

Using Resilience and Resistance Concepts to Manage Threats to Sagebrush Ecosystems, Gunnison Sage-Grouse, and Greater Sage-Grouse

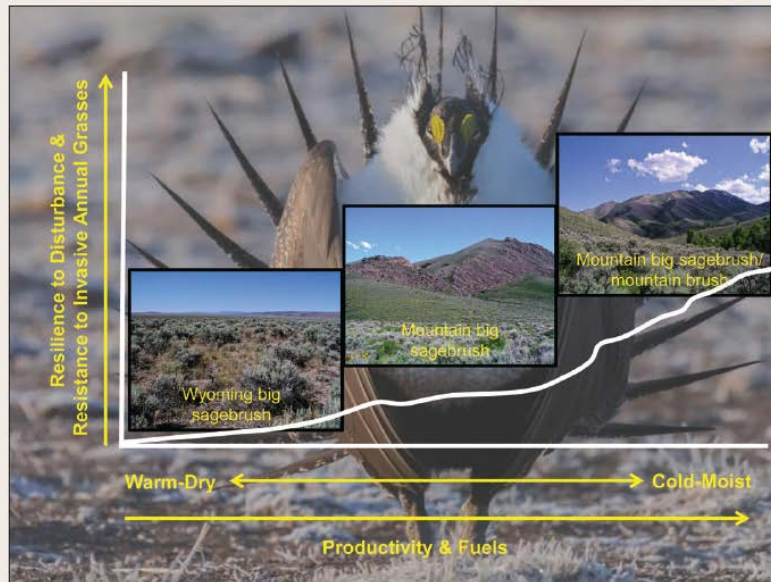
Jeanne C. Chambers, Jeffrey L. Beck, Steve Campbell, John Carlson, Thomas J. Christiansen, Karen Clause, Jonathan B. Dinkins, Kevin E. Doherty, Kathleen A. Griffin, Douglas W. Havlina, Ken Henke, Jacob D. Hennig, Laurie Kurth, Jeremy D. Maestas, Mary Manning, Kenneth E. Mayer, Brian A. Meador, Clinton W. McCarthy, Marco A. Perea, David A. Pyke



Science Based - Resilience and Resistance

Using Resistance and Resilience Concepts to Reduce Impacts of Invasive Annual Grasses and Altered Fire Regimes on the Sagebrush Ecosystem and Greater Sage-Grouse: A Strategic Multi-Scale Approach

Jeanne C. Chambers, David A. Pyke, Jeremy D. Maestas, Mike Pellant, Chad S. Boyd, Steven B. Campbell, Shawn Espinosa, Douglas W. Havlina, Kenneth E. Mayer, and Amarina Wuenschel

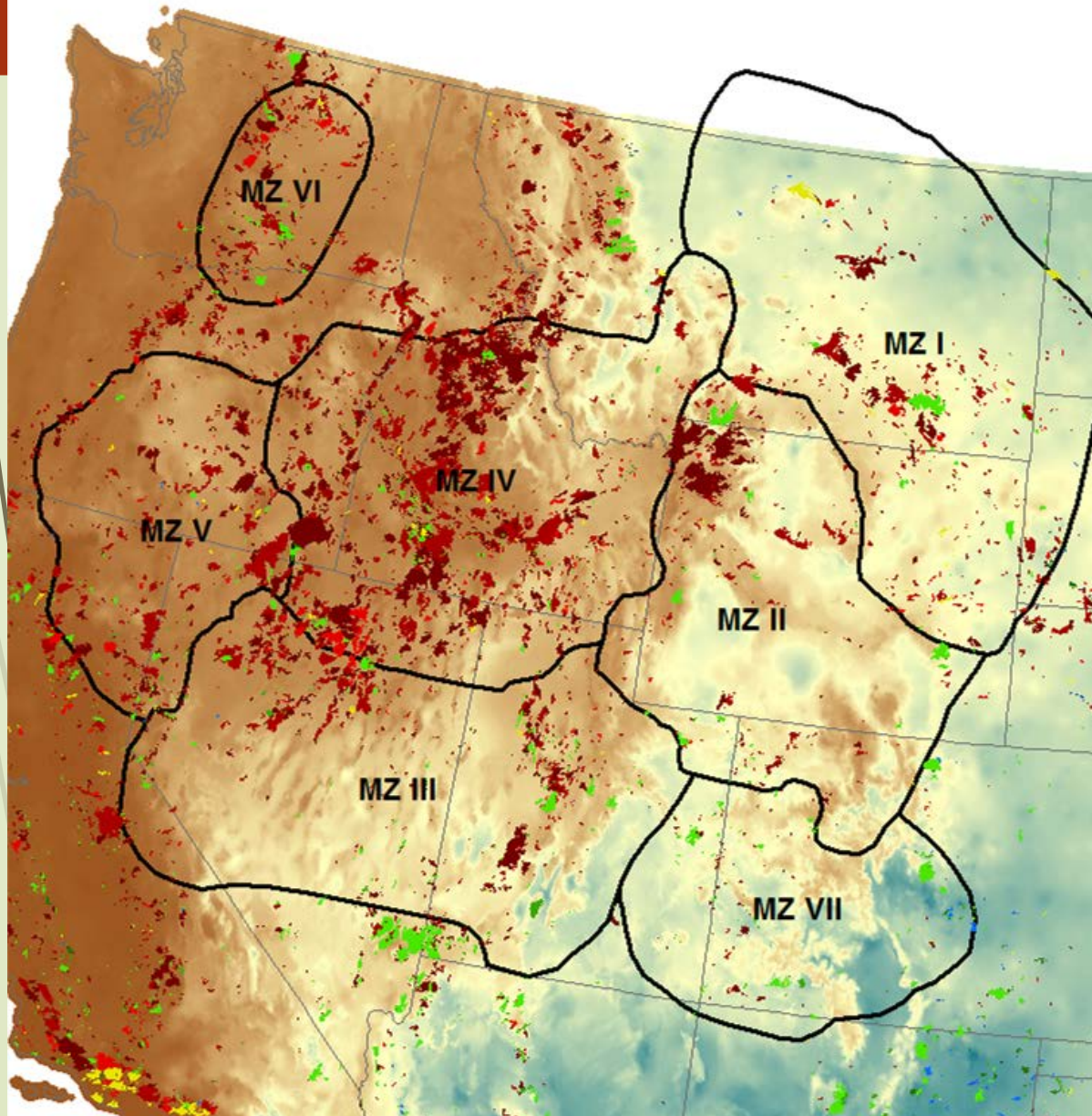


Using Resilience and Resistance Concepts to Manage Threats to Sagebrush Ecosystems, Gunnison Sage-Grouse, and Greater Sage-Grouse in Their Eastern Range: A Strategic Multi-Scale Approach

Jeanne C. Chambers, Jeffrey L. Beck, Steve Campbell, John Carlson, Thomas J. Christiansen, Karen J. Clause, Jonathan B. Dinkins, Kevin E. Doherty, Kathleen A. Griffin, Douglas W. Havlina, Kenneth F. Henke, Jacob D. Hennig, Laurie L. Kurth, Jeremy D. Maestas, Mary Manning, Kenneth E. Mayer, Brian A. Meador, Clinton McCarthy, Marco A. Perea, and David A. Pyke



ENVIRONMENTAL DIFFERENCES



Management Zones



Wild Fires 2000-2013

Month of Start



1



2



3



4



5



6



7



8



9



10



11



12

% Summer Rain



65%



50%



30%



15%



0%

Threats to Sagebrush Ecosystems

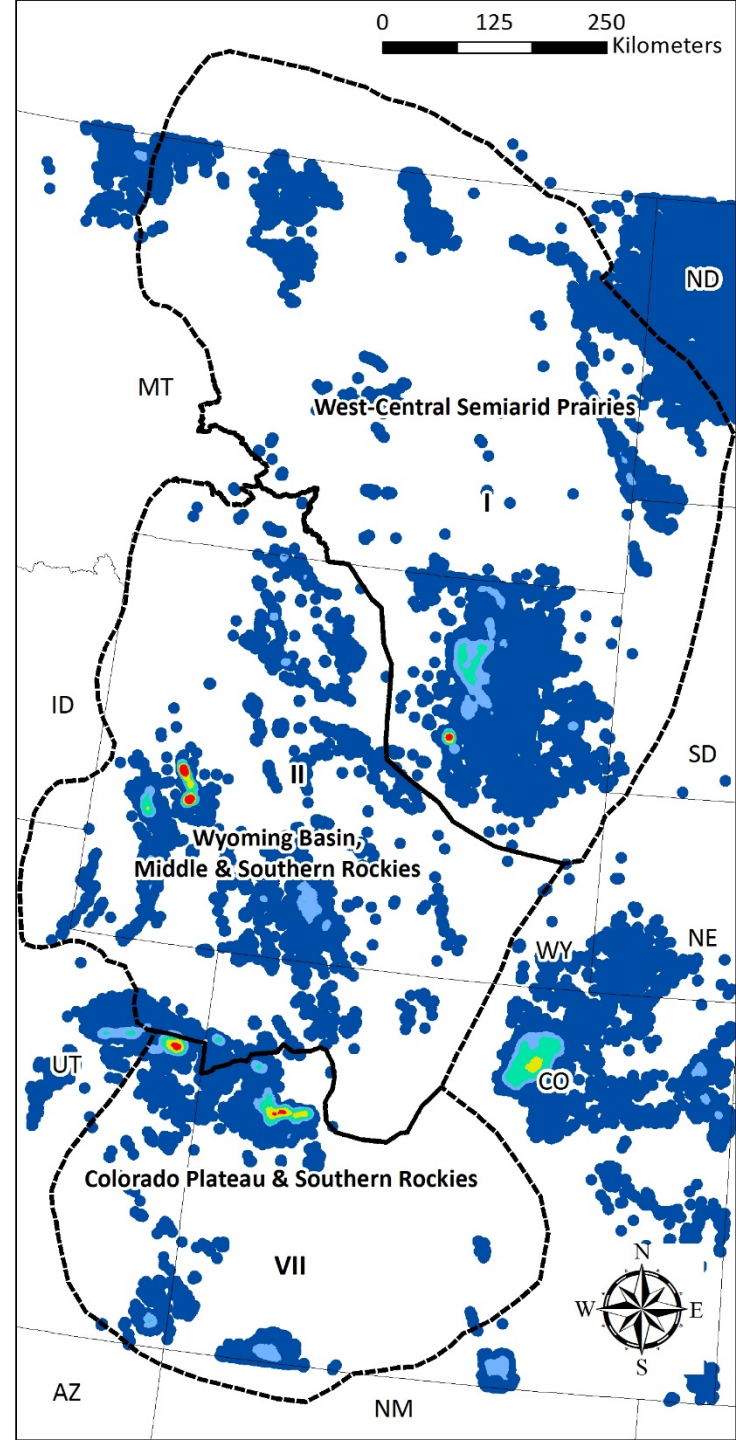
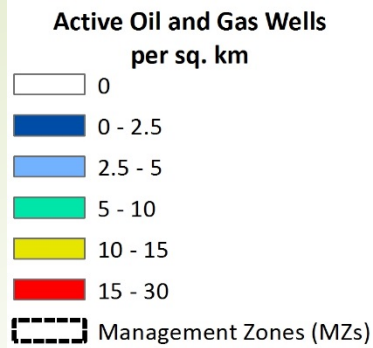
Anthropogenic Threats

- Cropland Conversion
- Oil and Gas Development
- Exurban Development
- Improper Livestock Grazing
- Recreation

Climate Change

- Effects on Ecosystems and Species

GTR Focus: Secondary Effects of Weed Invasion



Environmental Gradients Cold Desert



Chambers 2005,
Chambers et al. 2007,
Wisdom & Chambers 2009;
Brooks & Chambers 2011;
Condon et al. 2011;
Chambers et al. 2014a,b

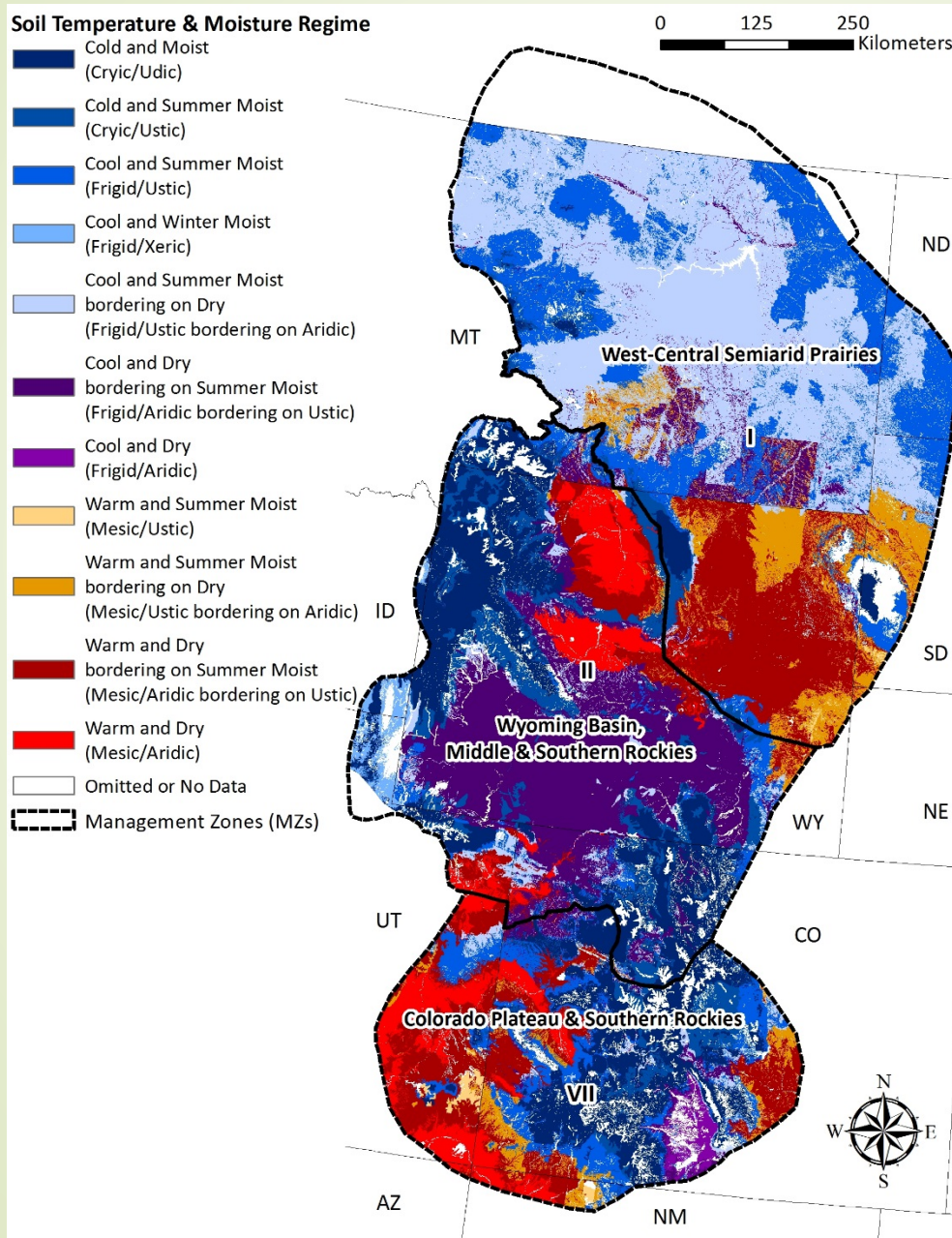
Warm-Dry to
Warm-Dry bordering
on Summer Moist

Cold-Wet to
Cold- Summer Moist

Productivity

Soil Temperature & Moisture Regimes

Resistance & Resilience ↑



Soil Temperature & Moisture Regimes =
Landscape indicator of resilience & resistance

SURGO – 1:24,000 with gaps filled with STATSGO -1:250:000 (Maestas et al. 2016)

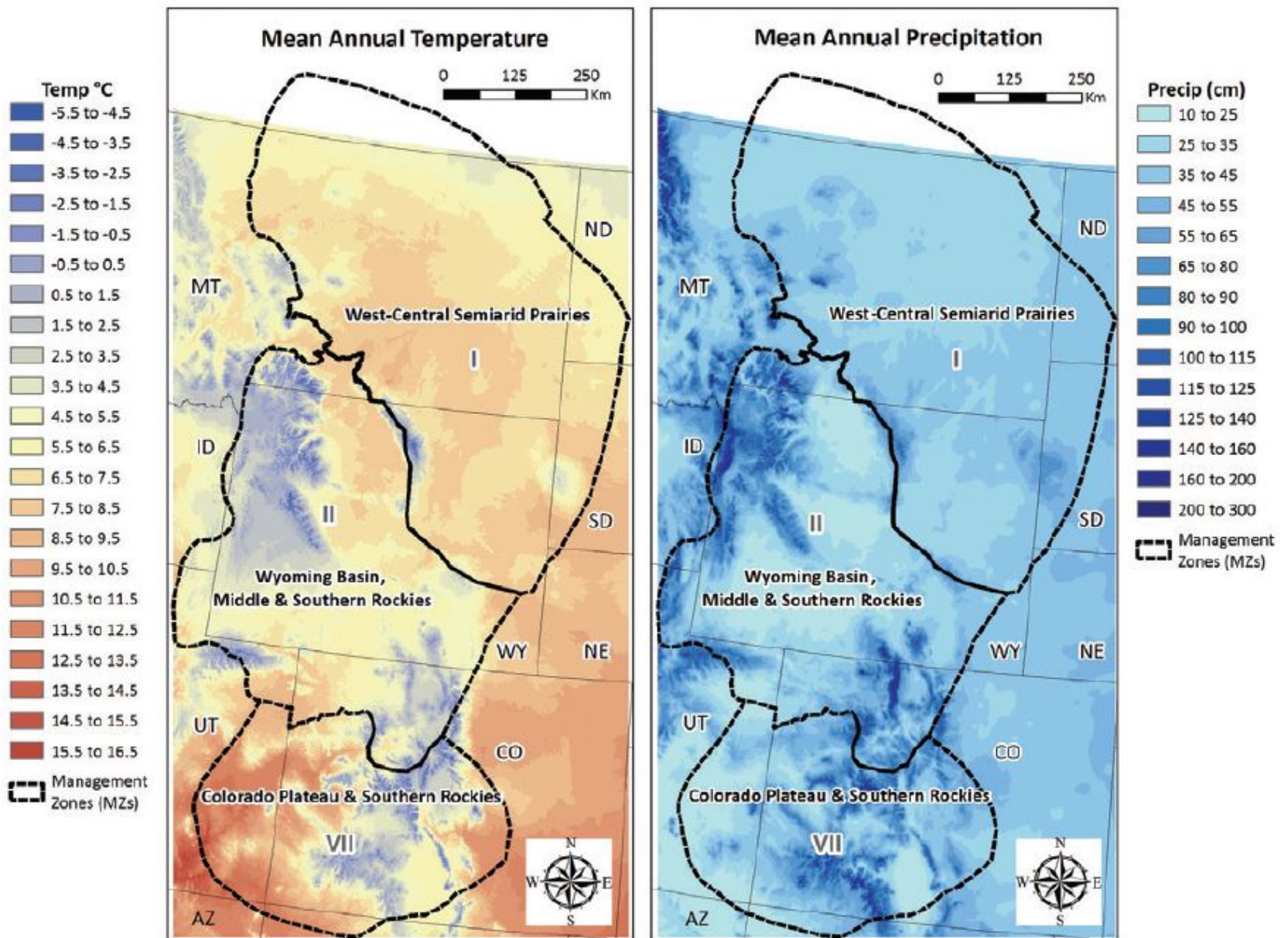


Figure 2—The 30-yr normal annual values for precipitation and temperature (PRISM) in Management Zones I, II, and VII (Stiver et al. 2006) and associated ecoregions (EPA 2016).

RESILIENCE & RESISTANCE OF ECOLOGICAL TYPES

Relative Resilience & Resistance

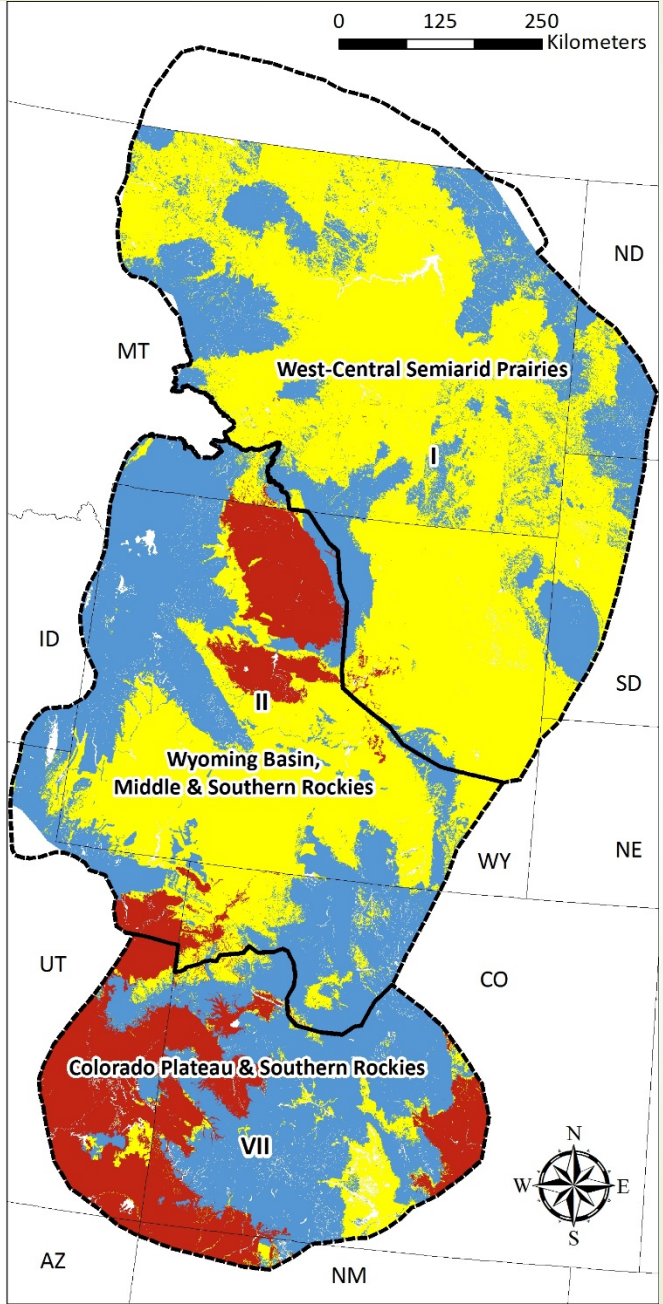
High ↑

↓ Low

Ecological Type	Characteristics	Resilience and resistance
Cold & Moist <i>Cryic (all)</i>	Ppt: 15-20+' Typical shrubs: Mountain big sagebrush, snowberry, serviceberry, silver sagebrush. Cool season bunch grasses	Resilience – High Resistance – High
Cool & Summer Moist <i>Frigid/Ustic</i>	Ppt: 12-22" Typical shrubs: Mountain big sagebrush, bitterbrush, snowberry. Cool season grasses Piñon pine and juniper potential	Resilience – Moderate to high Resistance – Moderate to high
Cool & Summer moist bordering on dry <i>Frigid/Ustic-Aridic</i>	Ppt: 12-16" Typical shrubs: Wyoming big sagebrush with basin big and silver sagebrush in drainages. Cool season grasses with some warm season grasses Piñon pine and juniper potential	Resilience – Moderate Resistance – Moderate
Warm & Summer moist bordering on dry <i>Mesic/Ustic-Aridic</i>	Ppt: 10-14" Typical shrubs: Wyoming big sagebrush, fourwing saltbush. Cool season grasses with some warm season grasses Piñon pine and juniper potential	Resilience – Moderate to Low Resistance – Low
Warm & Dry <i>Mesic/Aridic</i>	Ppt: 5-9" Typical shrubs: Wyoming big sagebrush, salt desert shrubs. Cool season grasses with some warm season grasses.	Resilience – Moderate to Low Resistance – Low

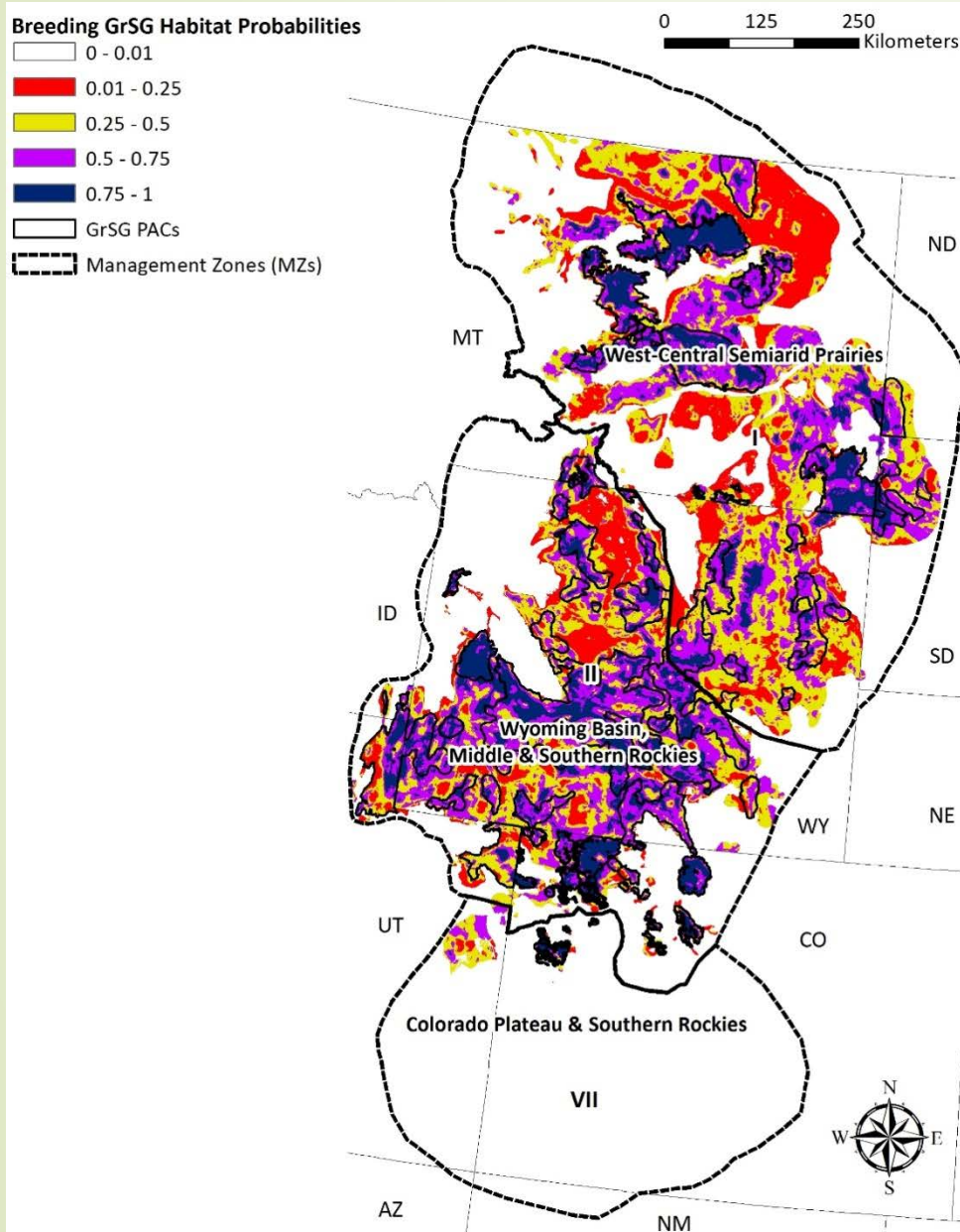
Resilience & Resistance Classes

- Resistance and Resilience**
- High
 - Moderate
 - Low
 - Management Zones (MZs)



***Soil Temperature & Moisture Regimes =
Landscape indicator of resilience & resistance***

Sage-grouse Breeding Habitat Probabilities



***Bases Breeding Habitat
on multivariate models –***

➤ ***2010 – 2014 BBD data***

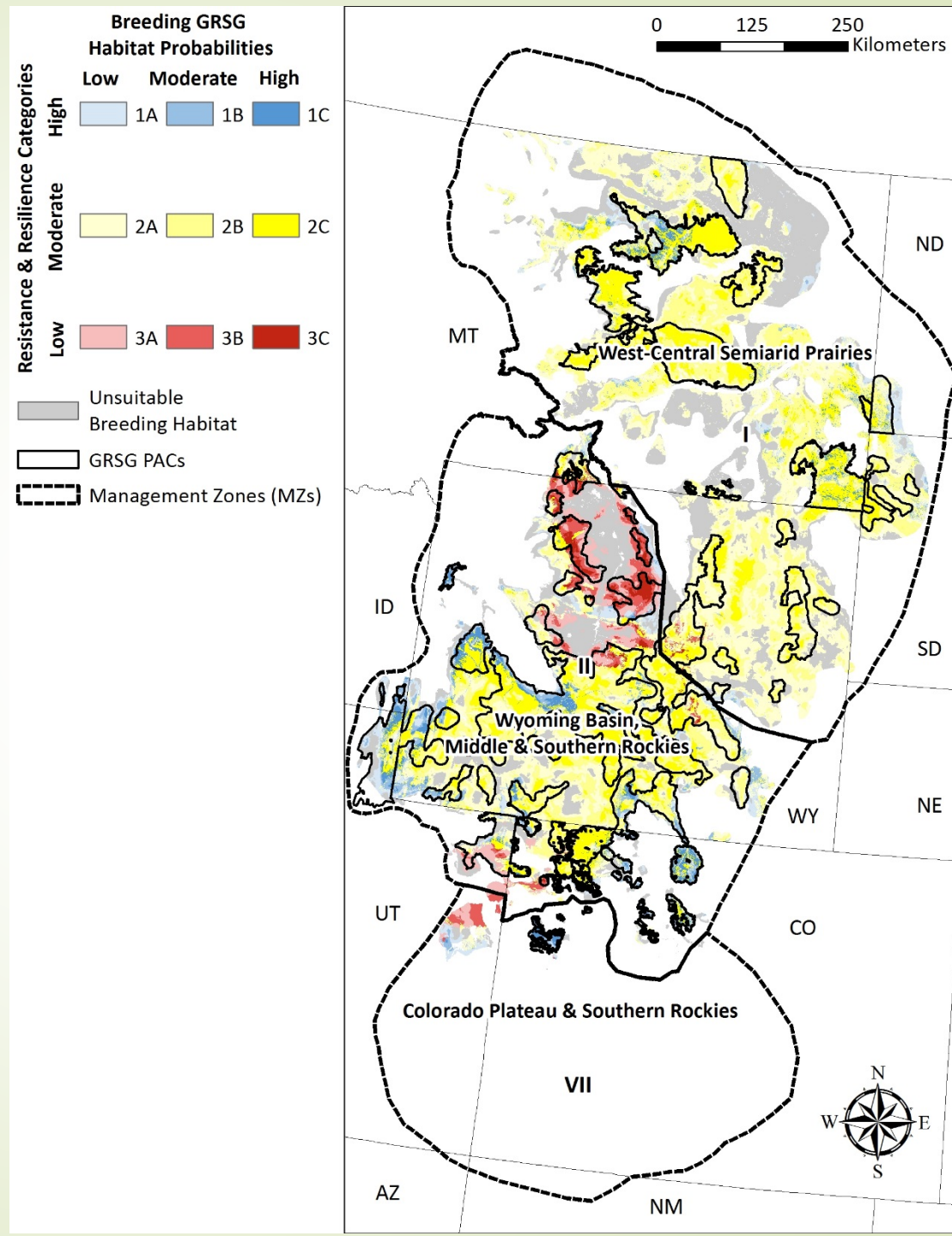
- ***General Habitat***
- ***Climate***
- ***Landform***
- ***Disturbance***

Doherty et al. 2015

Map of GRSG Habitat Matrix

Areas for targeted management –

- First filters – GRSG PACS developed by States
- Resilience & Resistance
- Sage-grouse breeding habitat probabilities (Doherty et al. 2015)
- Management strategies can be matched directly to the Matrix





Sage-Grouse Habitat Matrix

Probability of Sage-Grouse Breeding Habitat

Sagebrush Ecosystem Resilience & Resistance

Low (0.25-0.50)
Landscape context is likely limiting - significant restoration may be needed.

Medium (0.5-0.75)
Landscape context may be affecting habitat suitability – improve with management.

High (> 0.75)
Landscape context is highly suitable - maintain and enhance resilience & resistance.



High

RESTORATION/RECOVERY POTENTIAL HIGH
*Native grasses and forbs sufficient for recovery
Annual invasive risk low; Conifer expansion is a local issue
Seeding success is typically high*



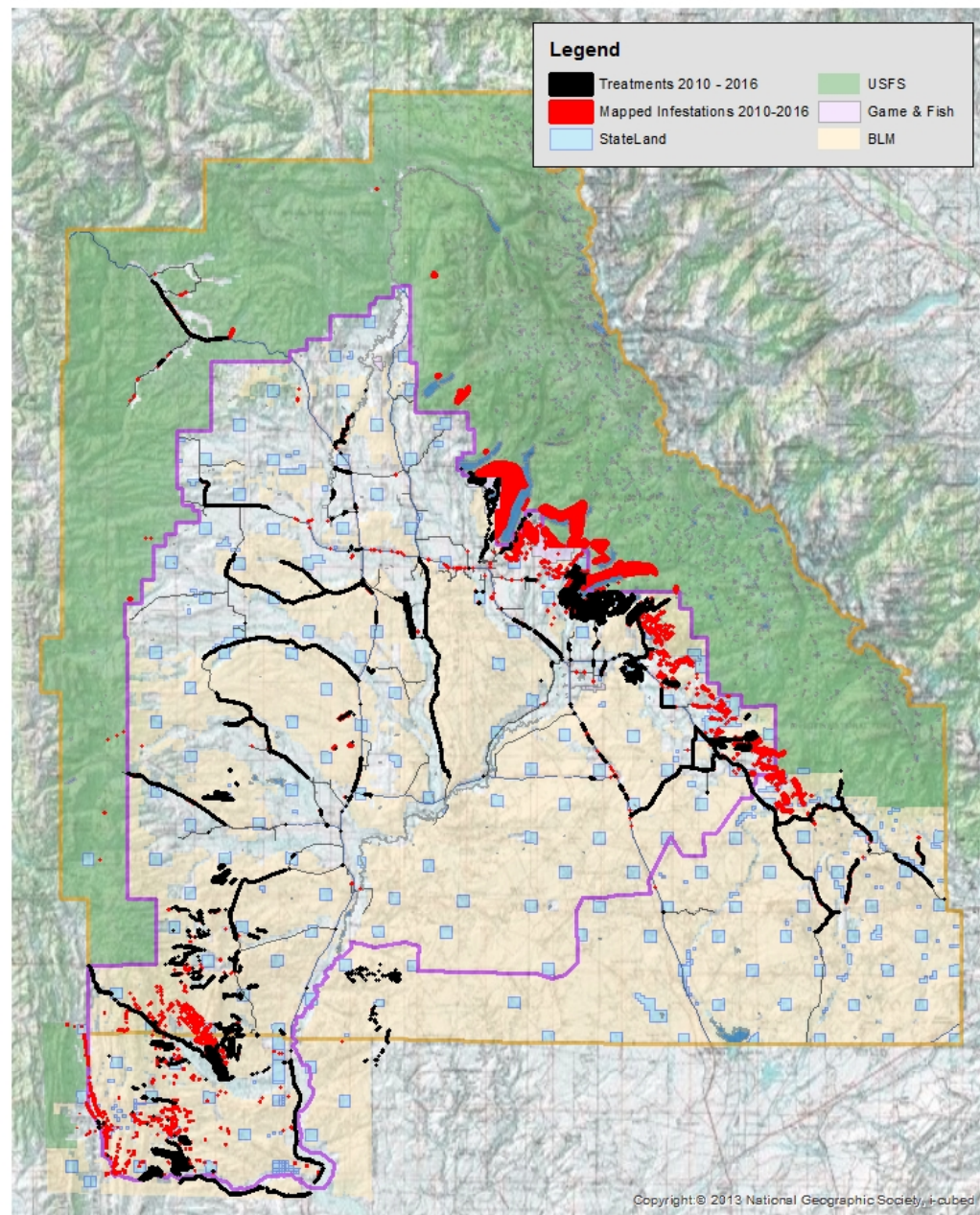
Moderate

RESTORATION/RECOVERY POTENTIAL INTERMEDIATE
*Native grasses and forbs usually adequate for recovery
Annual invasive risk moderate; Conifer expansion is a local issue
Treatment success depends on site characteristics*



Low

RESTORATION/RECOVERY POTENTIAL LOW
*Native grasses and forbs inadequate for recovery
Annual invasive risk is high
Seeding success depends on site characteristics, invasives & ppt
May require multiple management interventions*

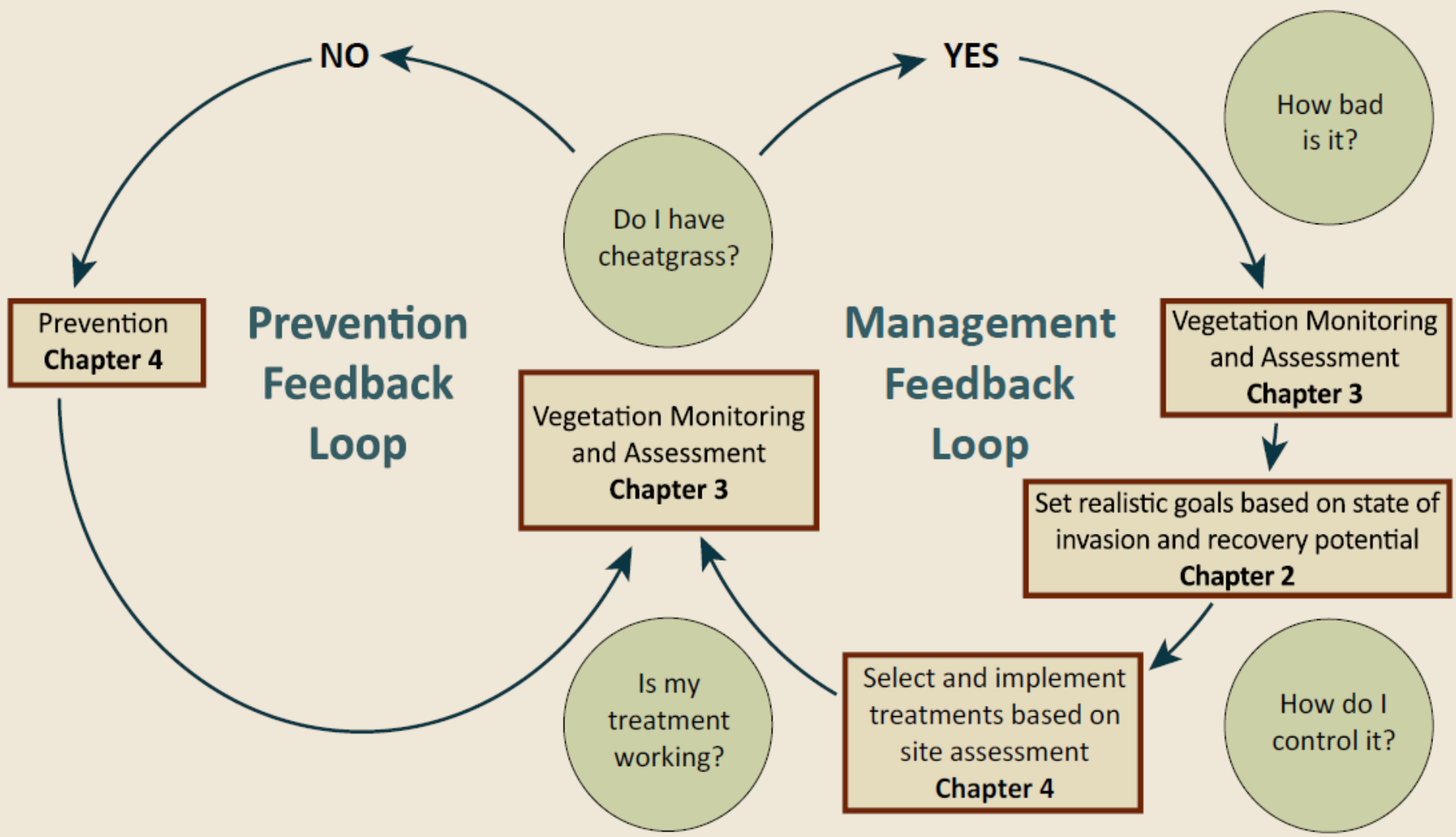


0 5 10 20 Miles

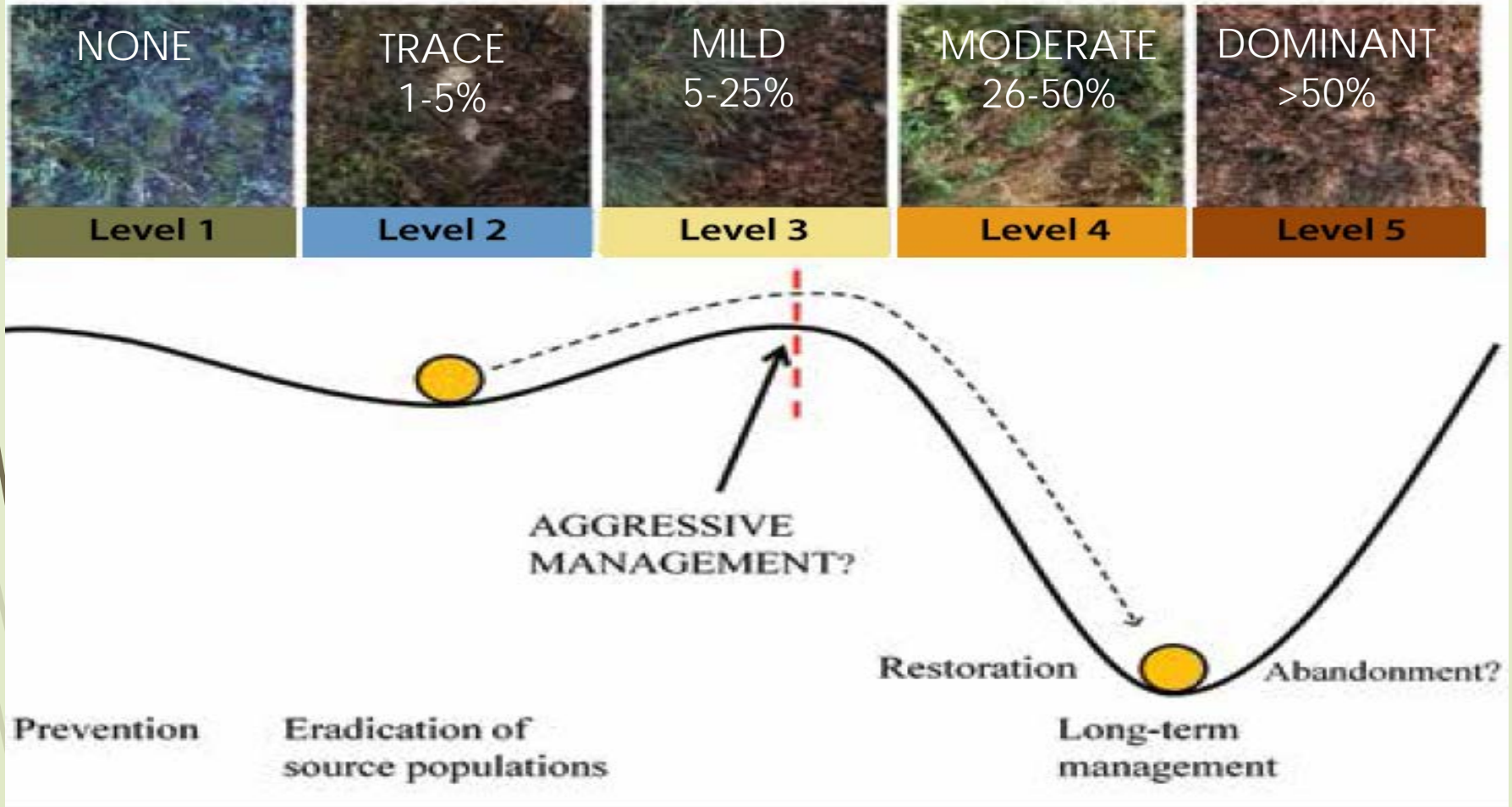
**Sublette County and Cooperators
Cheatgrass Project**



Cheatgrass Management Decision Framework



CONCEPT OF THRESHOLDS: LIFE ON THE EDGE



Cheatgrass Management Handbook Managing an invasive annual grass in the Rocky Mountain Region, by UW and CSU , August 2013

2011



Imazapic

no longterm
non-target damage
to native species

2016



GRASS COVER	2011	2012	2016
Cheatgrass	54	0	13
Native Grass	55	56	81



United States Department of Agriculture



Sage Grouse Initiative 2.0

Investment Strategy, FY 2015-2018

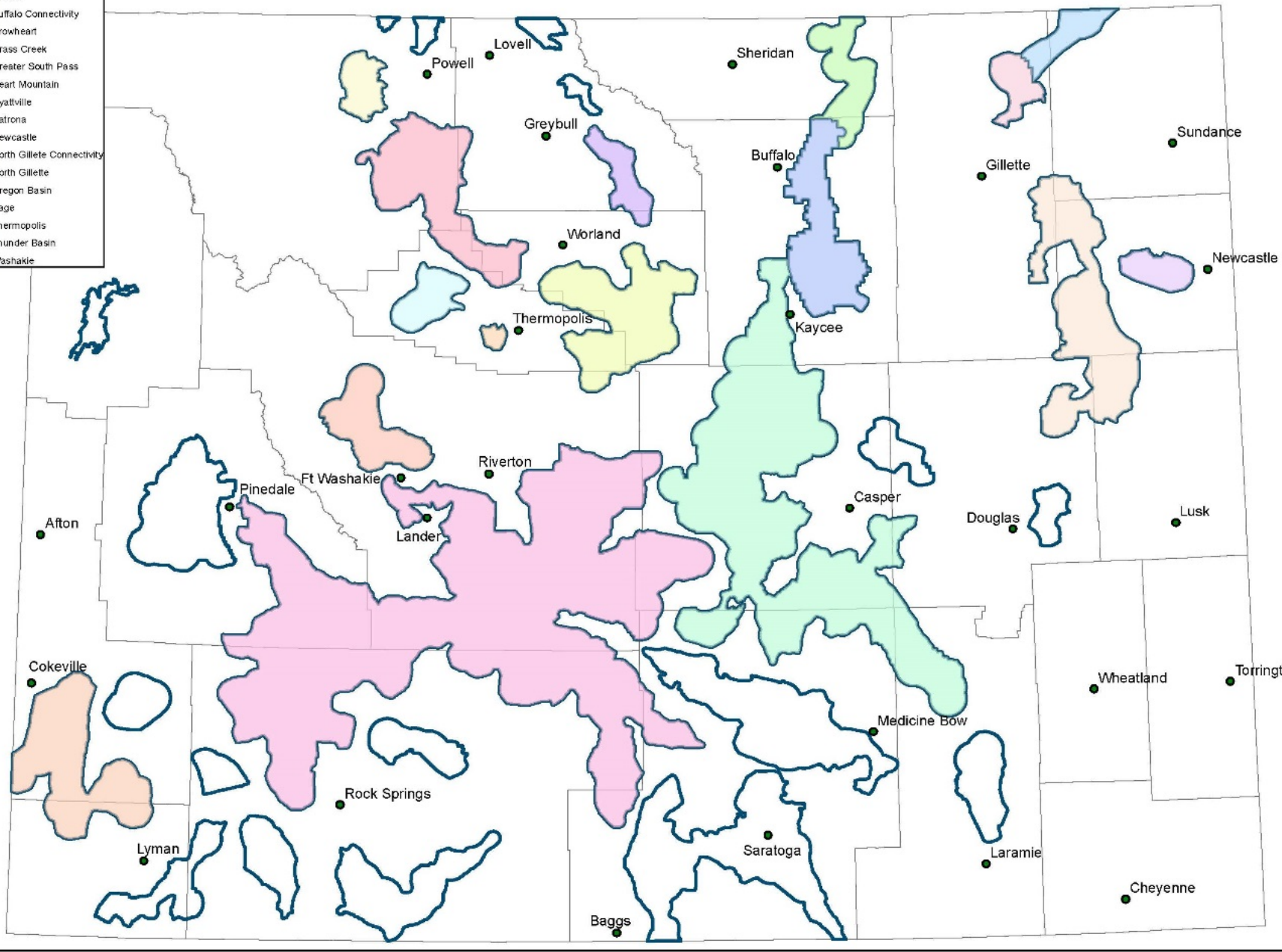


Natural Resources
Conservation
Service
August 2015

- Developed in Spring 2015
- \$211 million NRCS investment through 2018
 - \$93 million restoration
 - \$100 million easements
 - \$18 million staff, partners
- Increased prioritization
- Greater emphasis on fire and invasive species
- Goal of fully eliminating threats in some areas
- CSP Pilot
- Emerging opportunities

Priority Core Areas for Invasive Species Control

- Buffalo
- Buffalo Connectivity
- Crowheart
- Grass Creek
- Greater South Pass
- Heart Mountain
- Hyattville
- Natrona
- Newcastle
- North Gillette Connectivity
- North Gillette
- Oregon Basin
- Sage
- Thermopolis
- Thunder Basin
- Washakie



0 15 30 45 60

NATURAL RESOURCES CONSERVATION SERVICE

On the Range, Water Is Life

Help Conserve Wet Habitat in Sagebrush Country to Benefit Working Lands and Wildlife



<https://www.sagegrouseinitiative.com>

Questions?

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