Navigating trade-offs when managing for multi-species avian communities

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Trade-offs encountered in multi-species management

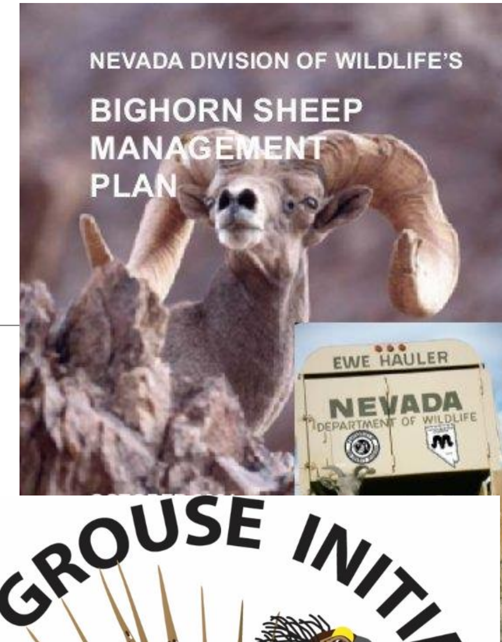
Who | What | When | Where | How | Why

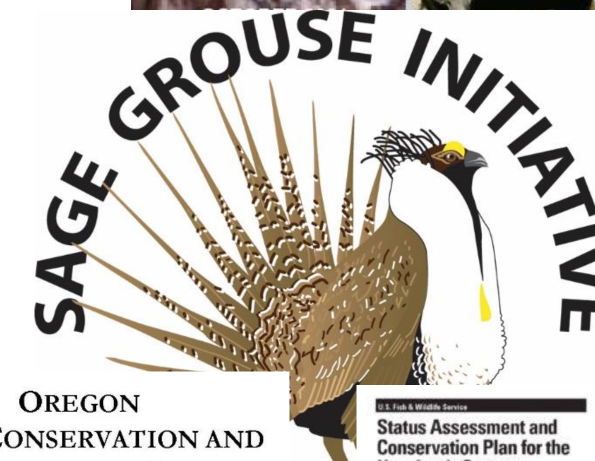


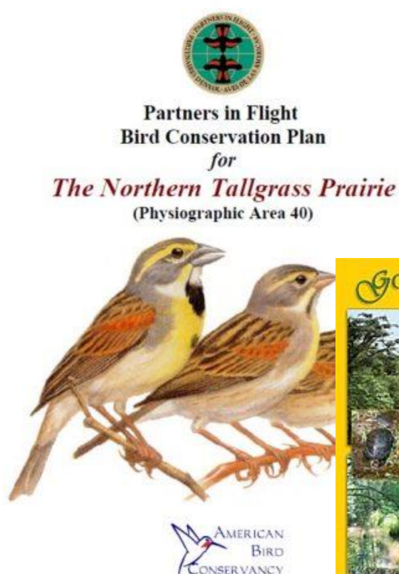


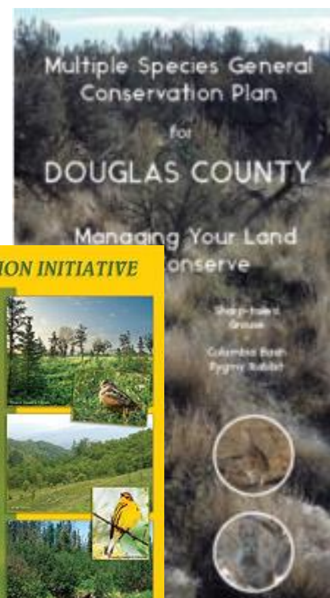
Single vs. Multi-Species

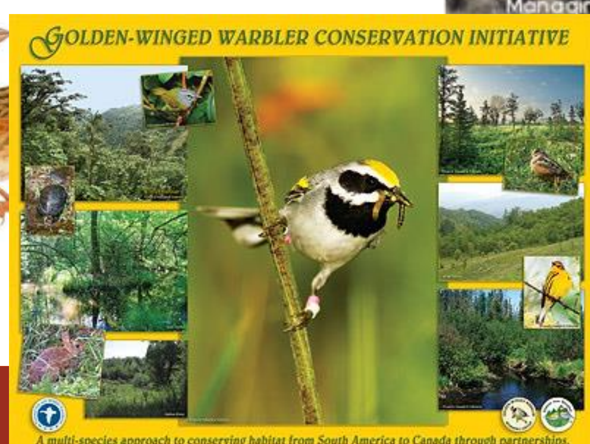
- Majority of traditional conservation/management is species-based
- More recently increase in multi-species conservation plans

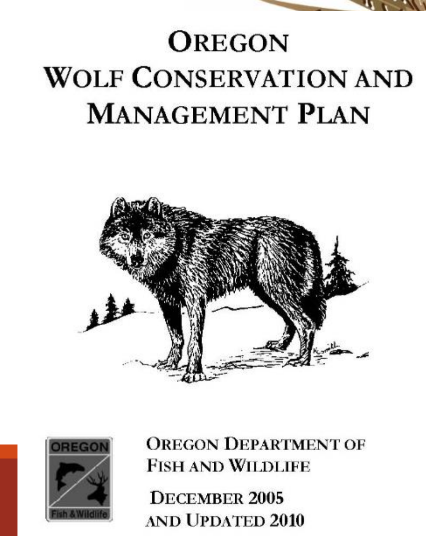












Umbrella species as multi-species management shortcuts

- Protection for 1 = protection for many
- Poor general performance of umbrellas

Is the heuristic *too* simple?

- Ecological proxies not accurate to biological response of interest

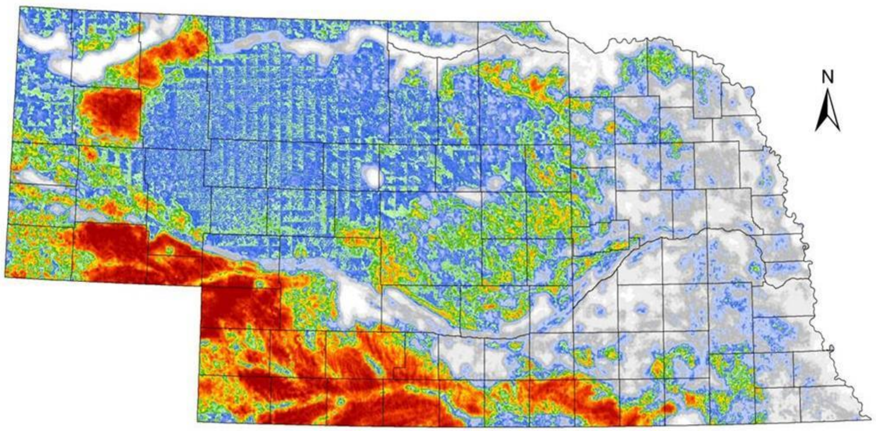
Low initial investment methods

- Rarity
- Body size
- Information available
- Sample-ability
- Home range

Rodriguez et al. 1998, Fleishman et al. 2000, Branton and Richardson 2010, and citations therein

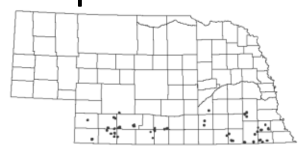
Data-rich method

- How much could we benefit by investing in data-driven umbrella
- Framework for identifying umbrella species that match ‘optimal’ habitat conditions
- Use species-habitat models to support strategic planning

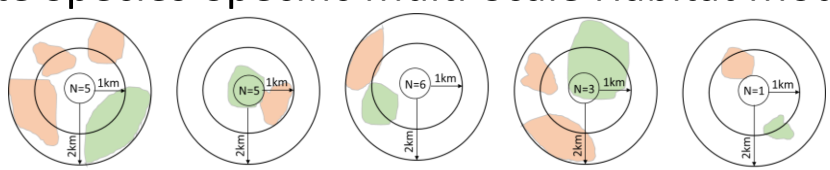


Define Species Set

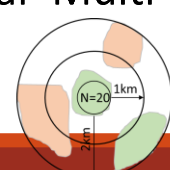
Conduct Species Monitoring



Create Species-Specific Multi-Scale Habitat Models



Identify Set-Wide 'Optimal' Multi-Scale Habitat Composition

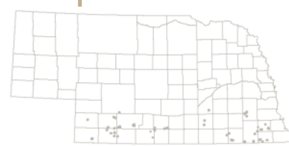


Study Goals:

- Compare whether species-habitat relationships lead to better expected outcomes compared to common umbrella selection approaches

Define Species Set

Conduct Species Monitoring



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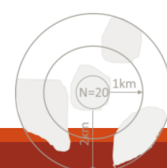
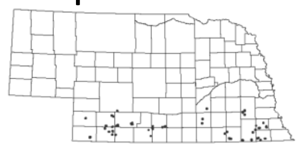


Possible species set

Selection Metric[1]	Potential Umbrella Species
Biodiversity indicator/ # co-occurring species	EAME, FISP
Charismatic	NOBO, RNEP, WEME
Habitat specialist/resource limited	FISP
Large area requirement	DICK
Large body size	RNEP
Large geographic range	GRSP, WEME
Low population density	LASP
Relatively abundant	GRSP
Game species	NOBO, RNEP
Large home range	RNEP
Migratory	DICK, EAME, FISP, GRSP, LASP, WEME
Dispersal-limited	RNEP

[1]: based on Lambeck (1997); Caro and O'doherty (1999); and Fleishman et al. (2000).

Conduct Species Monitoring



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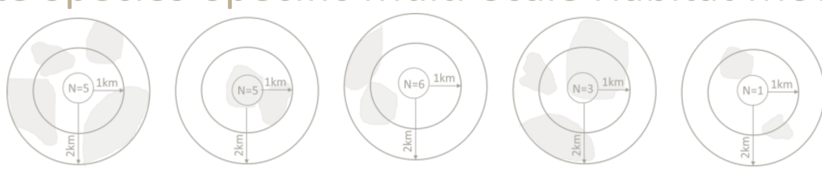

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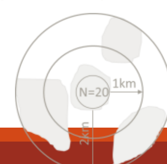
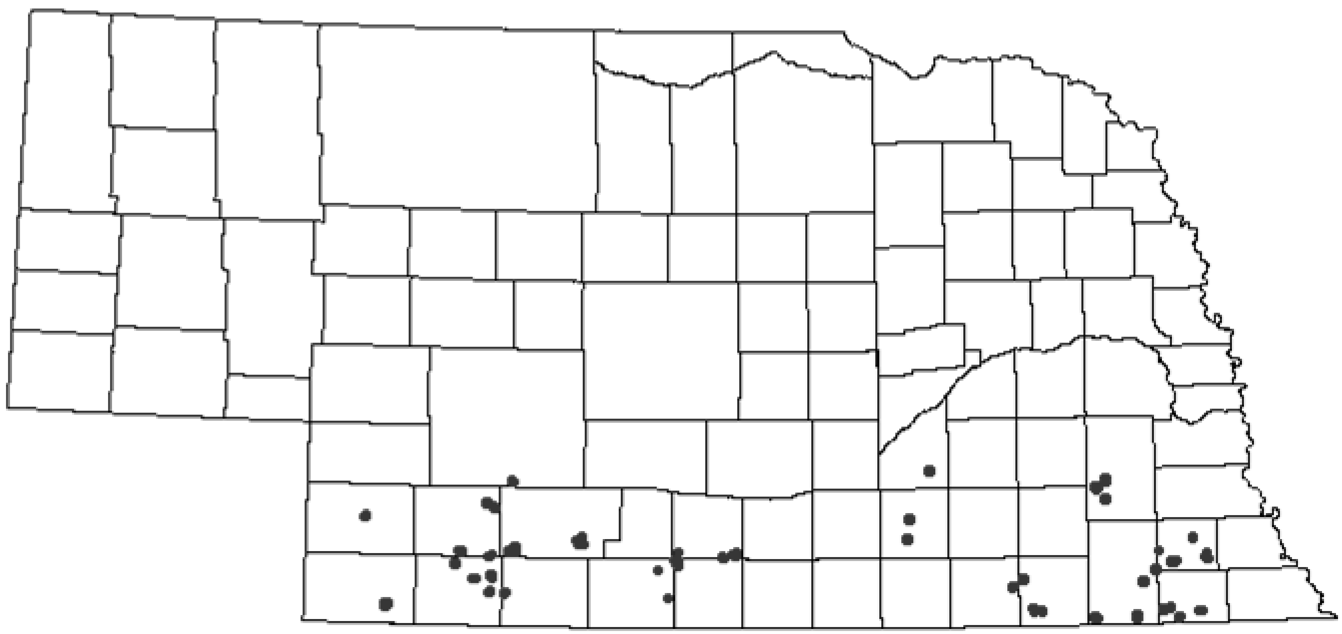
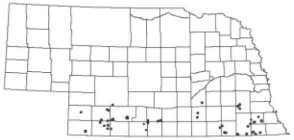


Species monitoring

- Point count surveys
- 2010 – 2012: 405 survey locations (600-1000 surveys/yr)



Conduct Species Monitoring



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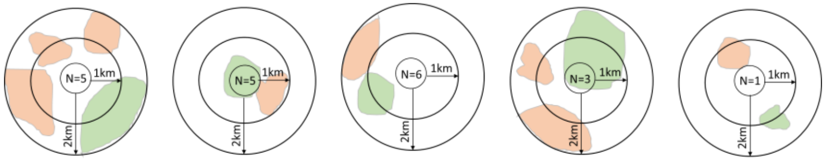
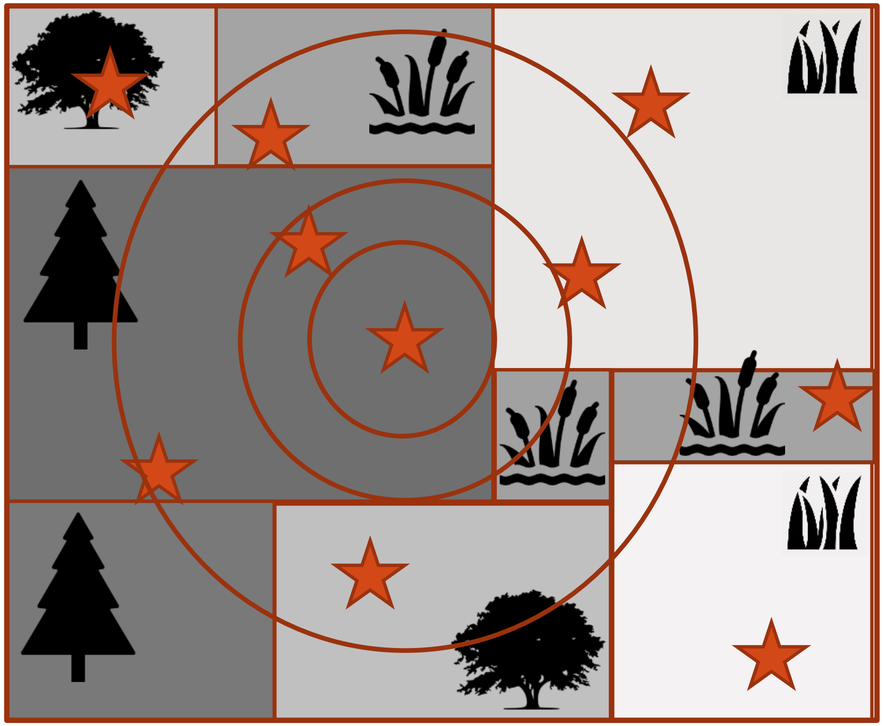


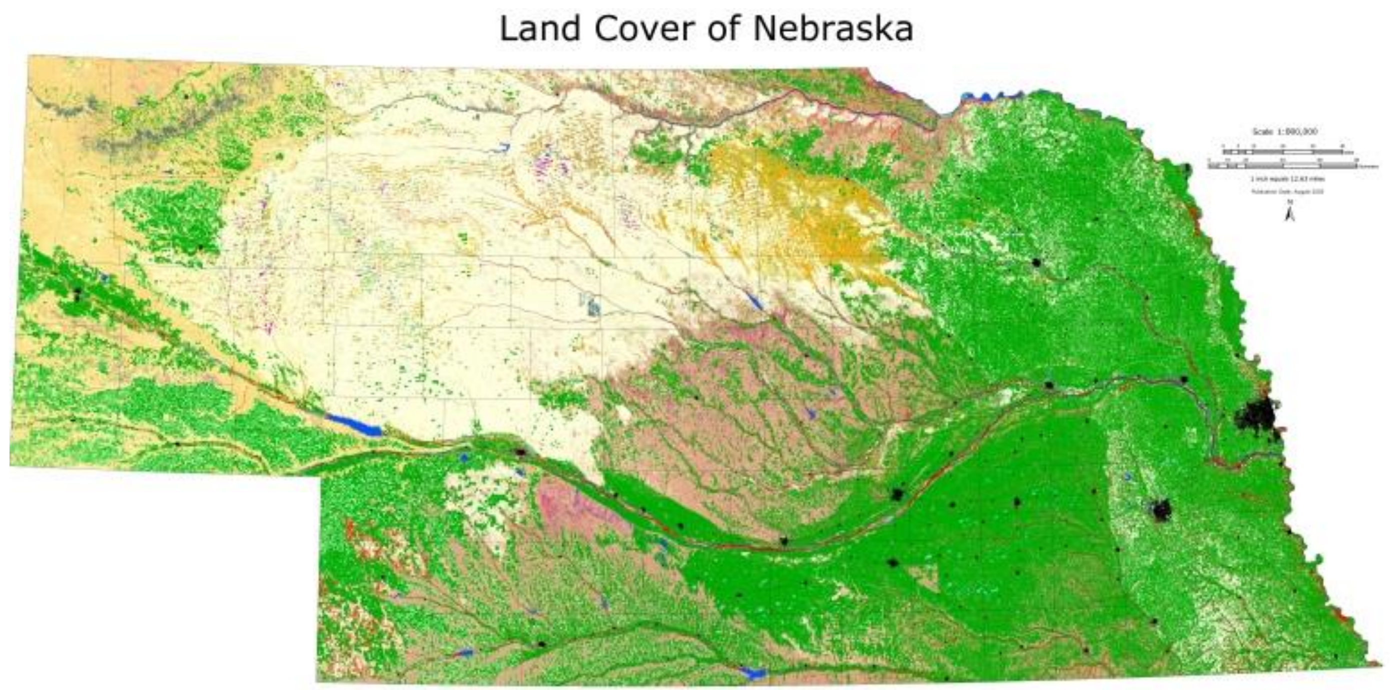
Identify Set-Wide 'Optimal' Multi-Scale Habitat Composition

Habitat models



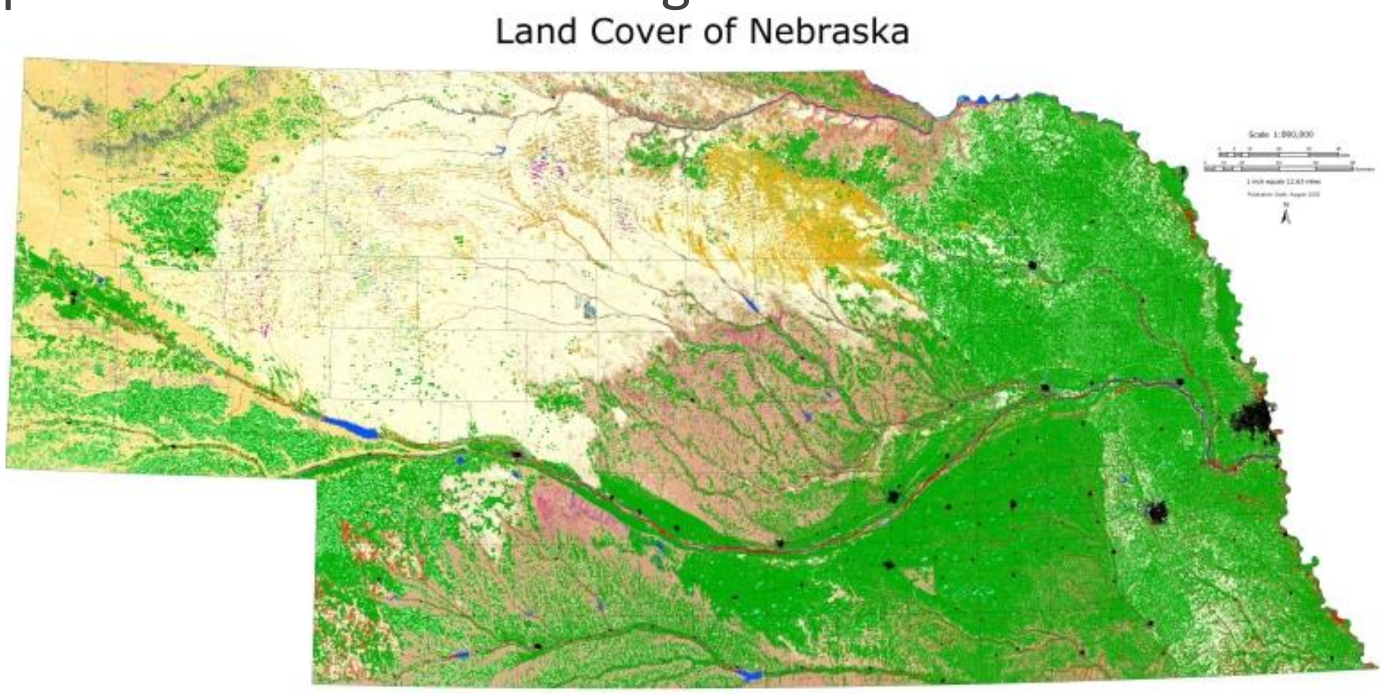
Habitat models

- Habitat classification: Rainwater Basin Joint Venture NE landcover development product (Bishop et al. 2011)

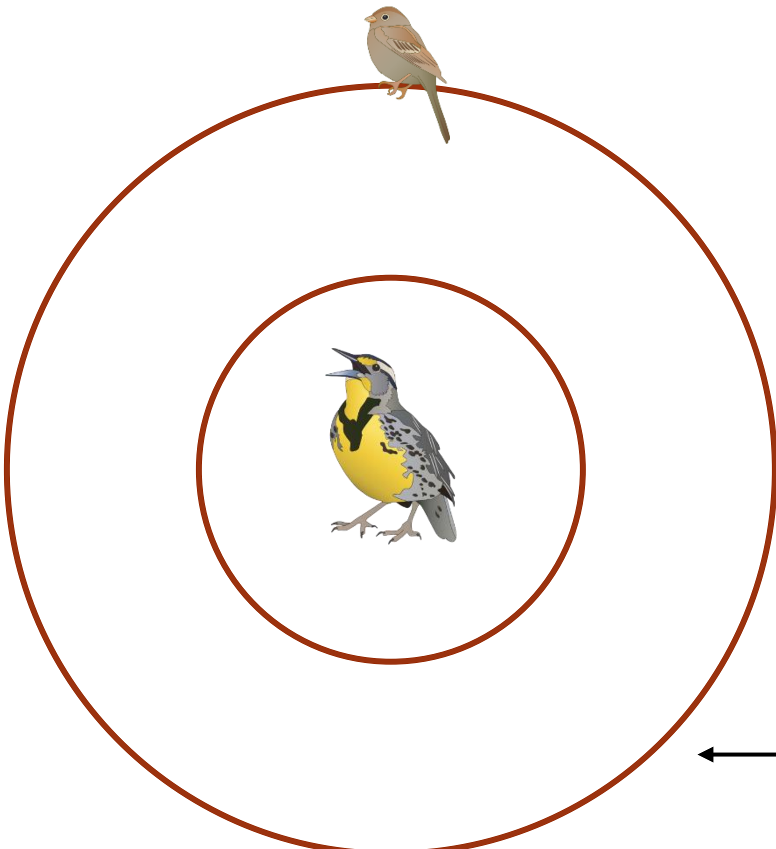


Habitat models

- Habitat classification: Rainwater Basin Joint Venture NE landcover development product (Bishop et al. 2011)
- Derived proportion of woodland and grassland within:
  - 500m
  - 1000m
  - 1500m
  - 2000m
  - 3000m
  - 4000m
  - 5000m (radii)



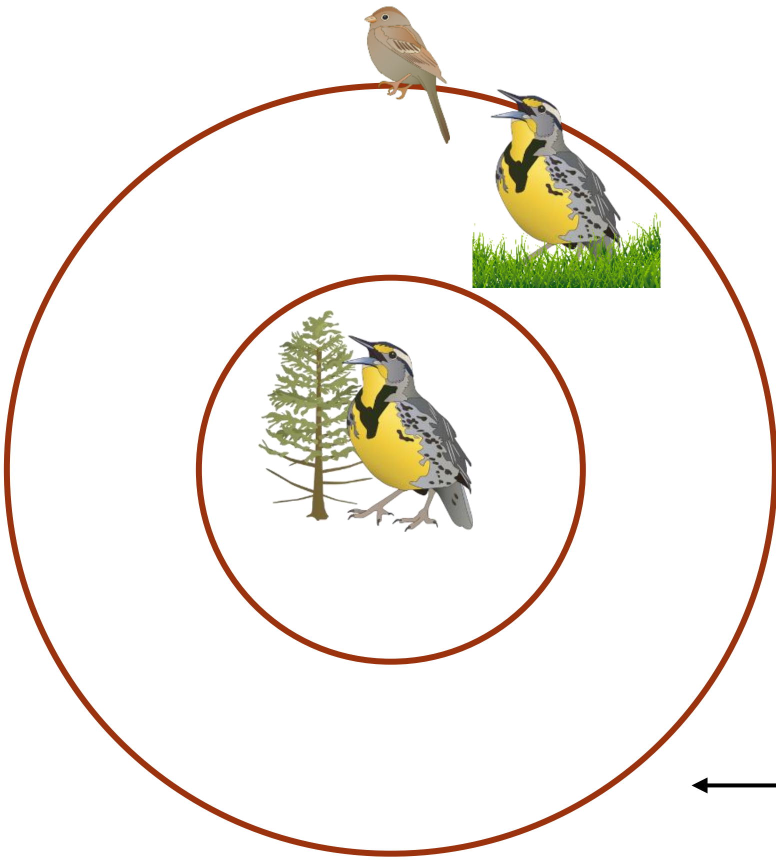
What are the ecological neighborhoods? (trees)



GRSP EAME FISP DICK
WEME LASP RNEP
NOBO

Small Scale ⟷ Large Scale

What are the ecological neighborhoods? (grass)



LASP GRSP FISP DICK

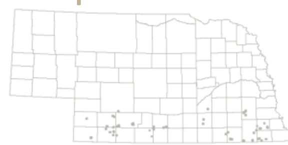
NOBO EAME

RNEP

WEME

Small Scale ↔ Large Scale

Conduct Species Monitoring



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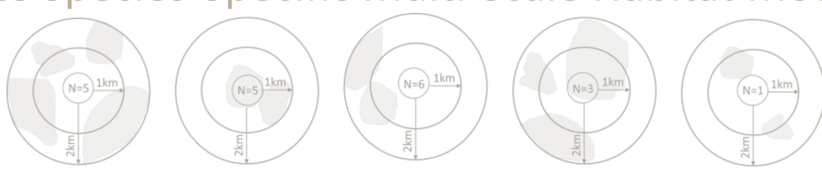
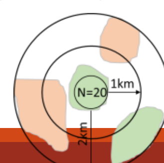


Identify Set-Wide ‘Optimal’ Multi-Scale Habitat Composition



Community Optimum

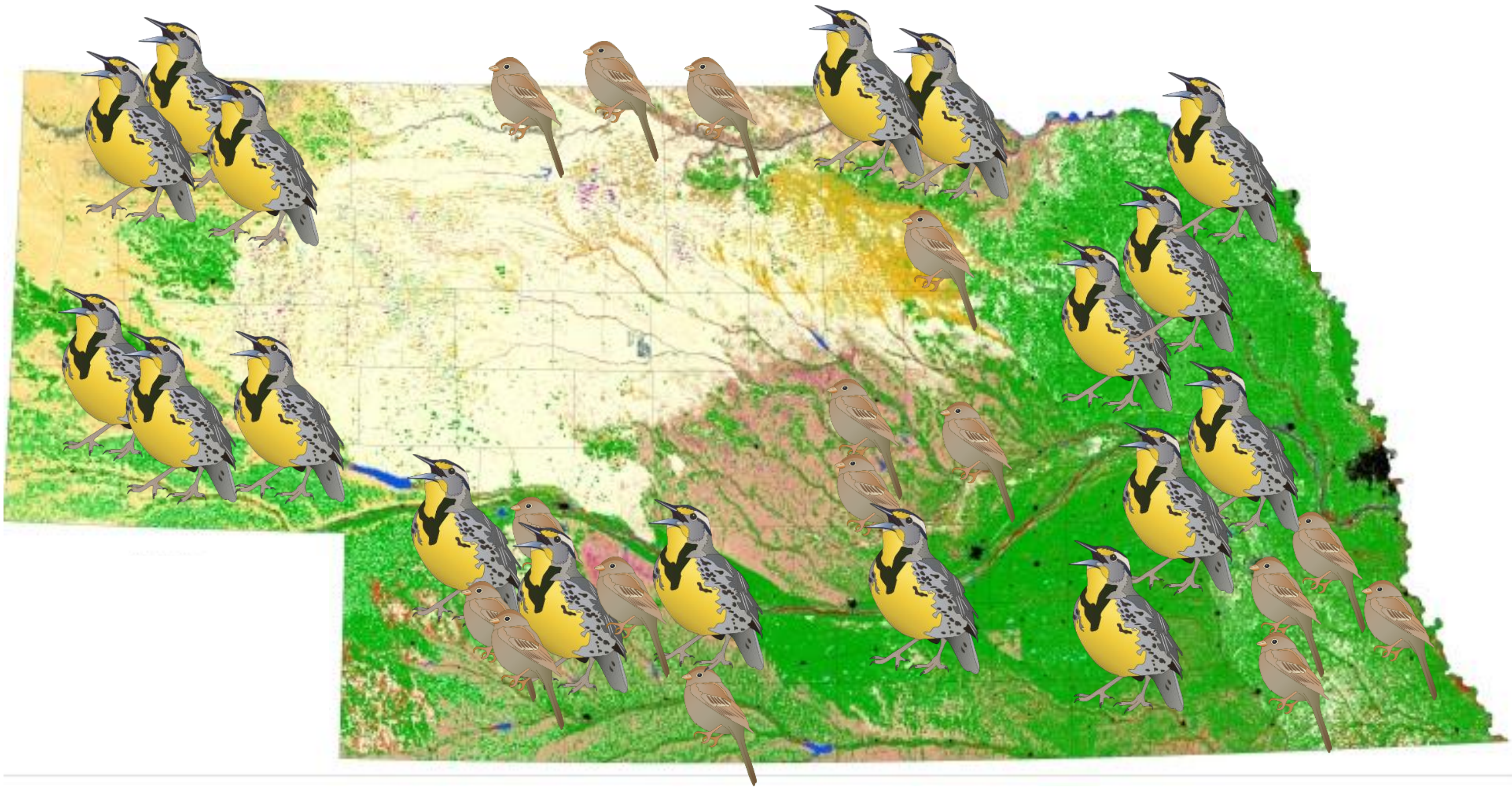
For each species:

- Calculated species-specific ‘optimal’ habitat characteristics
- Given the optimal characteristics of each species, how much ‘collective abundance’ can we expect?

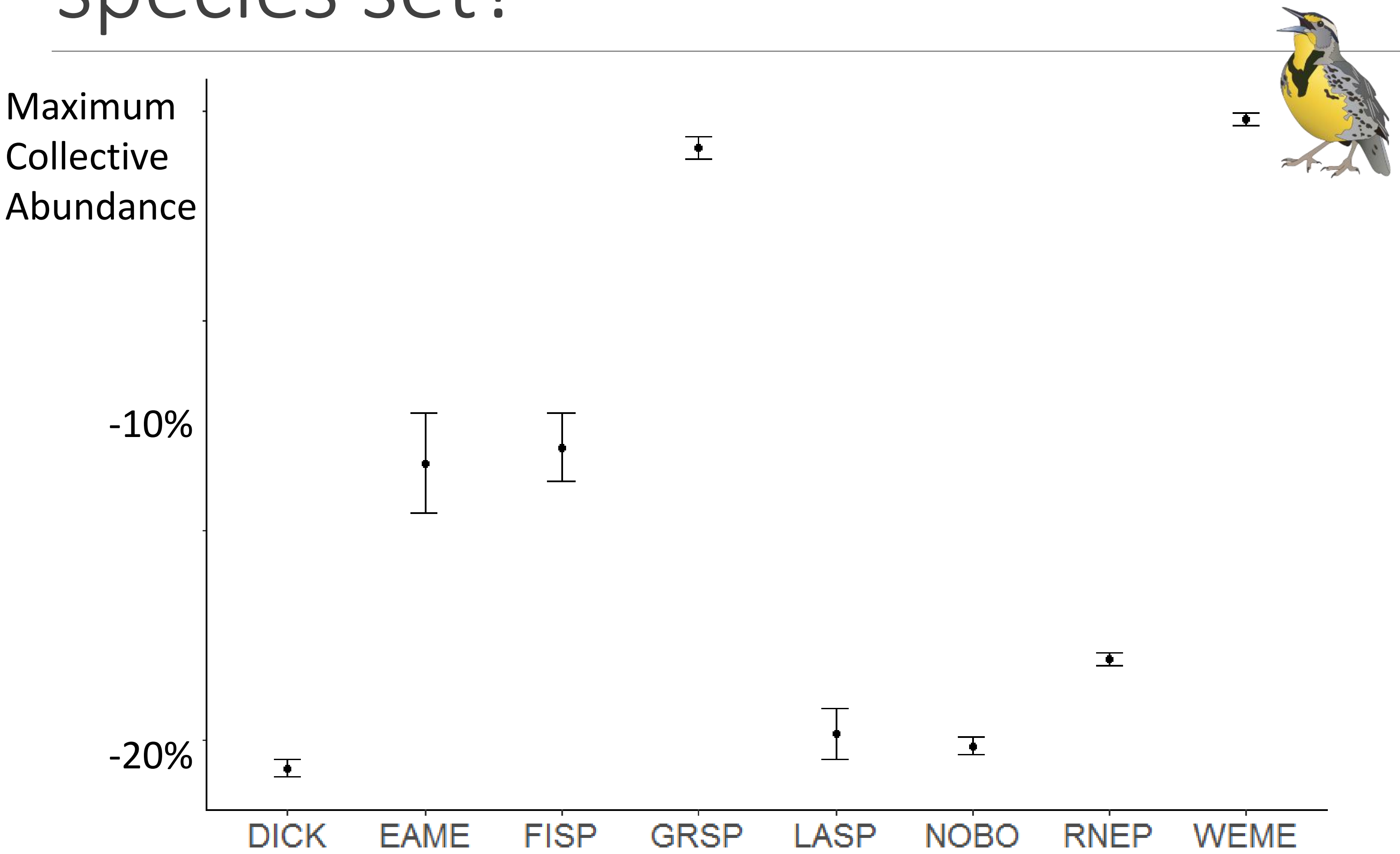






Who's habitat characteristics also maximizes abundance across our species set?

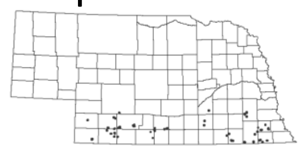


Conclusions

- More often than not, selection by simple criteria is sub-optimal
- Greater initial input might facilitate greater eventual return

Management option: habitat management

Conduct Species Monitoring



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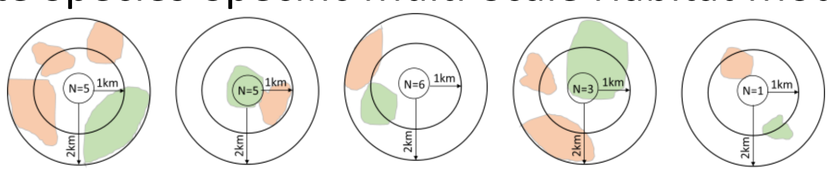
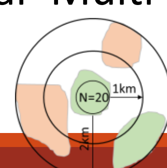
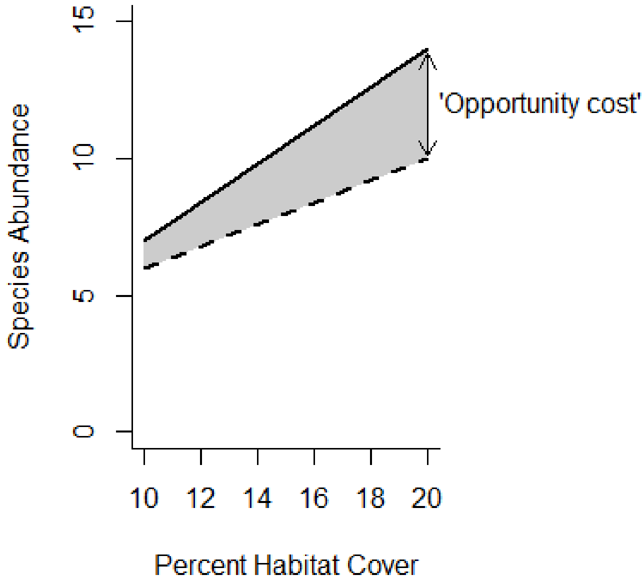
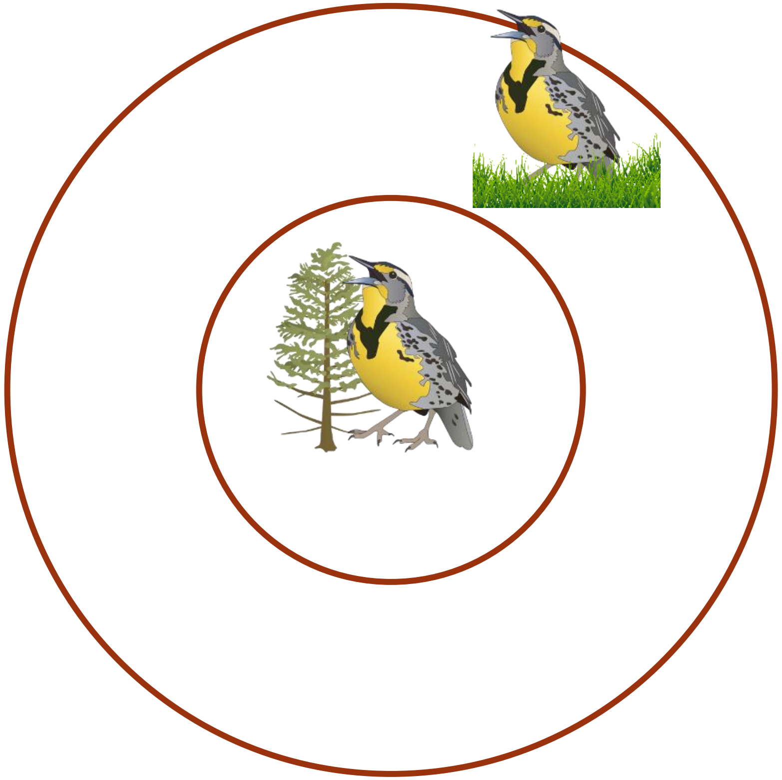


Identify Set-Wide ‘Optimal’ Multi-Scale **Management Action**

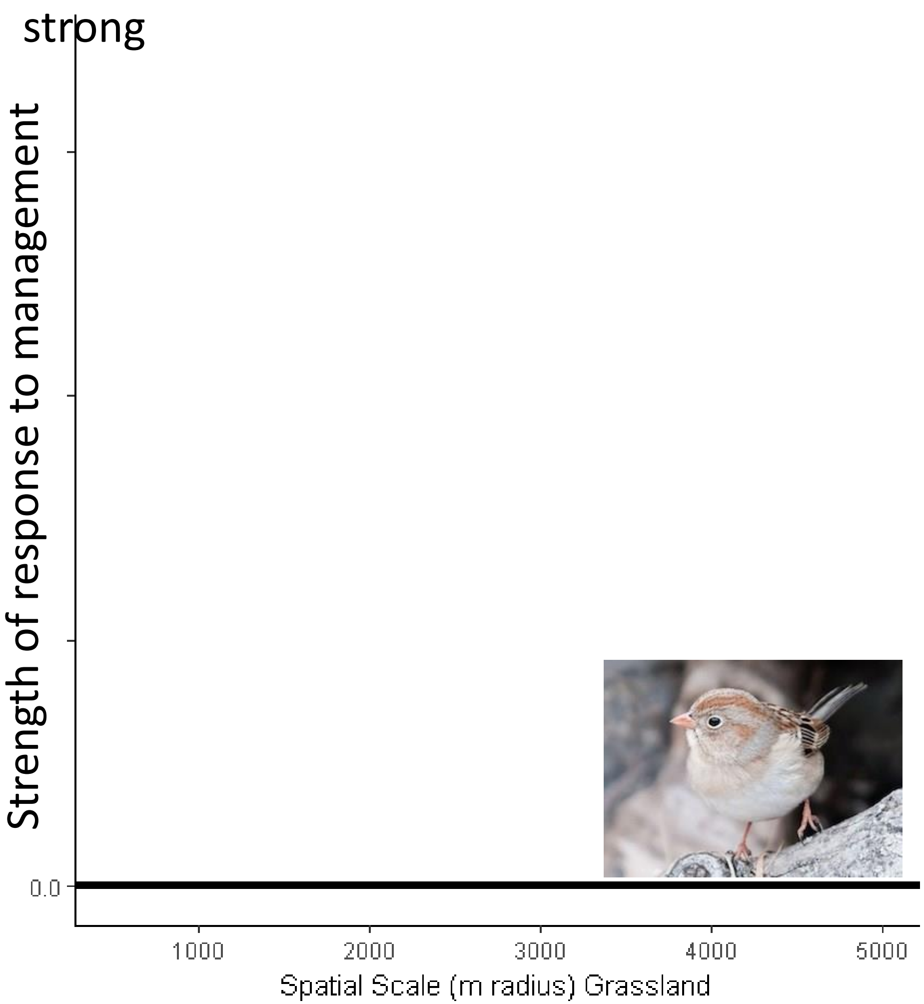


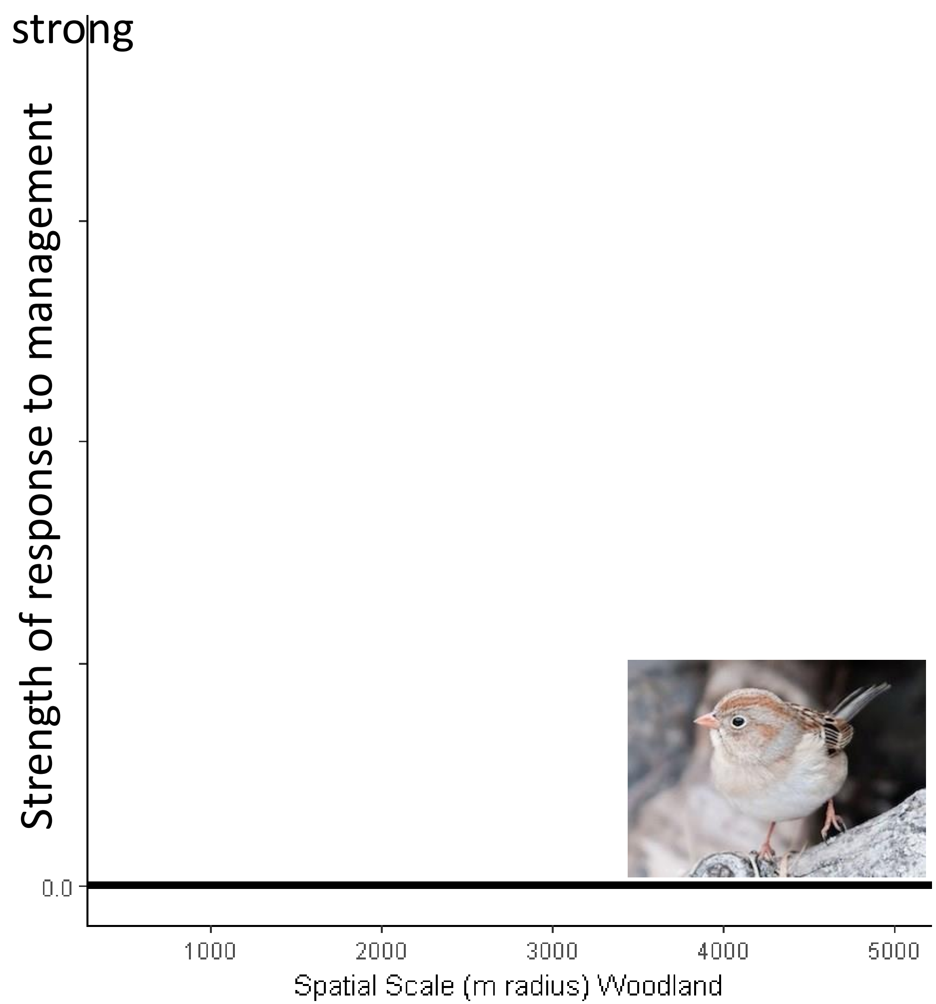
Opportunity costs to management





Where do birds respond strongest?





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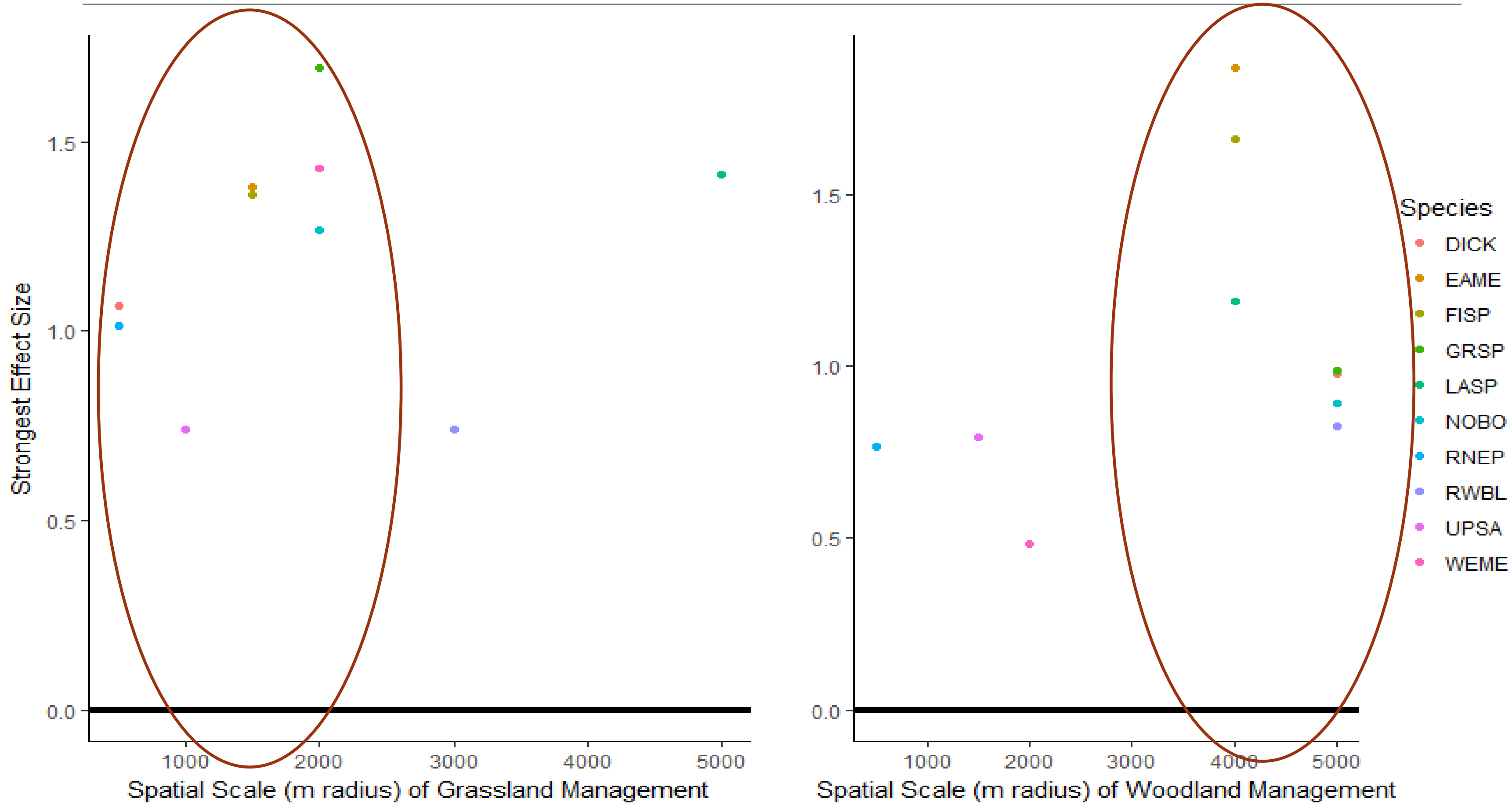
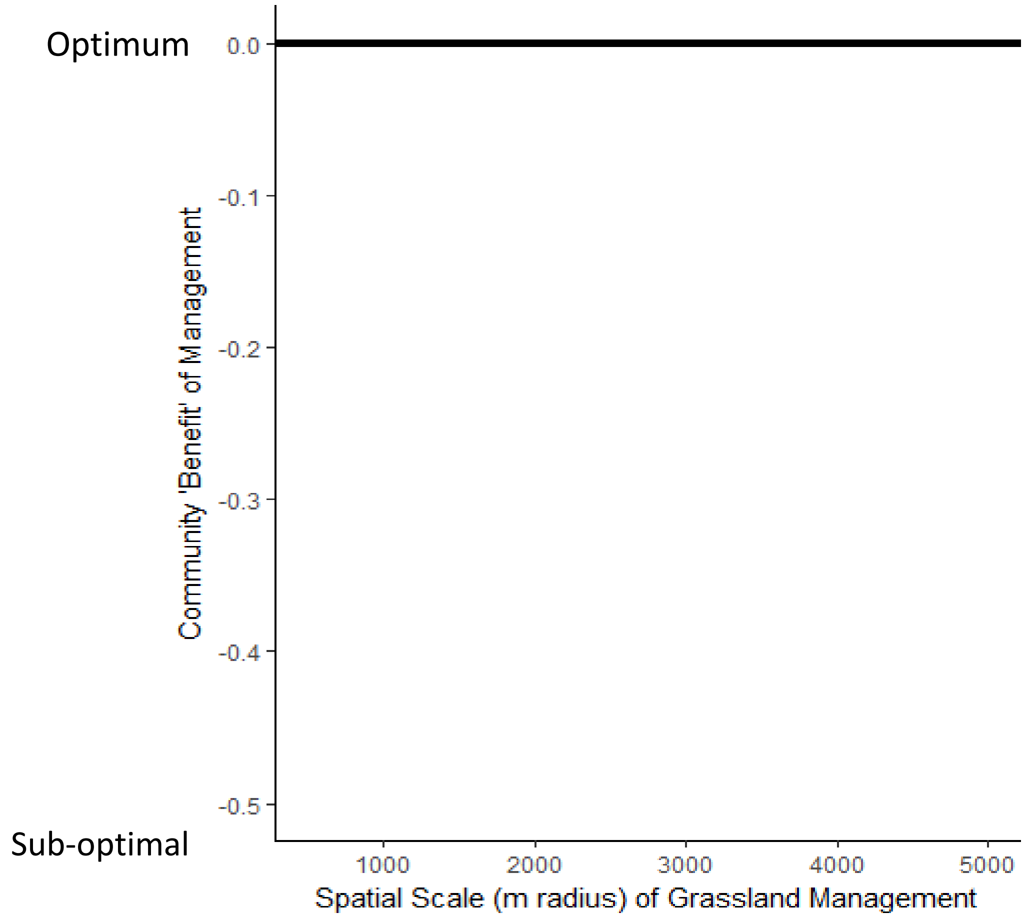


Where does our species-set respond strongest?



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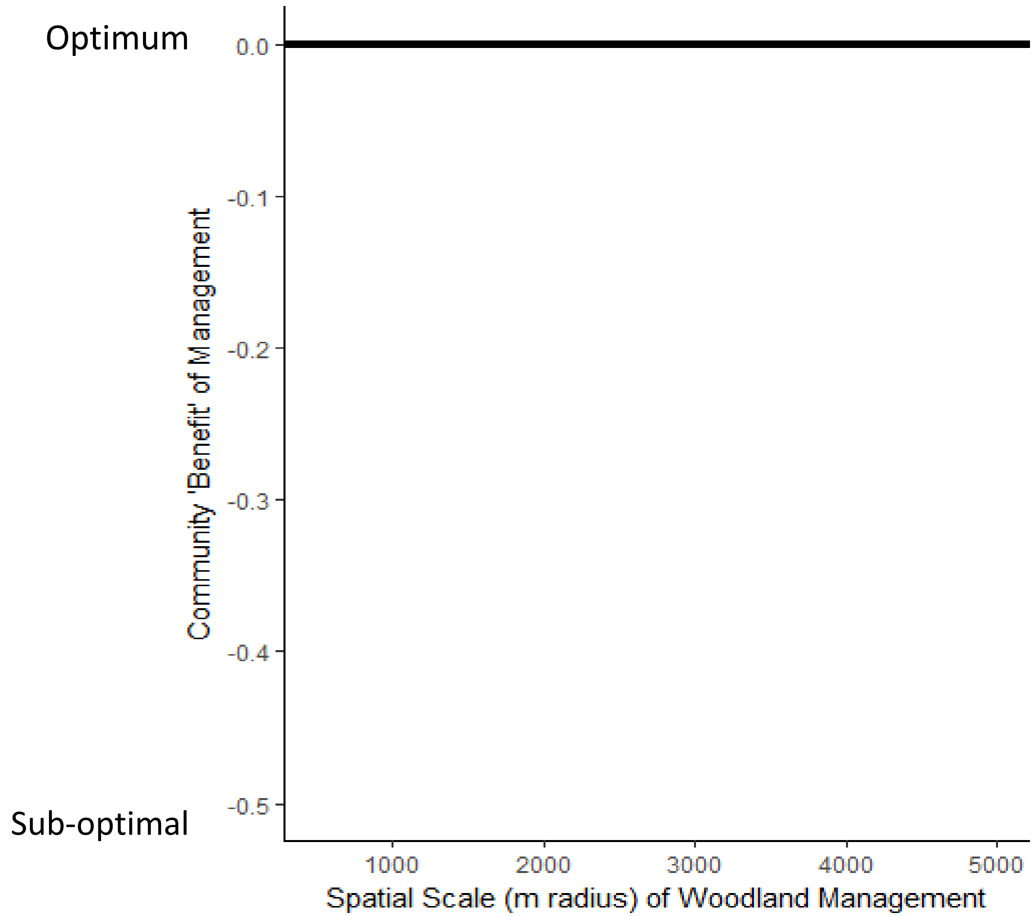

Conclusions

- Initial investment allows quantification of trade-offs
- Can be used to justify management action
- Petition for (more) resources
- Shape decisions for conservation-umbrellas, management-umbrellas
- Abandon umbrellas?

Additional doses of reality

- Weight collective abundance score by rarity
- Weight collective abundance score by habitat cost or availability
- Weight decisions by risk-aversion

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Thank you!

RAINWATER BASIN JOINT VENTURE

NEBRASKA GAME PARKS

UNIVERSITY OF Nebraska Lincoln

NEBRASKA COOPERATIVE FISH & WILDLIFE RESEARCH UNIT

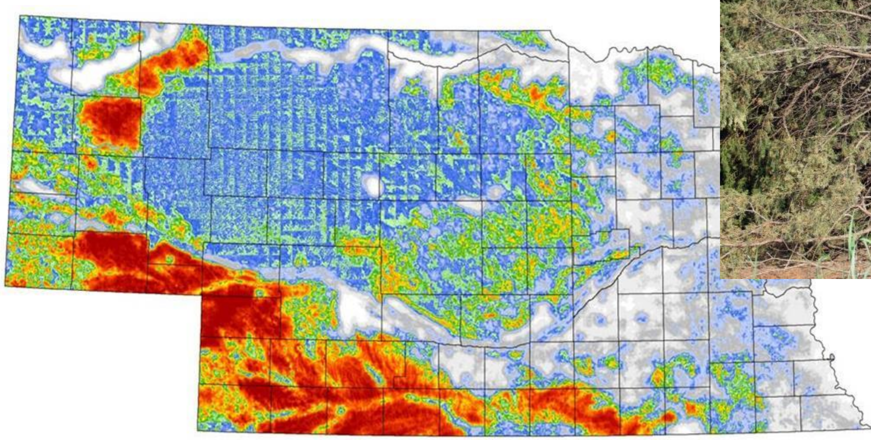
USGS science for a changing world

WILDLIFE RESTORATION

Grassland Scale	Proportion Grassland	Woodland Scale	Proportion Woodland
5000	0.20	5000	0.05
5000	0.53	3000	0.31
3000	0.53	2000	0.31
2000	0.86	1000	0.0003
500	0.53	3000	0.31
3000	0.20	3000	0.05
3000	0.09	5000	0.003
2000	0.86	5000	0.0003

Management Tools

- Strategic land acquisition
- Ecological restoration/habitat management projects



Management option: land acquisition