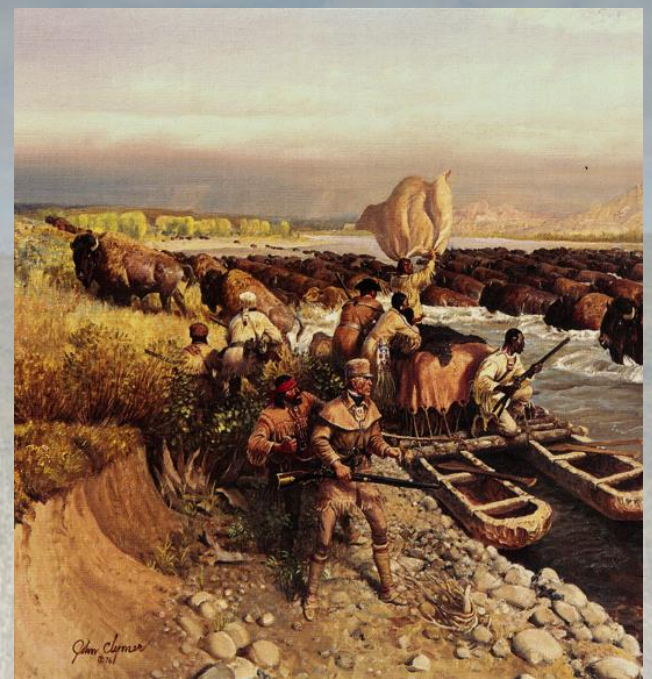
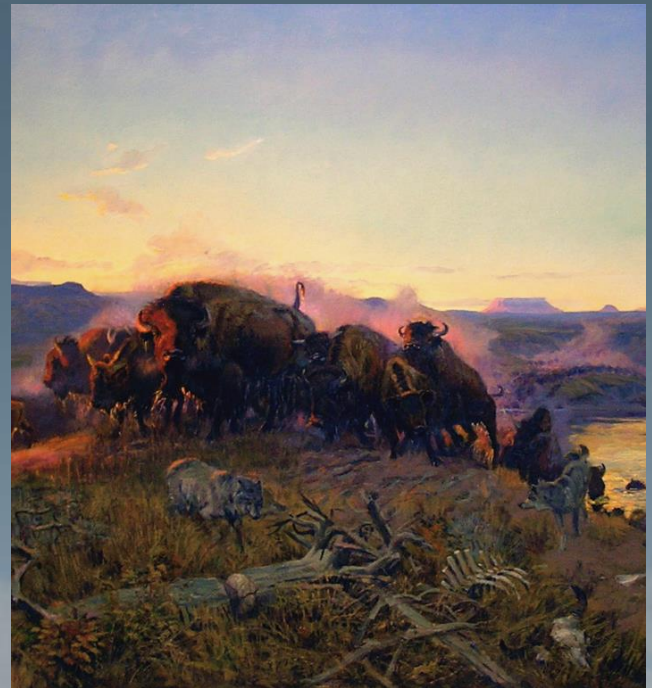
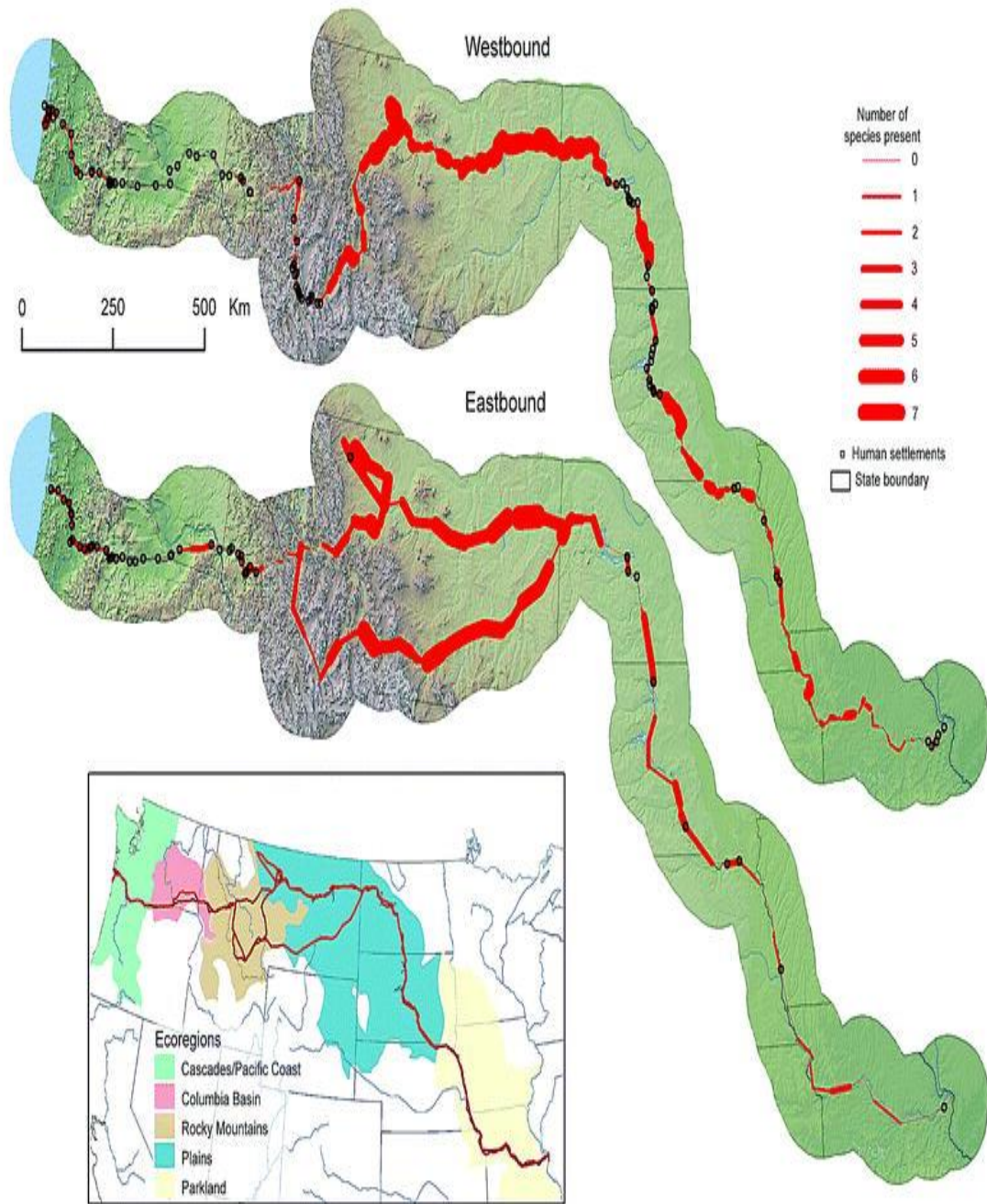


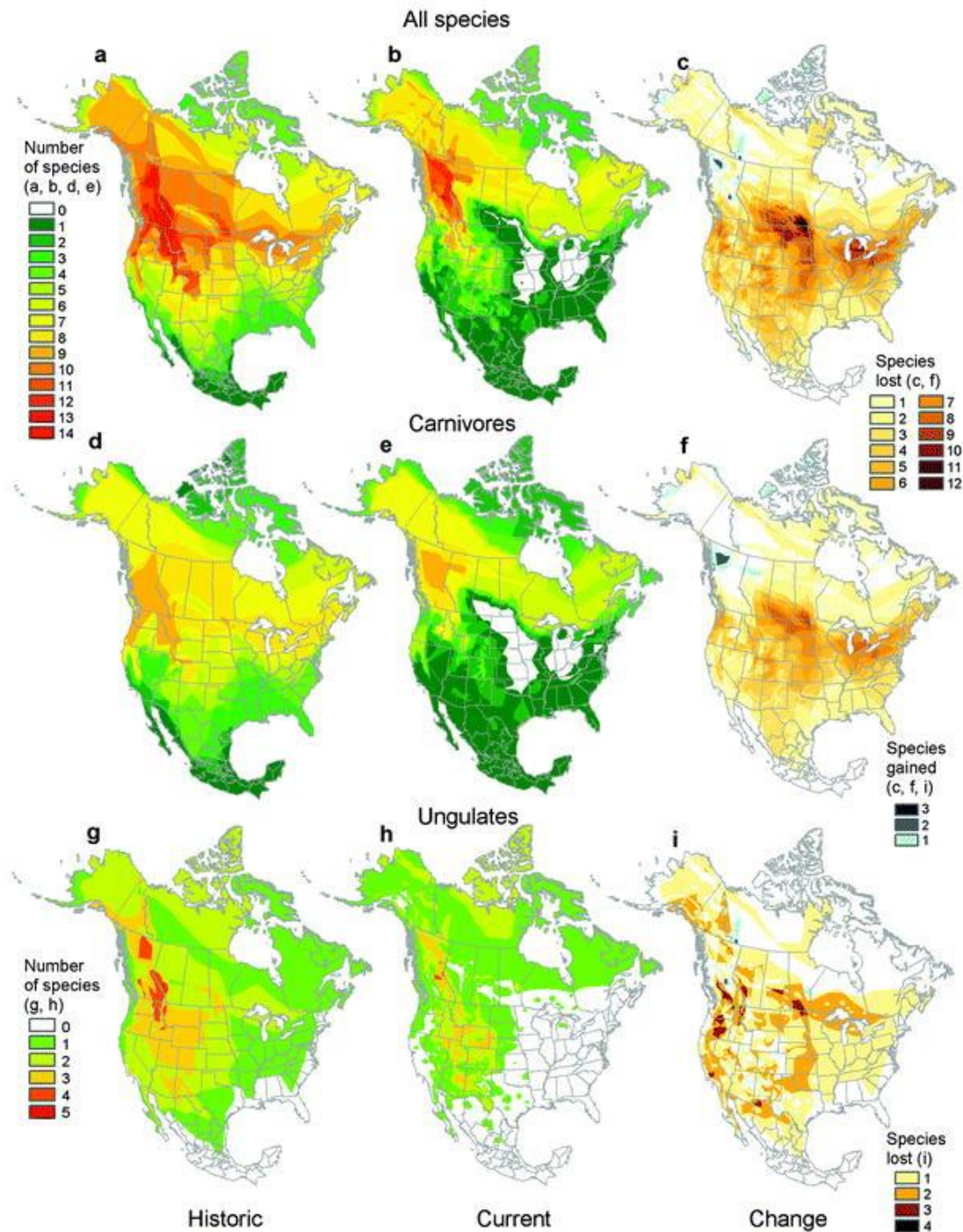
Creating America's Serengeti

Talk objectives and relevance

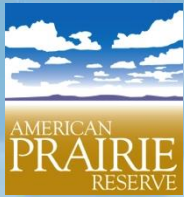
- Large scale Bison conservation
- Bison as flagships for large scale conservation – important endeavors
- Solutions for IBMP/APR needs – science, innovation, collaboration
- Montana and global conservation
- Ecologically and economically sustainable ranching



- More species have been extirpated from at least part of the grasslands than any NA biome.
- 74% of 39 obligate species are imperiled.
- Of 17 carnivores and ungulates, grasslands lost more on average and greater maximum species loss than any biomes.

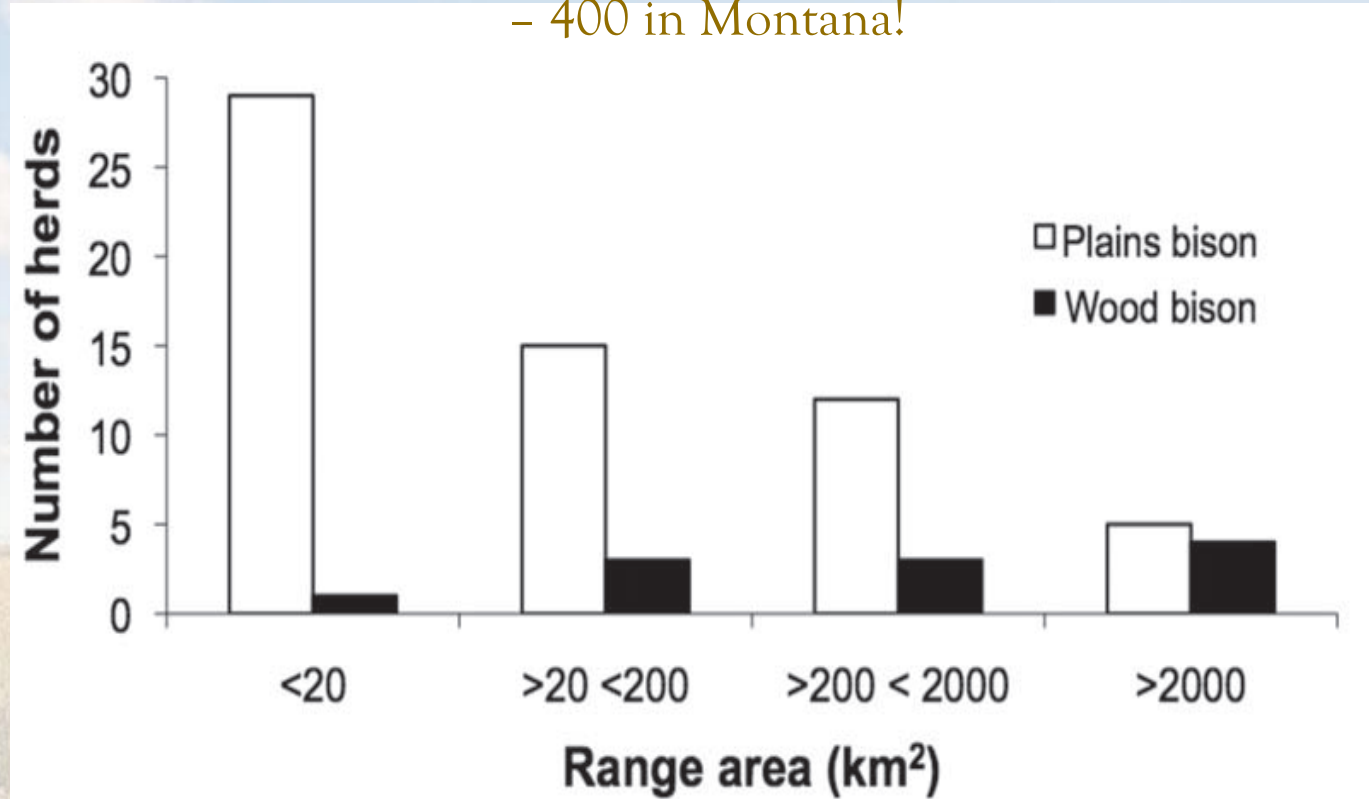






Conservation Concerns: *Ecological Extinction*

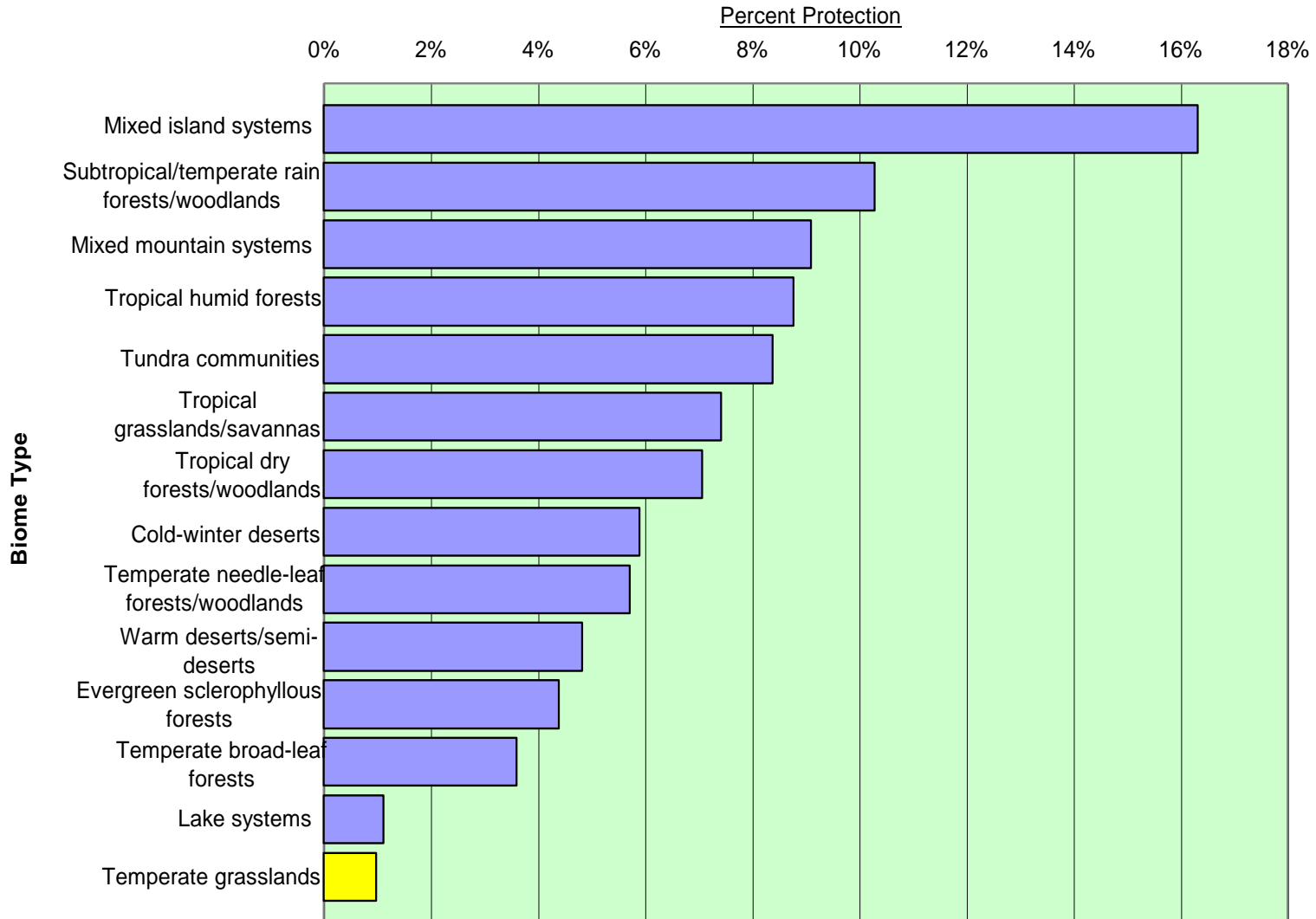
Occupy 0.0002% of original range
- 400 in Montana!





Protected Area Coverage by Biome

M. Greene & J. Paine 1997; WWF analysis





The Northern
Great Plains

Kazakh Steppe

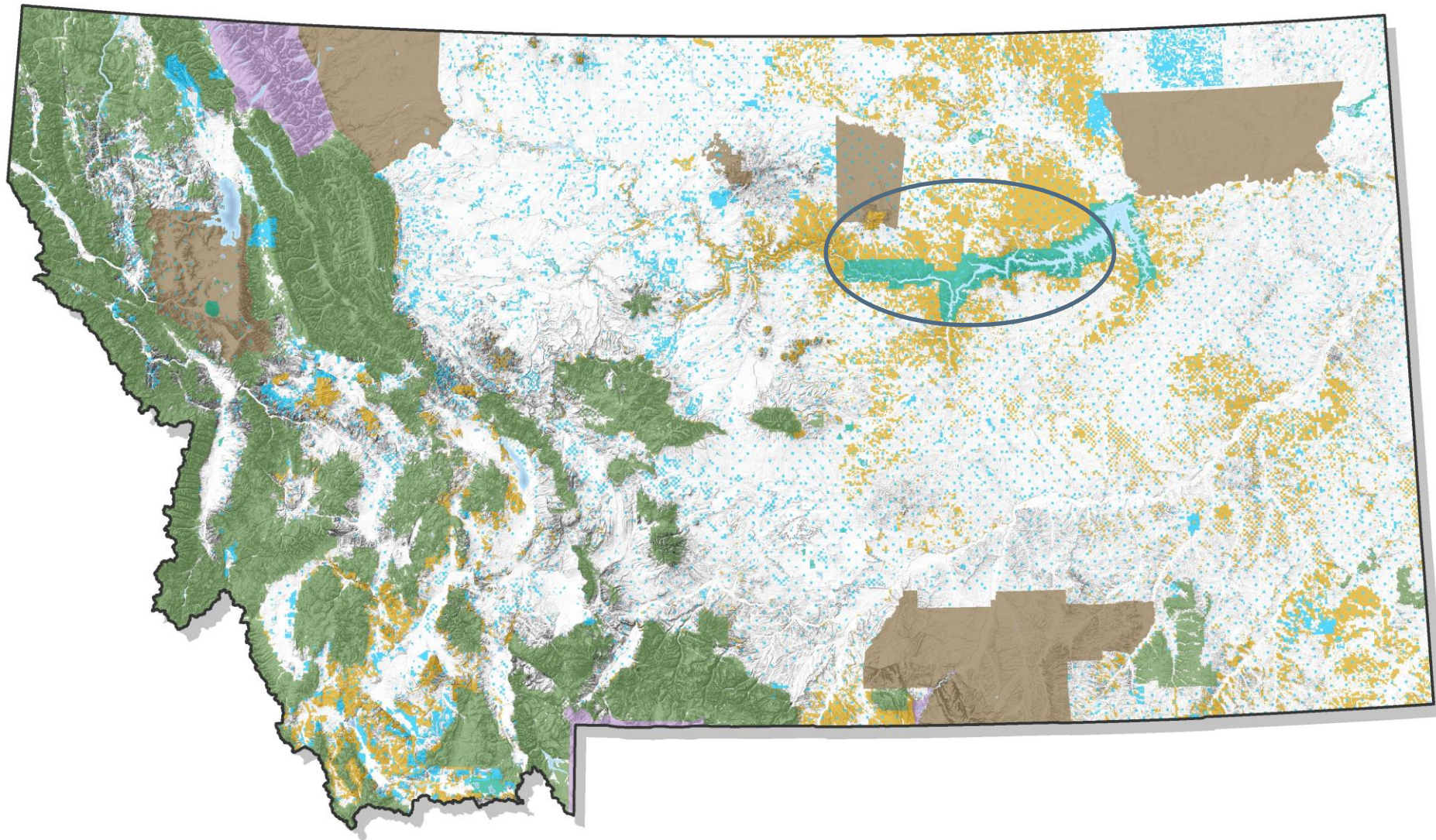
Mongolian Steppe







Patagonian
Steppe



“I could see the blue chain of the Great Lakes at the north – the Rocky Mountains and beneath them and near their base, the vast, and almost boundless plains of grass, which were speckled with the bands of grazing buffaloes! What a beautiful and thrilling specimen for America to preserve and hold up to the view of her refined citizens and the world in future ages! A nation’s park, containing man and beast, in all the wild and freshness of nature’s beauty!” – George Catlin (1796-1872)

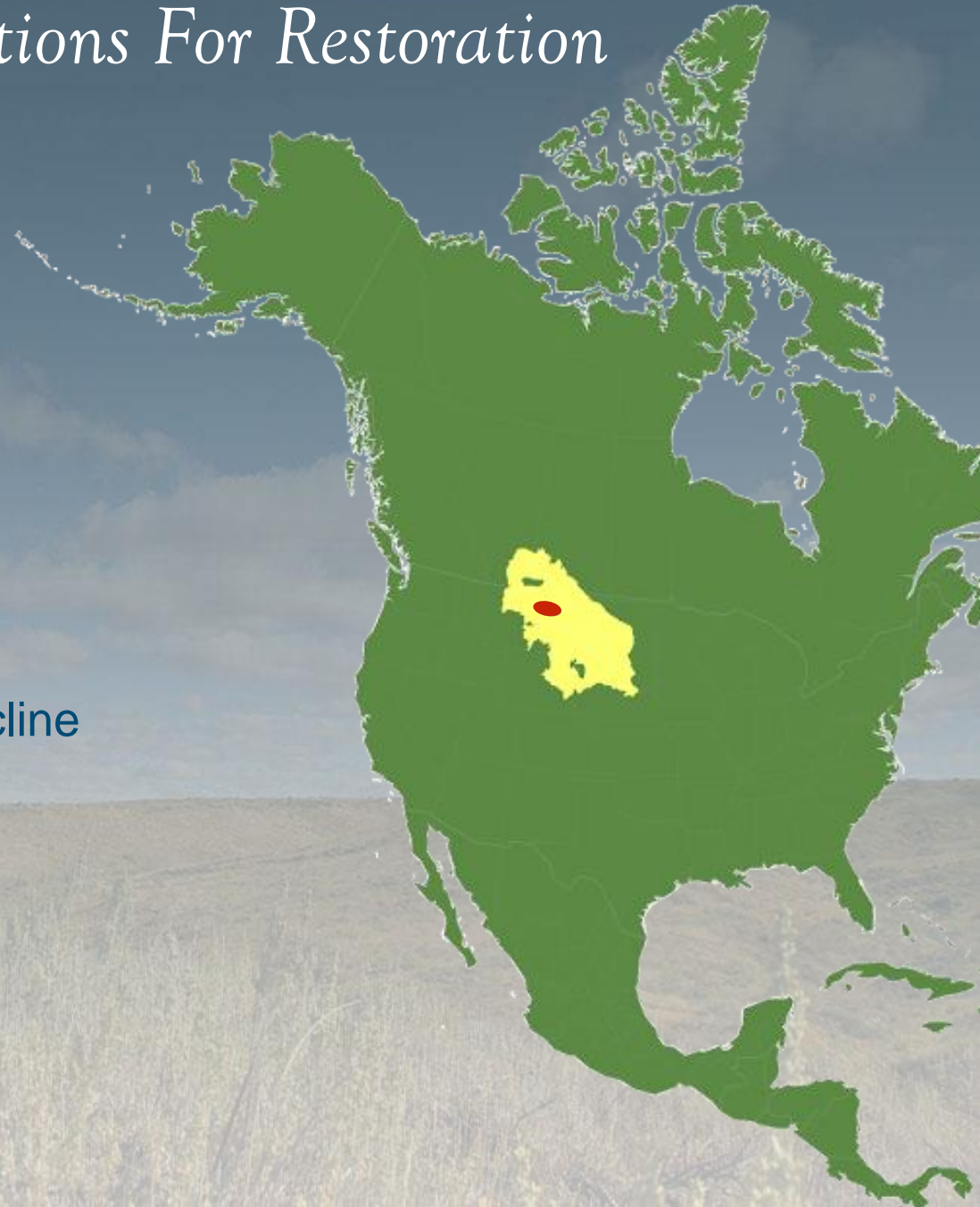


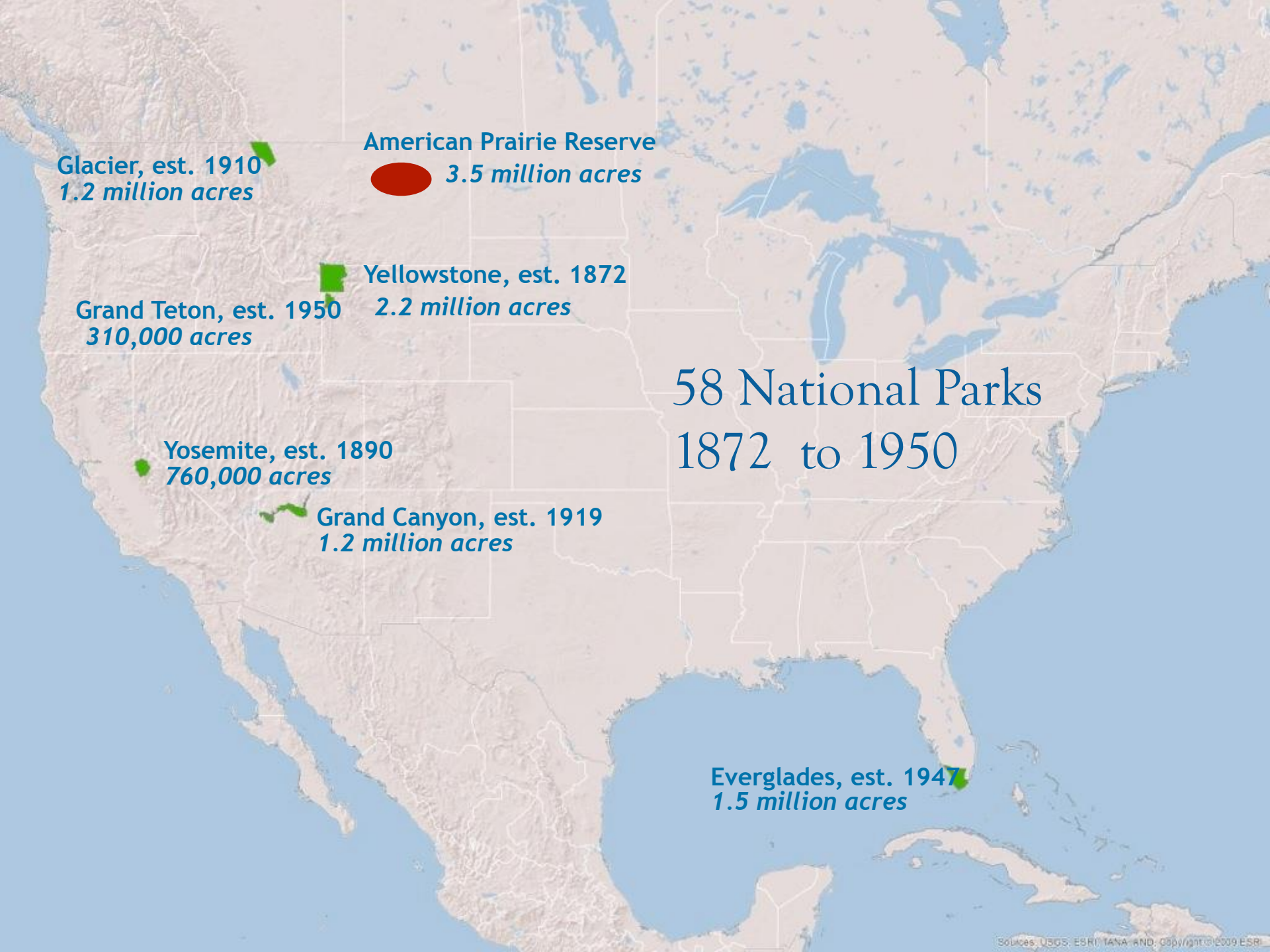


- | | | |
|---|--|--|
|  Indian Reservation |  National Park Service |  US Fish and Wildlife Service |
|  Montana State Trust Lands |  US Bureau of Land Management |  US Forest Service |

Ideal Conditions For Restoration

- Unique wildlife history
- 95% untilled
- High % of Public Land
- 90 Year Trend: Steady Decline of Human Population
- Affordable Land Prices





Glacier, est. 1910
1.2 million acres

American Prairie Reserve
3.5 million acres

Grand Teton, est. 1950
310,000 acres

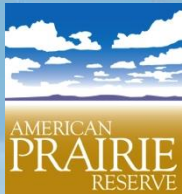
Yellowstone, est. 1872
2.2 million acres

Yosemite, est. 1890
760,000 acres

Grand Canyon, est. 1919
1.2 million acres

58 National Parks 1872 to 1950

Everglades, est. 1947
1.5 million acres



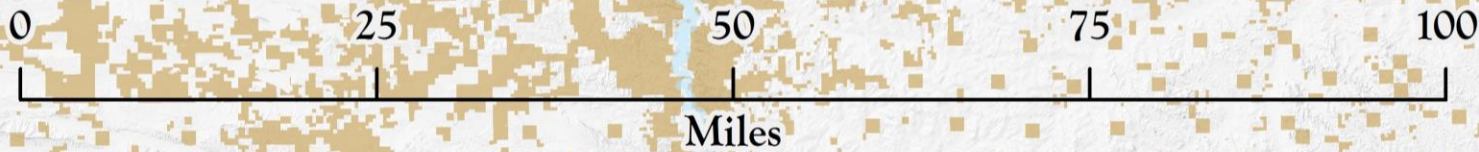
Three Areas of Strategic Focus







Habitat Accumulation

Biodiversity Restoration

The Human Element

Wind Cave National Park



-  Current APR Deeded/Leased
-  APR Acquisitions
-  National Wildlife Refuge
-  National Monument
-  Indian Reservation
-  Public Land



\$1 Billion

15
acres

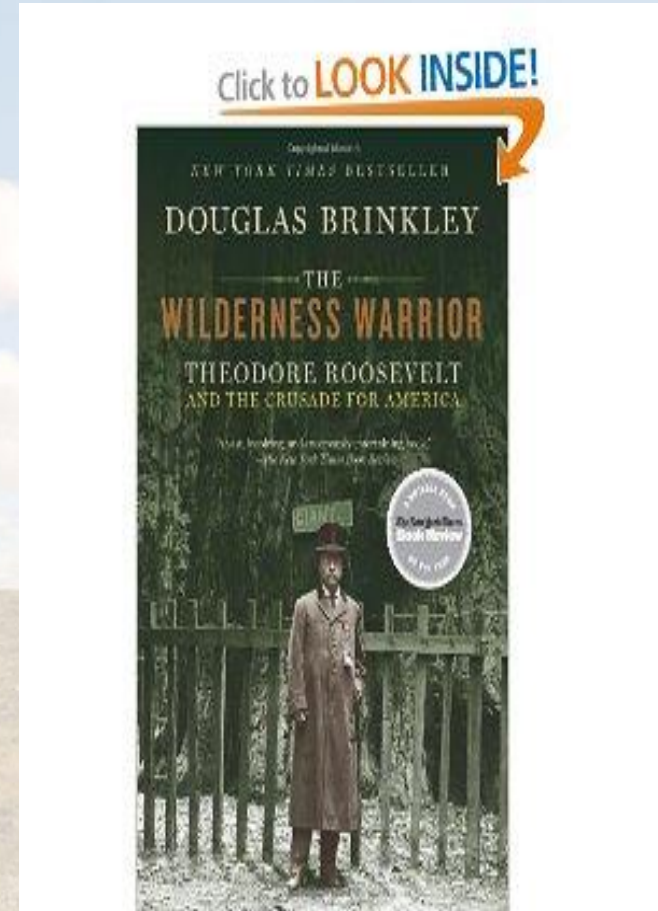


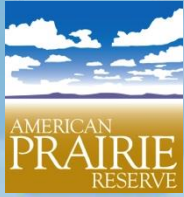
\$500 Million

3,500,000
acres

American Prairie Reserve

- National Geographic:
“most ambitious conservation project in
NA”
- Largest wildlife reserve in lower 48





The Palette





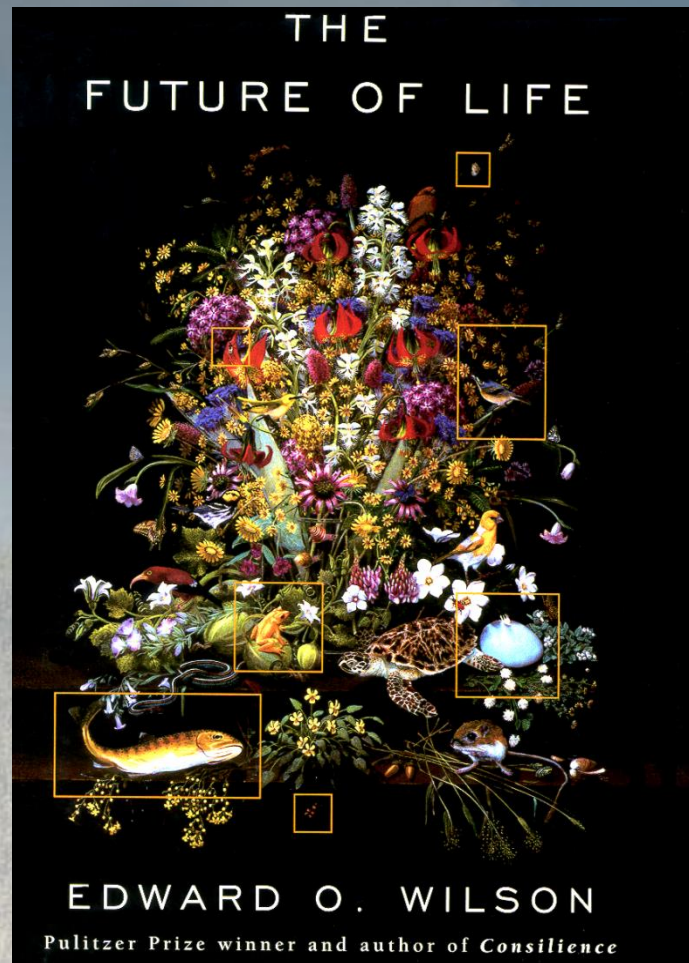


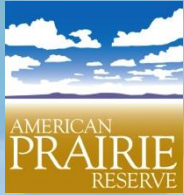
Vision

- Largest wildlife populations on continent; a wildlife spectacle
- Ecological capacity, function, resiliency reached for all species
- Most successful, inspiring restoration and conservation program anywhere
- Rising benchmarks
- Populations driven by habitat not humans



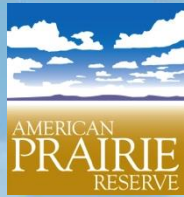
“There can be no purpose more inspiring than to begin the age of restoration, reweaving the wondrous diversity of life that still surrounds us.”





Models & Ideals



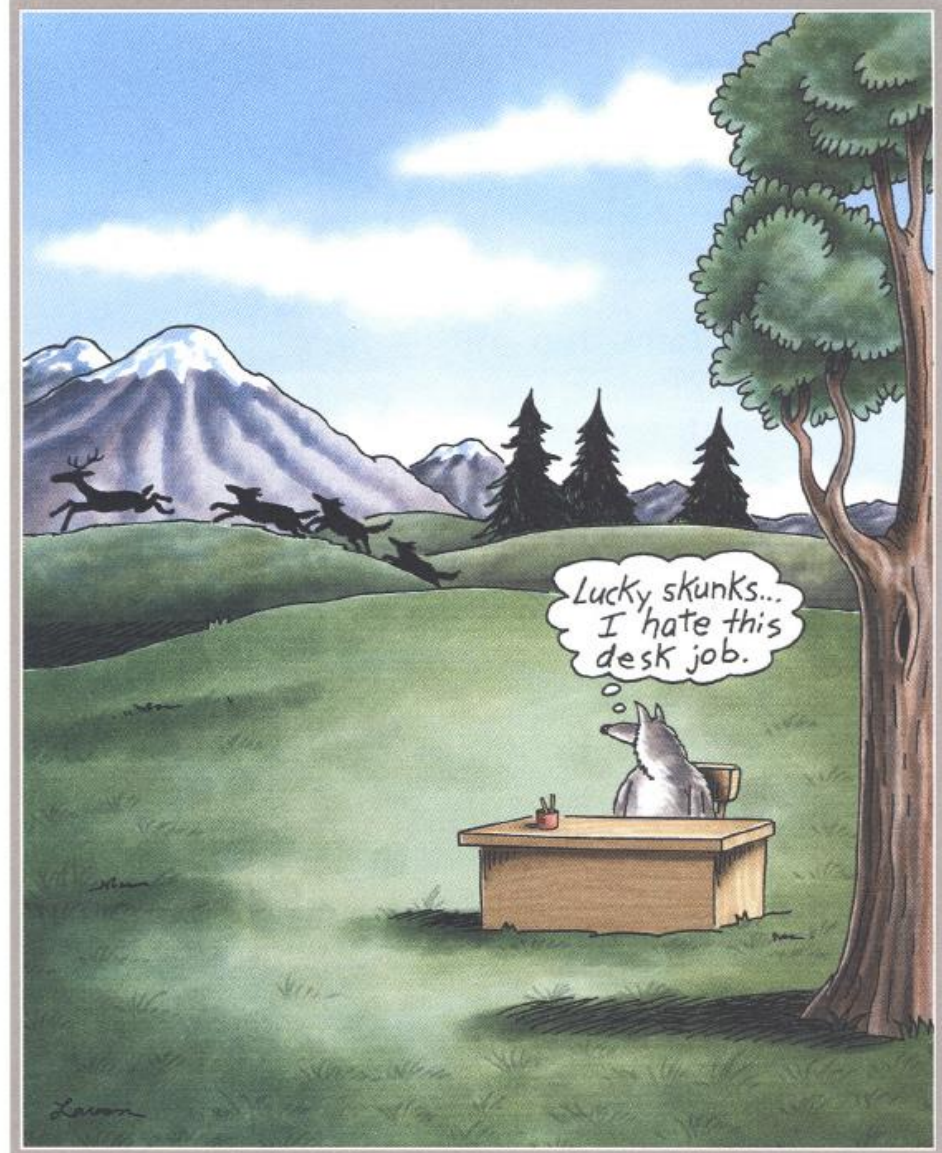


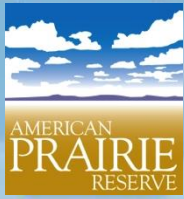
Draft Goals - New Paradigm, Grand & On the Offense

- Establish the standard for proactive conservation.
- Create first proactively managed population of carnivores in the US.
- Create first ecologically and economically sustainable and intact ecological system.
- Develop globally applicable payment for ecosystem services model for wildlife.

Approach

- Action on the ground: reintroduction, reduce mortality, improve habitat
- Innovation – incentives, create sources, proactive
- Science driven & adaptive
- Partners – science center
- HABITAT, HABITAT, HABITAT





Action

- Determine potential (vision and science)
- Assess threats (science)
- Reduce threats with innovation, hard work and persistence (LAND, sociology, economics, politics)

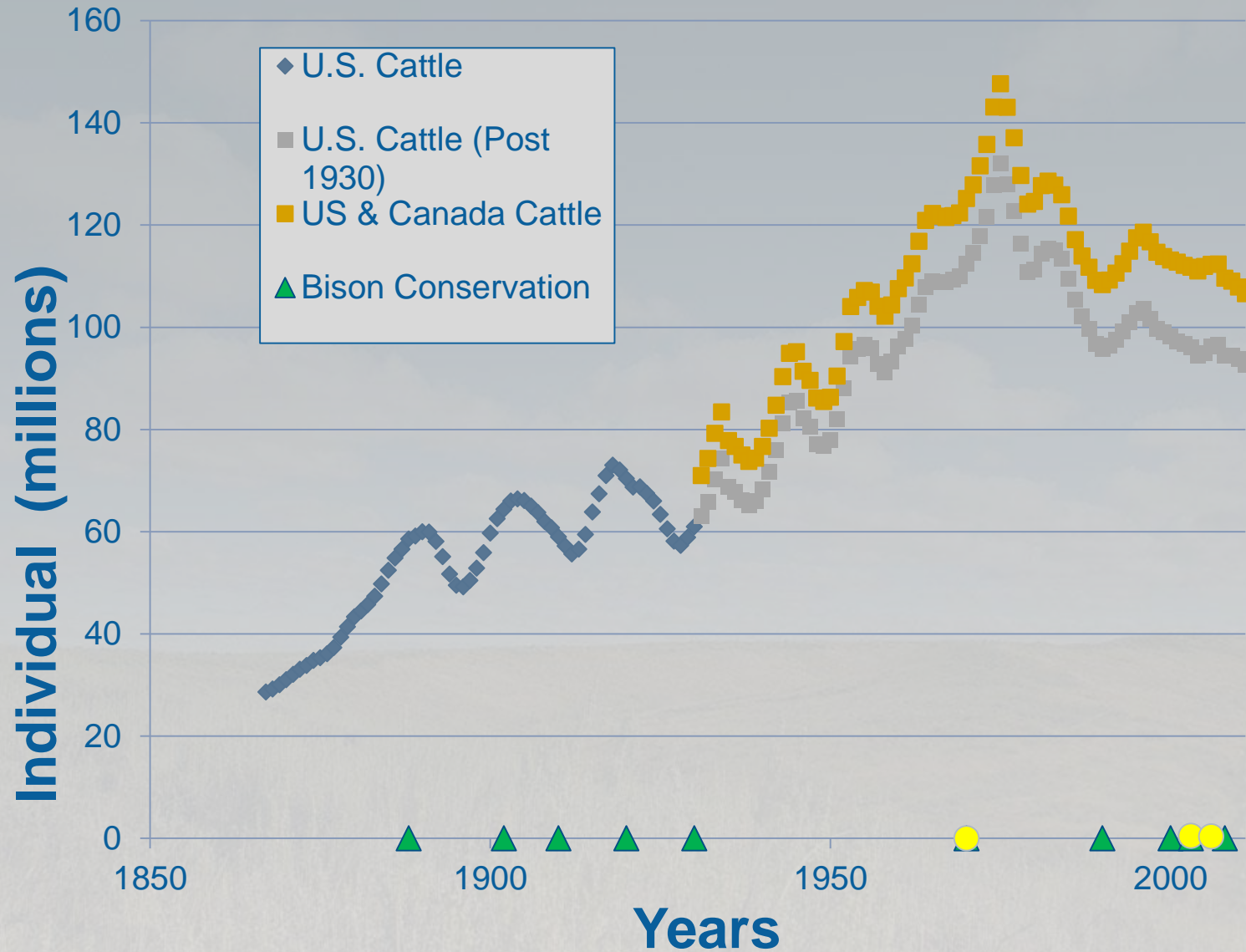




To develop a restoration plan for this vision, we need to answer these questions:

1. *How would we define success in terms of comprehensive biodiversity restoration?*
2. What are the ***most important biodiversity components*** and ecological processes to focus on in terms of stewardship to meet our long-term and intermediate conservation goals?
3. ***How big and with what configuration*** of habitats/biotic communities must the reserve be to meet our long-term goal of comprehensive biodiversity restoration? What conservation milestones can be achieved along the way at progressively larger geographic scales and longer time frames?
4. What does this analysis tell us about ***how to assemble and manage*** the land base in an economically efficient manner over the next 15-20 years?
5. How do we ***develop an adaptive management approach*** by testing alternative management scenarios and tracking success in meeting biodiversity conservation goals in the APR? How can what we learn here ***contribute to the field of restoration ecology*** and to restoration efforts underway in other ecosystems?

Primary Limiting Factors





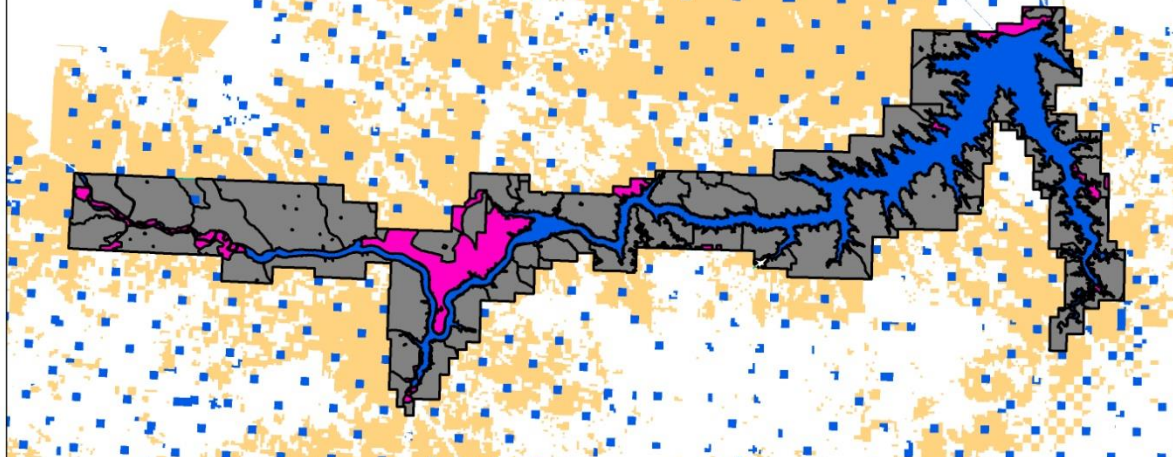
14,000
sheep and
60,000
cows in
Garfield
county

CMR_ORIG_HU_1986_EIS

ANNUAL_GRZ

NOT SINCE NWR

YES

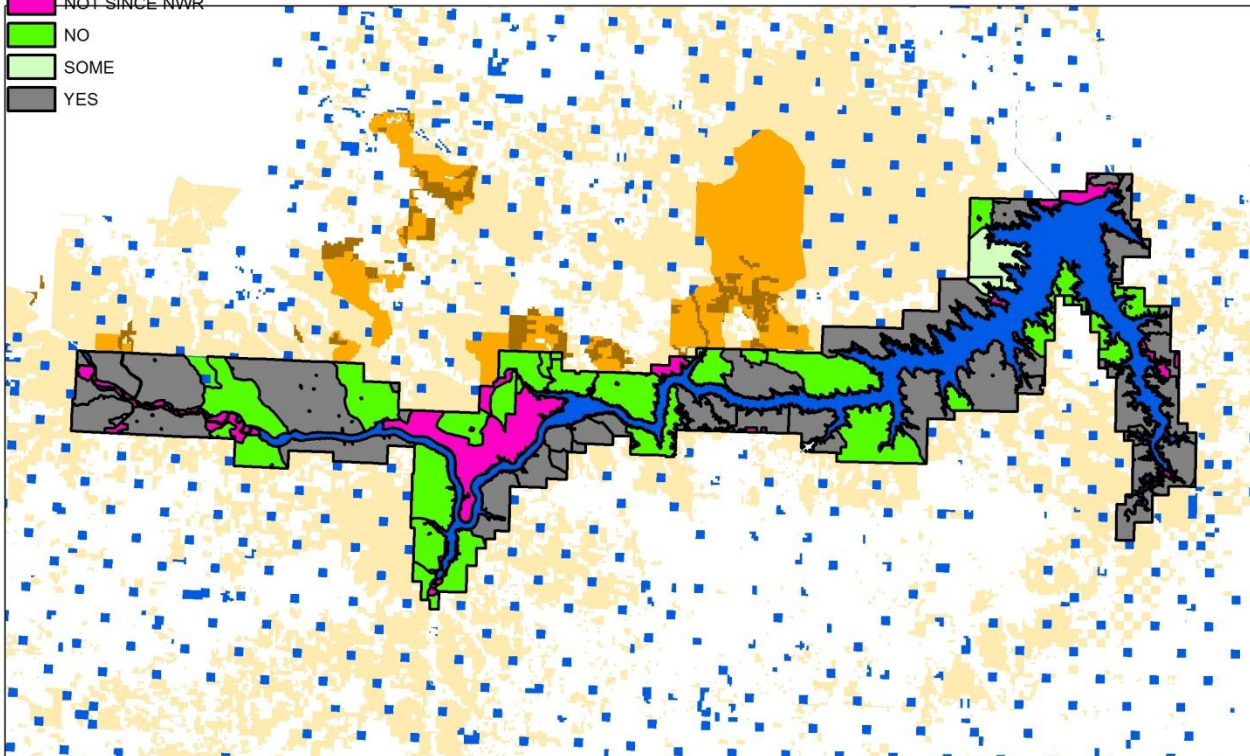


NOT SINCE NWR

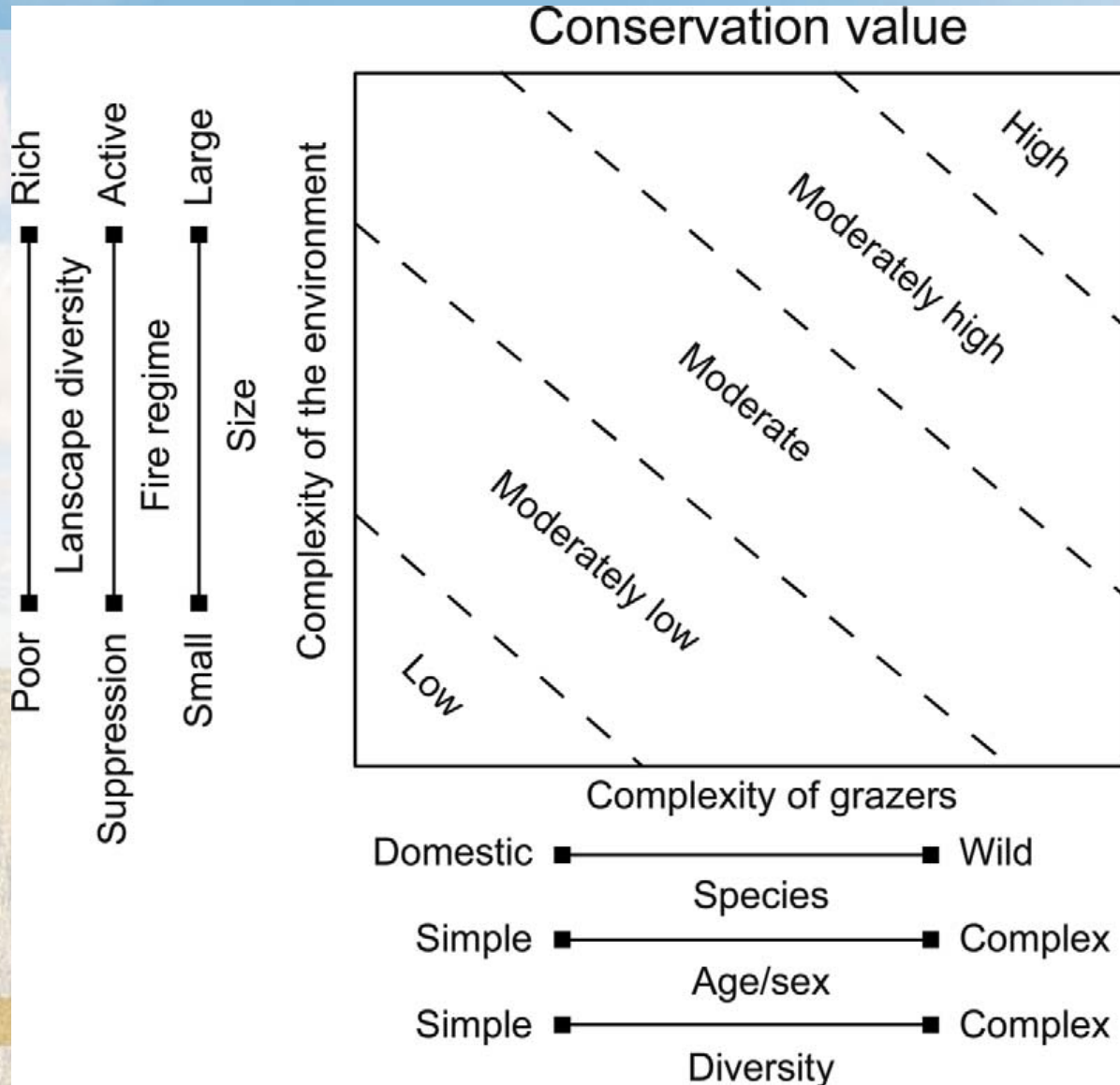
NO

SOME

YES



Hypotheses



The Freese Scale: 10 Ecological Conditions

	1	2	3	4	5	6	7
1. SOIL / VEG MGMT	High Manipulation				Low Manipulation		
2. HERBIVORY	Homogenous				Heterogenous		
3. FIRE	None				Well Integrated		
4. HYDROLOGY	Artificial				Natural		
5. VARIABILITY	Minimal				High		
6. HERBIVORES	Mostly Domestic				High Native		
7. NATIVE UNGULATES	Harvested/Removed				Decompose on Landscape		
8. PREDATORS	None / Few				Natural Populations		
9. FRAGMENTATION	Highly Fragmented				No Fragmentation		
10. UNIT SIZE	Small				Large		

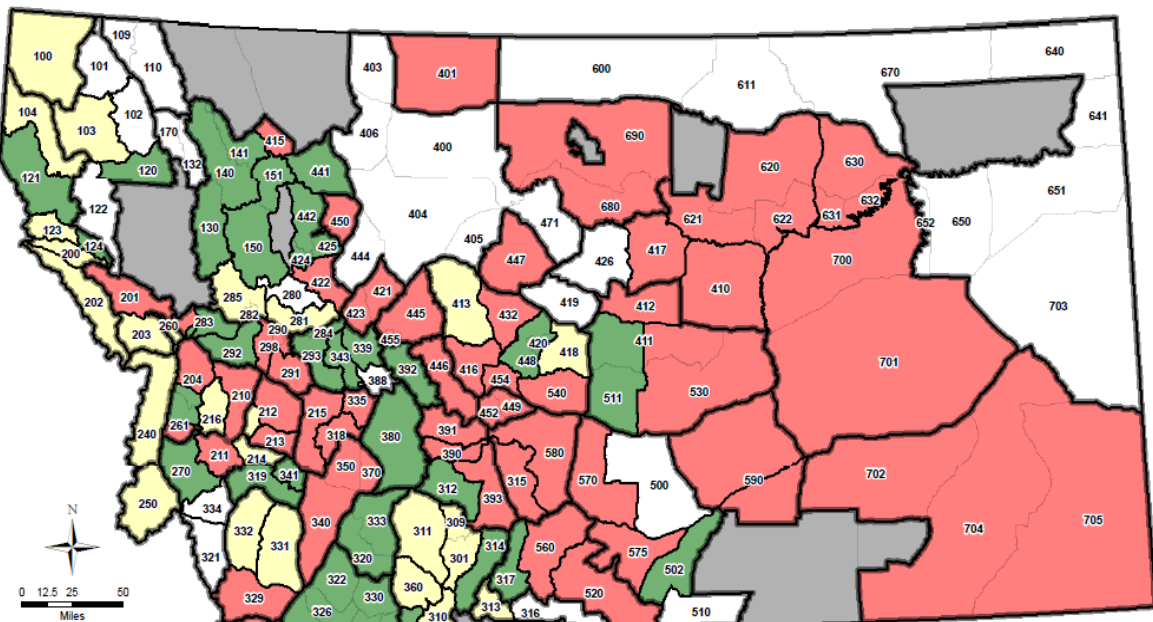
Freese Scale For Grassland Biodiversity



Commodity Centered
Management

Biodiversity Centered
Management

Elk Population Objective Status by Hunting District - 2013



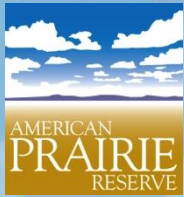
Elk Objective Status

- Below Objective
- At Objective
- Over Objective
- Not a Hunting District
- Not Applicable (No stated objective, no wintering elk or no survey flown)
- Elk Survey Unit Boundaries
- Elk Management Unit Boundaries

MANAGE
TO THE
MINIMUM

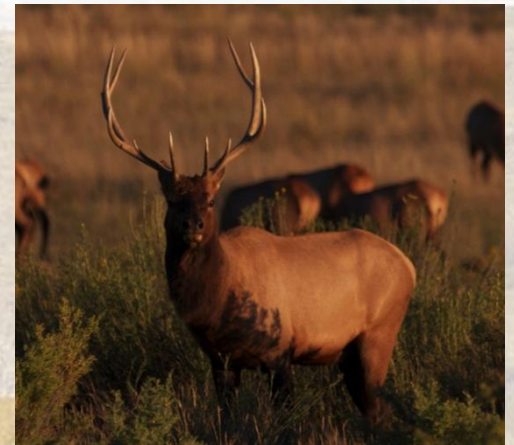
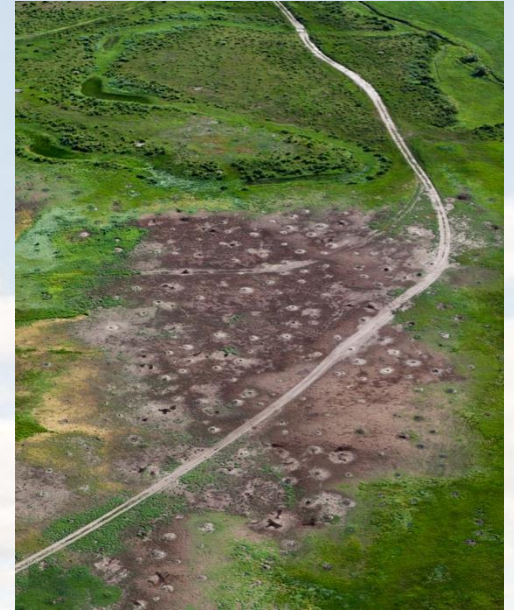


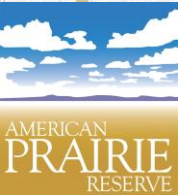
\\Projects\423_ObjectiveStatusMaps\EIK\2013\EIKObjective2013.mxd
MFWP - SPDS - MAM 8/19/2013



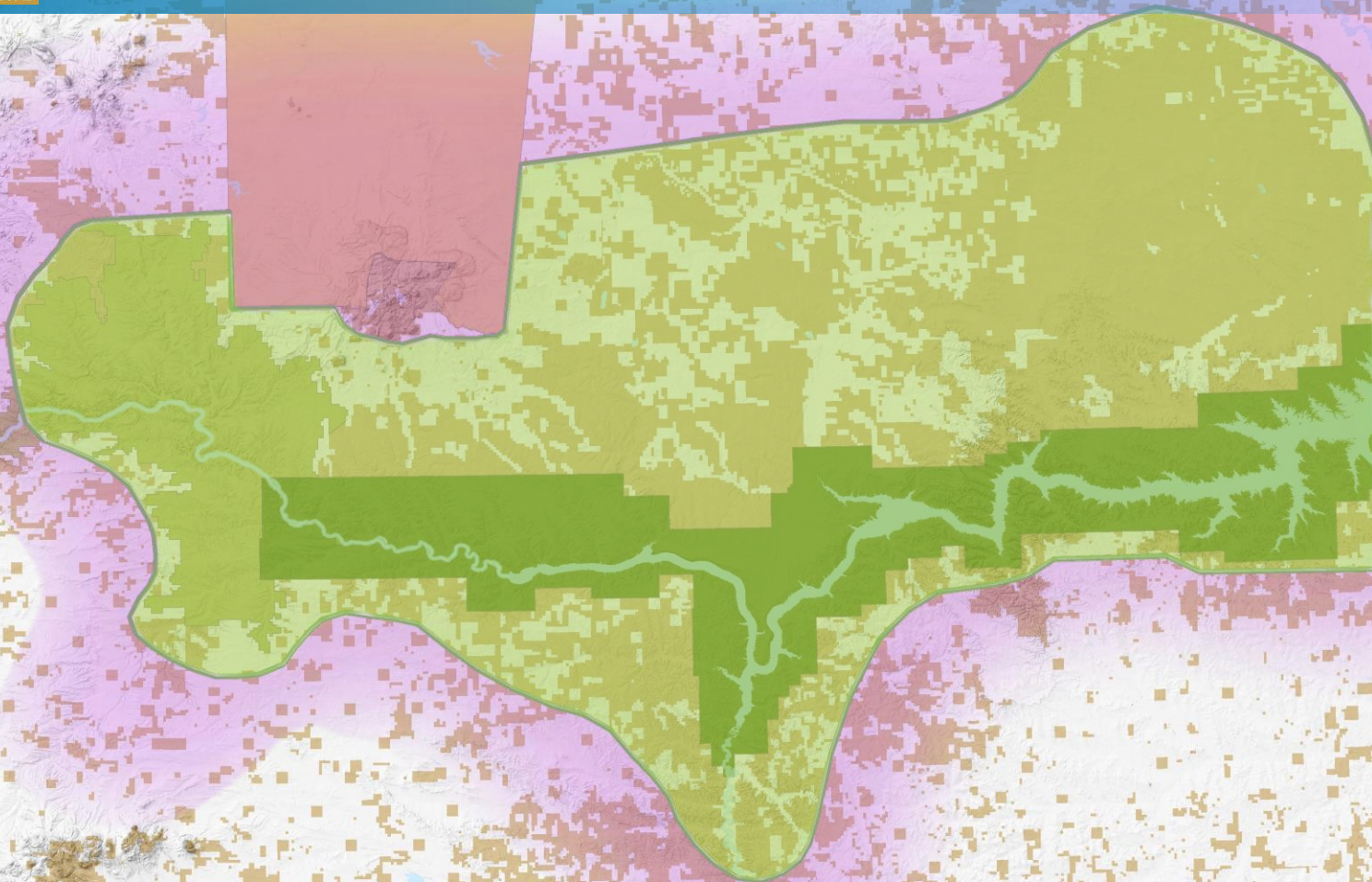
Outcomes: 10 years

- Viable population of swift foxes
- Prairie dog complex supporting ferrets, abundant owls, badgers, plovers, hawks
- >5000 bison – largest population in NA – ecologically effective
- Ungulates at ecological capacity, >5000 each on reserve
- Viable population of cougars
- >2 packs of wolves
- Bears





Softening the Edges





Freese Scale For Grassland Biodiversity



Supporting small-scale ranching
and large-scale conservation



Photo © Mike Kautz

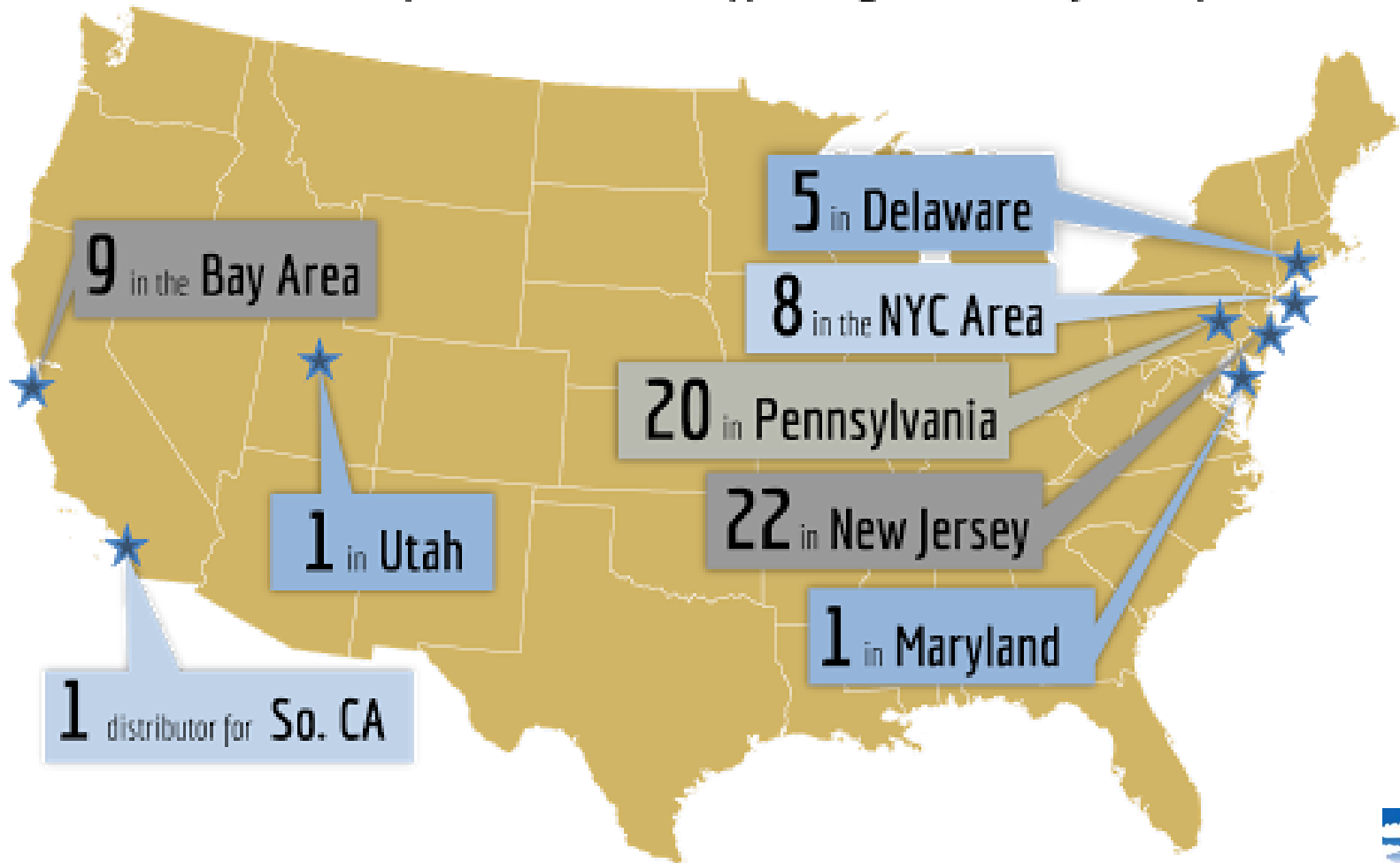
A Company of American Prairie Reserve





Coming to a store near you!

Number of Merchants Offering Wild Sky Beef

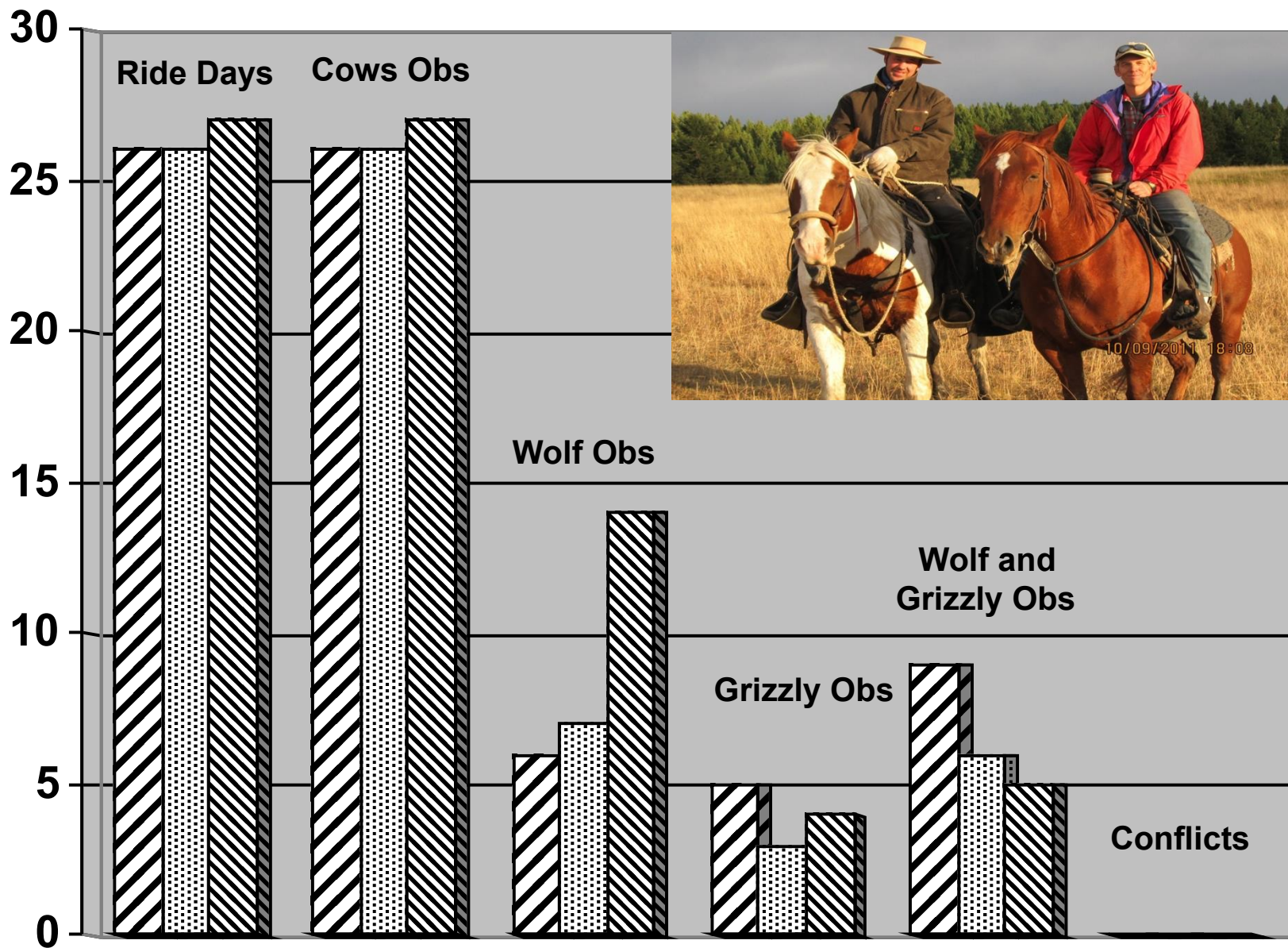


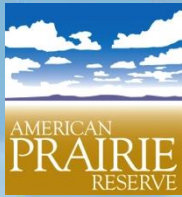
Score	Deer (both species)	Elk*	Pronghorn	Bighorn Sheep	“Wild” Bison	Acres of Prairie Dog Colony(ies)
0	No tolerance	No tolerance	No tolerance	No tolerance	No tolerance	<50
1						50-200
2						200-500
3	Infrequent hazing, no damage hunts	Infrequent hazing, no damage hunts	Infrequent hazing, no damage hunts	Infrequent hazing, no damage hunts	Infrequent hazing, no damage hunts	500-1,000
4						1,000-2,000
5						2,000-5,000
6						>5,000 non- contiguous
7	No hazing or damage hunts	No hazing or damage hunts	No hazing or damage hunts	No hazing or damage hunts	No hazing or damage hunts	>5,000 contiguous**
Result (weight)	(1x)	(2x)	(2x)	(2x)	(3x)	(3x)

July

August

September

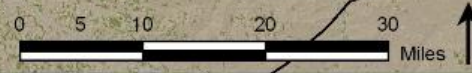
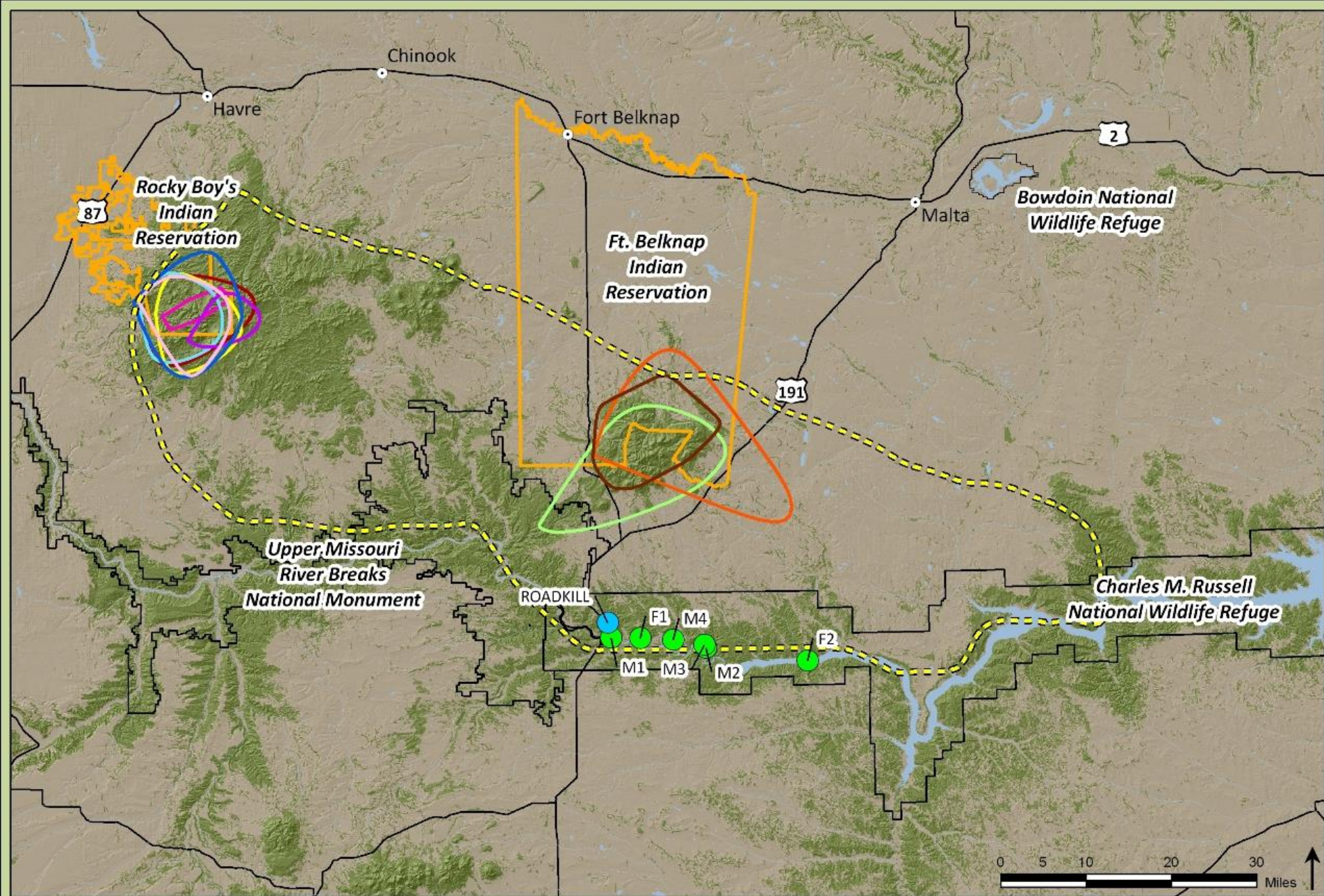




Cost - Benefit

- <0.01% livestock losses overall due to wolves
- Of losses, large carnivores <3% cause
- In Montana 2010, \$595,620 for 68 owners (\$8,759/owner): Costs of control 6 X the value of livestock loss per owner.
- Yellowstone, tourist spending for wolves in the region >\$35 million annually, value of livestock lost was \$64,000(>500 X value of the losses) & conservation flagship value





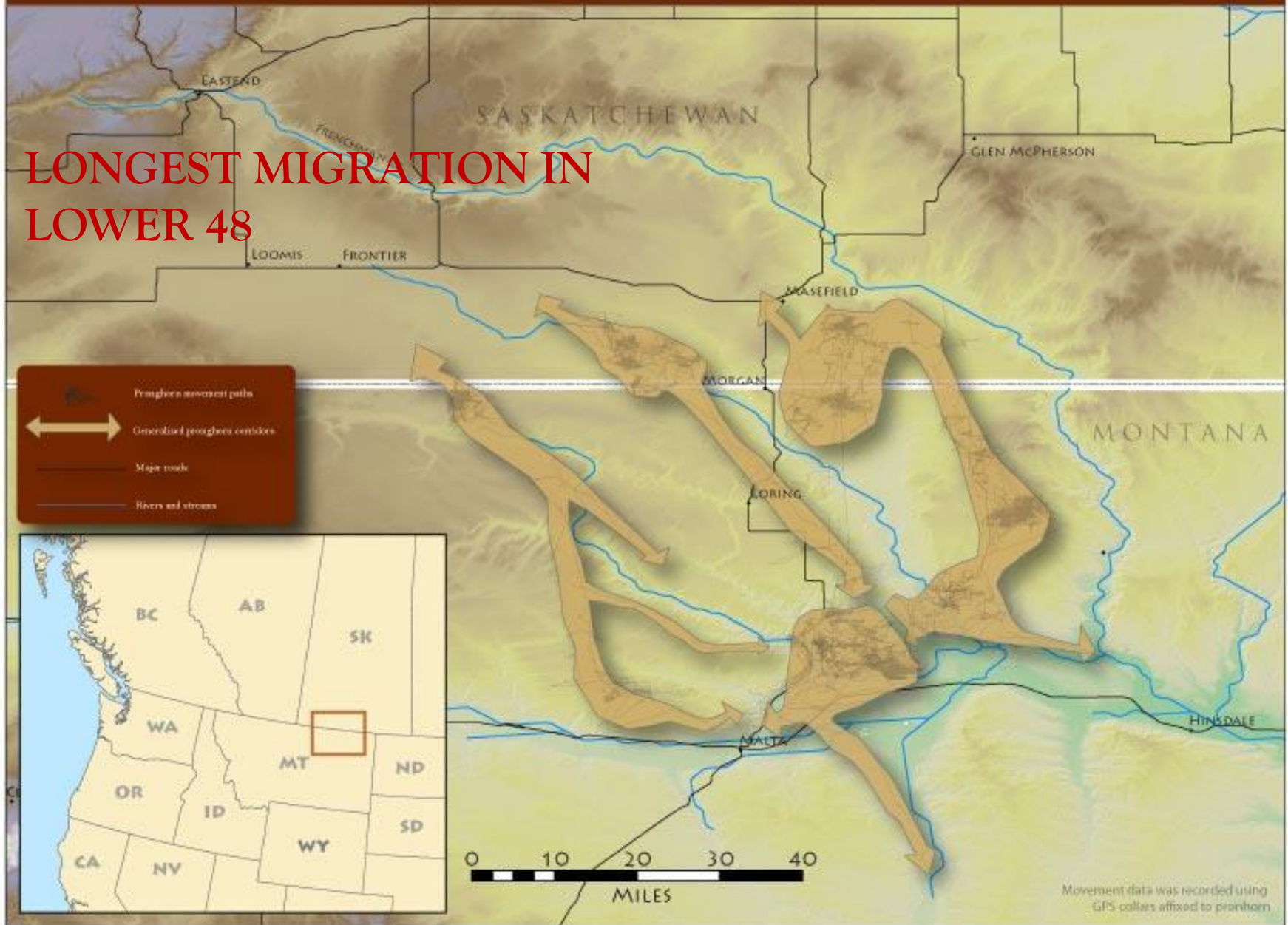
- Study Area
 - Viable cougar habitat (predicted)
 - Capture Locations (CMR)
- Cougar Observation Points**
- | | | | | |
|-------|-------|-------|--------|--------|
| ■ # 1 | ■ # 3 | ■ # 7 | ■ # 10 | ■ # 12 |
| ■ # 2 | ■ # 6 | ■ # 9 | ■ # 11 | ■ # 14 |

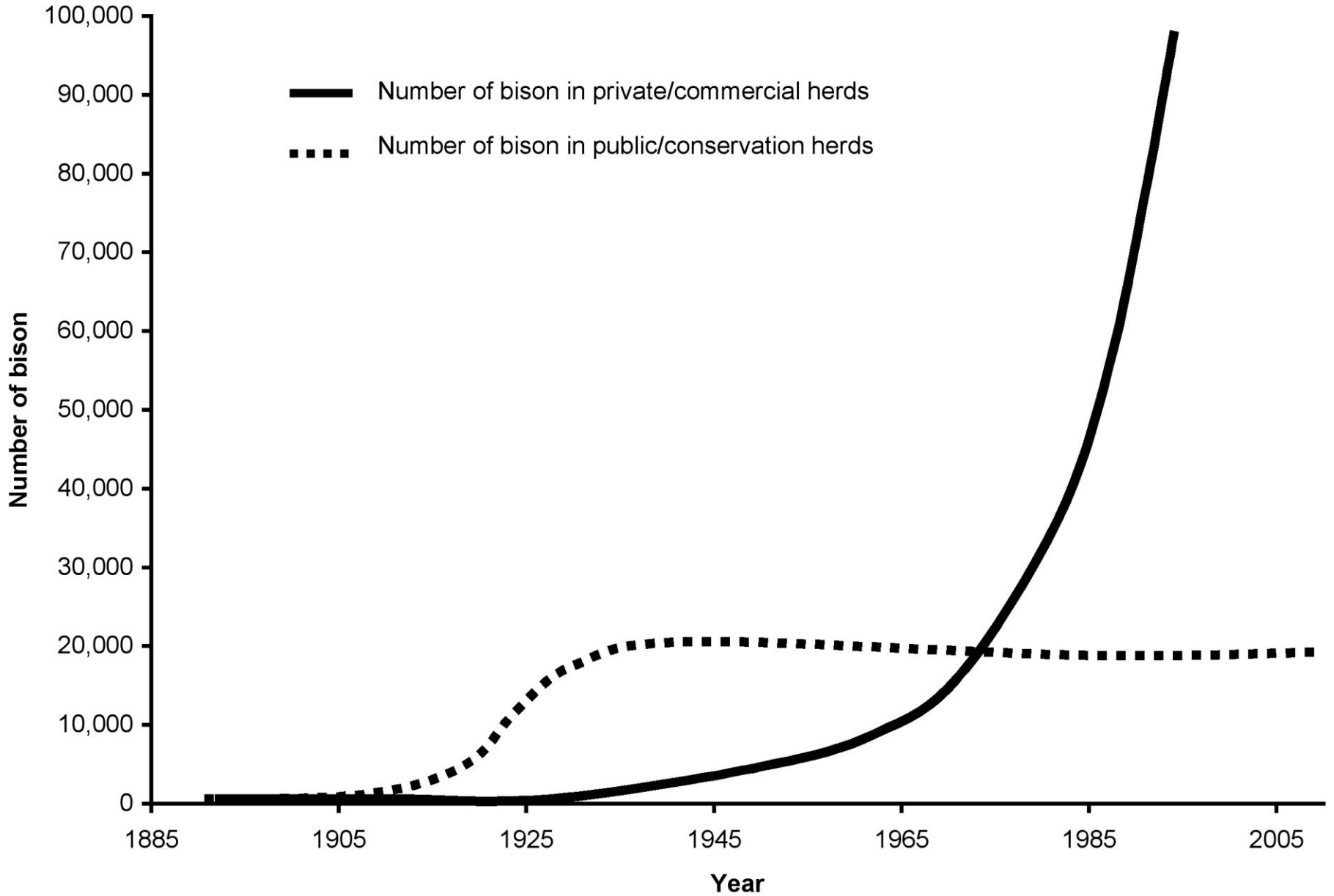
COUGAR LOCATIONS

SUITABLE HABITAT

PRONGHORN CORRIDORS NORTHERN MONTANA AND SOUTHERN SASKATCHEWAN

LONGEST MIGRATION IN LOWER 48





The 2nd Extinction? Red List Near Threatened

Domestication

Founder effect

Genetic diversity

Deleterious genes

Morphology

Behavior

Population structure

Natural selection

Conservation Success





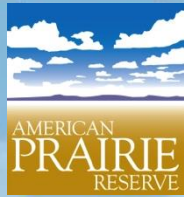
Draft Goals

- I. By 2020, we will make a significant contribution to the Vermejo statement:
 - Over the next century, the ecological recovery of the North American bison will occur when

multiple large herds move freely across extensive landscapes within all major habitats of their historic range,

interacting in ecologically significant ways with the fullest possible set of other native species,

and inspiring, sustaining and connecting human cultures.

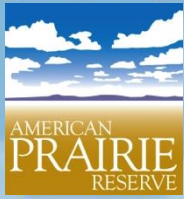


APR Mission

- To create and manage a prairie-based wildlife reserve that will protect a unique natural habitat, provide lasting economic benefits, and improve public access to and enjoyment of the prairie landscape.

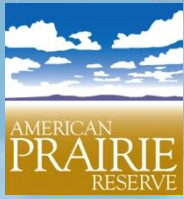
- **Bison:**

(1) high genetic diversity; (2) free of cattle genes; (3) fulfill ecological role in shaping the prairie ecosystem; (4) natural behavior. (5) enjoyed, with diverse cultural and economic benefits, by local communities and the public. Goals require herd grow to the thousands that are free to roam over millions of acres.



IUCN recommendations

- Outreach identifying social and economic benefits and ecosystem services from restoration of bison and prairie conservation for local communities, the private sector and governments.
- Create policies or economic and conservation incentives that reward private landowners who manage for biodiversity including bison.



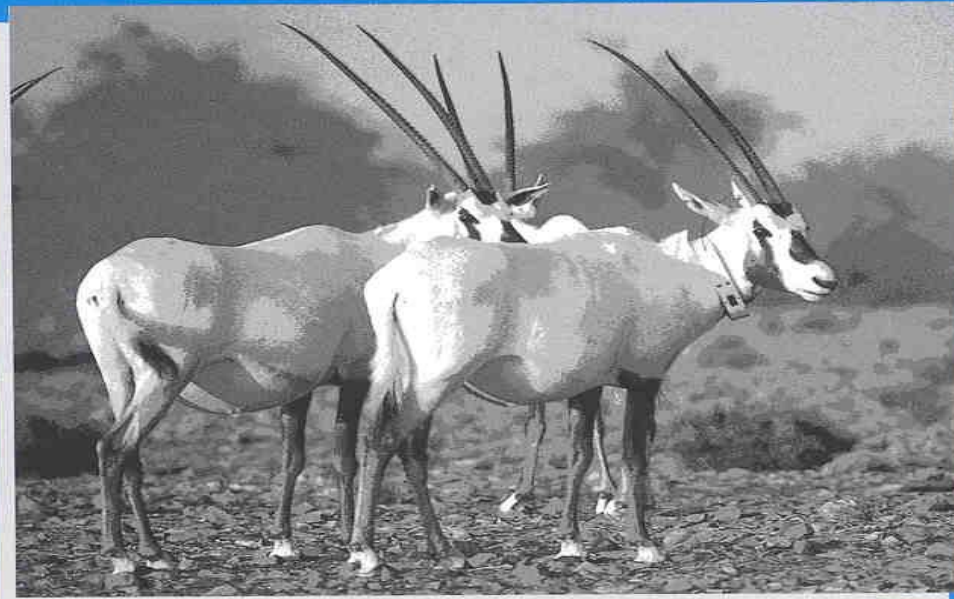
Primary limiting factors for large scale bison restoration

- 1. Cost - APR
- 2. Politics – e.g. treasured landscapes, MT EIS, Ft Peck YNP translocation
- 3. Legal status
- 4. Perceptions – disease, competition, damage



IUCN Guidelines for Re-introductions

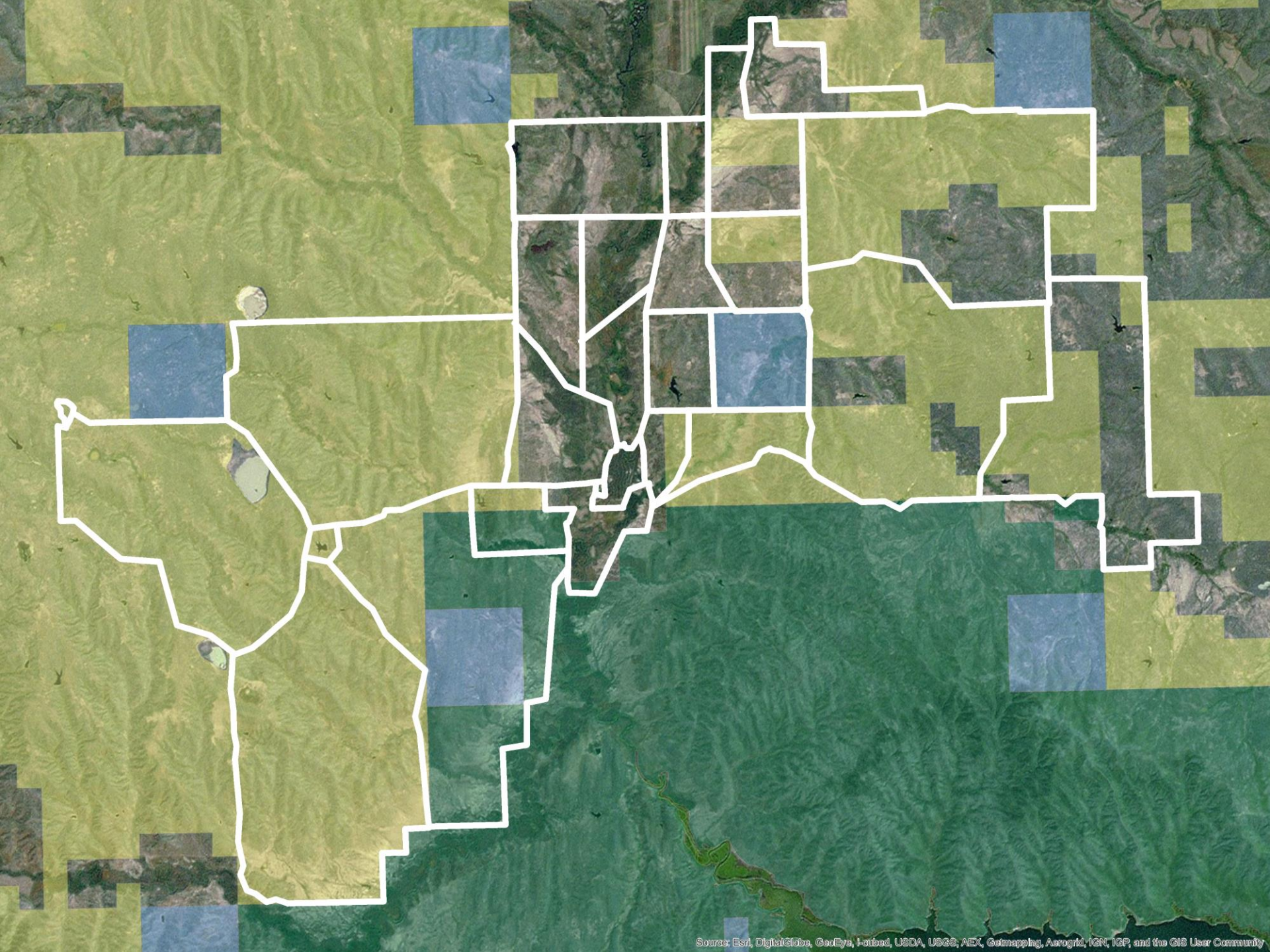
Prepared by the IUCN/SSC
Re-introduction Specialist Group

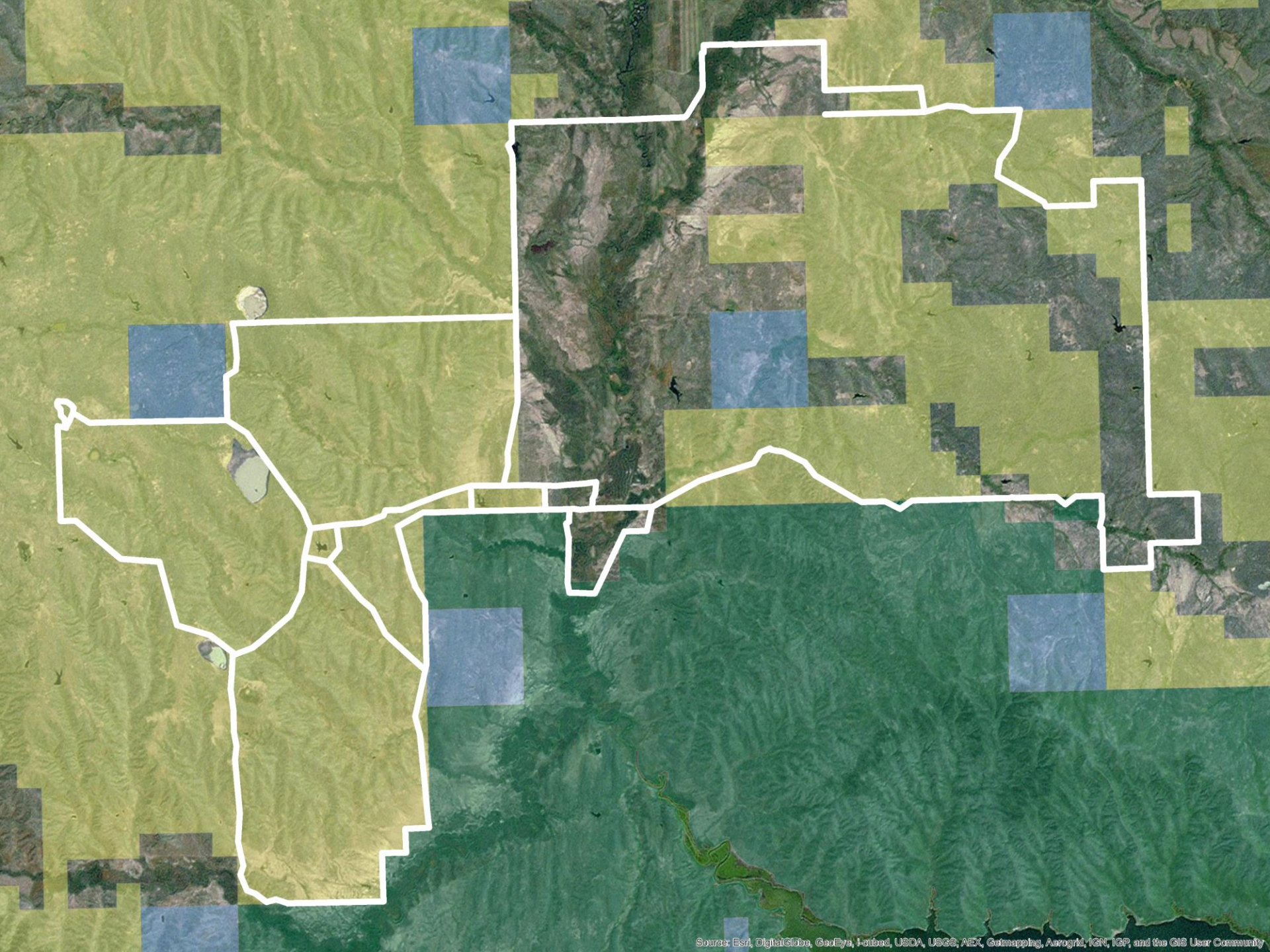


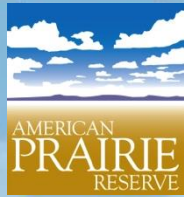
Our Version of Bison Fence





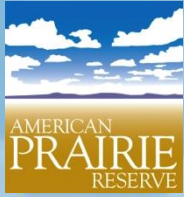






Current Population

- 2005, 16 Wind Cave National Park, SD
- 2006, 20 Wind Cave National Park, SD
- 2007, 22 Wind Cave National Park, SD
- 2008, 10 TNC's Broken Kettle Grasslands Preserve, IA
- 2010, 93 Elk Island National Park, Edmonton, Alberta
- 2012, 72 Elk Island National Park, Edmonton, Alberta
- 2014, 73 Elk Island National Park, Edmonton, Alberta

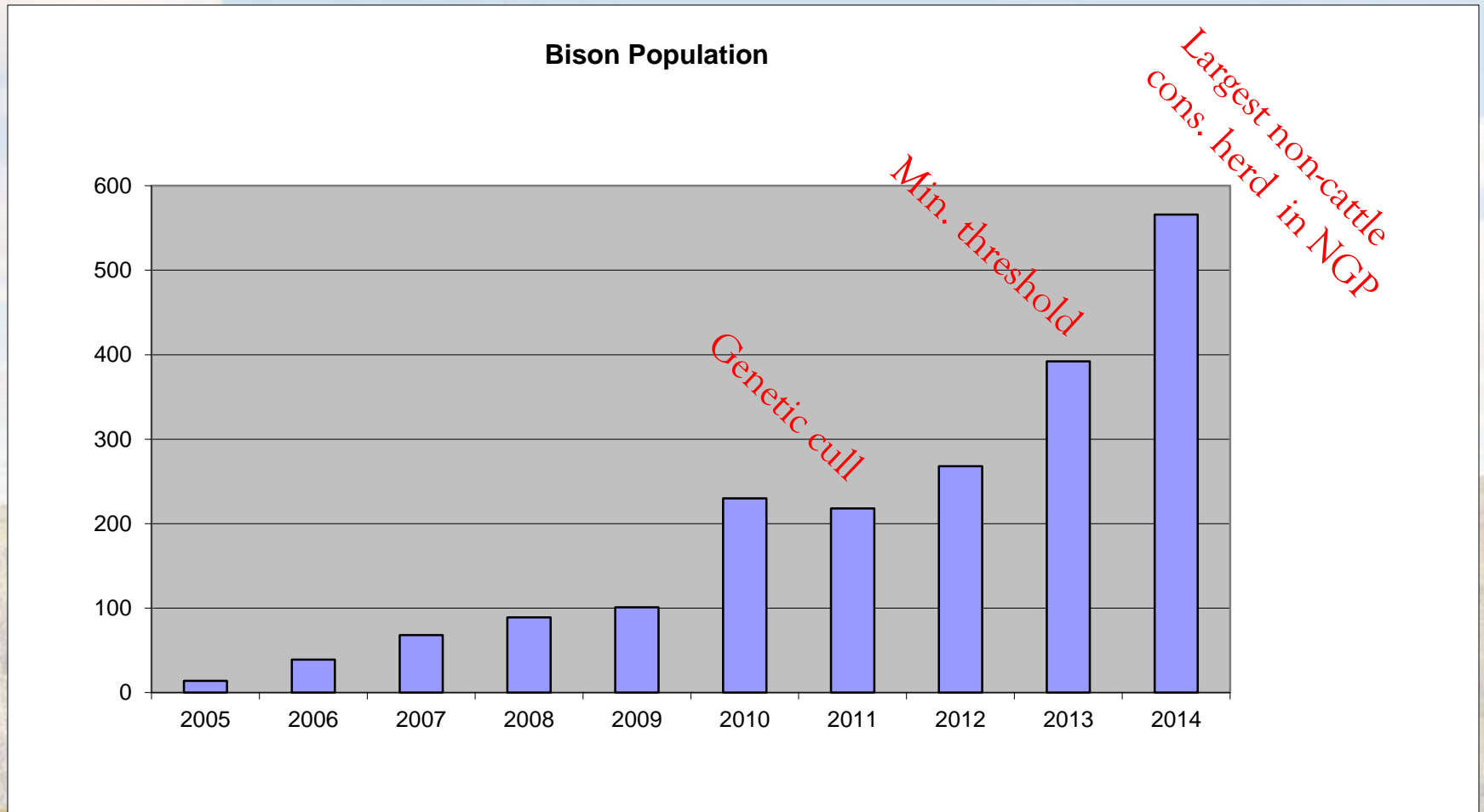


Elk Island Import 2014





APR Bison Population 2005-2014

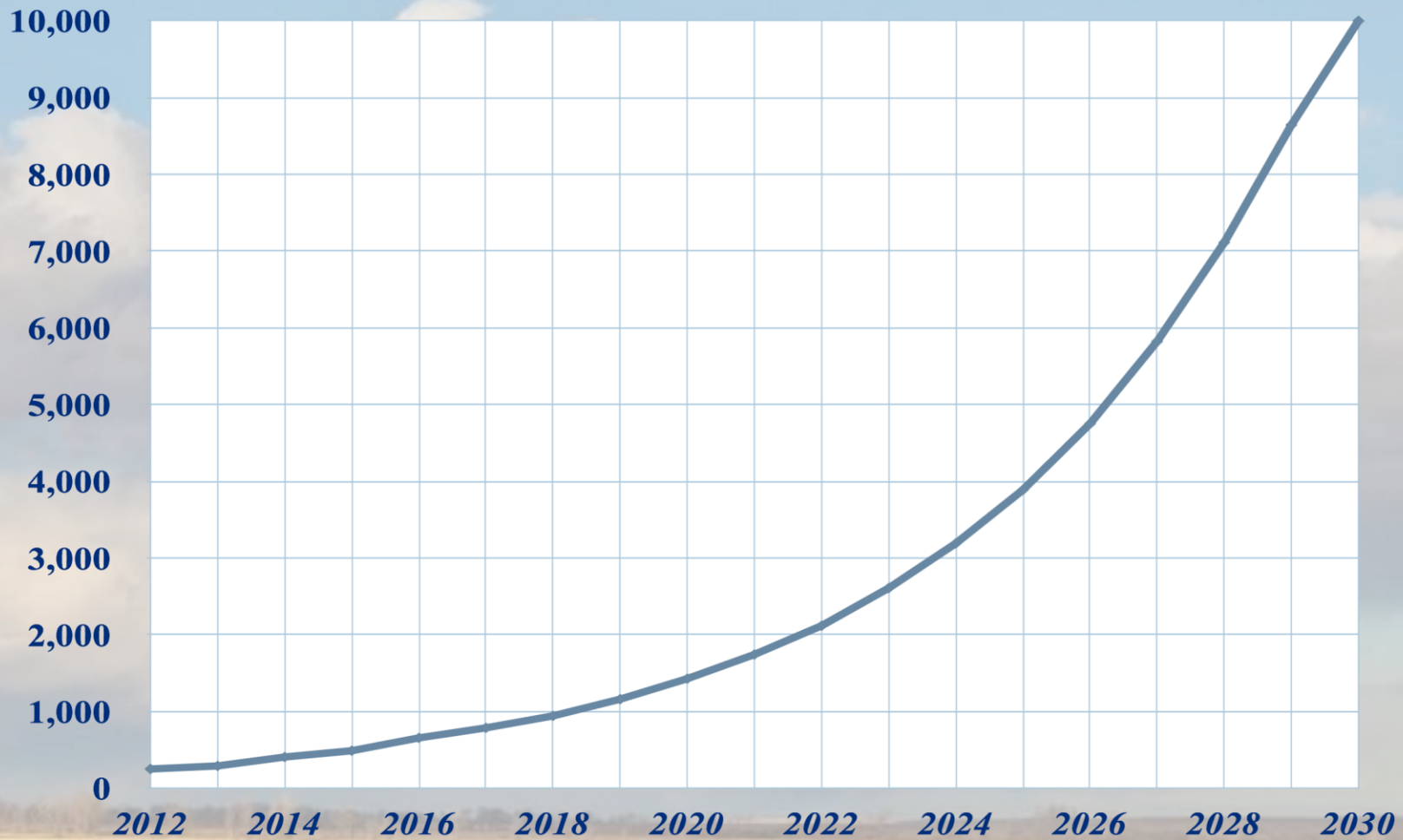




Premier Conservation herd in NA

- Flagship
- Best Sanderson et al “score”
- Best genetics – size, introgression, mix
- No reportable disease
- Largest 2019
- Most “wild”
- Best adaptive conservation
- Excellent social structure
- Low mortality, high productivity
- Proven success with our neighbors

APR Bison Herd Growth Projections



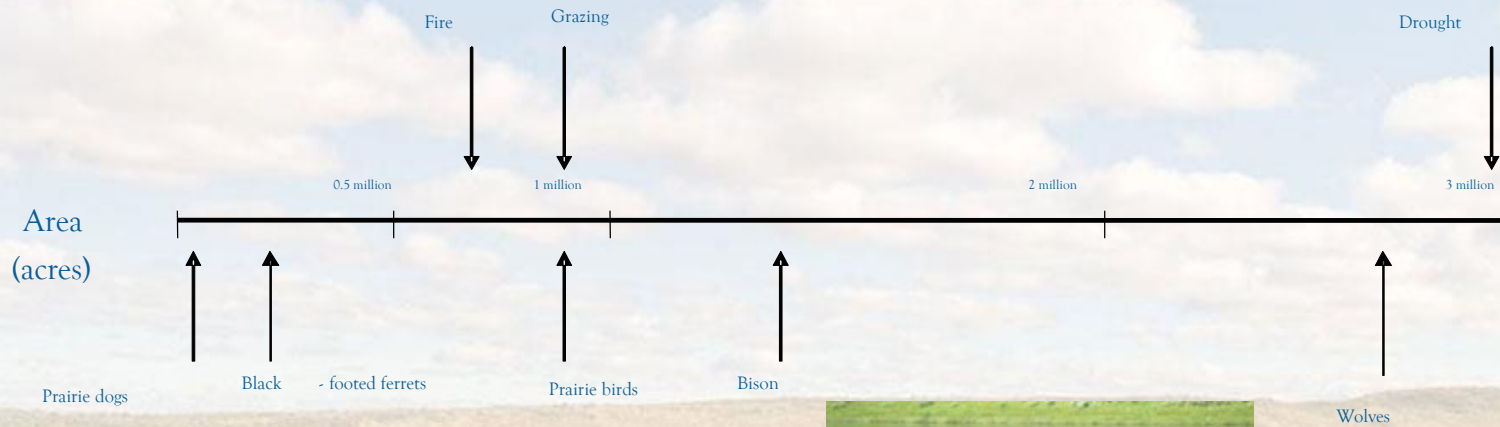


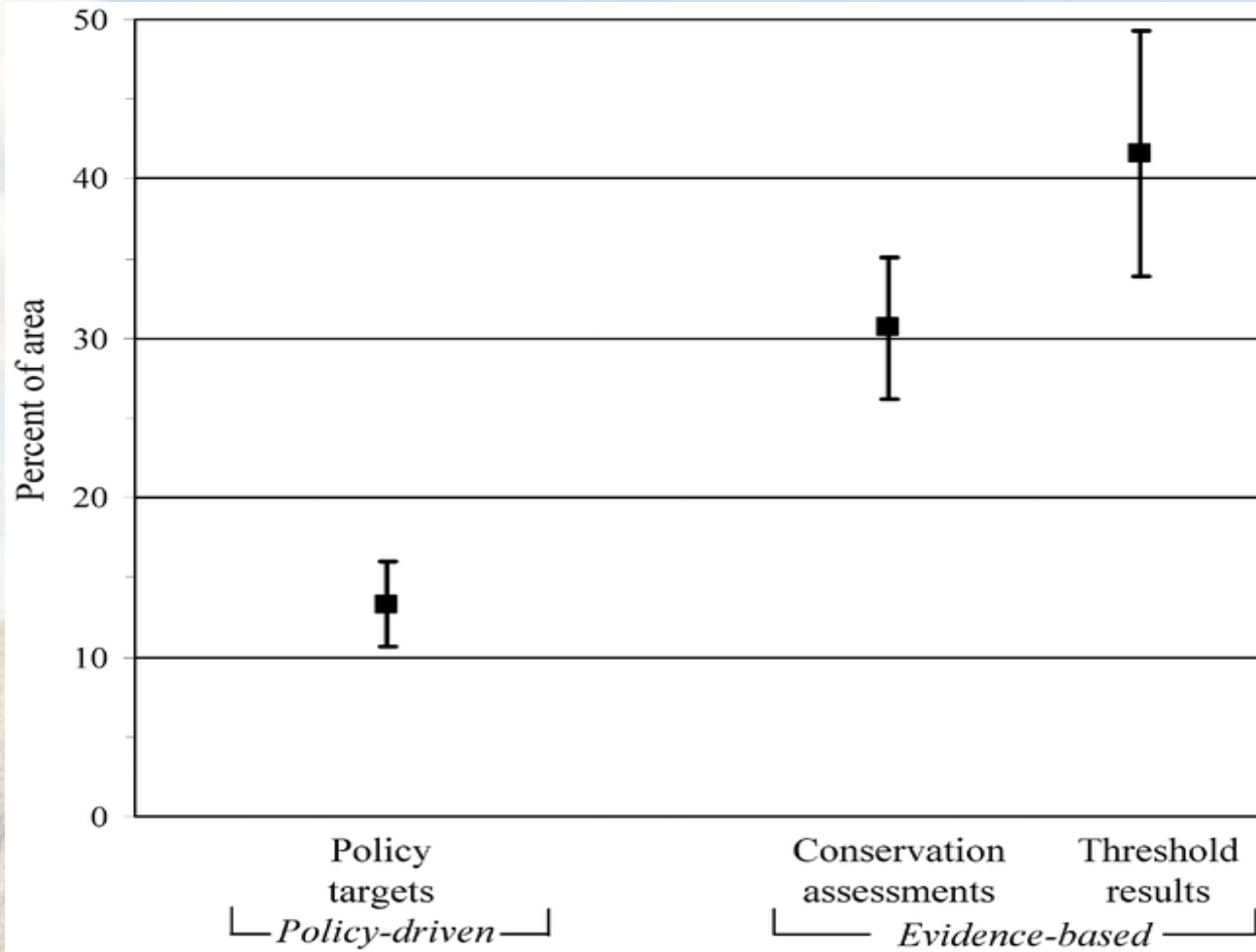
What is Ecological Restoration?

<u>Factor</u>	<u>Exceptional</u>
Herd Size	> 5,000
Pop. Structure	Natural
Ecological Interactions	Natural Selection
Human Interactions	Public access/hunting
Health	Disease Free
Genetics	No Introgression

MINIMUM DYNAMIC AREA

Approximate Minimum Dynamic
Area for NGP Processes and Species



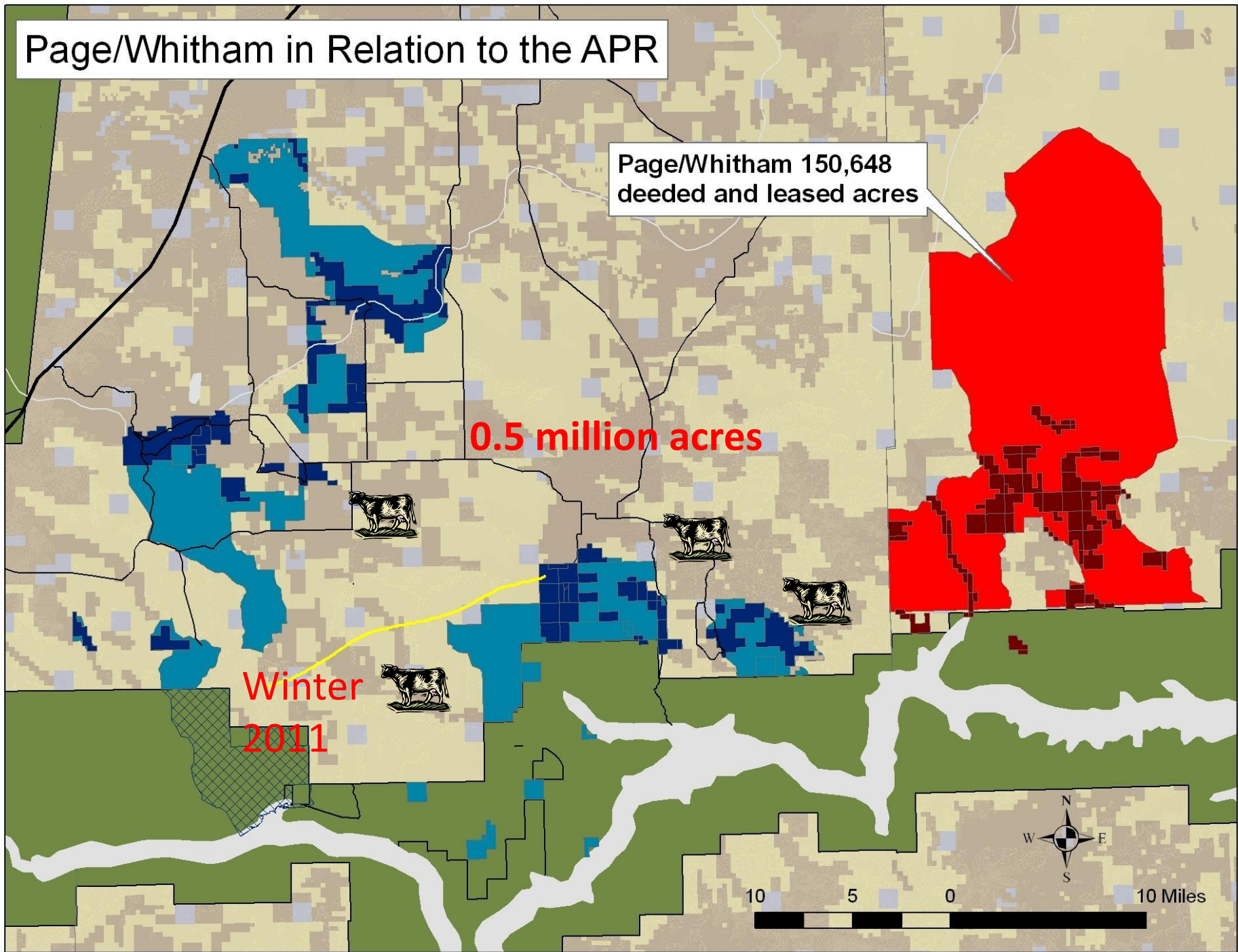


Page/Whitham in Relation to the APR

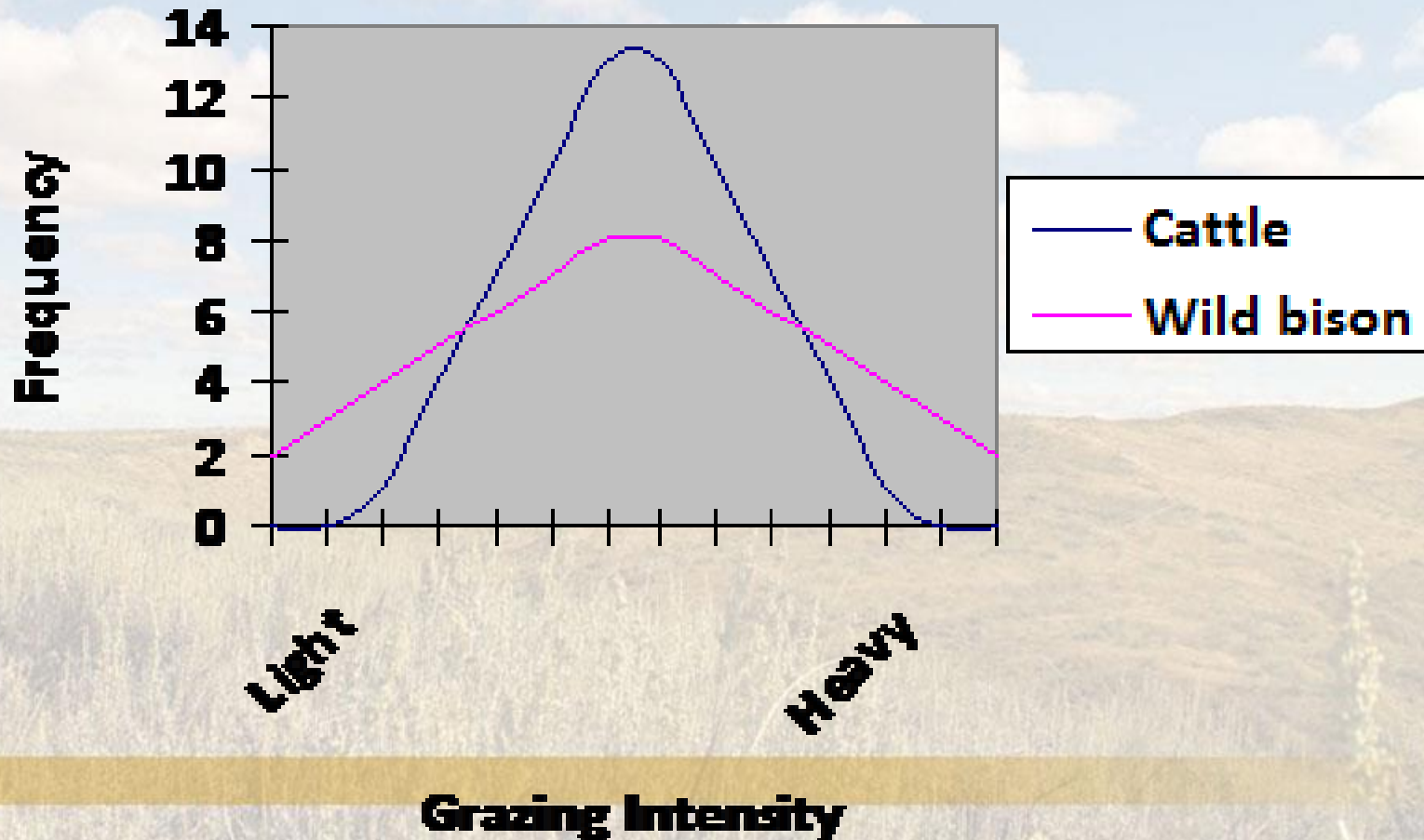
Page/Whitham 150,648
deeded and leased acres

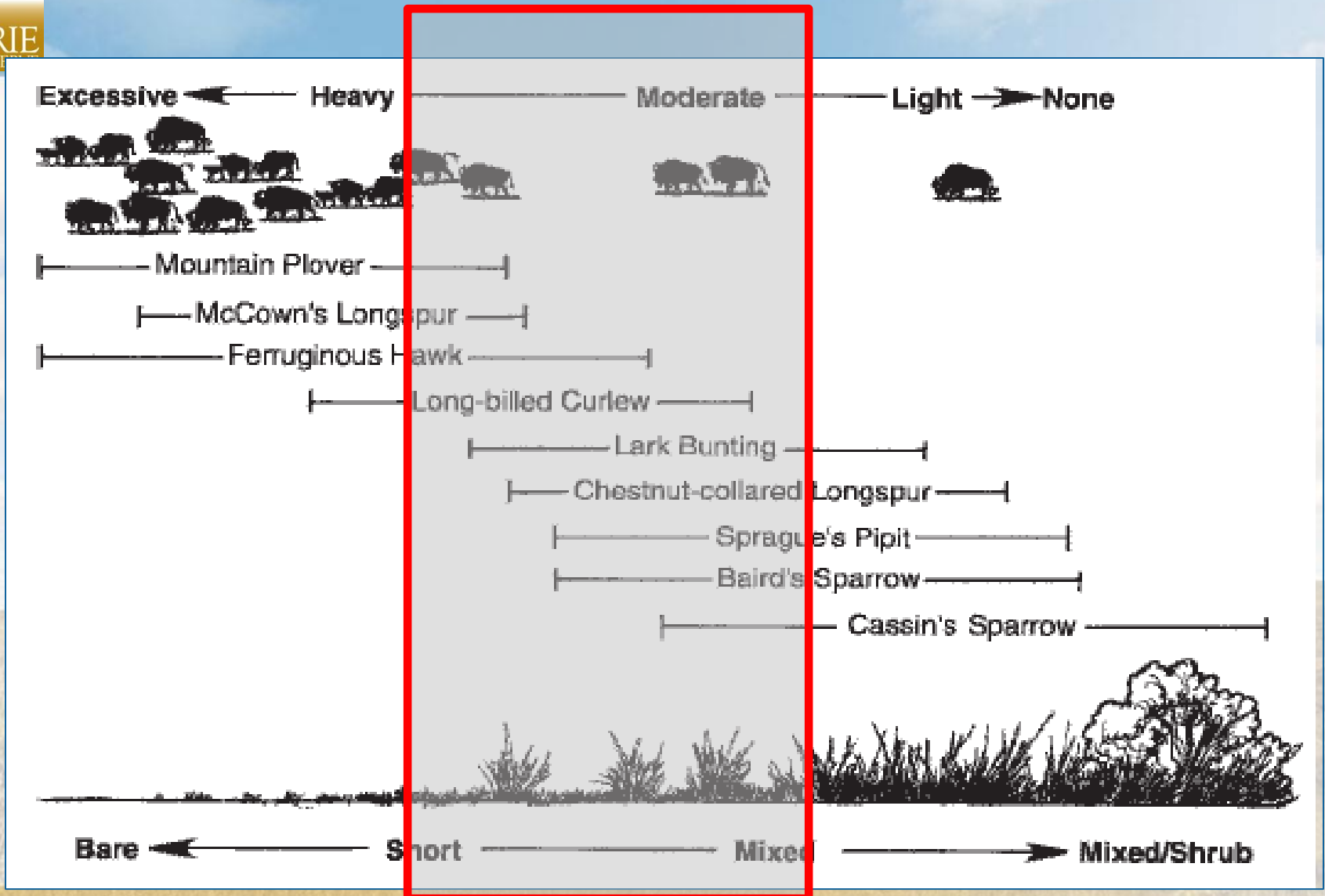
0.5 million acres

Winter
2011



Grazing Patterns





Knopf 1996



AMERICAN
PRAIRIE
RESERVE



Grazing Intensity (stocking rate)

No grazing

Light

Moderate

Heavy

Severe

Traditional Range Management

Gain per head

Economic Optimum for livestock

Gain per ha

Conservation of Pattern and Process

Rare butterflies

Compass Plant

Cotton Rat

Henslow's sparrow habitat

Water infiltration

Prairie Chicken- nesting
habitat

Insect diversity

Dickcissel

Plant species diversity

Upland sandpiper habitat

Prairie Chicken-Lekking habitat

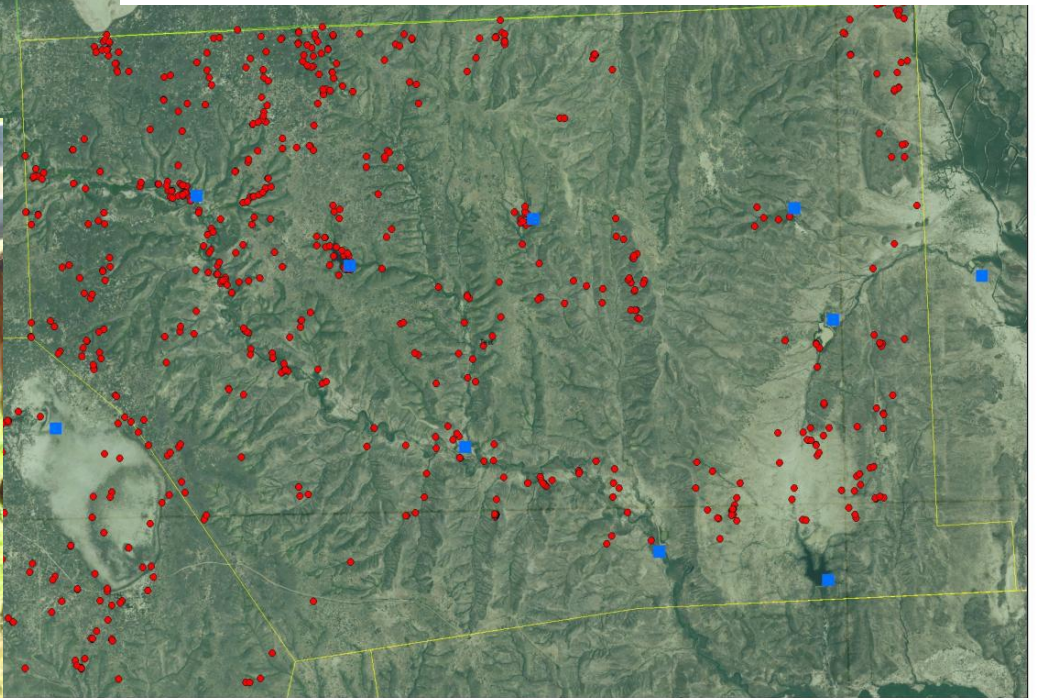
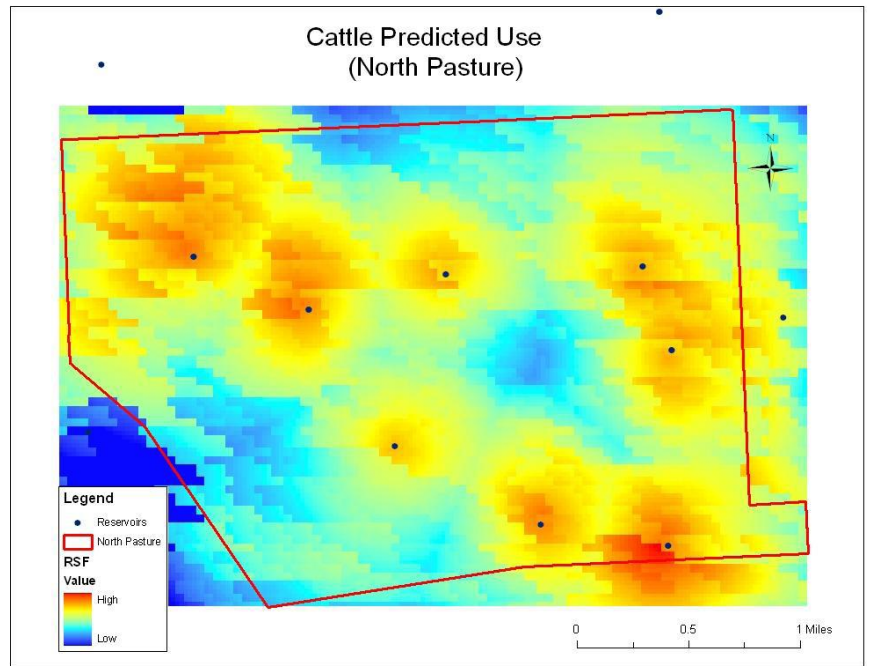
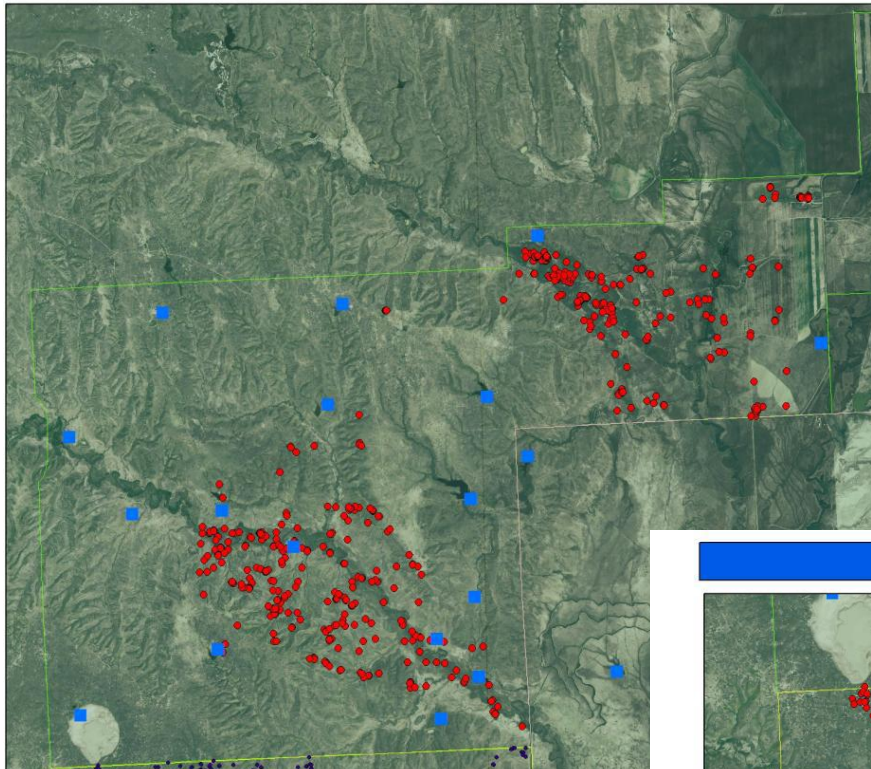
Water yield

Lark sparrow habitat

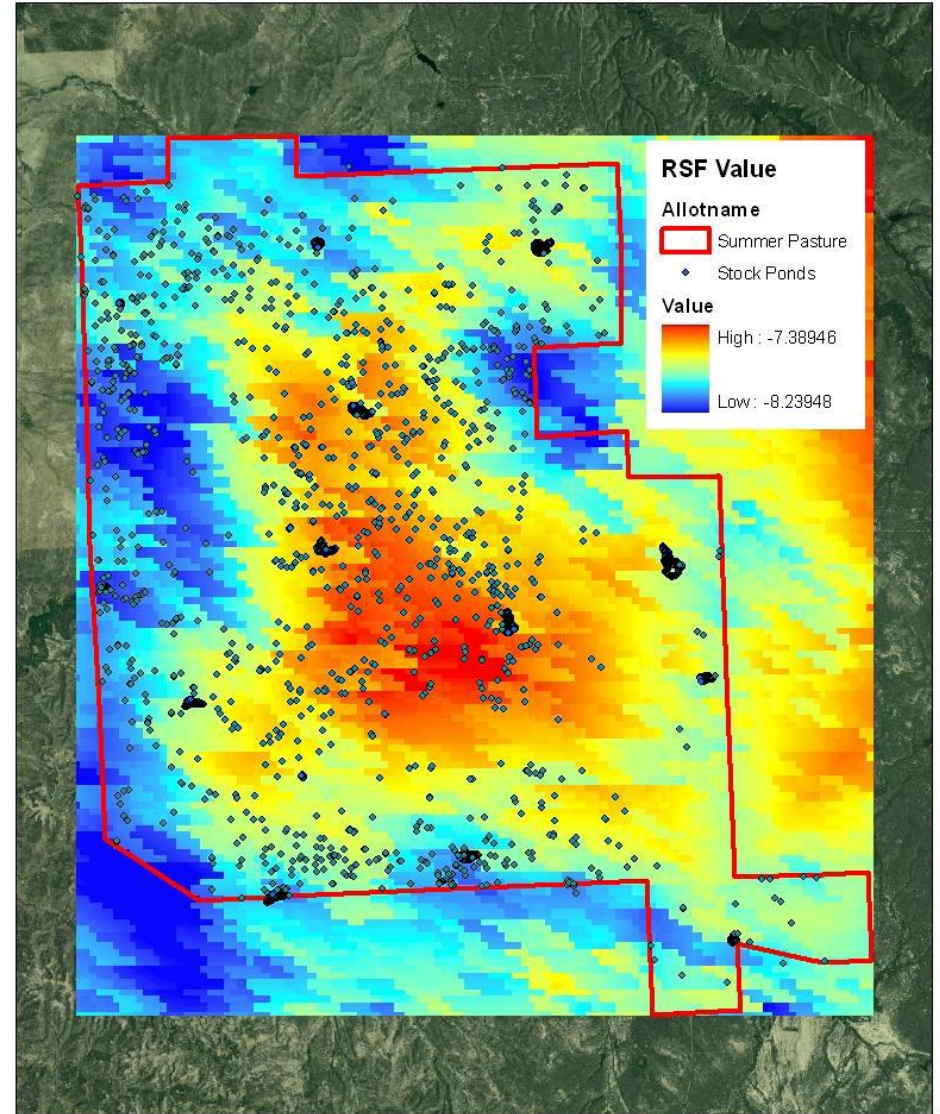
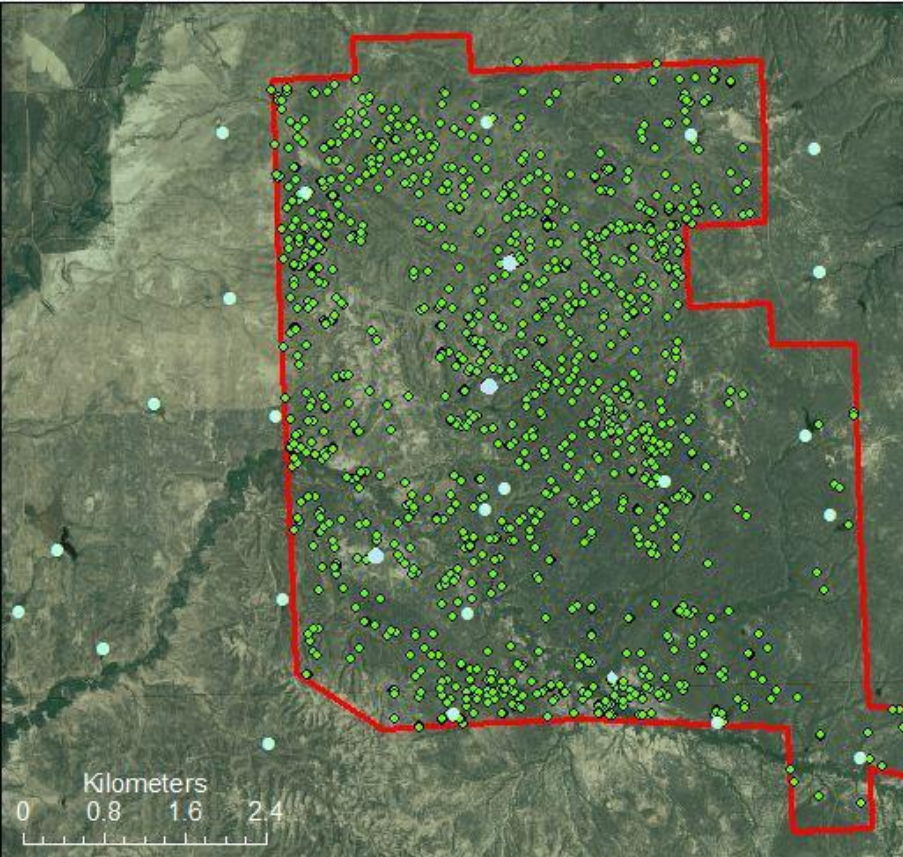
Nitrogen availability

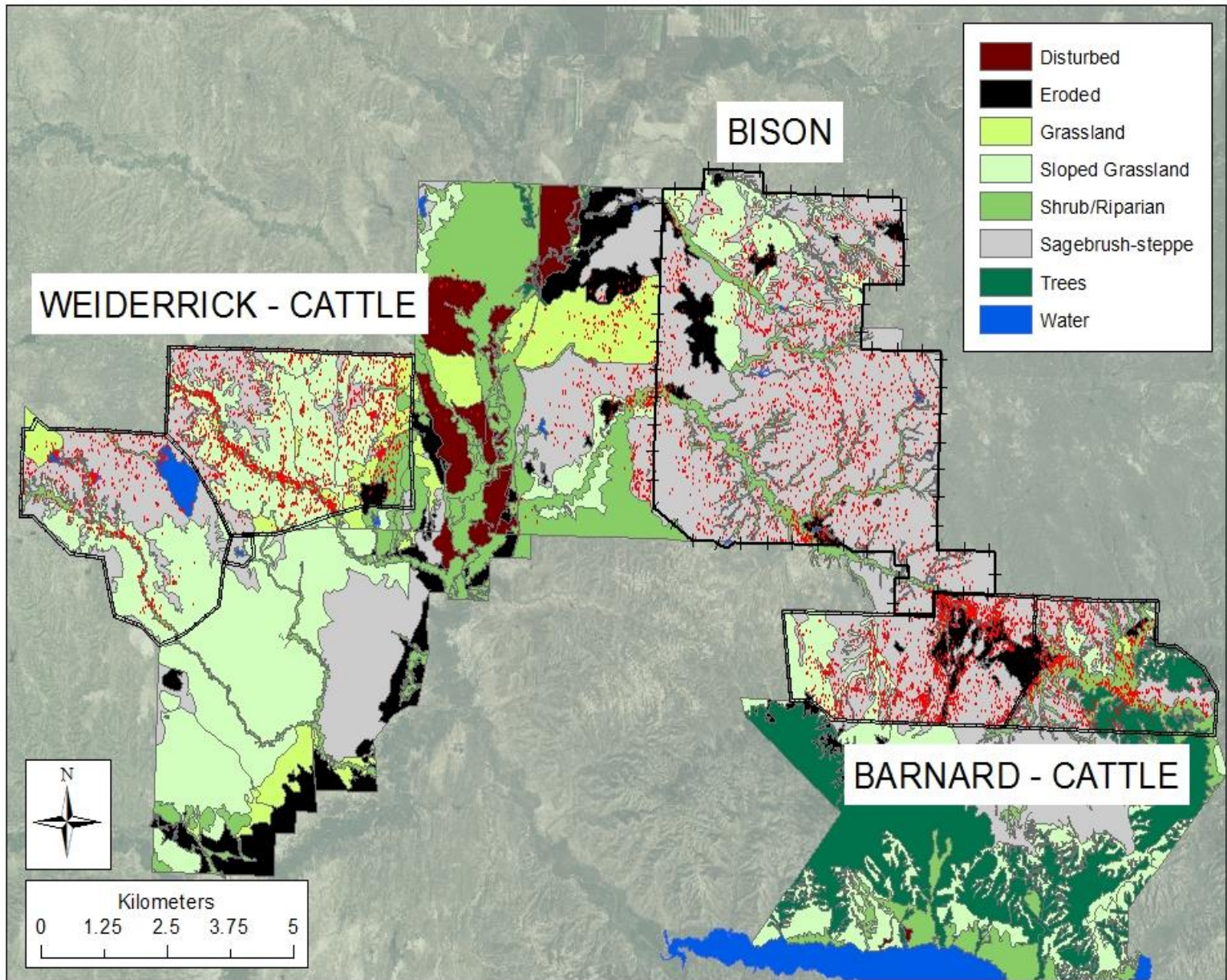
Prairie Dog Town Species

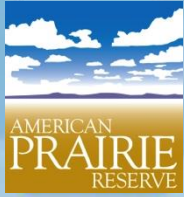
Barnard Cattle Use



Bison Resource Selection Function

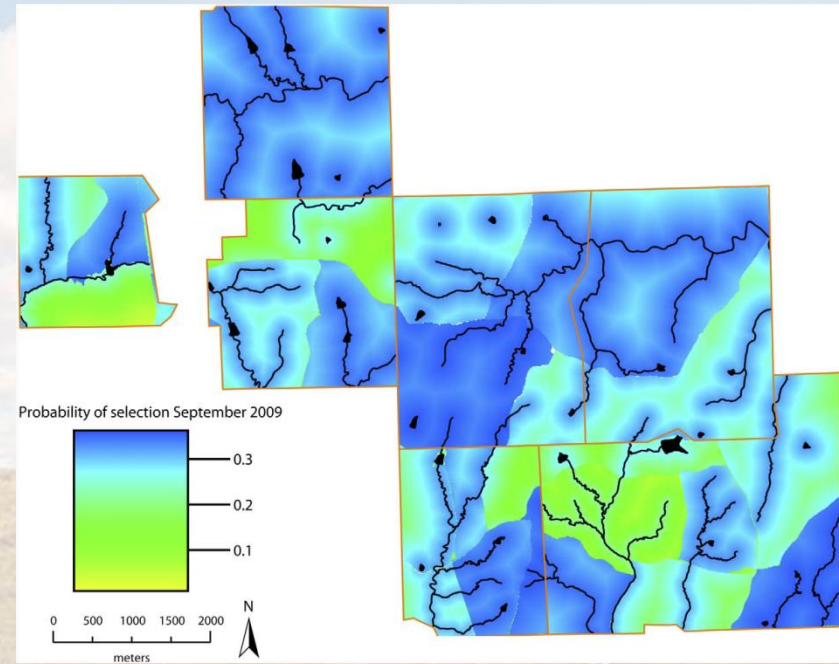
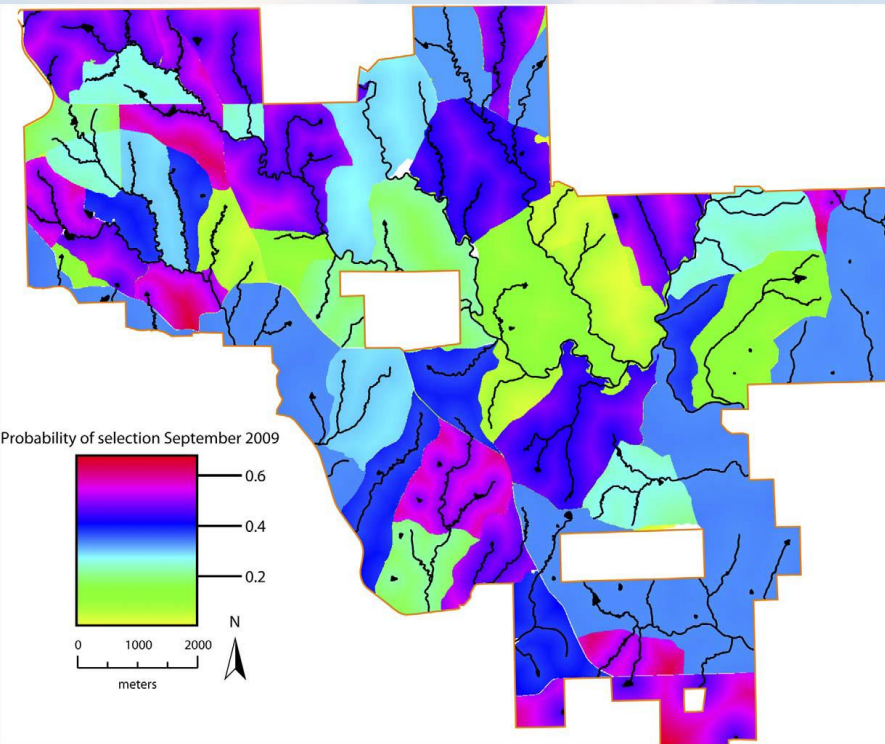






Tests - Tallgrass Prairie, OK

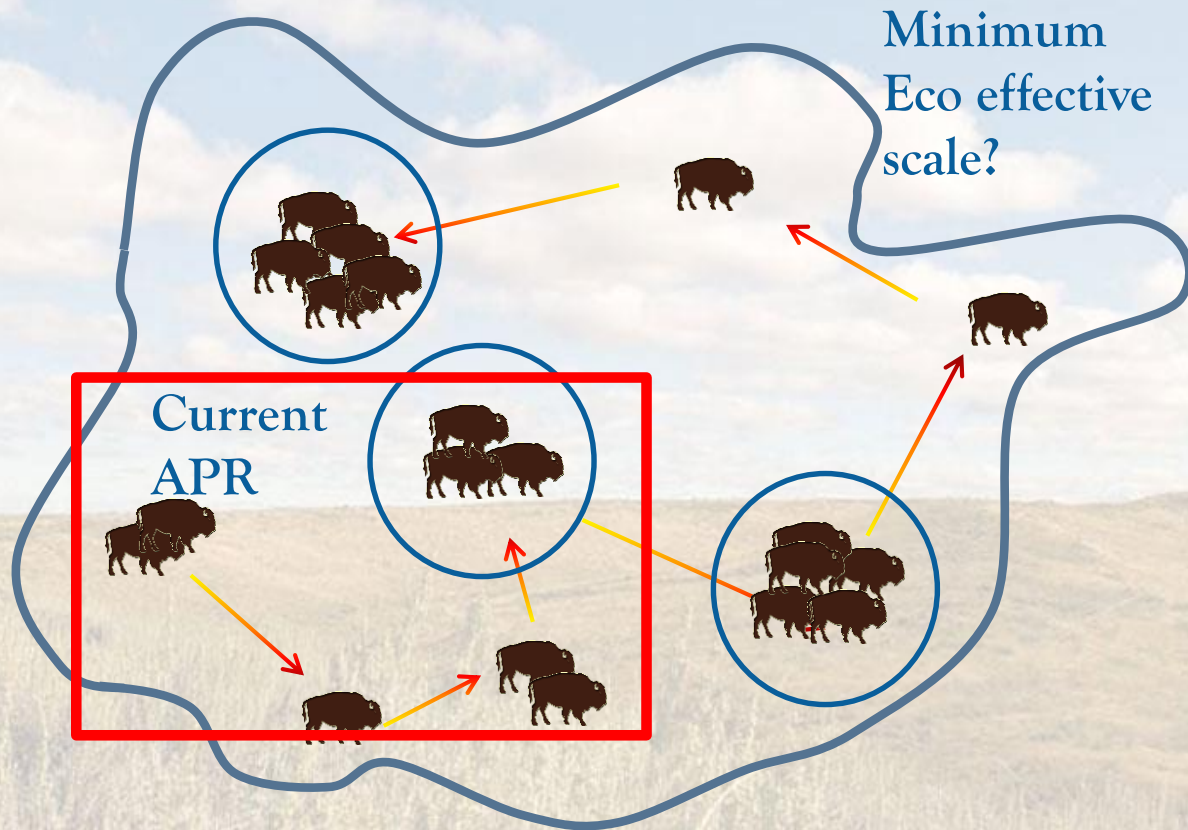
40,000 acres



Bison

Cattle

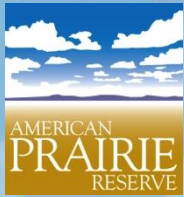
Movement



Monitor

- Amazing opportunities to learn about large scale conservation – do what we could not do 100 years ago – thresholds and designs
- Adaptive management





Bison and Cattle

95% of GP is cattle – “the potential for restoring bison at a meaningful ecological scale is therefore inextricably linked to the existing cattle industry.

2.6 million cattle in MT, 400 (fenced) bison, 150,000 elk





- Goal 1: Assess the efficacy of the bison-cattle landscape in meeting bison and biodiversity conservation goals.
- Goal 2: Assess effects of semi-free ranging bison on livestock production and profitability and on ranch operations.
- Goal 3: Design alternative models that enable landowners to be paid for ecosystems services provided by bison restoration identified under goal 1 and compensated for negative effects identified under goal 2.

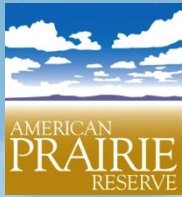


APR links to IBMP

- GOAL #1: INCREASE TOLERANCE FOR BISON WITH NO UNACCEPTABLE CONSEQUENCES (E.G., TRANSMISSION OF BRUCELLOSIS, UNACCEPTABLE IMPACTS ON PUBLIC SAFETY AND PRIVATE PROPERTY).
- Objective 1.3.—Reduce conflict between landowners, livestock operators, and bison outside YNP via permit management, improved relations, education, and incentives.

- Monitoring metrics:

Annually document the numbers, timing, and types of reported incidents for human safety and property damage related to bison



- Management action 2.1.c—Increase understanding of the ecological role of bison to inform adaptive management by commissioning a comprehensive review and assessment.
- Management action 2.2c—consider an operational quarantine facility to provide a source of live, disease-free bison for tribal governments and other requesting organizations.
- Move CMR/APR/Belknap to low complexity



And Then There Were (Almost) None

How many bison once roamed North America?

A good estimate is that roughly 30 million bison once roamed the grasslands of North America. To the explorers Lewis and Clark, the herds "darkened the whole plains." What happened? People. Massive hunting campaigns brought an end to the seemingly endless herds. Growth of farming and ranching and severe drought caused even more loss.



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A "bullish" economy.

Bison were a staple of the economy in the 1800s. As Americans became more industrial, the need for machine belts made from hides grew and grew. Sport hunting also became the rage. Railroad companies offered tourists a chance to shoot bison from the coaches; one record-setting rider killed as many as 120 animals in 40 minutes. Within 50 years, the great herds were gone.



Photo: © 2014 National Geographic Society. All rights reserved.

Time to stop "bullying" around!

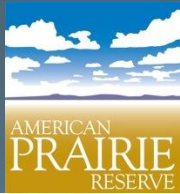
By the late 1800s, about 325 wild bison were left. Congress began to take action to protect the remaining bison, and private ranchers started to create small herds. Slowly, the population crept up thanks to legal protection, refuges, and breeding programs. Today about 30,000 bison live in conservation herds and hundreds of thousands live on private ranches. Efforts to bring back massive herds will take time, land and a strong commitment to the recovery of this treasured animal.



Photo: © 2014 National Geographic Society. All rights reserved.

Buffalo Camp Experience

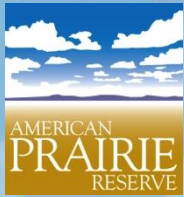




Enrico Education and Science Center





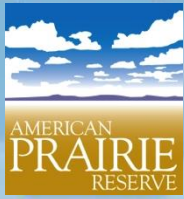


Culture and Economics

- Increase capacity for conservation
- Enhance economics of local communities
- New conservation, cultural and economic models



Hopa Mountain invests in rural and tribal citizen leaders who are working to improve education, ecological health, and economic development.

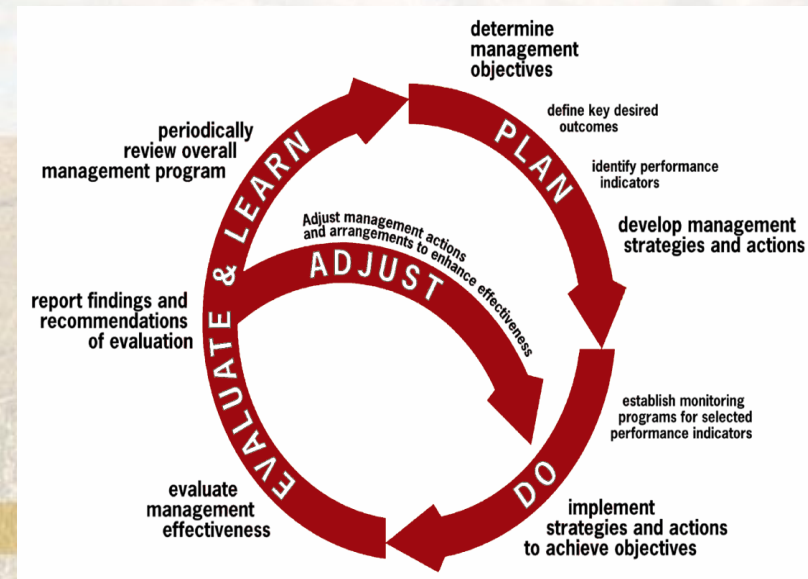


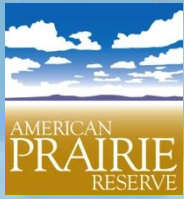
Lessons

Successful projects were collaborative with high community visibility and support, results disseminated effectively, informed policy, measured outputs, were grounded by science, supported by agencies, attracted new donors and delivered results even when political factors created difficult working environments.

-STF 2008

Learning by doing!





“Stewardship seems to leave us alone with our responsibilities to shoulder them as best we can and at whatever personal cost. But the word “covenant” conveys a sense of mutuality-that we have mutual obligations to one another. I suspect this may be something that Thomas Jefferson had in mind when he envisioned a commonwealth of small landowners, educated and well informed, who could find enough good will to sit down and talk to one another, to engage with one another fairly, to get past the rhetoric and pursue the common good... I further believe that the American people, who are so blessed with the bounty of this land, can find the good will and good sense to honor that covenant.”

Theodore Roosevelt 1908

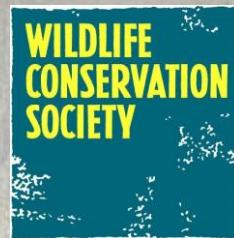
Actions for collaboration

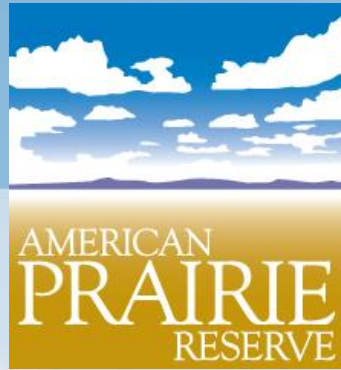
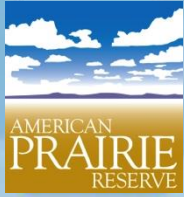
- Come visit
- Collaborate on ecological and economic impacts, incentives science projects
- Develop education projects, share students
- Rancher exchanges
- Montana conservation

Collaborators & Partners



**NATIONAL
GEOGRAPHIC**





americanprairie.org



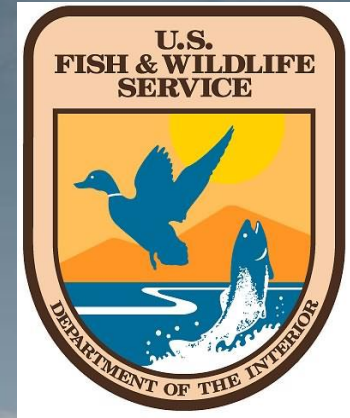




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Bison Collaborators









— SKY —

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[ABOUT THE BEEF](#)

[WHERE TO BUY](#)

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American Prairie Reserve is one of the
most ambitious conservation projects in American History...

[Learn More >](#)



ALL NATURAL 100% GRASS-FED BEEF

Landmark Project

- Walking 5 days per week; 10 to 15 kilometers per day
- Temperatures from -10 to 100 degrees
- Distance in 3 years: 38,000 km (once around the Earth!)

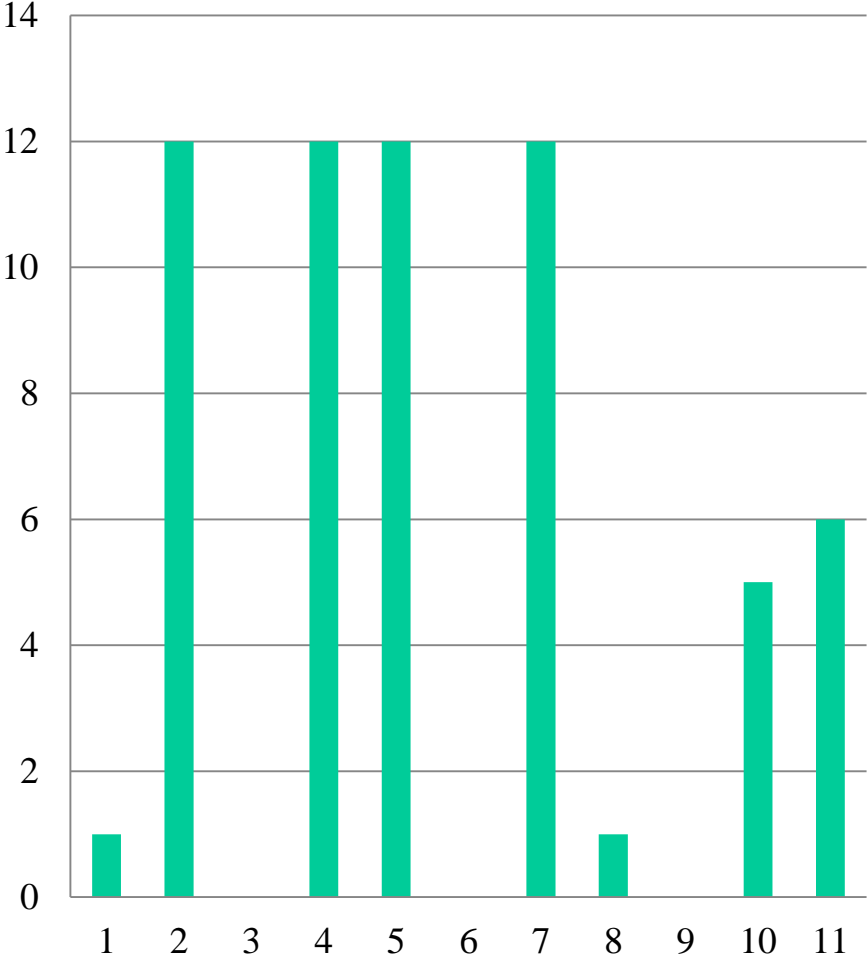


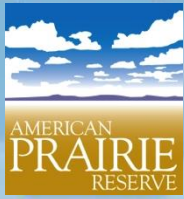
Canada



 Bureau of Land Management and Other Public Lands

Months Alive after Capture

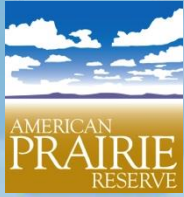




Bison and cattle

- 400 public bison (in fence) in MT – no public bison on MT Great Plains
- 2.6 million cattle in MT
- 150,000 elk





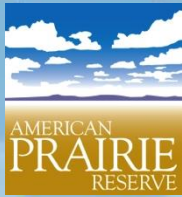
Conservation, management, and restoration design for the northern Great Plains





DOI Bison Report Moving Forward

- Move CMR/APR/Belknap to low complexity
- Due to the limited number of free-ranging bison herds, there is a general lack of specific information on the impact that free-ranging bison have on fences. Additional observations of the few existing free-ranging herds and their impact on fencing are needed to develop creative management solutions.



Where Are We Now?

Badlands National Park

Federal

>200,000 acres

~ 700 Animals

Disease Free

Future

???

1000-5000

Montana tribes

~ 100 YNP Animals

Disease Free

Genetically Pure

Future

Thousands

Sand Dunes Colorado

Private/Federal

50,000

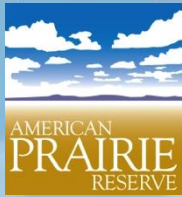
2000

Disease Free

Future

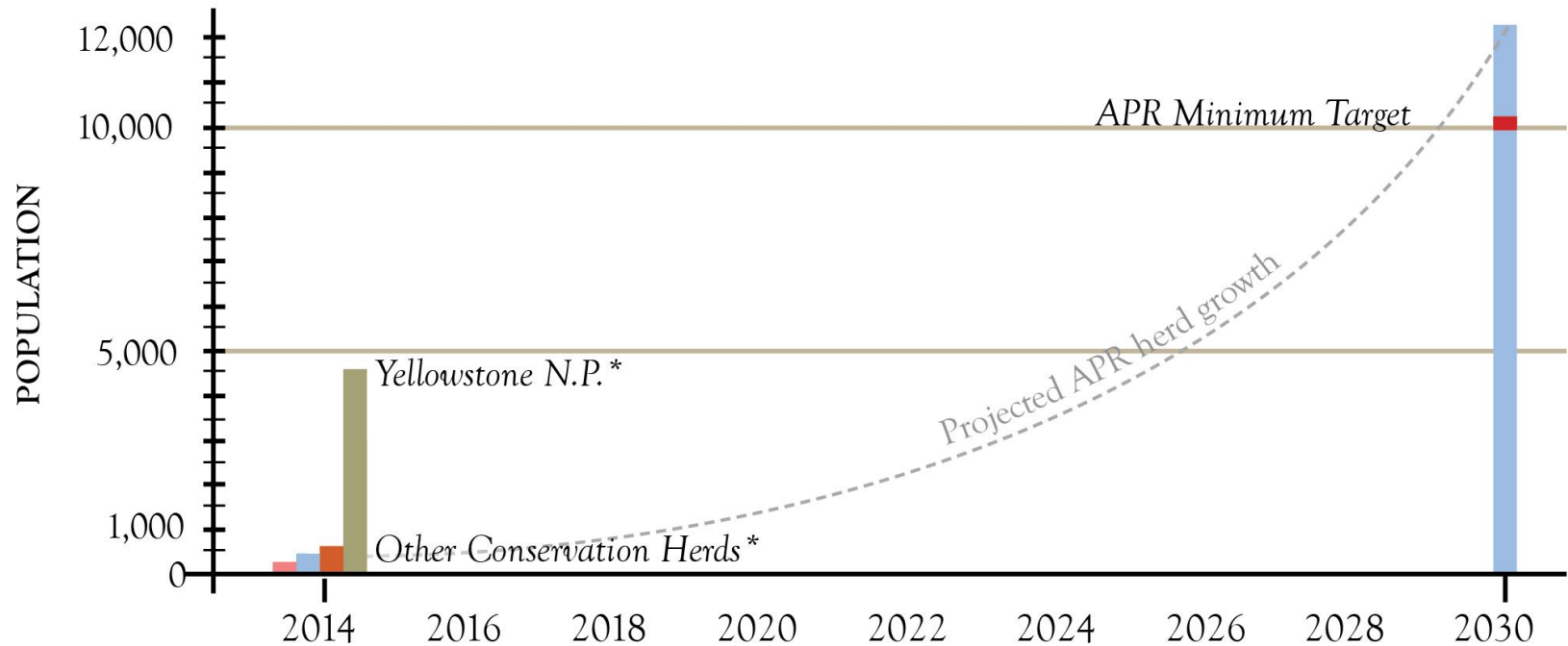
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Population

APR's Current and Projected Herd Population Compared to Other Bison Conservation Herds in the U.S.



CURRENT POPULATIONS

- Yellowstone N.P. - 4,600
- Badlands N.P. - 650
- APR - 440
- Henry Mtns, Utah and Wind Cave N.P. - 325

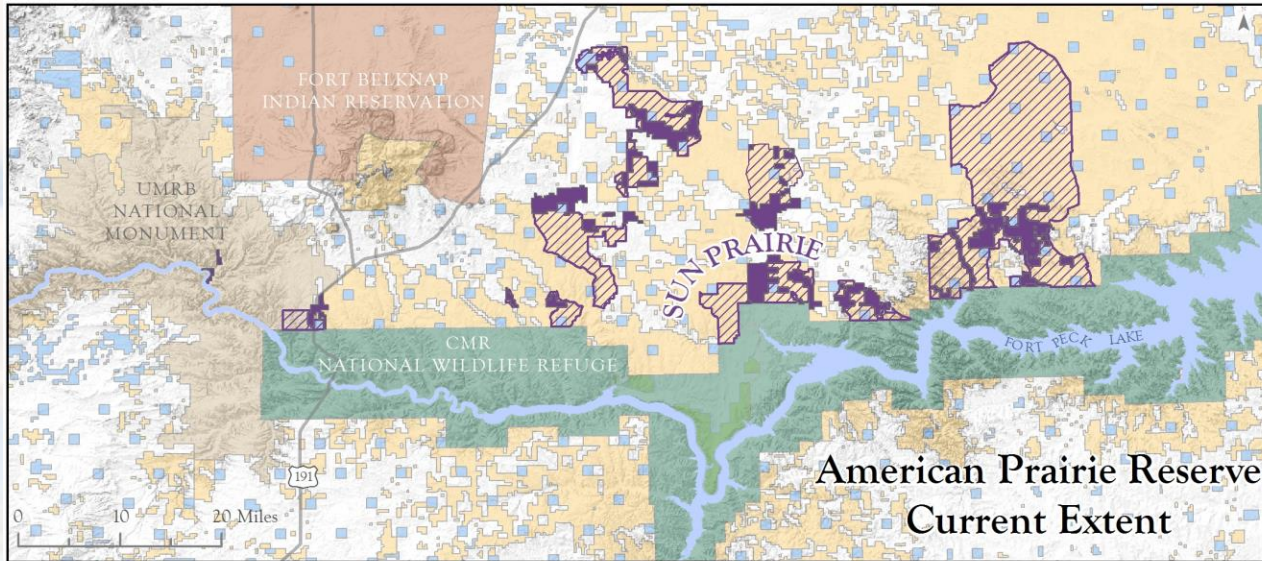
*DOI Bison Report, "Looking Forward", Natural Resource Report NPS/NRSS/BRMD/NRR-2014/821. Prepared by the Dept. of Interior Bison Leadership Team and Working Group.

Fort Belknap
Indian
Reservation

Charles M Russell
National Wildlife Refuge



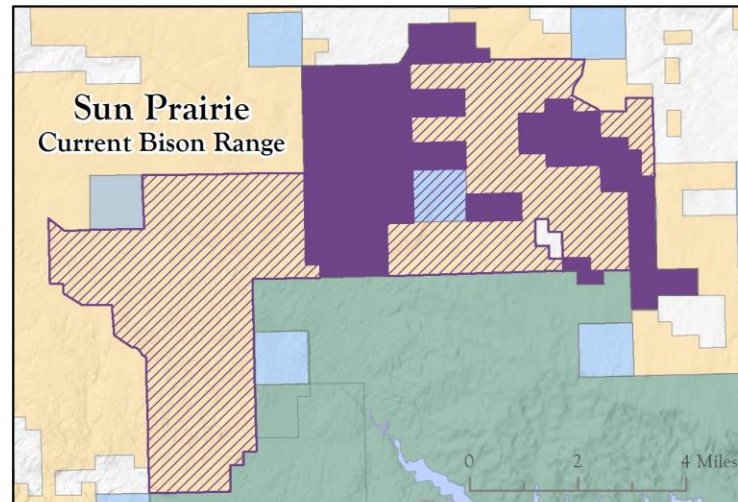
The Reserve Today

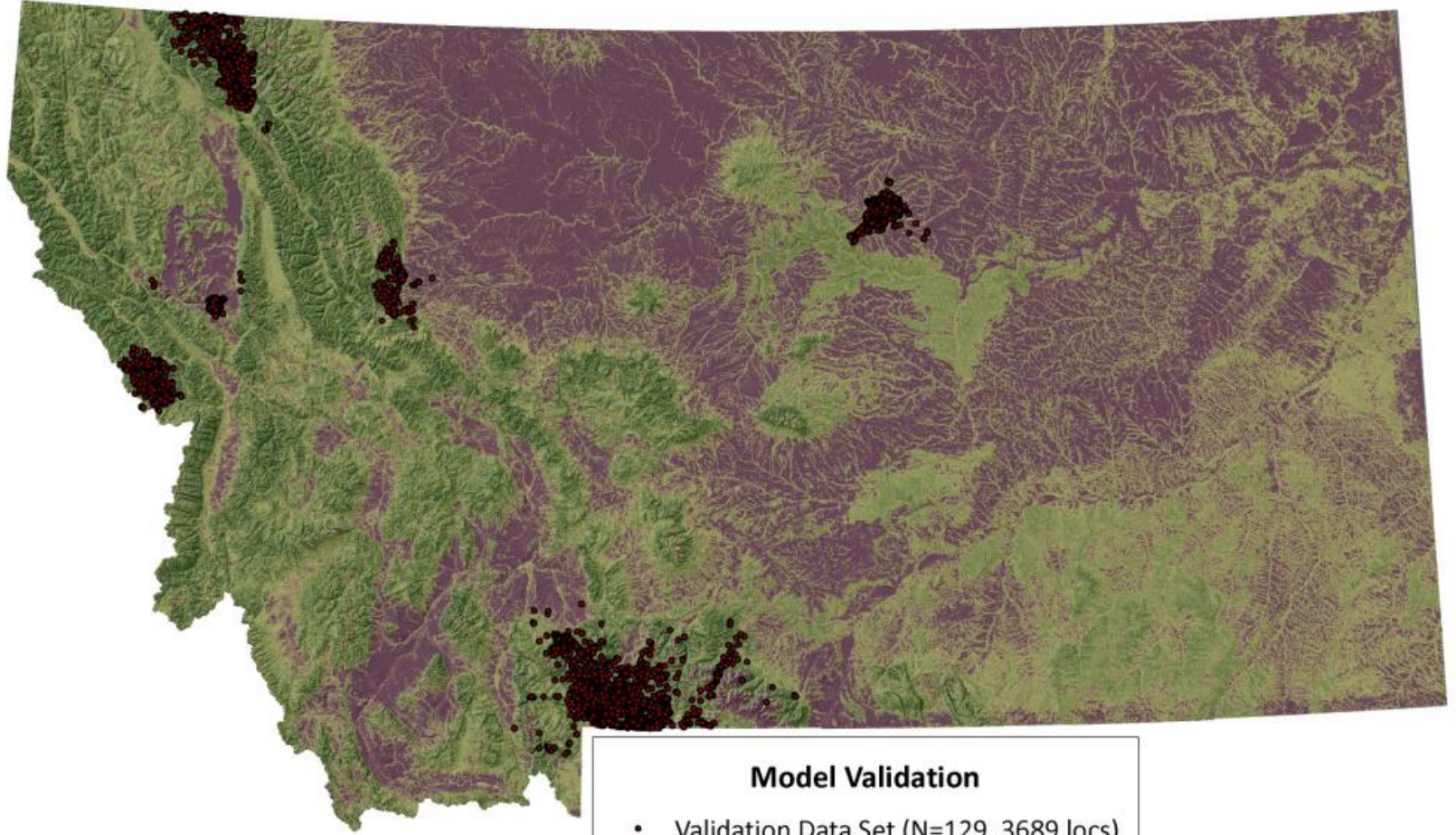


Land Management

- BLM
- Indian Reservation
- National Monument (BLM)
- National Wildlife Refuge (USFWS)
- State Land

- APR Deeded
- APR Leased





Model Validation

- Validation Data Set (N=129, 3689 locs)

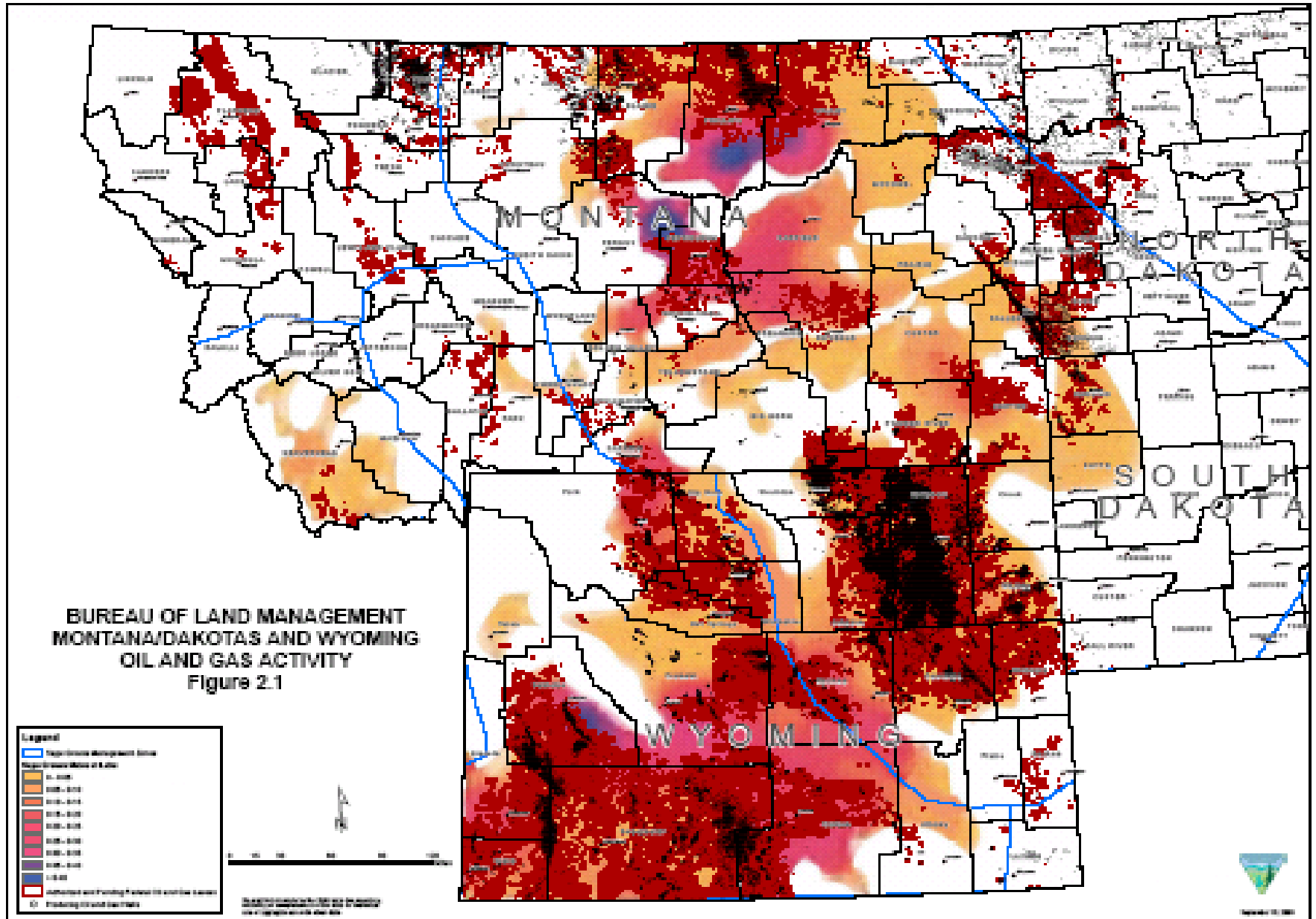
Probability of Lion Use

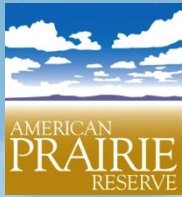


0 45 90 180 270 360

Kilometers

SAGE GROUSE FOCAL AREAS

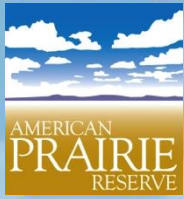




Key messages - BSG

- Implement adaptive large scale bison restoration and use collaborative science to help overcome economic and social limits
- Collaboration with all partners - tribal
- strive for improvement at all scales in scorecard and measure,
- Working hypothesis - MDA $> 1000 \text{ km}^2$
- Focus on large and exceptional herds
- Bigger goal is prairie conservation
- Identify, develop and implement CAD for top 5 landscapes
- Test bison with cattle model





Pablo Allard Herd

- from Walking Coyote to Canada's 1st wildlife reserve, Elk Island National Park





How Big is Big Enough?

Sanderson et al. 2008:

> 2,000 km² (500,000 acres)

Lott 2002:

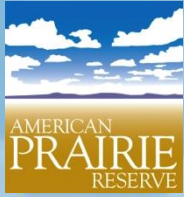
≥ 13,000 km²

Kohl 2012:

LARGE



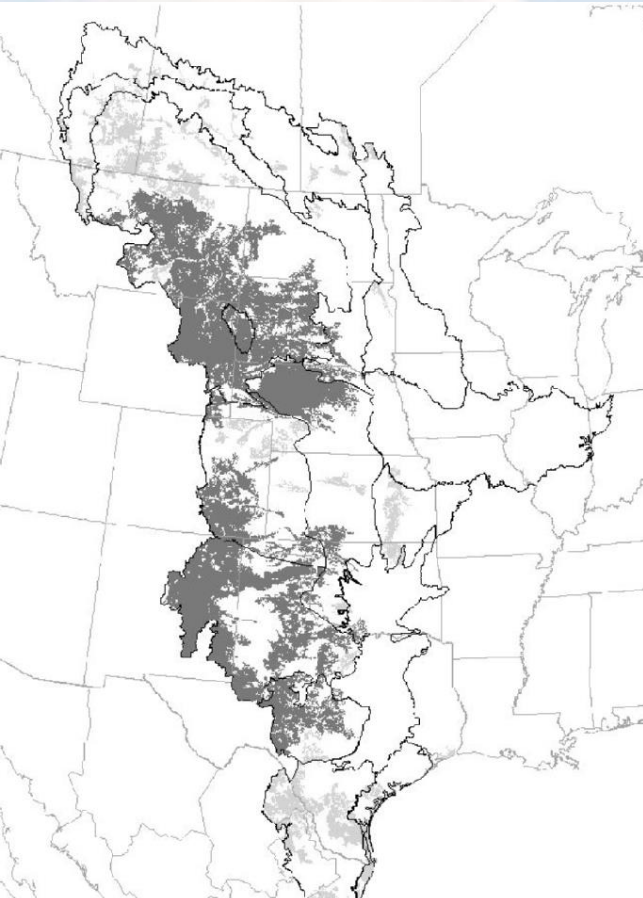
Kyran Kunkel



*large and exceptional herds - >50,000-500,000 acres
for >1000 bison*

MDA = 1,000 km²

*the smallest area with a system of natural ecological drivers that support
and sustain native biodiversity*



Nature reserves should:

- (1) be considerably larger than the largest disturbance patch size, including rare patches,**
- (2) include internal recolonisation sources,**
- (3) include different ages of disturbance-generated patches,**
- (4) encompass areas sufficient to support large consumer populations in habitats not made unsuitable by disturbance and**
- (5) contain separate minimum dynamic areas of each included habitat type.**