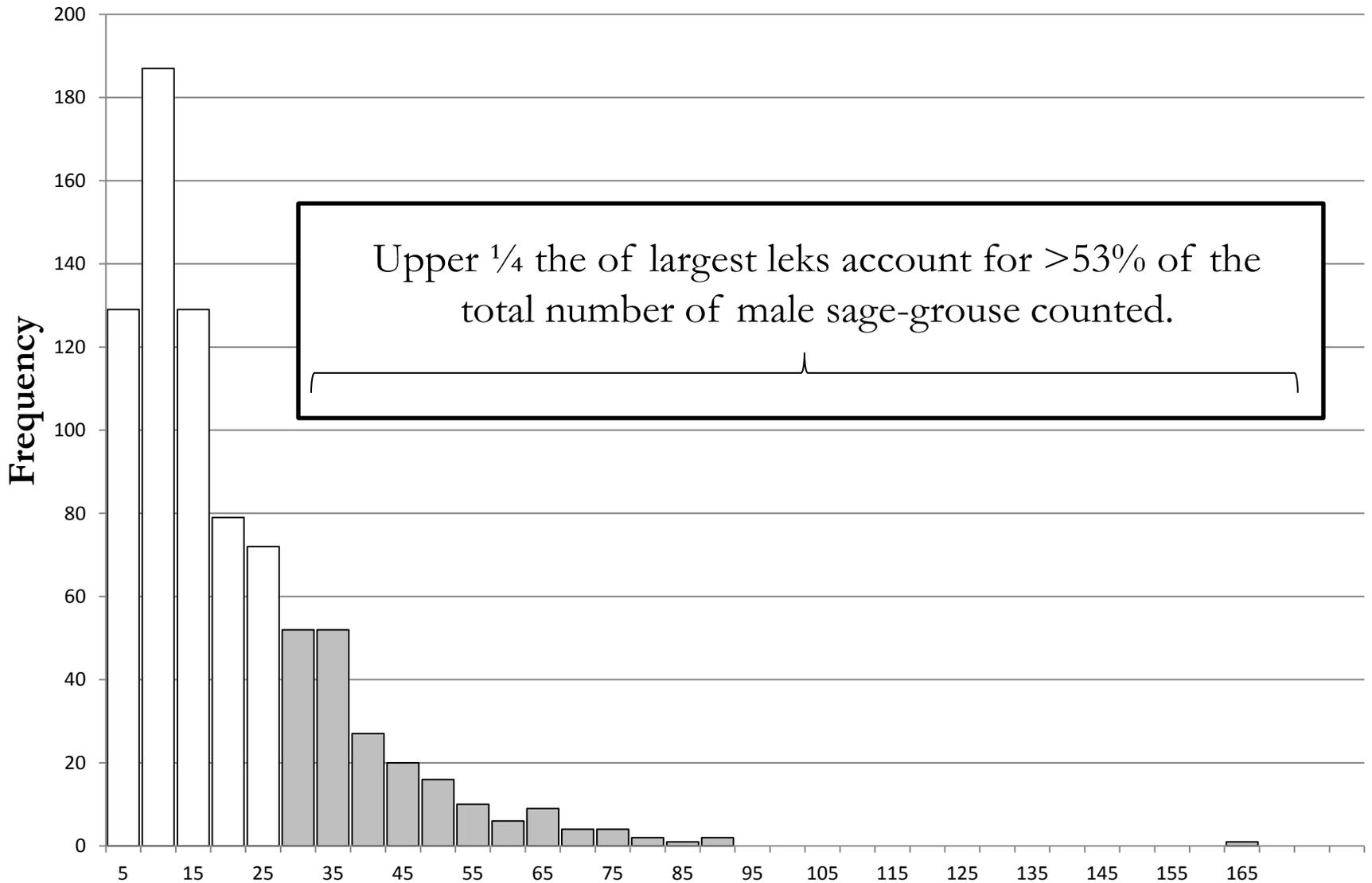


Human Footprint & Wildlife Conservation



Dave Naugle
Wildlife Biology Program

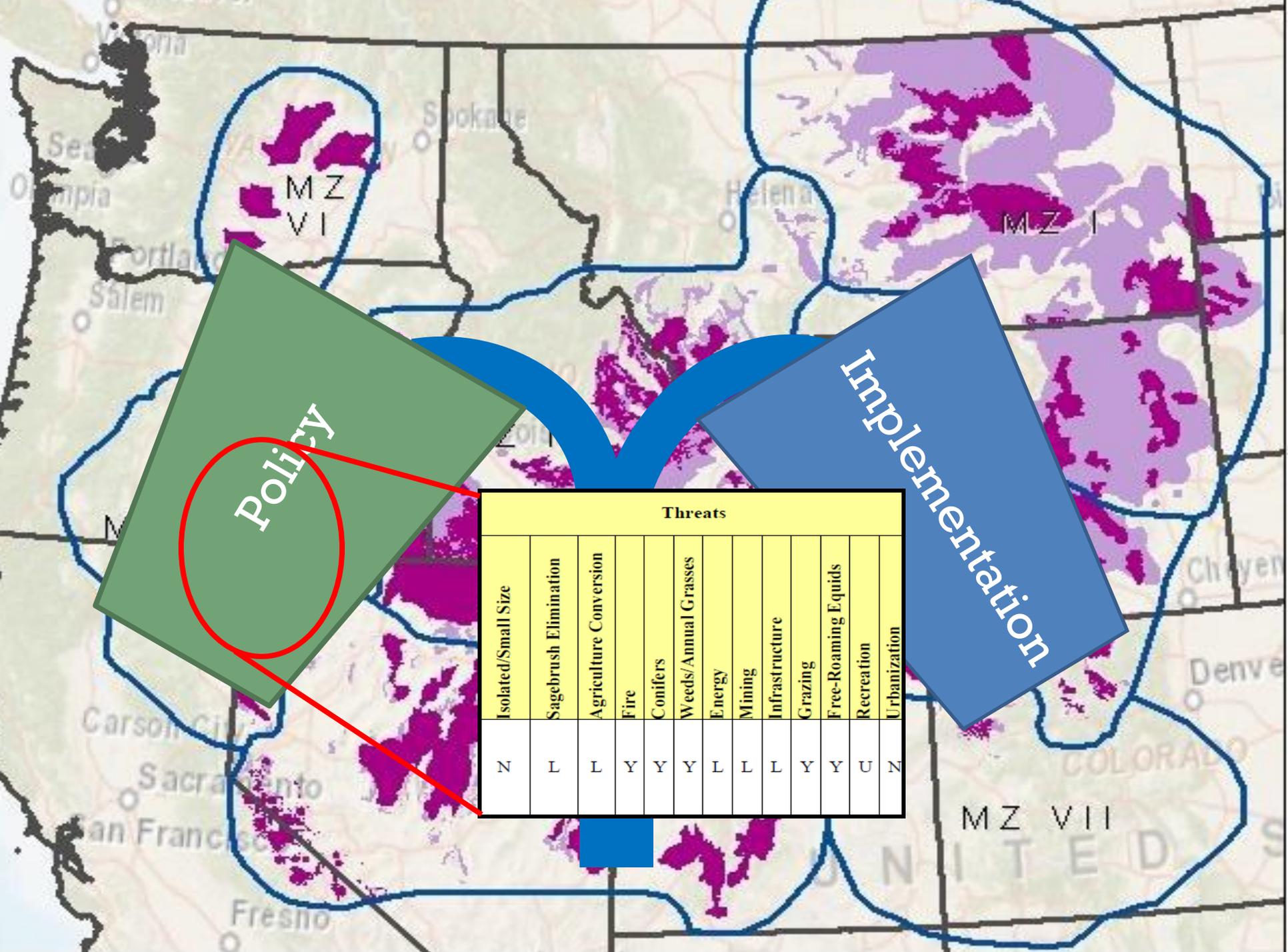


Male Count on Sage-Grouse Leks

How far we have come...

**Greater Sage-Grouse
Breeding Density
Thresholds**





Policy

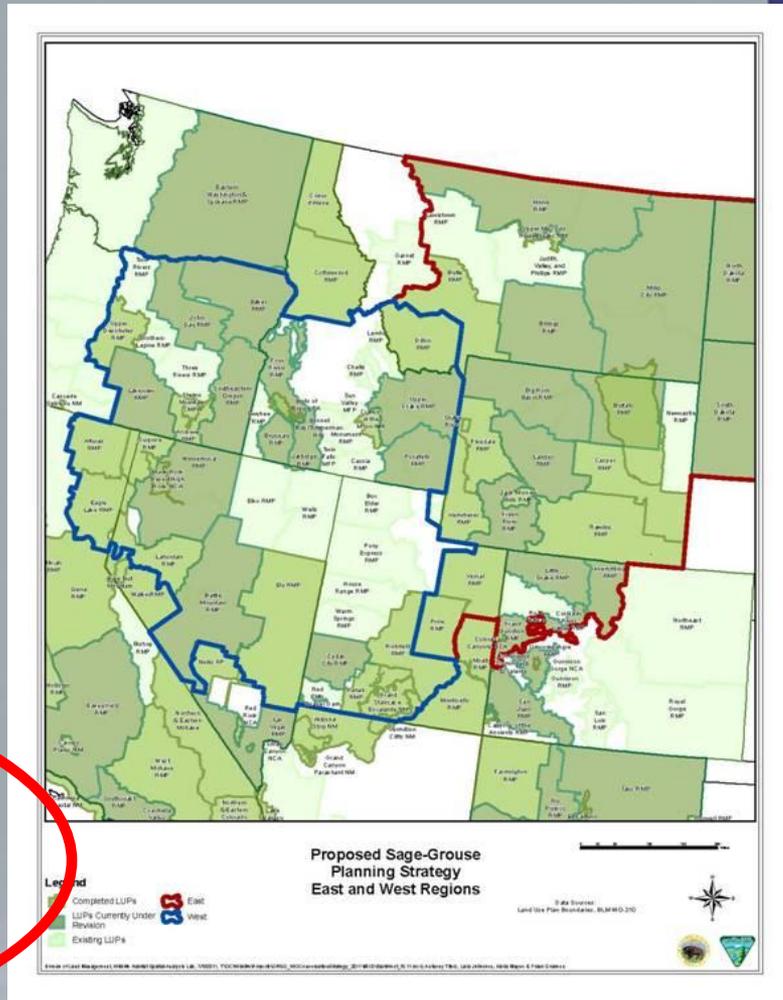
Implementation

Threats												
Isolated/Small Size	Sagebrush Elimination	Agriculture Conversion	Fire	Conifers	Weeds/Annual Grasses	Energy	Mining	Infrastructure	Grazing	Free-Roaming Equids	Recreation	Urbanization
N	L	L	Y	Y	Y	L	L	L	Y	Y	U	N

Policy

BLM and USFS revising RMP's to address regulatory mechanisms

State-based solutions to further limit fragmenting effects



MATTHEW H. MEAD
GOVERNOR

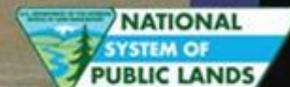


THE STATE OF WYOMING

STATE CAPITOL
CHEYENNE, WY 82002

Office of the Governor

STATE OF WYOMING
EXECUTIVE DEPARTMENT
EXECUTIVE ORDER





Implementation

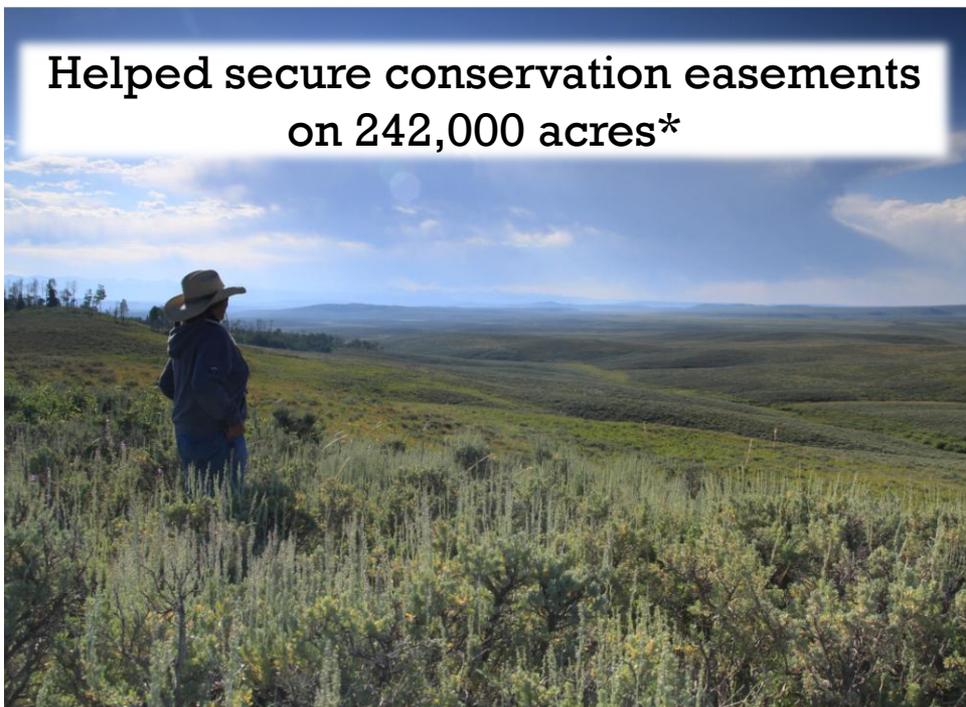
**Grazing systems on
2.1 million acres**



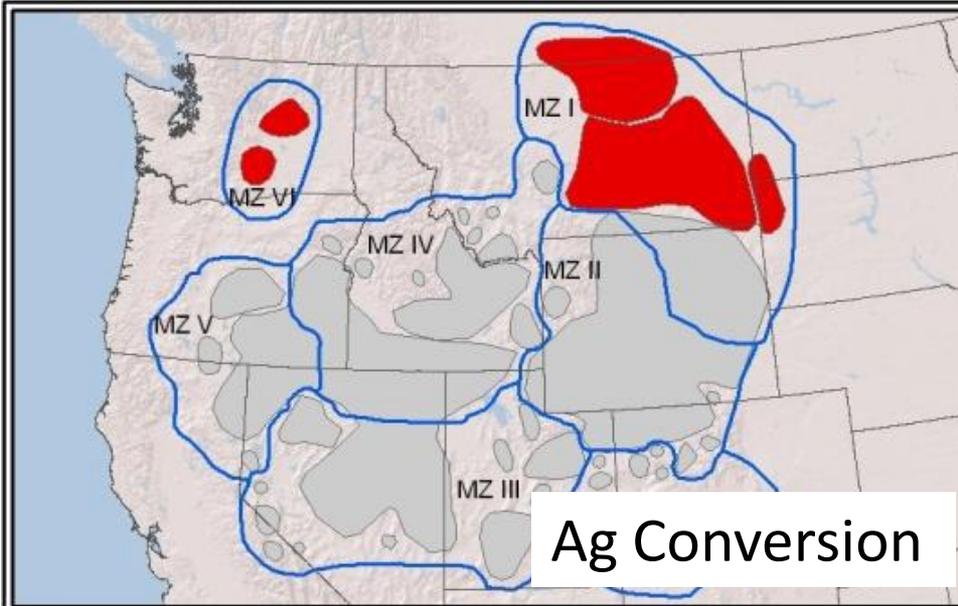
**Marked or moved 495 miles of
'high risk' fence**



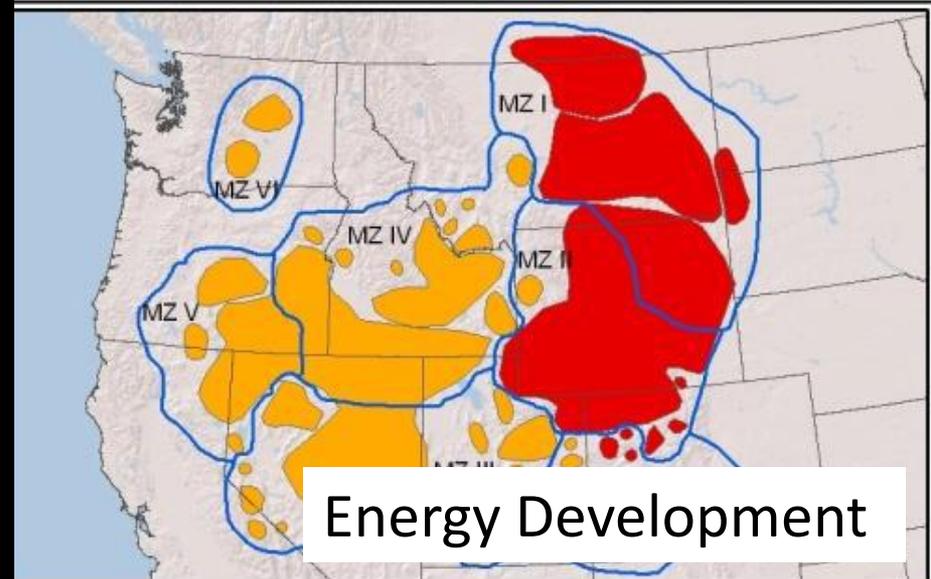
**Removed encroached conifers on
195,000 acres**



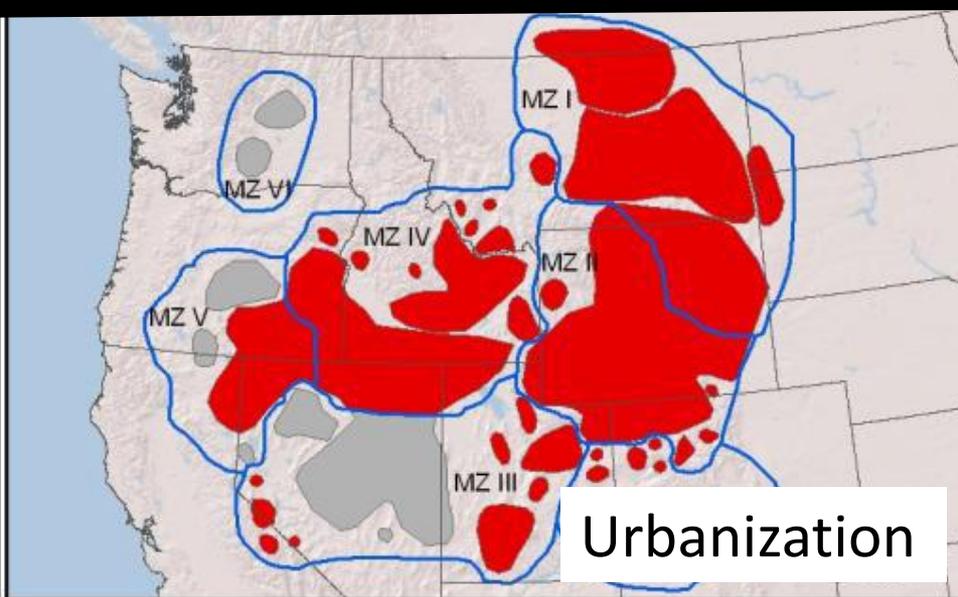
**Helped secure conservation easements
on 242,000 acres***



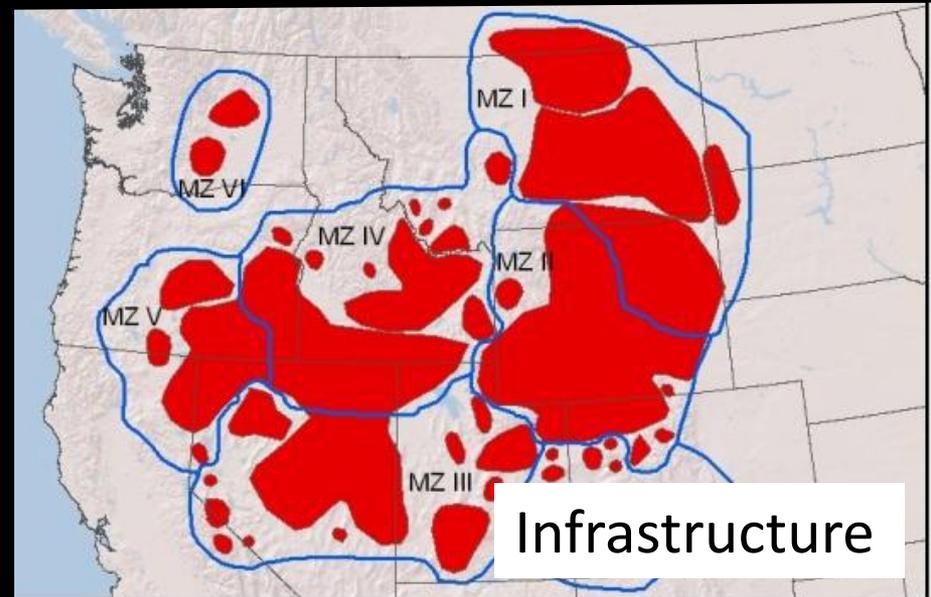
Created By: FWS WYES
 Map Date: 8/30/2012
 0 100 200 300 400 Miles
 0 100 200 300 400 Kilometers



Created By: FWS WYES
 Map Date: 8/30/2012
 Source: FWS | WAFWA | ESRI
 0 100 200 300 400 Miles
 0 100 200 300 400 Kilometers



Created By: FWS WYES
 Map Date: 8/30/2012
 Source: FWS | WAFWA | ESRI
 0 100 200 300 400 Miles
 0 100 200 300 400 Kilometers



Created By: FWS WYES
 Map Date: 8/30/2012
 Source: FWS | WAFWA | ESRI
 0 100 200 300 400 Miles
 0 100 200 300 400 Kilometers

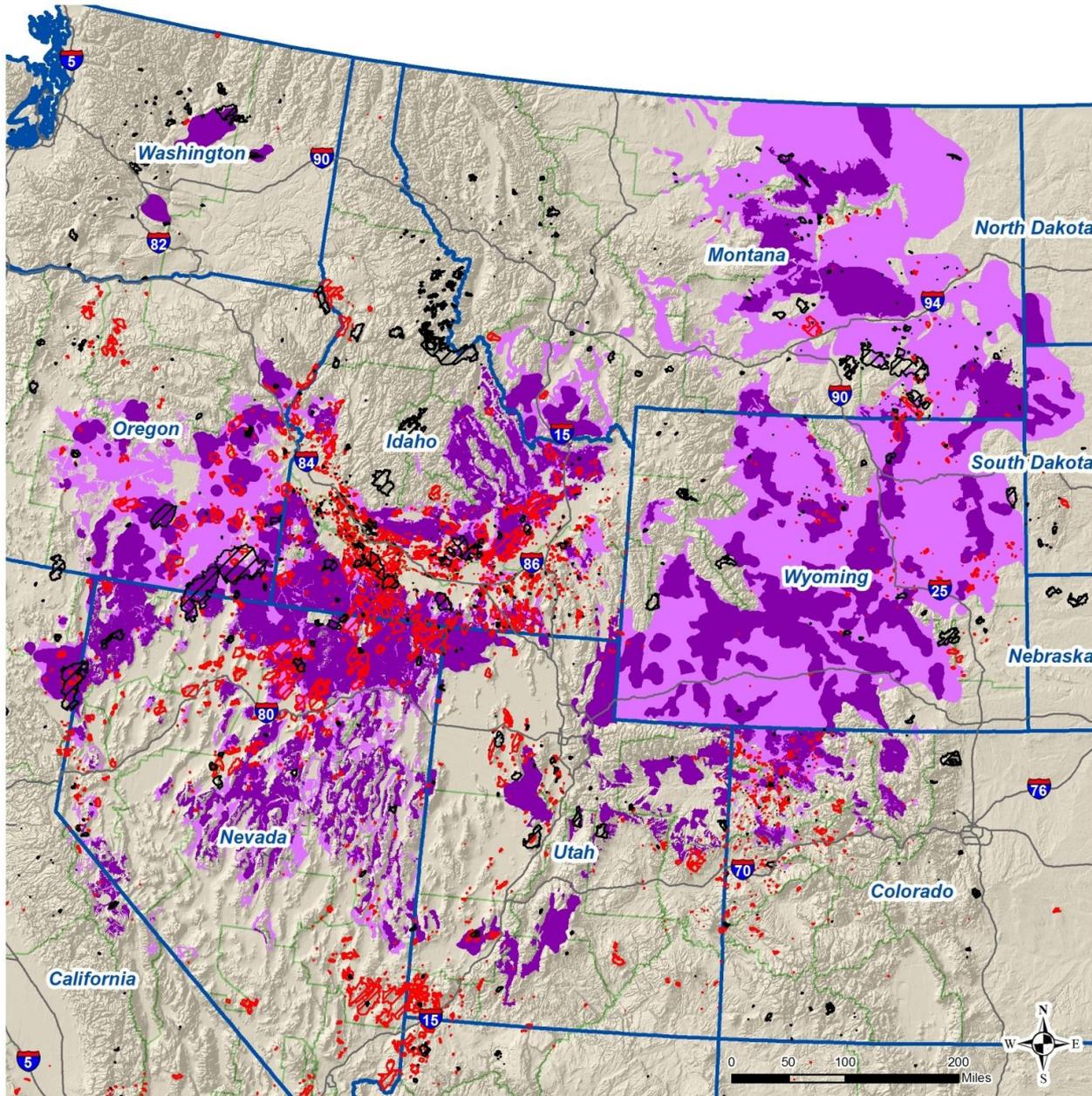
Wildfire Threat

2012: 2.7 M acres burned
(1.9 % of sage grouse range)

**But only 0.26% in all of
Montana**

BLM has implemented
sweeping policy changes, but
threat continues to challenge
managers

Spatially-explicit planning
tools and proactive measures
needed



 Preliminary Priority Habitat (PPH)  Preliminary General Habitat (PGH)  Fire Perimeters 2000-2011  Fire Perimeters 2012

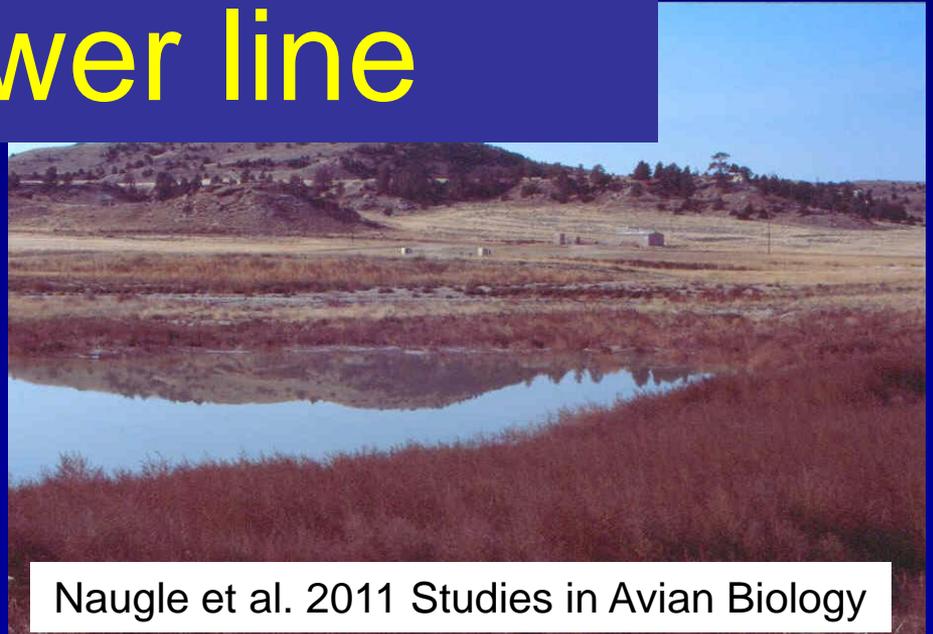
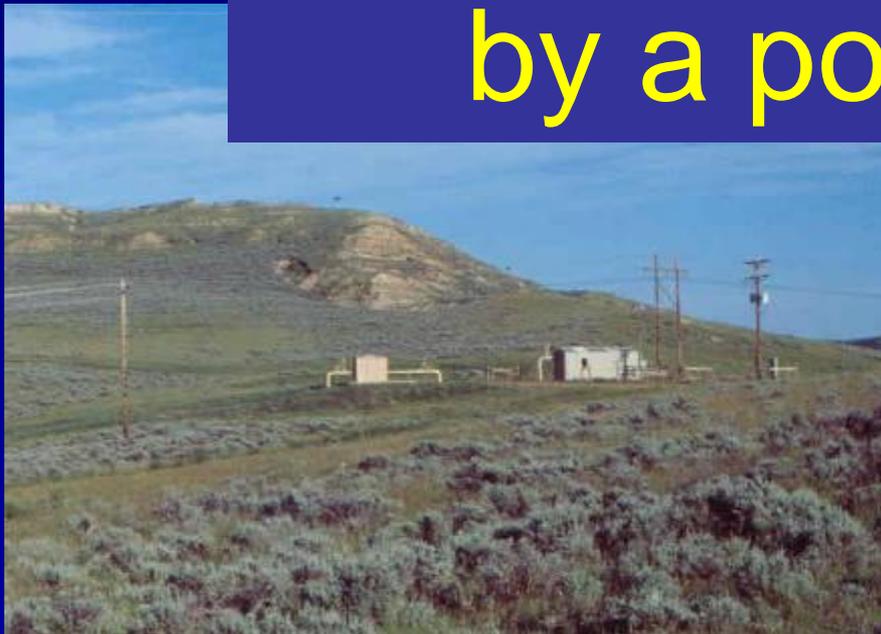
Murphy et al. *Rangelands*
(June 2013)

Energy development and wildlife
is a story of cumulative impacts



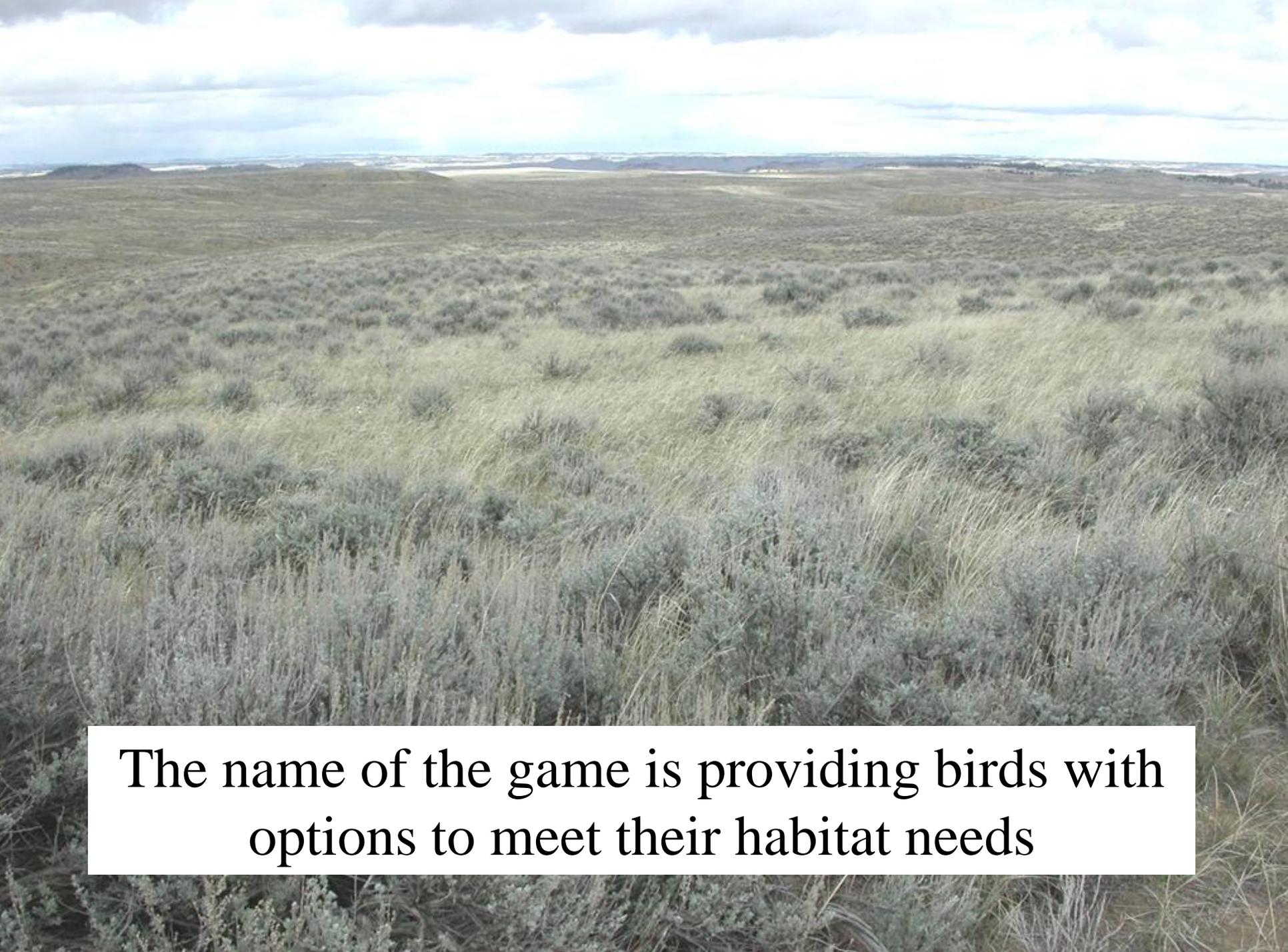


Every km² bounded by
a road and bisected
by a power line



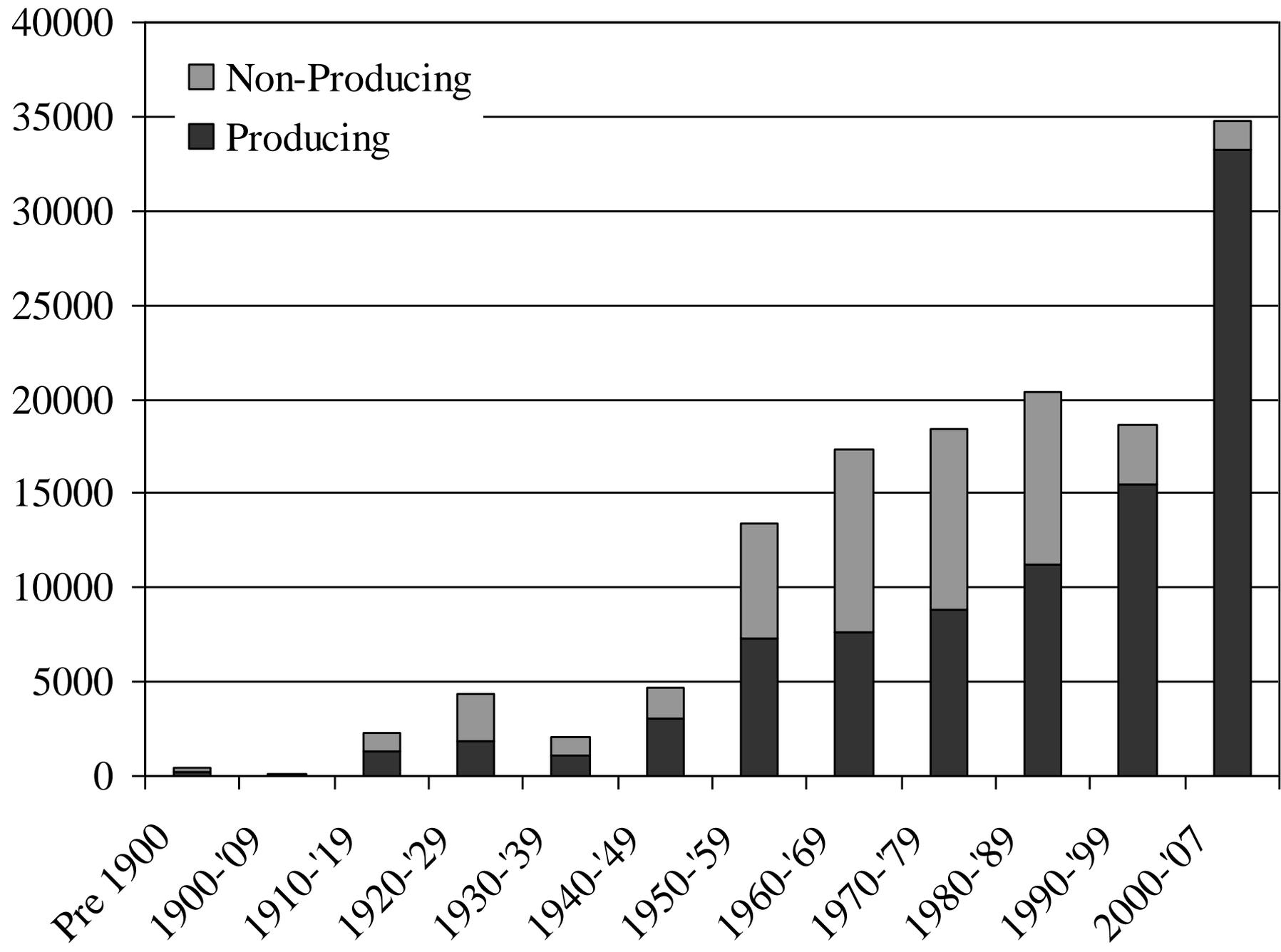


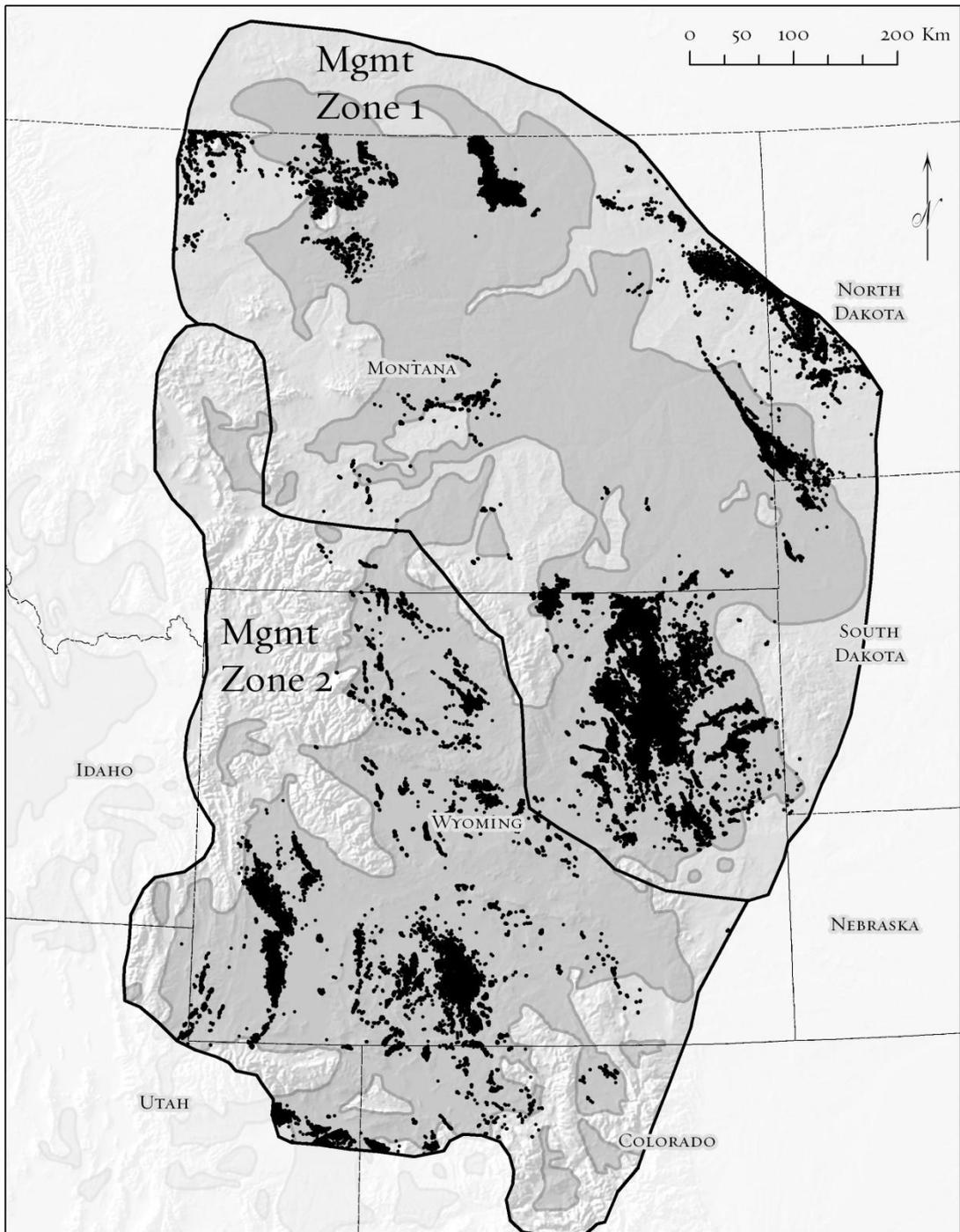
Sage-grouse nest

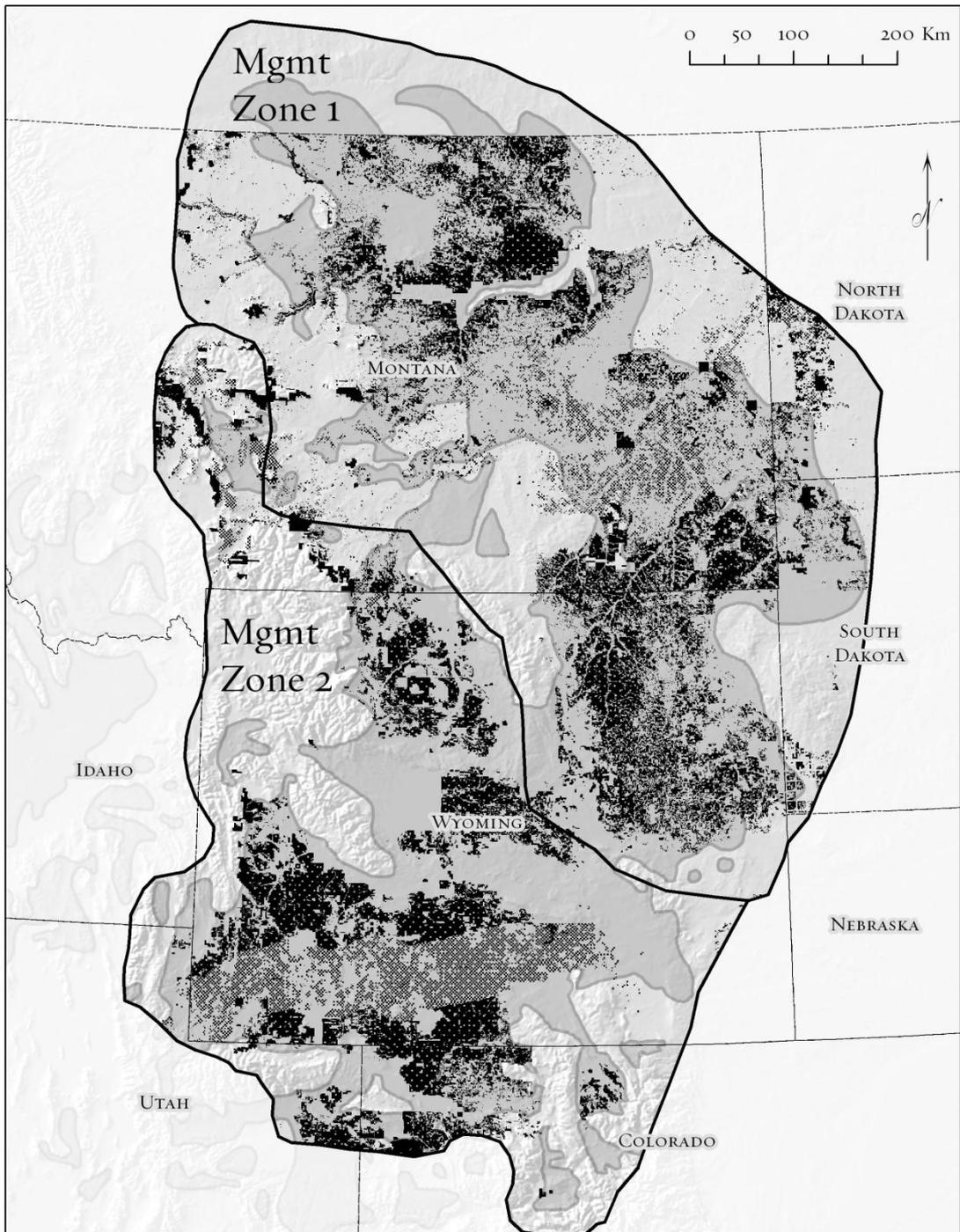


The name of the game is providing birds with options to meet their habitat needs

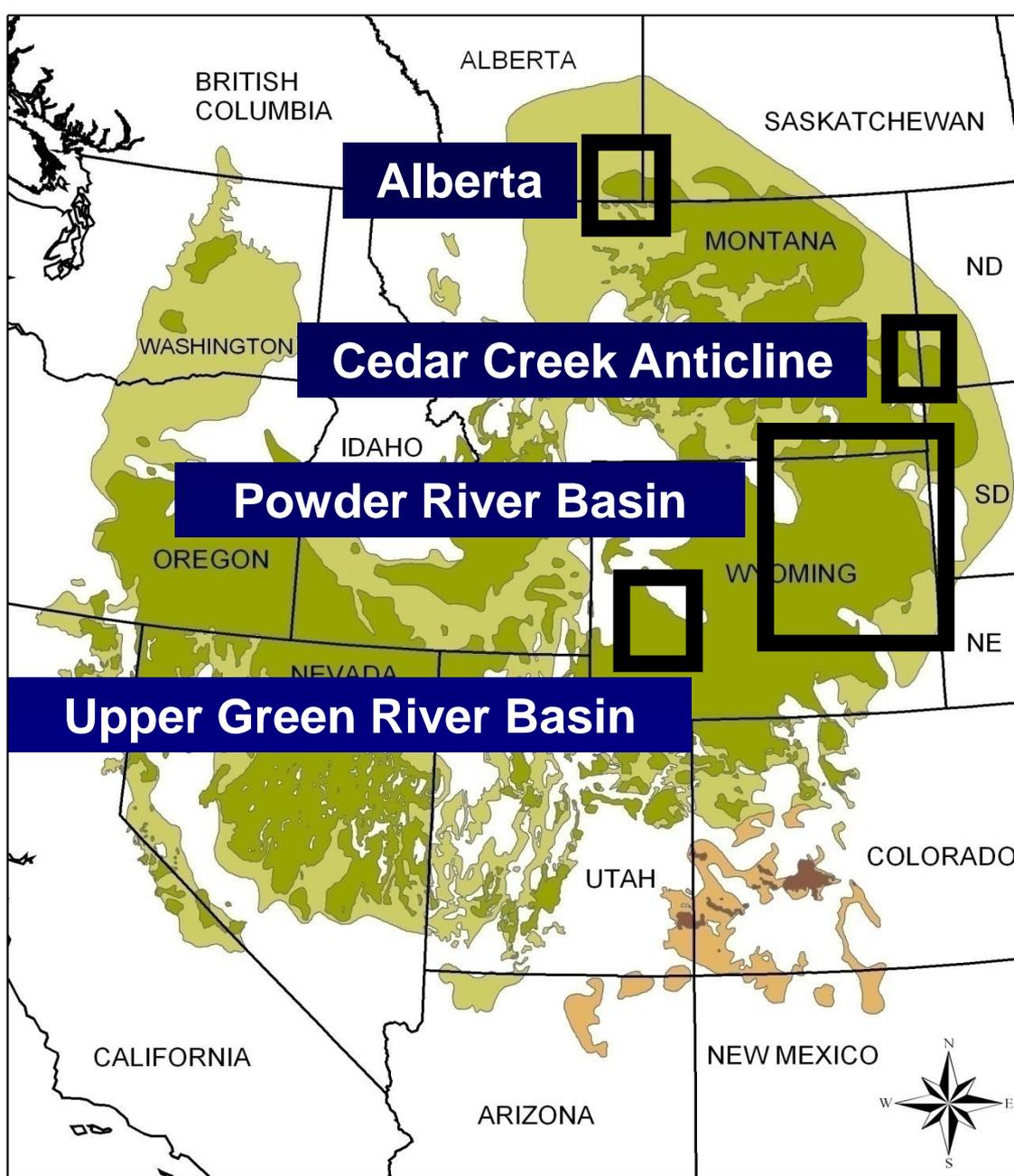
Number of wells





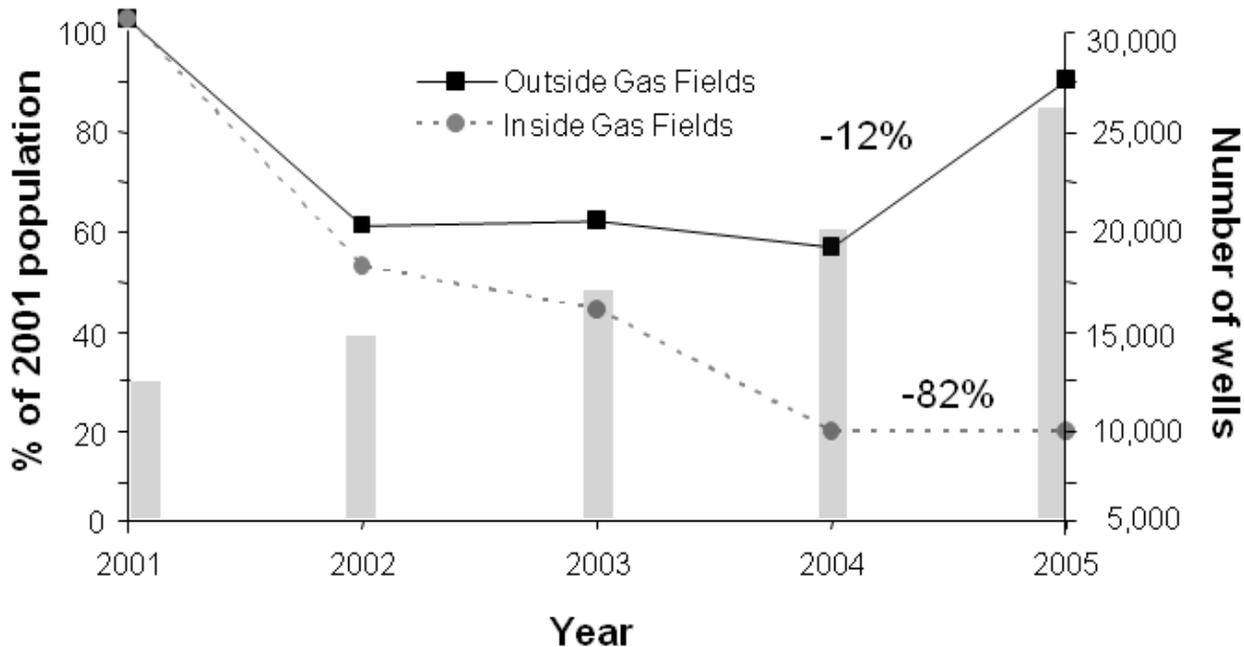


Consistency in patterns across studies of energy development



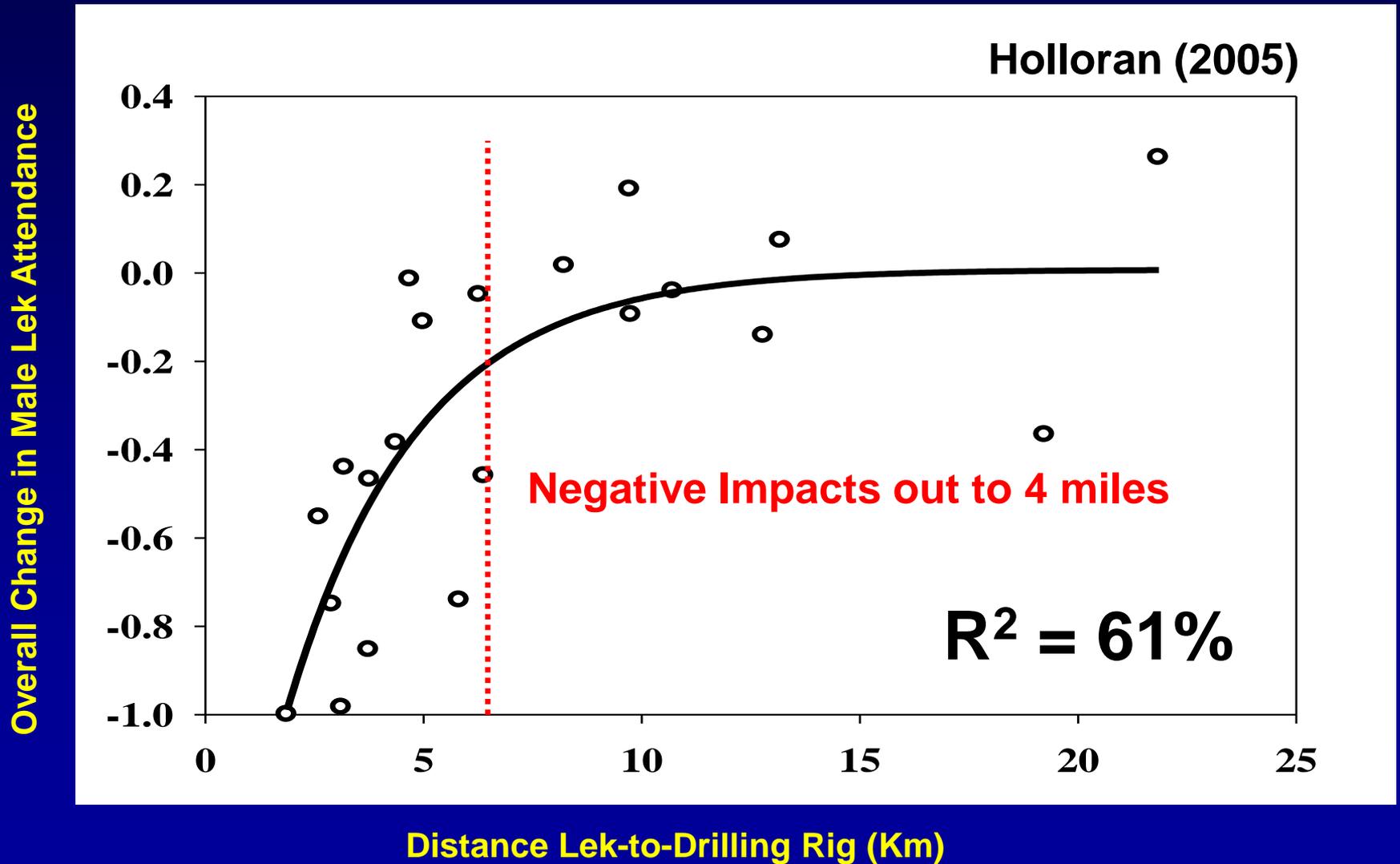
0 125 250 500 750 1,000 Kilometers

Population trends lower inside than outside gas fields



Walker and Naugle, et al. (2007) Journal of Wildlife Management

Distance to Closest Drilling Rig by Lek



Sage Grouse in Alberta

Manyberries Oil Field – Chicks go to development where succulent forbs abundant, but mortality 1.5x higher for each additional well within 1 km

Chick Survival = 13.3% ~13 males left Canada



Alberta is augmenting their population with birds from MT



Wintering sage-grouse avoid otherwise suitable habitat that has been developed for energy

Doherty and Naugle, et al. (2008) Journal of Wildlife Management



Cumulative impacts of multiple threats

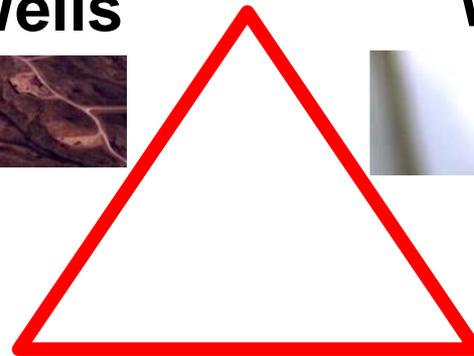
Associated each lek count with threats



Producing Wells

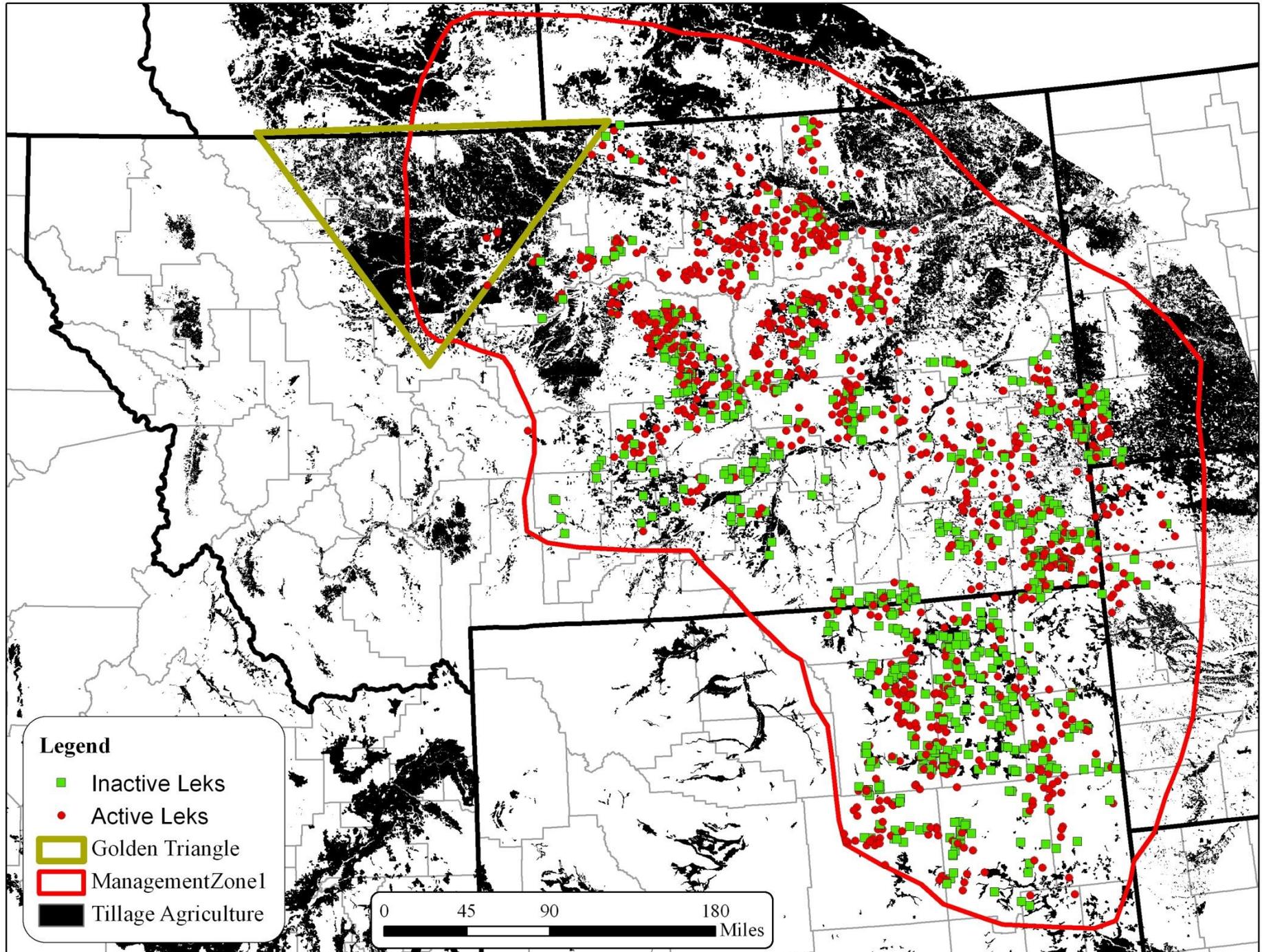


West Nile Virus



Sod busting





Legend

- Inactive Leks
- Active Leks
- Golden Triangle
- Management Zone 1
- Tillage Agriculture

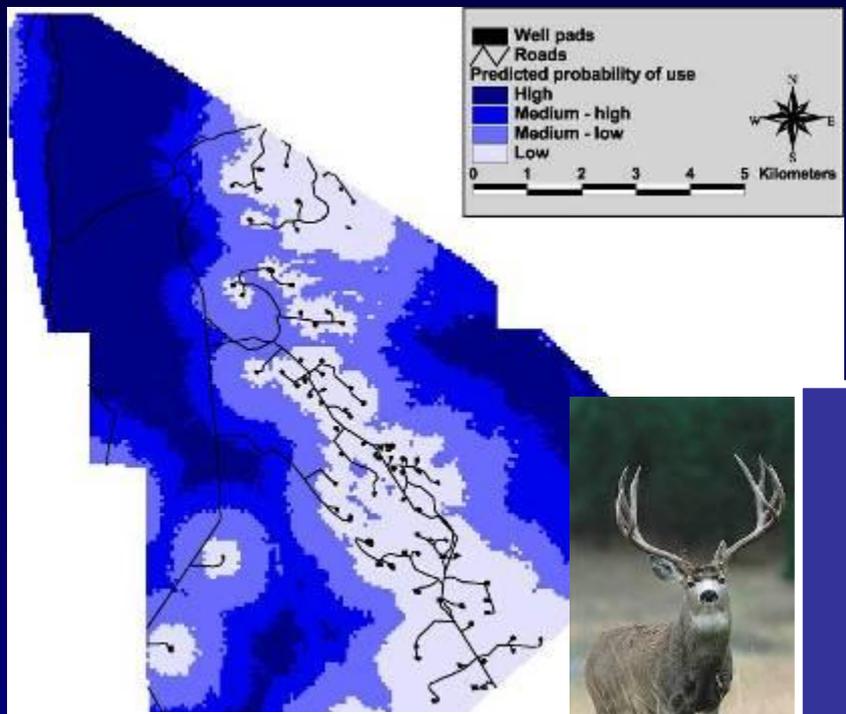


Managing Multiple Stressors in Carter

Without WNv Outbreak

With WNv Outbreak

% Tilled	Without WNv Outbreak				With WNv Outbreak								
	Well Spacing	Male Count	% Remaining	# leks of size	Male Count	% Remaining	# leks of size						
				0	1-10	11-25	> 25	0	1-10	11-25	> 25		
1	33294	1363	99	40	43	36	14	992	72	64	33	27	10
1	640	1213	88	33	55	36	10	543	39	87	26	16	4
1	160	767	55	22	90	21	1	46	3	127	6	1	0
1	80	365	26	29	102	3	0	1	0	133	1	0	0
1	40	73	5	84	50	0	0	0	0	134	0	0	0
10	33294	1215	88	46	43	34	12	670	48	71	38	21	4
10	640	1096	79	38	55	34	8	353	26	94	27	11	1
10	160	712	51	25	89	19	1	28	2	128	5	1	0
10	80	344	25	31	100	2	0	0	0	134	0	0	0
10	40	69	5	85	49	0	0	0	0	134	0	0	0
20	33294	1058	77	53	41	30	10	428	31	80	40	13	1
20	640	969	70	44	54	30	6	217	16	101	27	6	0
20	160	652	47	28	88	16	1	16	1	130	4	0	0
20	80	321	23	34	98	2	0	0	0	134	0	0	0
20	40	65	5	87	47	0	0	0	0	134	0	0	0



Sawyer et al. 2006 JWM



Ingelfinger and Anderson 2004
Bayne et al. 2008



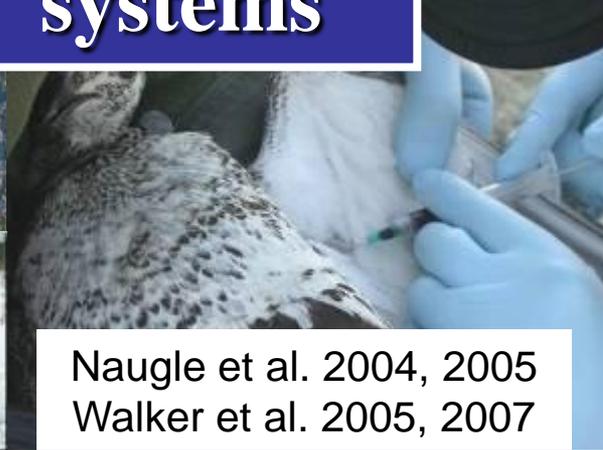
**Impacts
emerged
across
differing
taxa and
systems**



Bergquist et al. (2007)



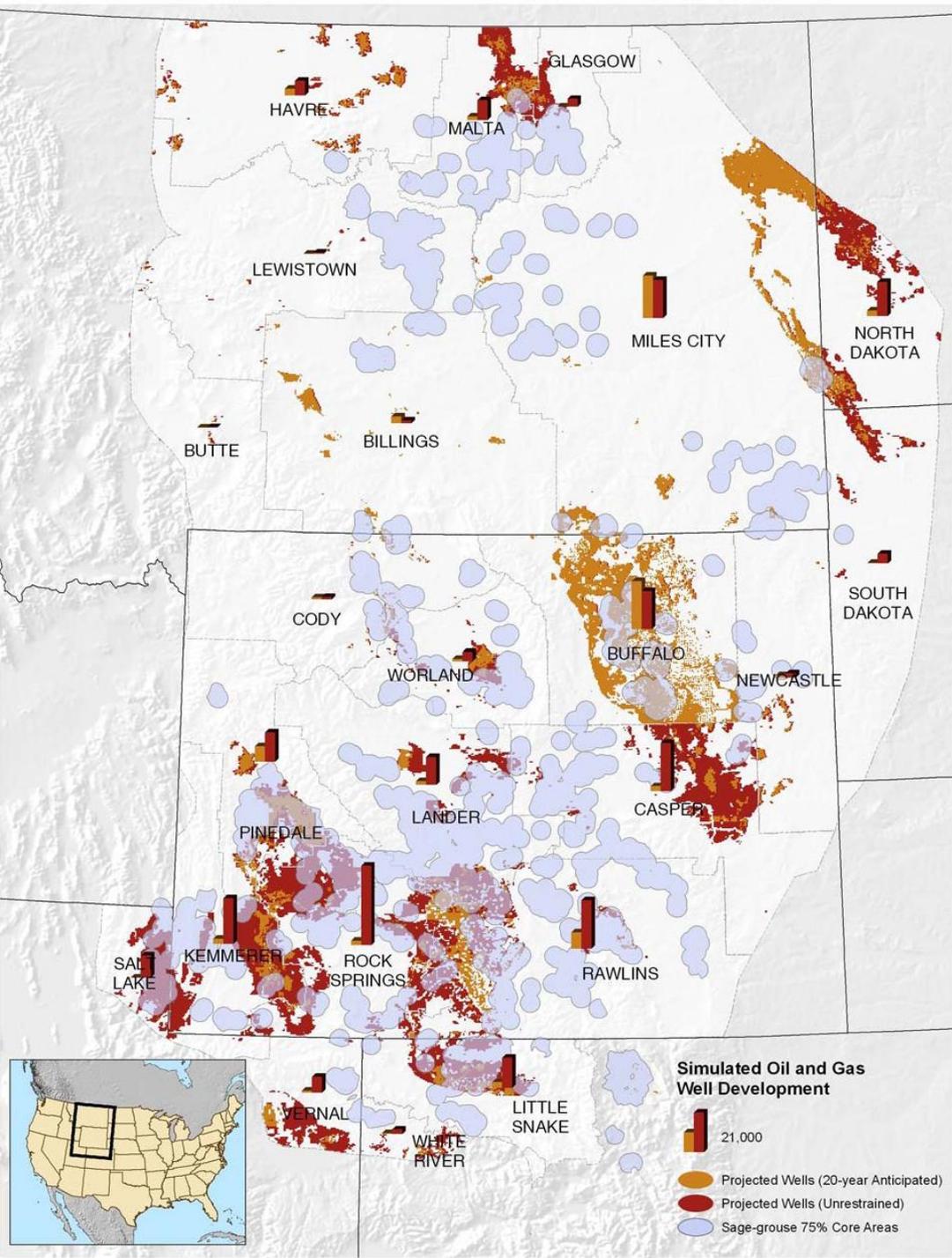
Sorenson et al. 2007 JWM



Naugle et al. 2004, 2005
Walker et al. 2005, 2007



Zou et al. 2006
Doherty 2007



Future oil and gas development will:

Decrease grouse populations by 20%

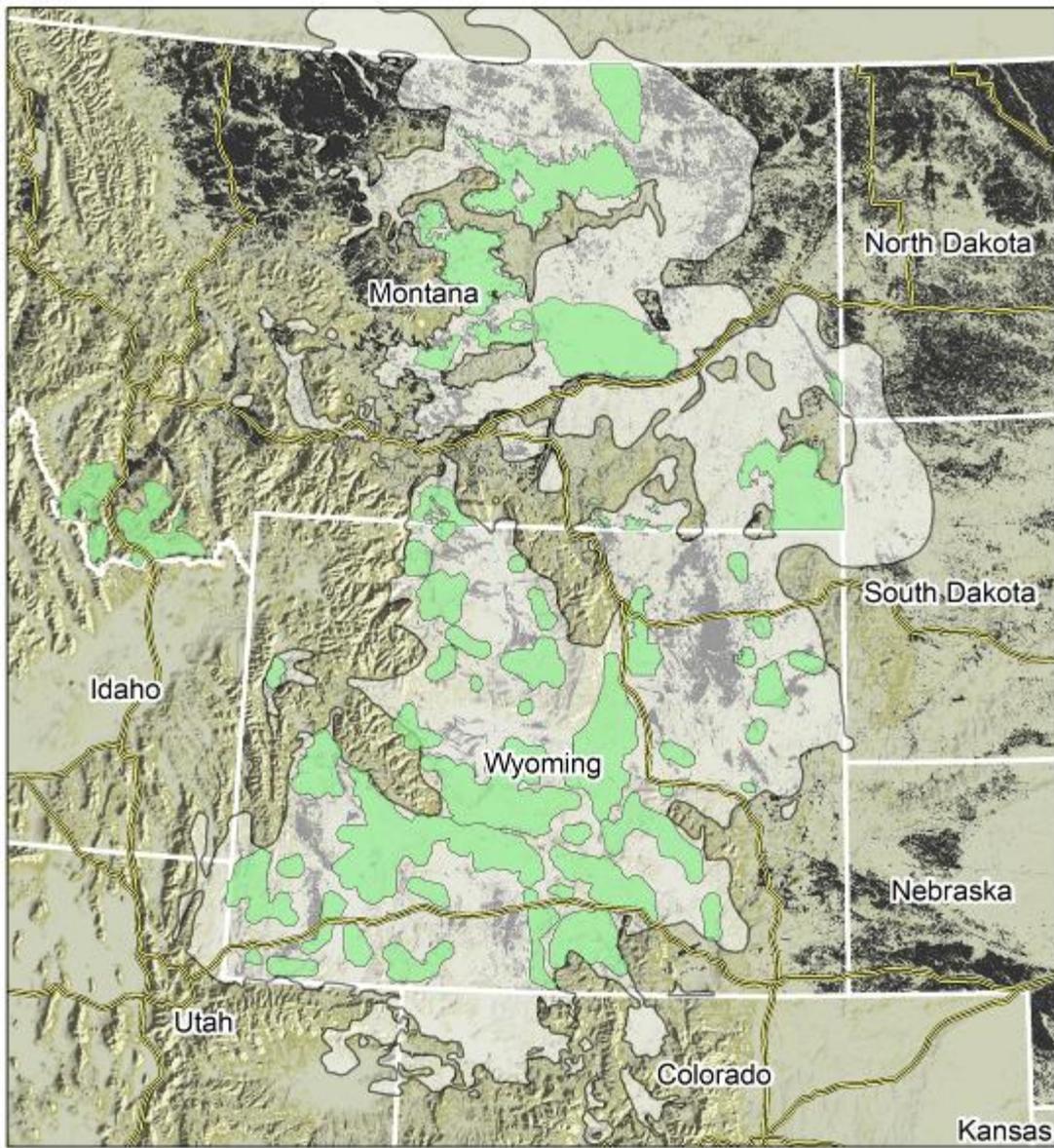
Impact 9.1 million ac of sagebrush

The answer to energy
development is not
'NO' but rather
'WHERE'

Biological Tools for Off-setting Impacts

- Trading out lower priority landscapes & partnering with industry to help fund conservation
- Birds rather than acres as the biological currency—creative tools to make informed decisions

Well Spacing	Decline in Active Leks (%)	Decline in Males (%) on remaining active leks
640 ac	-0.7	-2.1
160 ac	-11.5	-31.4
80 ac	-47.2	-32.6
40 ac	-55.1	-77.3



Greater sage-grouse core areas
 Greater sage-grouse eastern distribution



— Interstate Highways



DAVE FREUDENTHAL
GOVERNOR



STATE CAPITOL
CHEYENNE, WY 82002

Office of the Governor

STATE OF WYOMING
EXECUTIVE DEPARTMENT
EXECUTIVE ORDER

2010-4
(Replaces 2008-2)

GREATER SAGE-GROUSE CORE AREA PROTECTION

WHEREAS the Greater Sage-Grouse (*Centrocercus urophasianus*) inhabits much of the sagebrush-steppe habitat in Wyoming; and

WHEREAS the sagebrush-steppe habitat type is abundant across the state of Wyoming; and

WHEREAS the state of Wyoming currently enjoys robust populations of Greater Sage-Grouse; and

WHEREAS the state of Wyoming has management authority over Greater Sage-Grouse populations in Wyoming; and

WHEREAS the Greater Sage-Grouse has been the subject of several petitions to list the species as a threatened or endangered species pursuant to the Endangered Species Act; and

WHEREAS the United States Department of the Interior has determined that listing the Greater Sage-Grouse as a threatened or endangered species is warranted over all of its range, including the populations in Wyoming; and

WHEREAS the United States Department of the Interior has determined that listing the Greater Sage-Grouse as a threatened or endangered species is currently precluded by higher priority listing actions; and

WHEREAS the Greater Sage-Grouse is currently considered a "candidate" species under the auspices of the Endangered Species Act; and

WHEREAS the United States Department of the Interior is required to review the status of all candidate species every year; and

WHEREAS the listing of the Greater Sage-Grouse would have a significant adverse effect on the economy of the state of Wyoming, including the ability to generate revenues from state lands; and

WHEREAS the listing of the Greater Sage-Grouse would have a significant adverse effect on the custom and culture of the state of Wyoming; and



SAVING SAGE-GROUSE

THE WYOMING EXAMPLE



Implementation
Conservation Easements

Policy
Core Area Strategy

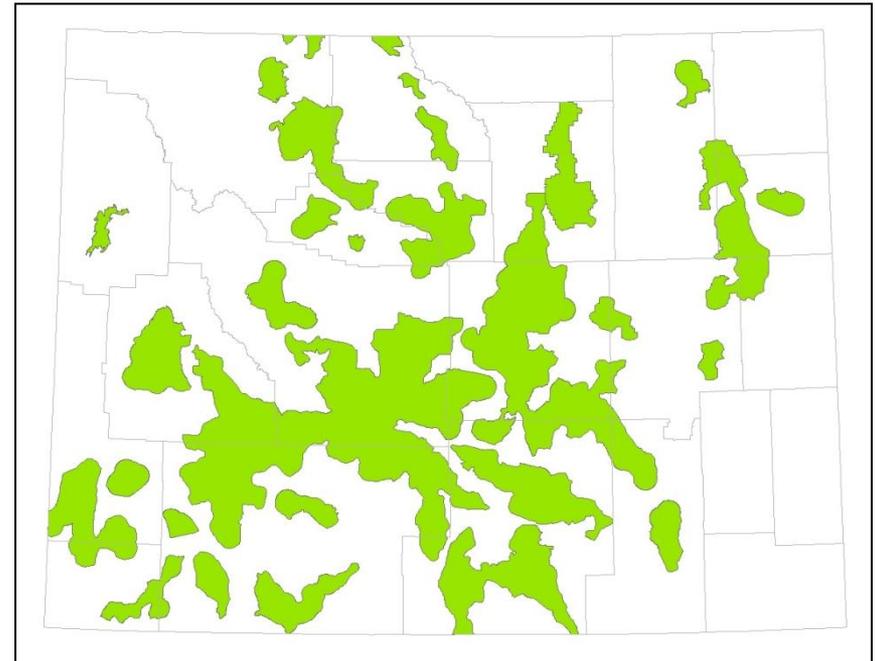
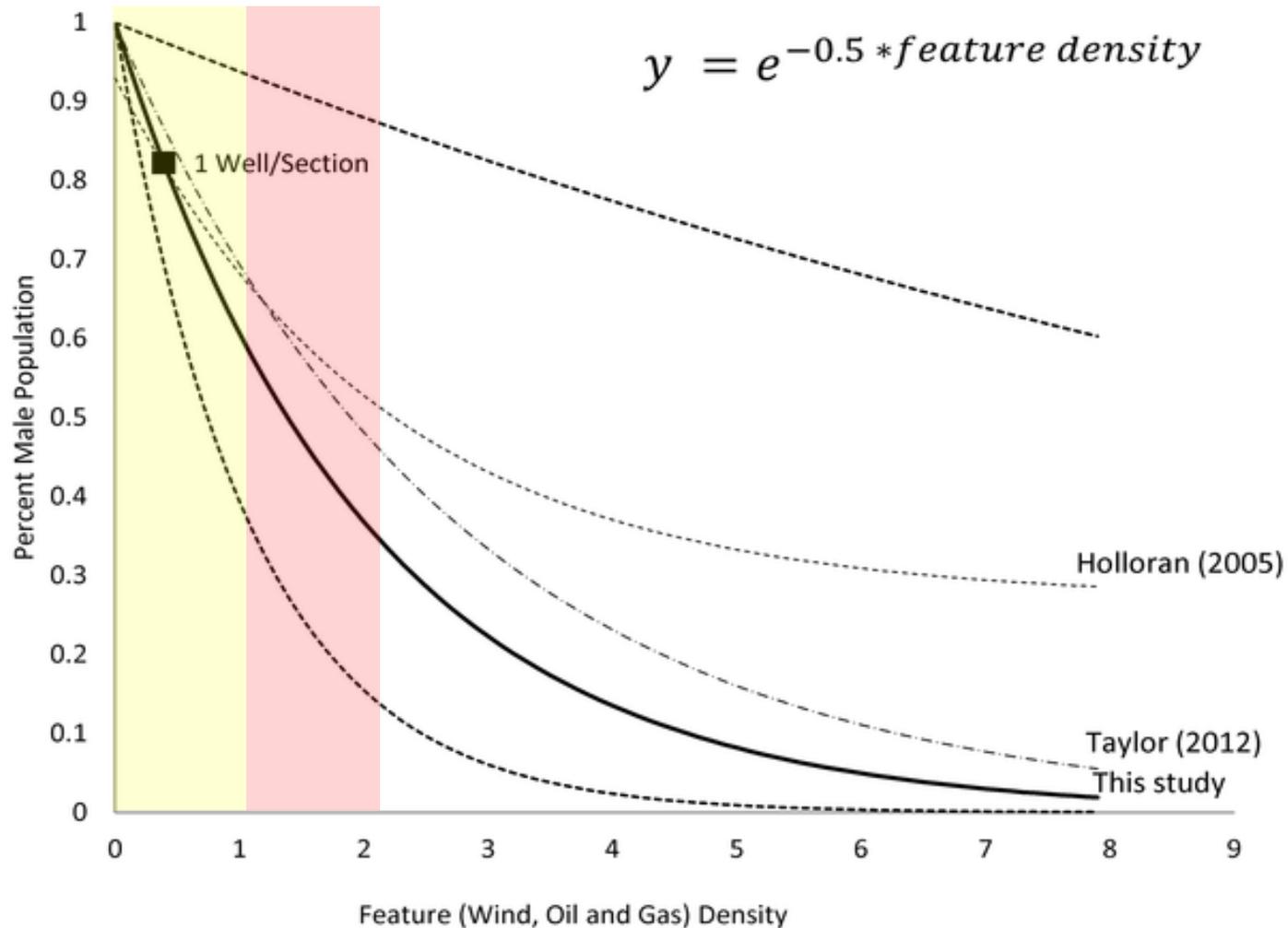


Figure 4. Sage-grouse population response to feature density regression relationship (solid line) with 95% CI (dotted lines).

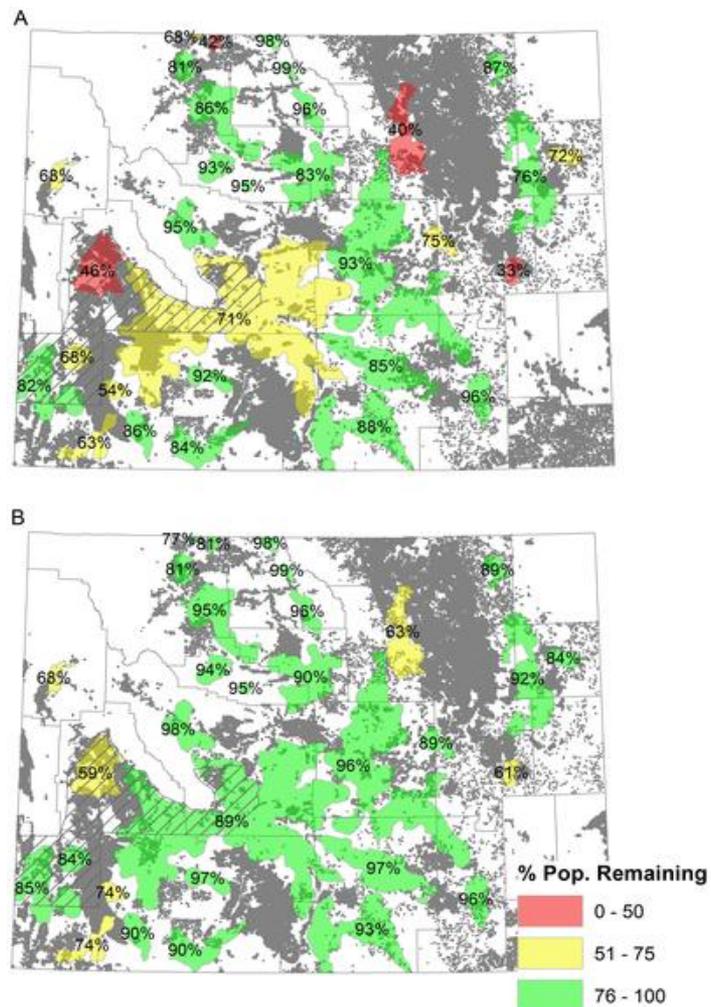


Copeland HE, Pocewicz A, Naugle DE, Griffiths T, et al. (2013) Measuring the Effectiveness of Conservation: A Novel Framework to Quantify the Benefits of Sage-Grouse Conservation Policy and Easements in Wyoming. PLoS ONE 8(6): e67261.

doi:10.1371/journal.pone.0067261

<http://www.plosone.org/article/info:doi/10.1371/journal.pone.0067261>

Figure 5. The percent of the sage-grouse population remaining under the long-term scenario with and without conservation.

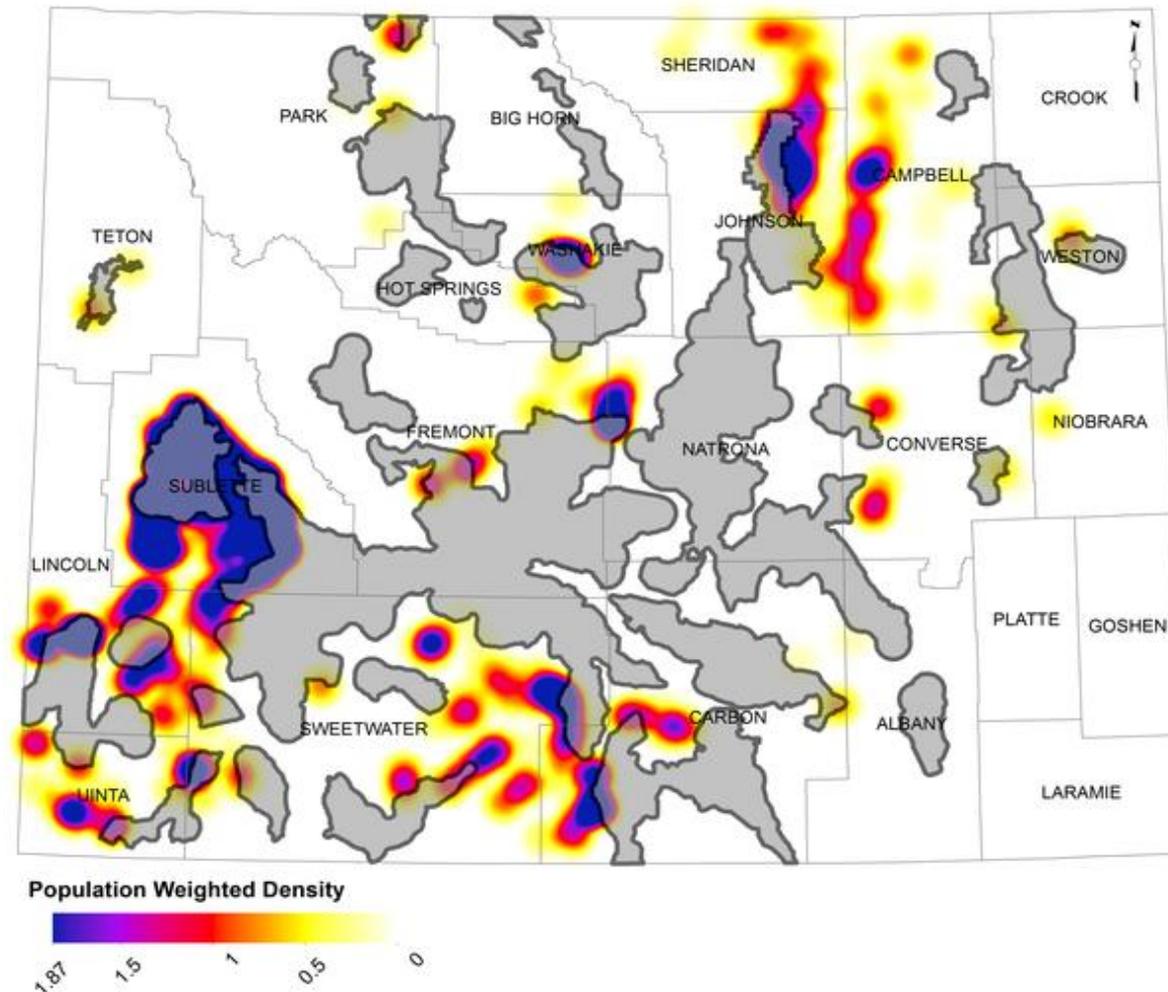


Copeland HE, Pocewicz A, Naugle DE, Griffiths T, et al. (2013) Measuring the Effectiveness of Conservation: A Novel Framework to Quantify the Benefits of Sage-Grouse Conservation Policy and Easements in Wyoming. PLoS ONE 8(6): e67261.

doi:10.1371/journal.pone.0067261

<http://www.plosone.org/article/info:doi/10.1371/journal.pone.0067261>

Figure 7. Population weighted kernel density map of leks with a predicted decline less than 75% of the current population under the long-term scenario (yellow=lower decline, blue=higher decline).



Copeland HE, Pocewicz A, Naugle DE, Griffiths T, et al. (2013) Measuring the Effectiveness of Conservation: A Novel Framework to Quantify the Benefits of Sage-Grouse Conservation Policy and Easements in Wyoming. PLoS ONE 8(6): e67261.

doi:10.1371/journal.pone.0067261

<http://www.plosone.org/article/info:doi/10.1371/journal.pone.0067261>

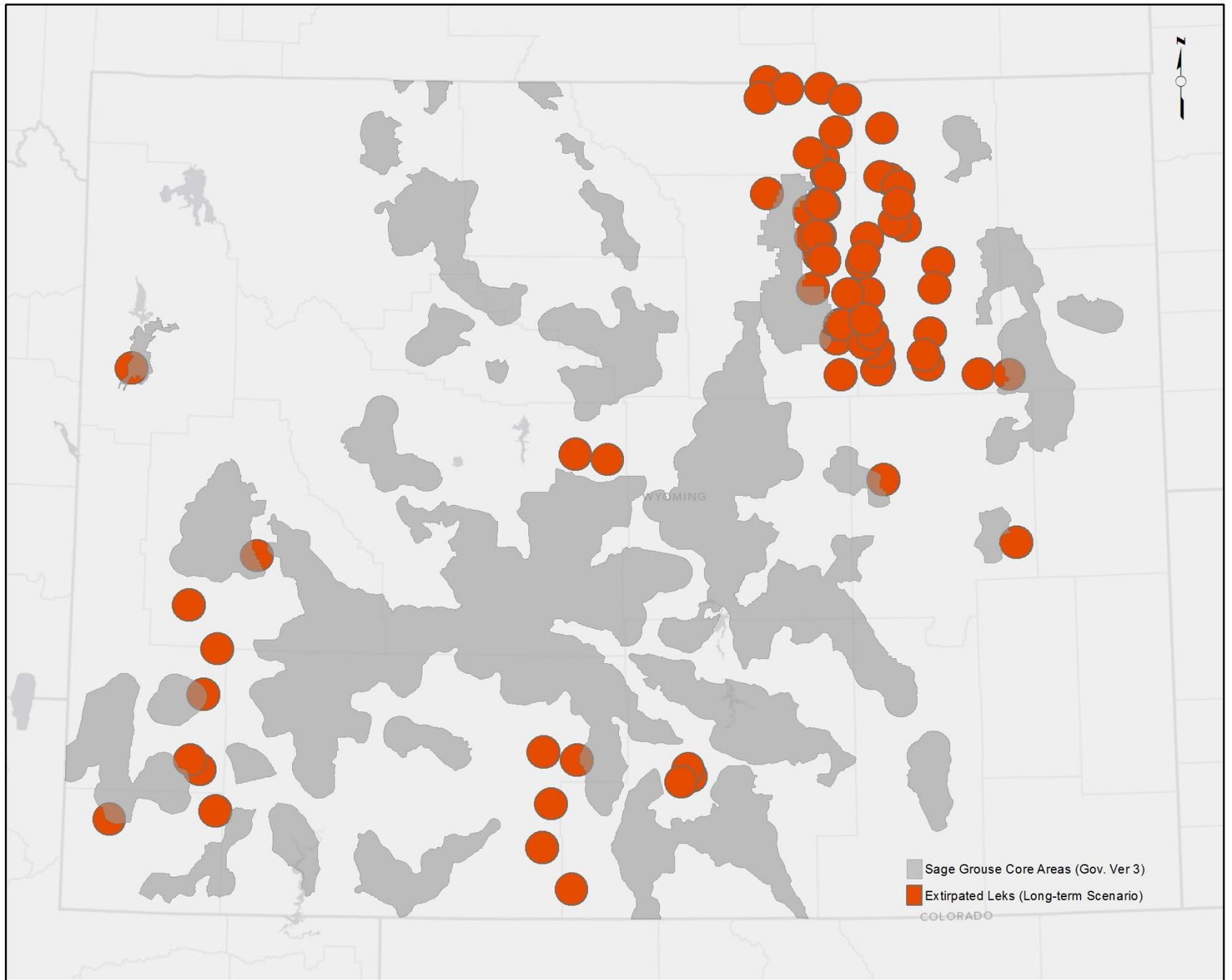
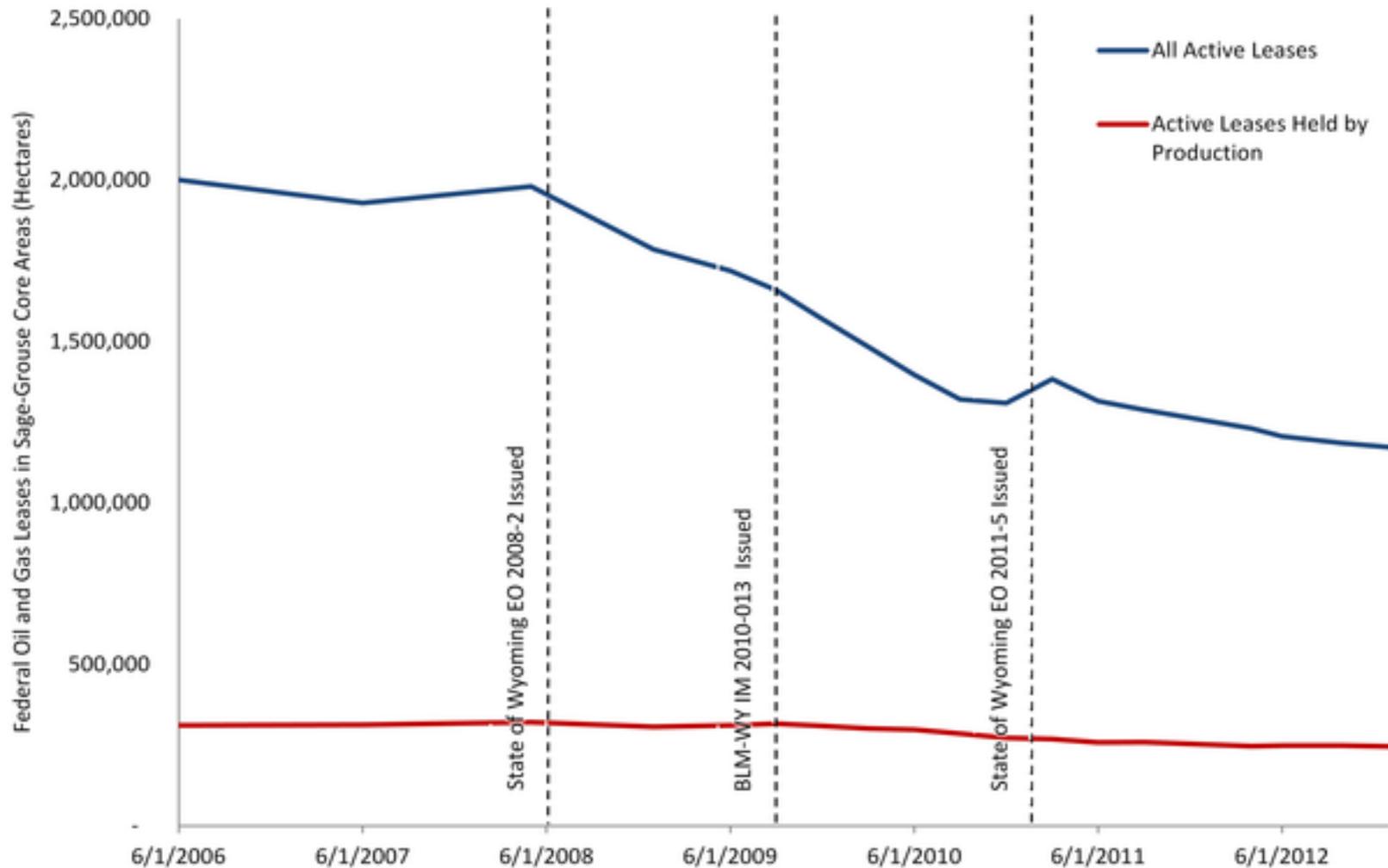


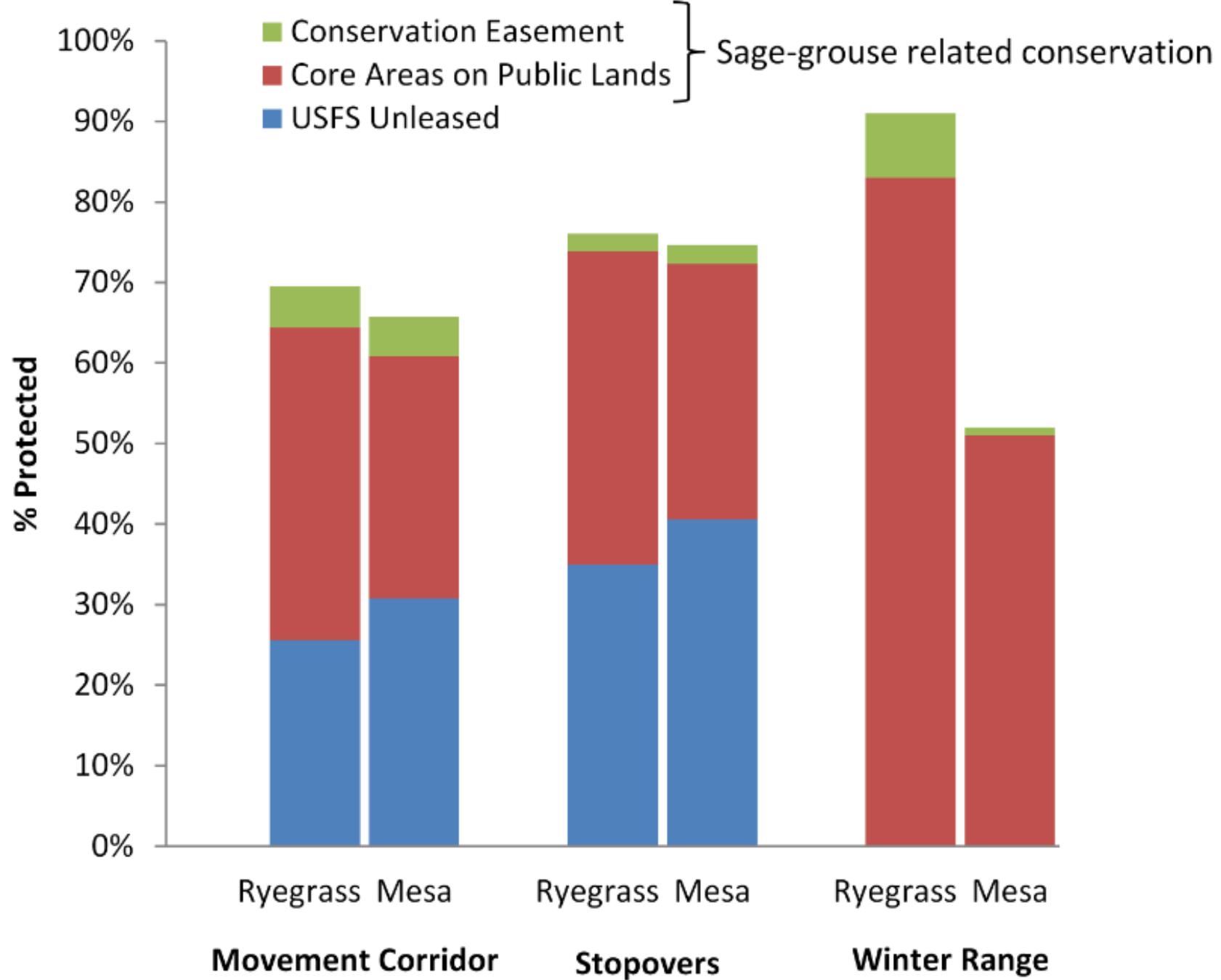
Figure 8. Federal oil and gas leases in Wyoming within sage-grouse core areas (Wyoming Governor's Version 3).



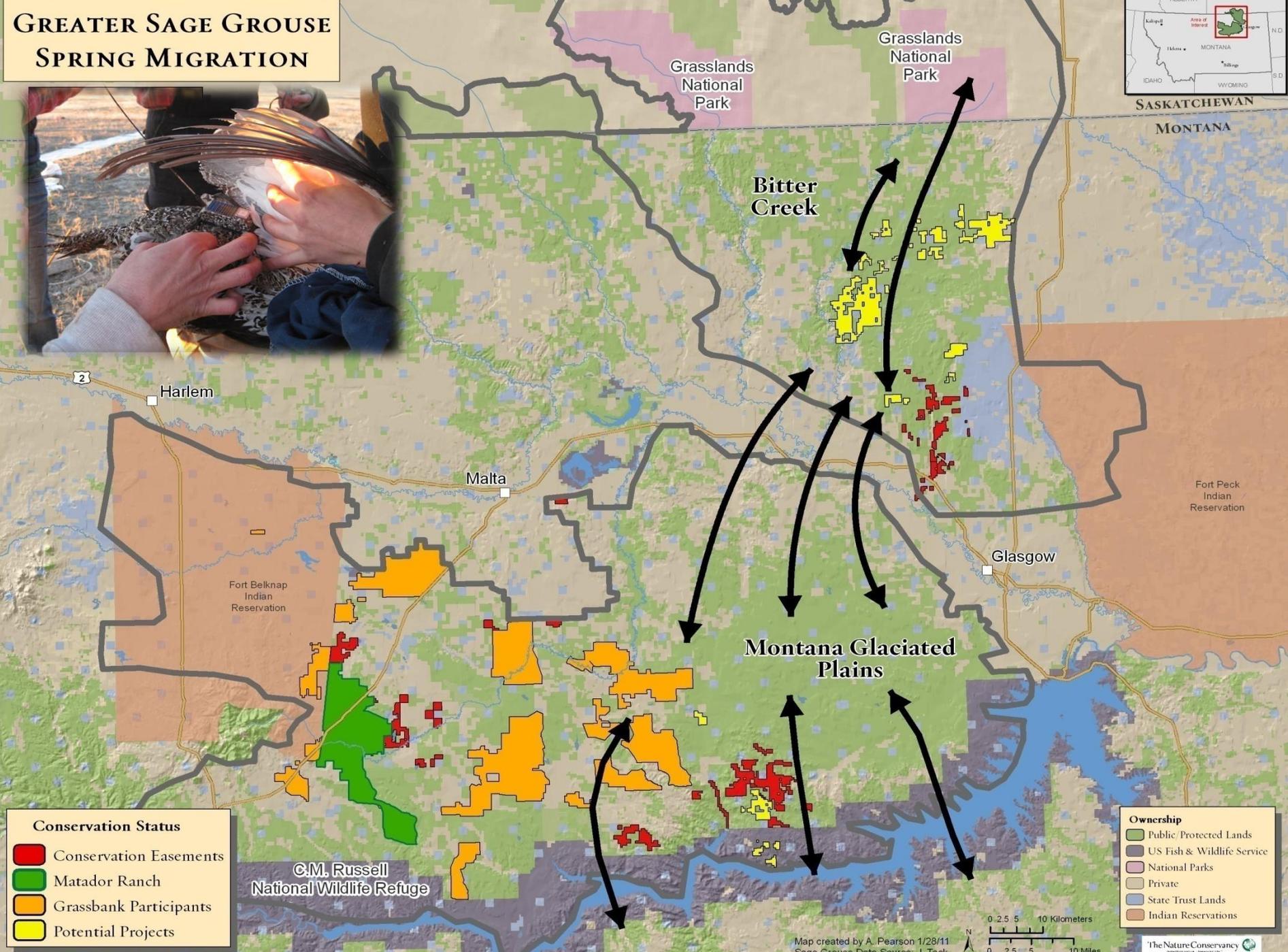
Copeland HE, Pocewicz A, Naugle DE, Griffiths T, et al. (2013) Measuring the Effectiveness of Conservation: A Novel Framework to Quantify the Benefits of Sage-Grouse Conservation Policy and Easements in Wyoming. *PLoS ONE* 8(6): e67261.

doi:10.1371/journal.pone.0067261

<http://www.plosone.org/article/info:doi/10.1371/journal.pone.0067261>



GREATER SAGE GROUSE SPRING MIGRATION



Conservation Status

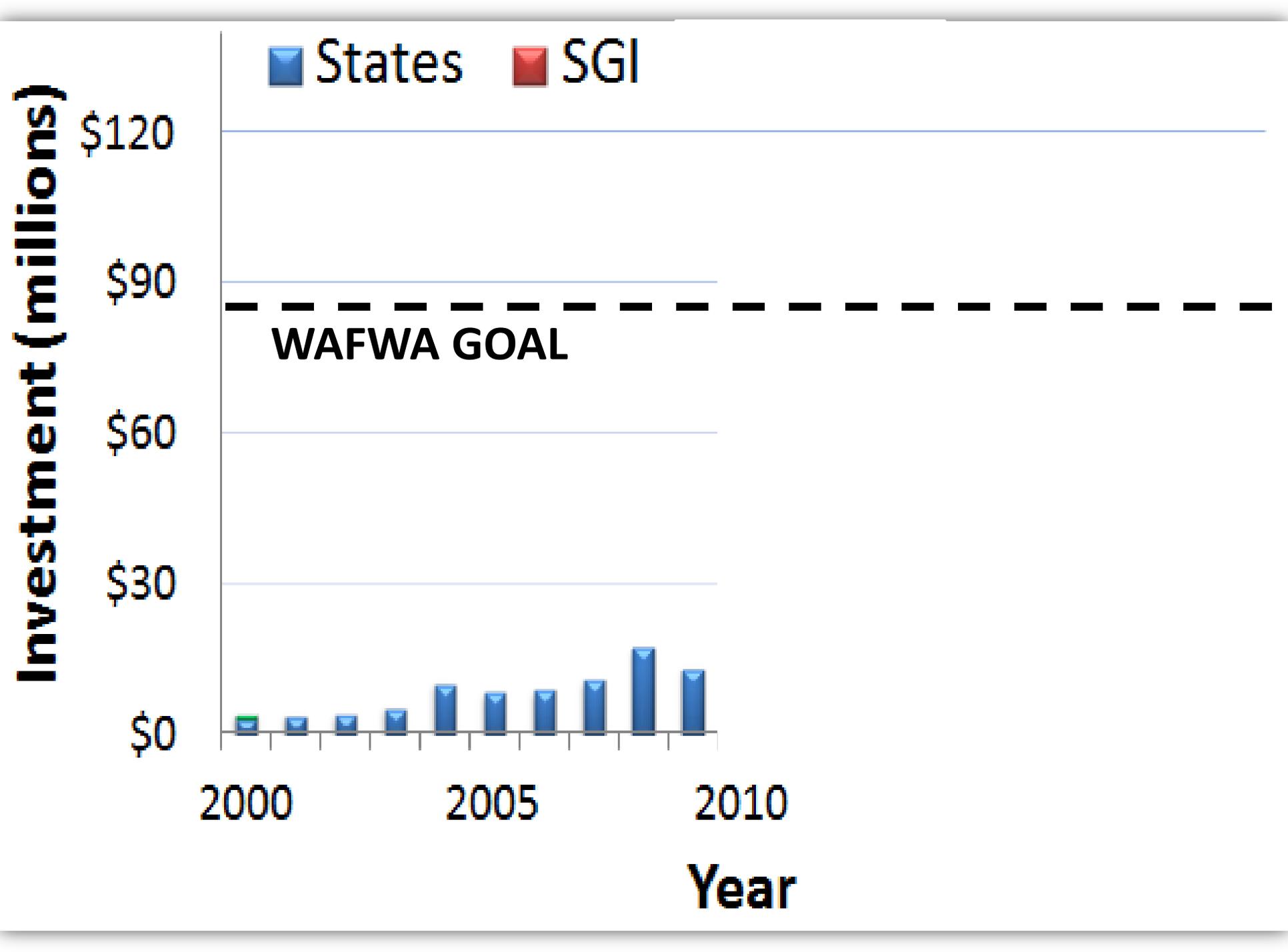
- Conservation Easements
- Matador Ranch
- Grassbank Participants
- Potential Projects

Ownership

- Public/ Protected Lands
- US Fish & Wildlife Service
- National Parks
- Private
- State Trust Lands
- Indian Reservations

Map created by A. Pearson 1/28/11
Sage Grouse Data Source: J. Tack





States SGI

\$120
\$90
\$60
\$30
\$0

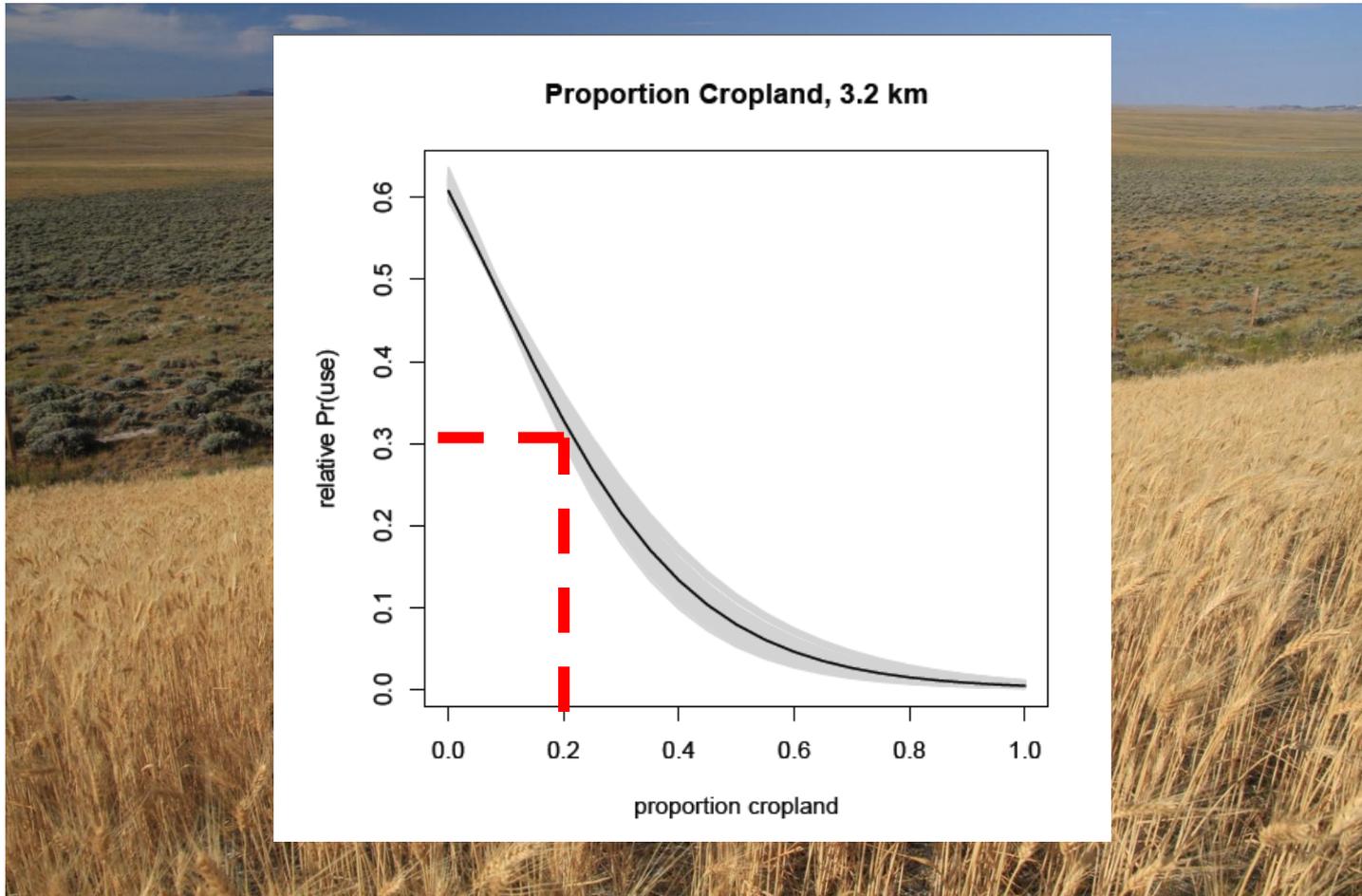
WAFWA GOAL

2000 2005 2010

Year

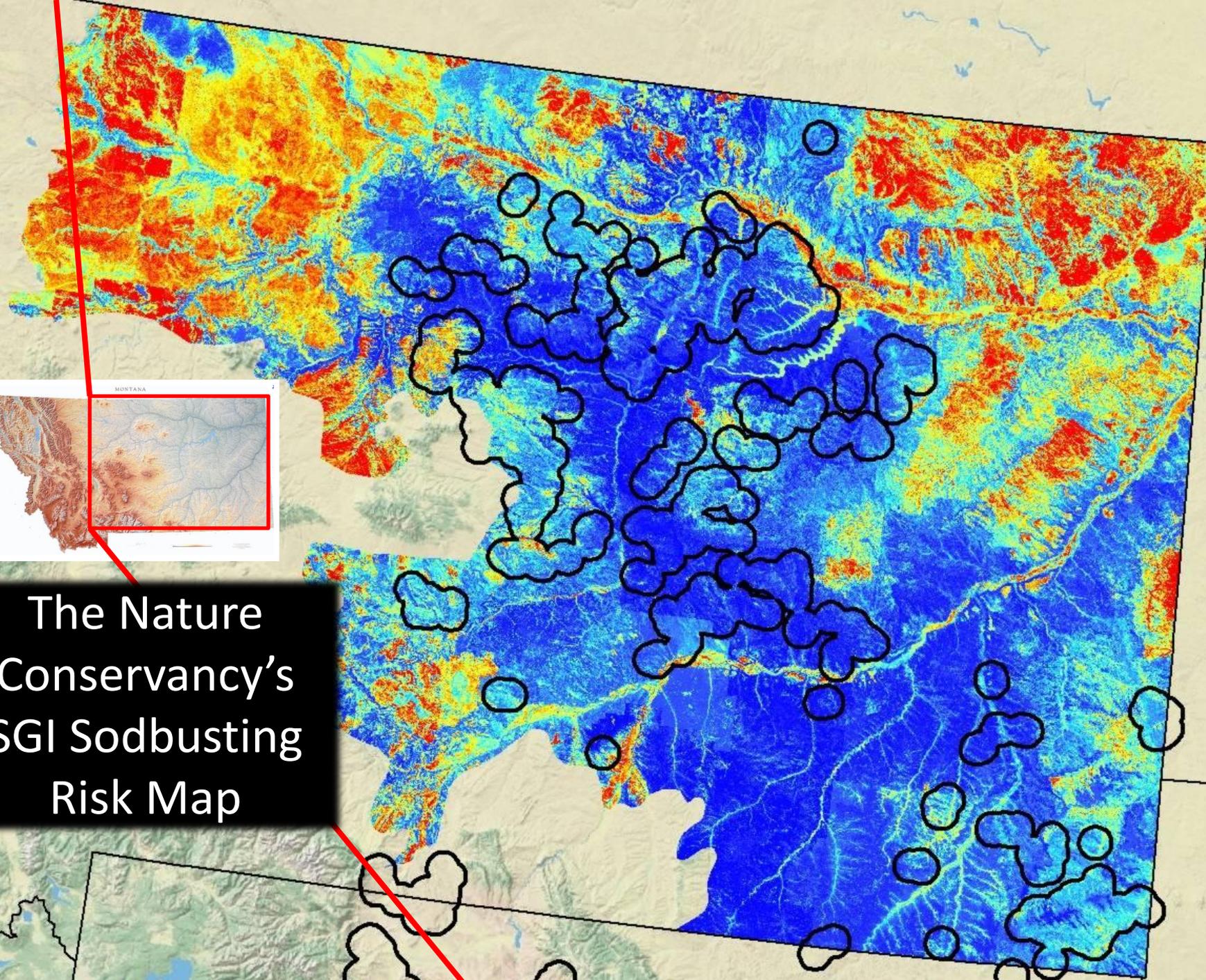
Job # 1

Stop the bleeding by keeping ranchers in business

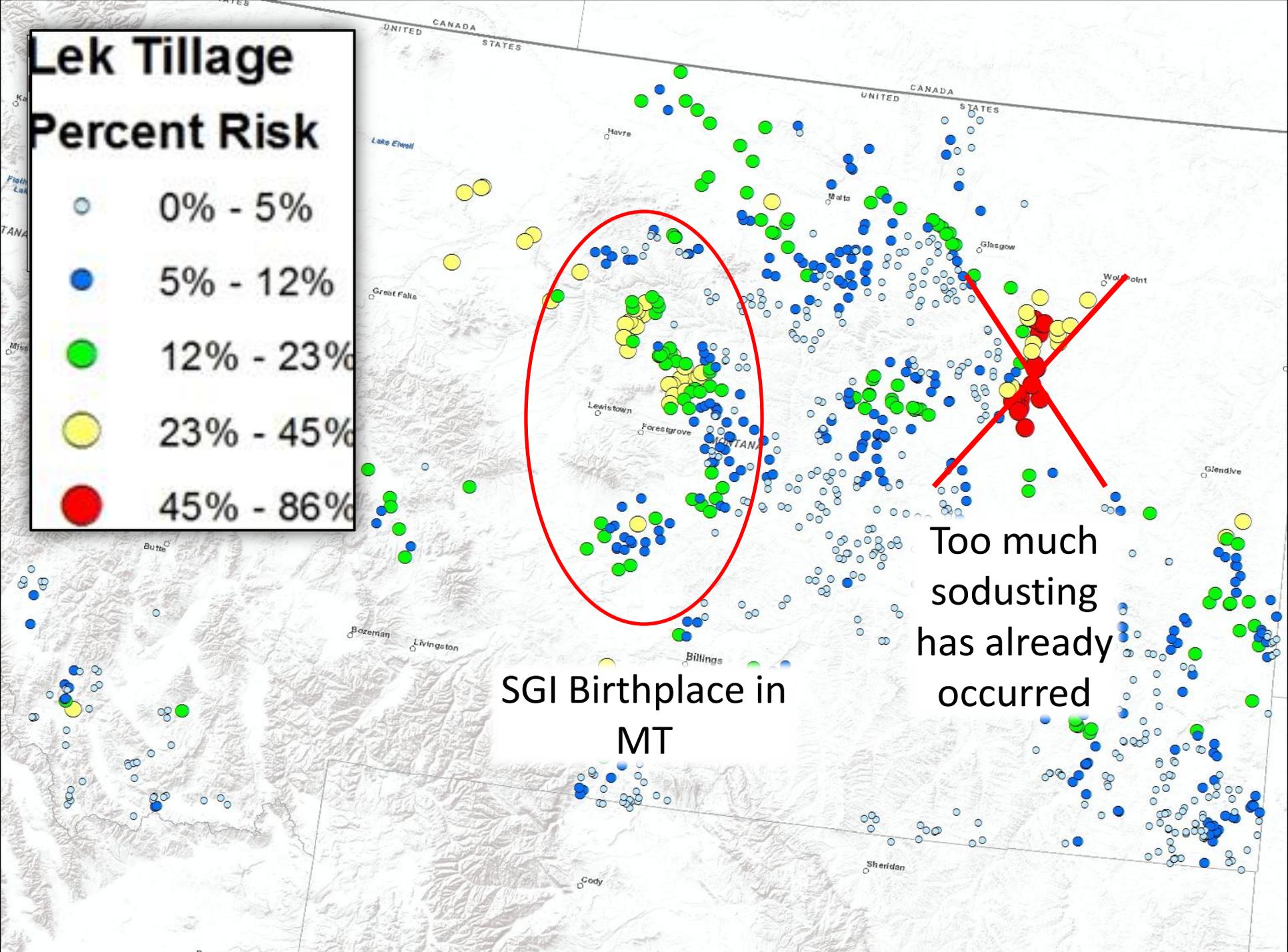




The Nature
Conservancy's
SGI Sodbusting
Risk Map



Lek Tillage Percent Risk



SGI Birthplace in
MT

Too much
sodusting
has already
occurred

Stop the bleeding, *make more birds*



8% increase in
nest success



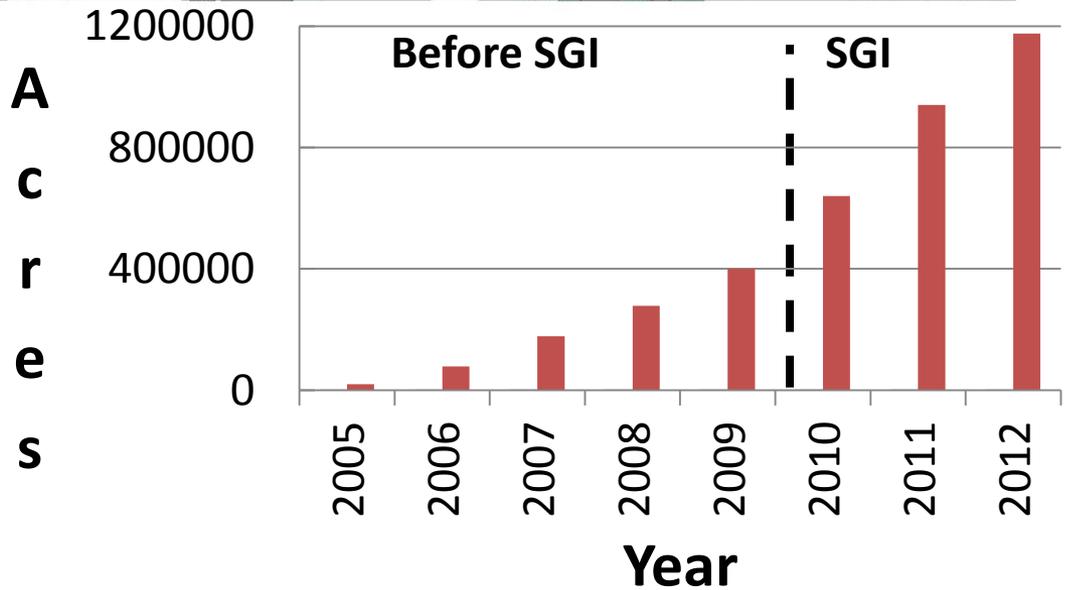
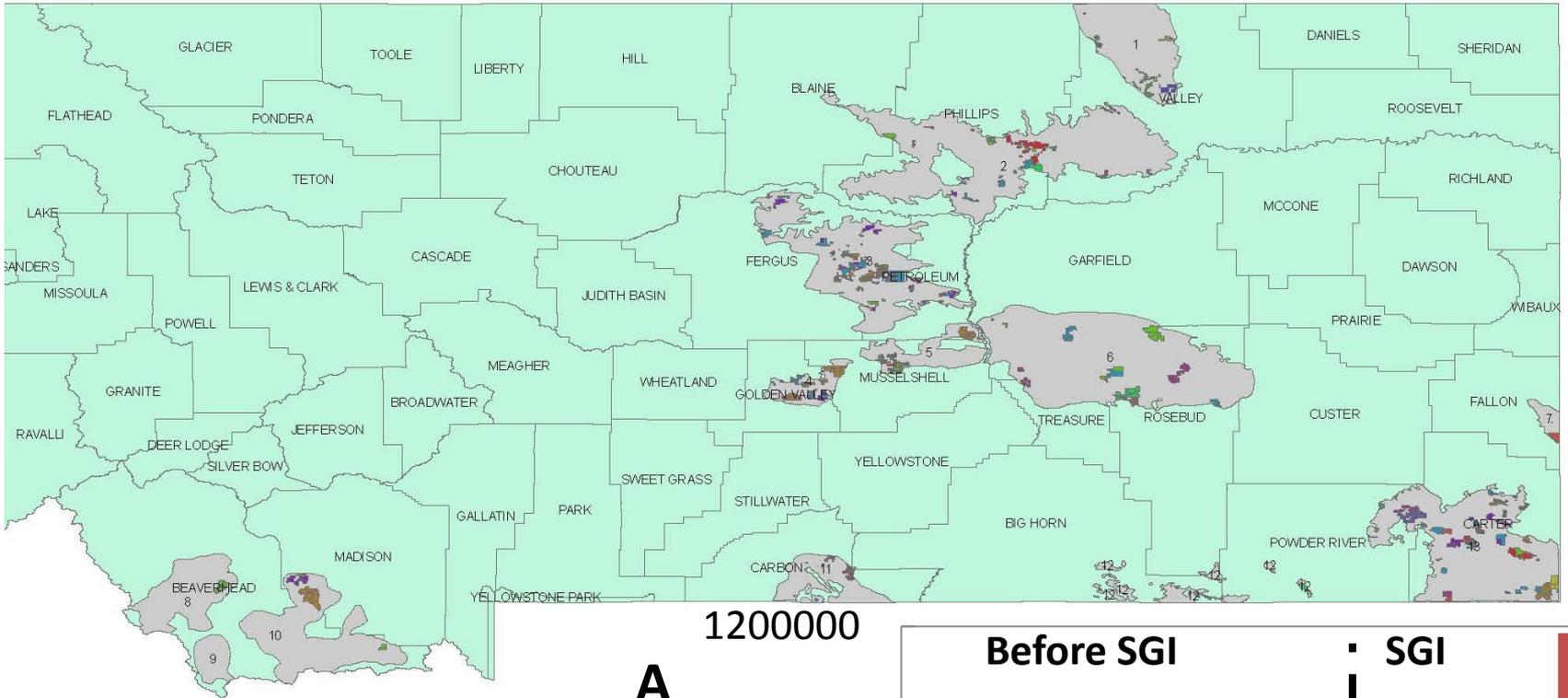
equates to 10% increase in
population growth

Taylor, Naugle and Mills BLM Report 2011

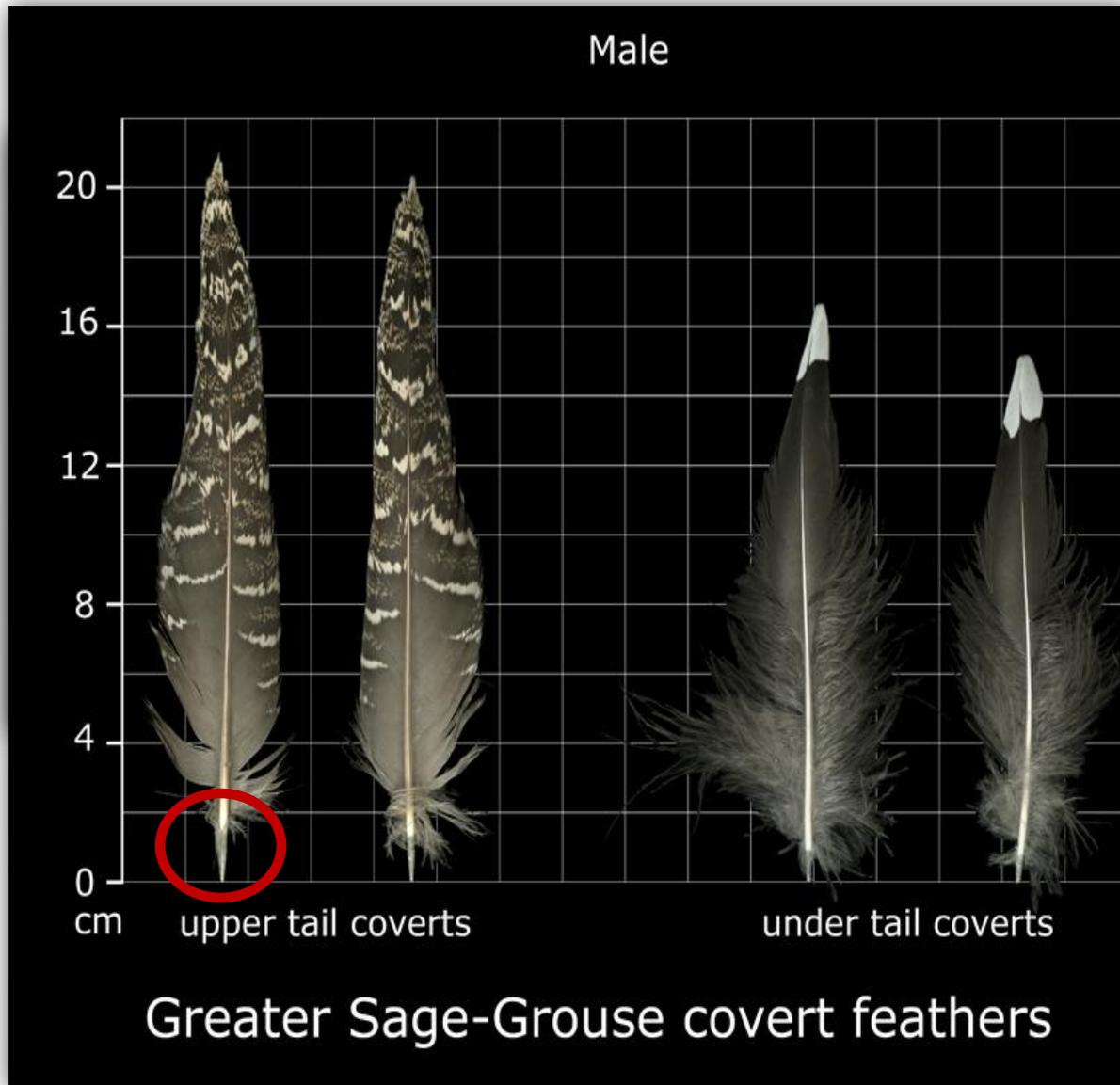
4 years of applied grazing system



Montana Grazing Systems 4x higher with SGI

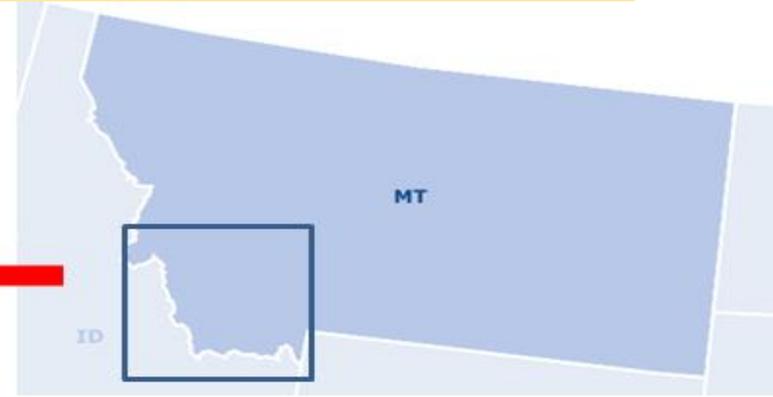
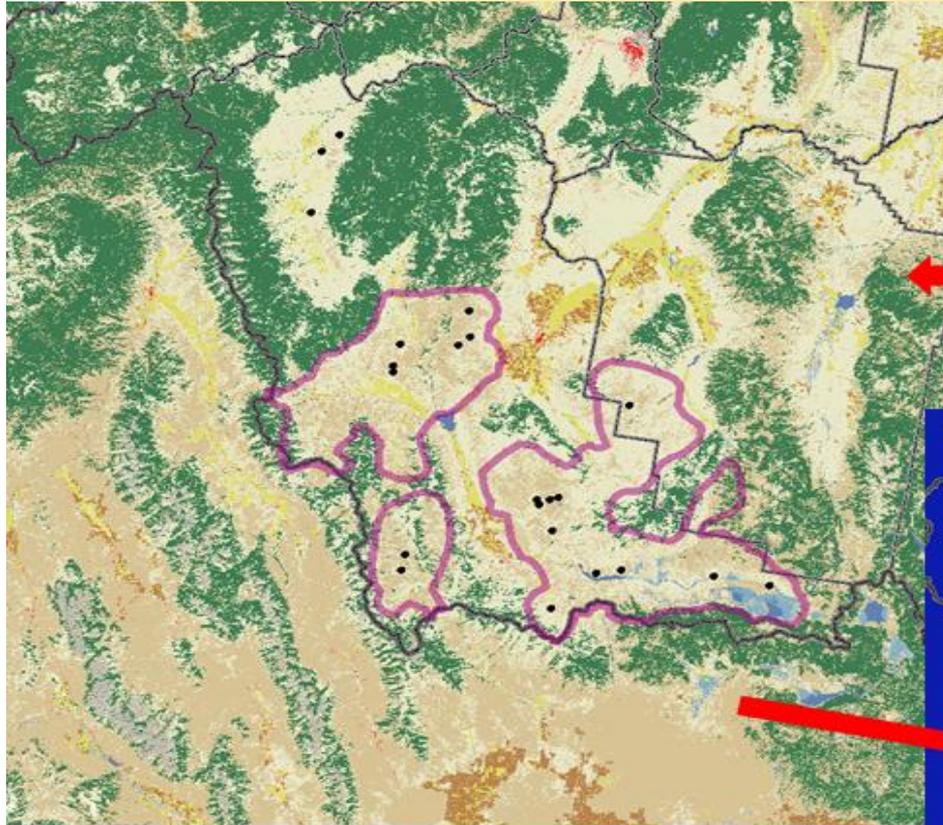


Leave Door Open for Connectivity



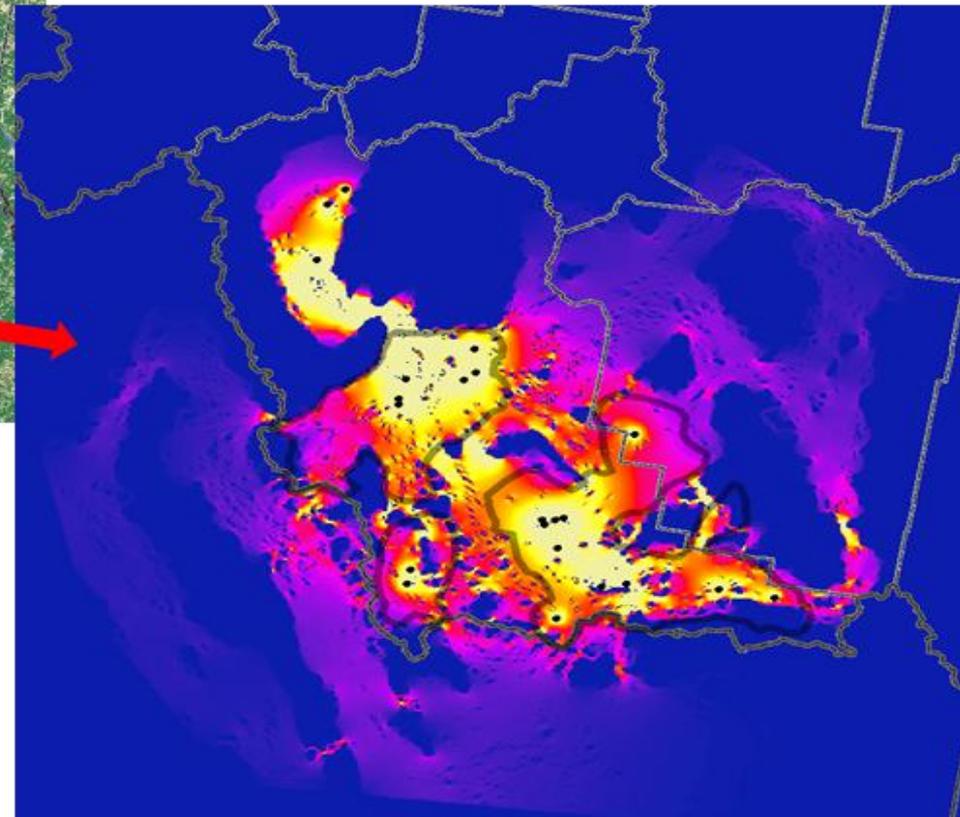
- Blood & Feathers
- Nuclear DNA extracted
- Amplified & genotyped at 9 microsatellite markers

Multiple resistance models will be developed and verified using genetic data:



NLCD 2001 Land Cover Legend

Open Water	Evergreen Forest
Perennial Ice/Snow	Mixed Forest
Developed, Open Space	Shrub/ Scrub
Developed, Low Intensity	Grassland/ Herbaceous
Developed, Medium Intensity	Pasture Hay
Developed, High Intensity	Cultivated Crops
Barren Land	Woody Wetlands
Deciduous Forest	Emergent Herbaceous Wetlands



**Resistance to
Movement
(Gene Flow)**

High



Low

Thanks for your time today!

