IMPACTS OF DEVELOPMENT ON THE SPATIAL PATTERN OF MULE DEER HABITAT IN CENTRAL OREGON

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Geo 580: Advanced GIS Applications in the Geosciences
June 3, 2009

Outline

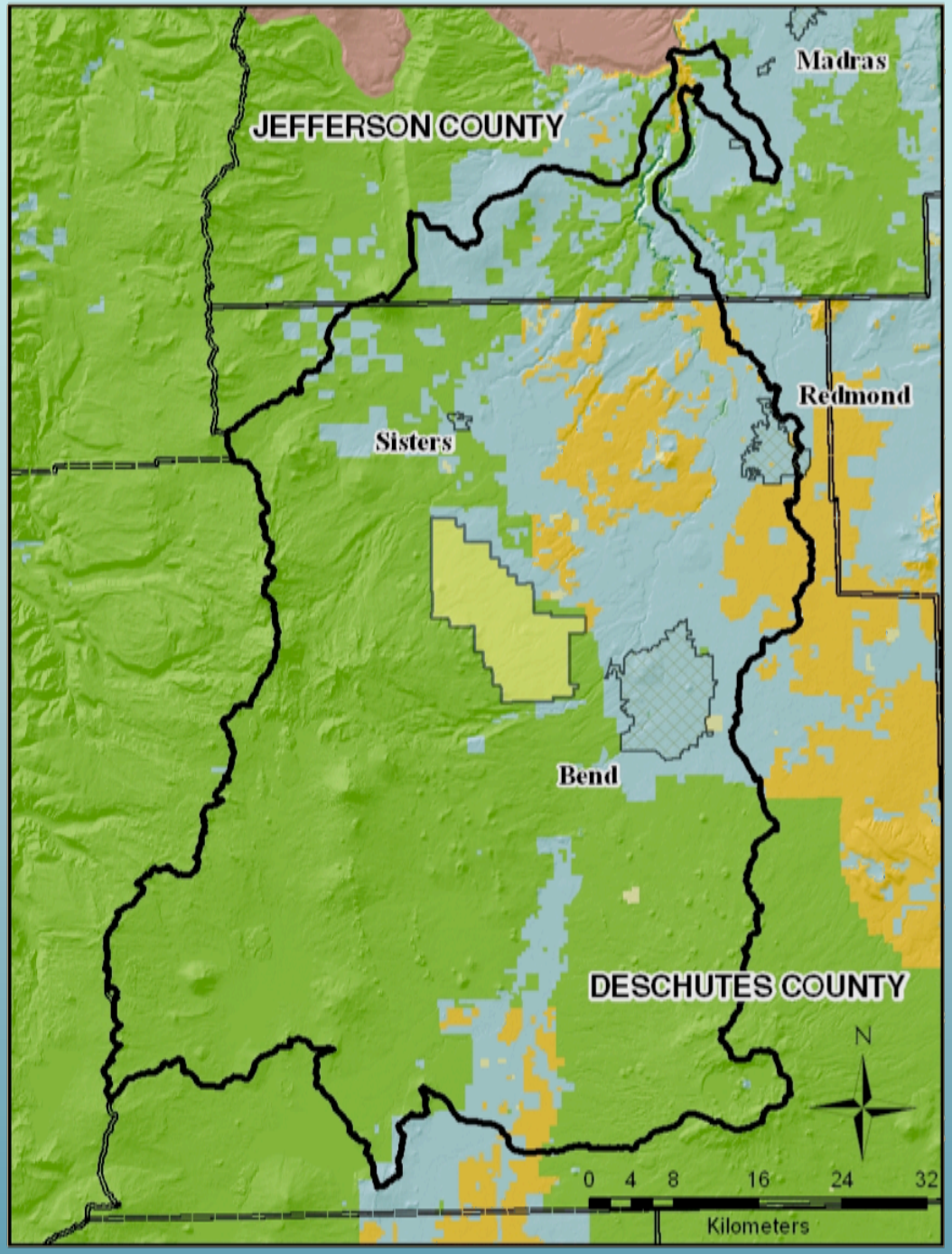
- Introduction and research question
- Background on rural residential development and landscape ecology
- Data and methods
- Results
- Discussion and next steps

The Bull Springs Tract: development proposed

Research Question

How might the spatial arrangement of mule deer habitat elements change over the next 60 years?

Study Area



Legend

- Bull Springs Tract
- City Limits
- County Boundaries

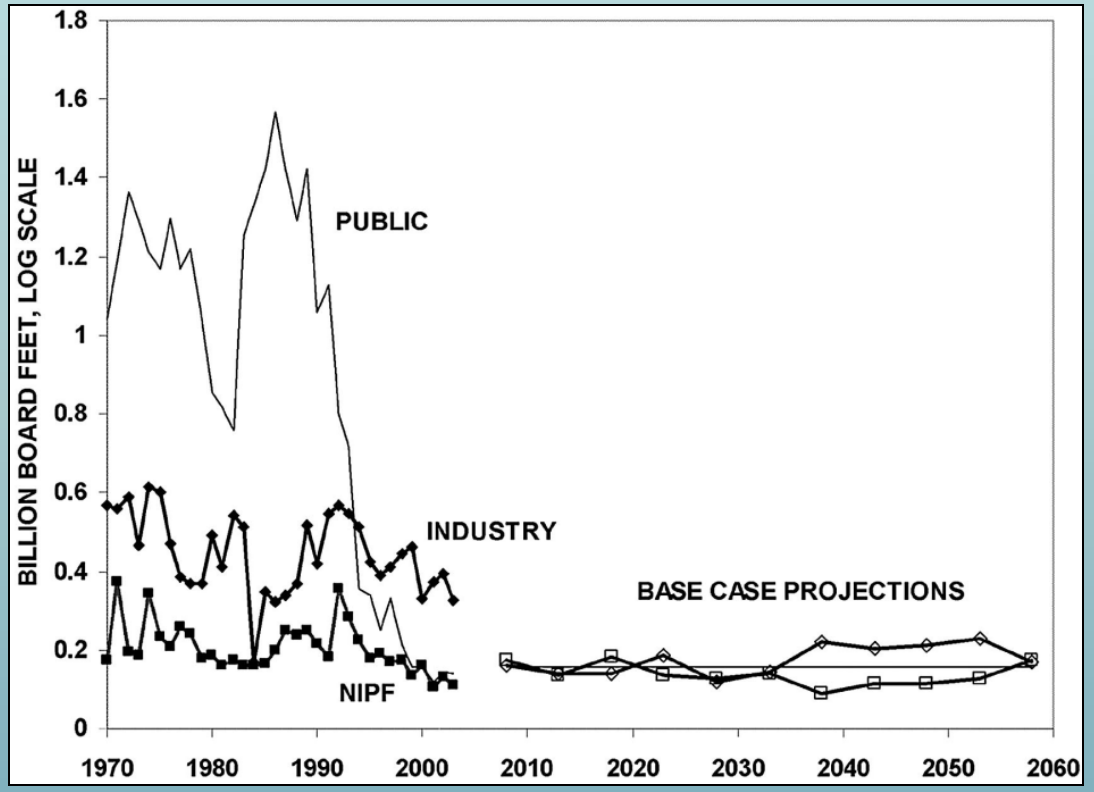
Owner Type

- Bureau of Indian Affairs
- Bureau of Land Management
- Forest Service
- Oregon Department of Forestry
- Oregon Department of State Lands
- Private

BACKGROUND

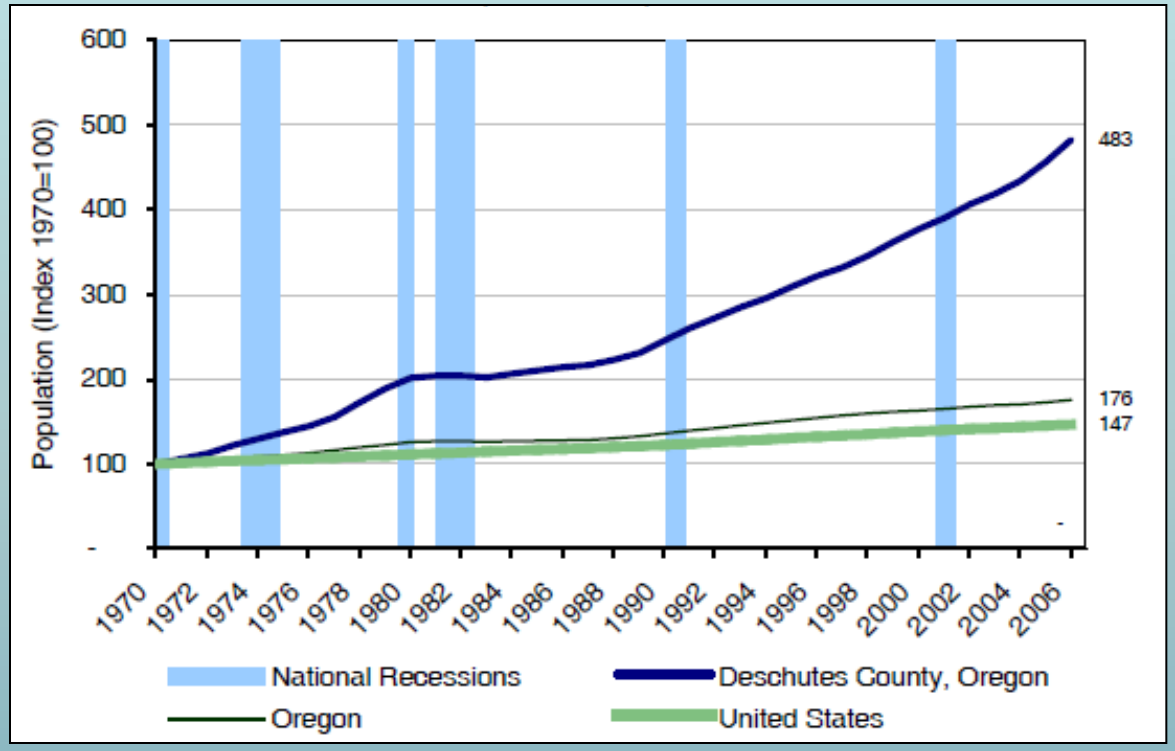
Rural Residential Development

- Deindustrialization and reduced natural resource extraction
- Forestland ownership change



Historical and projected annual timber harvest in eastern Oregon by owner group. From Adams and Latta 2007

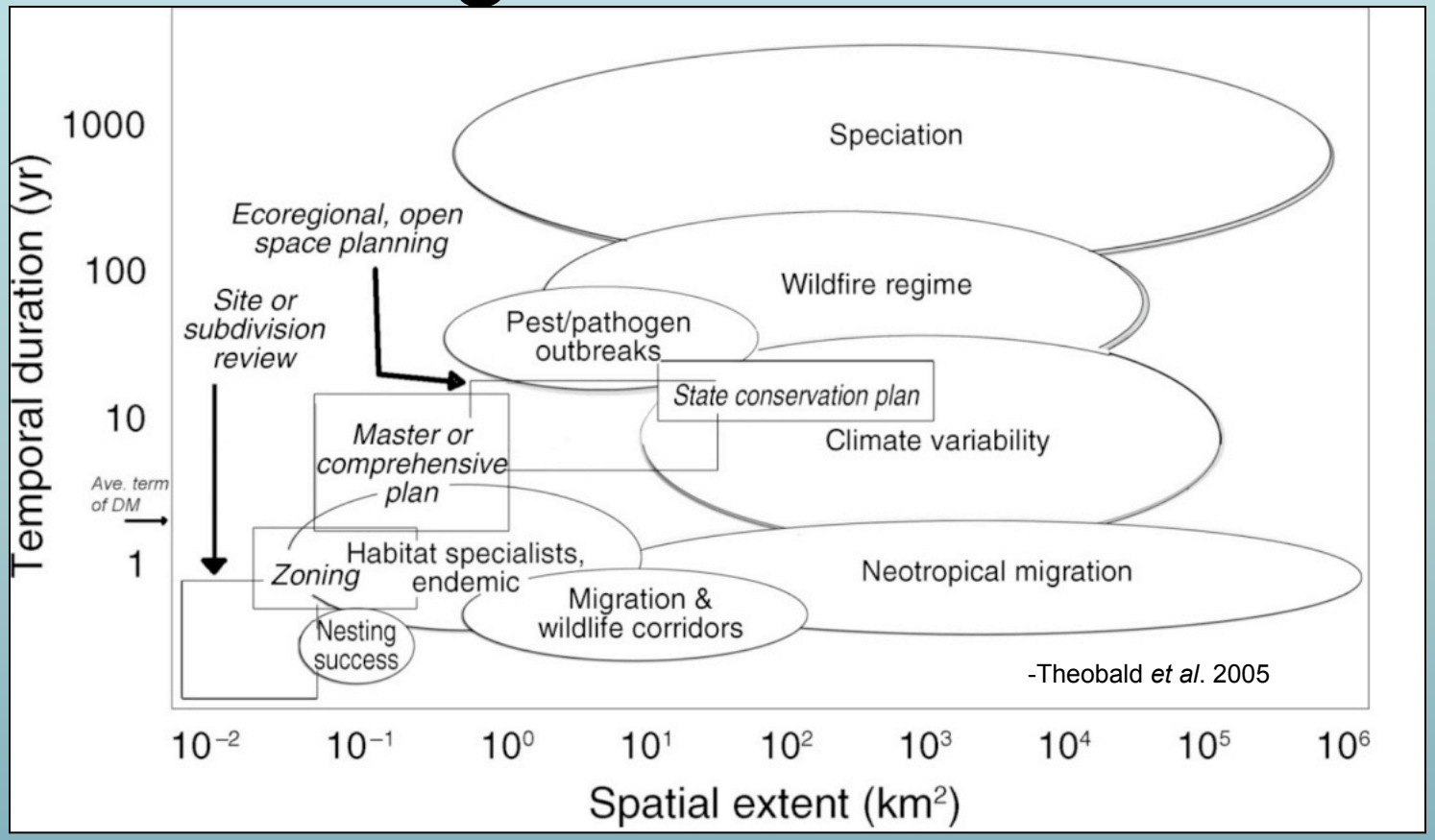
Rural Residential Development



-Bureau of Economic Analysis, US Department of Commerce

- Amenity migration, demographic change
- Land use planning, land use change

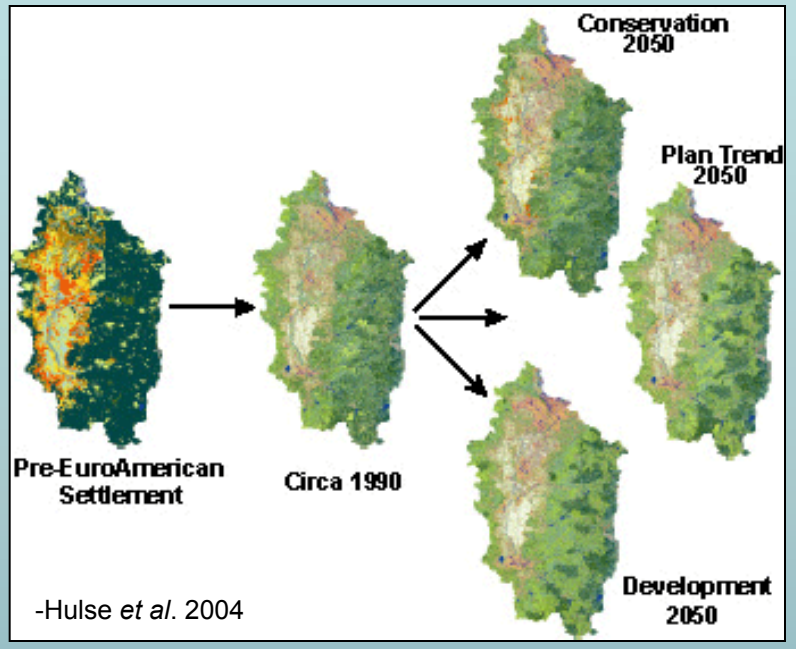
Ecological Interactions



- Timing and scale of ecological processes
- Timing and scale of land use and cover change

Ecological Interactions

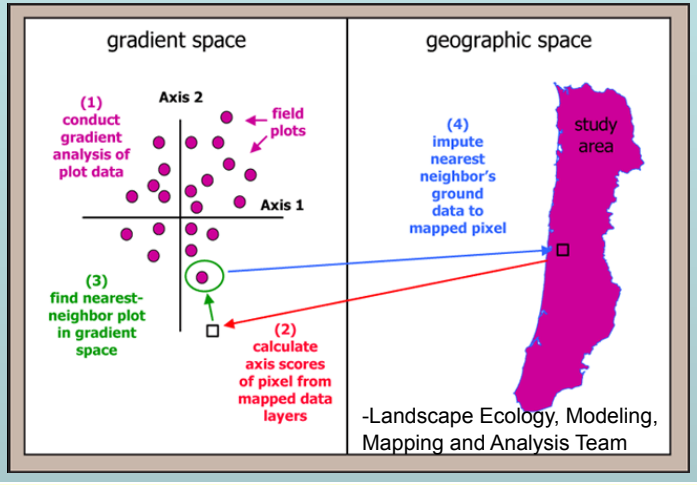
- Wildlife-habitat associations
  - Spatial arrangement and quantity of habitat
- Landscape ecology
  - Spatial pattern and processes
- Alternative future scenario analysis

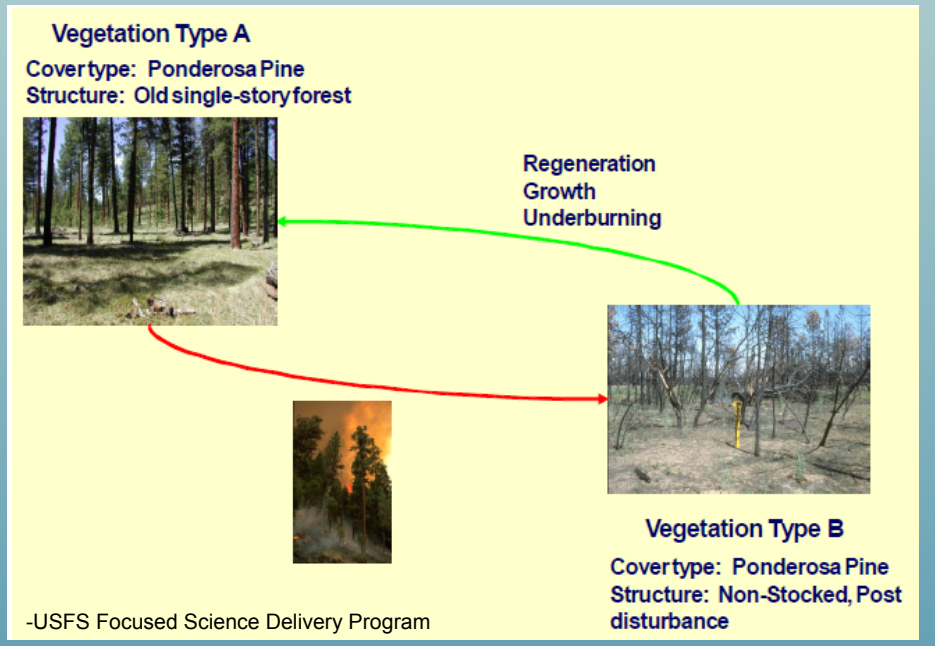


DATA AND METHODS

Data – State Class Maps

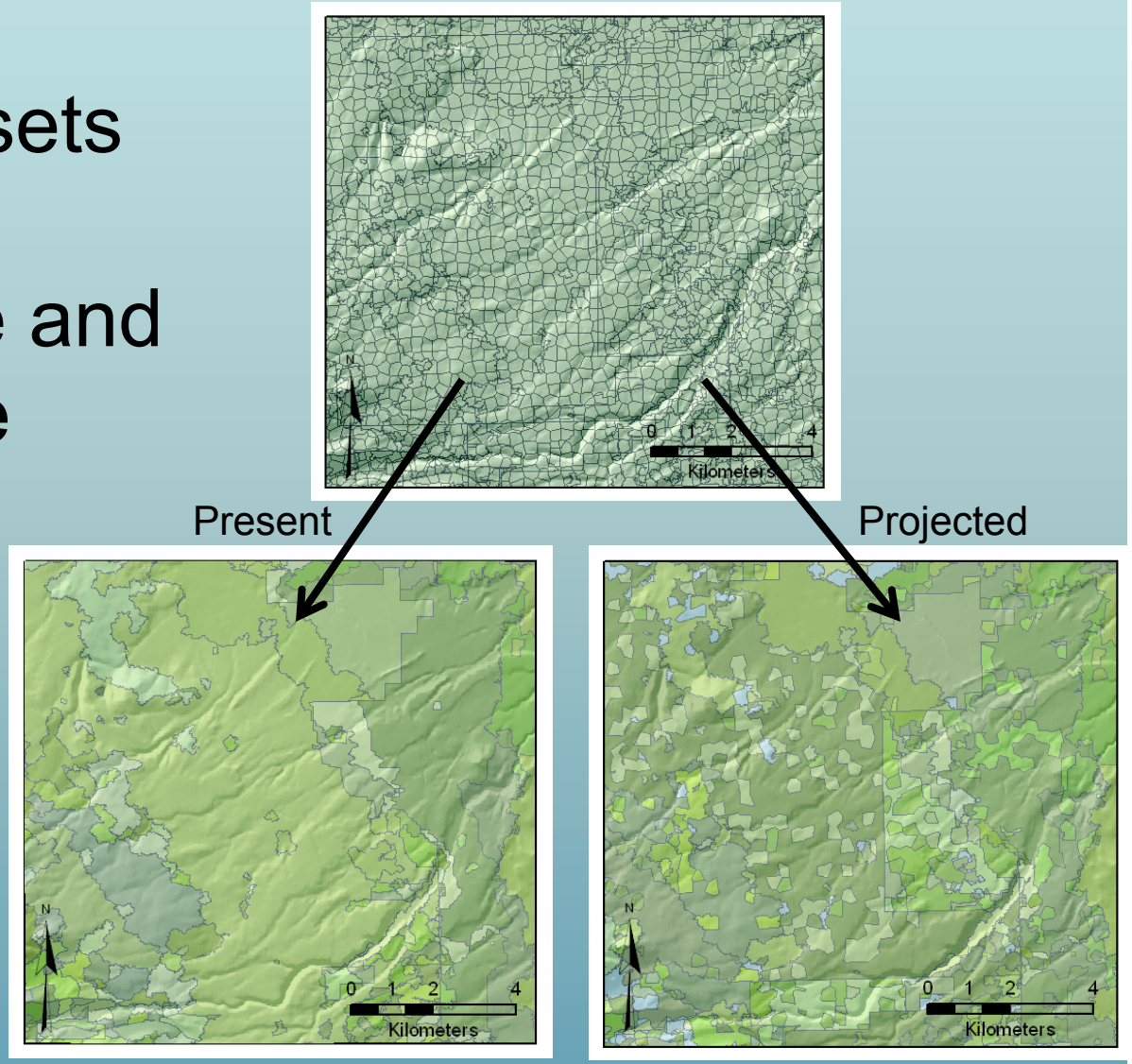
- Gradient Nearest Neighbor dataset (Ohmann and Gregory 2002)
- Vegetation Development Dynamics Tool (VDDT)
- Tool for Exploratory Landscape Scenario Analysis (TELSA)





Data – State Class Maps

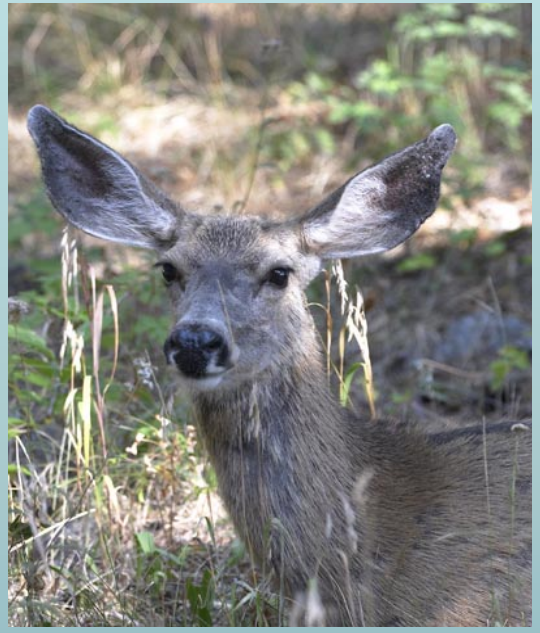
- Resulting datasets contain both vegetation type and structure (State Class)



Scenario Descriptions

- Scenario 1 - Development at historical rates with no restriction on the Bull Springs tract
- Scenario 2 - Bull Springs tract managed as working forest, development in surrounding areas at historical rates

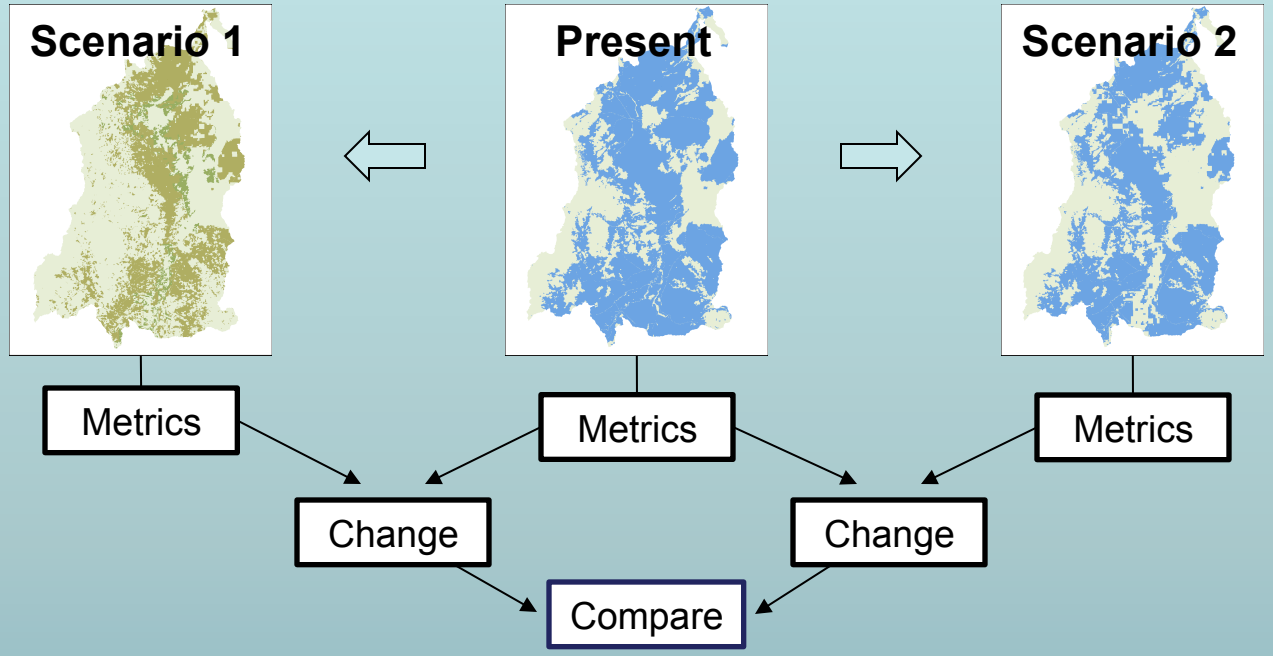
Methods – Habitat Relationships



Mule Deer

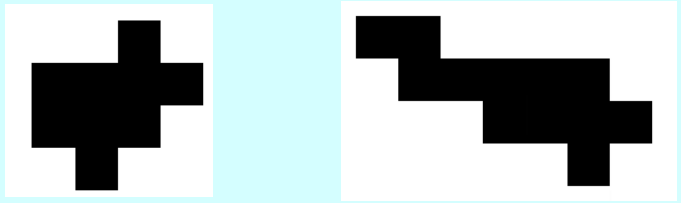
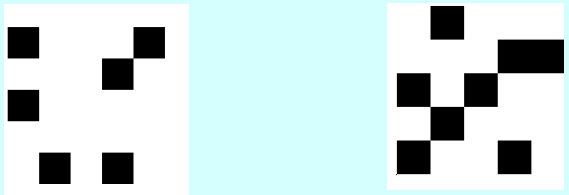
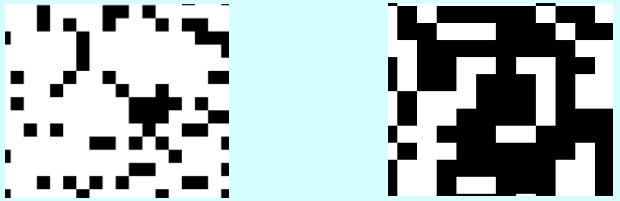
- Derive categorical maps for each component of habitat for mule deer
  - Winter range
  - Forage
  - Hiding cover
  - Thermal Cover

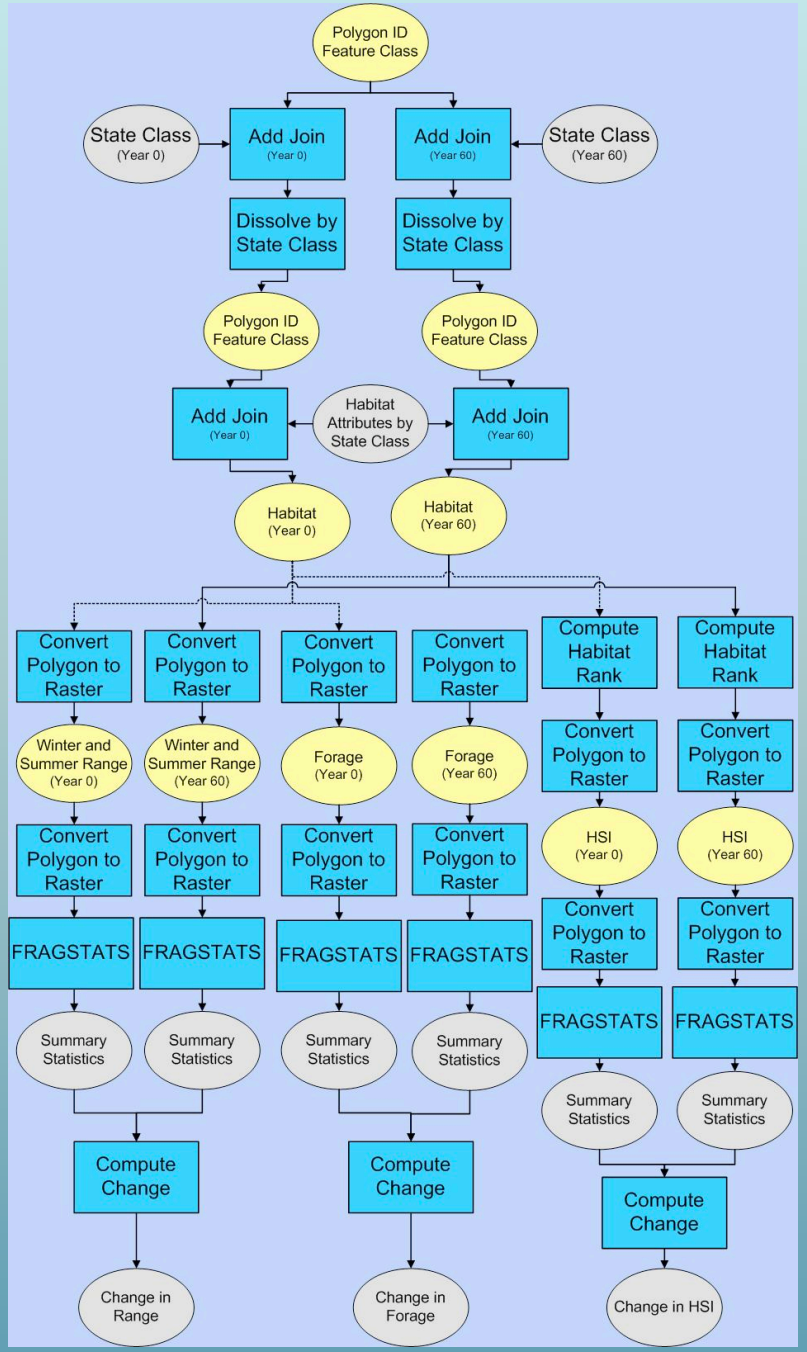
Methods – Analysis Model



Metric	*Description*	*Level of Use*
AREA	The size of a patch	Patch, Class
GYRATE	The extensiveness of a patch	Patch, Class
ENN	The isolation of a patch	Patch, Class
PLAND	The percentage of the landscape in each class	Class
CONTAG	A measure of overall landscape connectivity	Landscape

Methods – Metrics

		Increasing value →
Patch Size	**Measured in hectares**	
Nearest Neighbor	**Measured in meters**	
Radius of Gyration	**Measured in meters**	
Percentage of Landscape	**A percentage for each class**	
Contagion	**Ranges from 0 to 100 and measures aggregation and connectivity**	

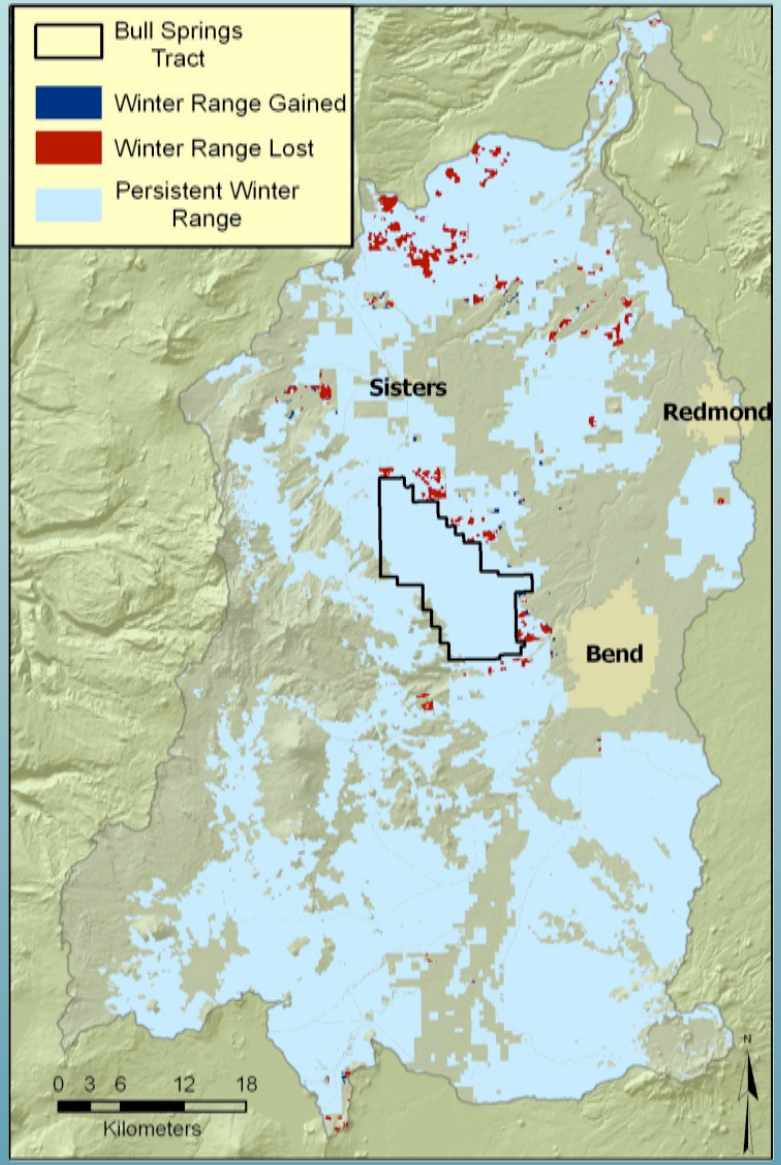


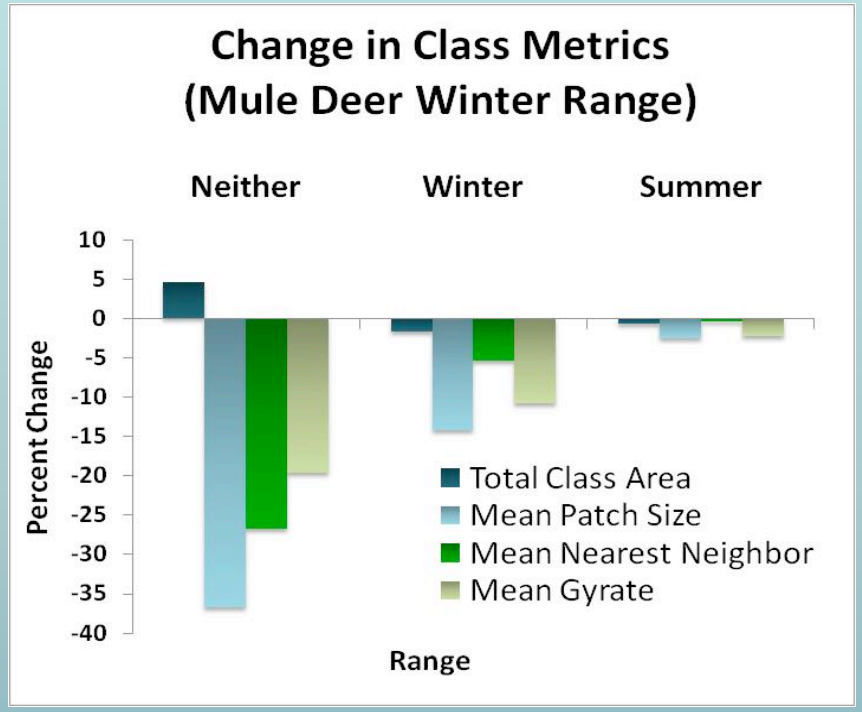
Methods – Analysis Model

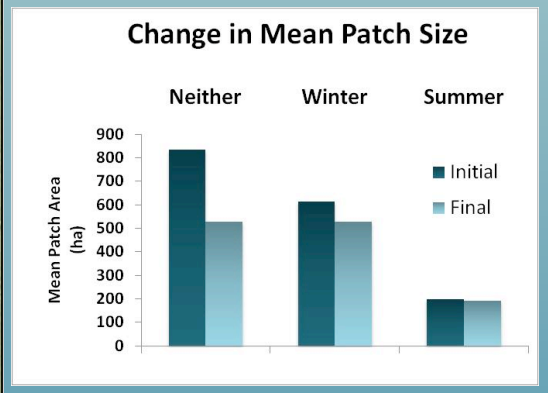
- Join outputs to polygons
- Create categorical maps
- Calculate HSI
  - Forage + Hiding + Thermal
- Convert to raster
- Run FRAGSTATS
- Analyze metric results

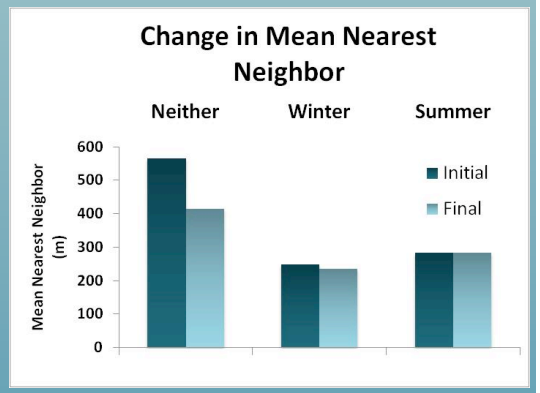
RESULTS AND DISCUSSION

Mule Deer Winter Range

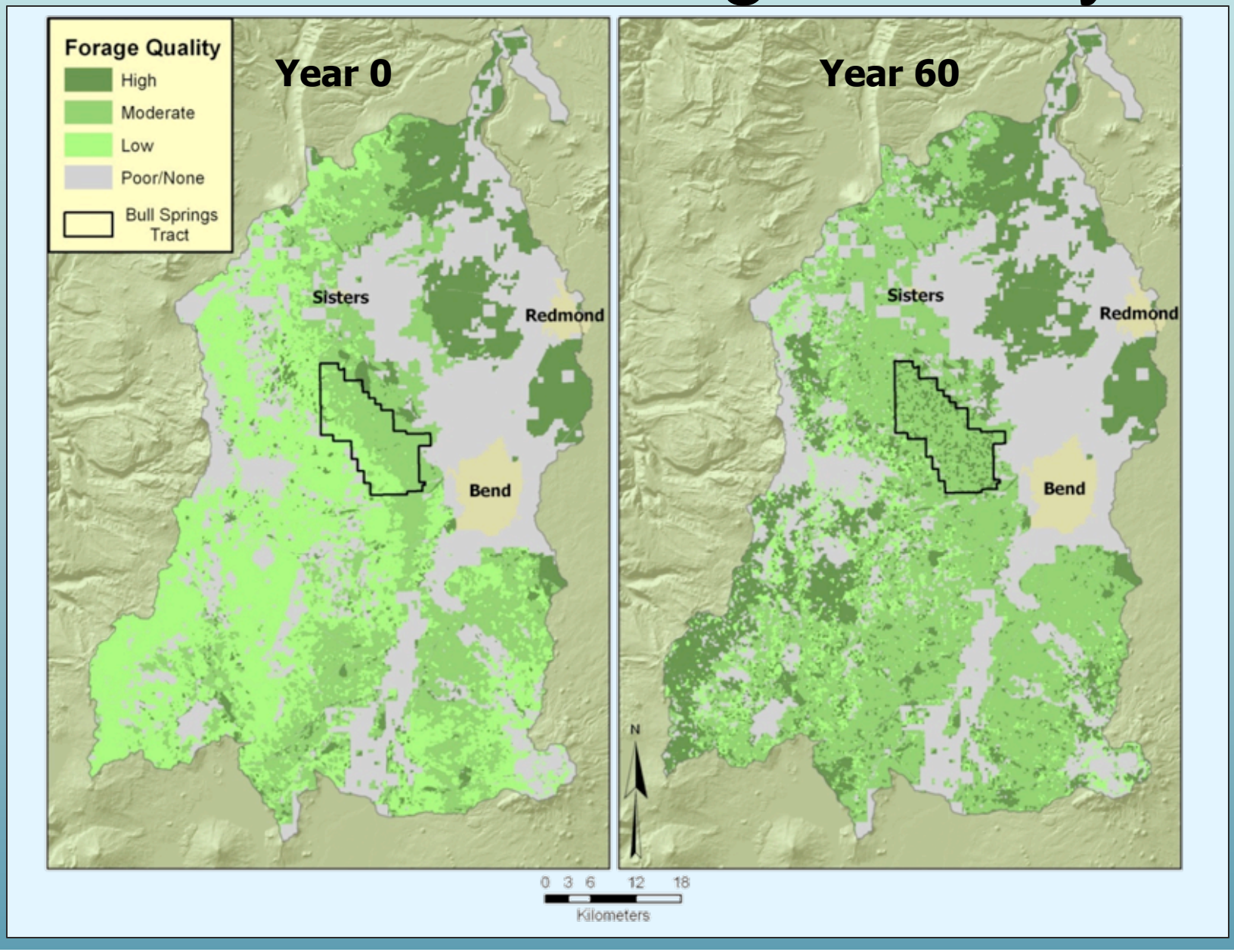




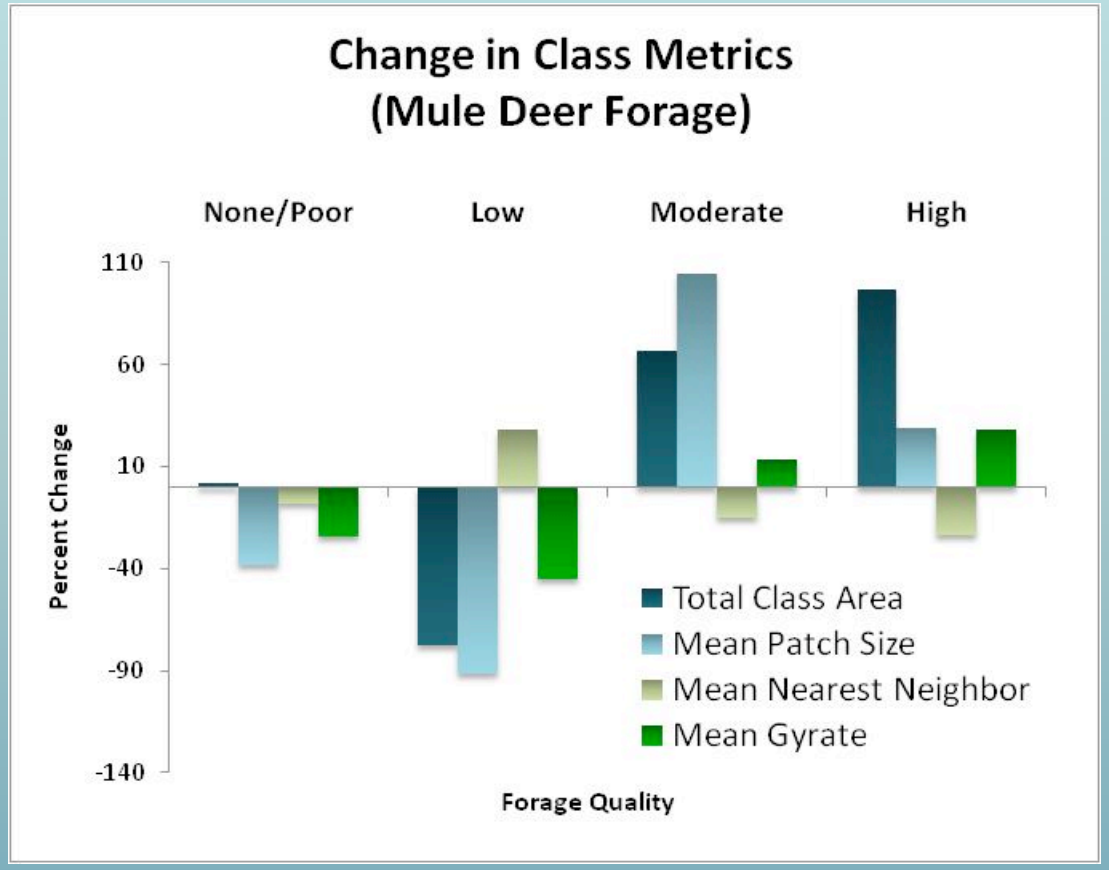


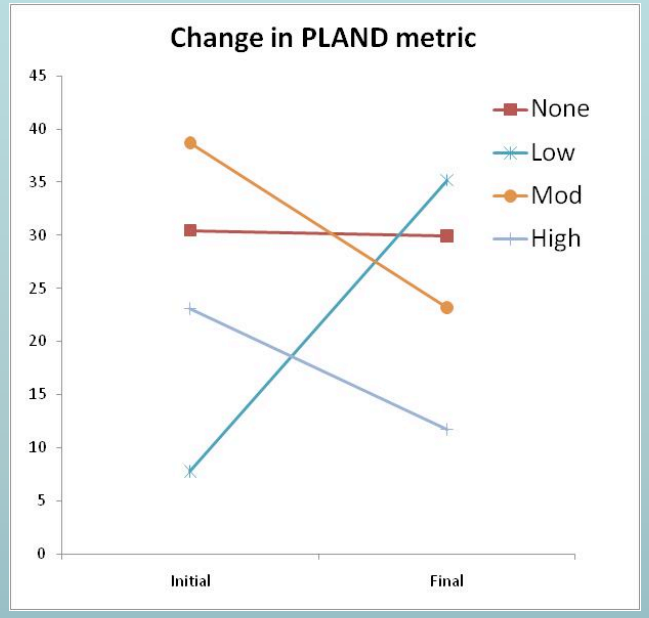


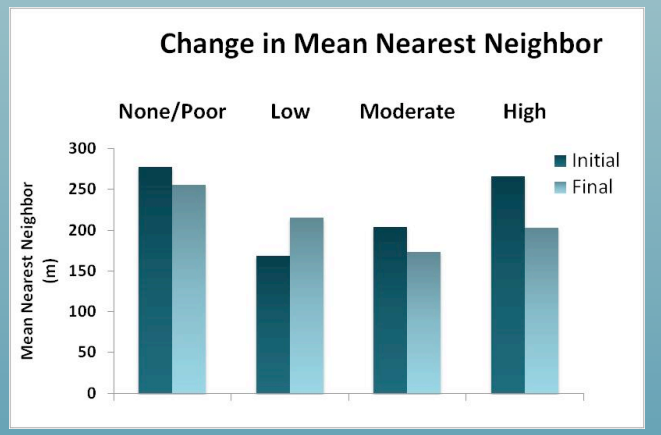
Mule Deer Forage Quality



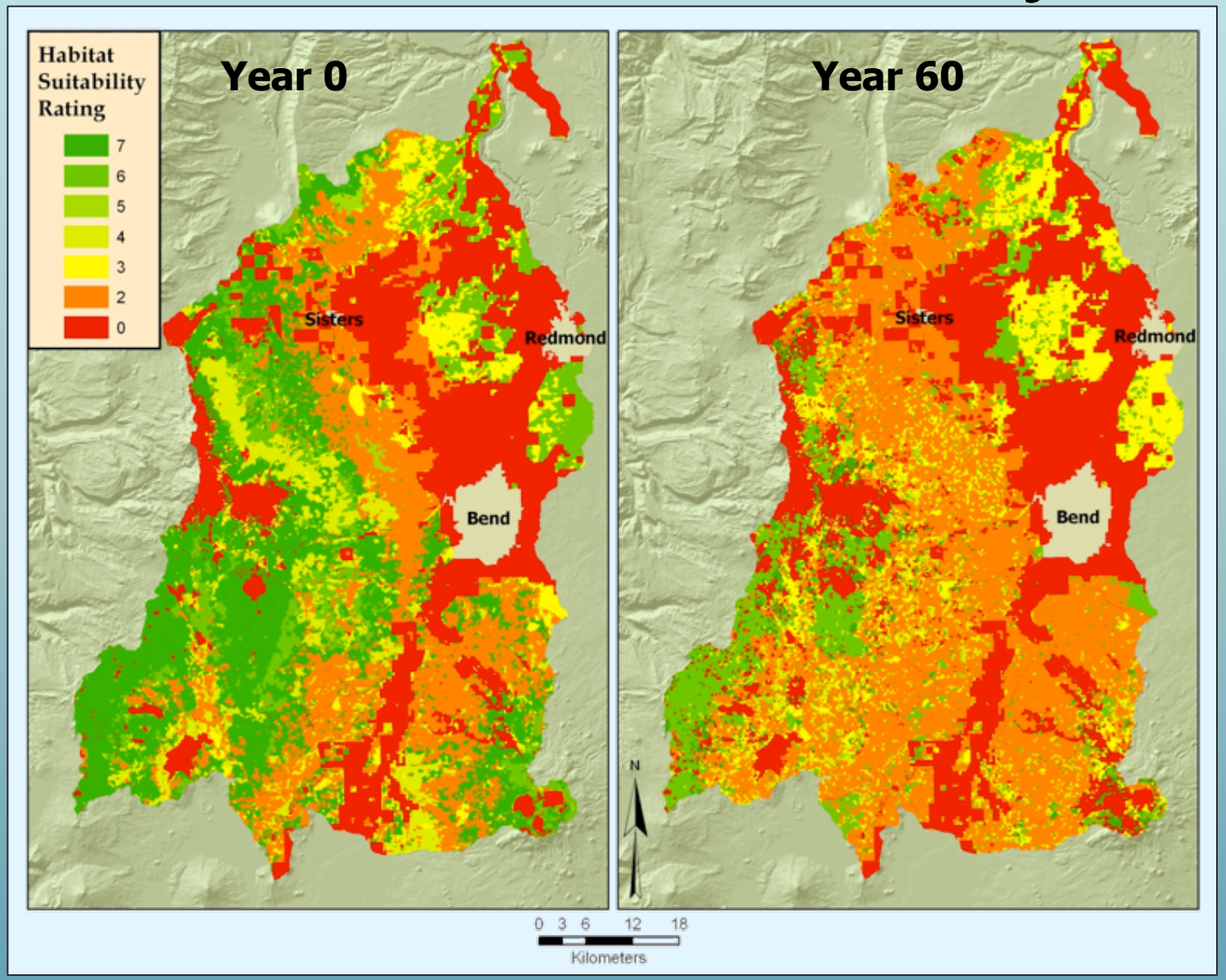
Mule Deer Forage Quality



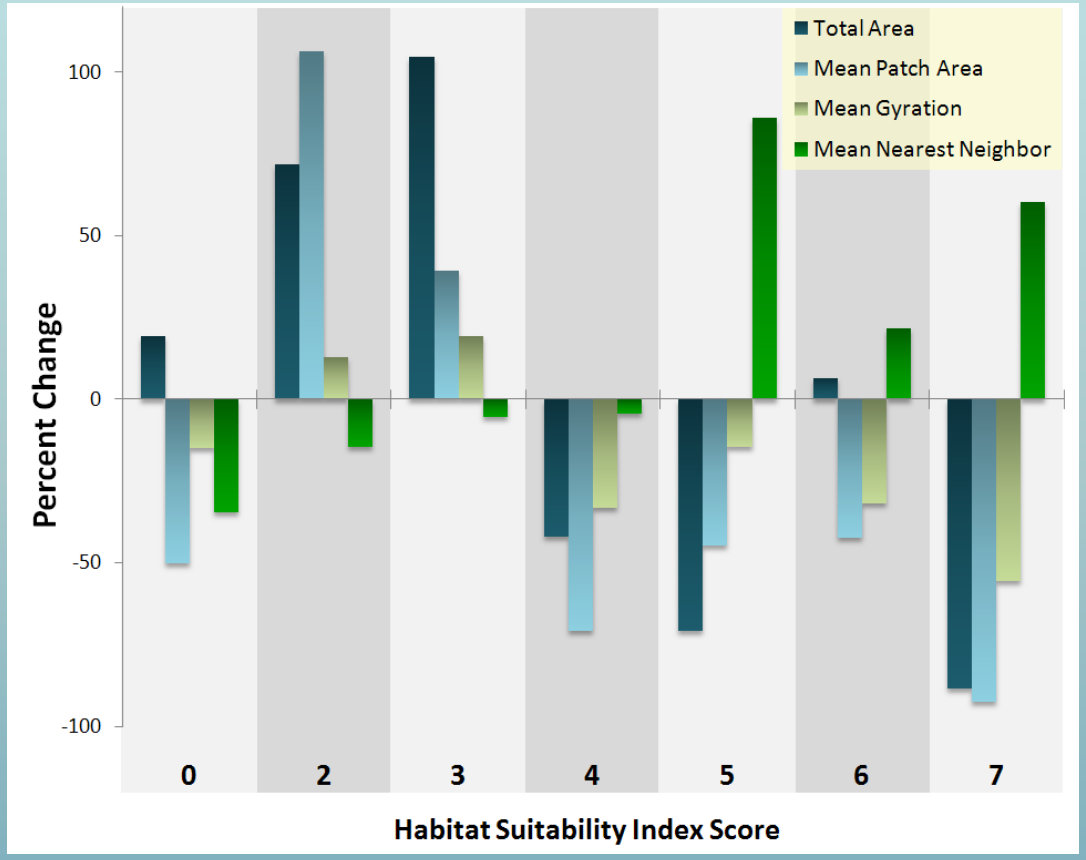


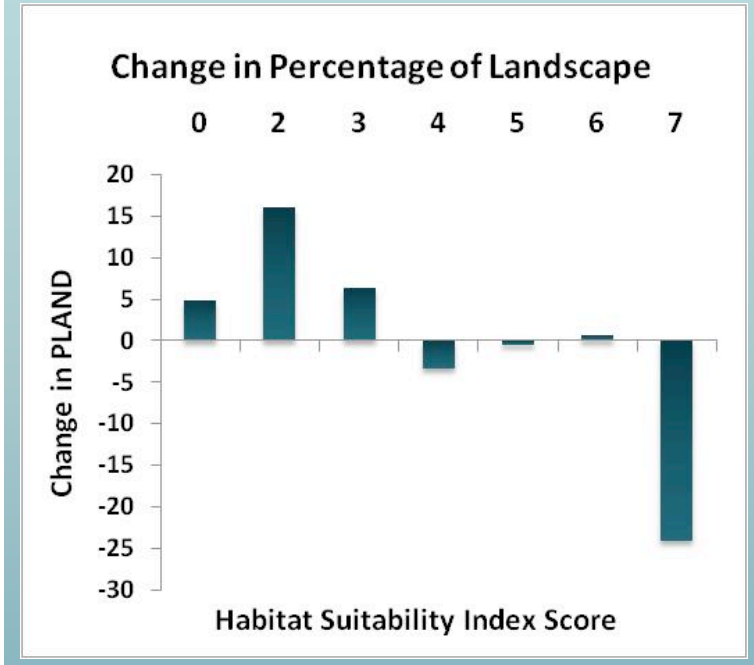


Mule Deer Habitat Suitability Rating

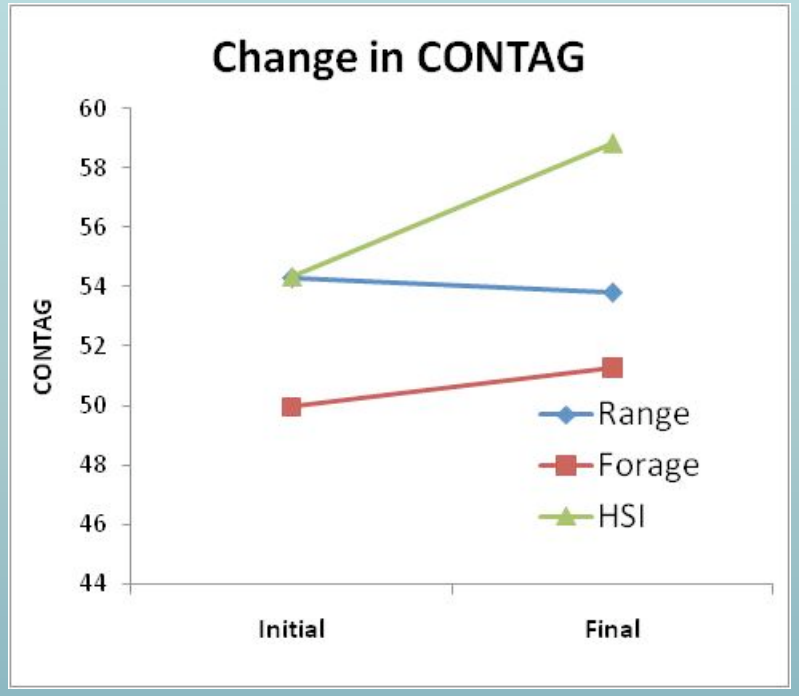


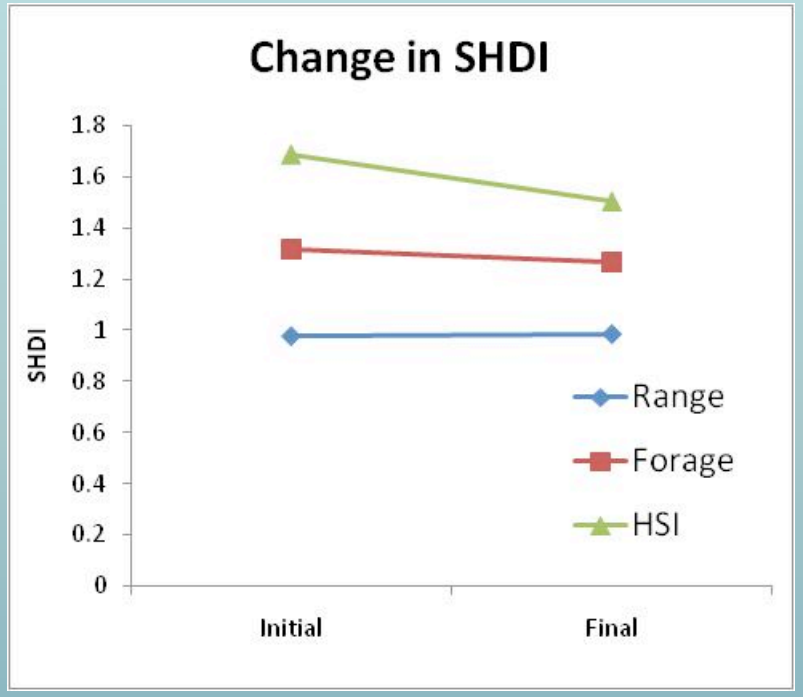
Mule Deer Habitat Suitability Rating





Landscape-Level Metrics





FUTURE WORK

Next Steps – More species

Flammulated Owl

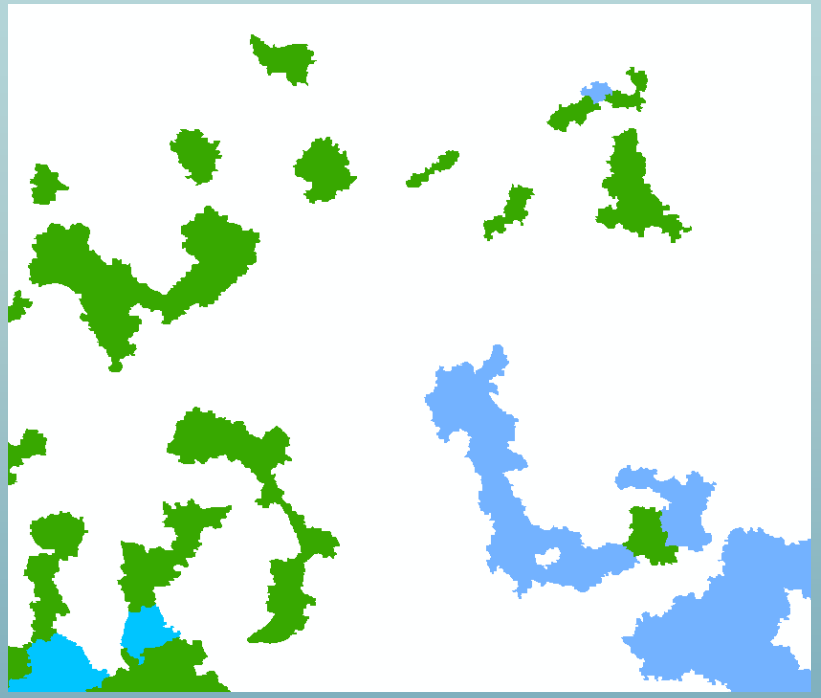
American Marten

Ponderosa Pine Forest and Woodlands

- Derive categorical maps for each component of habitat for marten and owl
- Derive categorical map of emergent and established Ponderosa Pine forest
- Analyze Scenario 1 and compare change

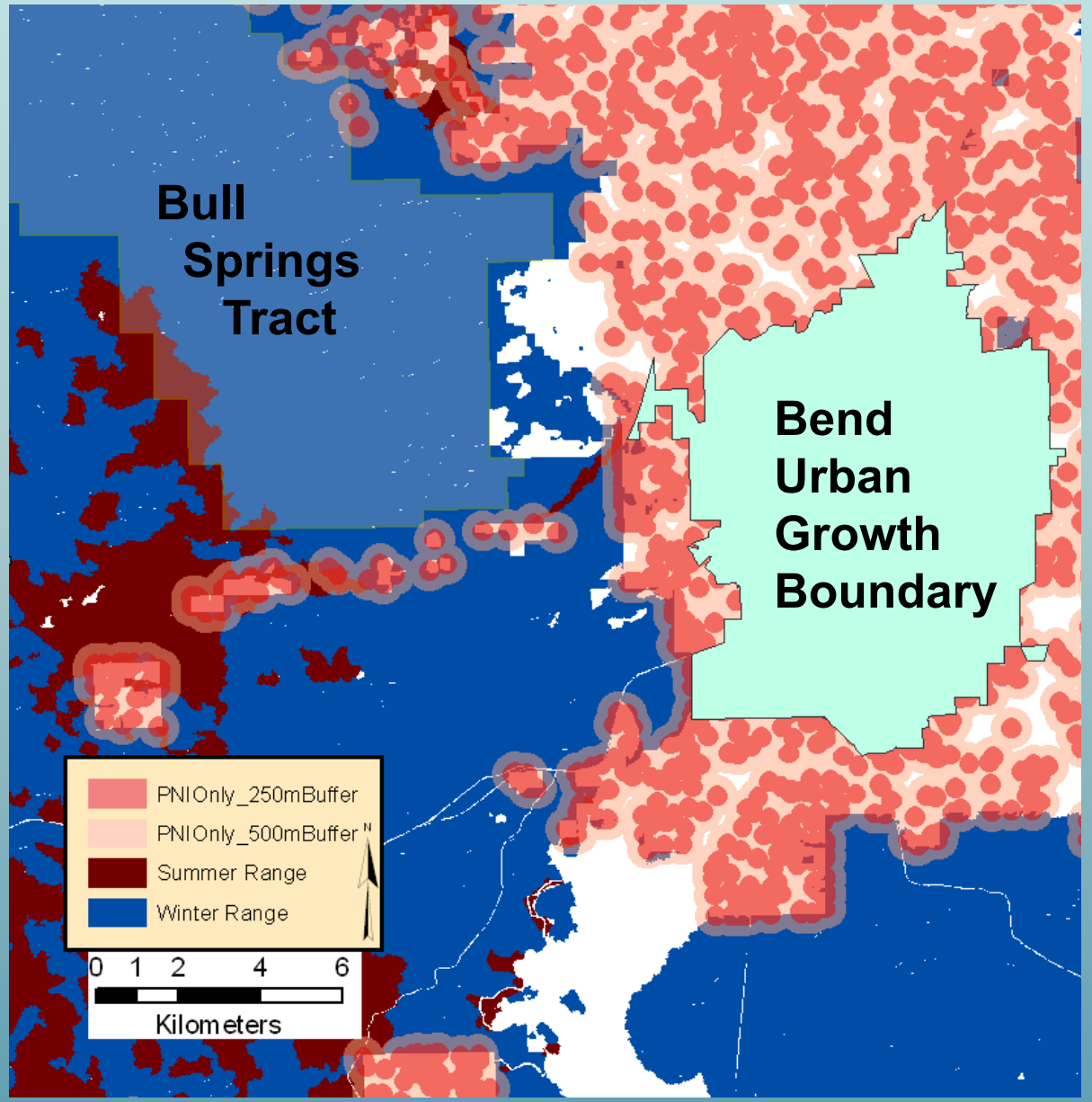
Next Steps – Scale and Adjacency

- Explore scale dependency of metrics on this landscape
  - Extent
  - Grain size
- Adjacency
  - Use species-specific traits



Next Steps – Disturbance Zones

- Houses disrupt wildlife movement beyond physical footprint
- Multiple buffers (Theobald *et al*. 1997)



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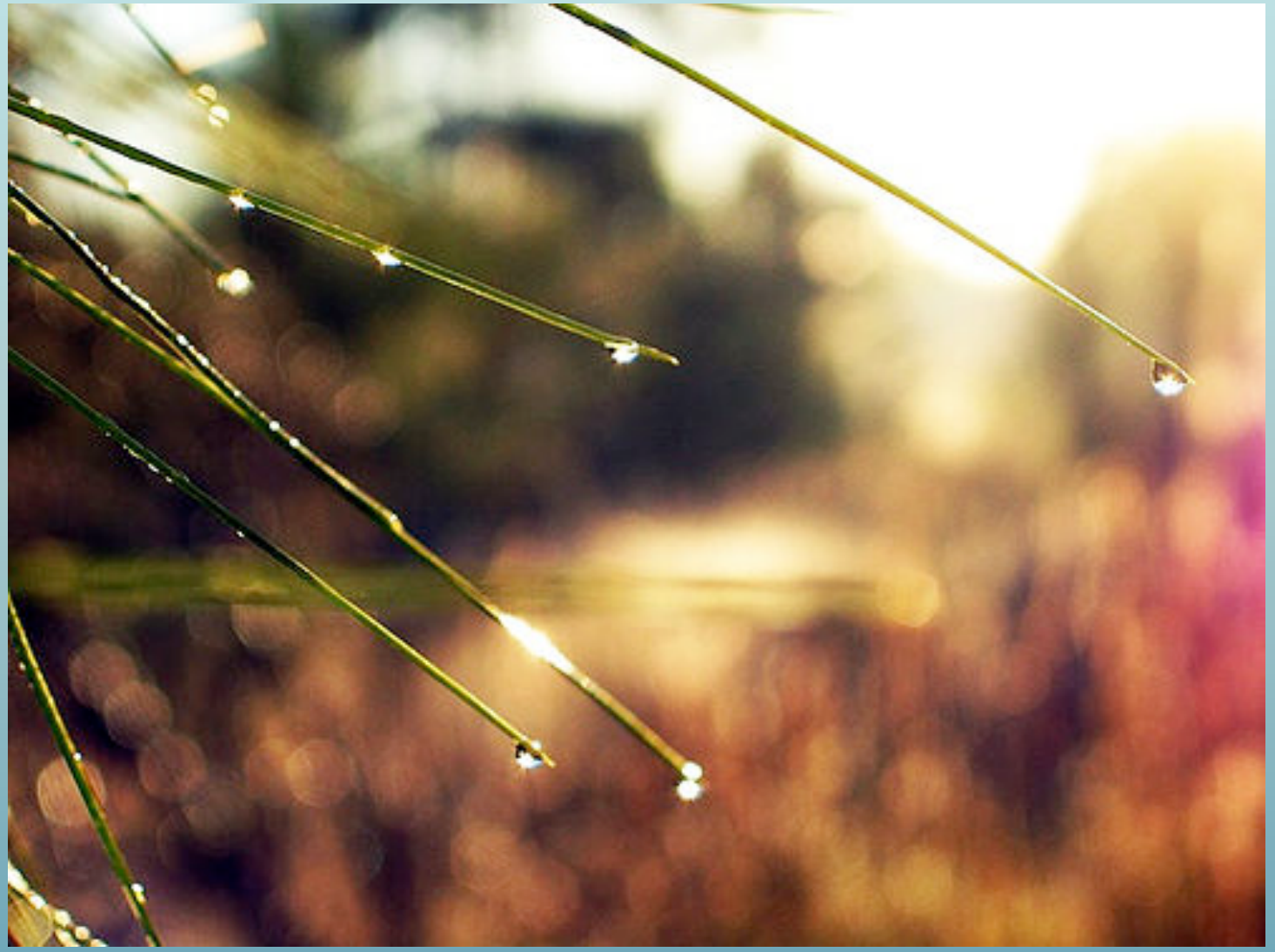
Acknowledgements

- Hannah Gosnell (Advisor)
- Dr. Theresa Burcsu and the US Forest Service
- Julia Jones
- Denis White
- John Bliss
- Mark Meyers

Image credits (when not cited):

- Deschutes Basin Land Trust
- Idaho Fish and Game
- Mike Dunn, Naturalsciences.org
- Jerry Colwell 2003
- US Forest Service Focused Science Delivery Program

Thank You



Questions?