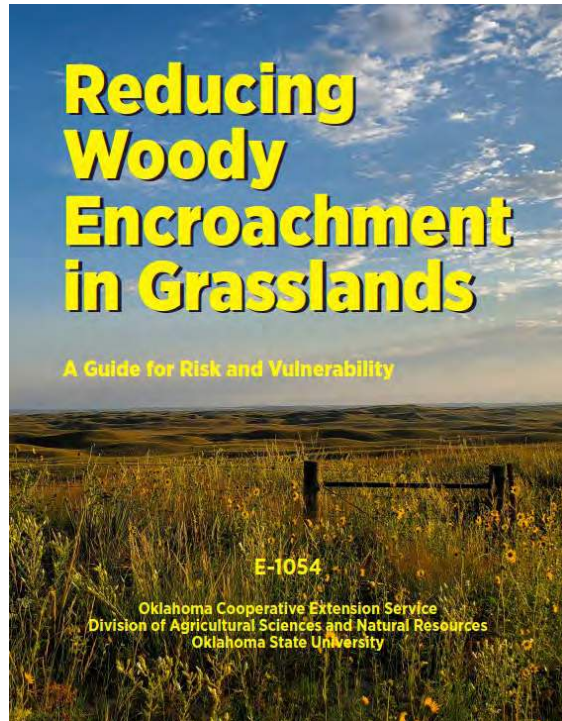
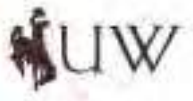
"This program will help us determine solutions to protect our water supply, our grazing lands and wildlife habitats, and will help us reduce the risk of wildfires."





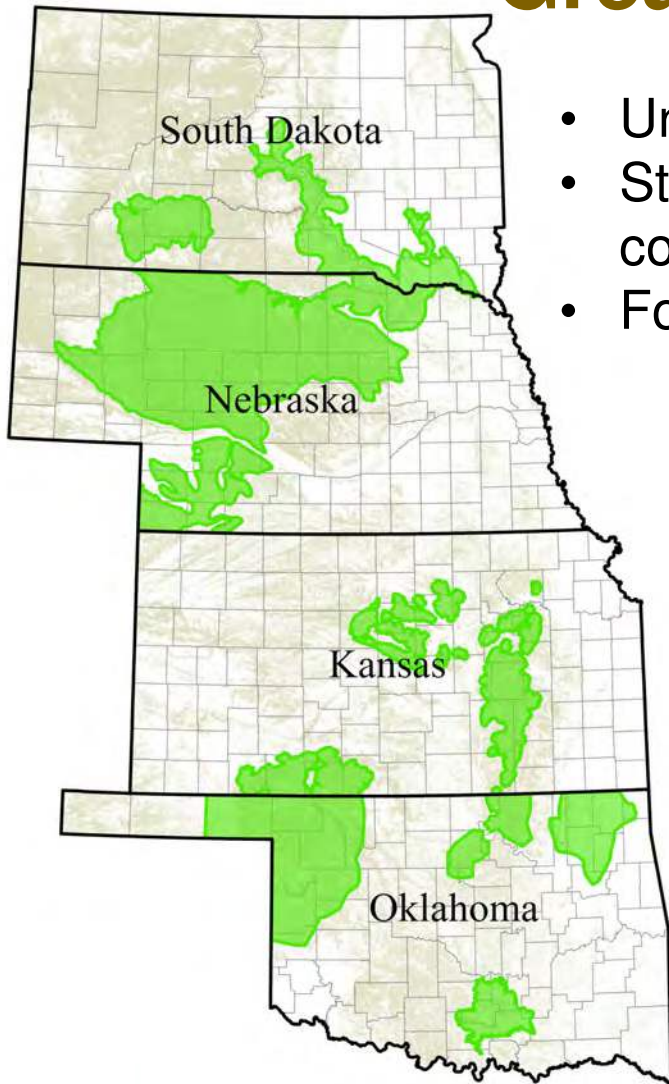
GREAT PLAINS

Grassland Extension Partnership




Great Plains Grassland Initiatives

- Unprecedented private lands buy-in
- State-based implementation of new national guidance for grassland conservation
- Focus is on addressing drivers of large-scale grassland loss



■ Great Plains Grassland Initiative (Phase 1 Implementation)
■ Grasslands (Phase 1 Technical Guidance; Future GPGI Candidates)


 United States Department of Agriculture

RANCHER DRIVEN, SCIENCE INFORMED, AGENCY SUPPORTED

Transitioning from productive grassland to woody plant dominance is the greatest threat facing grasslands in Kansas. Ranchers have new tools, science, and a funding opportunity to help address woody plant encroachment on targeted rangelands through the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS).

Woody plant encroachment puts pressure on working rangelands by decreasing livestock production and increasing wildfire risk as well as harming grassland biodiversity and increasing threat to animal species living in this biome.

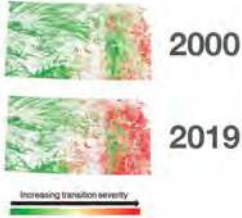
New scientific tools now provide unprecedented opportunities to track woody encroachment and develop strategic approaches to combat it. When combined with landowner expertise, Kansas ranchers and NRCS can defend intact grasslands, reduce vulnerability to future encroachment, and cut long-term maintenance costs.

USDA NRCS is adopting a new approach to addressing this widespread threat through the Kansas Great Plains Grassland Initiative (GPGI). The initiative is part of the NRCS Working Lands for Wildlife (WLFW) framework calling to conserve the last remaining iconic grassland regions in the Great Plains biome.

GPGI provides technical and financial resources to eligible ranchers in specific geographic rangelands to address woody plant encroachment. This initiative provides an opportunity for producers to reduce the vulnerability of Kansas core grasslands from woody encroachment.

Core grasslands include targeted areas within the Flint Hills, Gypsum Hills, and Smoky Hills regions of Kansas.

Treatment strategies will rely on an integrated pest management conservation system plan to manage woody species encroachment on identified planned land units (PLU) within the core grassland areas.



2000
2019

Increasing transition severity

KANSAS GREAT PLAINS GRASSLAND INITIATIVE

Success Spotlight

Scaling-Up Collaboration

Since 2005, the Loess Canyons Rangeland Alliance has grown from a handful of visionary producers to an entire community committed to reinstating fire to save their grazing lands from the onslaught of redcedar invasion. Working together as a prescribed burn association, this partnership provides a rare example in the Great Plains of successfully halting the transition of a rangeland ecoregion to woodlands. Backed with support from NRCS, Pheasants Forever, and Nebraska Game & Parks Commission, the Loess Canyons grasslands have stabilized, benefitting livestock production and species like bobwhite quail and the imperiled American burying beetle.



"We didn't want our kids or grandkids to say, 'Why didn't Dad take care of those cedars when he had the chance?' " reflects Scott Stout. "We decided the time to get after cedars is now - and we came together as a community to do something about it."
 — Scott Stout, N-N Ranch Inc. and President of Loess Canyons Prescribed Burn Association, NE.

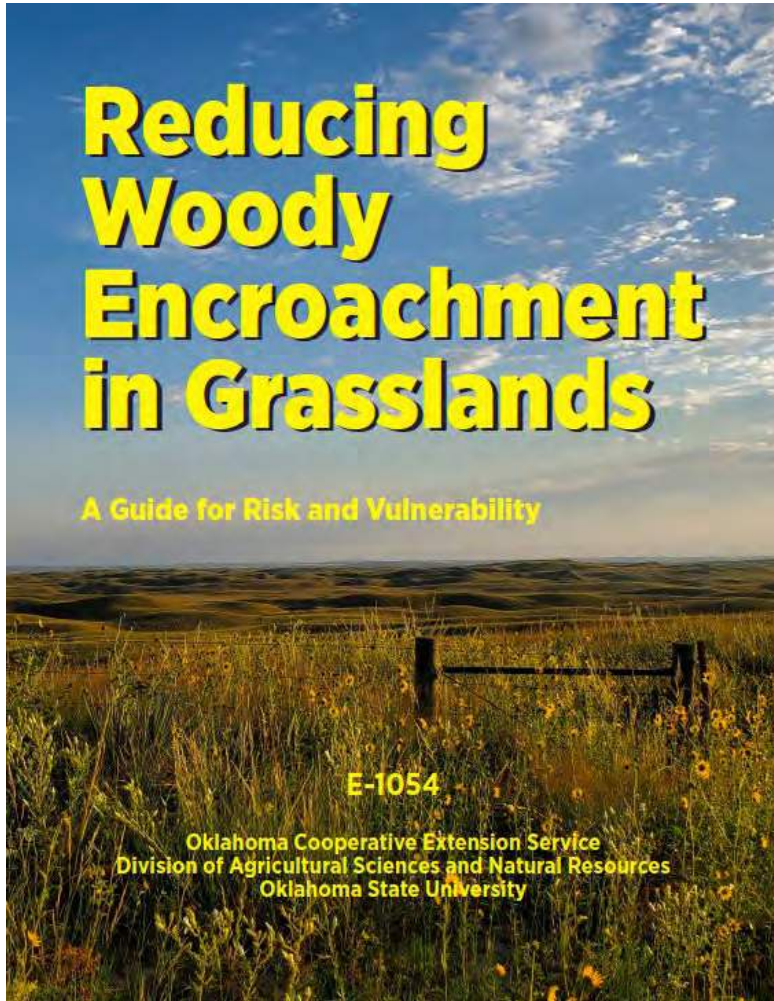
13

Photo: Scott Stout

What Can Be Done Now?



Thank You!



Additional links:

Reducing Woody Encroachment in Rangelands: A Guide for Risk and Vulnerability <https://wlfw.rangelands.app/great-plains/woodland-expansion/>

Working Lands for Wildlife's Great Plains Grassland Biome Framework: <https://wlfw.rangelands.app>

Rangeland Analysis Platform: <http://rangelands.app>

Eastern redcedar science literacy website: <http://cedarliteracy.unl.edu>

Loess Canyons Science Report: <https://www.lpcinitiative.org/wp-content/uploads/Loess-Canyons-Experimental-Landscape-Report-LOW-RES-FINAL-102121.pdf>



Technical Transfer: Moving from Awareness to Action

- **Jeremy Maestas**
*National Sagebrush Ecosystem Specialist,
USDA-NRCS West National Technology
Support Center*
- **Doug Spencer**
*State Grazing Land Management Specialist,
Kansas NRCS*
- **Dusty Tacha**
Area Range Specialist, Kansas NRCS
- **Dillon Fogarty**
*Research Assistant Professor, Woody
Invasions Ecologist, University of Nebraska-
Lincoln*





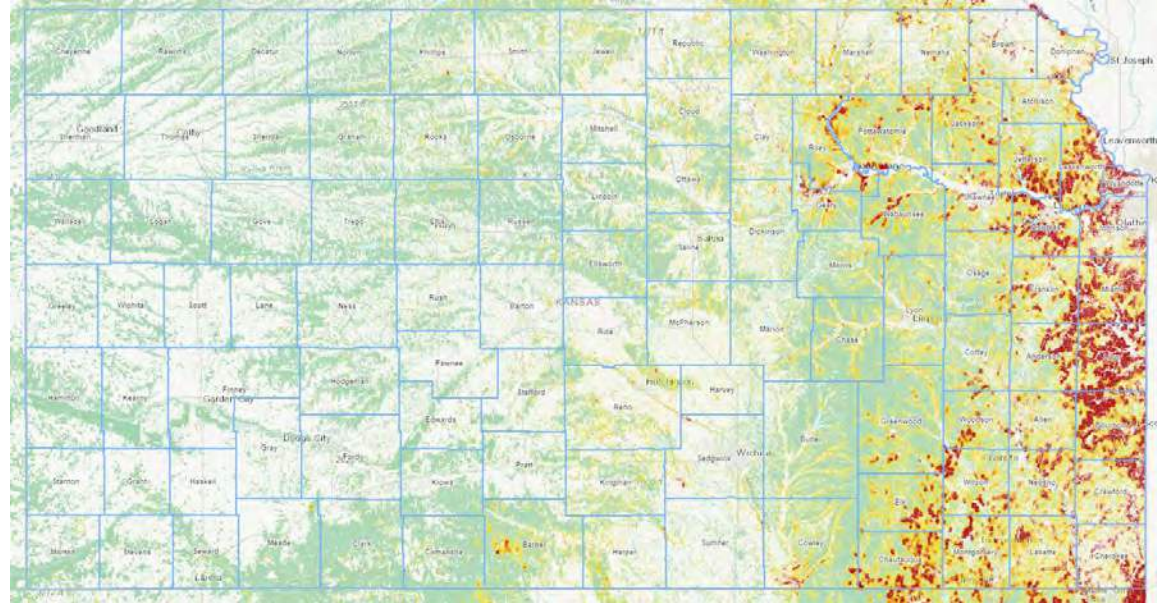
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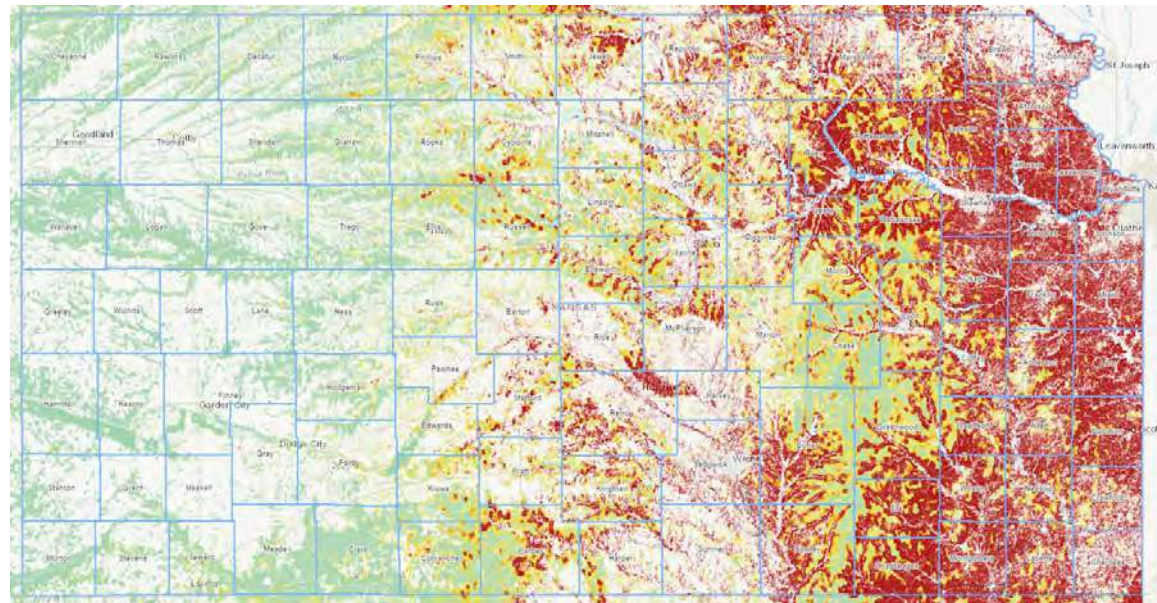
Early warnings - 1990 →



Landscape Reality



Early warnings - 2020 →



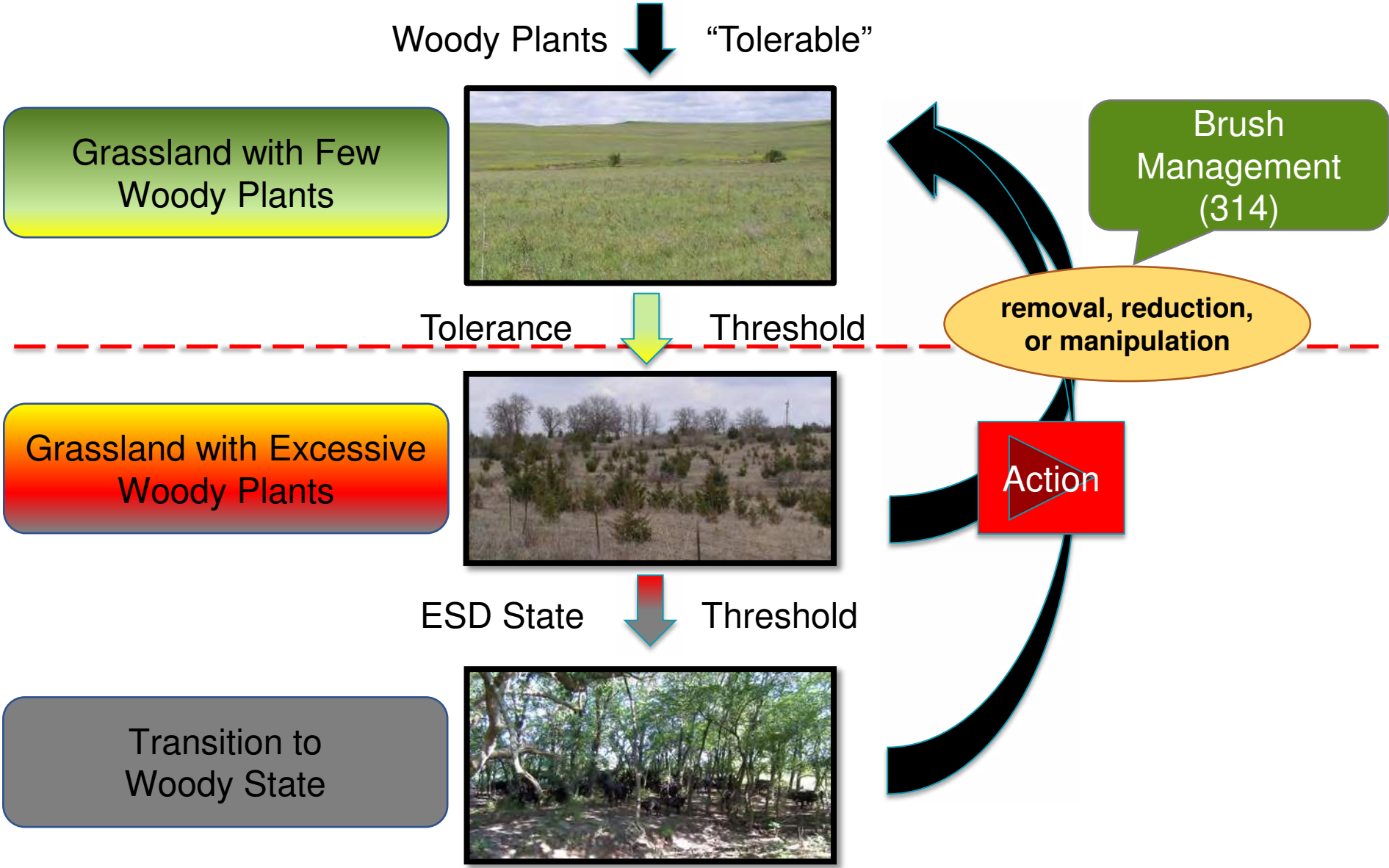
Brush Management



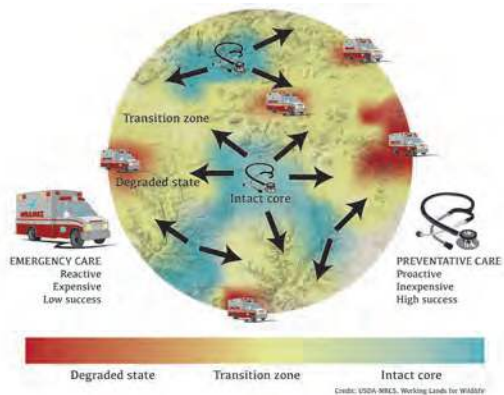
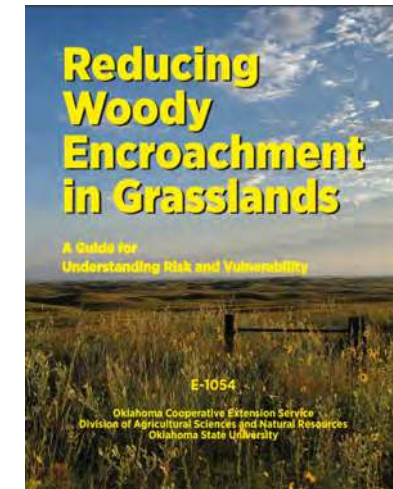
Traditional Views

- Because of the potential aesthetic, economic, and recreational value of wildlife, scattered stands of woody plants are compatible with livestock production.
- Once brush is reduced to tolerable levels, good grazing and pasture management can limit recurrence.

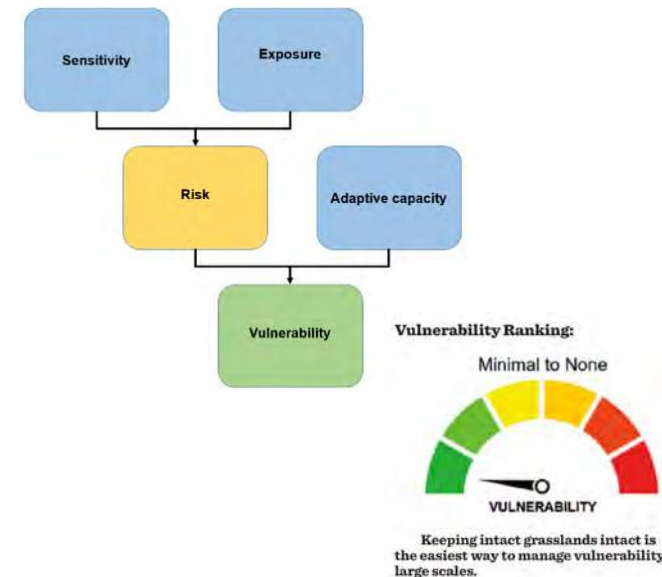
Additional context was lacking with these recommendations.



Defend the Core, Grow the Core – Reduce Vulnerability

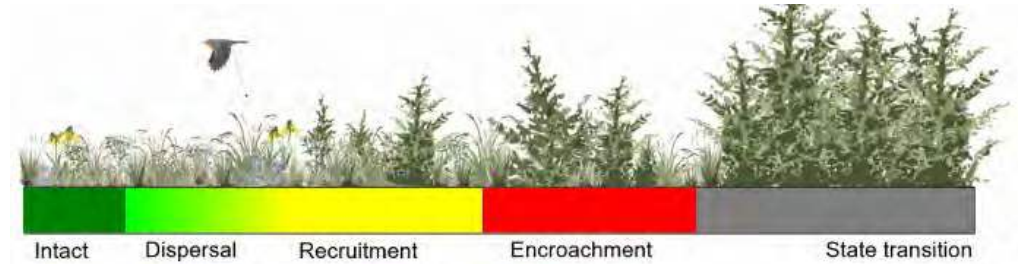


Stages	Description	Management
Woodland Transition	Woody plant dominance	Heavy machinery - mechanical removal, fire
Expansion	Scattered producing trees	Hand tools, heavy machinery - mechanical removal, fire
Dispersal & Recruitment	Intact with seedlings or incoming seed	Fire, hand cutting, haying, mechanical removal, browsers
Intact Grassland	Treeless with no seed	Avoid introducing seed



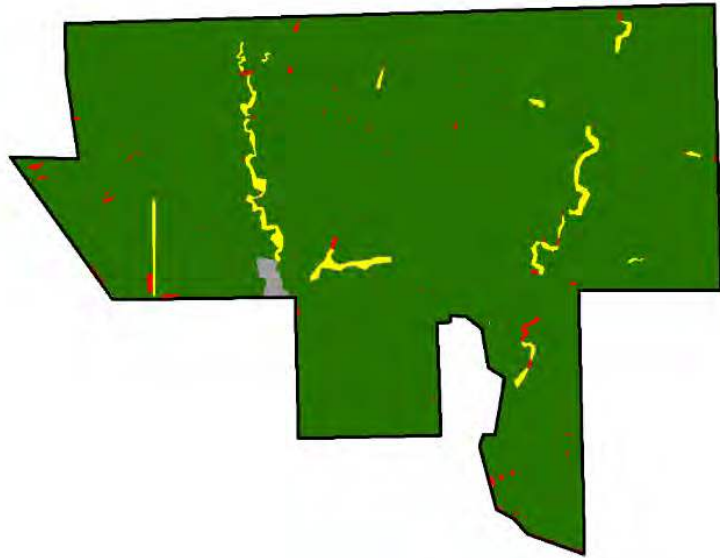
Recognizing Phases/Stages of WPE

The Vulnerability Lens

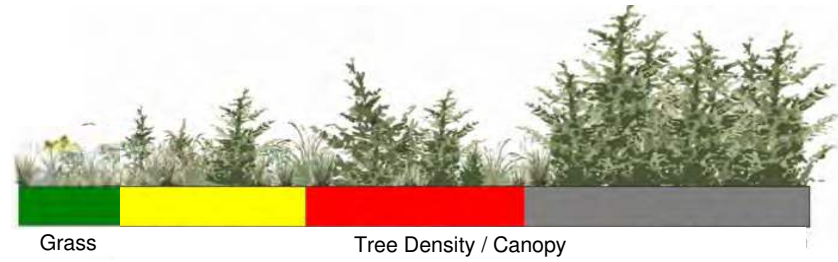


★ One seed-producing tree exposes at least 26 acres to WPE!

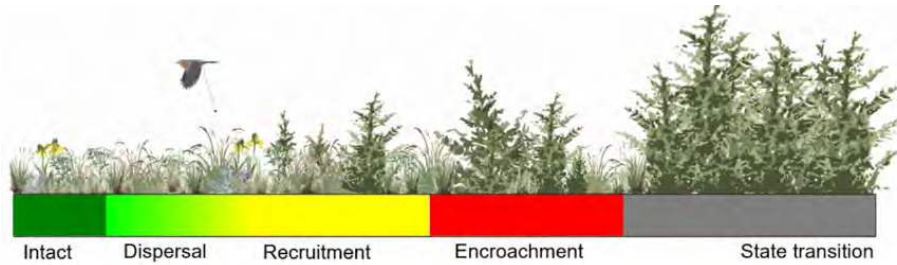
Mapping Phases/Stages of WPE



How we used to see it...



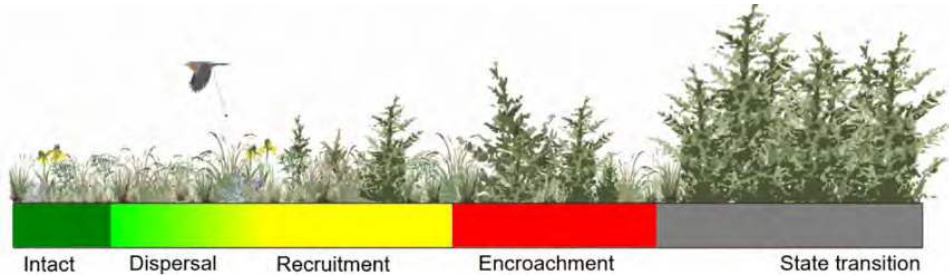
How we understand it now...



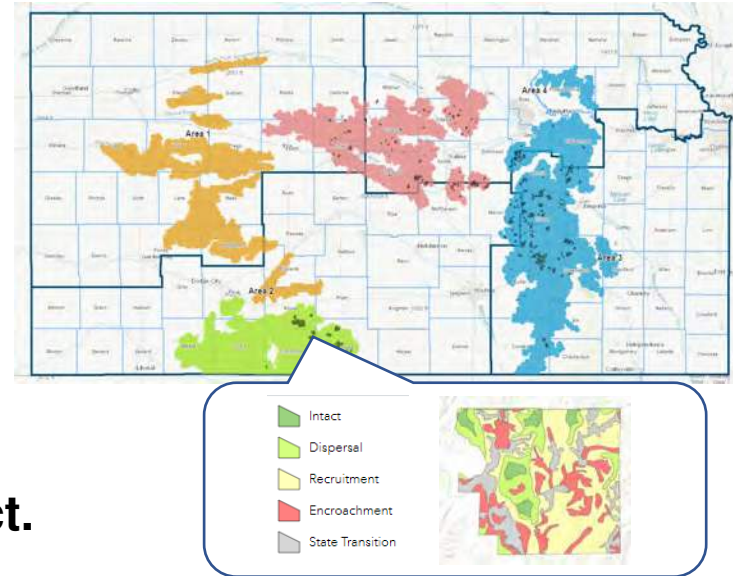
Local Reality in Core Grasslands

Inventory 2021, 2022, 2023

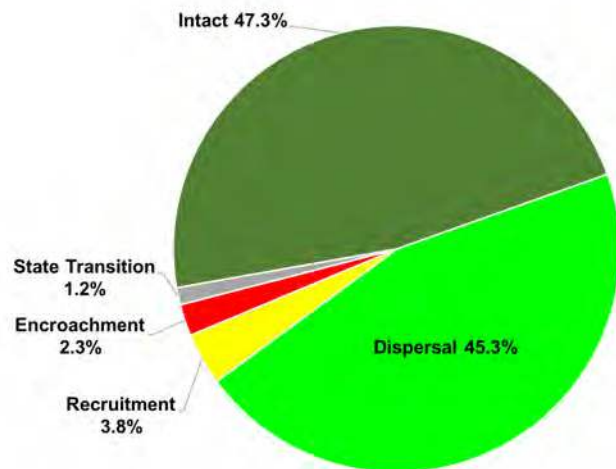
186,900 acres



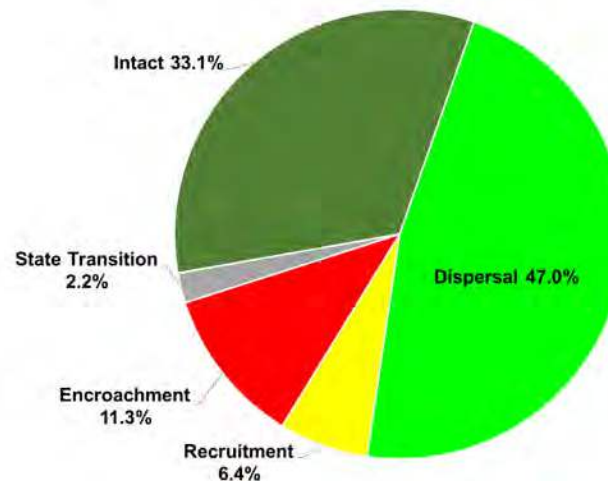
Geoportal Data – Browser App



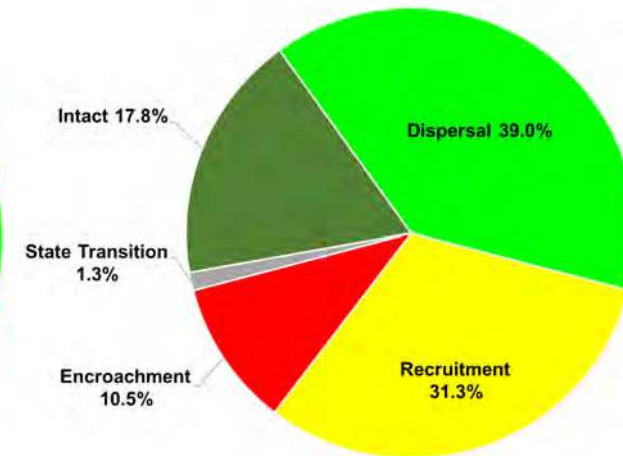
Inventoried grasslands are less than 50% intact.



Flint Hills

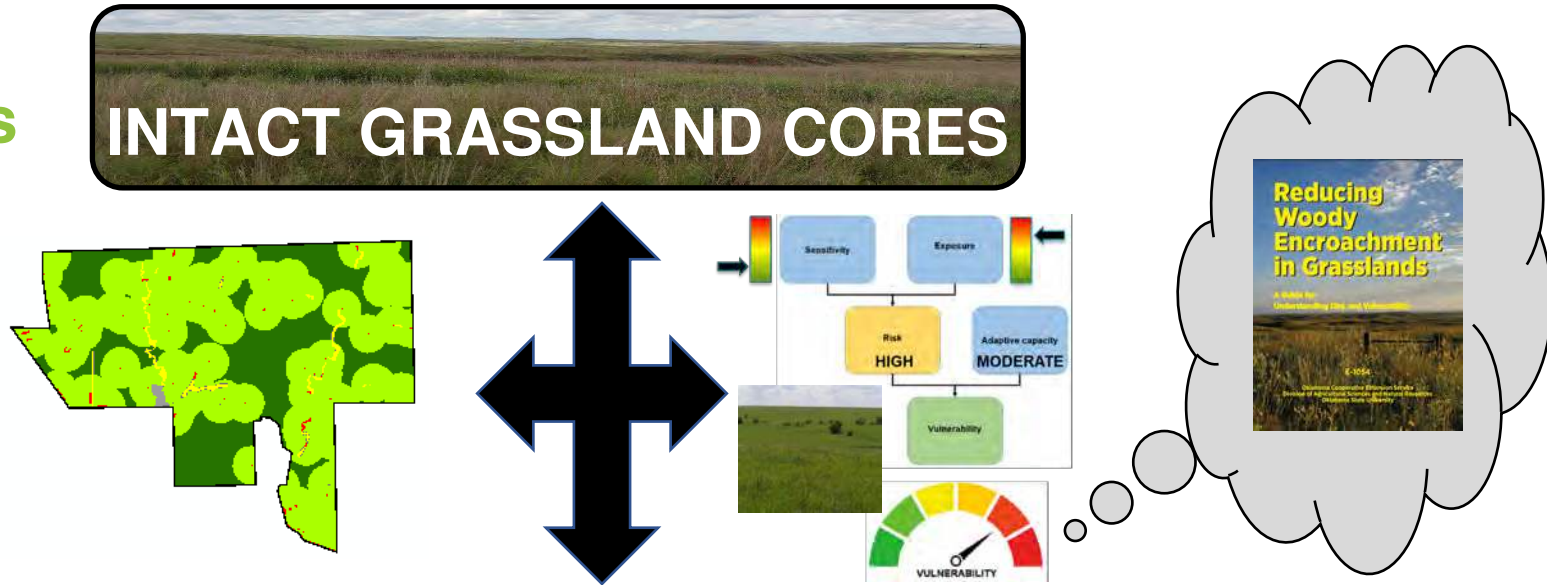


Gypsum Hills



Smoky Hills

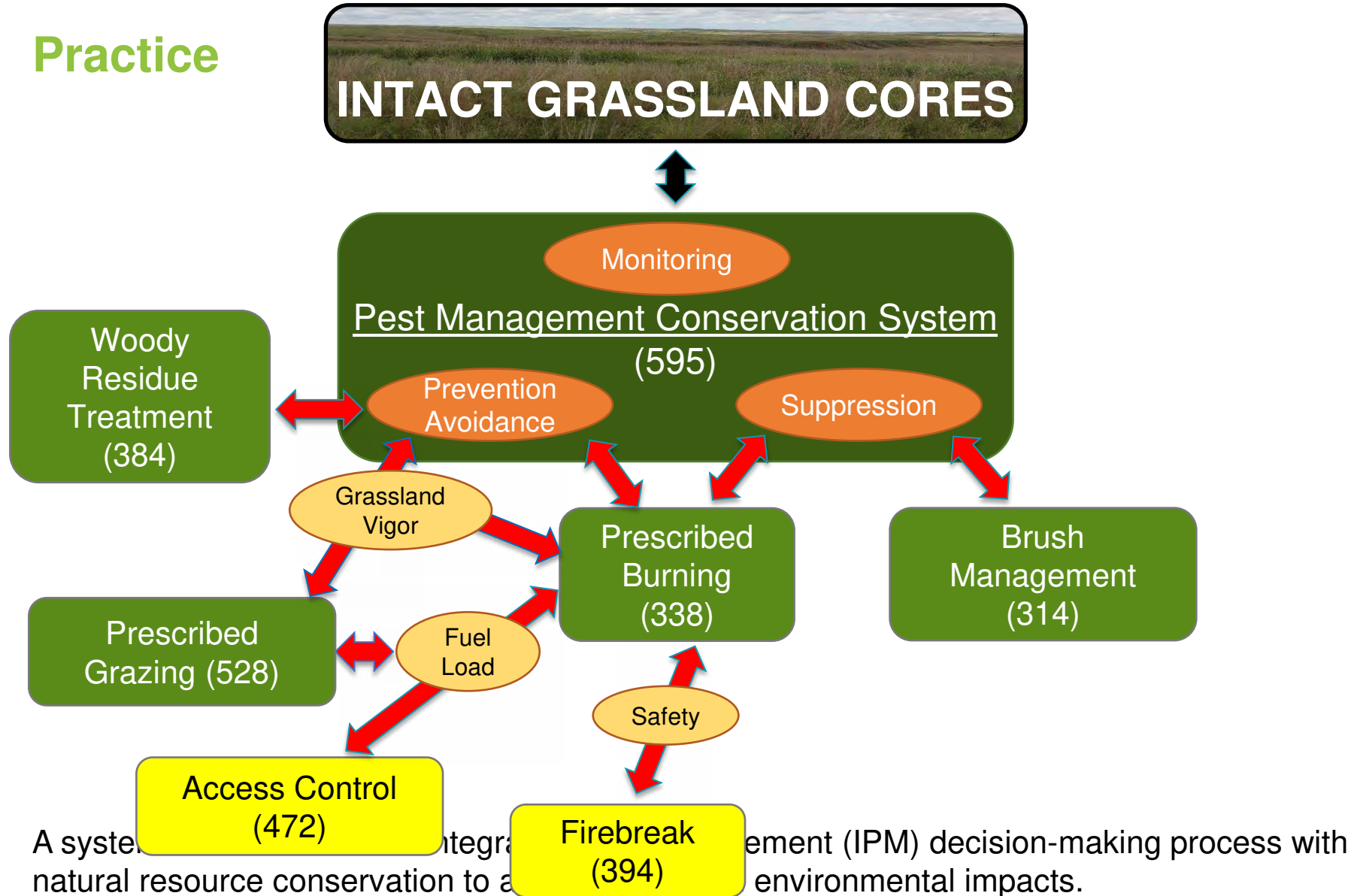
Deciding the Actions to Take

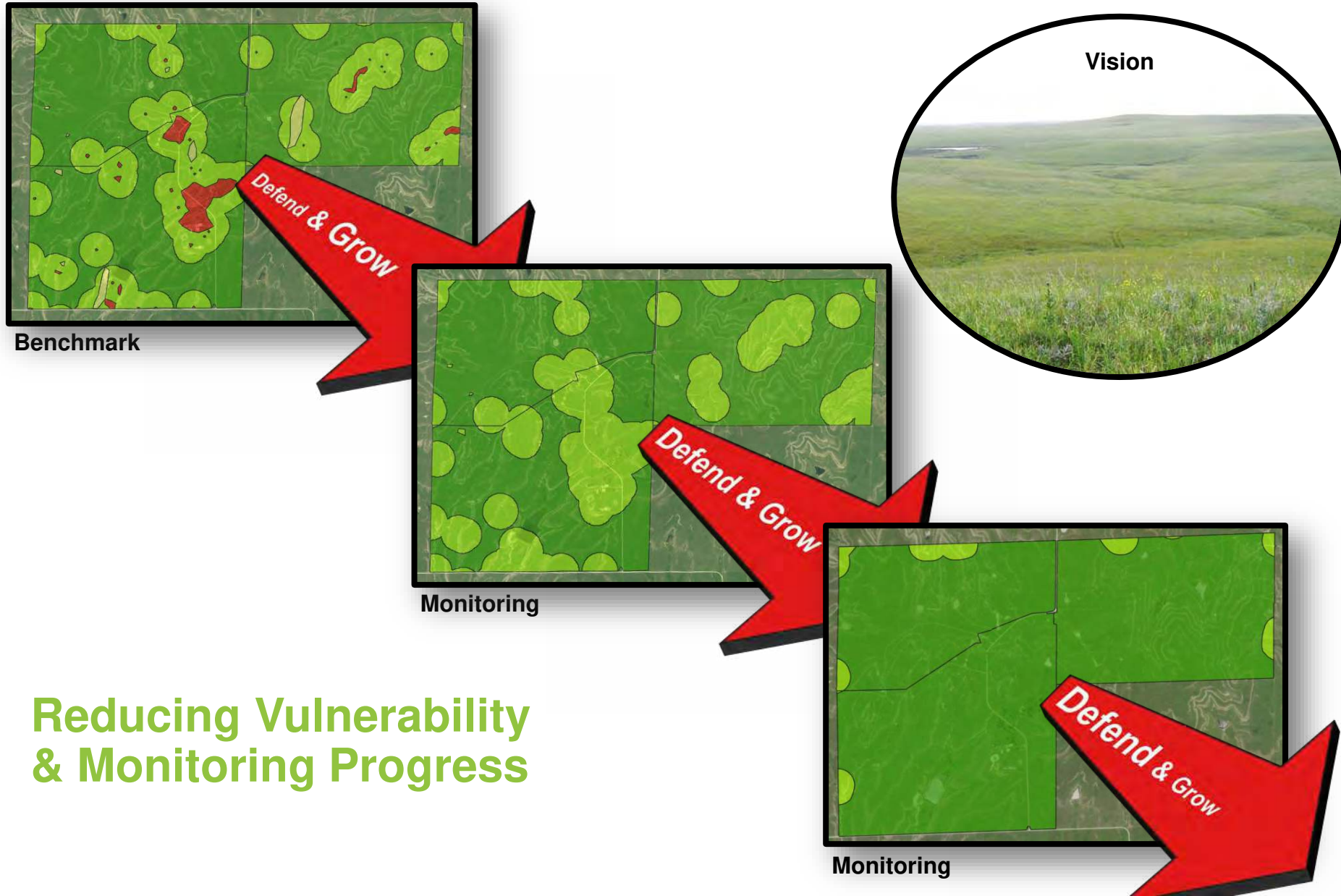


Practice	Woody encroachment stages				State transition	Components of risk	
	Intact	Dispersal	Recruitment	Encroachment		Sensitivity	Exposure
Prescribed fire	X	X	X	X	X	↓	↓
Hand tool removal			X	X			↓
Haying			X				↓
Goats			X			↓	↓
Mechanical management				X	X	↑↓	↓

- P**revent seed dispersal into intact grasslands
- A**void allowing seedlings to become seed sources
- M**onitor the encroachment stages as they change
- S**uppress the problem by eliminating seed sources

Practice





Benchmark

Vision

Defend & Grow

Monitoring

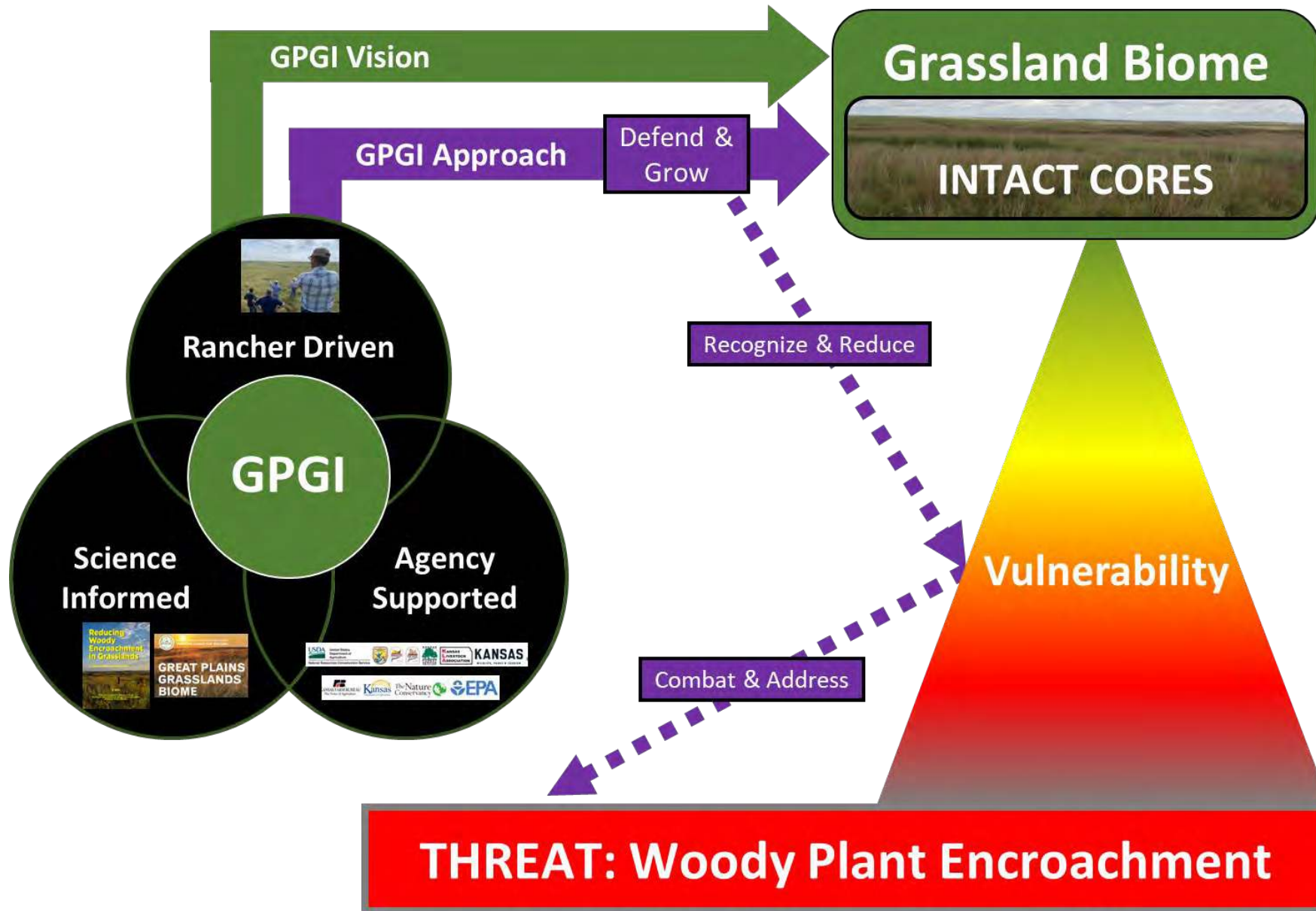
Defend & Grow

Monitoring

Defend & Grow

Reducing Vulnerability & Monitoring Progress

Great Plains Grassland Initiative





Technical Transfer: Moving from Awareness to Action

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*Research Assistant Professor, Woody
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The Land *and* The People



Goal: Large Tracts of Intact Grassland



Phases of Woody Encroachment

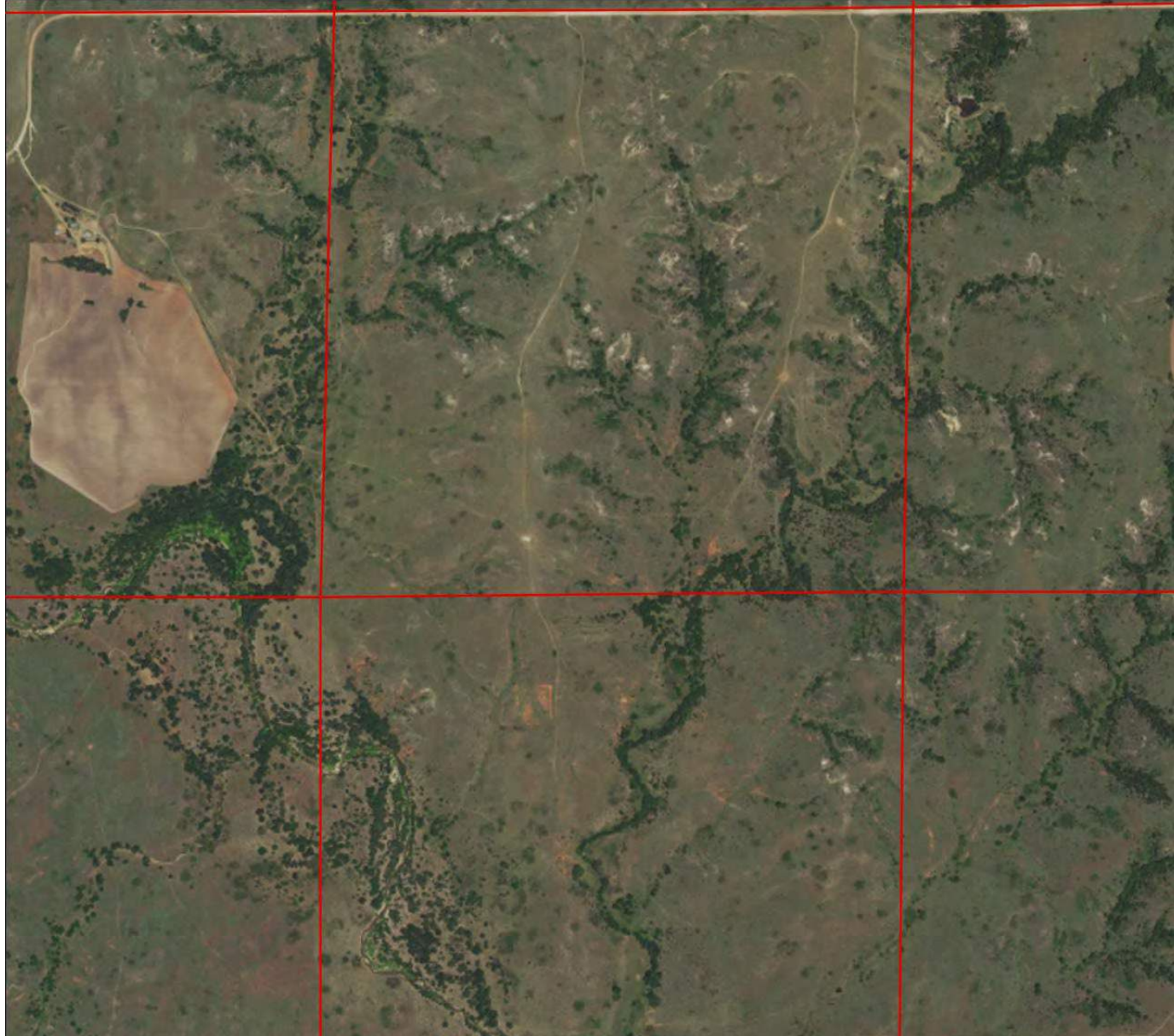


Encroached

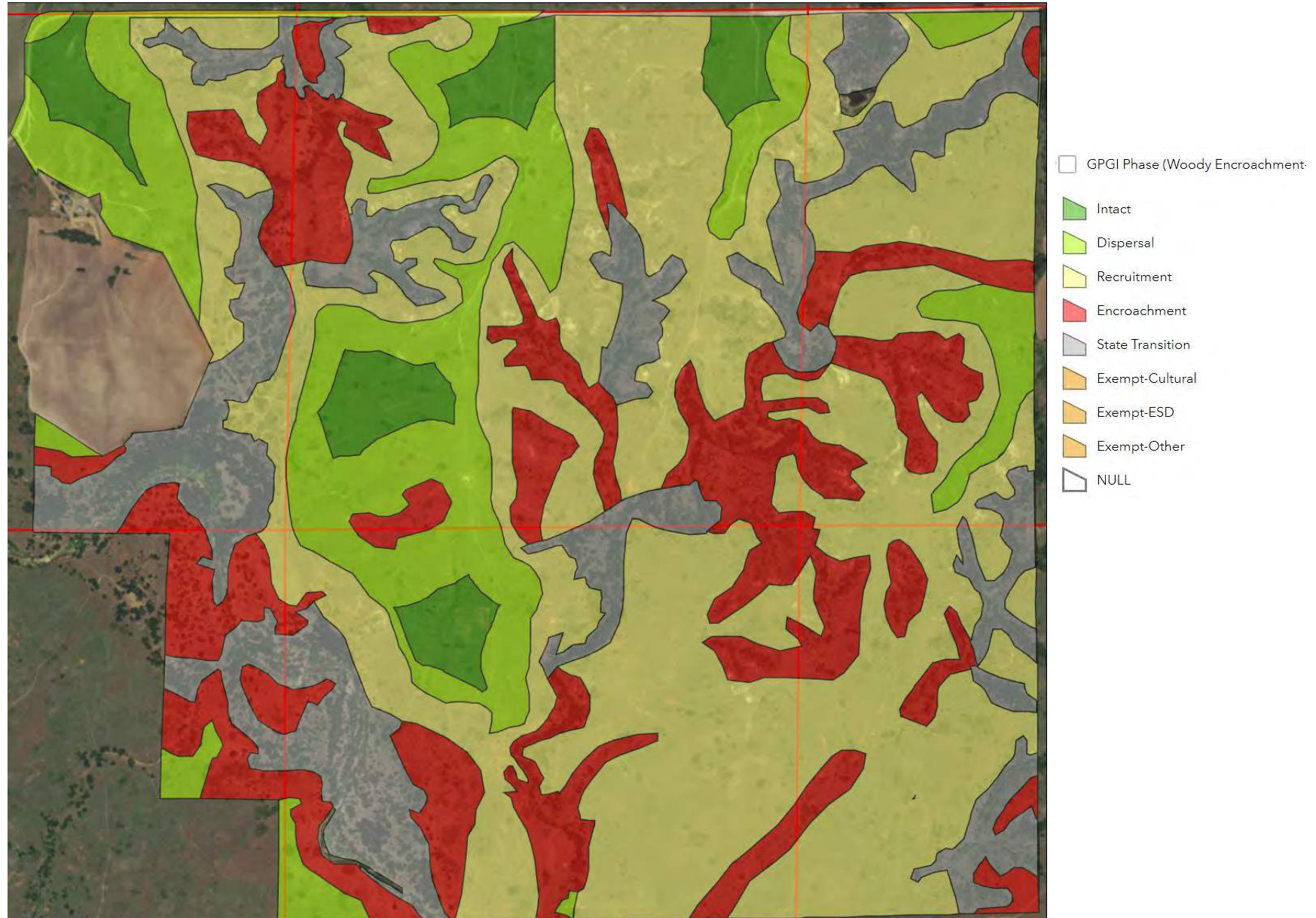


Woodland State Transition

A Typical Starting Point



Reality of the Starting Point



Mechanical Brush Management



Mechanical Brush Management



Mechanical Brush Management



Before



After

Mechanical Brush Management

Extreme terrain, yet no tree left behind.



Is This Now Intact?



Prescribed Burning Essential to Success



Photo Credit: Michael Coleman, PF





Cultural Dimension

- Recognizing the problem
- Paradigm shift on viewing and addressing the problem
 - Formerly not finishing the job
 - Former desire to attack the worst first.
- Operator vs Owner
- Absentee ownership
- Ag vs Recreational land use
- Financial limitations
- Implementation of fire where not culturally accepted
- Changing traditional burning
- Cultural will

Logistics

- Extreme terrain
- Planted Windbreaks
- Cultural or ESD Exempt Trees

- Prescribed Burn Associations (PBAs)
- Neighbor-to-neighbor relations
- Peer Pressure – “Tree Shaming”
- Outreach and Educational Events
- Publications – i.e. Vulnerability Guide
- Coordination amongst Govt. agencies and NGOs

Gyp Hills Prescribed Burn Association



Early Adopting Producers Identify the Problem



Seeing the Science for the First Time

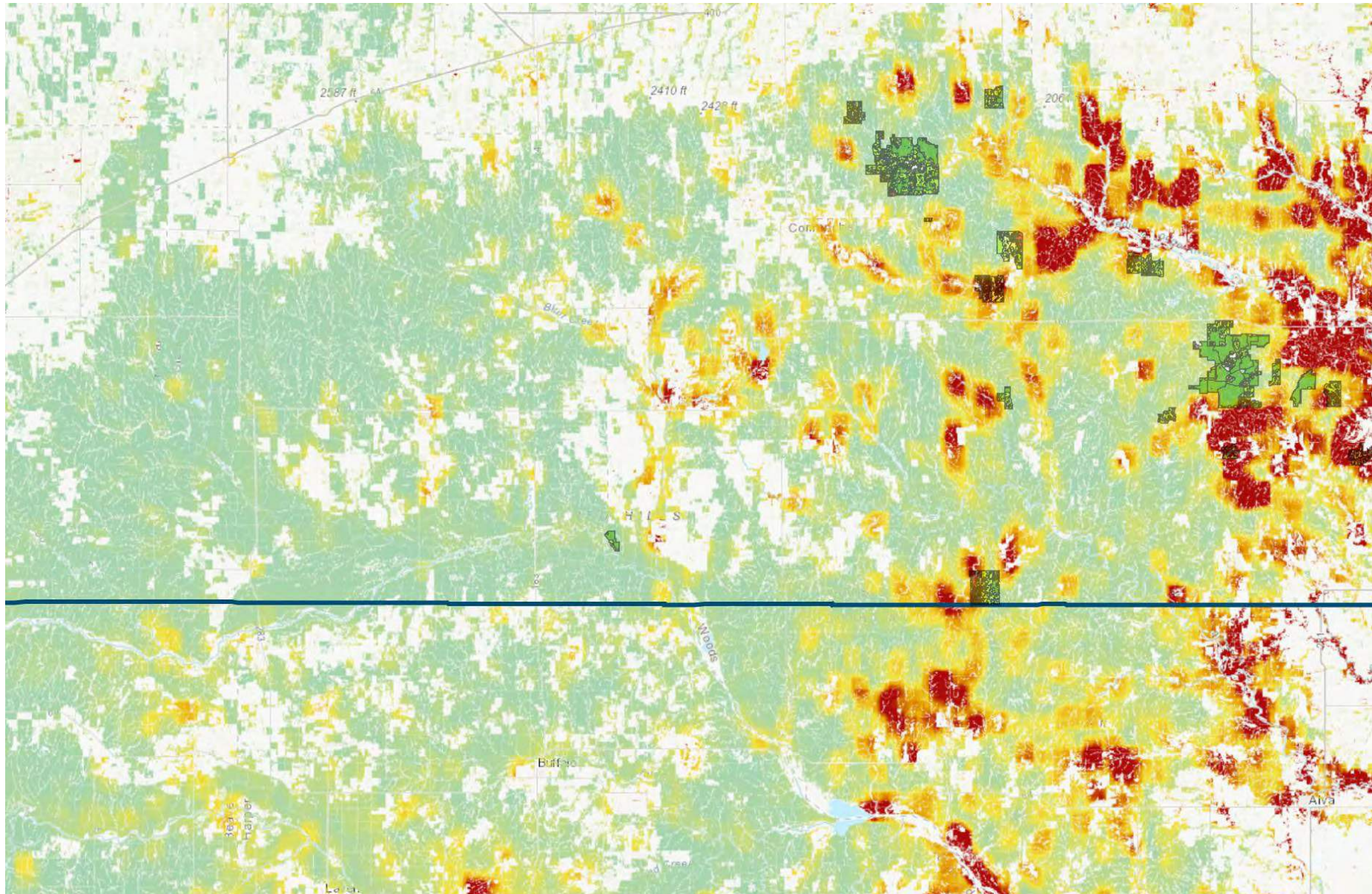
The Problem Gets Personal!

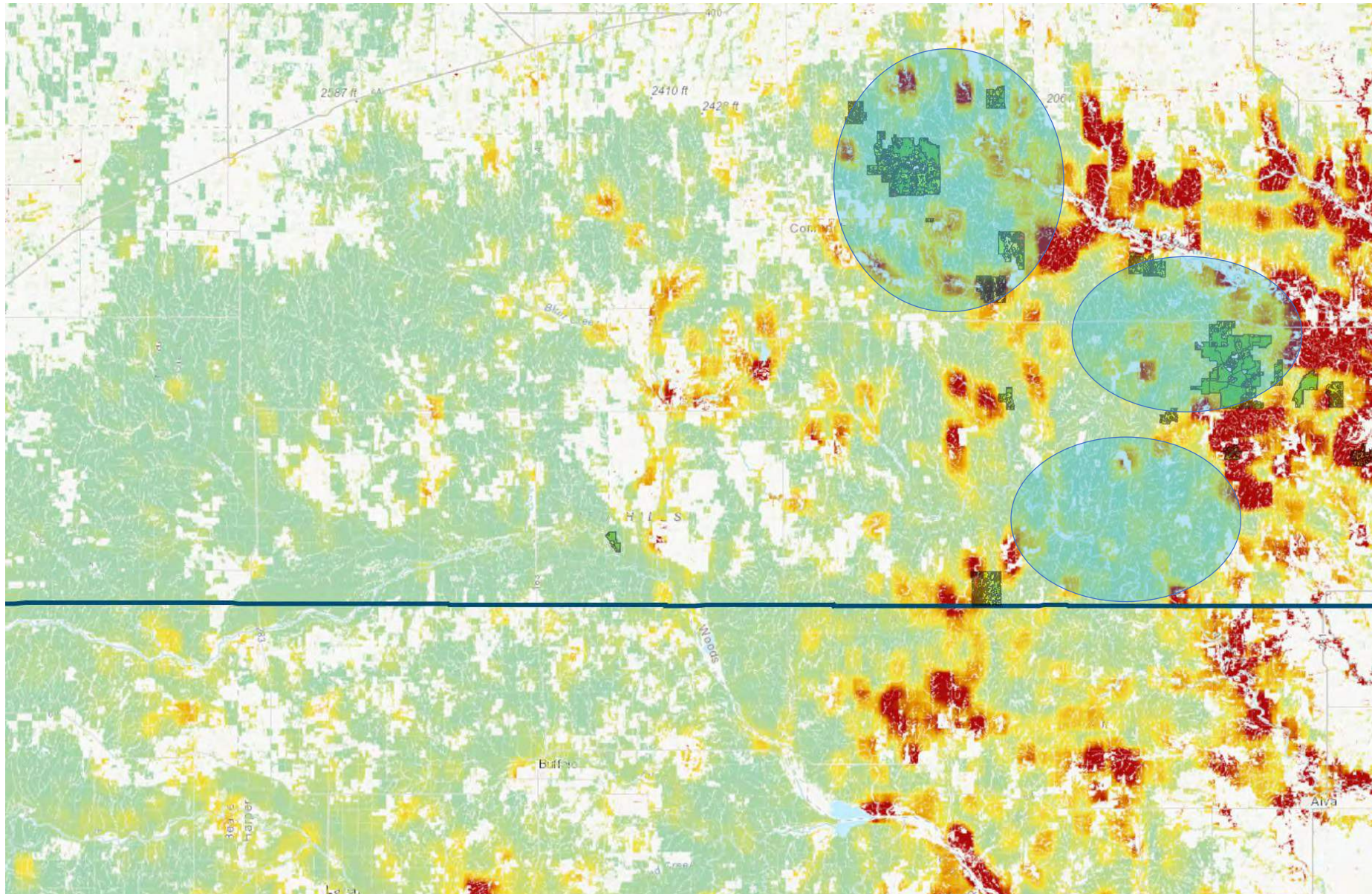


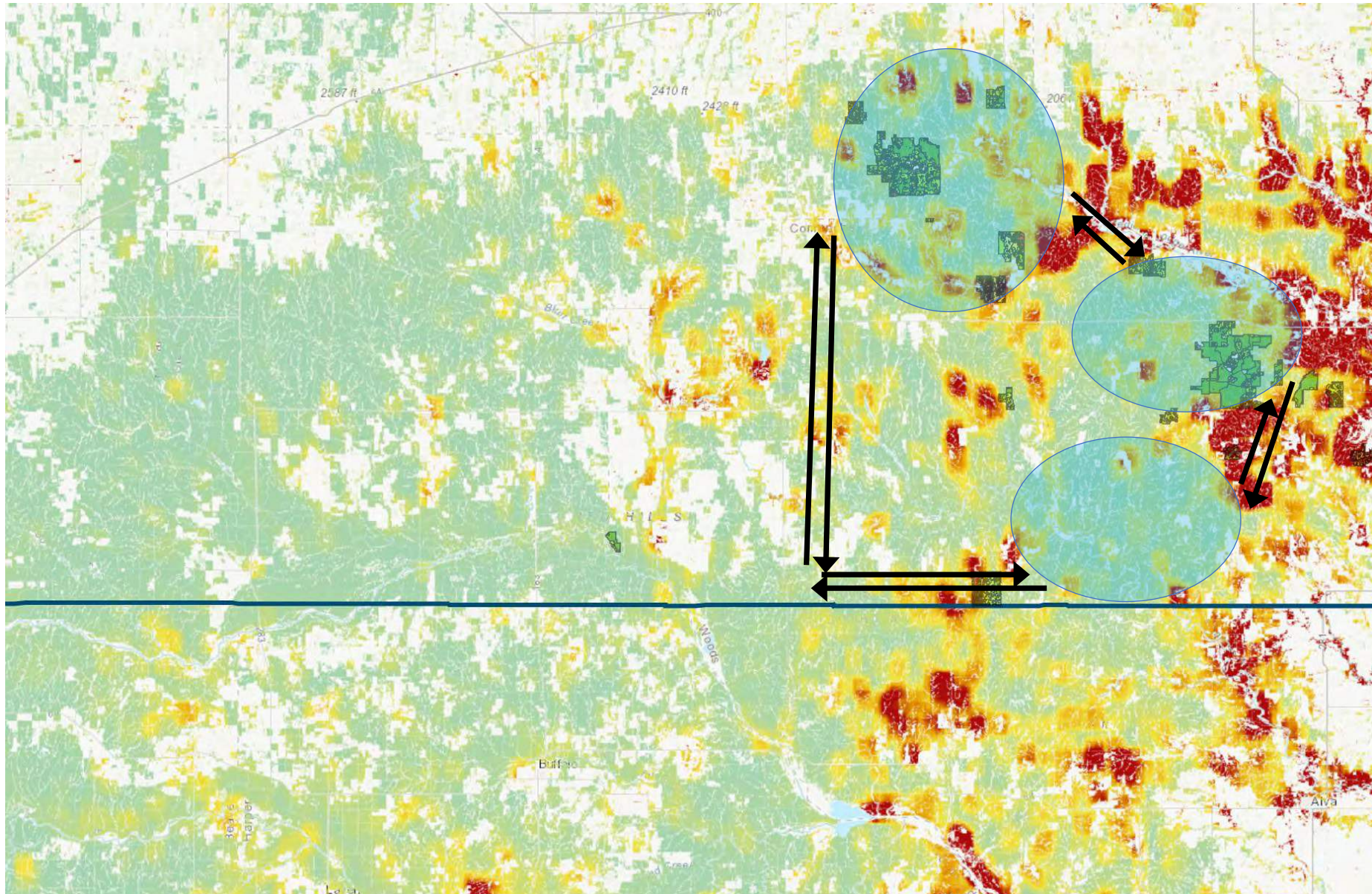
Gyp Hills Conservation Coordination Group



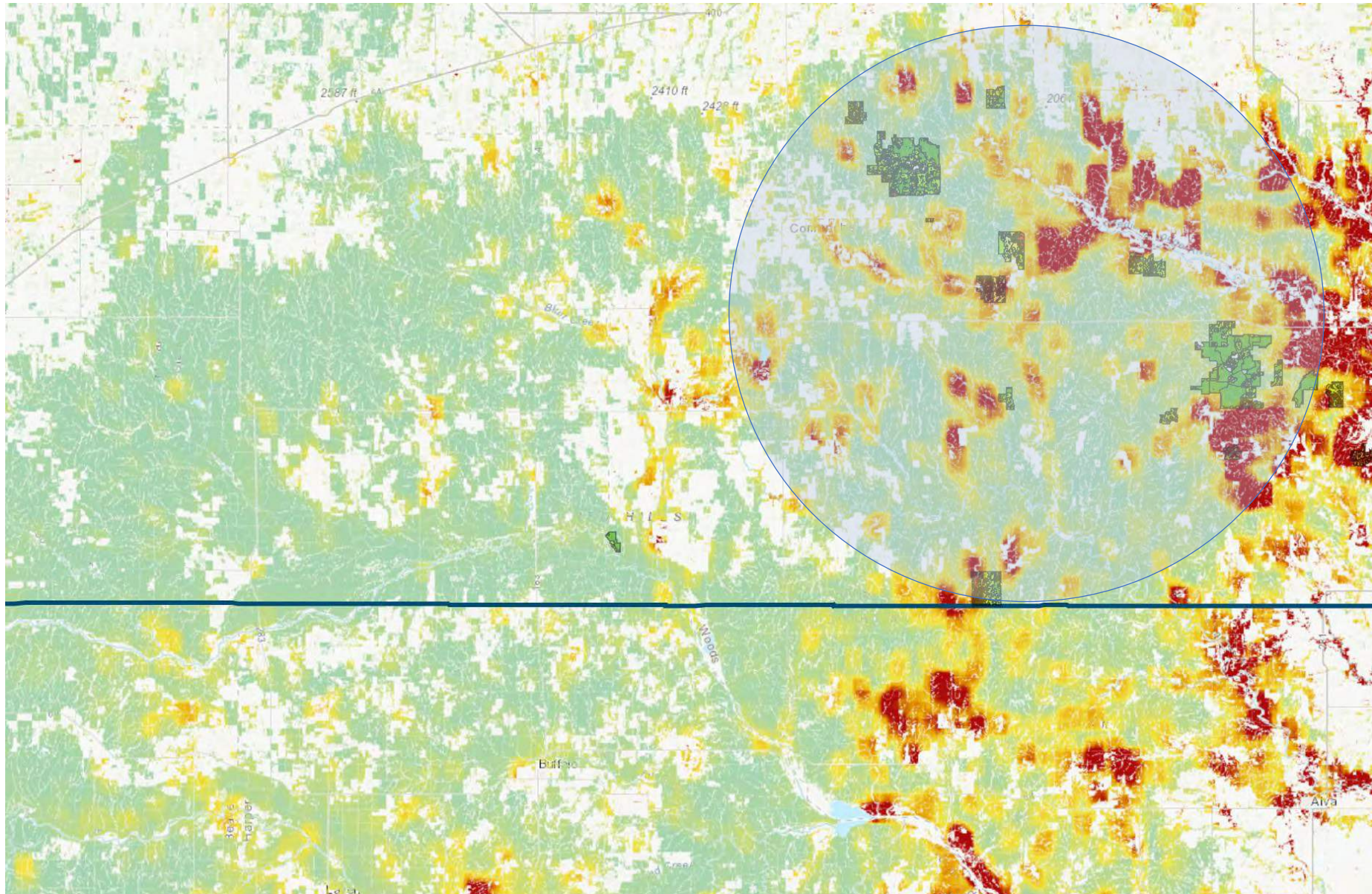
Landscape Problem Requires Landscape Solution







Macro Core of Intact Grassland





Technical Transfer: Moving from Awareness to Action

- **Jeremy Maestas**
*National Sagebrush Ecosystem Specialist,
USDA-NRCS West National Technology
Support Center*
- **Doug Spencer**
*State Grazing Land Management Specialist,
Kansas NRCS*
- **Dusty Tacha**
Area Range Specialist, Kansas NRCS
- **Dillon Fogarty**
*Research Assistant Professor, Woody
Invasions Ecologist, University of
Nebraska-Lincoln*



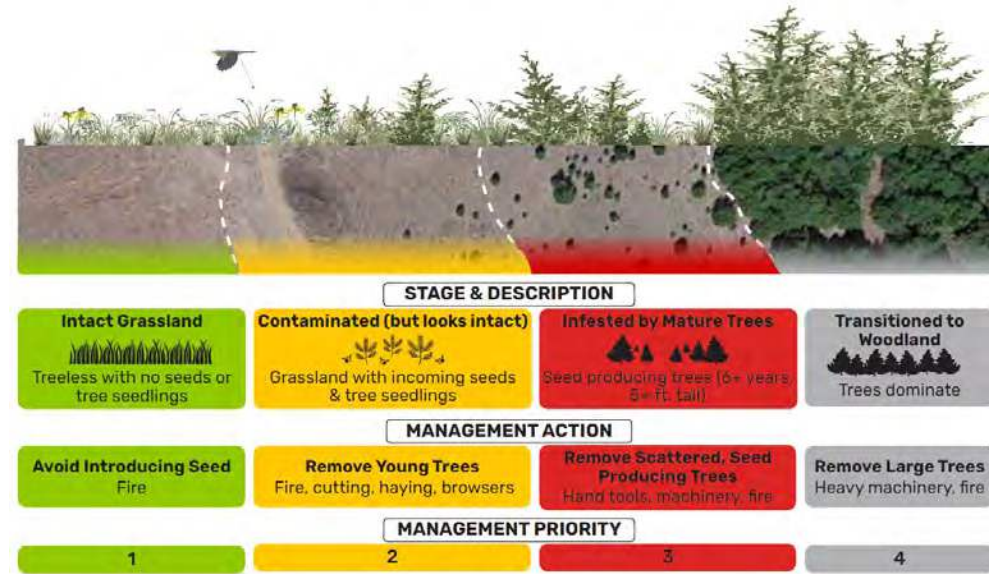
Reducing Woody Encroachment in Grasslands

A Guide for Understanding Risk and Vulnerability

E-1054

Oklahoma Cooperative Extension Service
Division of Agricultural Sciences and Natural Resources
Oklahoma State University

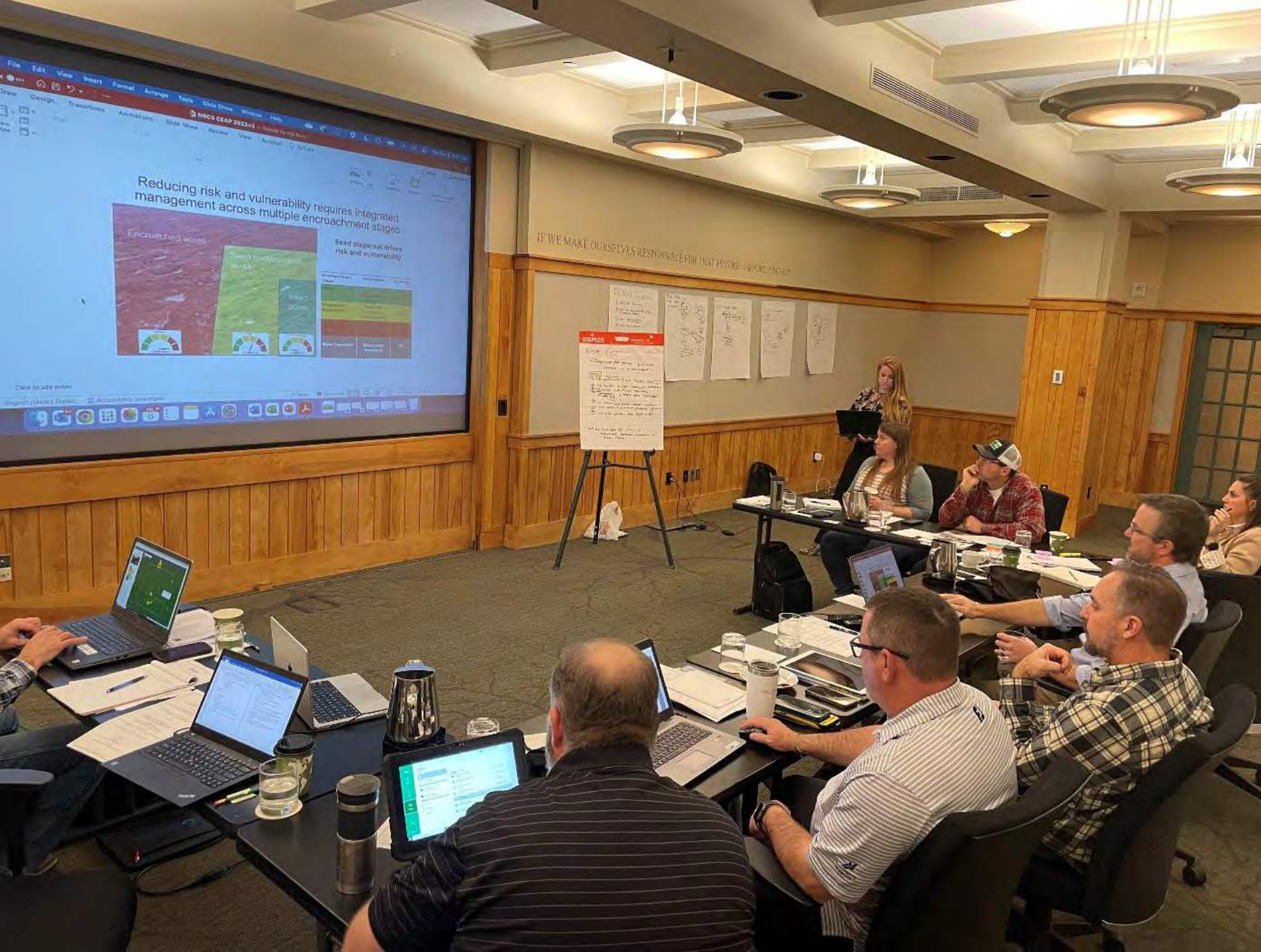
New Order of Business *Maintain Your Intact Grasslands*



- Saves \$25-500 per acre compared to traditional brush management.

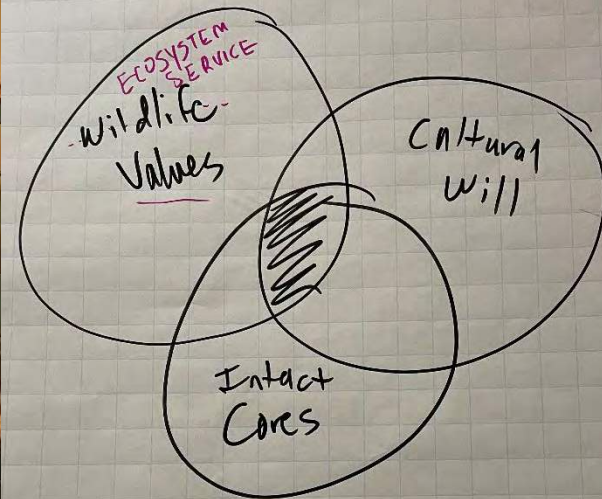
“We can remove isolated parent trees from otherwise treeless pastures for just \$1-2 per acre, which allows our managers to cover more ground and get ahead of encroachment.”

—Julie Bain, Bessey Ranger District, U.S. Forest Service

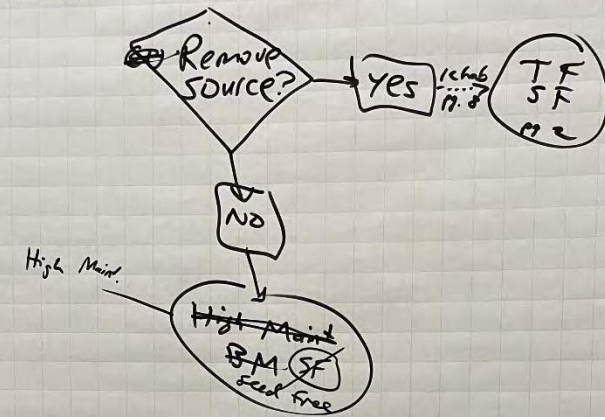


DESIGN GUIDELINES

- ① MUST BE "HOW TO..."
- ② MUST BE ACCOMPLISHED USING PLANNING PROCESS
- ③ MUST REDUCE RISK
- ④ MUST GIVE CHOICES



NOT SEED FREE



Pocket Guide: Special Recognition



REDUCING WOODY ENCROACHMENT IN GRASSLANDS: A POCKET GUIDE FOR PLANNING & DESIGN

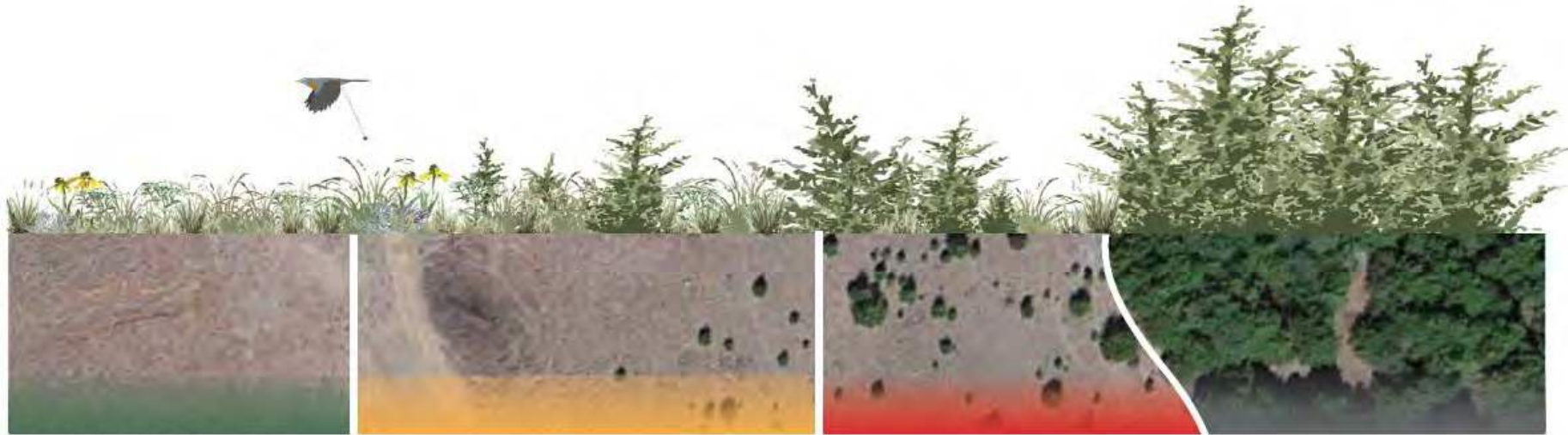
Authors

Dirac Twidwell (University of Nebraska)
Carol Baldwin (Kansas State University)
Laura Goodman (Oklahoma State University)
Allison Thompson (Oklahoma State University)
Morgan Treadwell (Texas A&M AgriLife Extension)
Pete Bauman (South Dakota State University)
Doug Cram (New Mexico State University)

NRCS State Range/Grazing Specialists

Doug Spencer (Kansas NRCS)
Brandon Reavis (Oklahoma NRCS)
Jeff Nichols (Nebraska NRCS)
Emily Helms (South Dakota NRCS)

New Order of Business: Recognize and Reduce Vulnerability on our Grasslands



STAGE & DESCRIPTION

<p>Intact grassland</p>  <p>Treeless with no seeds or tree seedlings</p>	<p>Dispersal & recruitment</p>  <p>Contaminated (looks intact) due to incoming seed dispersal & seedling recruitment</p>	<p>Encroached</p>  <p>Infested by seed-producing trees (6+ years, 5+ ft. tall for eastern redcedar)</p>	<p>Transitioned to woodland</p>  <p>Trees dominate</p>
--	---	---	---

MANAGEMENT ACTION

<p>Avoid introducing seed Fire</p>	<p>Remove young trees Fire, cutting, haying, browsers</p>	<p>Remove scattered, seed-producing trees Hand tools, machinery, fire</p>	<p>Remove large trees Heavy machinery, fire</p>
---	--	--	--

PRIORITY FOR MANAGEMENT

<p>1</p>	<p>2</p>	<p>3</p>	<p>4</p>
-----------------	-----------------	-----------------	-----------------

Old Approach

New Approach

Where We Usually Work vs. Where We Should Work



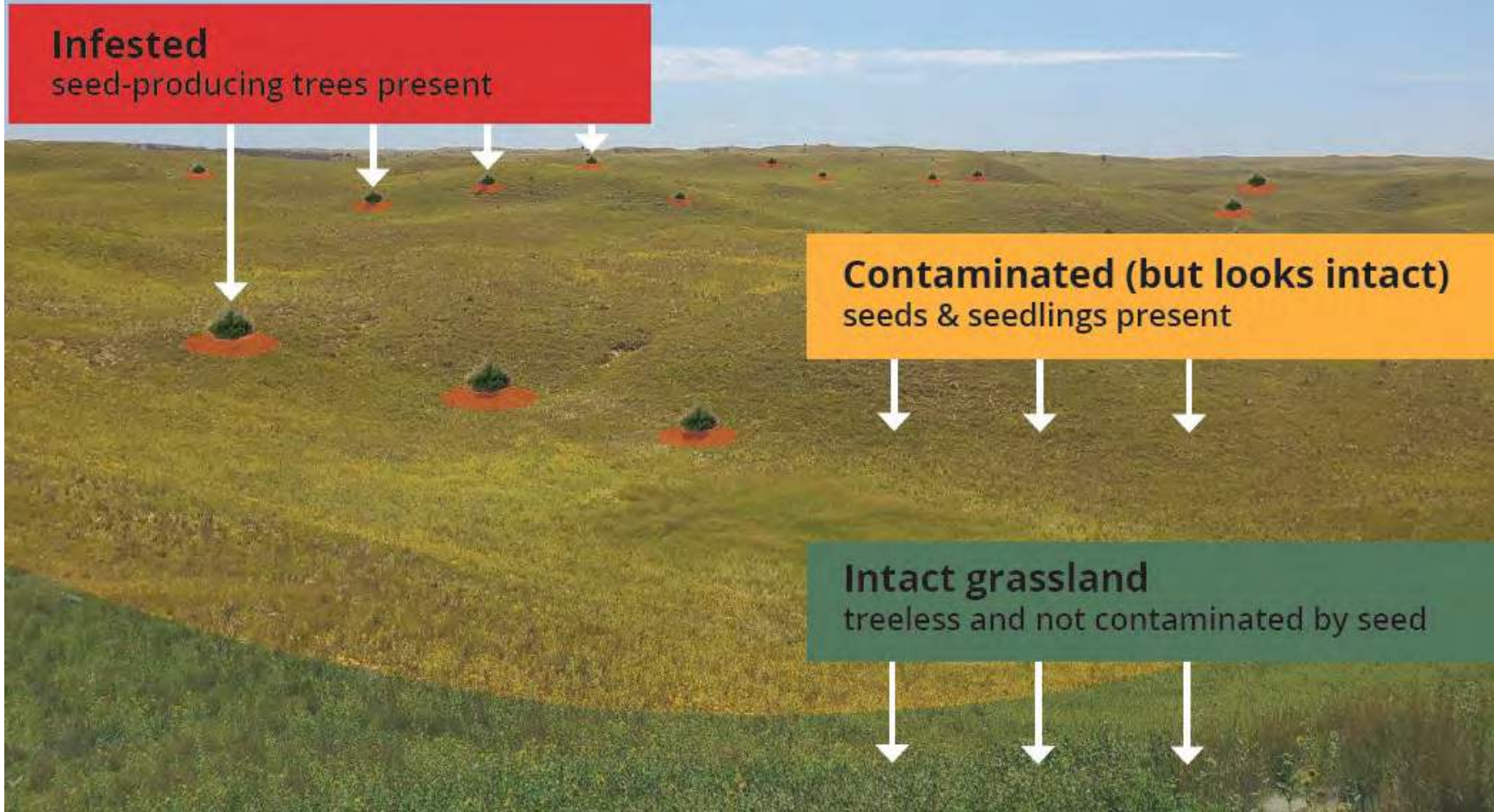
Which of the following best describes this landscape?

- a. mostly intact
- b. mostly contaminated
- c. mostly infested



Which of the following best describes this landscape?

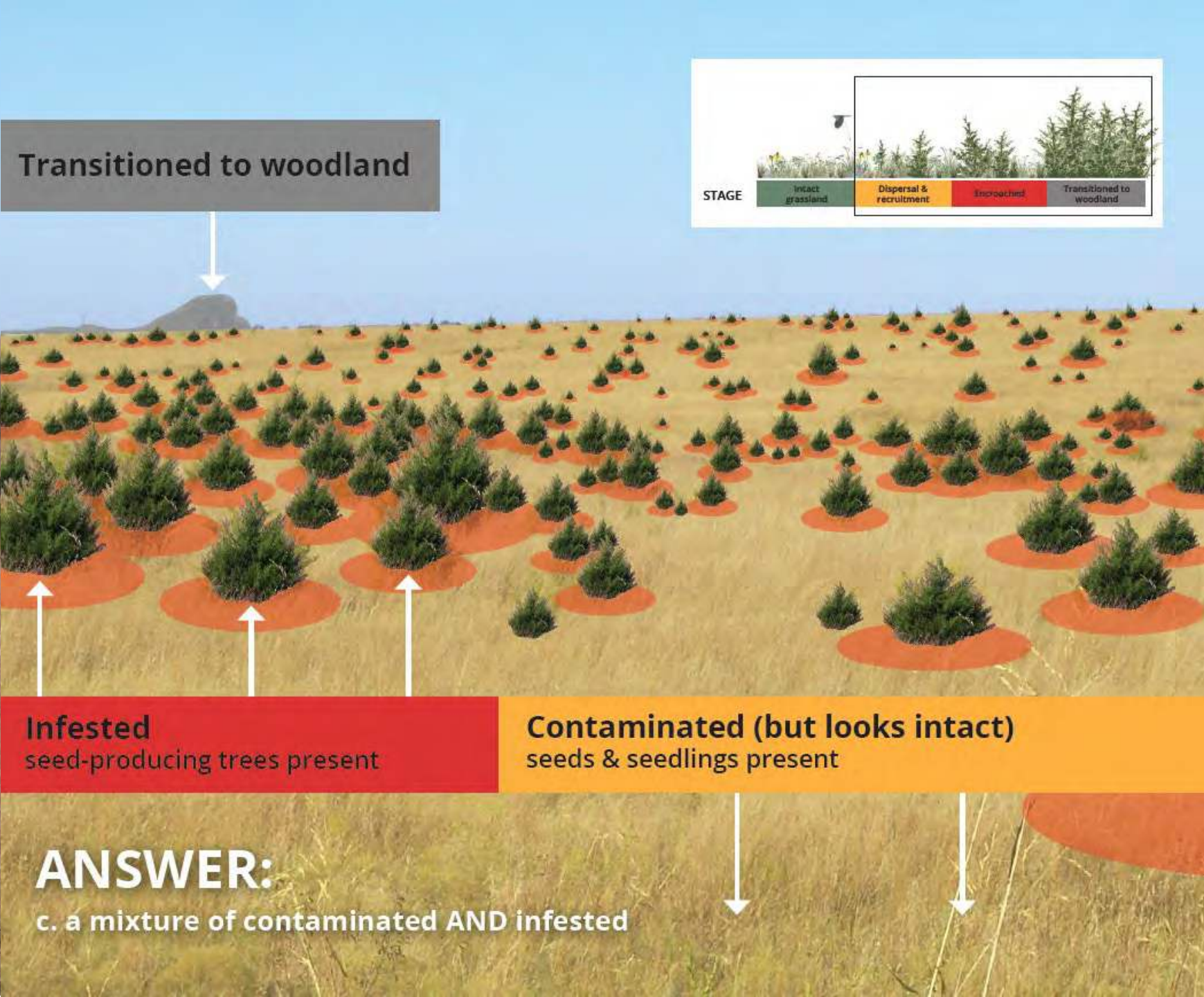
- a. mostly intact
- b. mostly contaminated**
- c. mostly infested





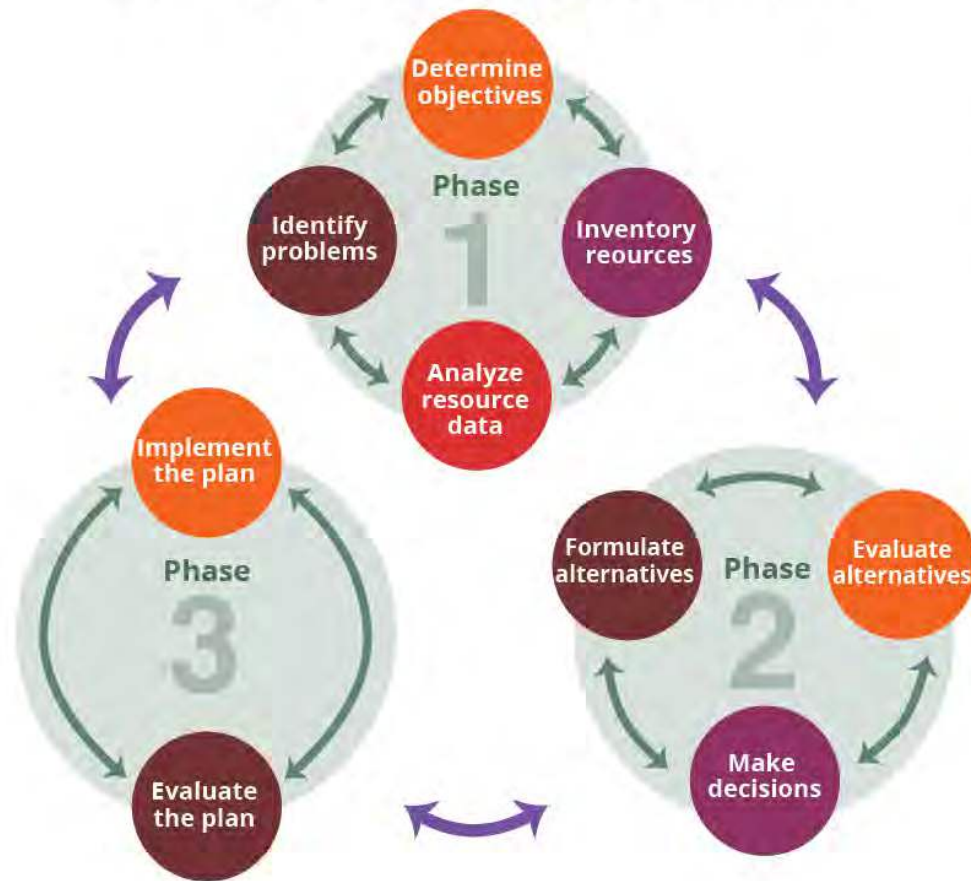
Which of the following best describes this landscape?

- a. mostly contaminated
- b. mostly infested
- c. a mixture of both contaminated AND infested



Develop a Plan for Every Acre and Track Progress Over Time

Conservation Planning Process



Phase 1. Identify the Problem, Determine Objectives, and Conduct an Inventory

Identify the underlying sources of the problem, determine objectives, and map and inventory resources (landscape context, cultural will, and ecosystem service values).

Phase 2. Decision Support

Use the decision-support process to formulate, evaluate, and select among alternative management strategies that best achieve the manager's objectives.

Phase 3. Implementation

Implement the selected management strategies as part of a spatial game plan. Evaluate progress, adapt, and learn.

Recommendations for the Inventory Process

Landscape context

provides critical information on the site's vulnerability to woody encroachment.

Ecosystem service values

illustrate the broader benefits of your work to the people, plants, and animals that depend on intact grasslands.

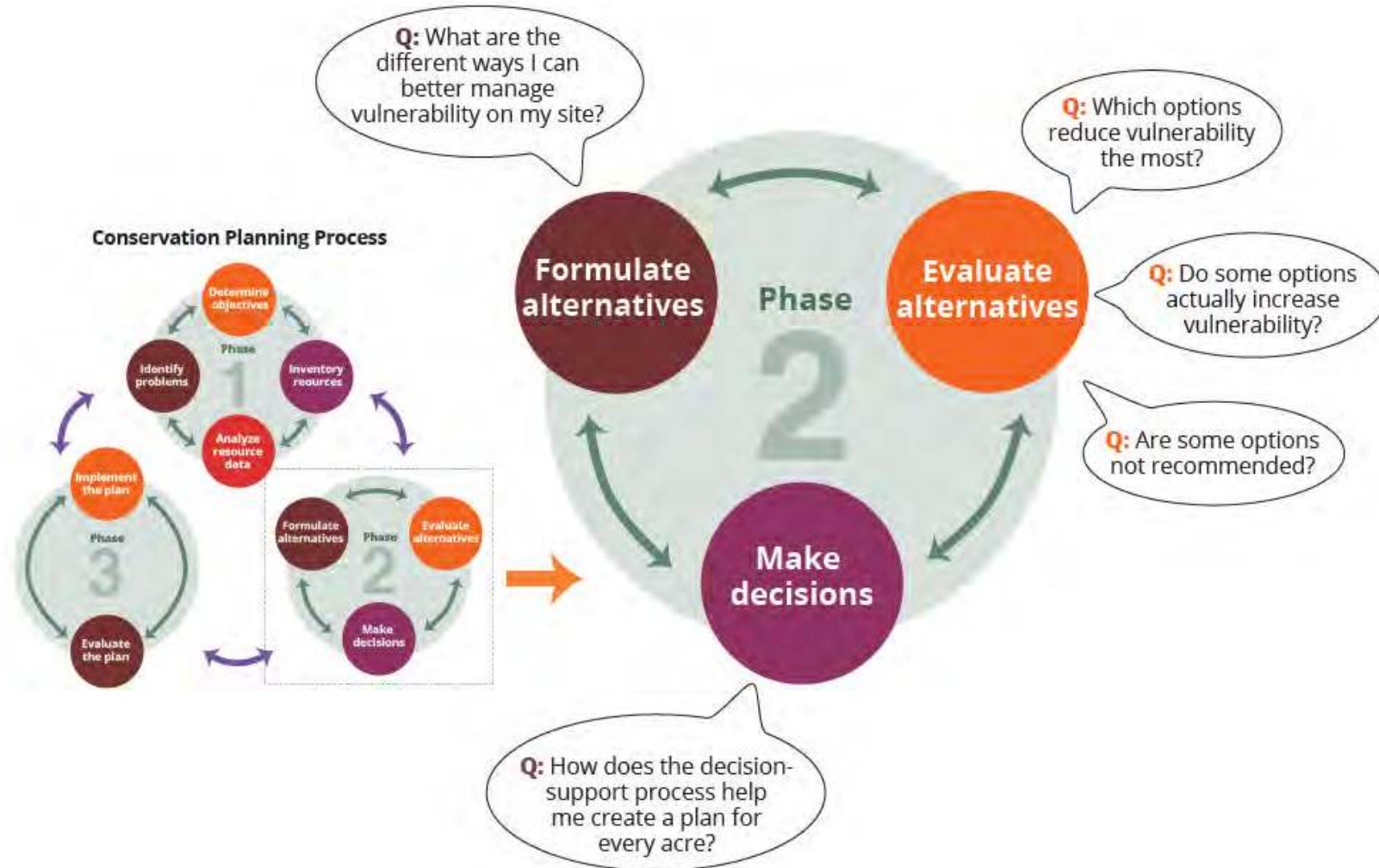


Cultural will

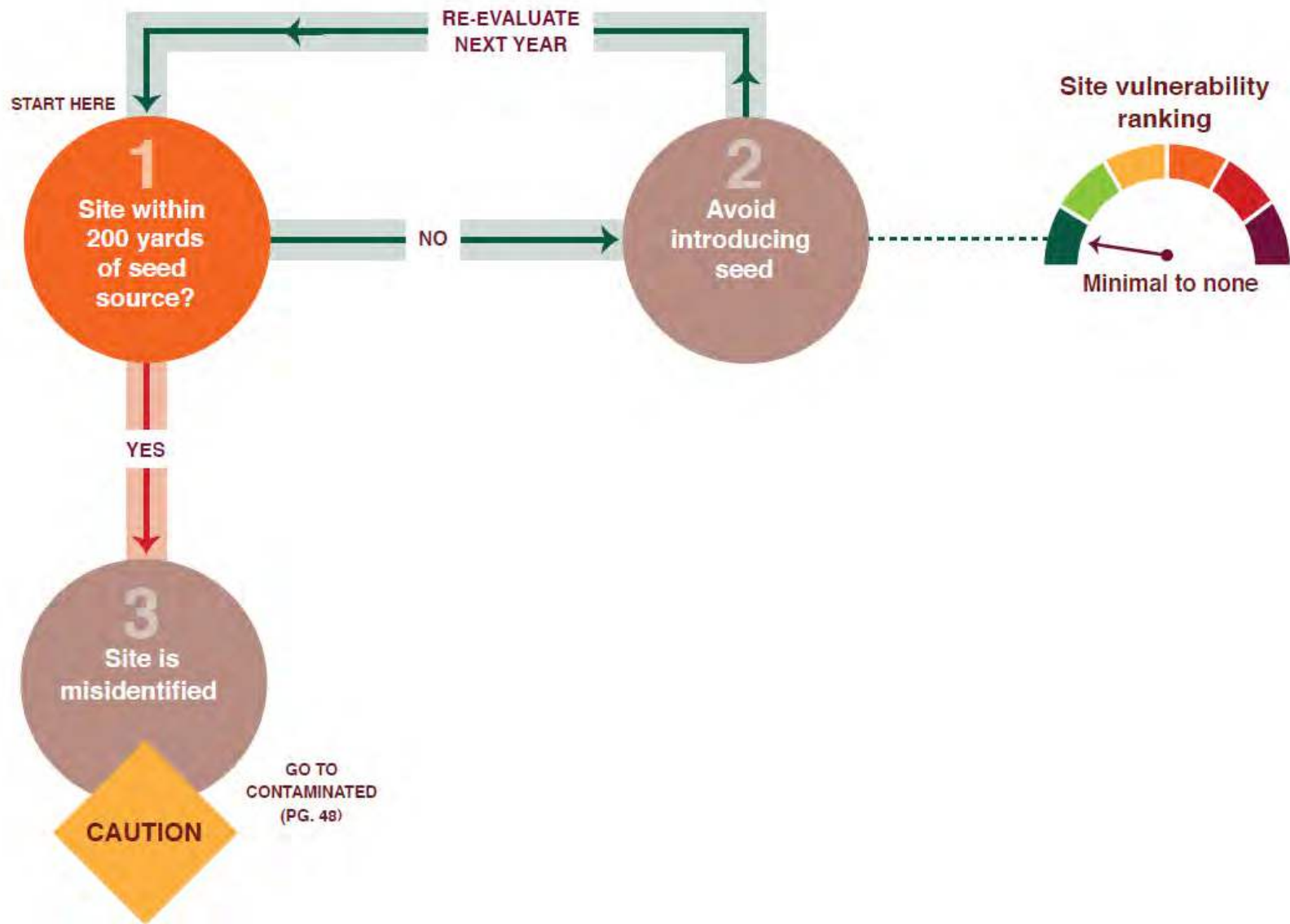
outlines the potential to partner with neighbors and scale up management.

New Decision Support Process

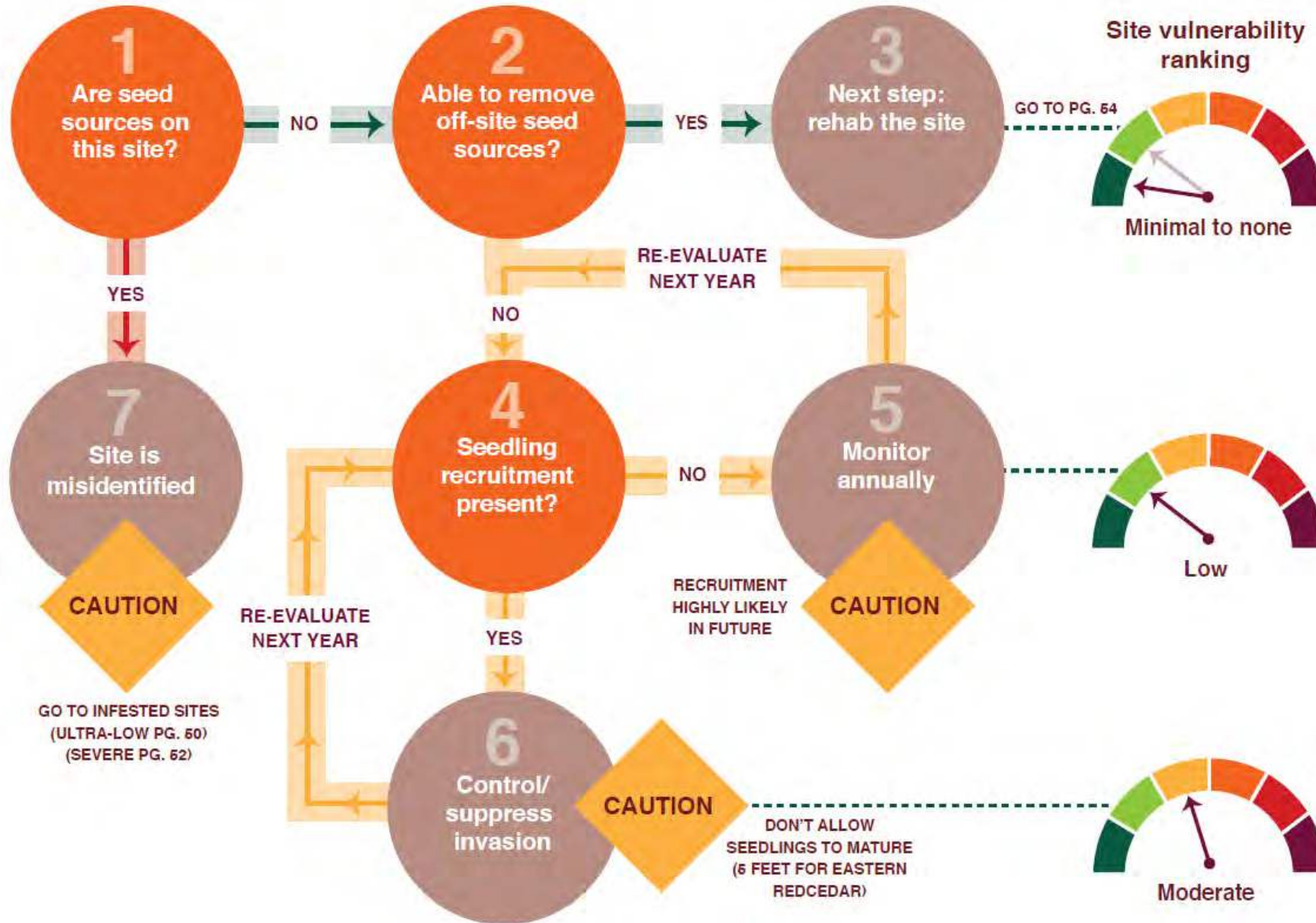
Developing solutions to reduce grassland vulnerability to woody encroachment.



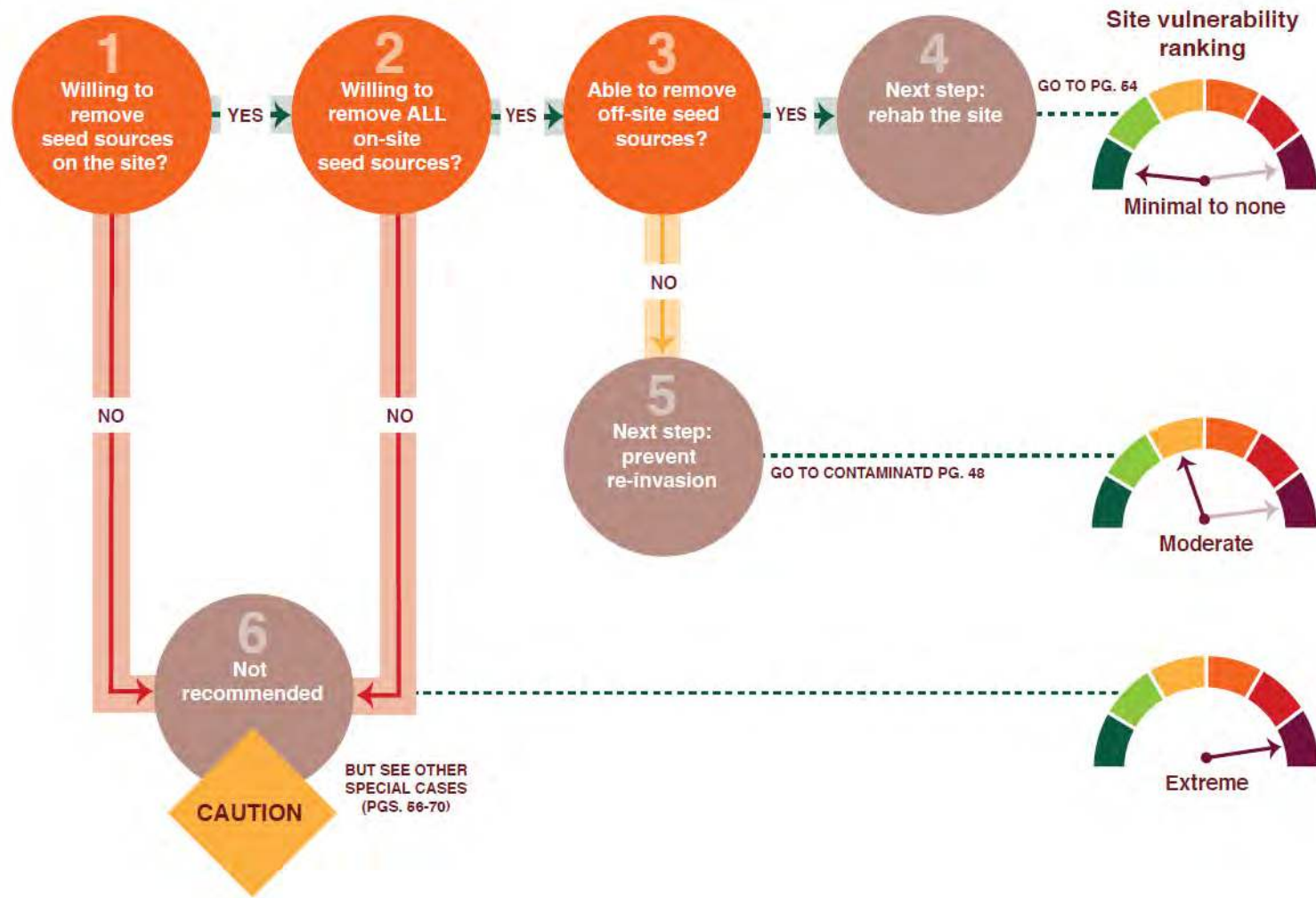
Intact



Contaminated

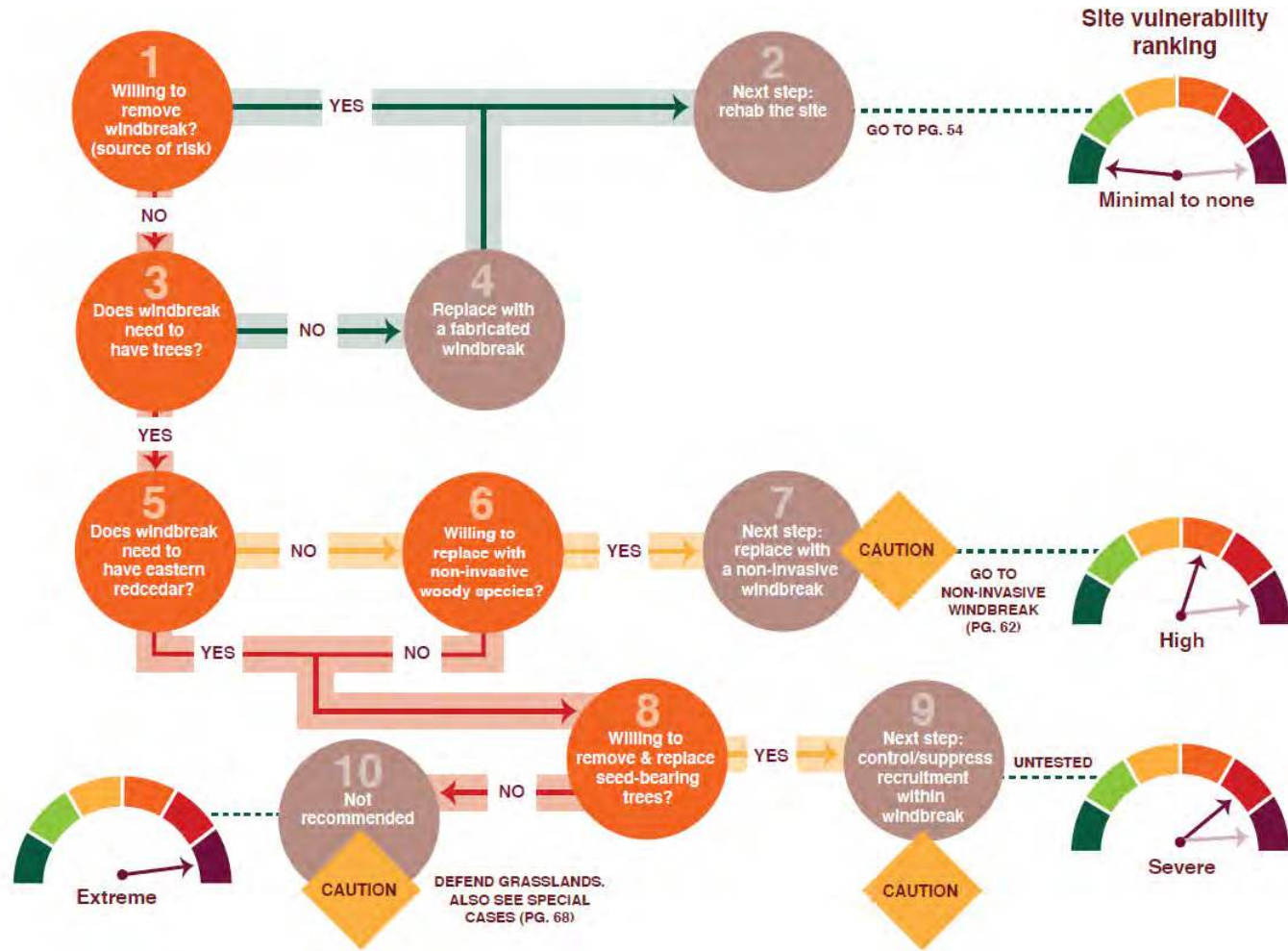


Severe Infestation



No longer recommended: 1. A single 'restoration' treatment.
 2. Leaving behind seed sources.

Windbreak Management



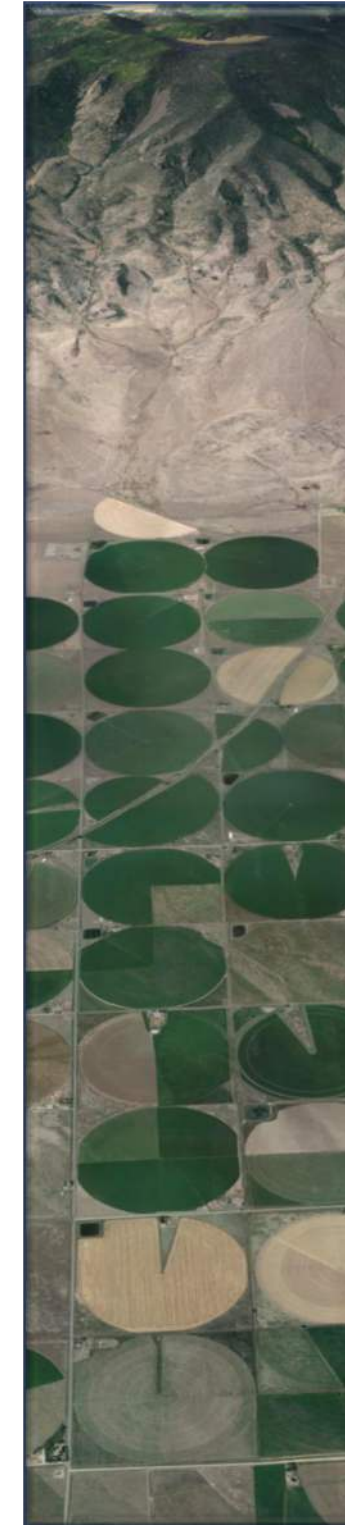
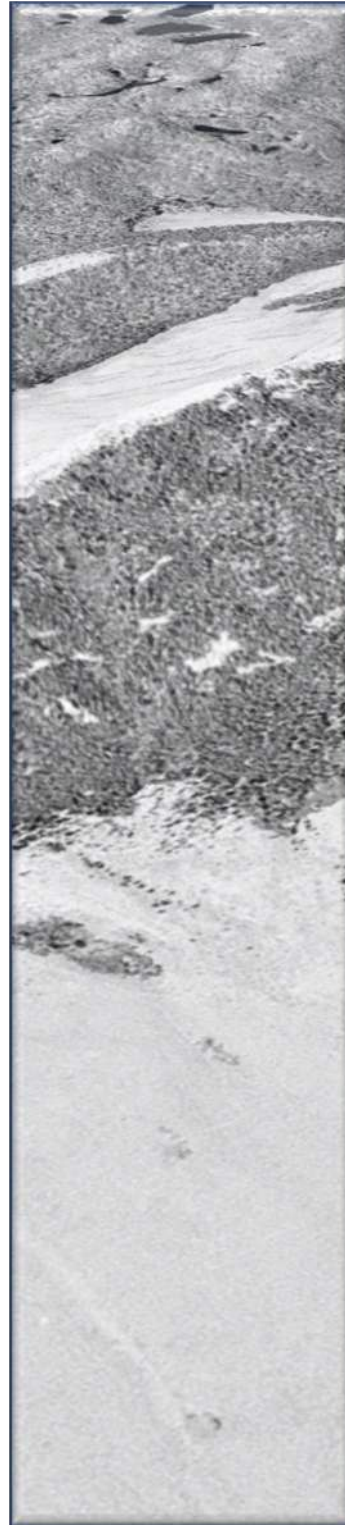
No longer recommended: Not managing windbreaks.



Landscape Explorer

A conservation tool to visualize and communicate landscape change.

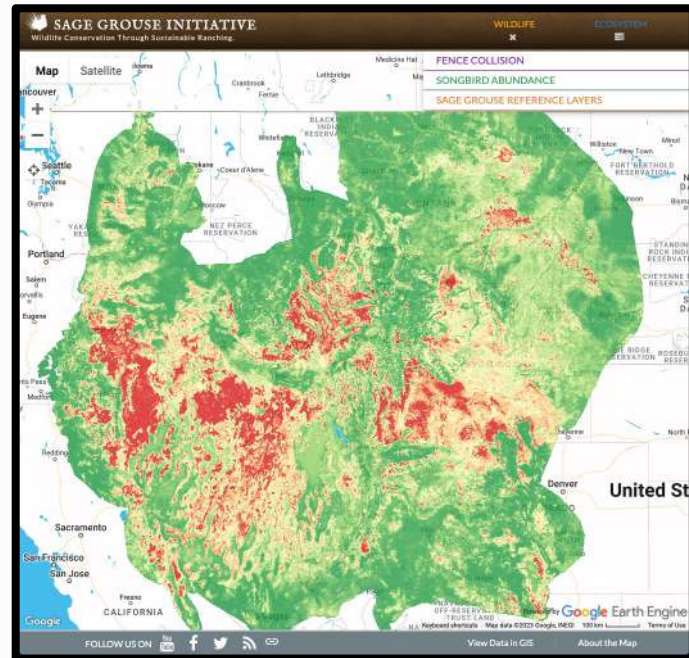
*Scott Morford
WLFW science team
University of Montana*



Working lands science innovation through co-production

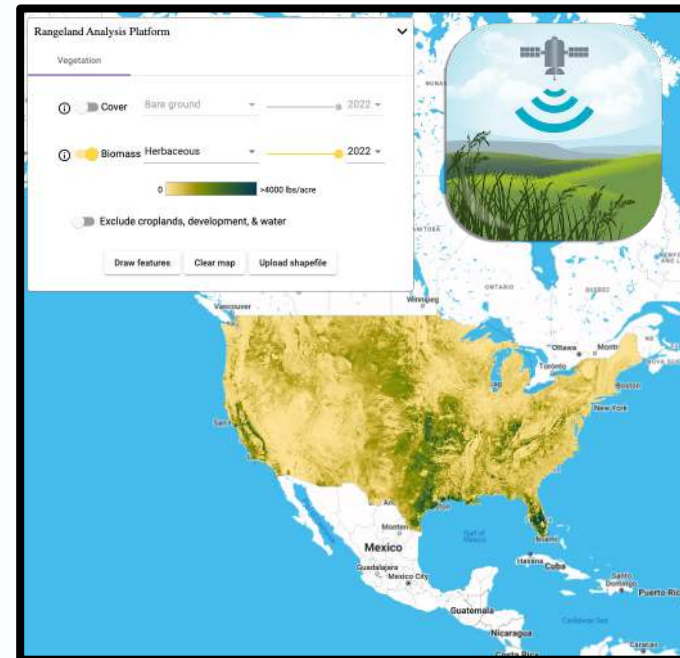
A track record of tools you can use....

2016



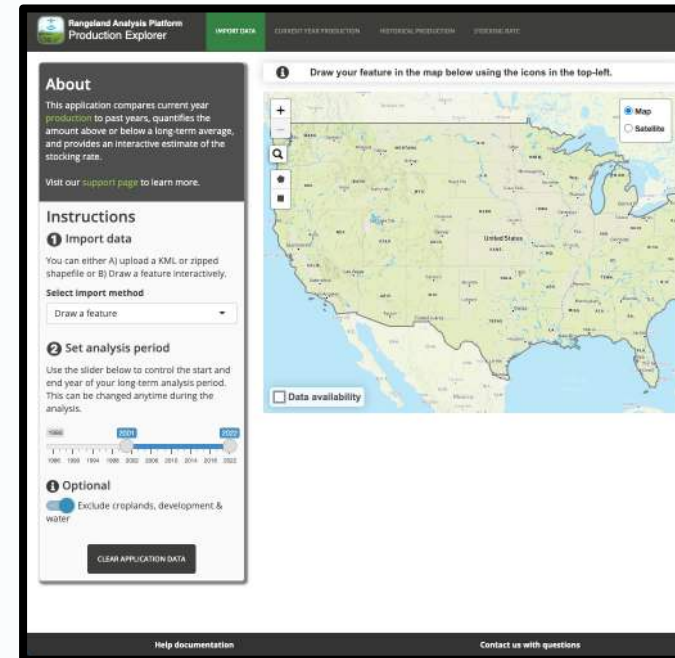
SGI Mapping Platform

2019



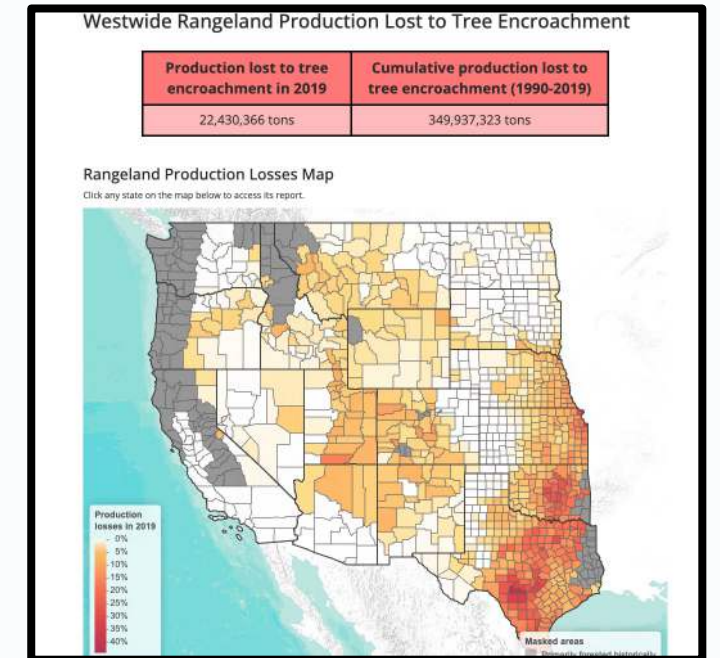
Rangeland Analysis Platform

2021



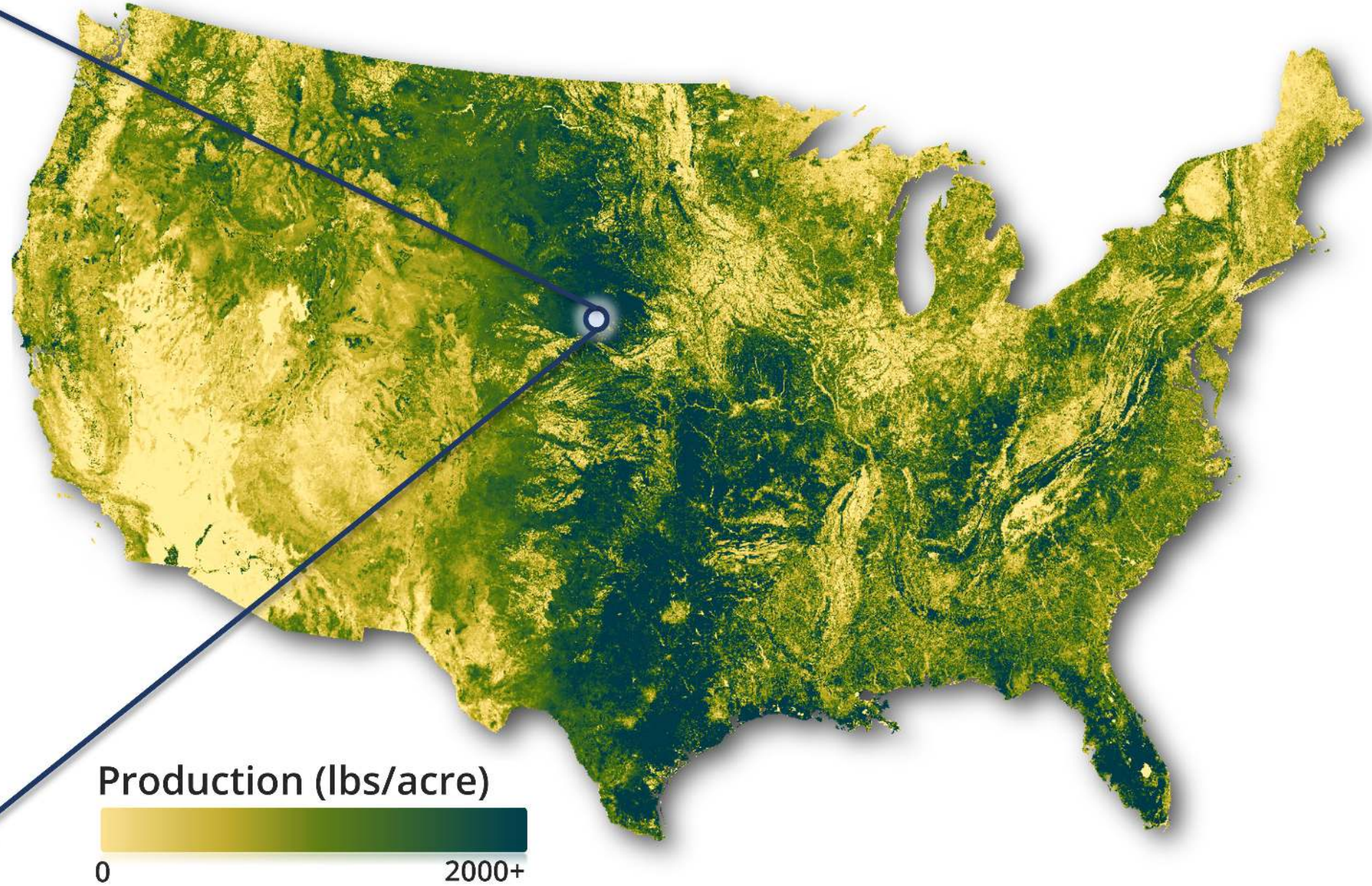
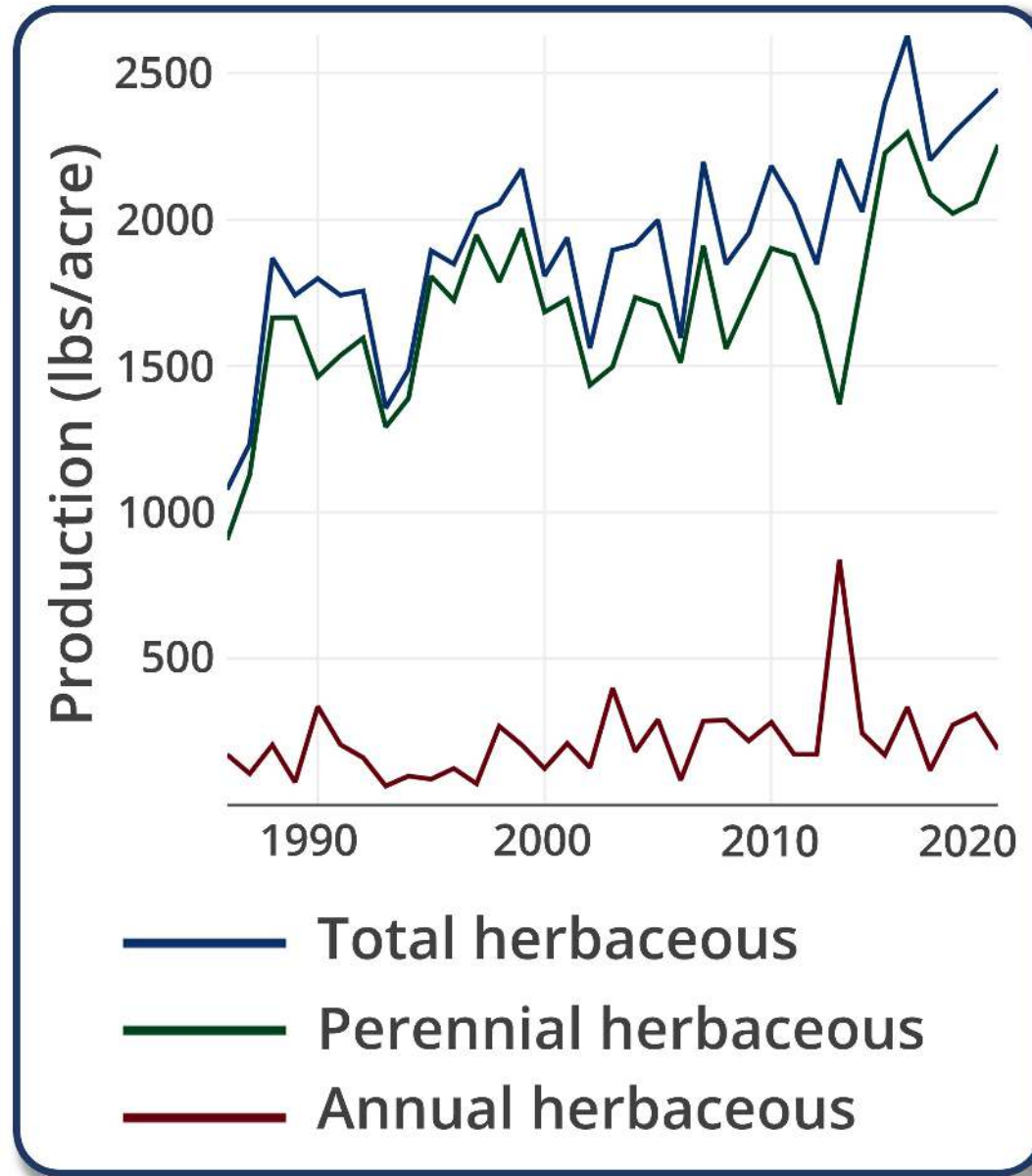
Production Explorer

2022



Yield Gap Explorer

The science of everywhere. Everywhere.



Tools that promote cross boundary collaboration and building shared narratives.



Landowners

State Lands

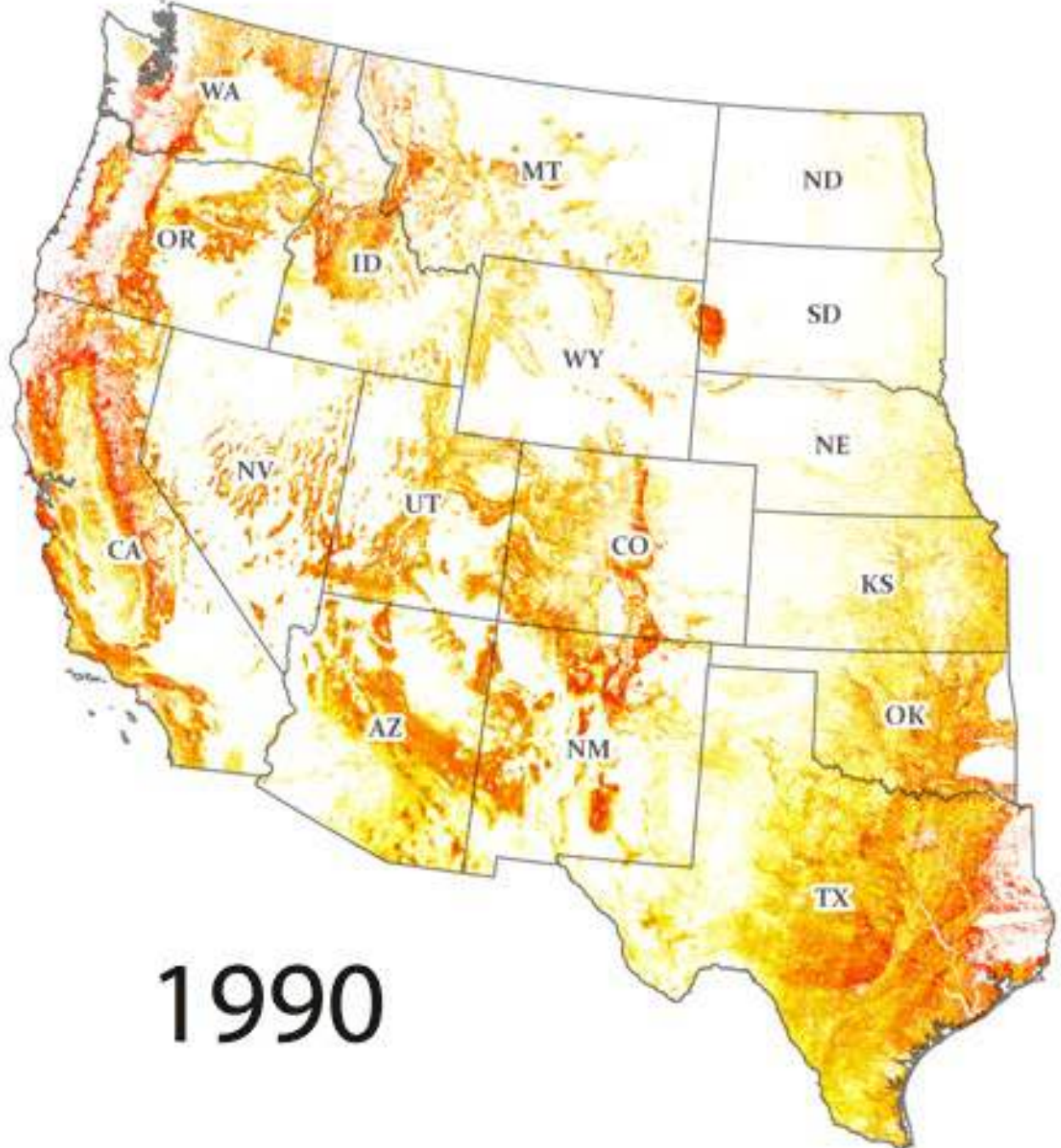
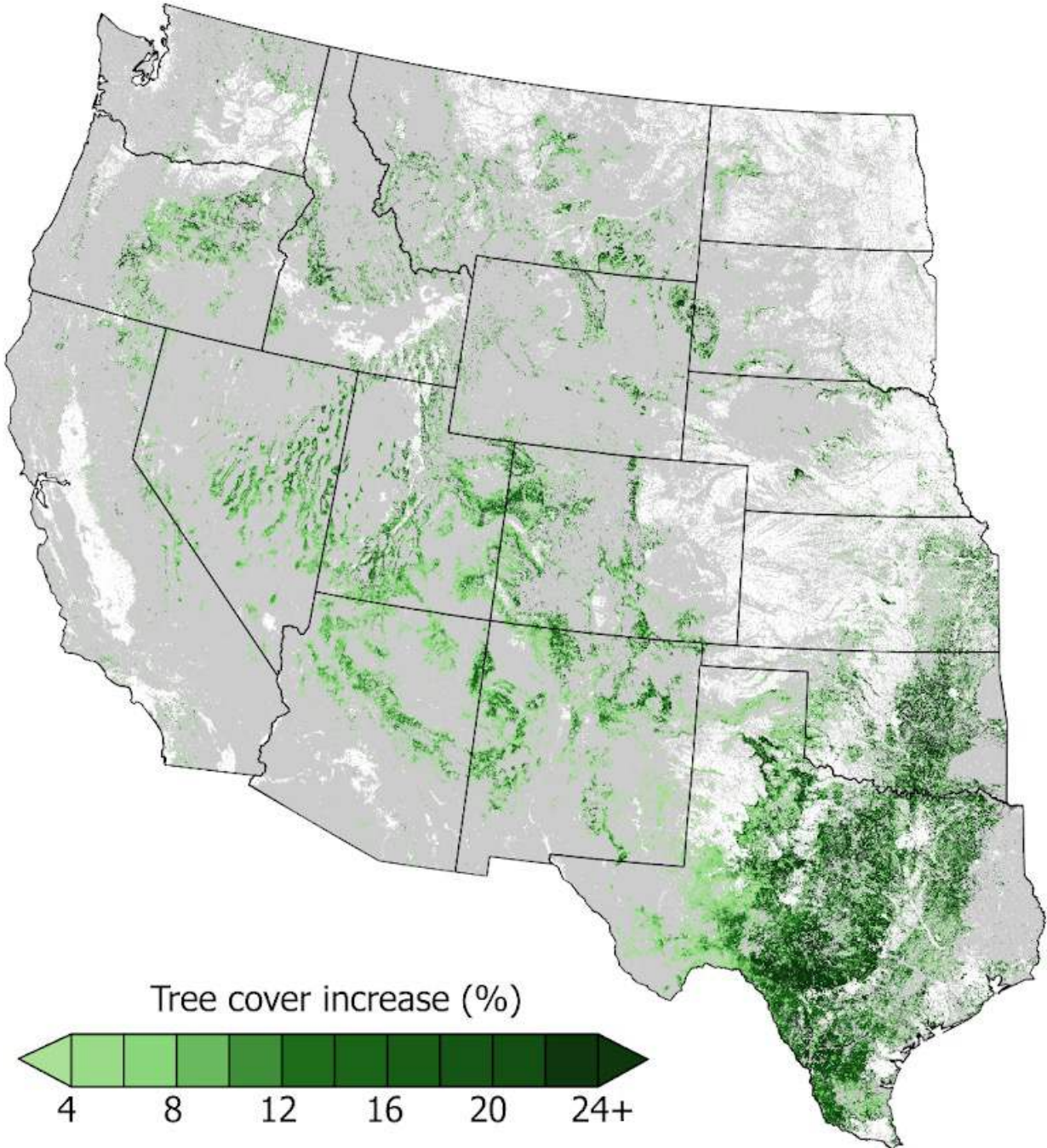
Fish & Game

NRCS

USFWS

BLM

Scale mismatch complicates the communication of ecosystem threats.



$y = \sin x$
 $\sqrt{ab} = \sqrt{a} \cdot \sqrt{b}$
 $\cos x$
 $\sin x$
 $A = 2, P = \frac{2\pi}{3}$
 $N = C \cdot \cos(a)$
 $P(A) = \sum p(u)$
 $\sqrt{2} \sin 2x$
 $C = 2\pi$
 $\lim_{x \rightarrow 0} \frac{A}{B}$
 $\lim_{x \rightarrow 0} \frac{ax^2 + bx + c}{a \neq 0}$
 $\lim_{x \rightarrow 0} \frac{ax^2 + bx + c}{a \neq 0}$
 $y = ax^2 + bx + c$
 $A = A$
 $a^3 + b^3 = (a+b)(a^2 - ab + b^2)$
 $(a+b)^2 = a^2 + 2ab + b^2$
 $E = mc^2$
 $\lim_{x \rightarrow a} c = c$
 $\sum n$
 $A = \pi r^2$
 $a^m \cdot a^n = a^{m+n}$
 $f(x)$





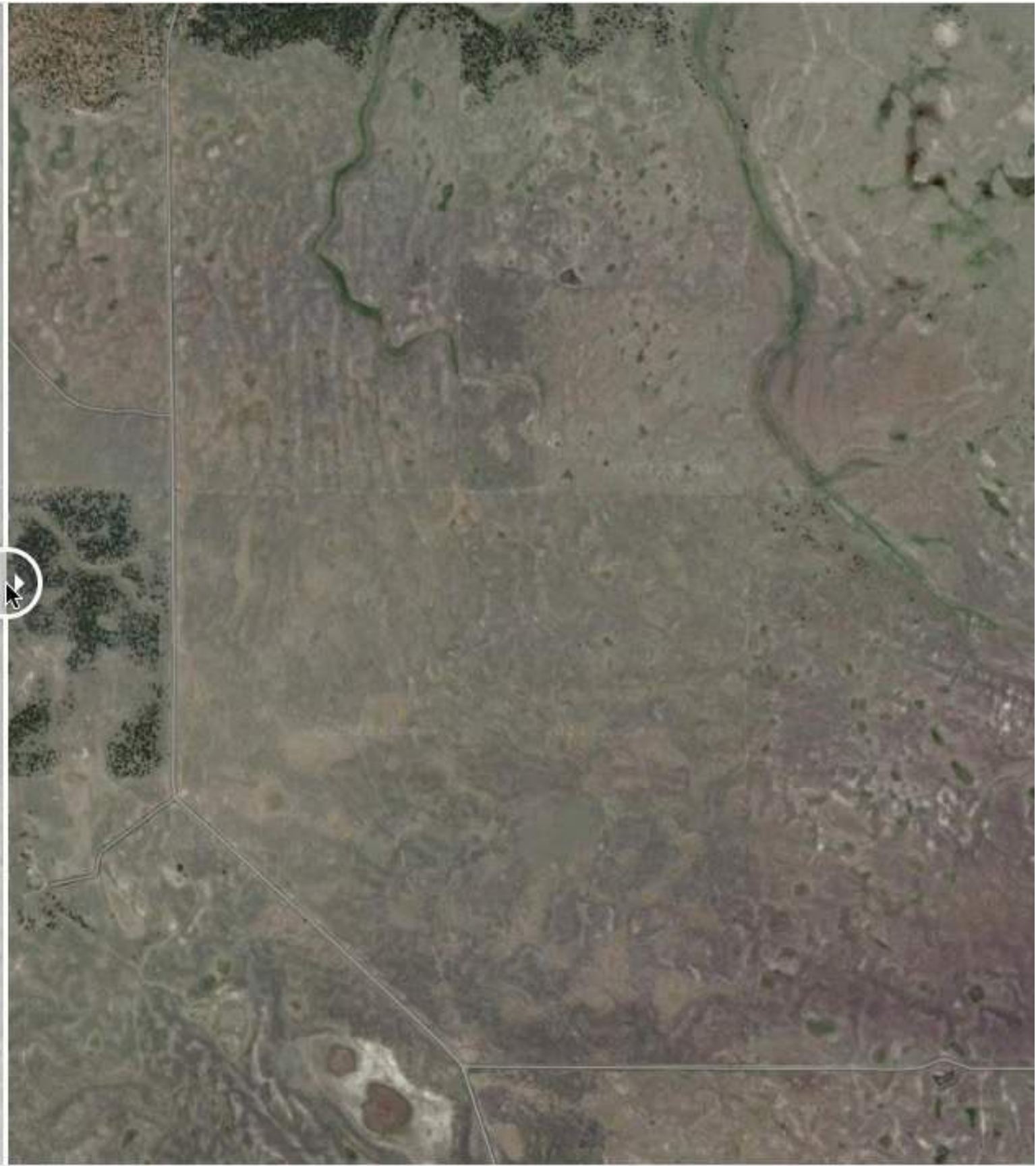
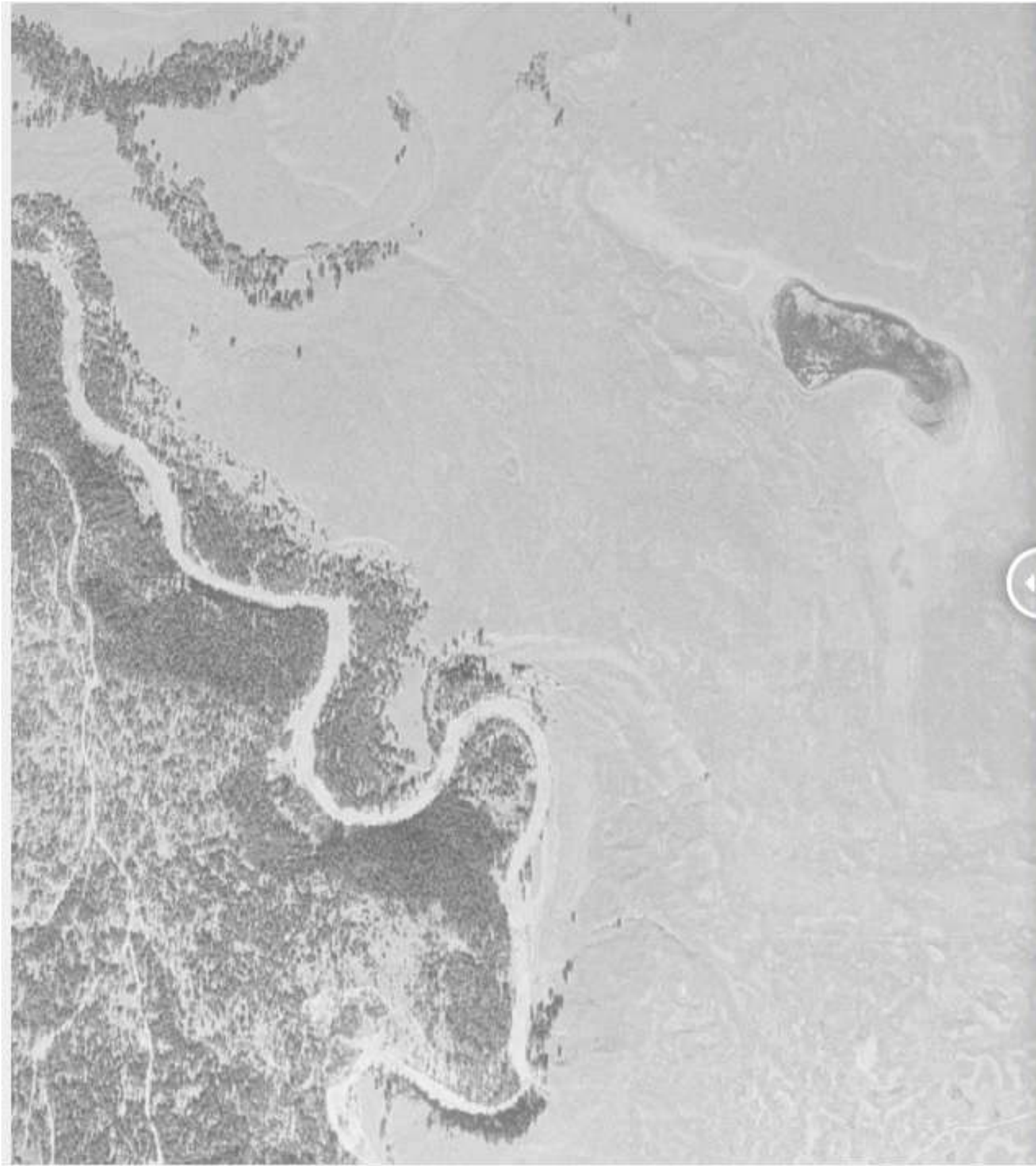
Keystone Ranch, about 1890.



Keystone Ranch, 1989.

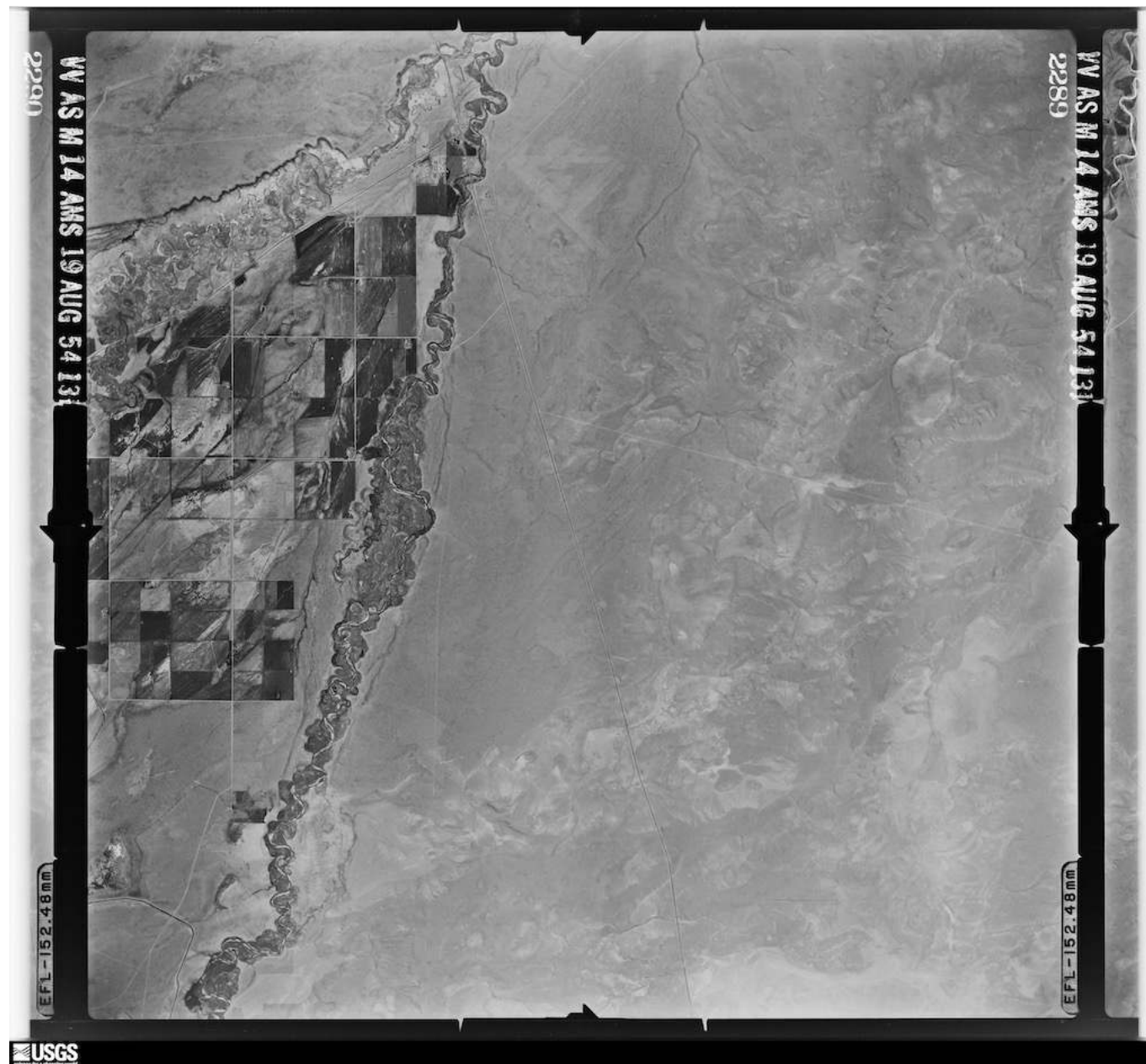
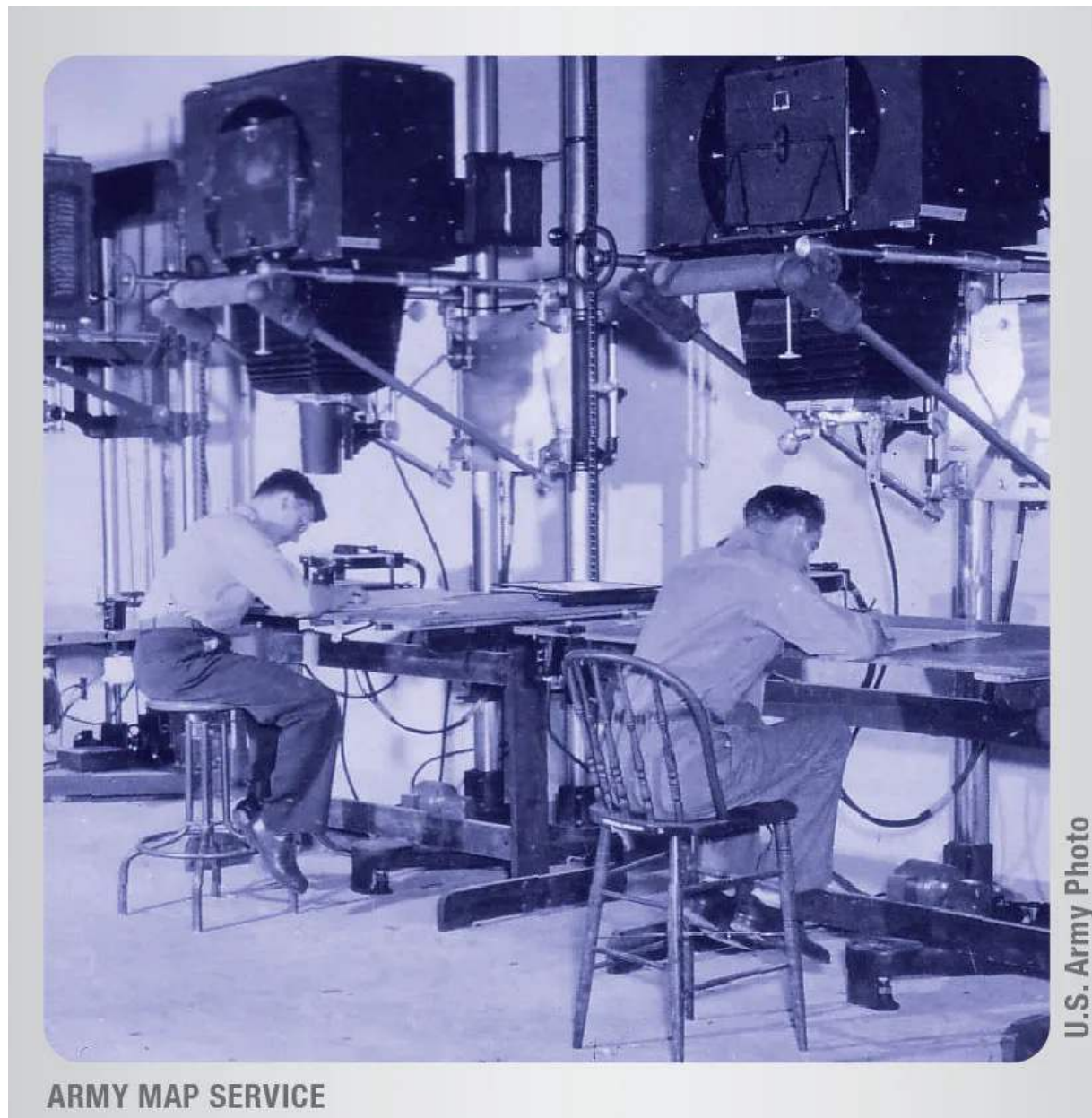
Enchanted Mesa near Albuquerque, NM.
From Allen *et al.* 2002.

Near Prineville Oregon
From Miller 2005.

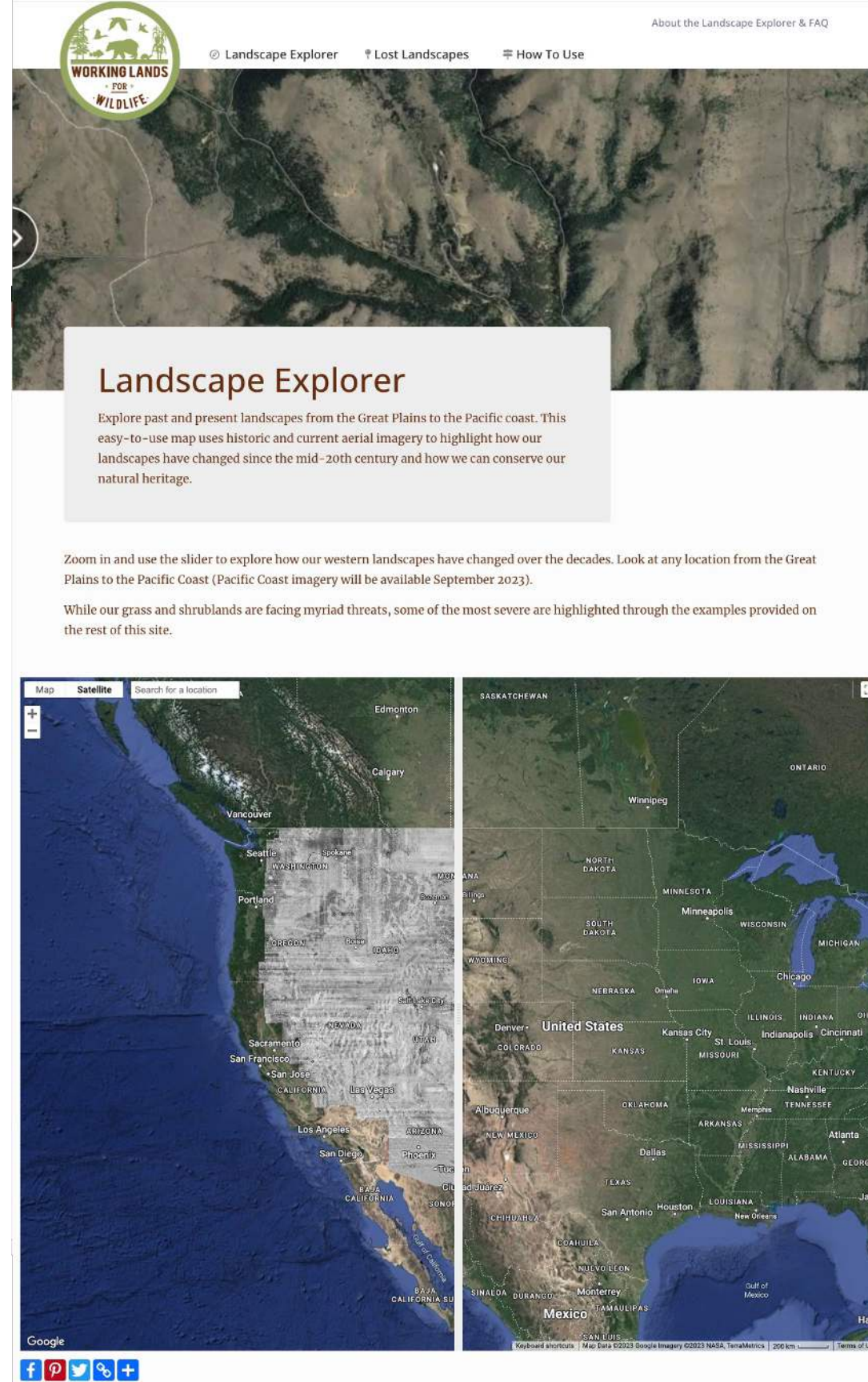




Army Map Service Achieve at the USGS



Live demo
<https://LandscapeExplorer.org>



The screenshot shows the top portion of the Landscape Explorer website. At the top left is the logo for "WORKING LANDS FOR WILDLIFE" featuring a circular emblem with a landscape and a bear. To the right of the logo are navigation links: "Landscape Explorer", "Lost Landscapes", and "How To Use". Further right is a link for "About the Landscape Explorer & FAQ". Below the navigation is a large satellite image of a landscape. A white text box is overlaid on the image with the following text:

Landscape Explorer

Explore past and present landscapes from the Great Plains to the Pacific coast. This easy-to-use map uses historic and current aerial imagery to highlight how our landscapes have changed since the mid-20th century and how we can conserve our natural heritage.

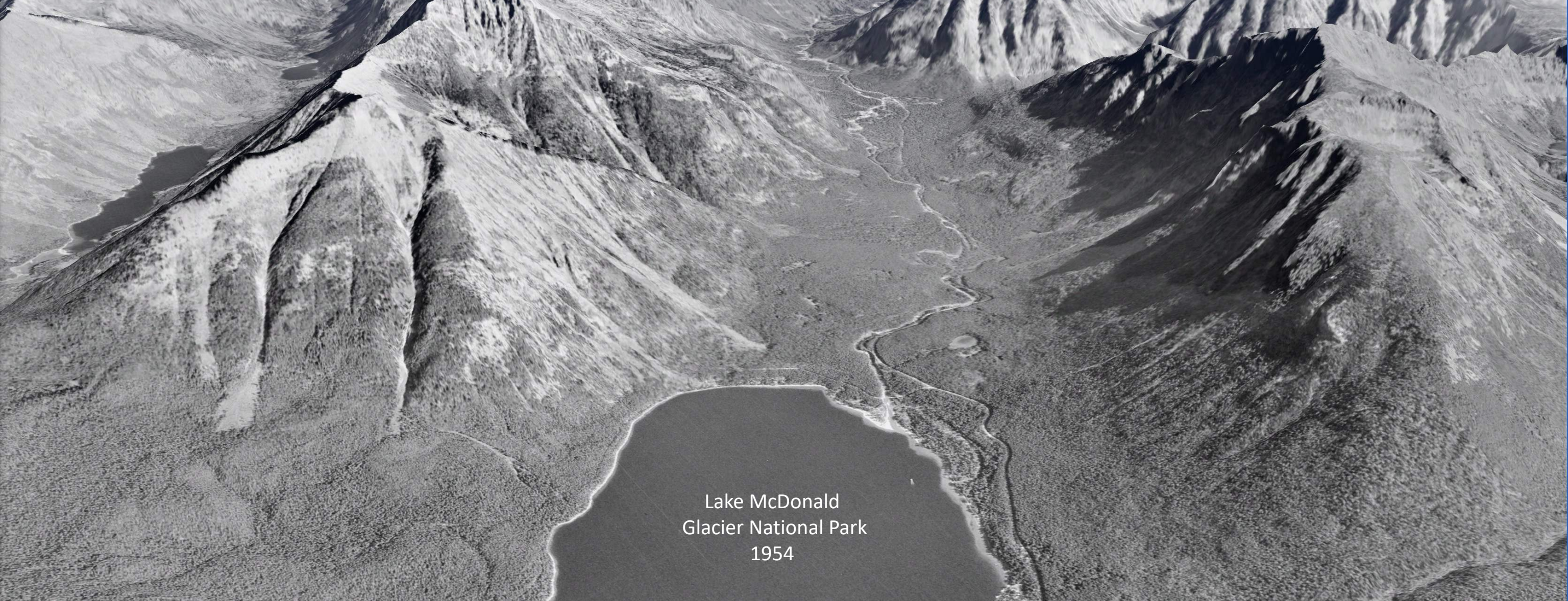
Zoom in and use the slider to explore how our western landscapes have changed over the decades. Look at any location from the Great Plains to the Pacific Coast (Pacific Coast imagery will be available September 2023).

While our grass and shrublands are facing myriad threats, some of the most severe are highlighted through the examples provided on the rest of this site.

Below the text box are two map panels. The left panel shows a satellite view of the western United States and parts of Canada, with a search bar at the top that says "Search for a location". The right panel shows a map of the United States and Mexico with state and provincial boundaries, major cities, and a search bar. At the bottom of the page are social media icons for Facebook, Pinterest, Twitter, and LinkedIn, along with a "Google" logo and a "Terms of Use" link.

Upcoming: Historical Imagery in Google Earth





Lake McDonald
Glacier National Park
1954

- **LandscapeExplorer.org is live!**
- **Expanding to the Pacific Coast in August**
- **Improved functionality on mobile in coming weeks.**
- **Check out the WLFW newsletter and WLFW.org for upcoming tech-transfer opportunities!**

LandscapeExplorer.org

THANK YOU!

Financial and technical
assistance from:



Scott Morford
University of Montana
scott.morford@ntsg.umt.edu
406.461.4910

WESTERN WORKING LANDS FOR WILDLIFE WORKSHOP

Spotlight on Wyoming Migratory Big Game Project





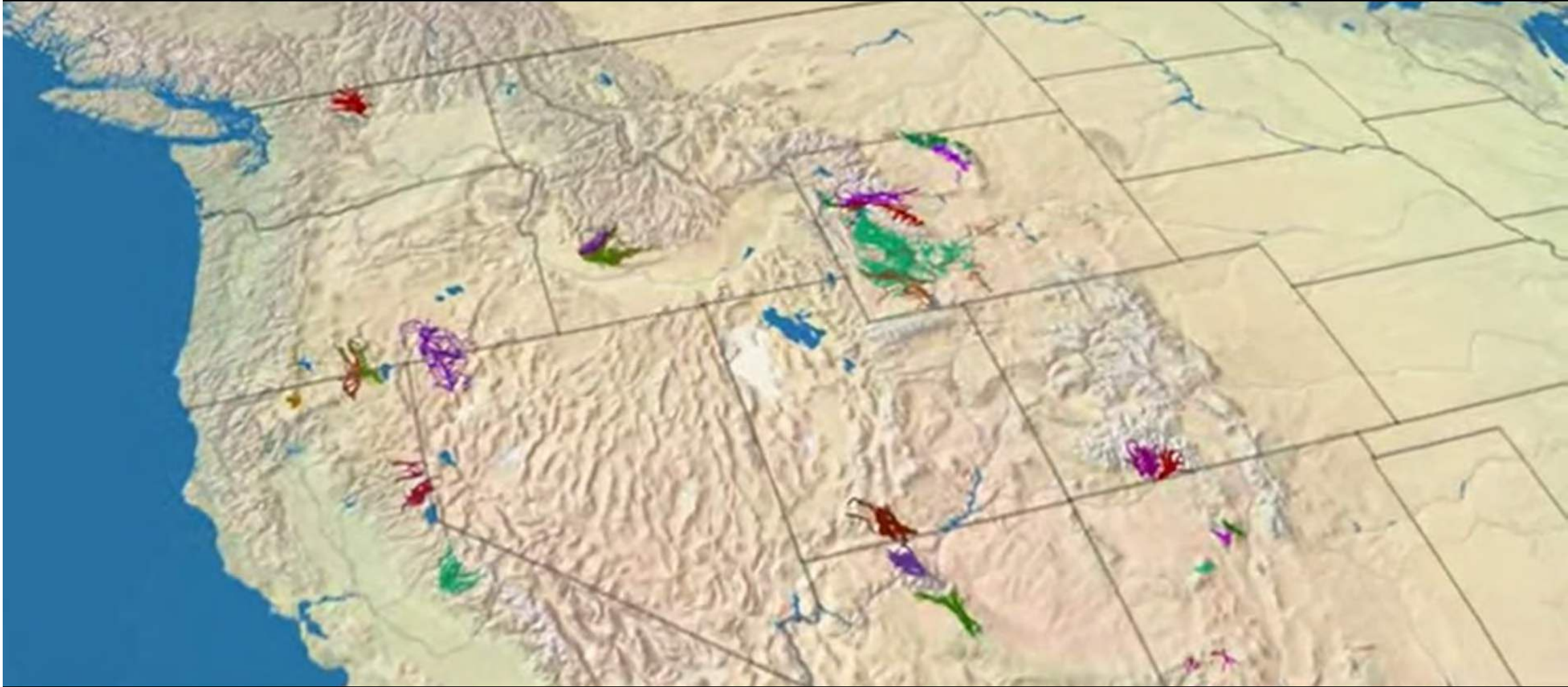
Spotlight on Wyoming Migratory Big Game Project

- Tim Griffiths
*National Coordinator, West Working Lands
for Wildlife, USDA*
- Arthur Middleton
Senior Advisor, Wildlife Conservation, USDA
- Jackie Byam
State Conservationist, Wyoming NRCS
- T.J. Wilson
*Director, Conservation Division,
USDA Farm Service Agency*



ent of satellite tracking and remote
n see further into the hidden lives
their movements, their impacts on
what threats they face.





Research and mapping efforts have been accelerating across the western states.



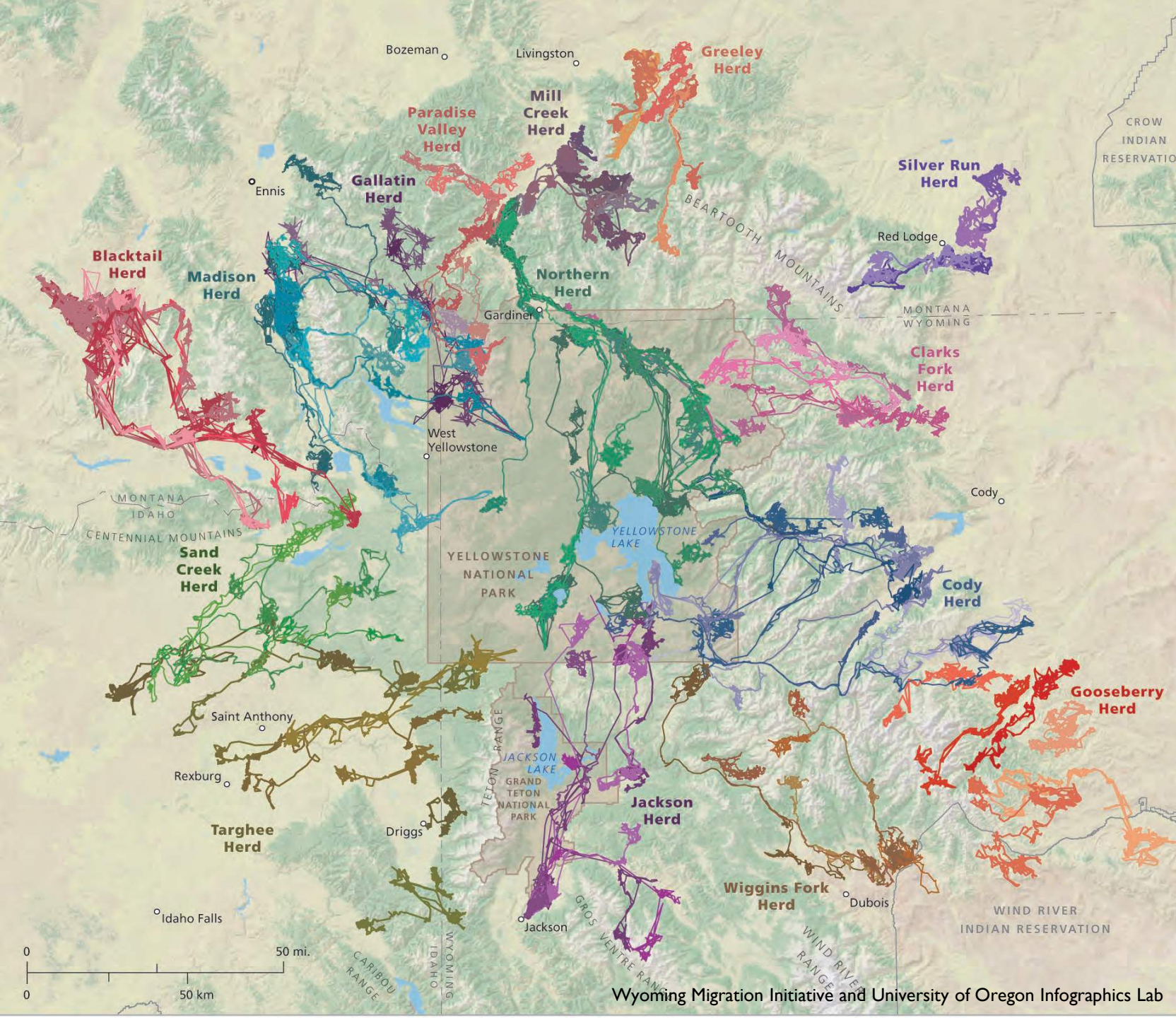












Elk movements illustrate the richness and power of new data and mapping.

Agencies, universities, ranchers and tribes have mapped migrations of 16+ major, partially migratory populations.

In total, some 20,000-30,000 females undertake these migrations seasonally.

Their average spring departure is May 11 (+/- 24 days); average fall departure is about November 2 (+- 22 days). Their migrations range from 30-140 miles.

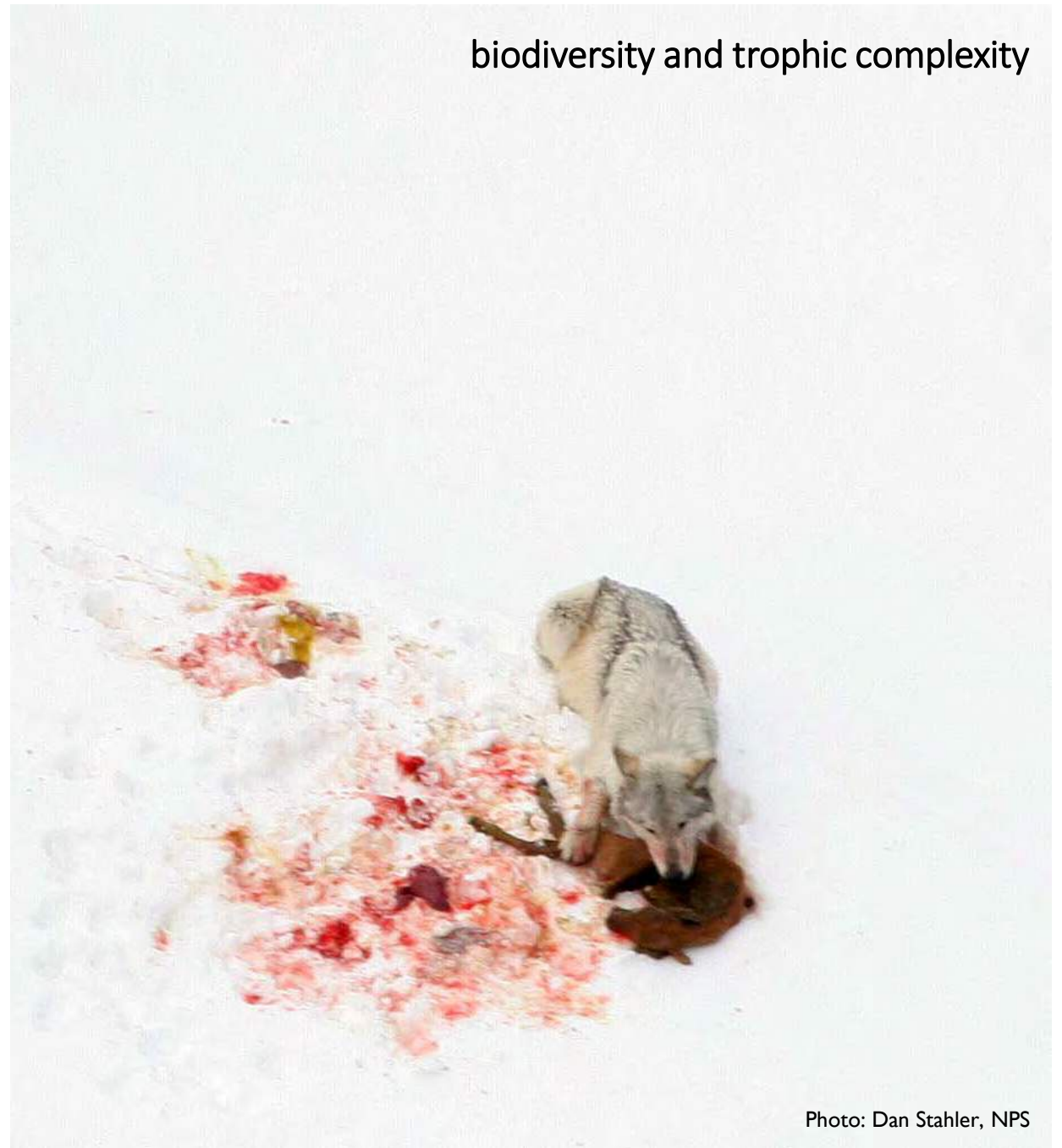
This amounts to 10-12,000,000 pounds of biomass moving in and out of core areas of GYE twice each year.

Herds spend significant time on private and some on tribal working lands.

Middleton, A.D., et al. 2020. Conserving transboundary wildlife migrations: recent insights from the Greater Yellowstone Ecosystem. *Frontiers in Ecology and the Environment* 18:83-91



biodiversity and trophic complexity





climate resilience and
mitigation



Photo: Joe Riis



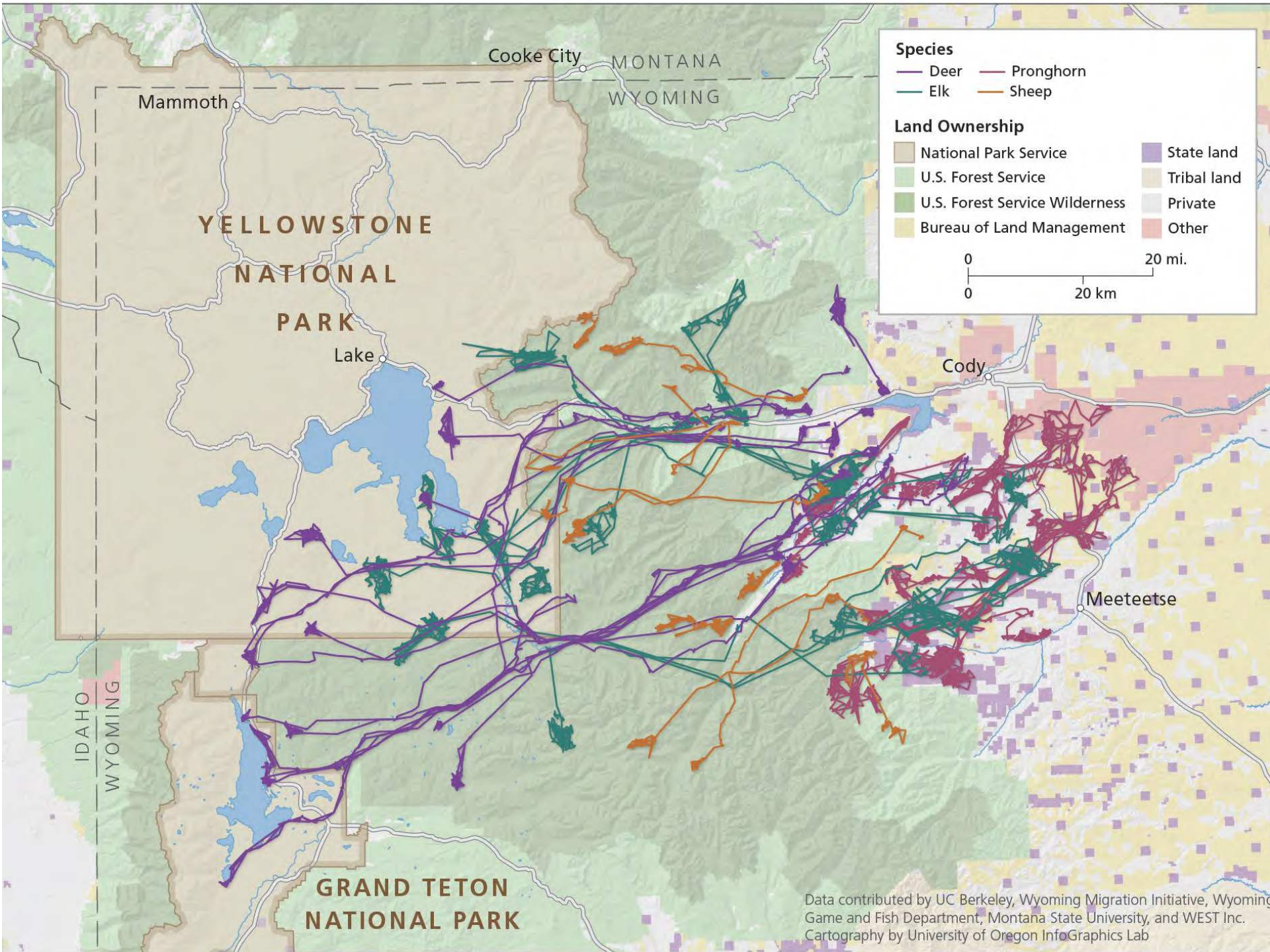
Photo: Jason Baldes



Photo: Lee Livingston



Cultural values, economic opportunity, recreation



Data contributed by UC Berkeley, Wyoming Migration Initiative, Wyoming Game and Fish Department, Montana State University, and WEST Inc. Cartography by University of Oregon InfoGraphics Lab

Wilderness values and “the visitor experience”



Land use conversion



Fences



Roads



Invasive species



Conflicts over disease, forage



Conflicts over crop damage



ELSEVIER

Wildlife migrations highlight importance of both private lands and protected areas in the Greater Yellowstone Ecosystem

Laura C. Gigliotti^{a,*}, Wenjing Xu^a, Gabriel R. Zuckerman^a, M. Paul Atwood^b, Eric K. Cole^c



DOI: 10.1111/1365-2684.14401

RESEARCH ARTICLE

Journal of Applied Ecology 

Multi-level thresholds of residential and agricultural land use for elk avoidance across the Greater Yellowstone Ecosystem

Laura C. Gigliotti^{1,2}  | M. Paul Atwood³ | Eric K. Cole⁴  | Alyson Courtemanch⁵ 



Received: 6 July 2020 | Accepted: 19 November 2020

DOI: 10.1111/1365-2664.13806



RESEARCH ARTICLE

Journal of Applied Ecology



Barrier Behaviour Analysis (BaBA) reveals extensive effects of fencing on wide-ranging ungulates

Wenjing Xu¹ | Nandintsetseg Dejid² | Valentine Herrmann³ | Hall Sawyer⁴ | Arthur D. Middleton¹

Muley Fanatic Foundation and Maven present

My Wild Land

Produced by Wyoming Migration Initiative

**3 ranches. 3 films. 3 inspiring stories
of commitment to preserving
western heritage and wildlife,
come hell or highwater.**



Courtesy Joe Riis

Formal partnership between USDA and State of Wyoming

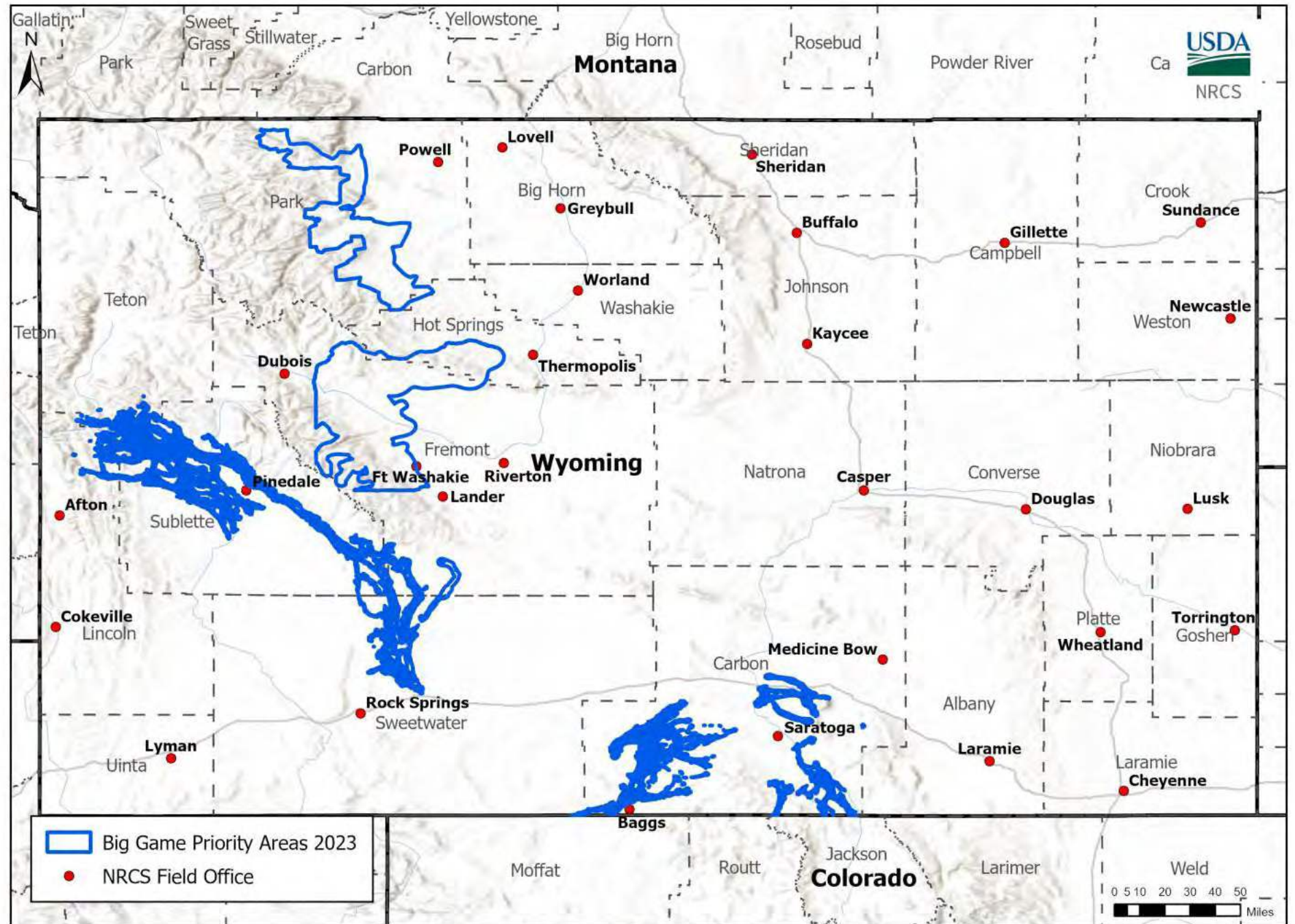
Internal NRCS-FSA partnership to offer diverse tools for short, medium and long term conservation and restoration and increase their complementarity

- Priority areas to focus efforts
- 4 with State of Wyoming
 - 1 with Eastern Shoshone and Northern Arapaho Tribes

About \$1m invested to date in ecological and social science research at the University of Wyoming

Commitments of about \$22m in ACEP and EQIP to Wyoming in 2022 and 2023

A commitment of at least \$40m in ACEP and EQIP to Wyoming, Idaho, and Montana for 2024



WESTERN WORKING LANDS FOR WILDLIFE WORKSHOP

Keeping Grass Green-Side Up





Keeping Grass Green-Side Up

- Alan Lange
Natural Resources Specialist, USDA Farm Service Agency
- David Naugle
WLFW Science Advisor, Wildlife Biology Professor, University of Montana



Keeping Grass Green-Side Up



Alan Lange

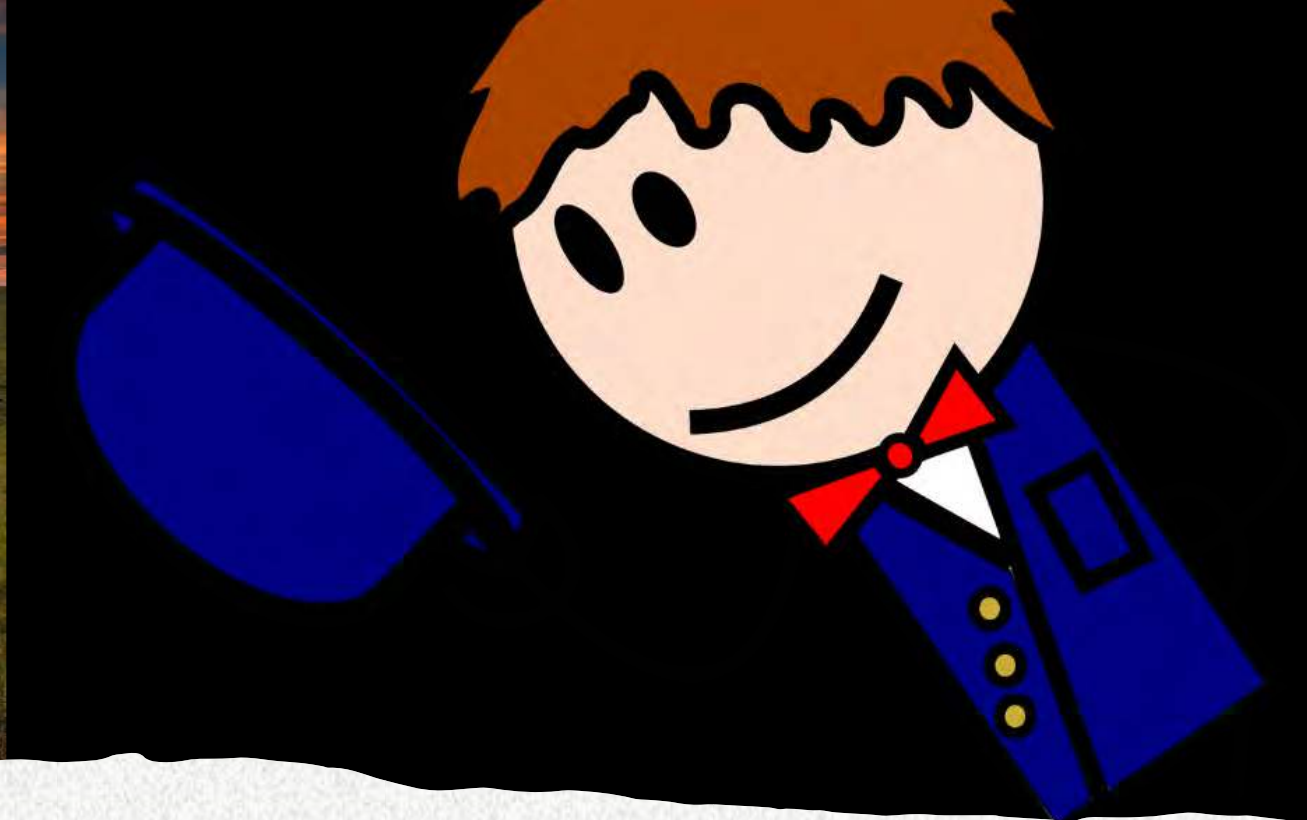
FSA Natural Resource Specialist

&

David Naugle

USDA Science Advisor





Landowner
leadership

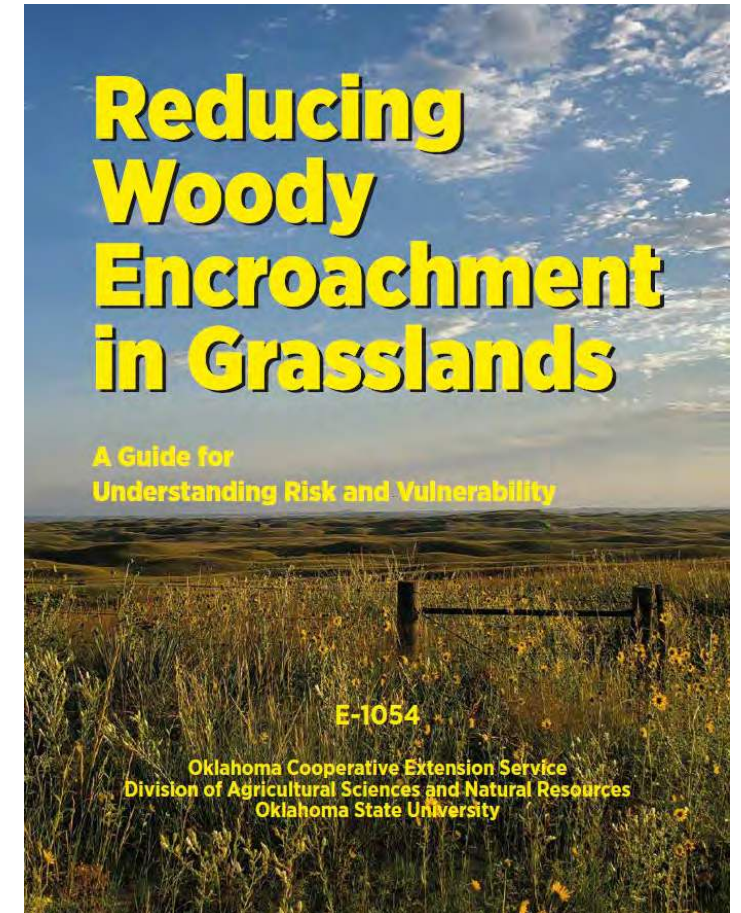
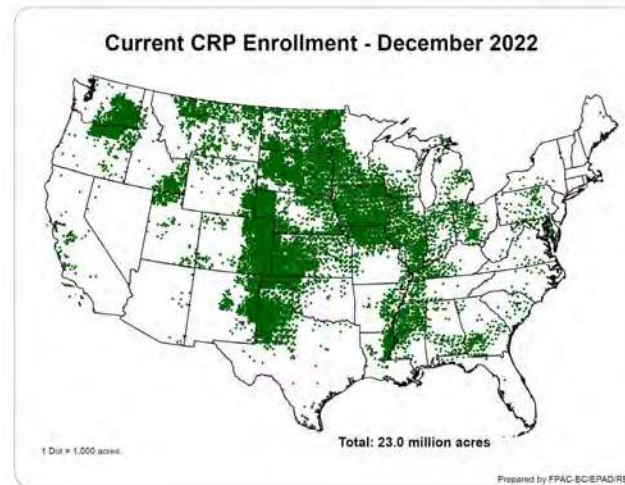
‘Hat’s off’ for implementing an
effective strategy for reducing
woodland expansion

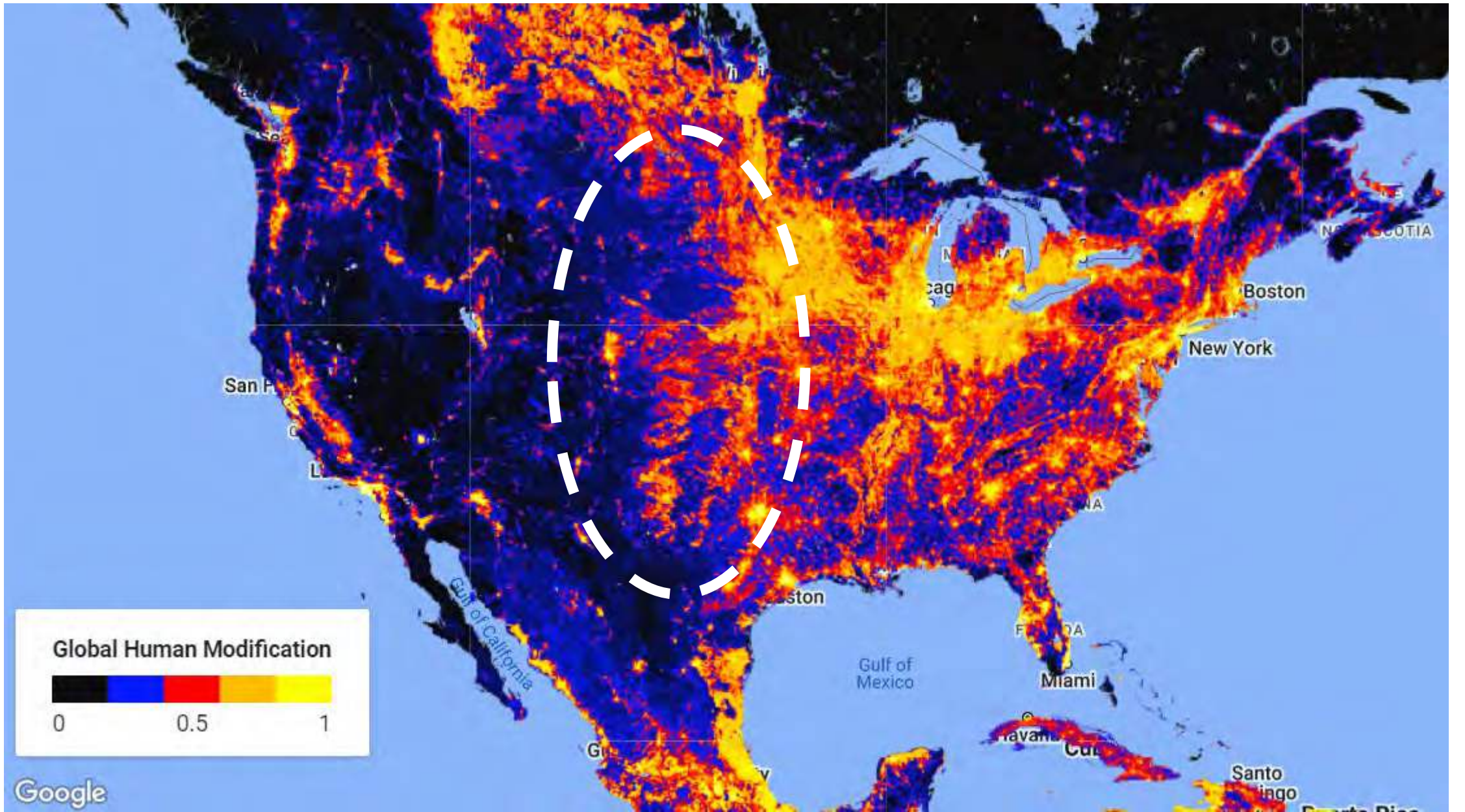


FSA is investigating woodland encroachment on CRP

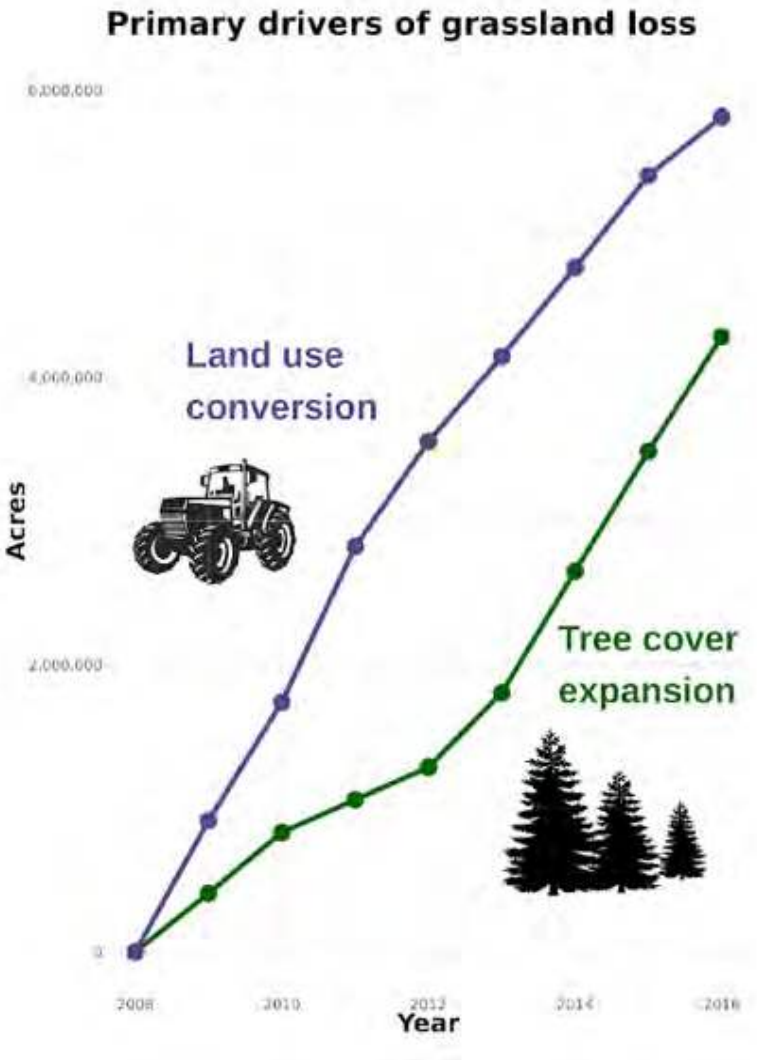


UNIVERSITY of NEBRASKA
LINCOLN





Two Primary Threats Limiting Grassland



South Dakota
sod busting



eastern
Montana

CENTRAL GRASSLANDS ROADMAP

SUPPORTING AND GROWING OUR CORE OF GRASSLANDS



CONSERVATION CATEGORIZATION

CORE
GRASSLANDS

185,718,255 acres

VULNERABLE
GRASSLANDS

134,461,849 acres

CONVERTED/ALTERED
GRASSLANDS

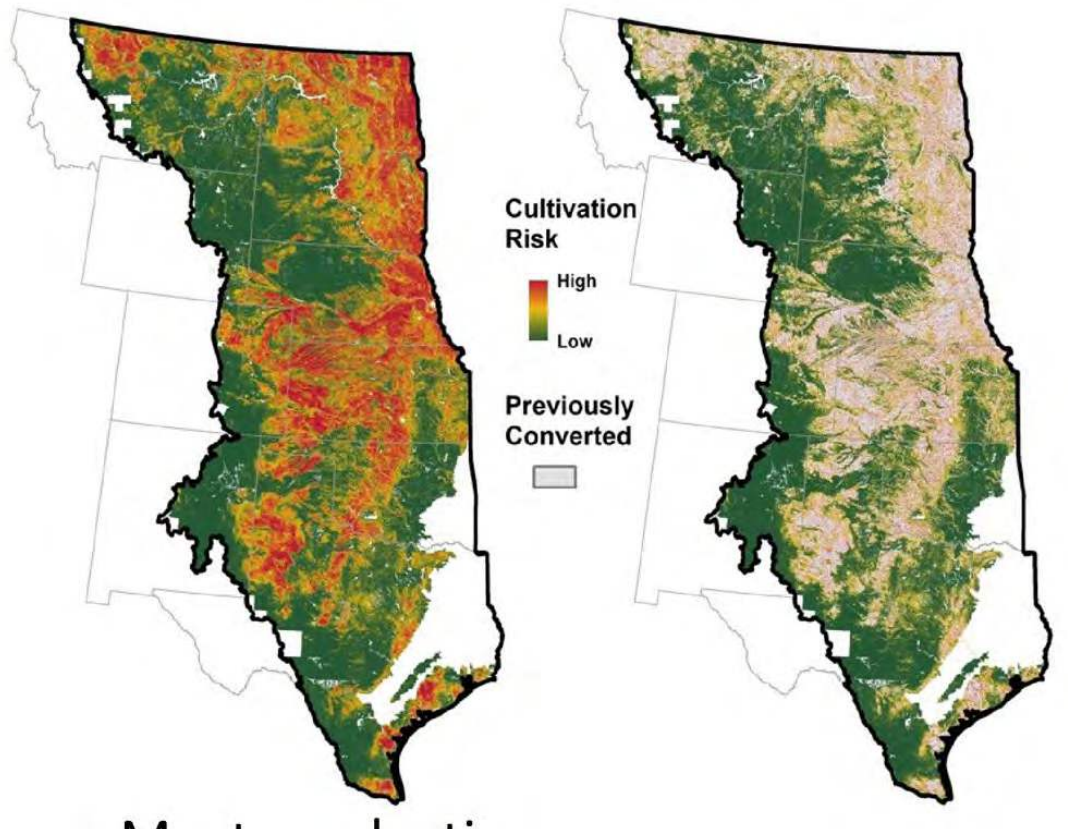
435,478,559 acres

*Maps are based on currently available data. Areas at risk of cultivation or converted to plowed land since 2009 are from Plowprint.com. Areas at risk to woody encroachment or infested by woody plants are from the Rangeland Analysis Platform (rangelands.app).

Where We Stand Today:

- 25% still core and currently at low risk to cultivation / encroachment
- 17% currently vulnerable to cultivation, encroachment or both
- 58% Already cultivated or severely degraded by encroachment

Marginal Soils



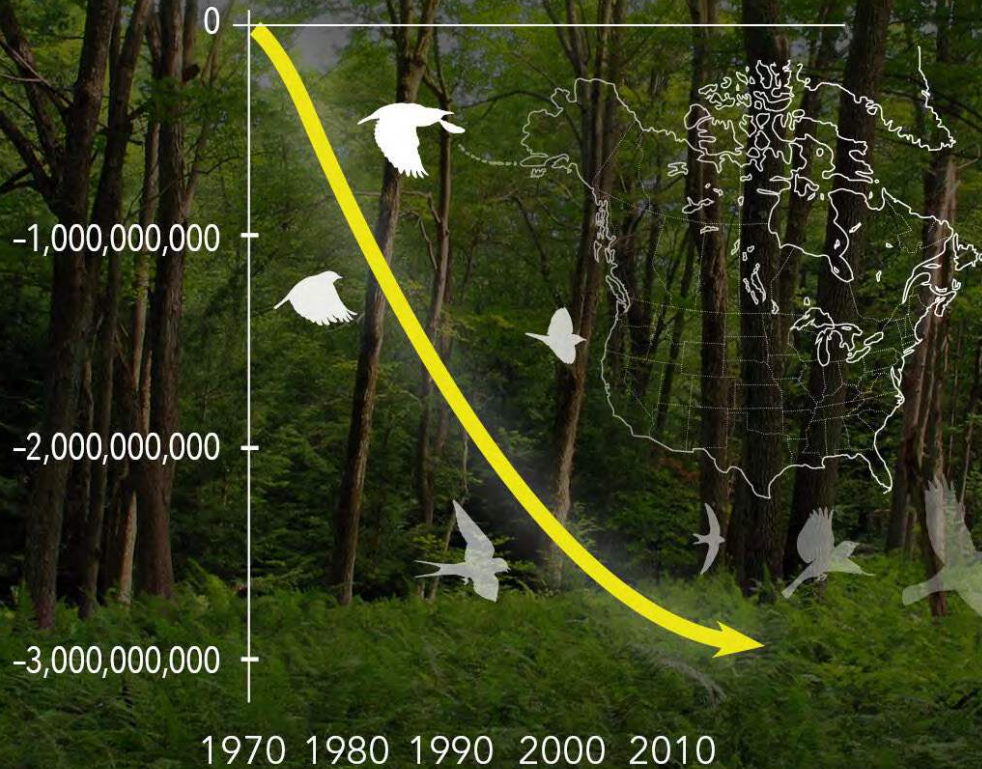
Most productive
soils already
cultivated

Ongoing conversion
in marginal soils

- 70% of new croplands produced yields below the national average, with a mean yield deficit of -6.5%
- Reduced yields come at high cost to wildlife, water quality, soil health & carbon
- Rates of loss in PPR rival those of Brazilian Amazon rainforest

2.9 billion

birds gone since 1970



Courtesy of the Cornell Lab of Ornithology. Source: Science, 2019

Forest by Nicholas Tonelli/Creative Commons. Map from Birds of North America birdsna.org

Grassland Birds

720

MILLION
GRASSLAND BIRDS
LOST SINCE 1970

-53%

POPULATION LOSS
IN GRASSLAND
BIRDS SINCE 1970

3 IN 4

EASTERN MEADOWLARKS
LOST SINCE 1970



Courtesy of the Cornell Lab of Ornithology. Source: Science, 2019

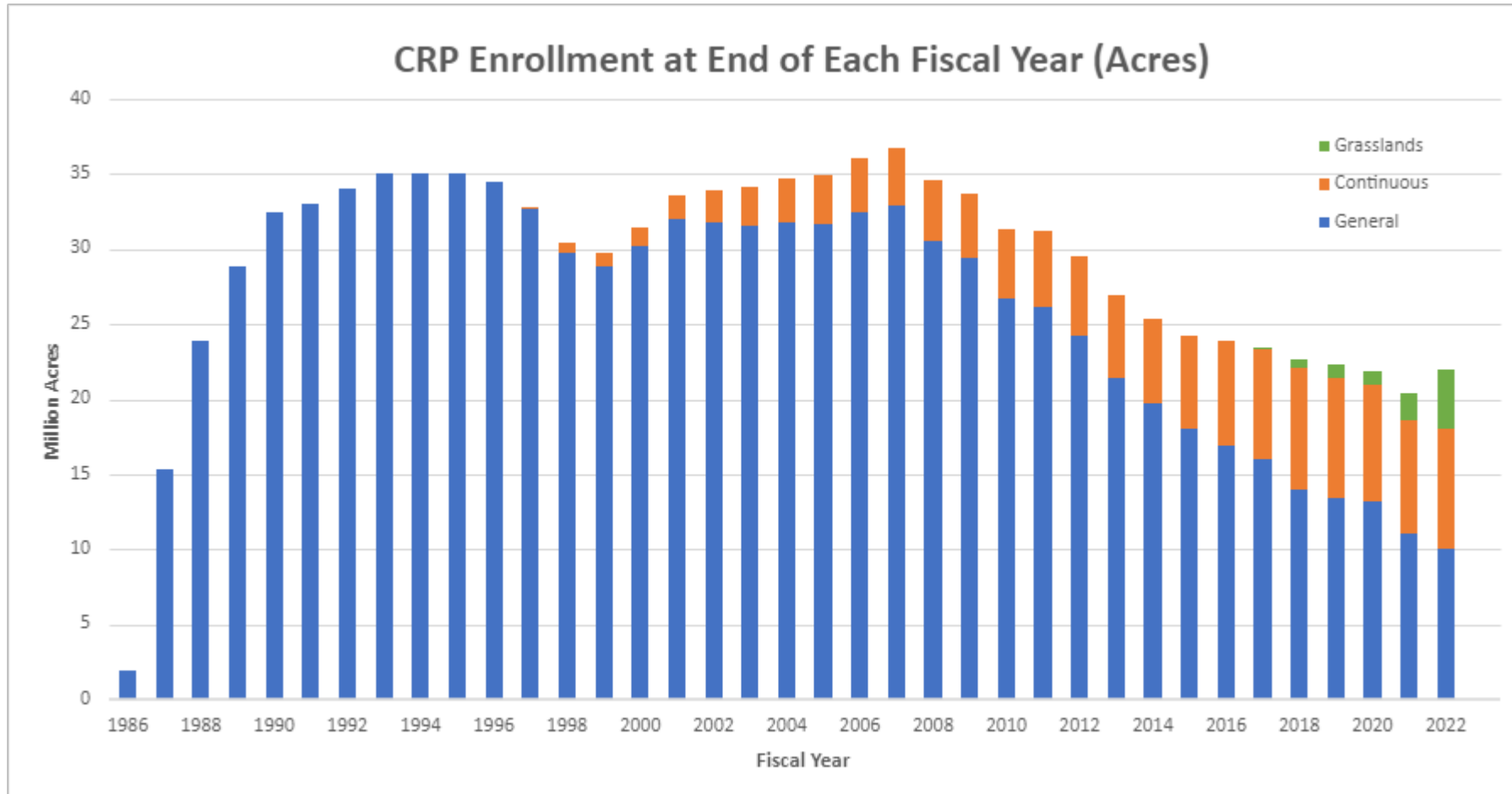
Eastern Meadowlark by S. Queen/Macalloy Library, Prairie Grasslands by Joshua Mayer/Creative Commons

Conservation Reserve Program

- Since 1985 CRP has incentivized grass re-establishment
- CRP the single largest program capable of restoring grassland in core areas
- CRP conserved 4.5M songbirds, and met recovery goals for 8 species



CRP Enrollment History



Today, CRP enrollment is approximately 23 million acres, or 63% of its former 36.7 million-acre high

Our Primary Toolbox in USDA-FPAC

FSA

- 'Traditional' CRP Yearly payment to *remove cultivated land* from production and plant back grasslands
- Grassland CRP Yearly payment to conserve grasslands as grazing or hay lands; *no crop history required*

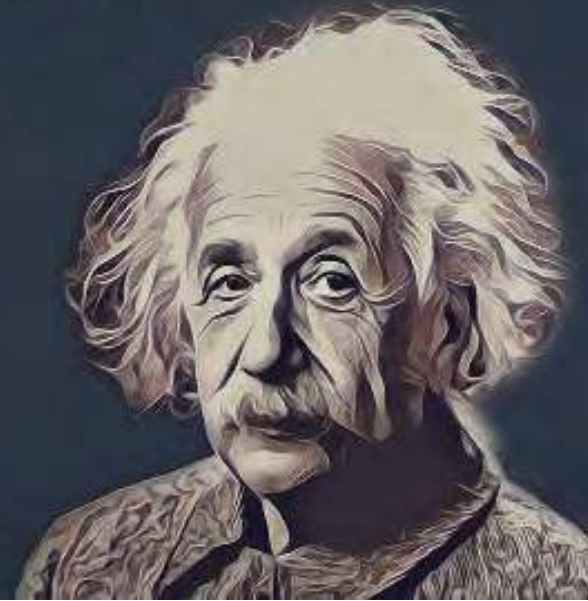


NRCS

- EQIP – Technical and financial assistance to develop grazing system, install fencing and water
- ACEP – Easements provide lump sum to protect intact grassland from cultivation in perpetuity

**If you can't explain
it to a six year old,
you don't
understand it
yourself.**

~ Albert Einstein



Crop the Best &
Grass the Rest



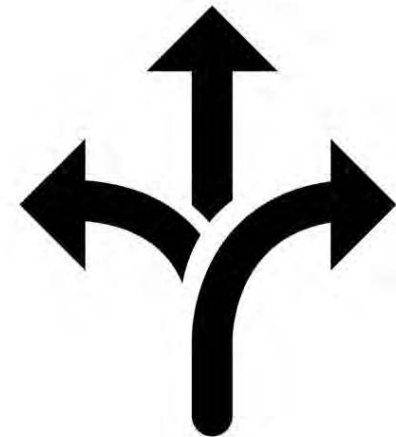


1. Prioritize Grassland Restoration to Grassland Cores

- All USDA programs focused on grassland cores
- For FSA, Traditional CRP is the primary mechanism
 - For NRCS, EQIP grassland plantings



EBI N1-7 for rankings?
State & National Priority
Zones?
CART mechanism?





2. Transition Traditional CRP to Working Lands

Retain grassland exiting Traditional CRP by replacing lost annual payments with revenues from livestock grazing



- Many of these former farm fields lack a grazing plan and infrastructure, so...
- NRCS or FSA can help producers transition from idled lands to working lands
- Including technical know-how and financial assistance for fencing and water



3. Alleviate current cultivation risk on existing grasslands

In cores, use Grassland CRP to maintain existing grasslands

Avoided Loss to Proactively Maintain Working Grasslands



Scientific Underpinnings

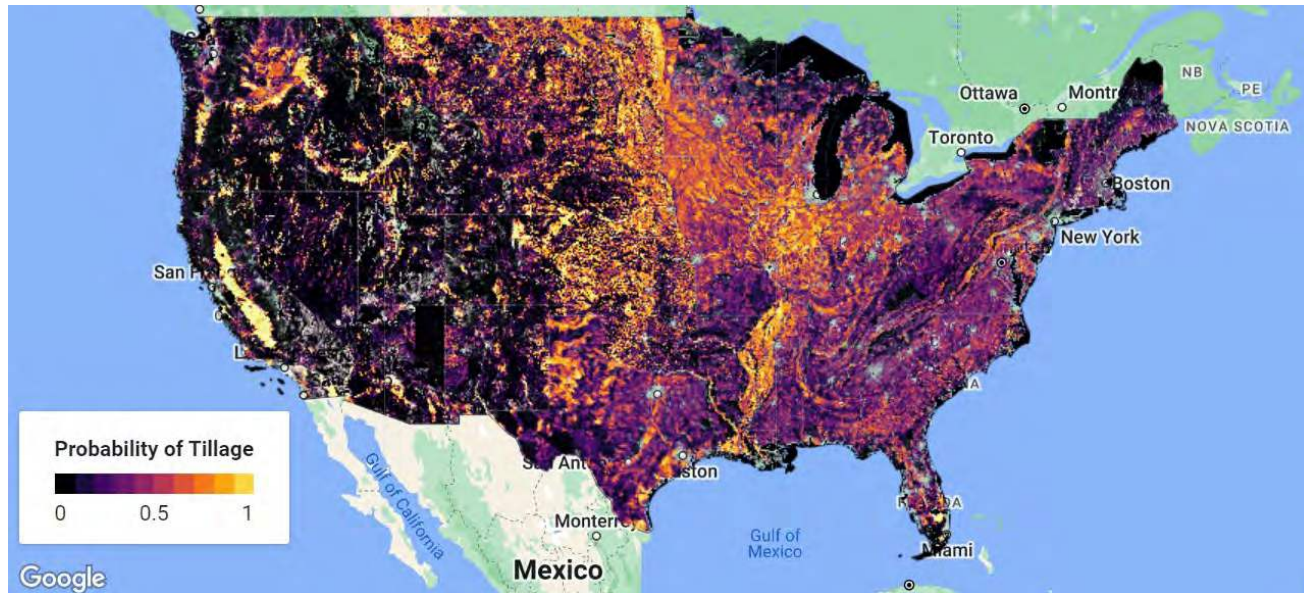


- Show you from a science perspective why this approach will work
- Evidence that we have the tools in place to help
- Culmination of work by 3 universities over past 8 years

What the Spatial Scientists Taught Us

Reducing cultivation risk for at-risk species: Predicting outcomes of conservation easements for sage-grouse

J.T. Smith ^{a,*}, J.S. Evans ^{b,c}, B.H. Martin ^d, S. Baruch-Mordo ^b, J.M. Kiesecker ^b, D.E. Naugle ^a



2016

2021

2023



Funded in part by
FSA & NRCS

Quantifies probability of cultivation using soils, climate, topography, and other inputs

What the Social Scientists Taught Us


CONTRIBUTED PAPER

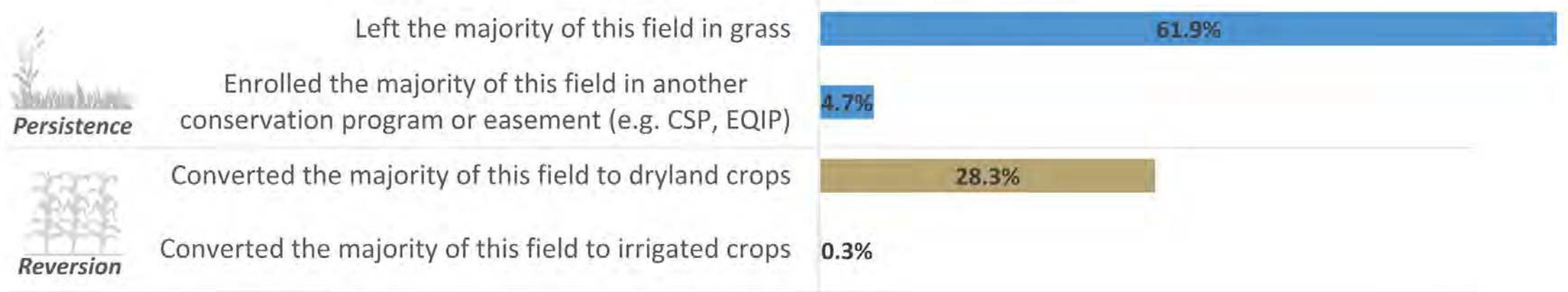
Land use decisions after the Conservation Reserve Program: Re-enrollment, reversion, and persistence in the southern Great Plains

Jessica C. Barnes¹  | Mary Sketch¹ | Ashley R. Gramza¹  |
Michael G. Sorice²  | Rich Iovanna³ | Ashley A. Dayer¹ 



Funded by FSA
in 2020

 **Reported post-CRP land use**
Landowners with former CRP fields



Recommendation: Need to understand biophysical factors that promote grassland persistence after CRP to maximize program benefits for rural communities and wildlife

Cowboy Boots Meets Big Data at K-State



Policy analysis

Increasing durability of voluntary conservation through strategic implementation of the Conservation Reserve Program

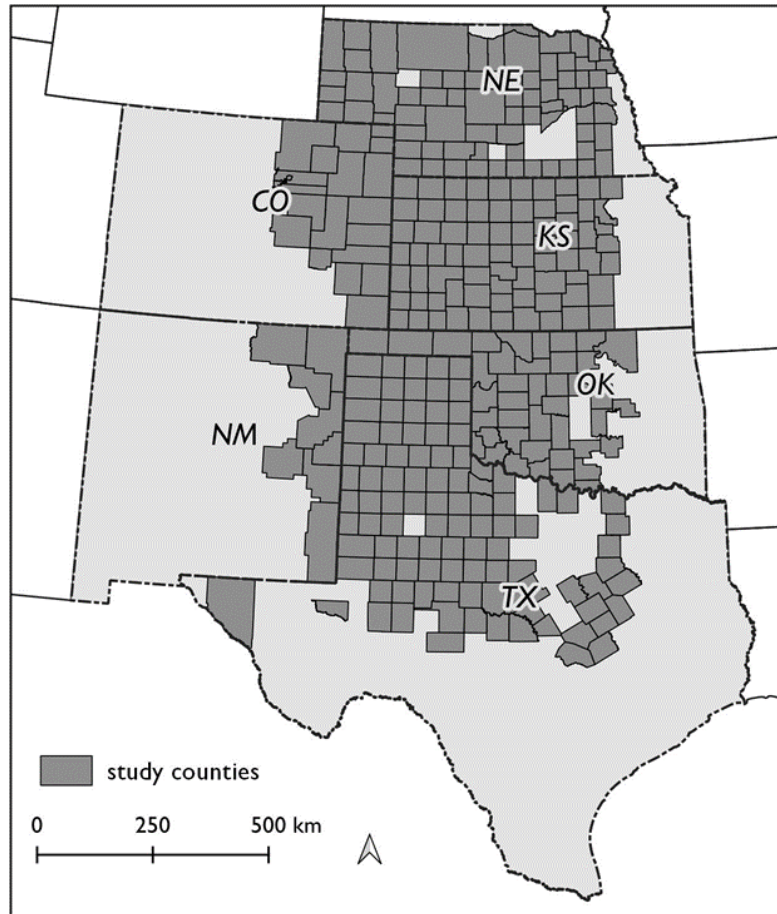
Daniel S. Sullins^{a,*}, Meghan Bogaerts^b, Bram H.F. Verheijen^c, David E. Naugle^d, Tim Griffiths^e, Christian A. Hagen^f



Funded by FSA & NRCS in 2021

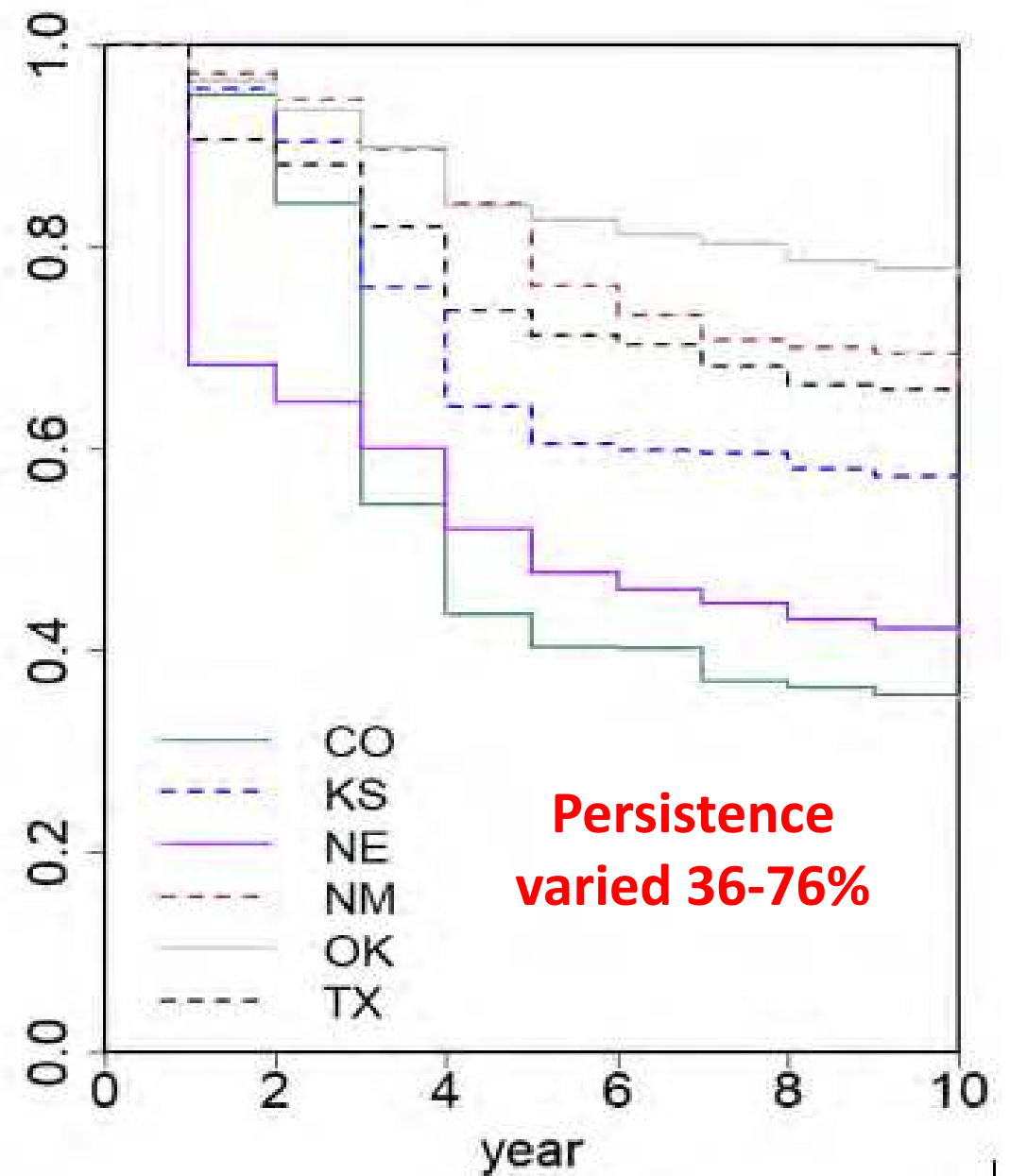
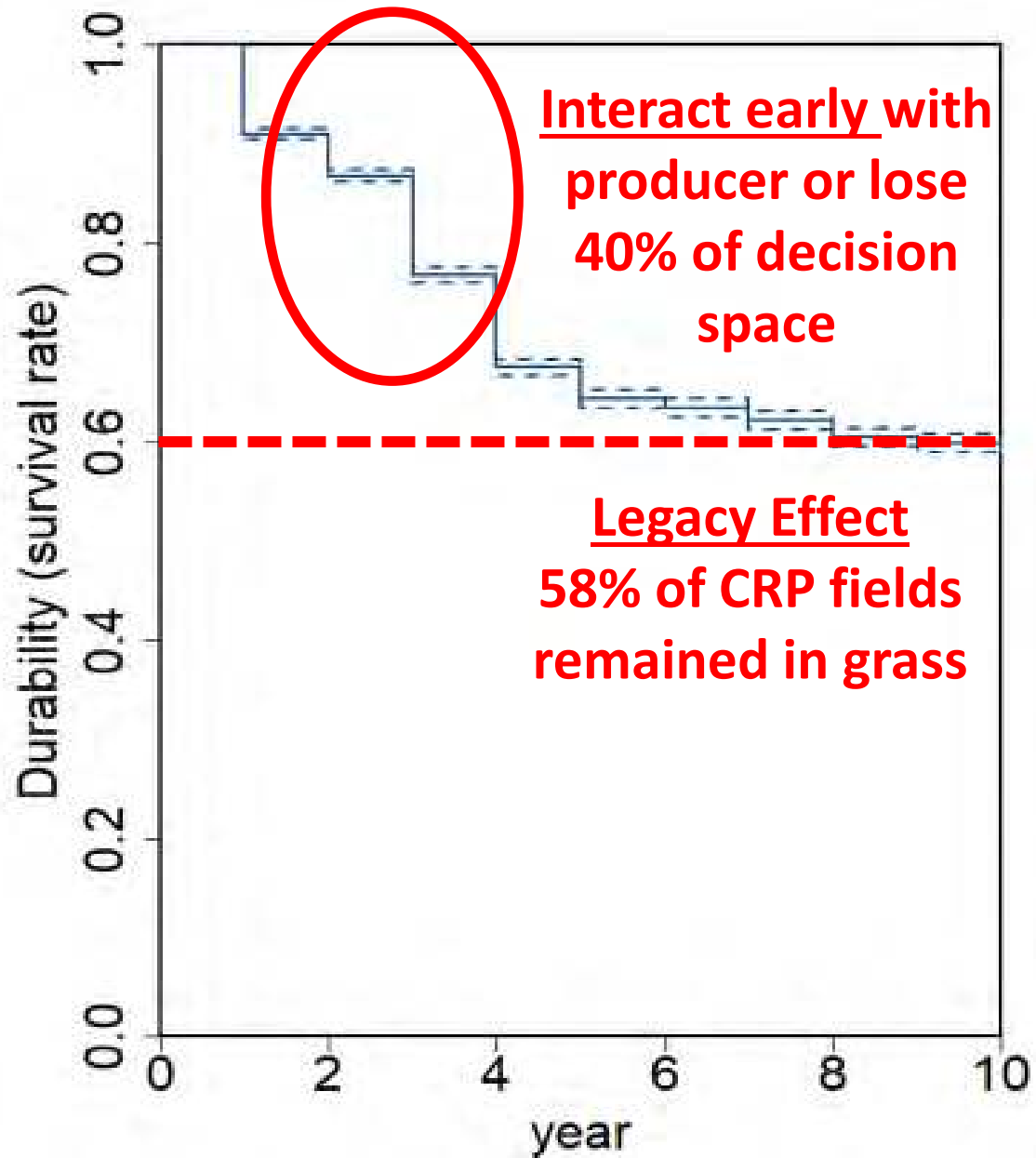
Two Questions

1. How many CRP fields remain as grassland a decade after contracts expire?
2. What biophysical factors contribute to grassland persistence?



Study Design

- 6 states
- 10,879 CRP grasslands
- Contracts expired in 2007

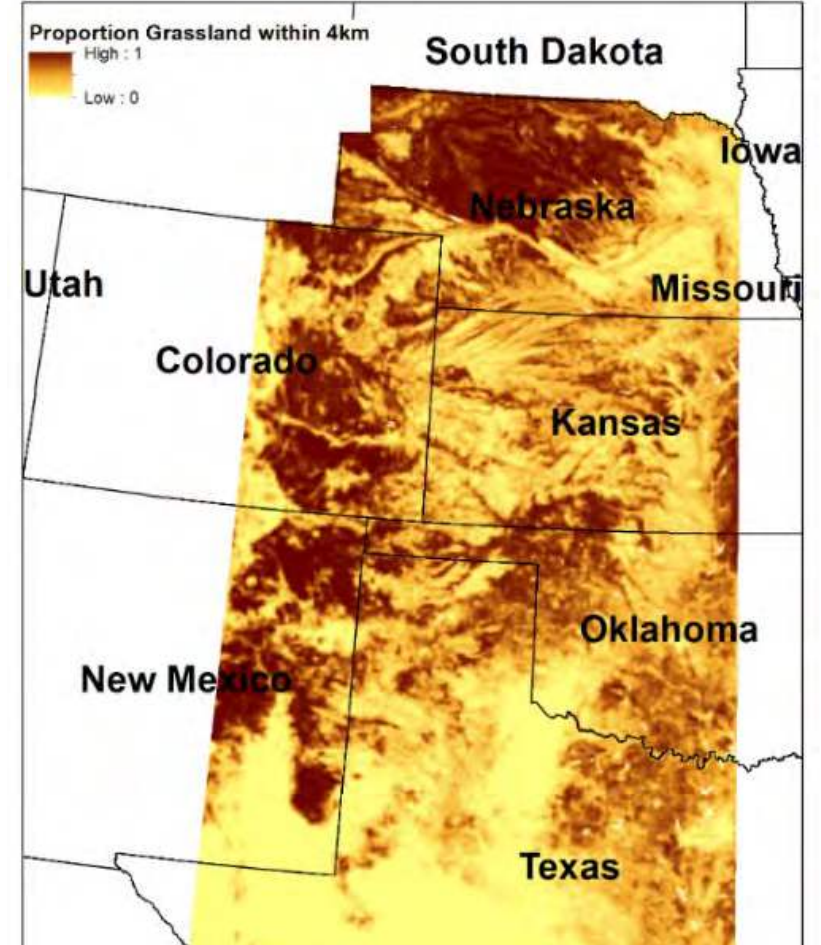
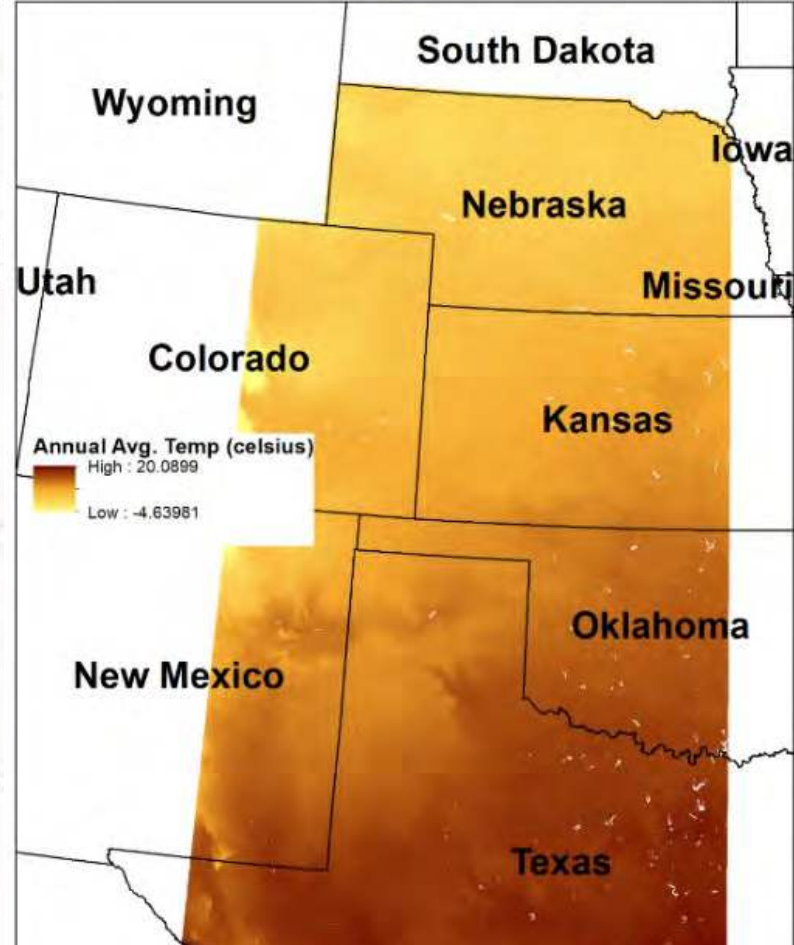
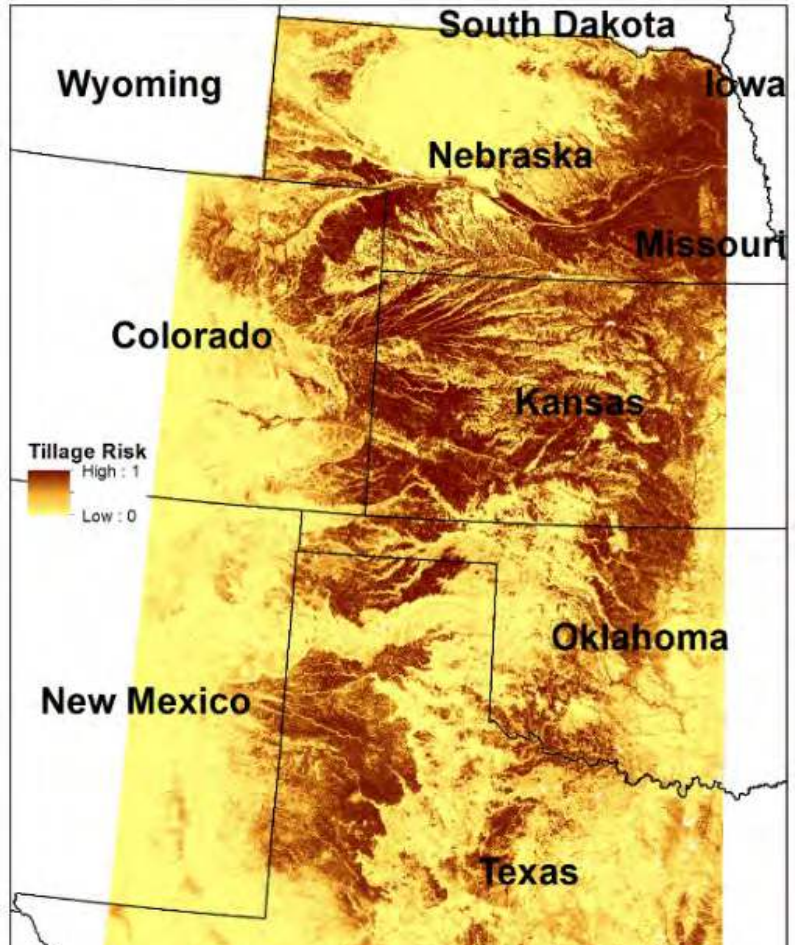


Variation in Grassland Persistence

Tillage Risk

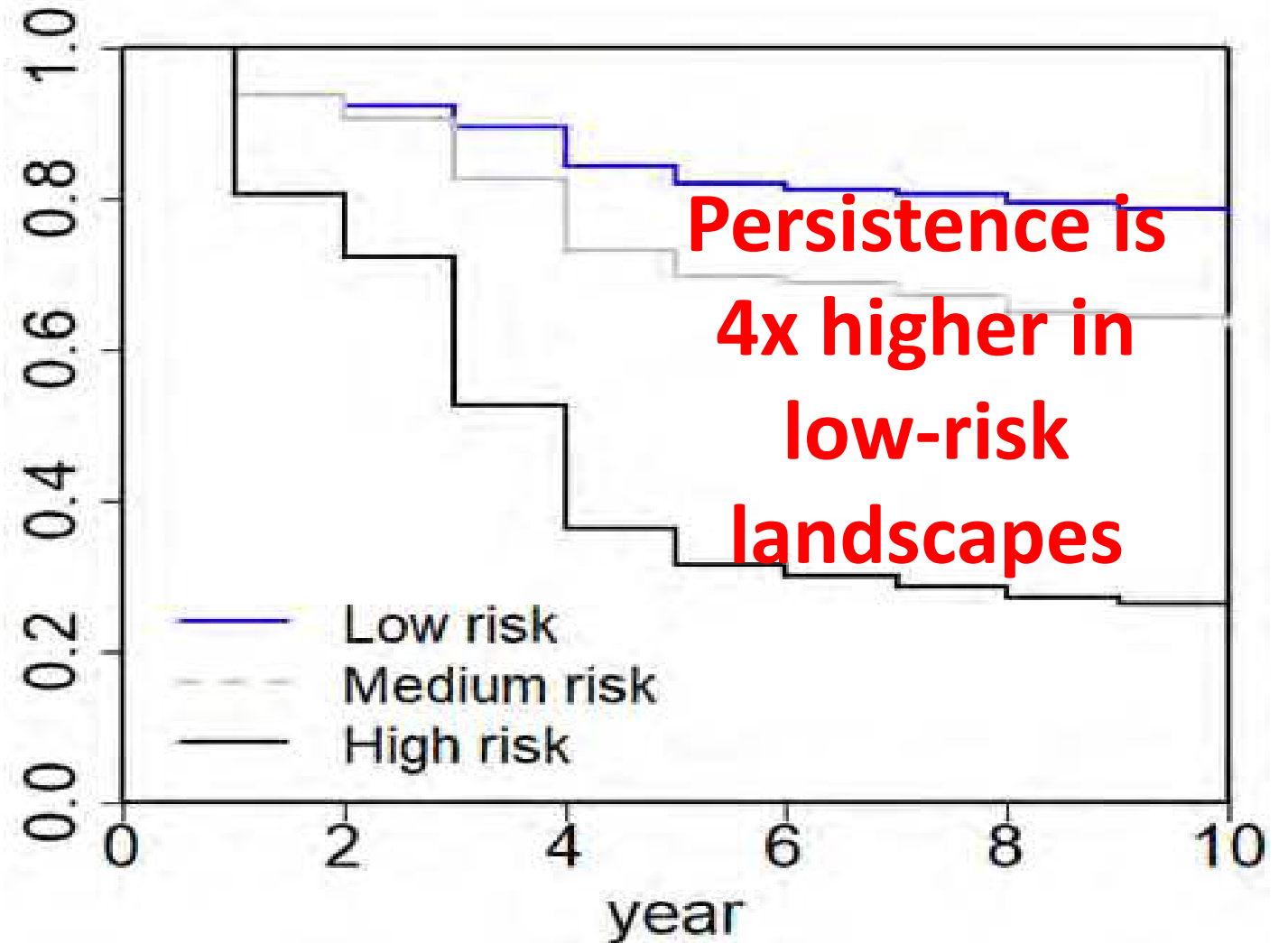
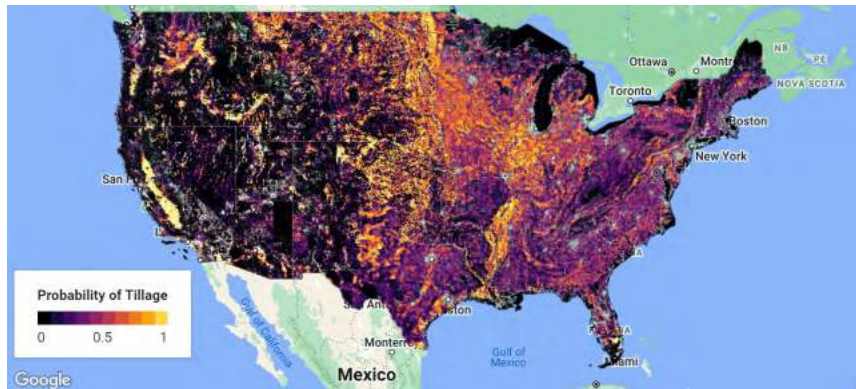
Annual Average Temperature

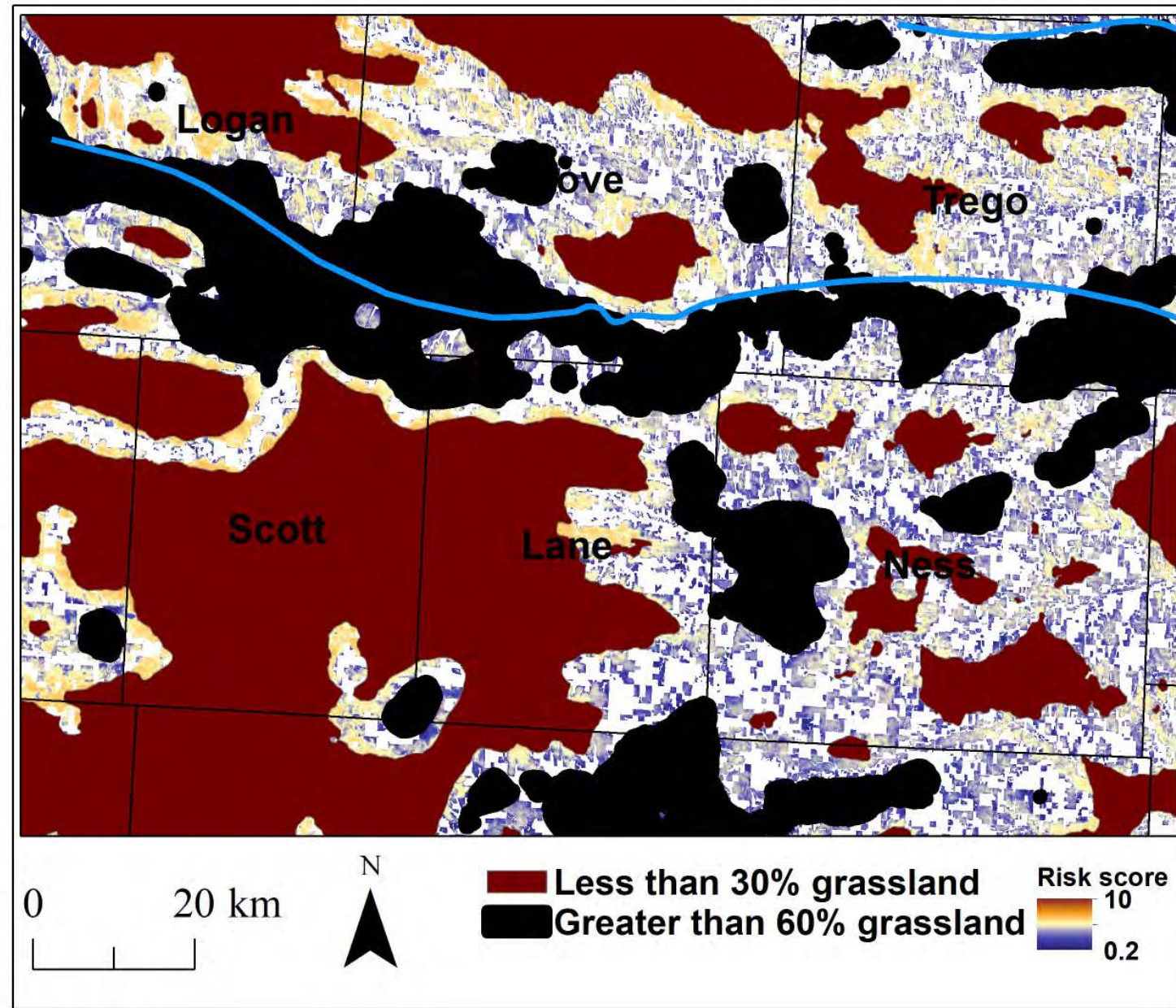
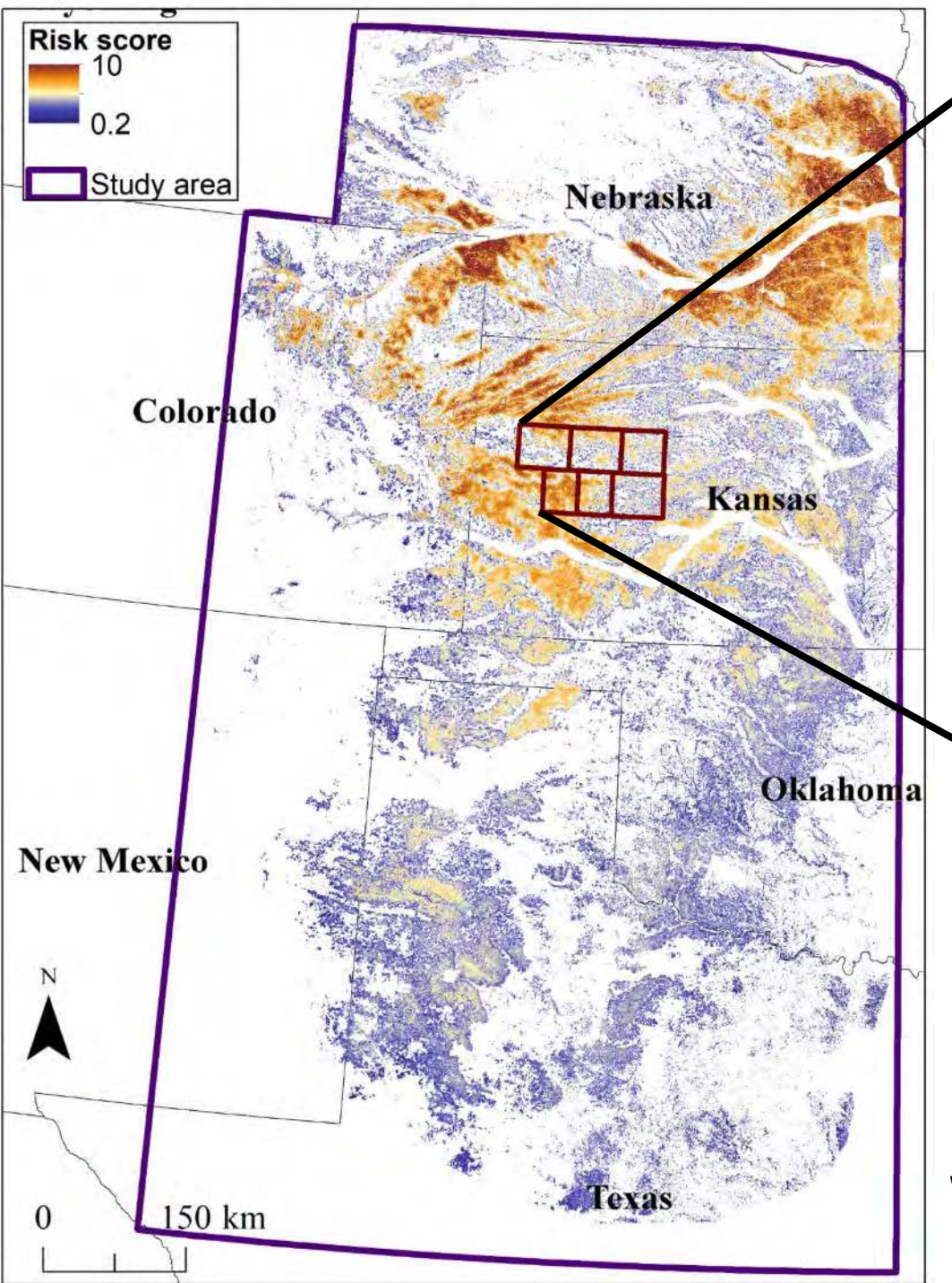
Grassland Abundance in 20 sq mile area



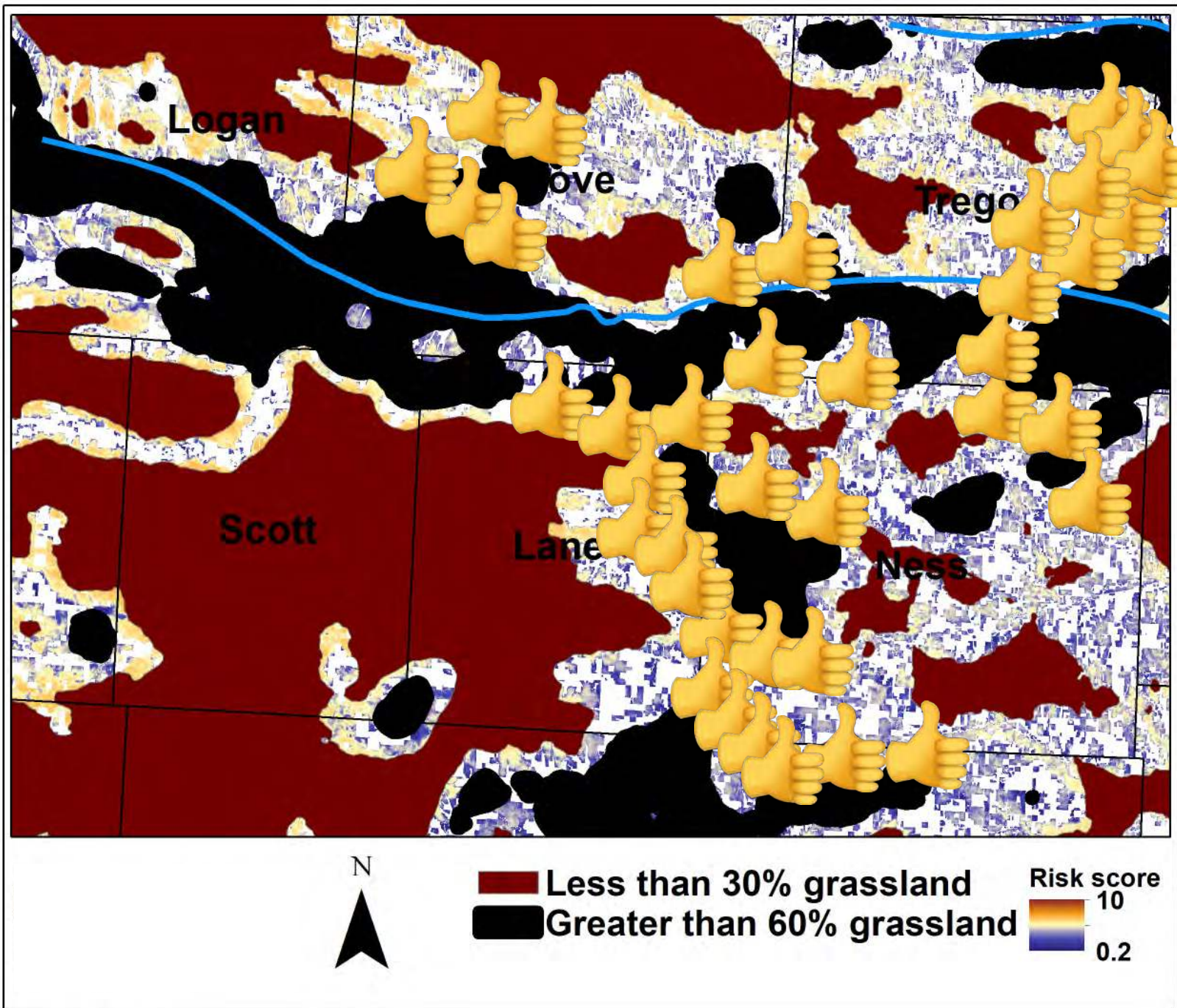
Annual variation in crop prices and drought severity also influenced durability

Influence of Cultivation Risk on Persistence





We have the technology to do this everywhere



RECAP

Defend and expand
grassland cores

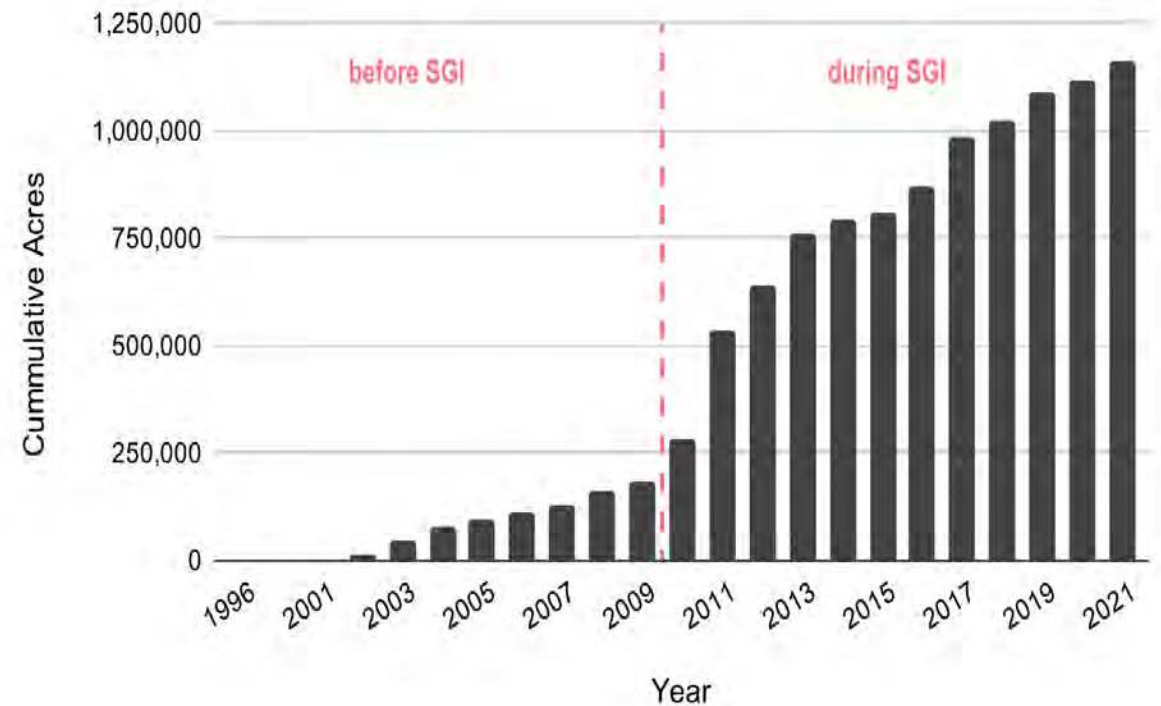
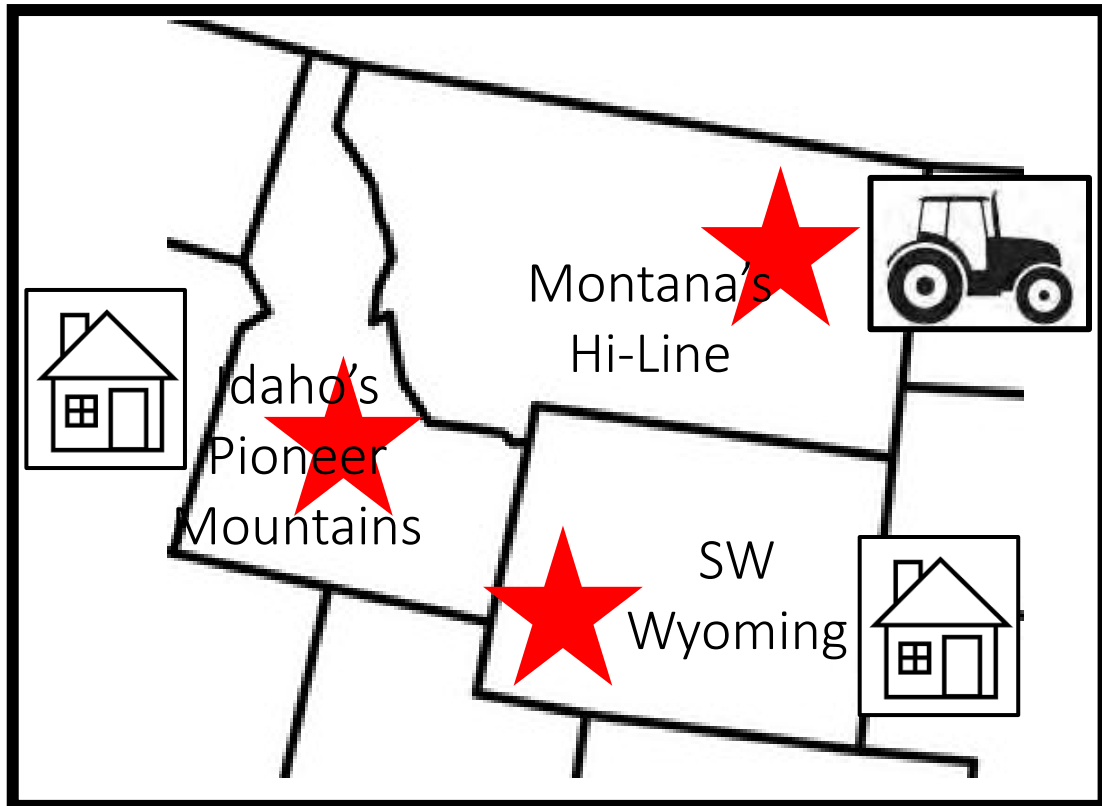
Saturate priority areas
knowing persistence
will be high

Maintain Grazing
Cultures

Significant Easement Investment



717,060 Acres \$427.3M Invested 265 Ranches



Vision is to provide the entire buffet of Farm Bill programs to producers for grassland conservation

*Bon
Appétit*



**KEY TO
SUCCESS**

**Tackling Both Threats Together,
Not Separately,
and Align FSA and NRCS**





Framework for Action

Conservation Plan



Producer Decisions

