Conservation for Greater Sage-Grouse

Approaches for Prioritizing Management

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Greater Sage-Grouse

Central Nevada

Greater Sage-Grouse
Why is conservation so challenging?

- Broad range-wide distribution
- Diversity of sagebrush environments
  - Complex dynamics
- Wide variety of system stressors
- Multiple land ownerships
  - Public lands managed for multiple use
  - Not all lands are equal

Eastern Nevada

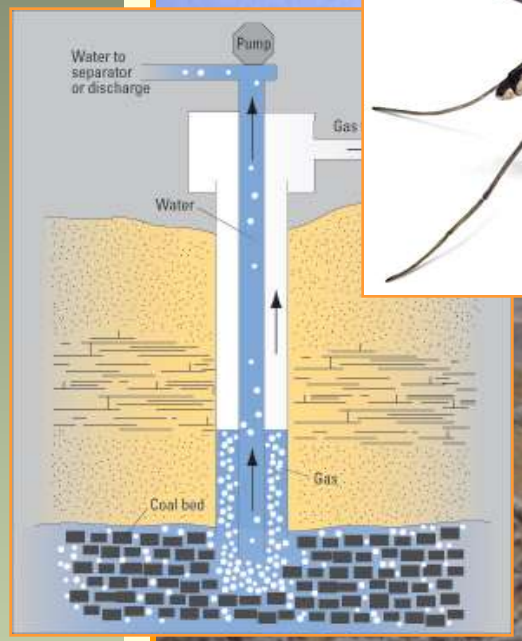
USGS

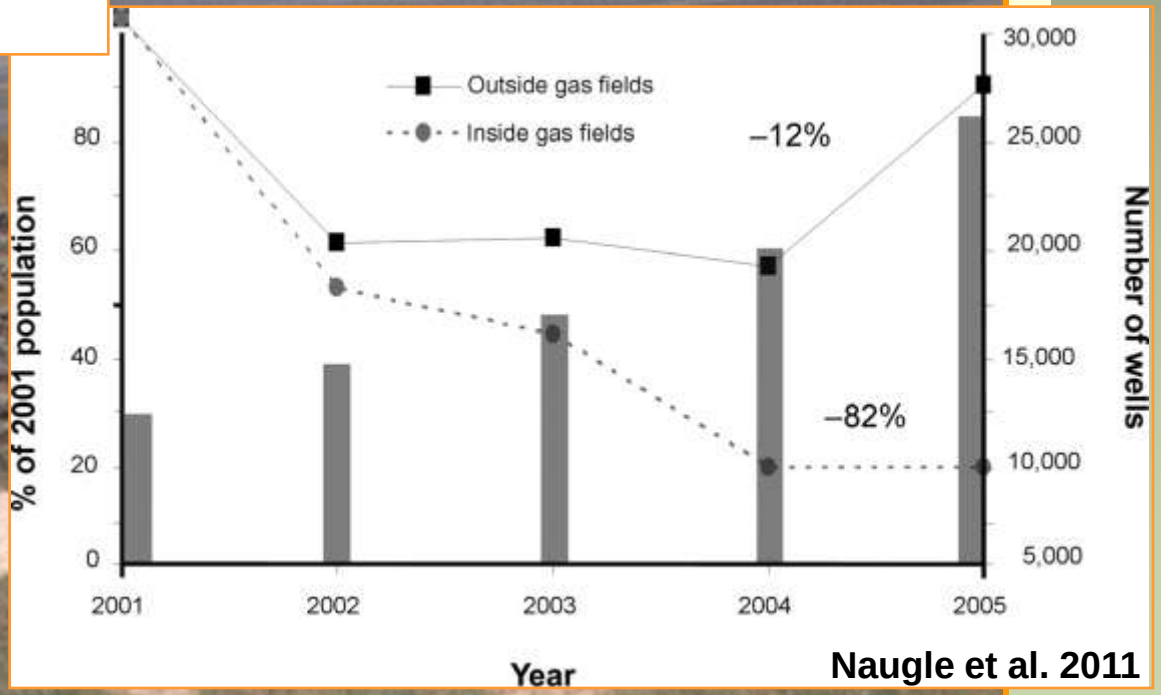
“The future ain’t what it used to be”

Yogi Berra

Coalbed Natural Gas Development, Wyoming

USGS





Naugle et al. 2011

USGS

Coalbed Natural Gas Development, Wyoming

USGS

Coalbed Natural Gas Development, Wyoming

Sage Grouse Leks

Sagebrush Habitat

- 0% - 15%
- 16% - 36%
- 37% - 62%
- 63% - 99%

Urban Areas

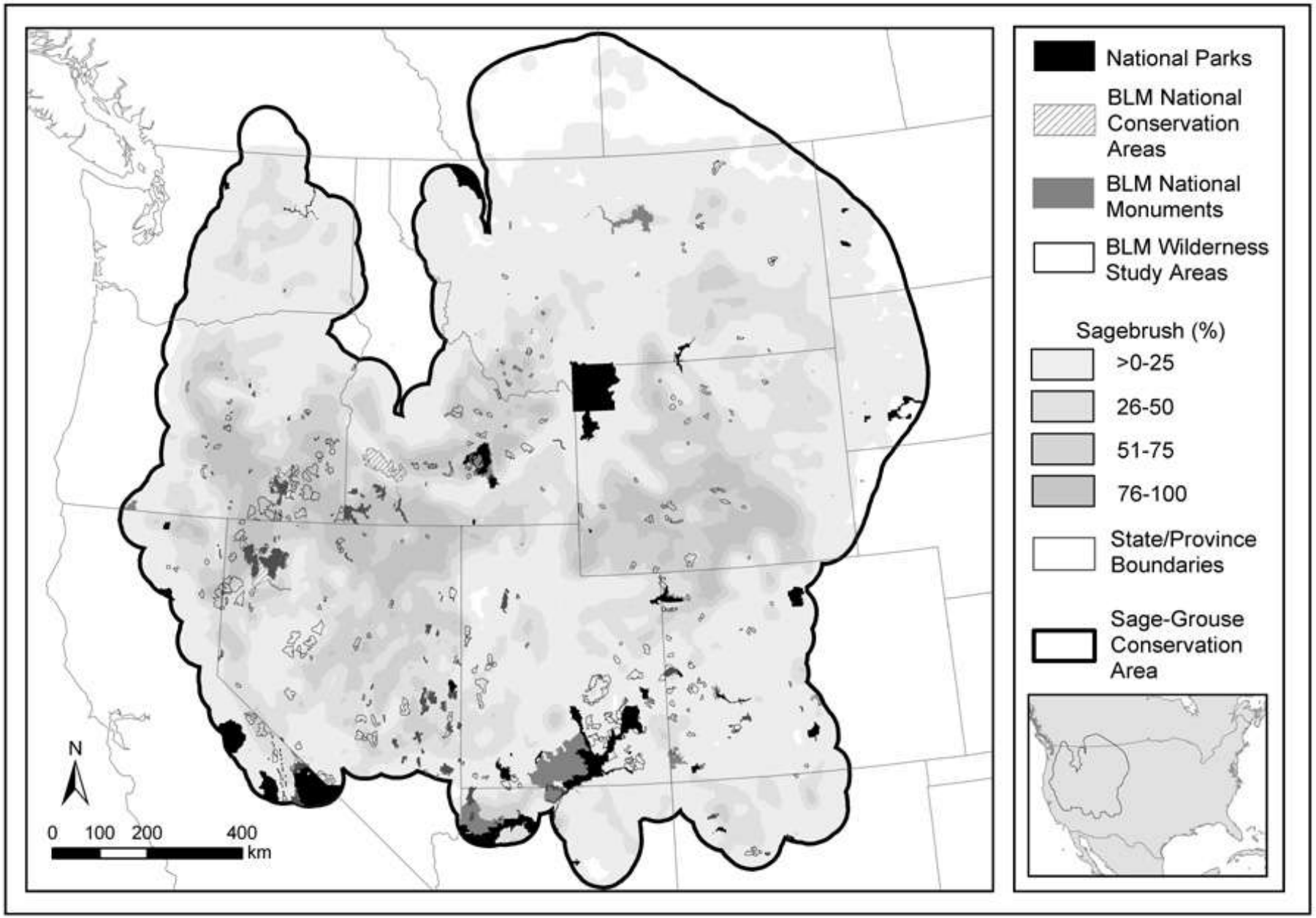
Agricultural Land

Power Lines

Major Roads

Fires

Oil and Gas Wells


National Parks
BLM National Conservation Areas
BLM National Monuments
BLM Wilderness Study Areas
Sagebrush (%)
>0-25
26-50
51-75
76-100
State/Province Boundaries
Sage-Grouse Conservation Area
N
0 100 200 400
km

USGS

Presentation Objectives

- Illustrate the need to prioritize regions
- Describe organization of sagebrush systems
- Develop a strategy for conservation actions
  - Spatial modeling to delineate sage-grouse distributions and focus restoration

Greater Sage-Grouse

“Conserve what we have, and improve or restore what has been lost.”

Healthy Lands Initiative

Oregon-Idaho-Nevada Shrub-Steppe Landscape

The highest priority is to ***maintain sagebrush steppe habitat followed by strategically restoring fragmented habitat***. This action will conserve habitat for at-risk wildlife species, such as ***sage-grouse***, that are dependent on large sagebrush communities.

Greater Sage-grouse

Northcentral Nevada

The Challenge
Great Basin Ecoregion (ha)

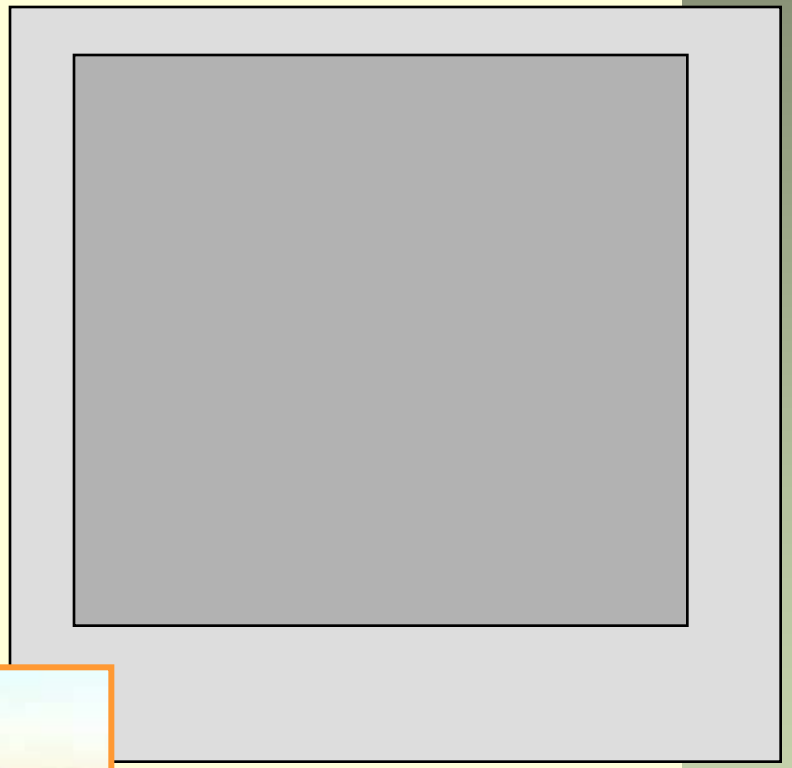
- Area 29,304,818

Sources:
Knick et al. 2003
Wisdom et al. 2005
Meinke et al. 2009

USGS

The Challenge
Great Basin Ecoregion (ha)

- Area 29,304,818
- BLM Management 18,168,987

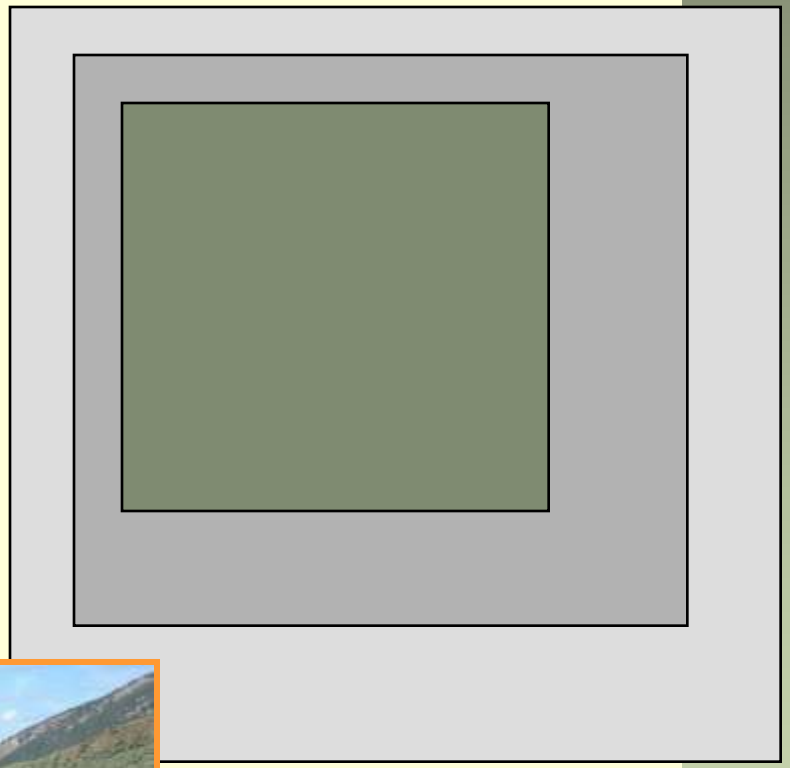


Central Nevada

Sources:
Knick et al. 2003
Wisdom et al. 2005
Meinke et al. 2009

The Challenge
Great Basin Ecoregion (ha)

- Area 29,304,818
- BLM Management 18,168,987
- Sagebrush area 8,844,892



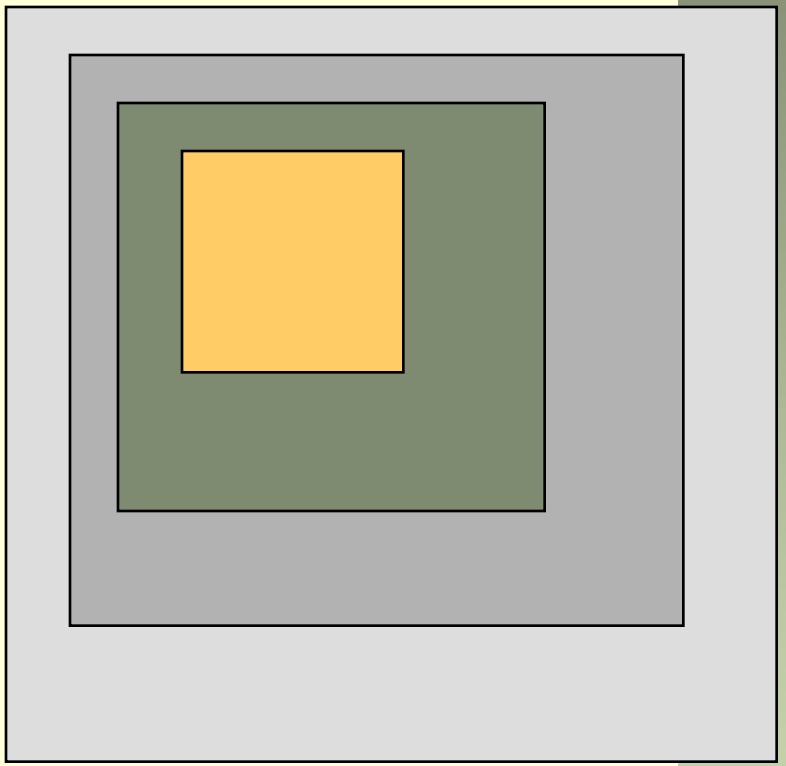
Southwestern Idaho

Steve Hanser

Sources:
Knick et al. 2003
Wisdom et al. 2005
Meinke et al. 2009

The Challenge
Great Basin Ecoregion (ha)

Area	29,304,818
BLM Management	18,168,987
Sagebrush area	8,844,892
Cheatgrass risk	4,787,161

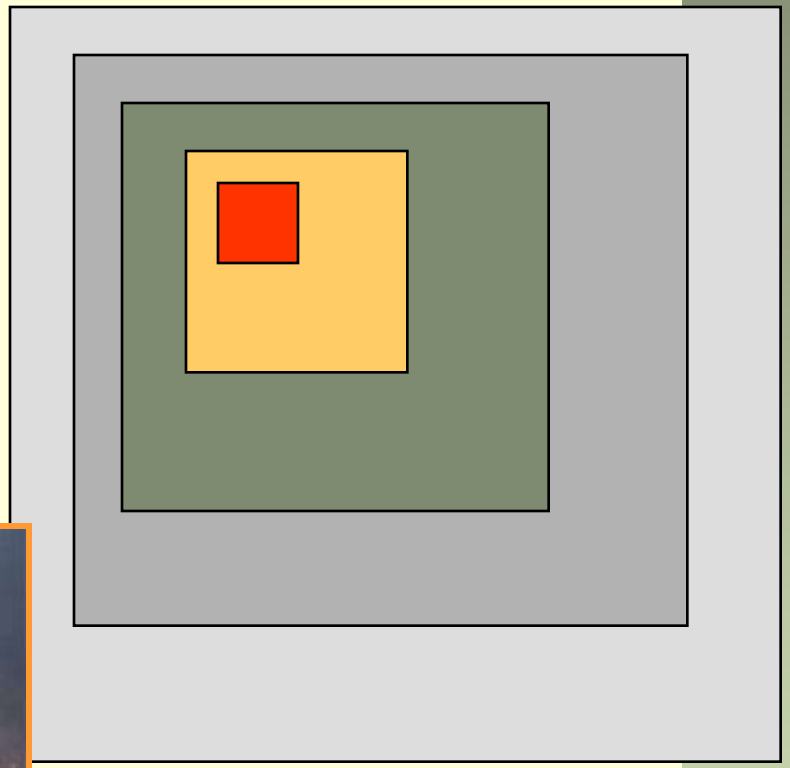


Southern Idaho

Sources:
Knick et al. 2003
Wisdom et al. 2005
Meinke et al. 2009

The Challenge
Great Basin Ecoregion (ha)

Area	29,304,818
BLM Management	18,168,987
Sagebrush area	8,844,892
Cheatgrass risk	4,787,161
Area burned	506,279

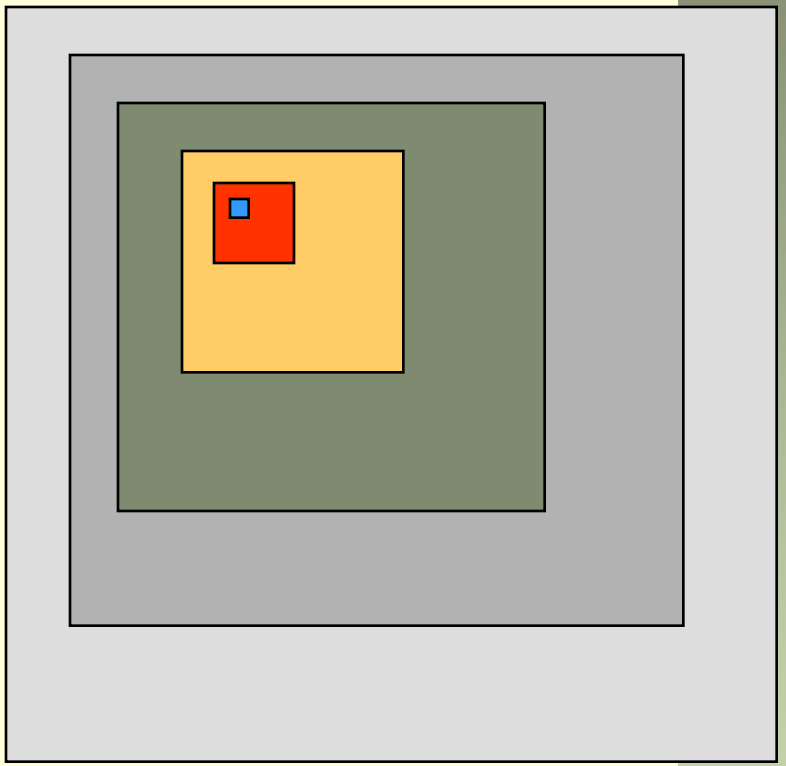


Sources:
Knick et al. 2003
Wisdom et al. 2005
Meinke et al. 2009

USGS

The Challenge
Great Basin Ecoregion (ha)

Area	29,304,818
BLM Management	18,168,987
Sagebrush area	8,844,892
Cheatgrass risk	4,787,161
Area burned	506,279
Treatment area	9,308



Sources:
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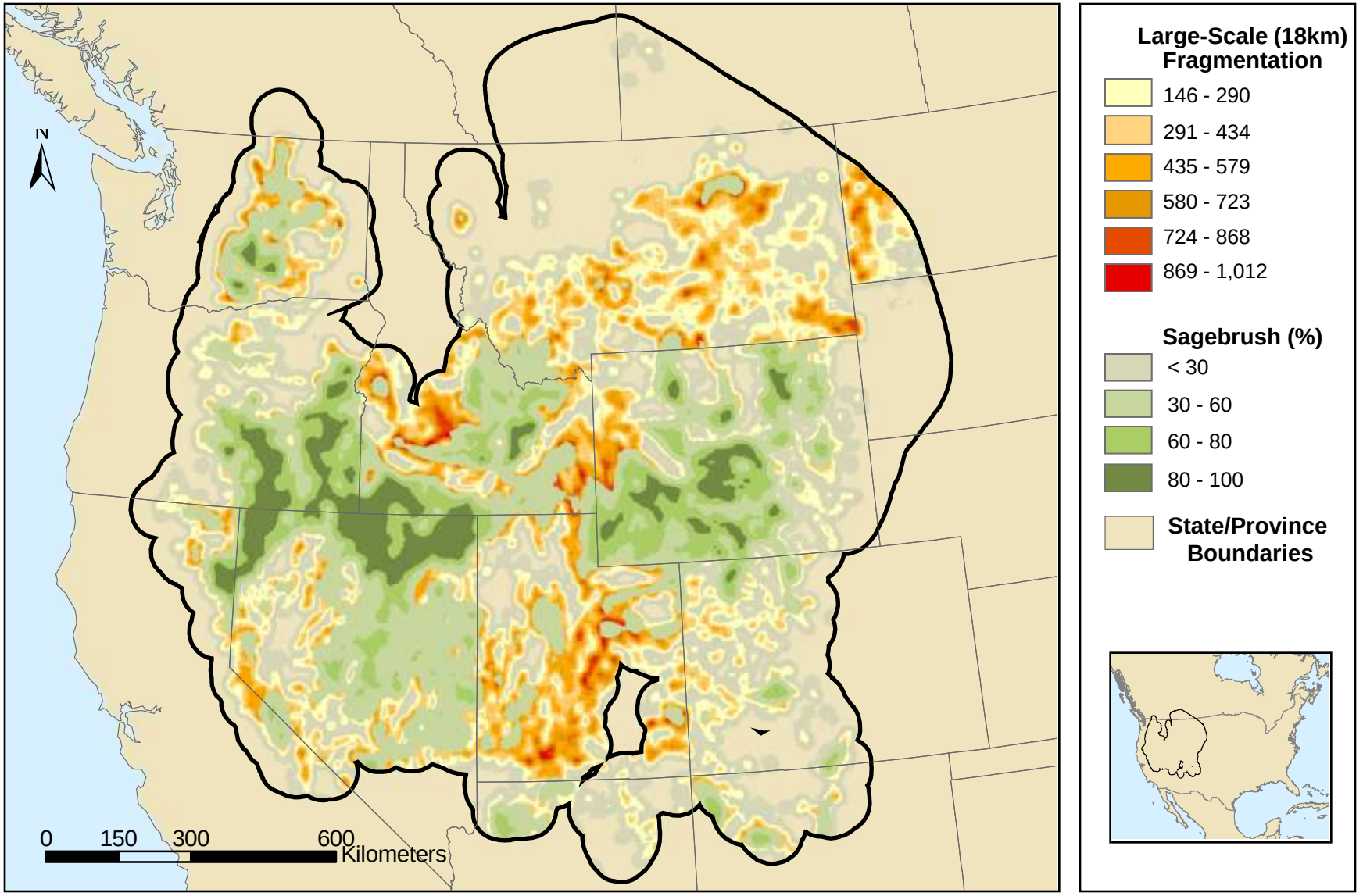
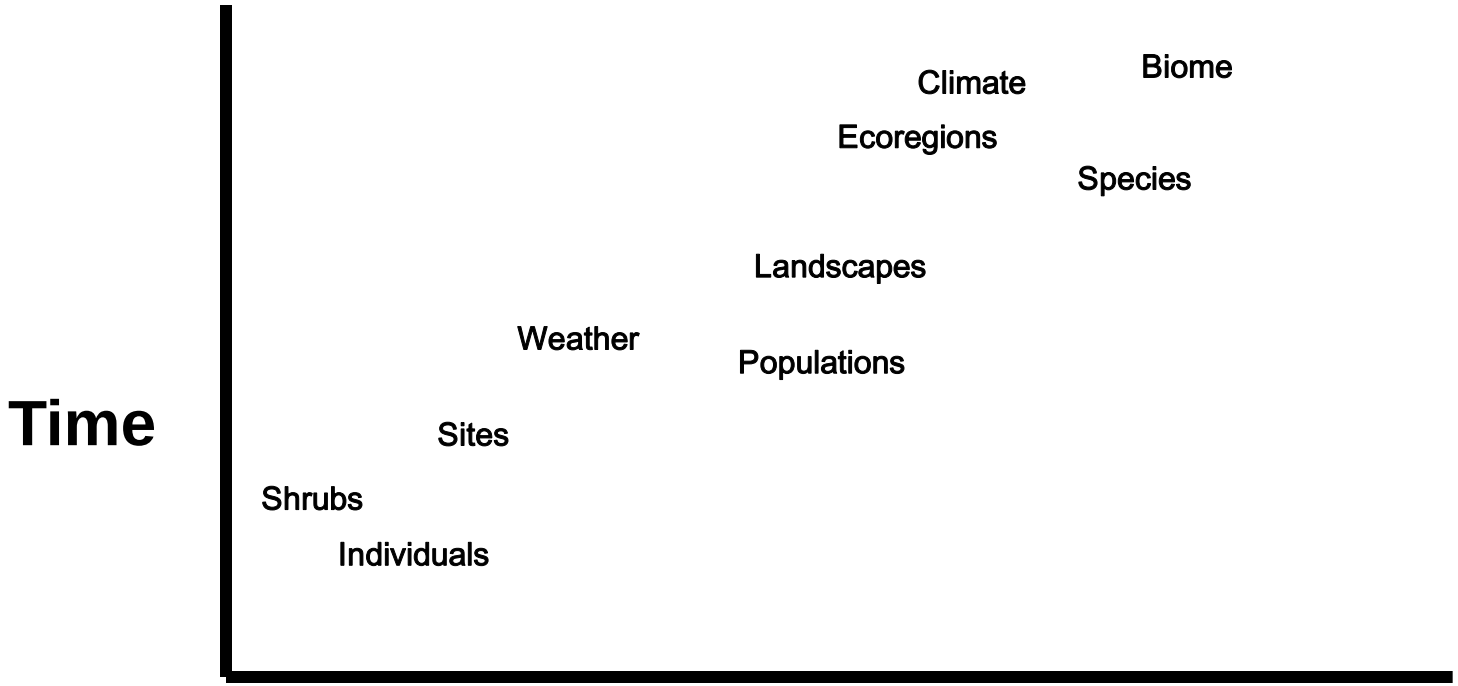
Wisdom et al. 2005
Meinke et al. 2009

USGS


N
0 150 300 600
Kilometers
Large-Scale (18km) Fragmentation
146 - 290
291 - 434
435 - 579
580 - 723
724 - 868
869 - 1,012
Sagebrush (%)
< 30
30 - 60
60 - 80
80 - 100
State/Province Boundaries

USGS

Hierarchical Organization



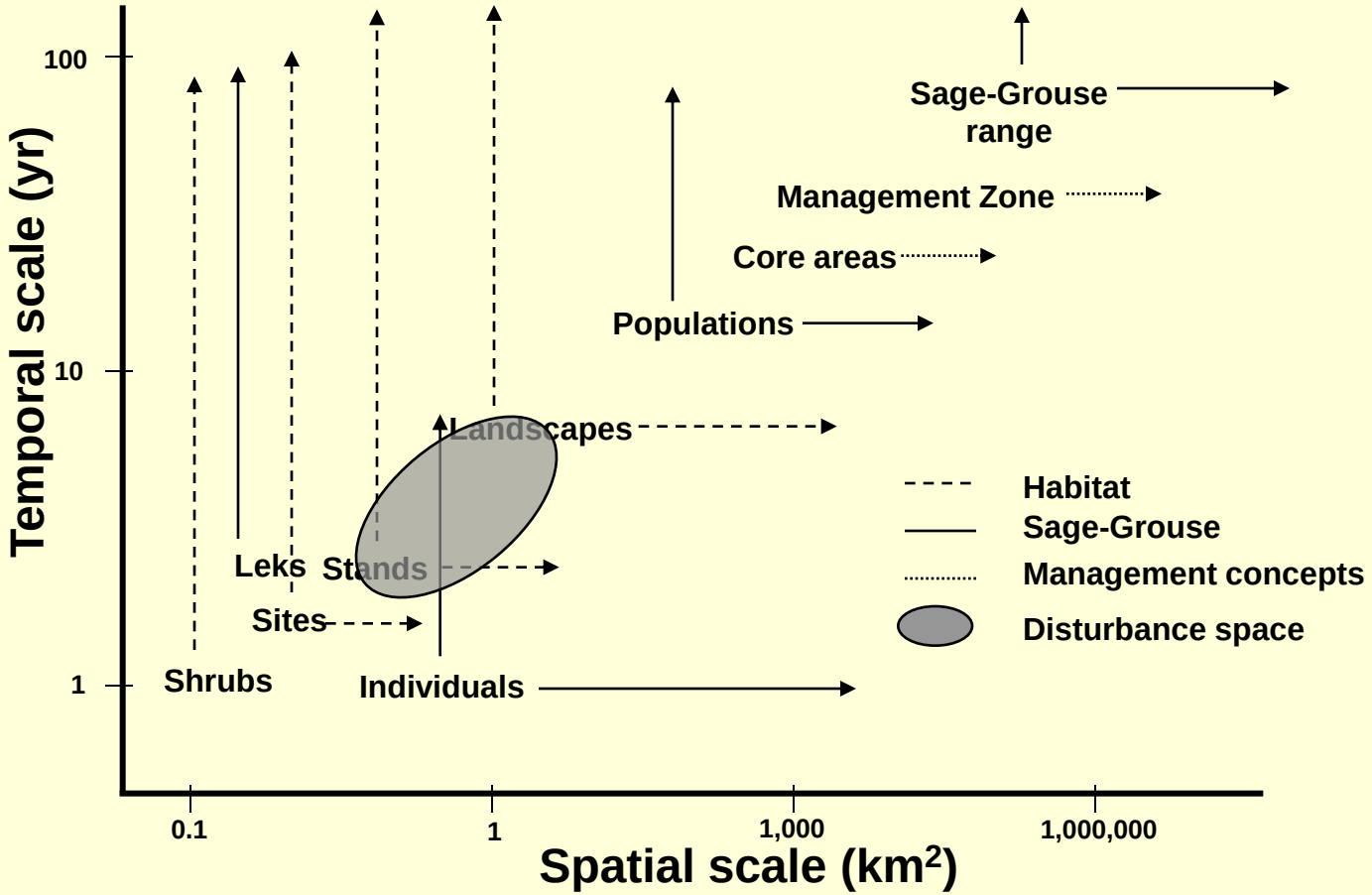
So, Nat'ralists observe, a Flea
Hath smaller Fleas that on him prey,
And these have smaller Fleas to bit 'em,
And so proceed ad infinitum.

Jonathan Swift 1733

USGS

Sage-Grouse

Space-time dimensions



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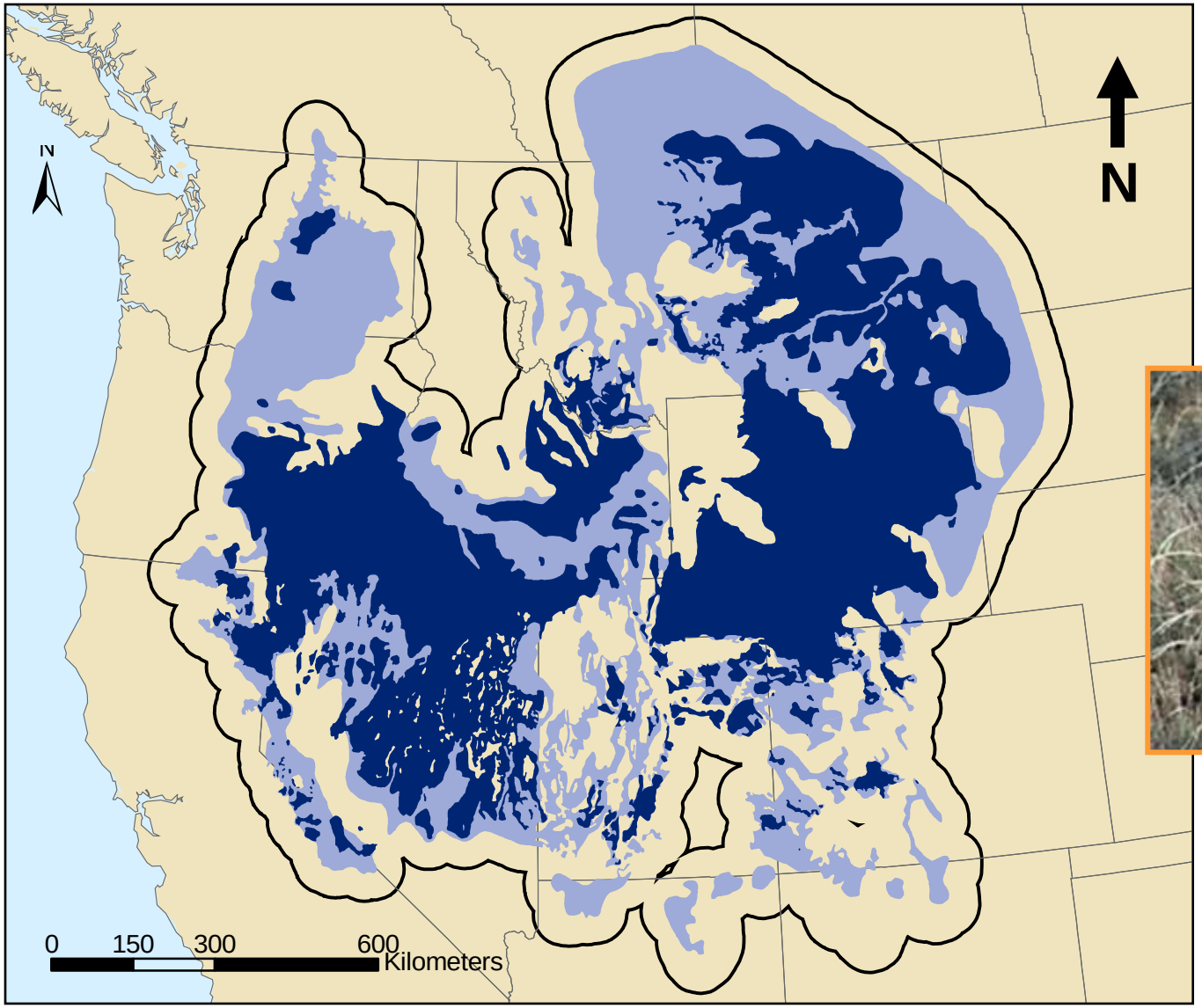
Conservation Goals

- Delineate sage-grouse distributions
- Identify optimal areas for sagebrush conservation and restoration
- Increase/maintain connectivity of sage-grouse populations

"The highest priority is to ***maintain sagebrush steppe habitat followed by strategically restoring fragmented habitat***. This action will conserve habitat for at-risk wildlife species, such as ***sage-grouse***, that are dependent on large sagebrush communities."

"Conserve what we have, and improve or restore what has been lost."

USGS

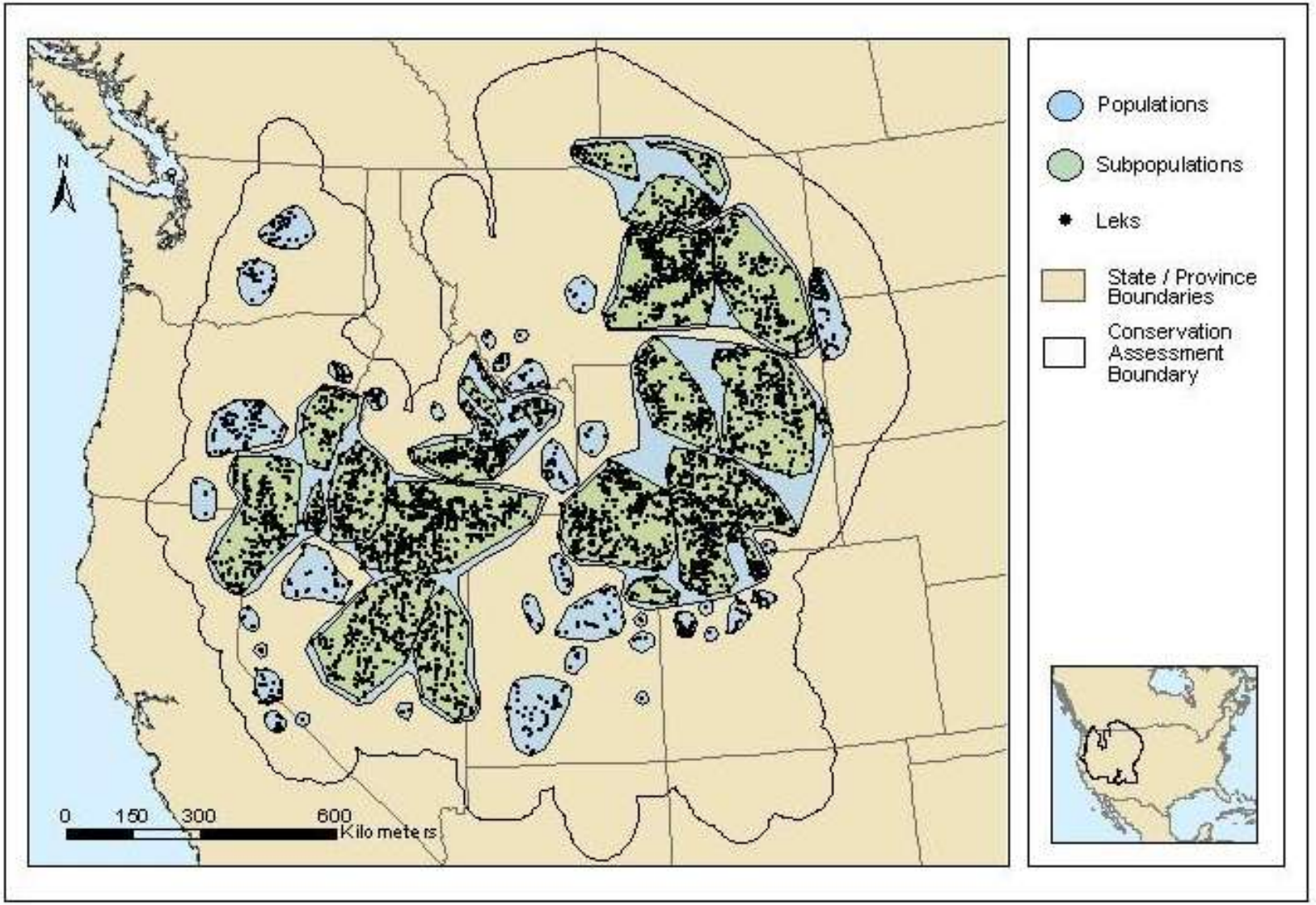


Greater Sage-Grouse

- Current Range
- Historical Range

USGS

Greater Sage-Grouse Populations



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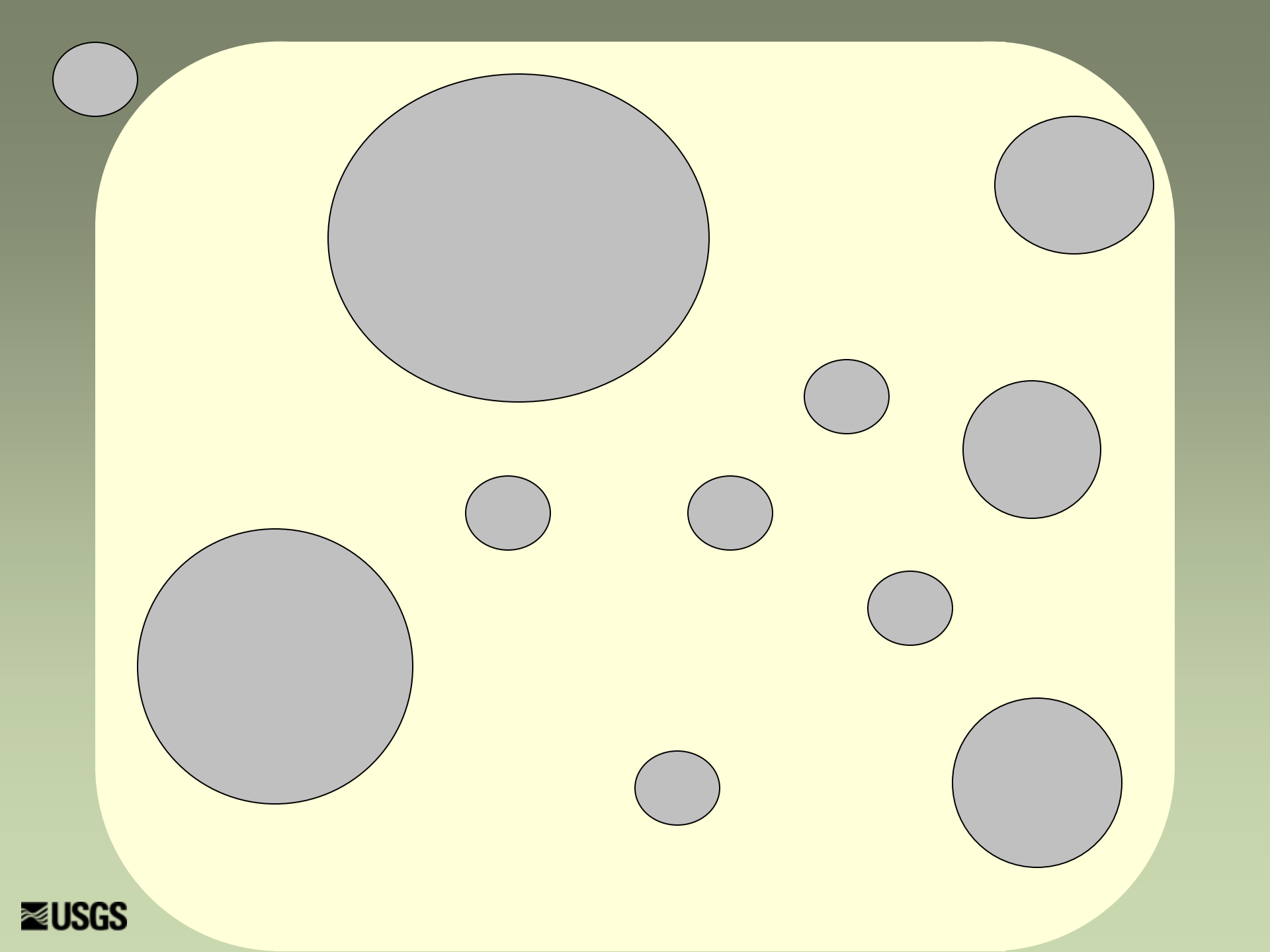
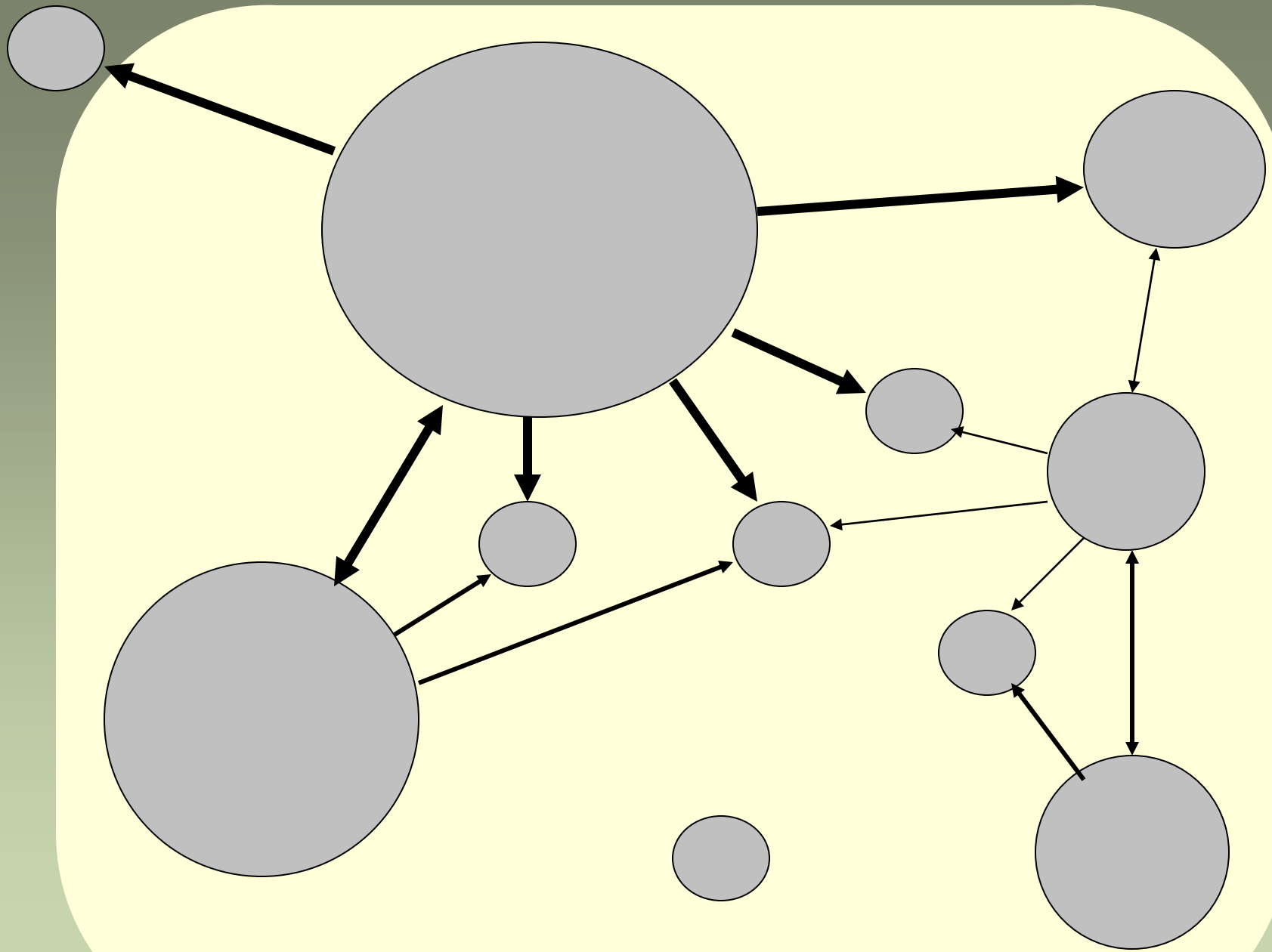
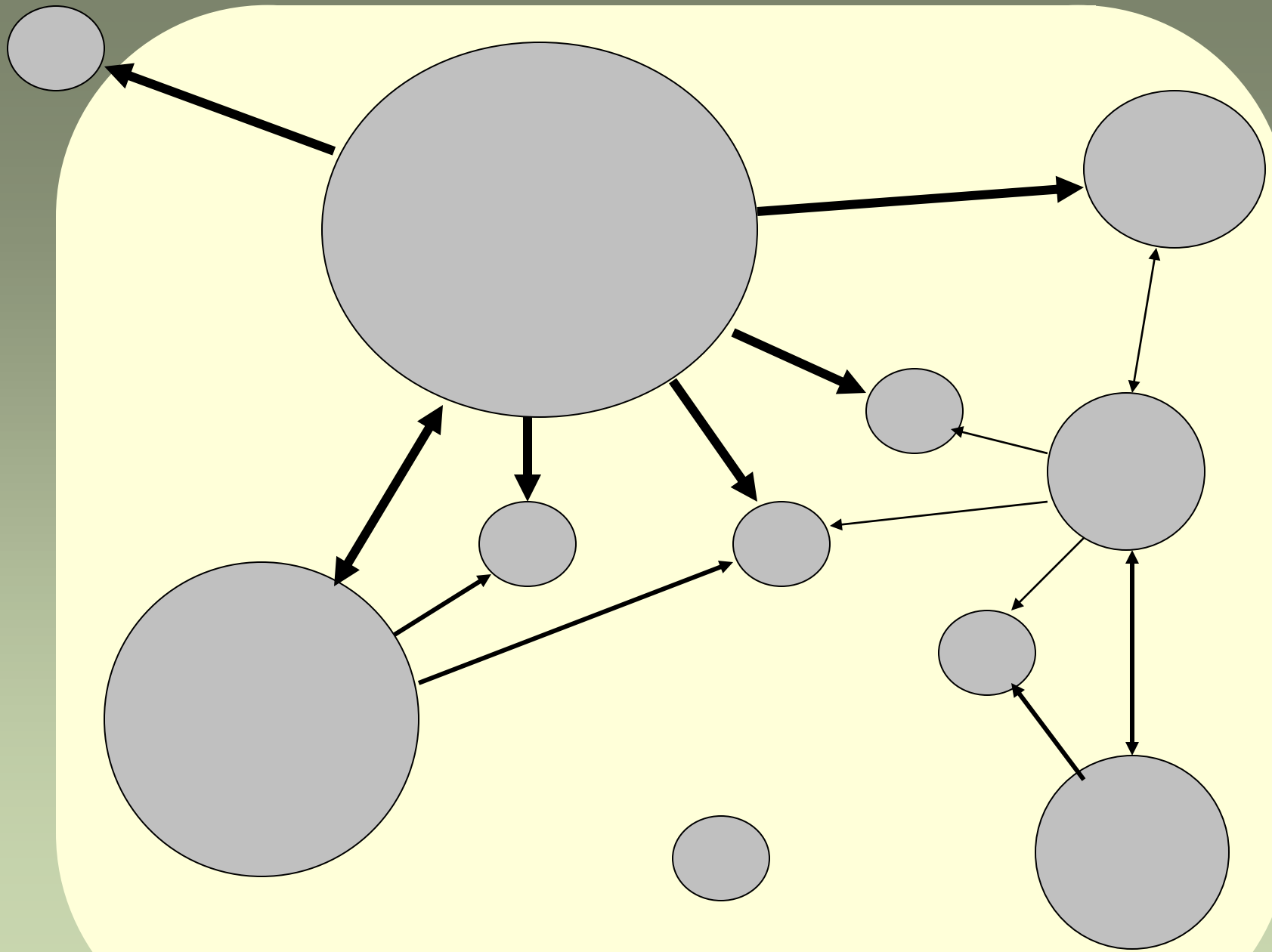
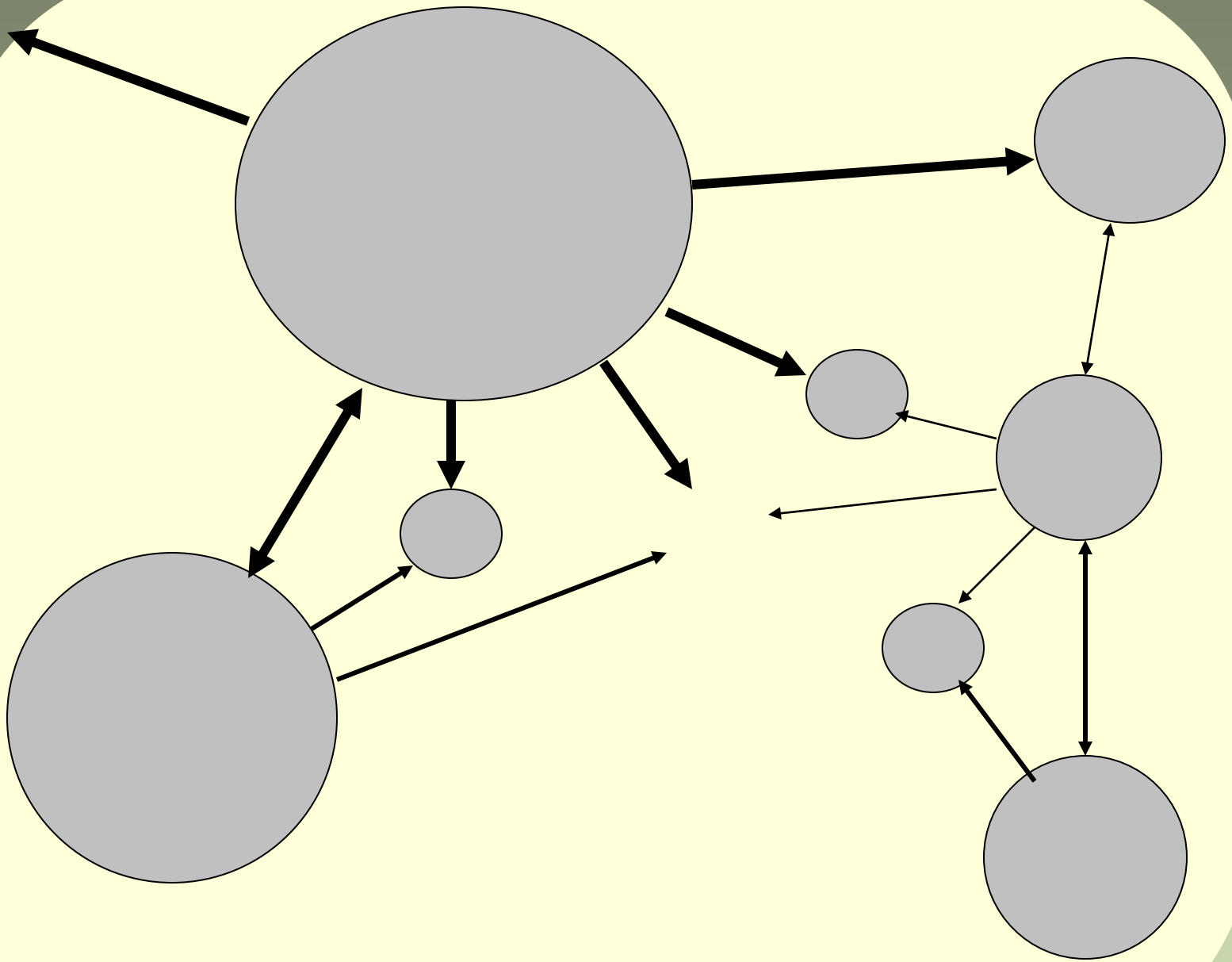




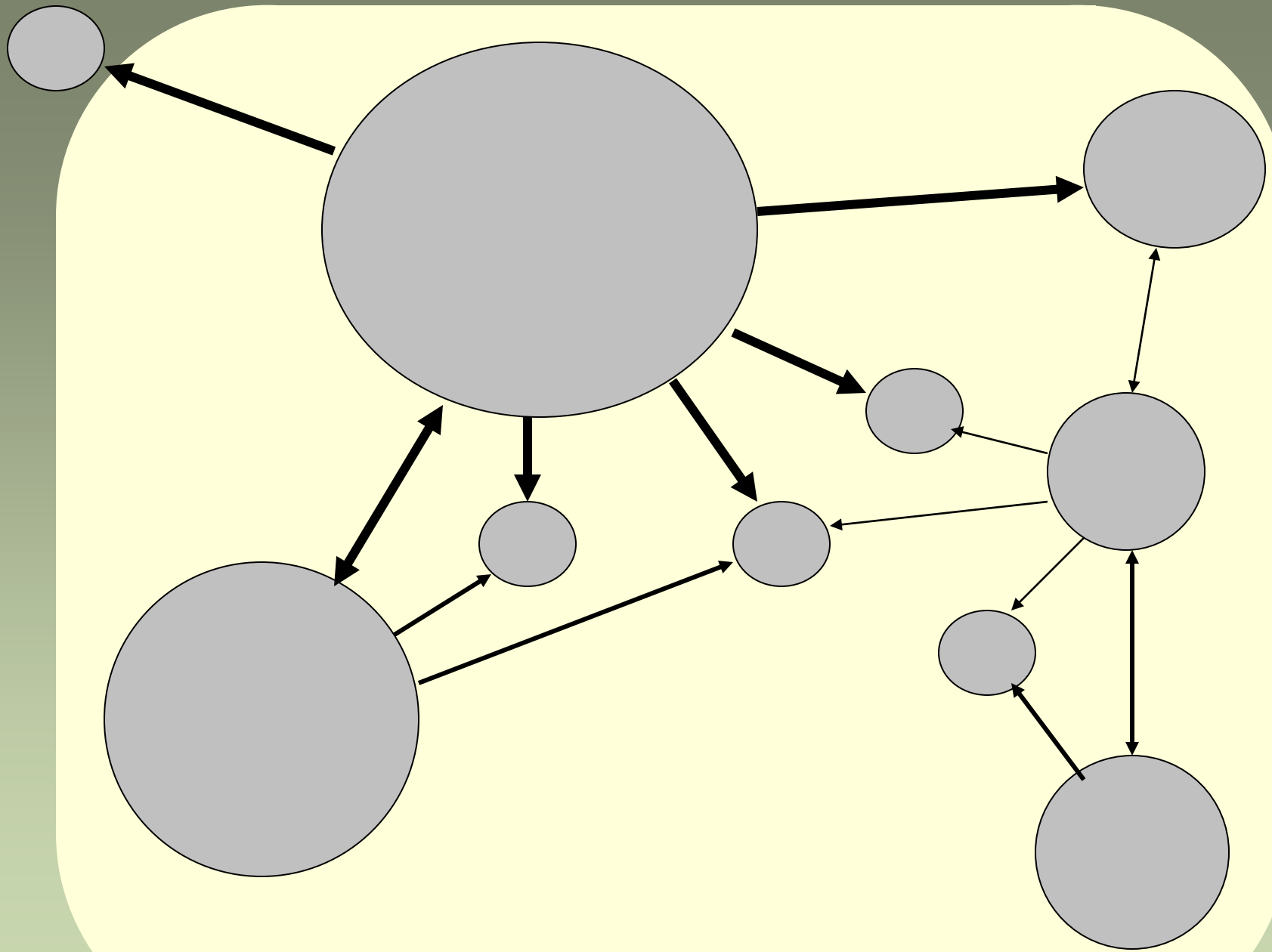
USGS



USGS



USGS



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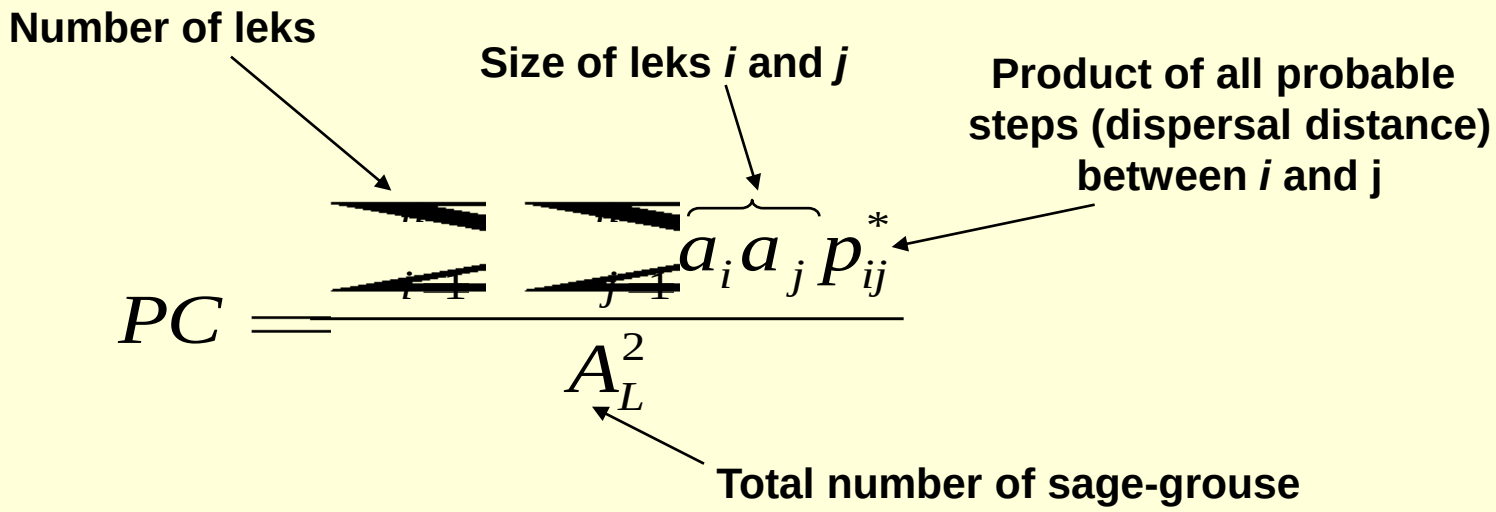
Probability of Connectivity



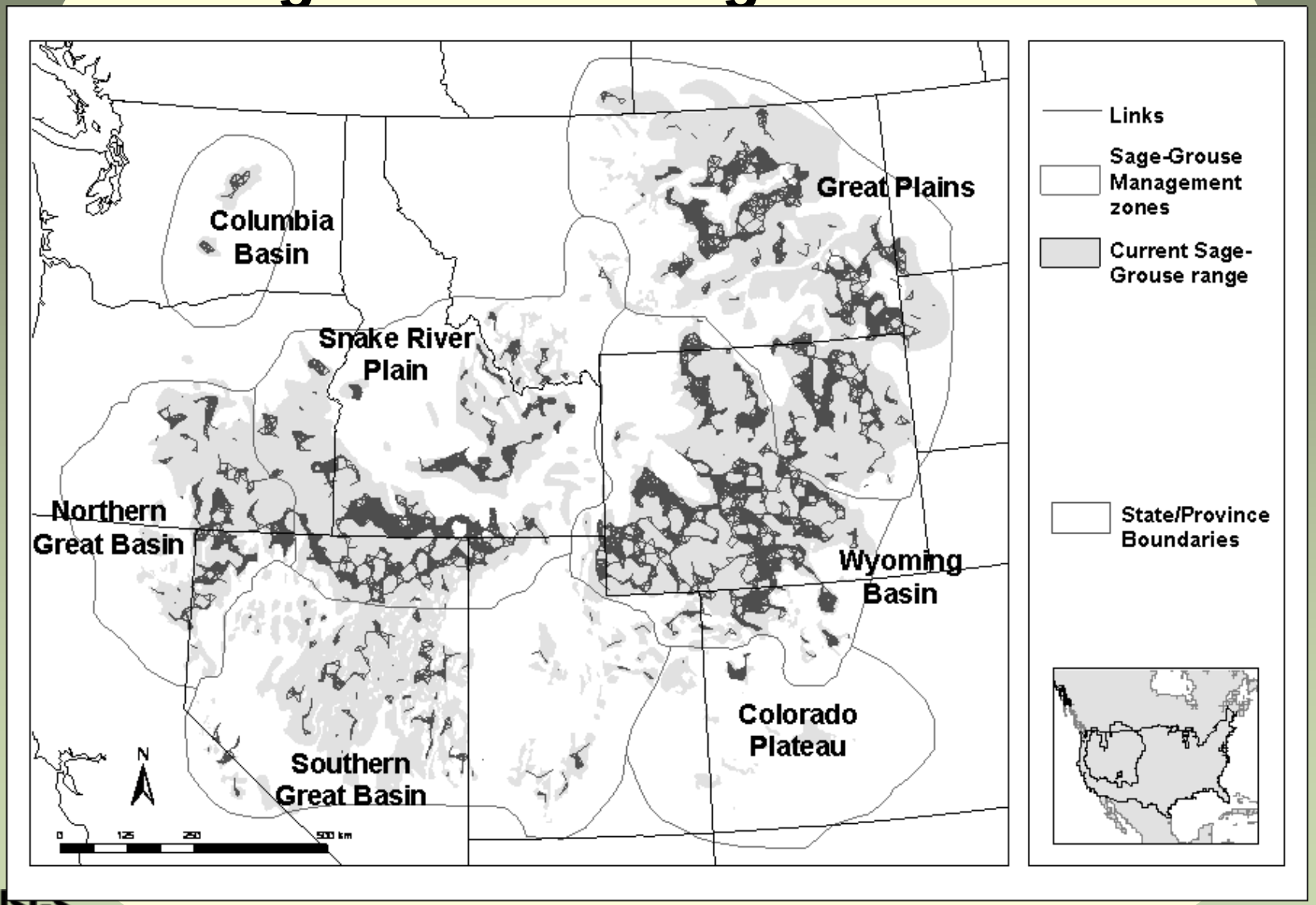
Connectivity varies with:

(1) distance between leks

(2) differences in lek size

USGS

Linkages: Active Sage-Grouse Leks



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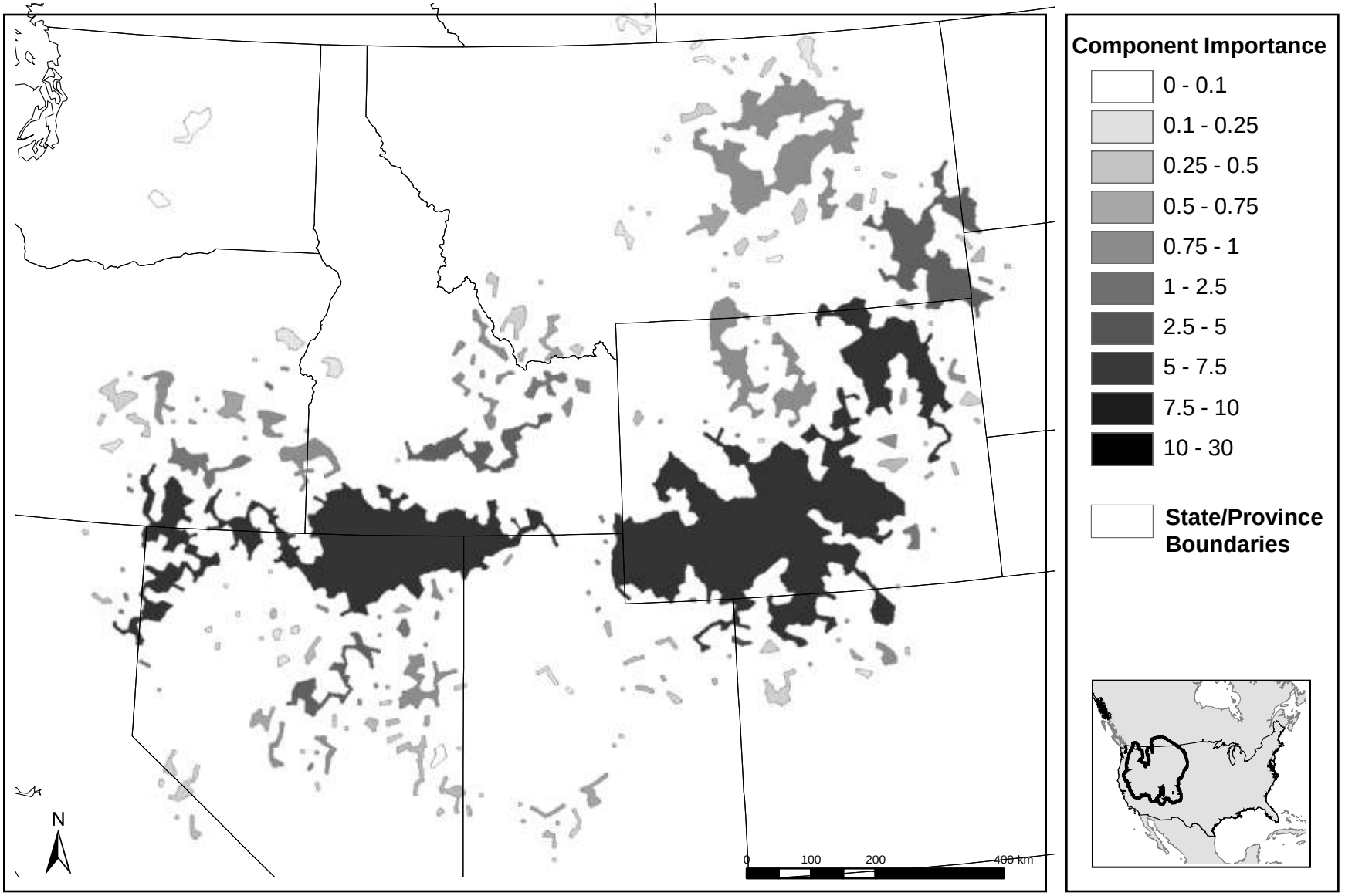
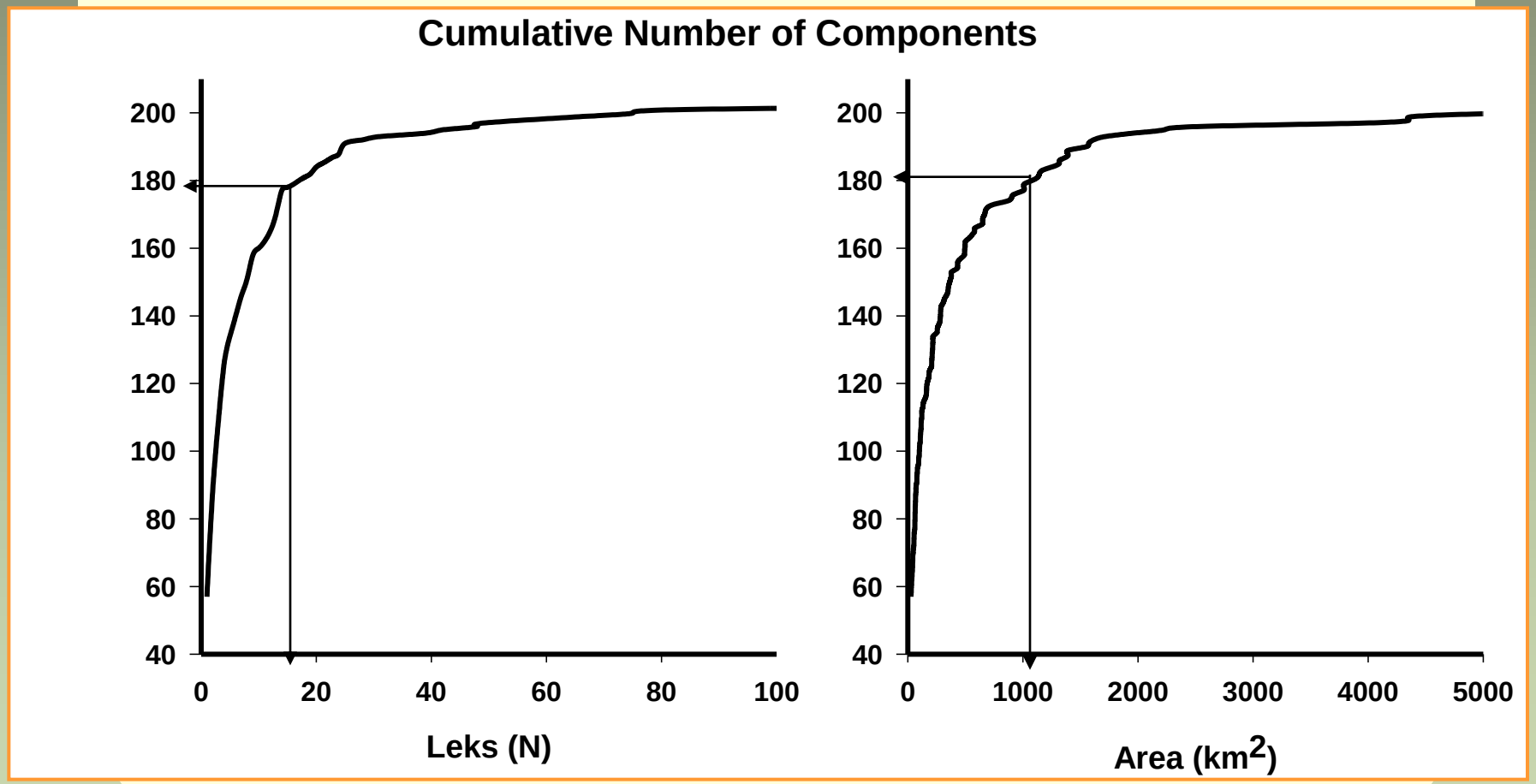
Sage-Grouse: Breeding Components



Knick and Hanser 2011

Sage-Grouse Components: Size and Area



Knick and Hanser 2011

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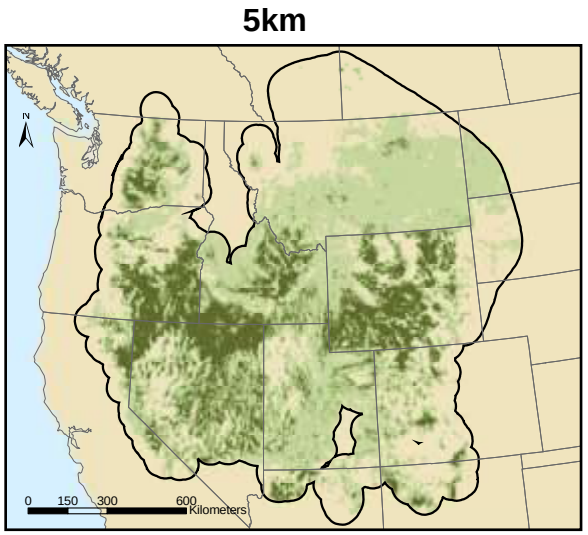
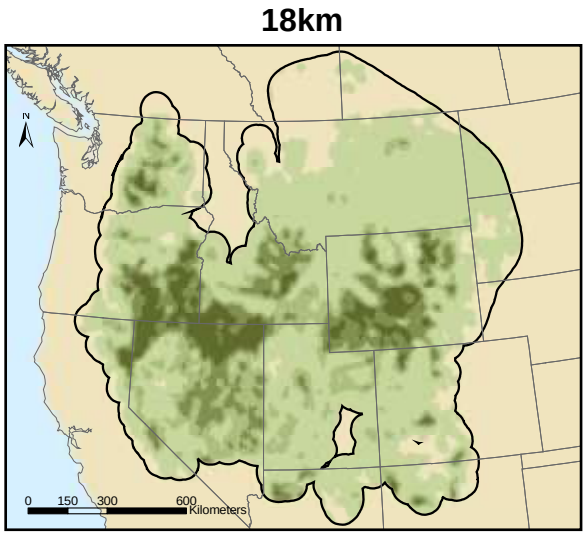
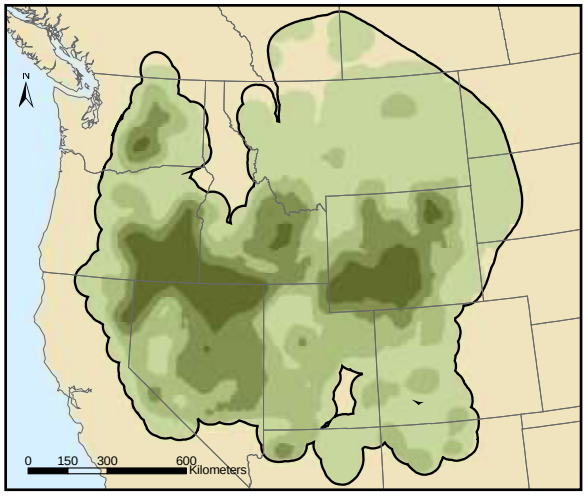
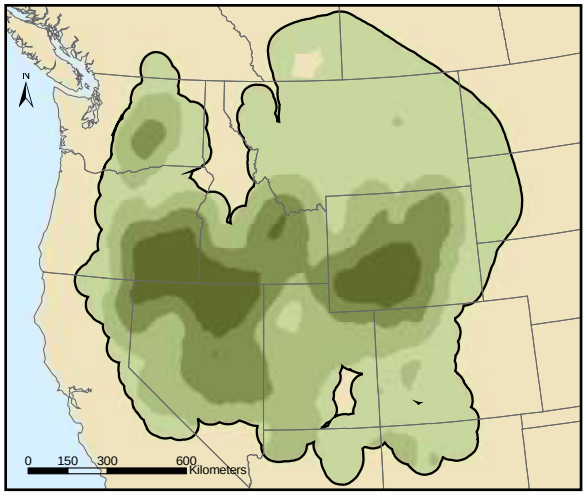
Conservation Goals

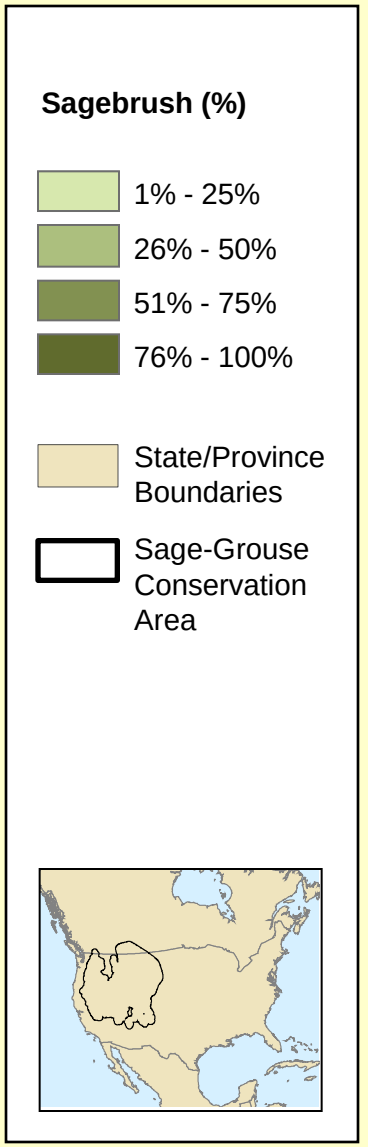
- Delineate sage-grouse distributions
- Identify optimal areas for sagebrush conservation and restoration


5km
N
0 150 300 600
Kilometers


18km
N
0 150 300 600
Kilometers


50km
N
0 150 300 600
Kilometers


100km
N
0 150 300 600
Kilometers


Sagebrush (%)
1% - 25%
26% - 50%
51% - 75%
76% - 100%
State/Province Boundaries
Sage-Grouse Conservation Area

USGS

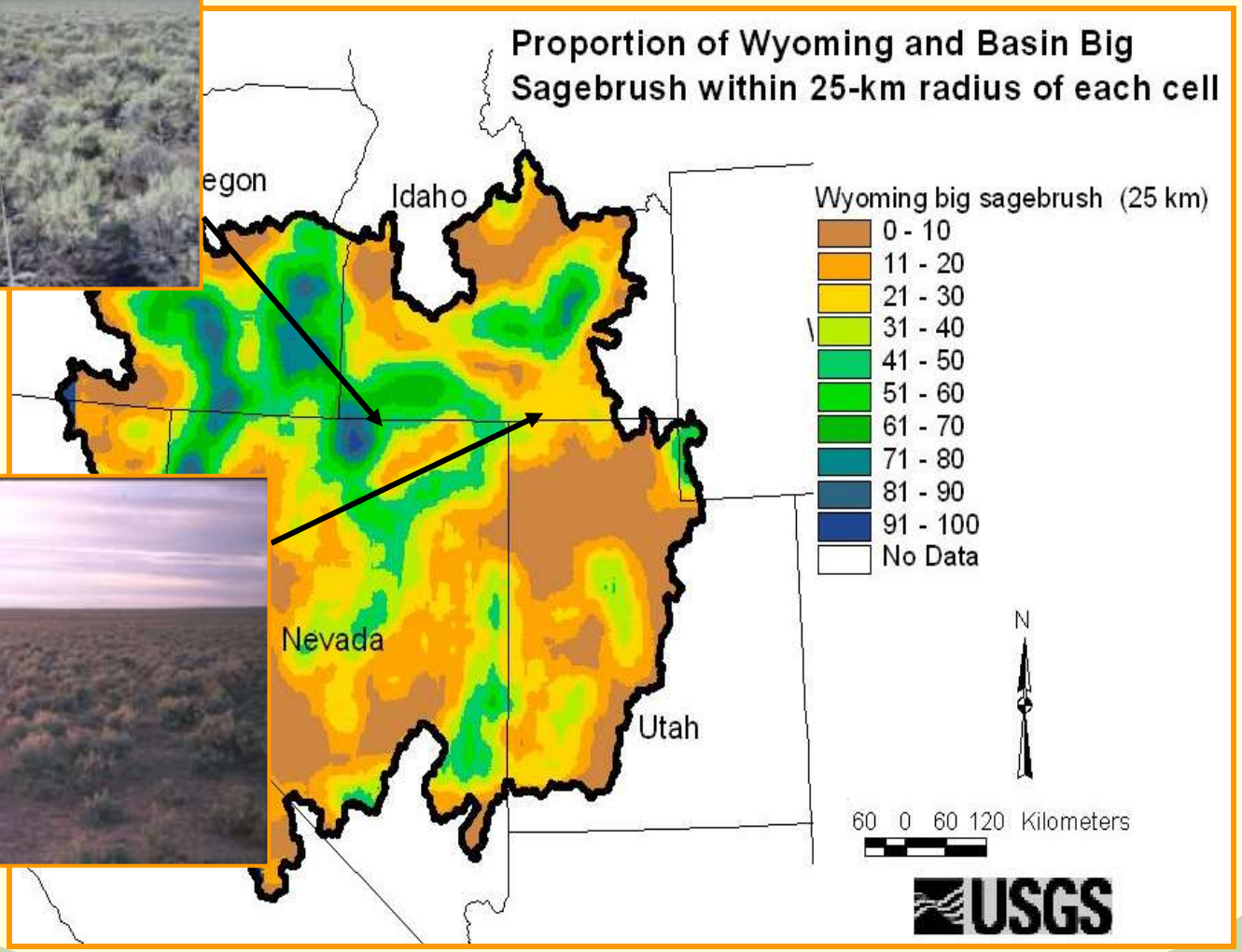
Sagebrush: Model Steps

- Delineate:
  - (1) large-scale Wyoming or basin big sagebrush distribution
  - (2) small-scale patterns of fragmentation

Southeastern Idaho

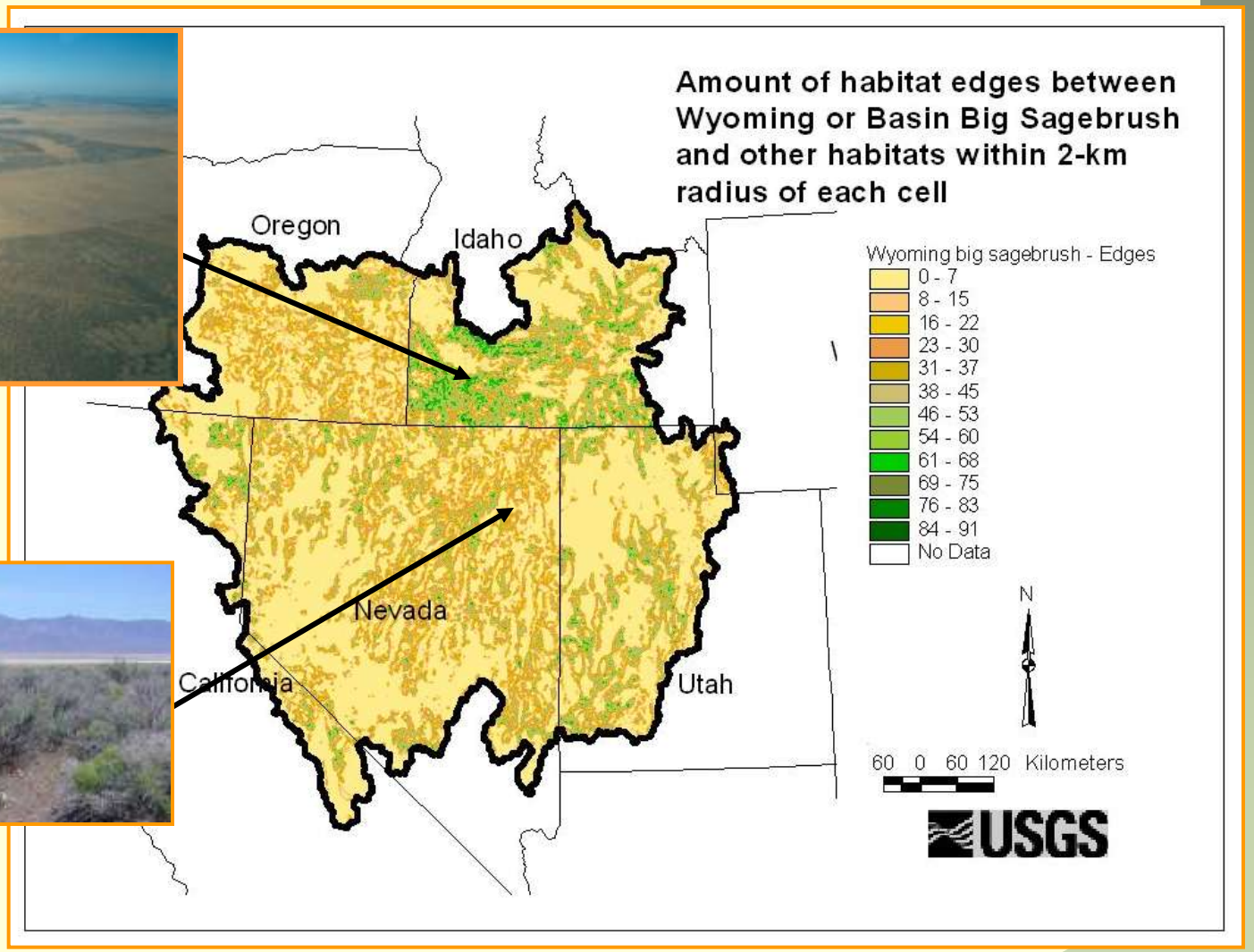
USGS

Large-scale Patterns of Sagebrush Distribution



USGS

Small-scale Patterns of Sagebrush Fragmentation



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Sagebrush: Model Steps

- Delineate:
  - (1) large-scale Wyoming or basin big sagebrush distribution
  - (2) small-scale patterns of fragmentation
- Model optimal locations for sagebrush

Southeastern Idaho

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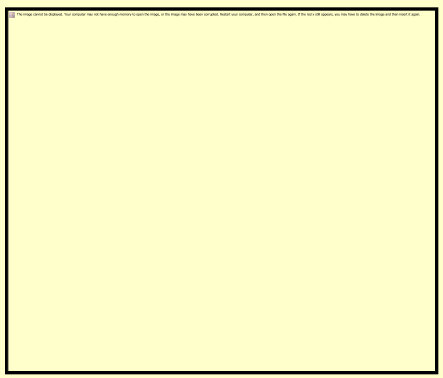
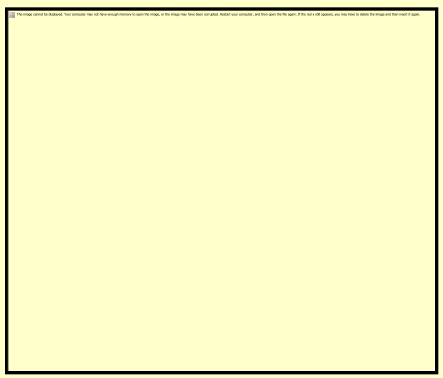
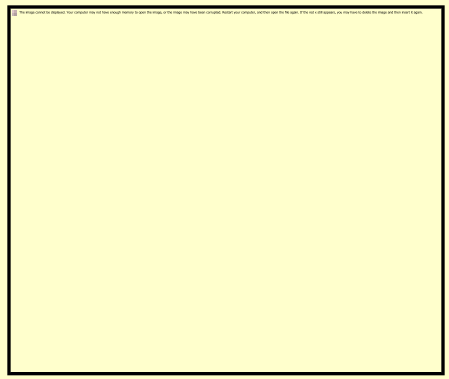


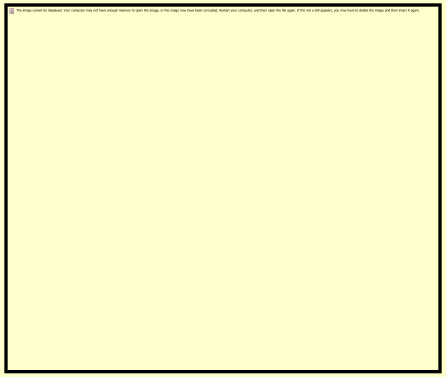
Elevation



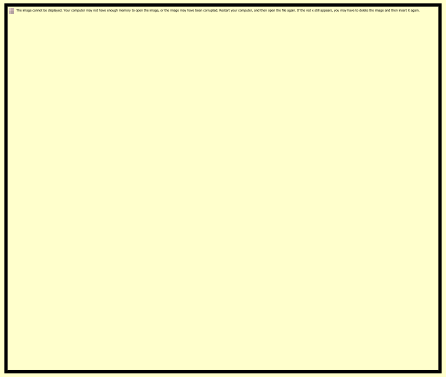
Precipitation



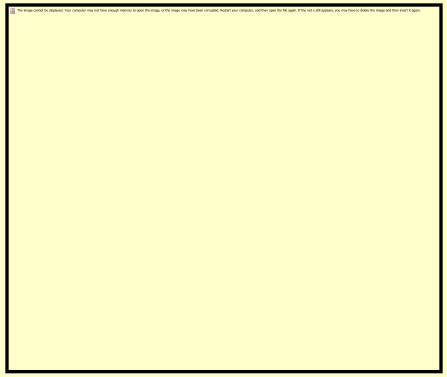
Average Water Capacity



Depth to Rock



Soil Salinity



Soil pH

0 500 1000 2,000 Kilometers

N

Elevation (meters)

Low : -3

High : 4362

Precipitation (inches)

Low : 3

High : 135

Average Water Capacity

Low : 0

High : 25

Depth to Rock (inches)

Low : 0

High : 60

Soil Salinity

Low : 0

High : 21

Soil pH

0 - 3

4 - 5

5 - 6

6 - 7

7 - 8

8 - 9

USGS

Sagebrush: Model Steps

- Delineate:
  - (1) large-scale Wyoming or basin big sagebrush distribution
  - (2) small-scale patterns of fragmentation
- Model optimal locations for sagebrush
- Model risk of cheatgrass displacement

Southeastern Idaho

USGS

Probability of Cheatgrass Occurrence

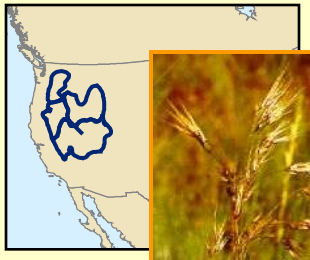
Low

High

Geographic Subdivisions

1. Columbia Basin
2. Snake River Plain
3. Northern Great Basin
4. Southern Great Basin

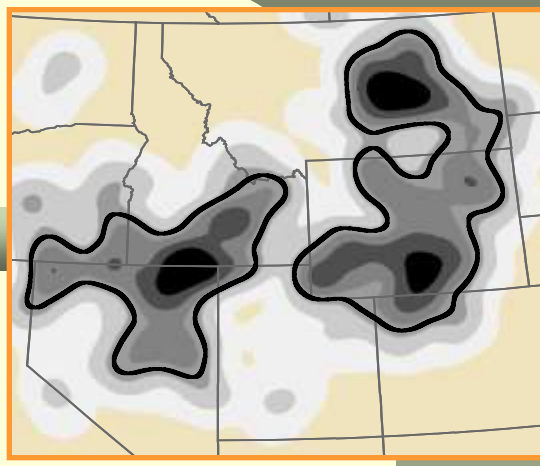
State / Province Boundaries



Miller et al. 2011

USGS

Predictive Model

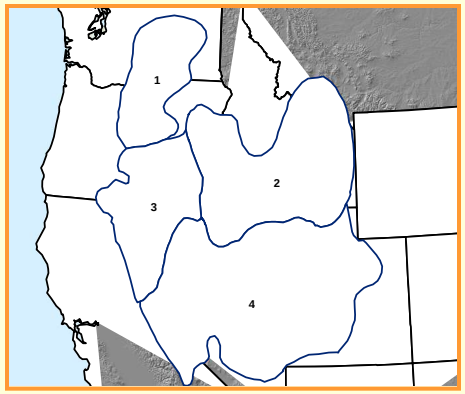


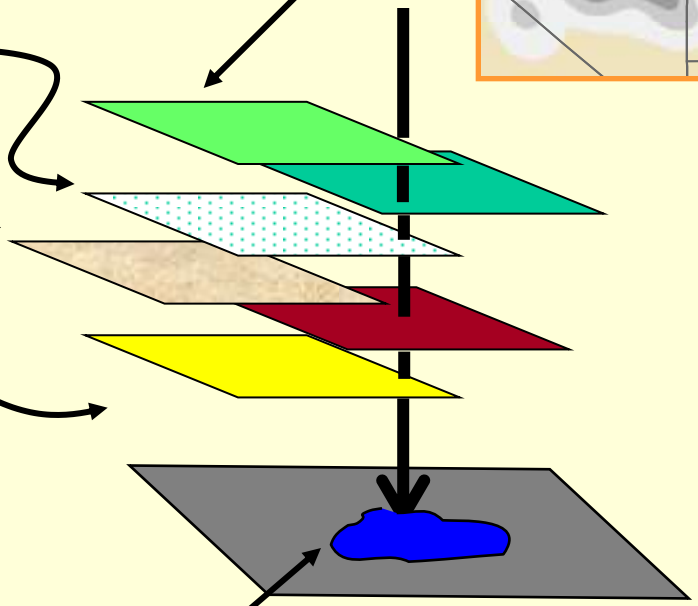
Sage-grouse distribution

Optimal sagebrush environment

Landscape Components

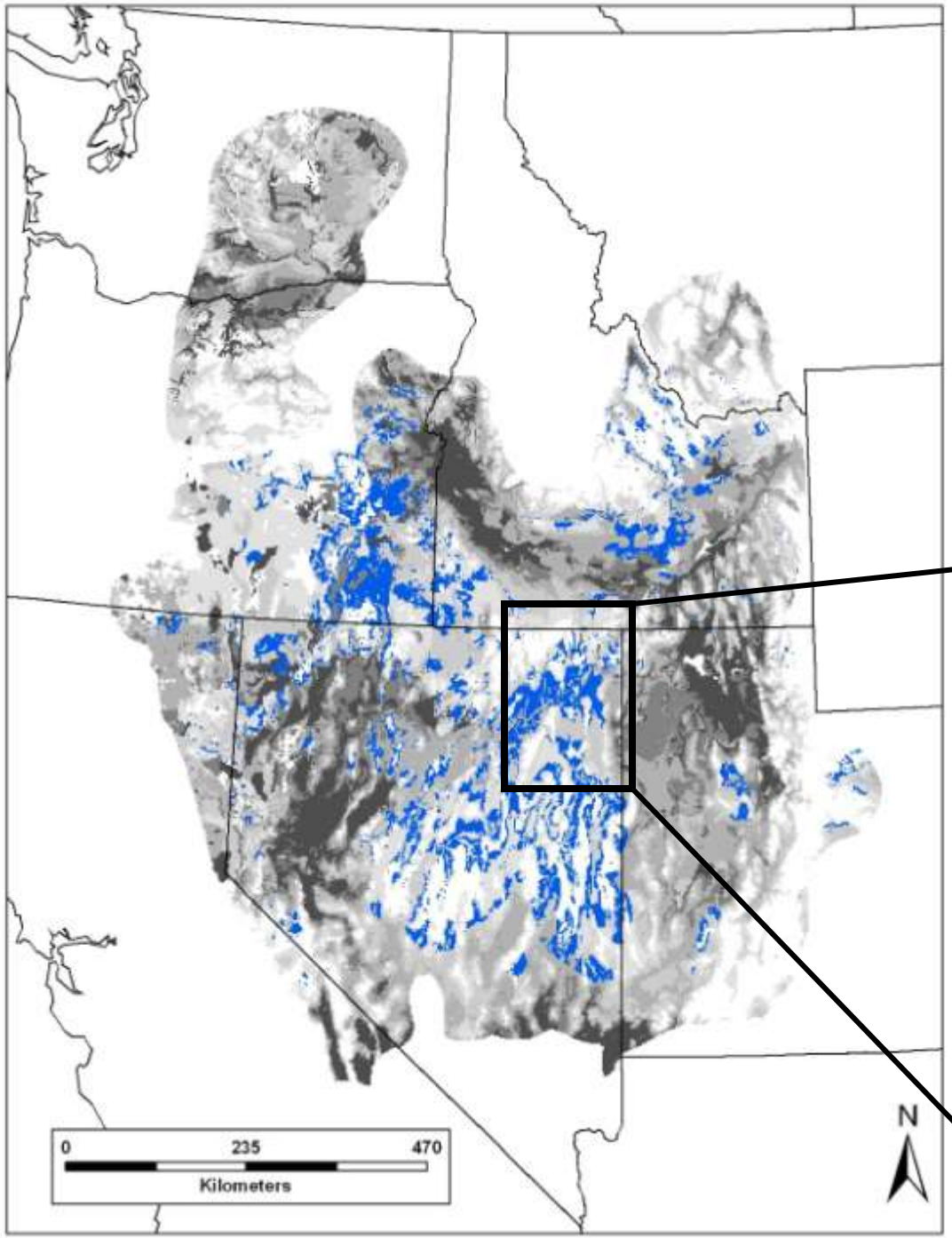
Cheatgrass





Priority Region

USGS

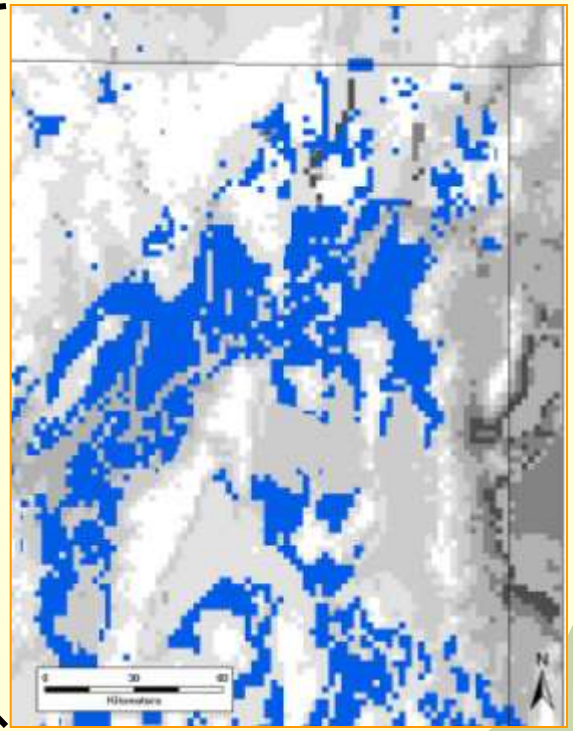


Restoration Priority

- Medium
- High

Cheatgrass Risk

- Low
- Medium
- High

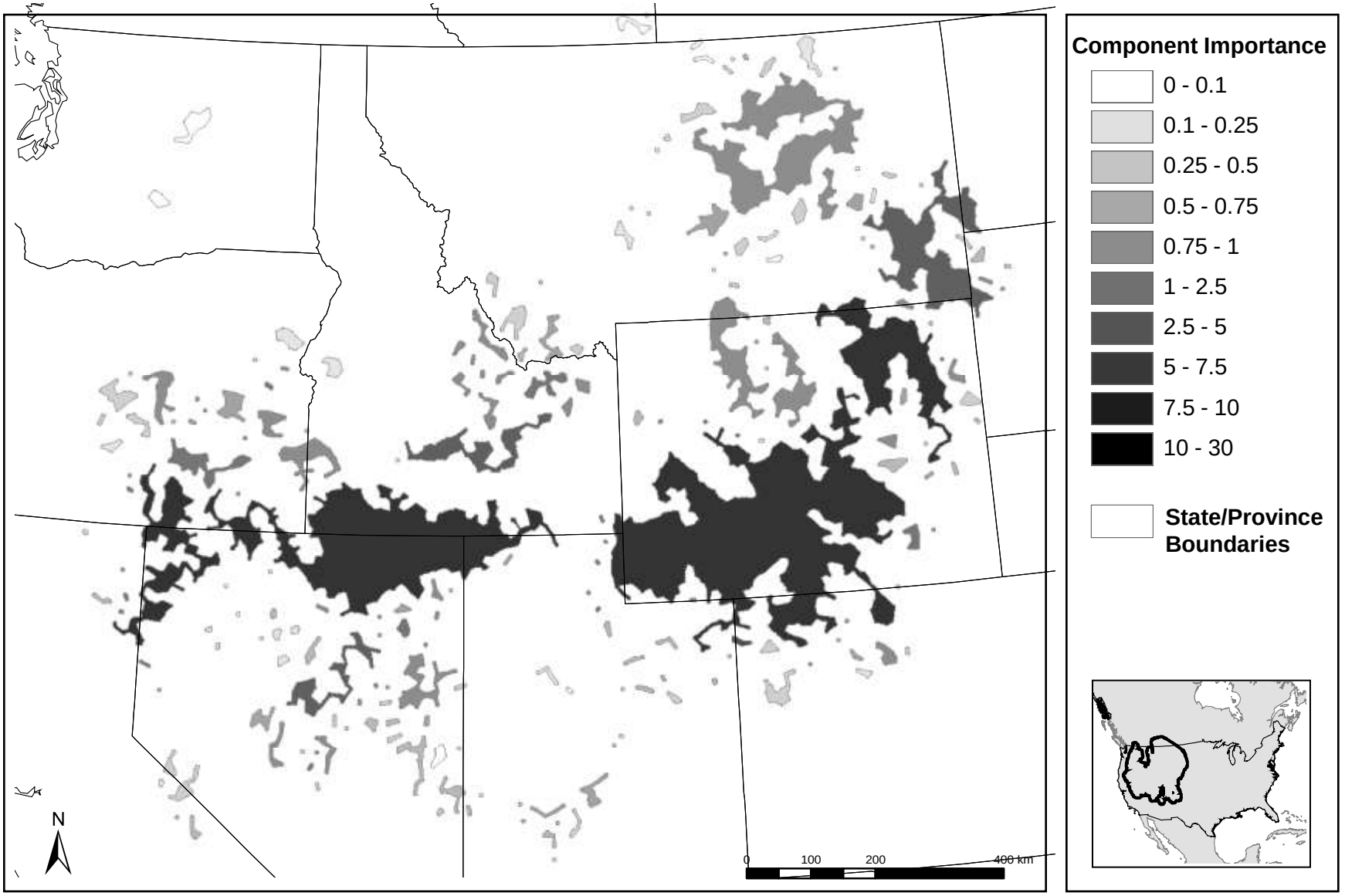


Meinke et al. 2009

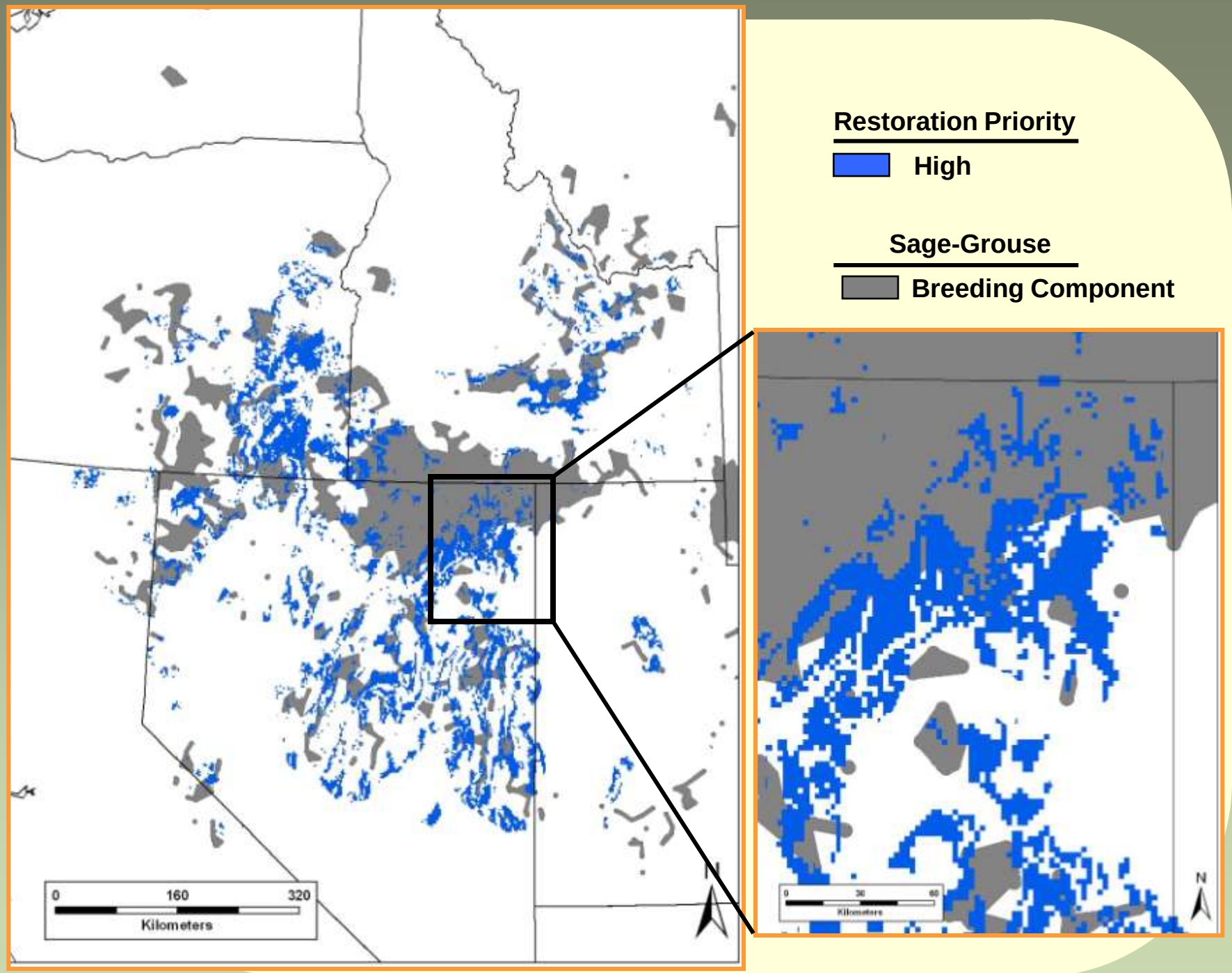
Conservation Goals

- Delineate sage-grouse distributions
- Identify optimal areas for sagebrush conservation and restoration
- Increase/maintain connectivity of sage-grouse populations

Sage-Grouse: Breeding Components



Knick and Hanser 2011


Restoration Priority
High
Sage-Grouse
Breeding Component
0
160
320
Kilometers
N
0
30
60
Kilometers
N

Conclusions

- Available resources require prioritizing regions for sagebrush and sage-grouse conservation
- Spatial modeling is an important tool to delineate sagebrush and sage-grouse
- Conservation strategy based on conserving what we have and restoring what has been lost

"History and our current use of the vast landscapes dominated by sagebrush can tell us much about land use, priorities, values, and resource management. The future will tell others about the effectiveness of conservation actions we implement today."
(*Knick and Connelly 2011*)

USGS

Acknowledgments

- U.S. Geological Survey
- Idaho Department of Fish and Game
- U.S. Fish and Wildlife Service
- U.S. Bureau of Land Management
- Western Association Fish and Wildlife Agencies
- Nevada CAD Project; Wilburforce Foundation

Southcentral Utah

Jack Connelly