Context Matters: Adapting Vegetation Management Strategies to Various Forest Types

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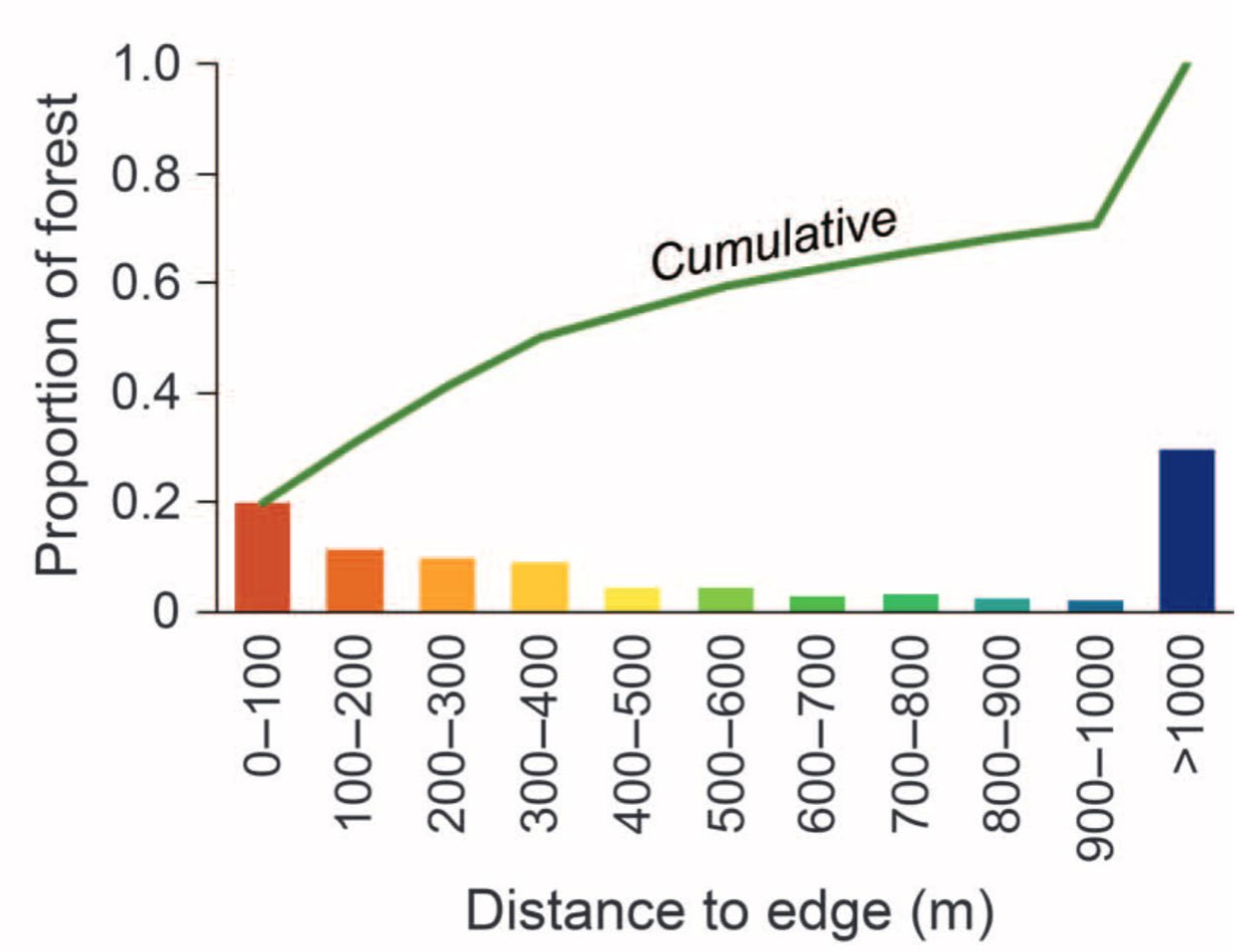
- Essential economic and ecosystem services provided by our national forests:
  - Agroforestry industry
  - Recreation
  - Carbon sequestration
  - Wildlife habitat
  - Soil Health
  - Pollination services

- There is currently *poor* regeneration – accruing *regeneration debt* – in many of these forests

- Sustainable management requires native plants to grow and regenerate in place
- Observation: Forest sites prioritized for regeneration differ in their surroundings
  - Urban <-> Rural

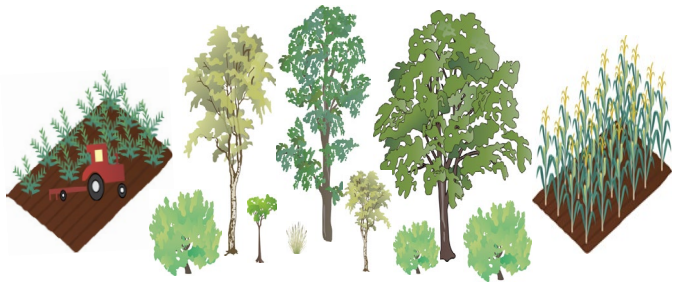
- Approx. 70% of the world's forest occur within 700 m (< ½ mile) from an edge



Haddad et al. 2017

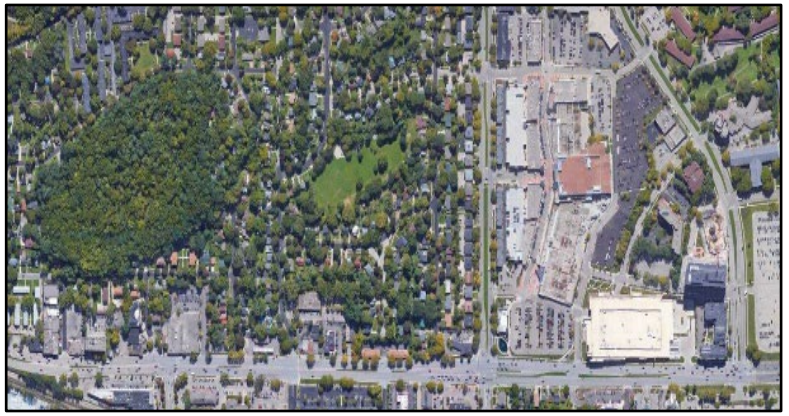
Rural Forests

Agricultural Woodlots



Urban Forest Remnants

Satellite images



1. Forests exist in <u>different contexts</u>

2. Forest context may influence *management priorities*

Does forest context modify the effectiveness of our management strategies targeting native plant regeneration?

Competition with Invasive Shrubs

Herbivory by White-tailed Deer

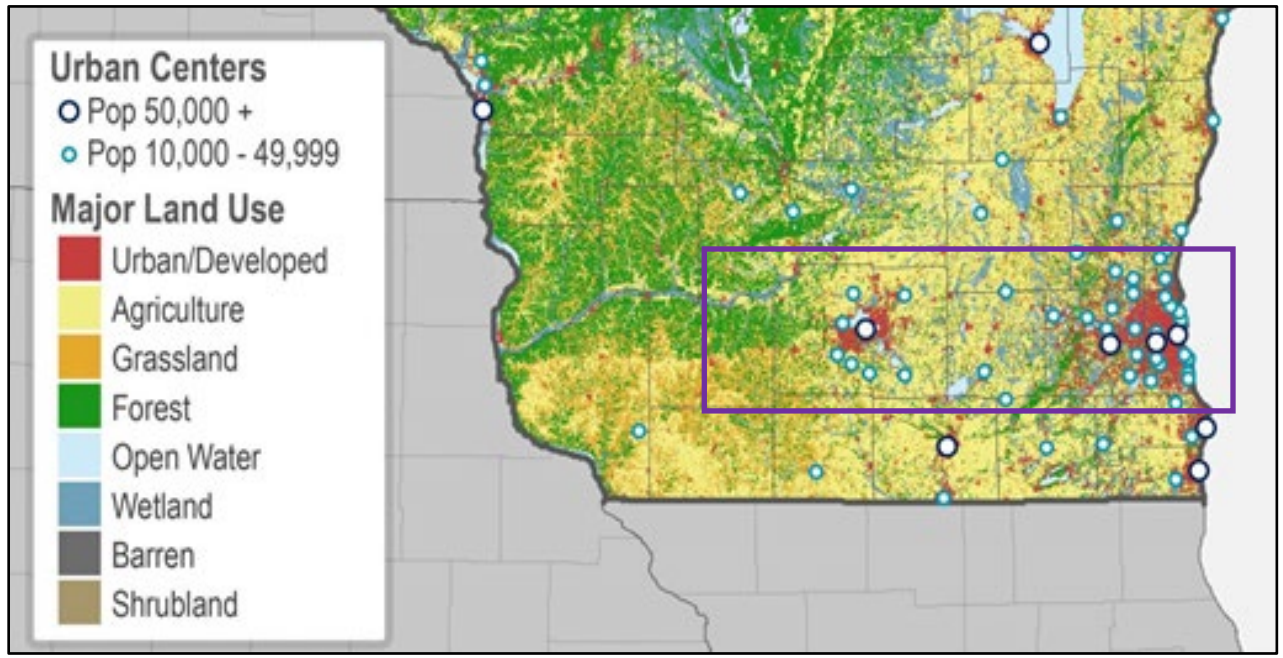
Blossey et al. 2019

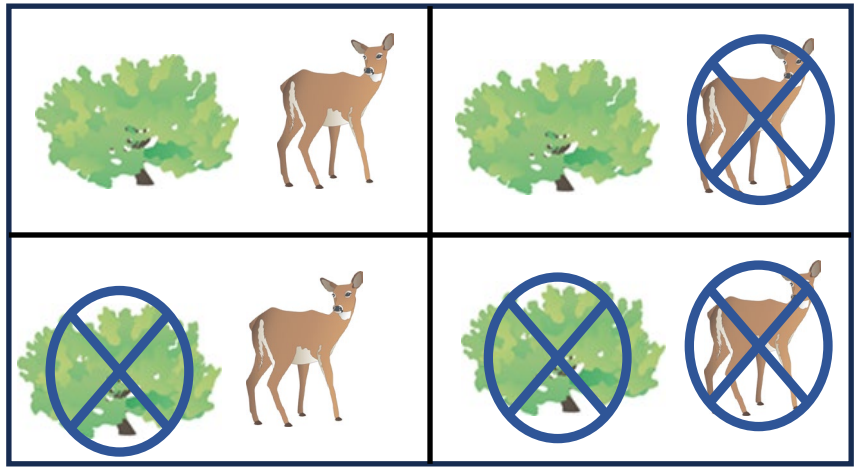
Our Field Experiment

- 16 sites across urban, agriculture-adjacent, and rural forests in southeastern Wisconsin

- Treatments that mimic management:
  - Invasive Shrub Removal
  - Deer Exclusion

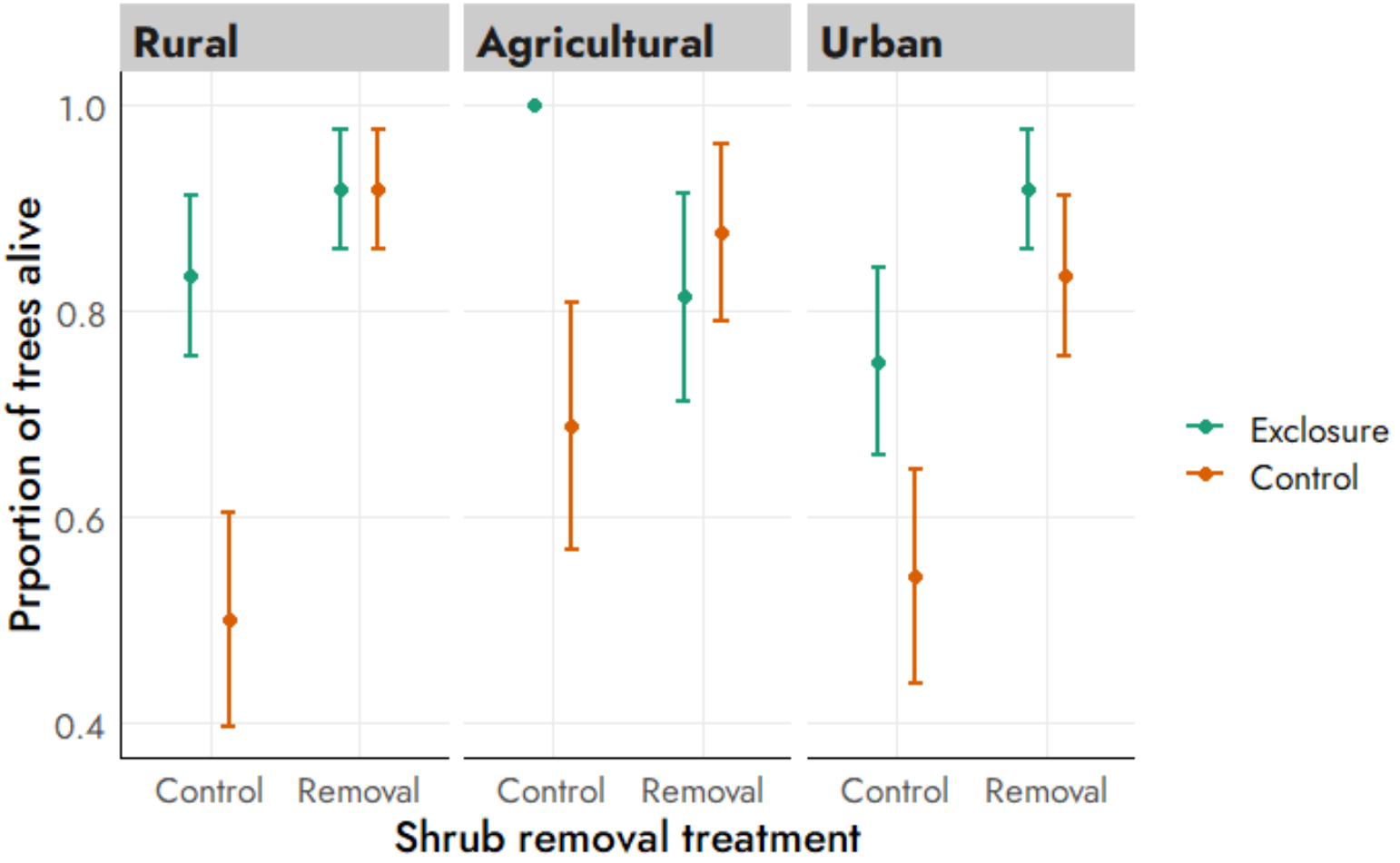
- Monitored:
  - Survival of, and herbivory on, transplanted Red Oak
  - Native understory richness





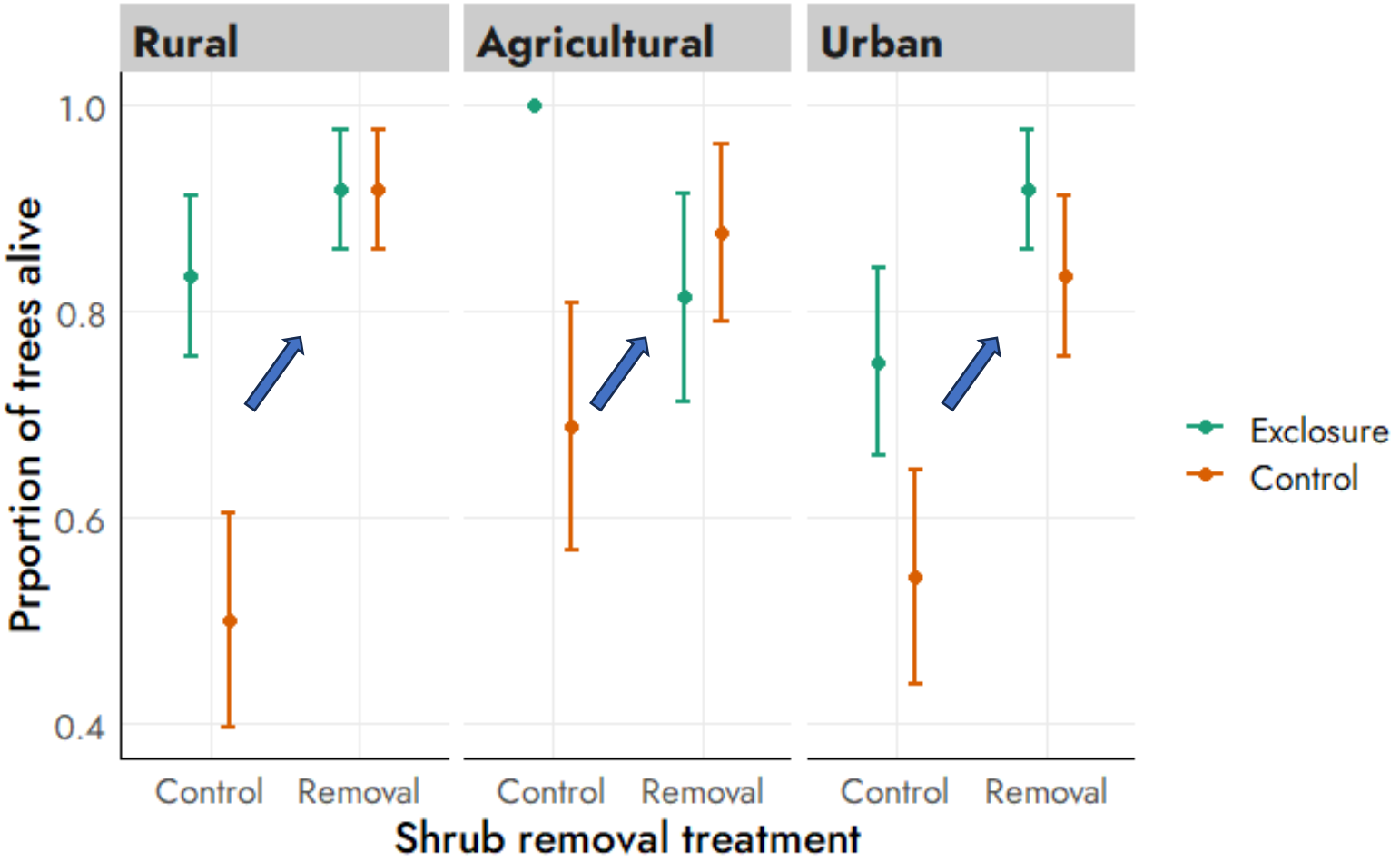
Blossey et al. 2019

Oak Seedling Survival



Oak Seedling Survival

- Invasive shrub removal improves oak seedling survival regardless of deer treatment



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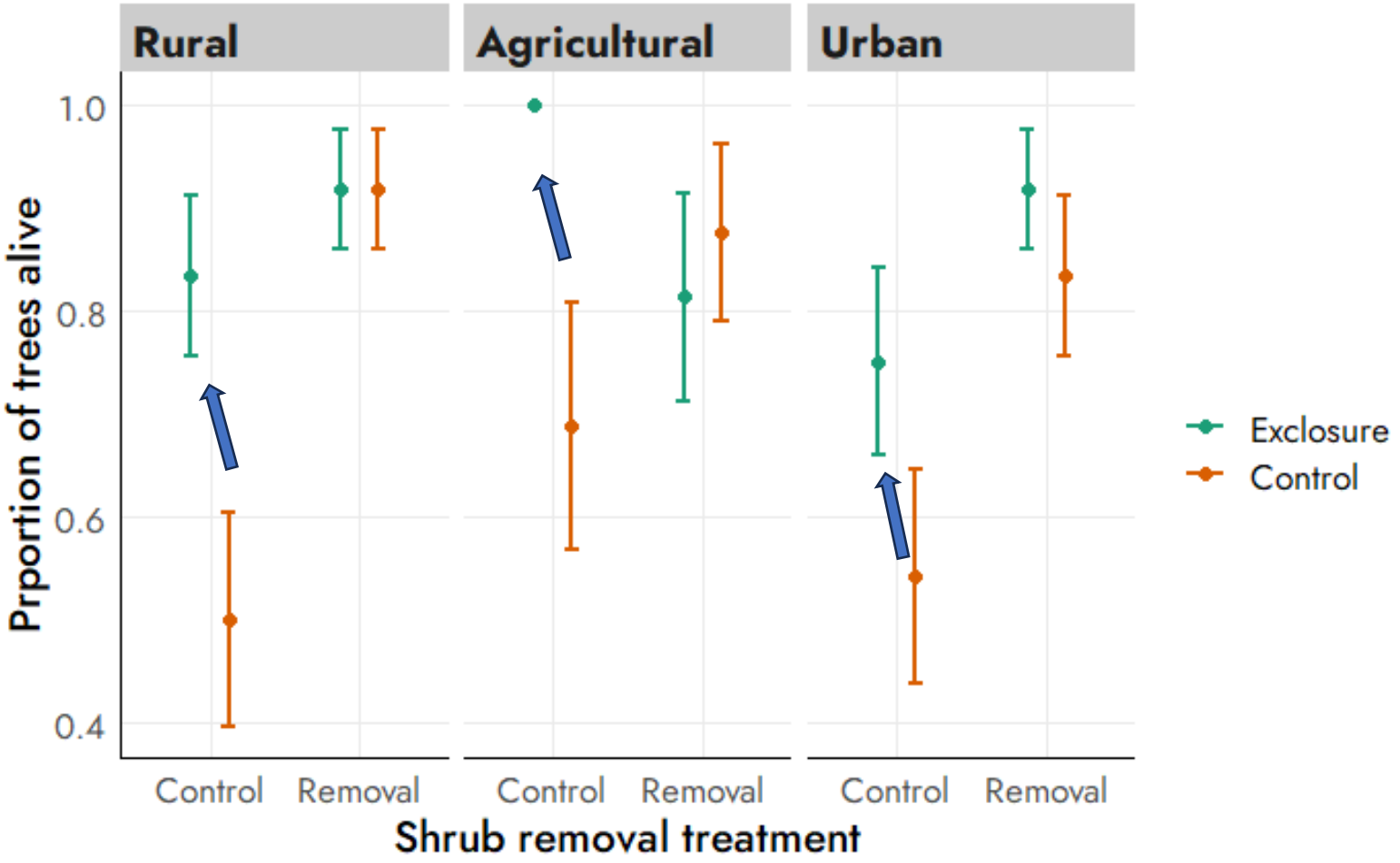
- Invasive shrub removal improves oak seedling survival regardless of deer exclosure

- Deer exclusion improves seedling survival but only strongly in plots with invasive shrubs present



Oak Seedling Survival

- Invasive shrub removal improves oak seedling survival regardless of deer exclosure
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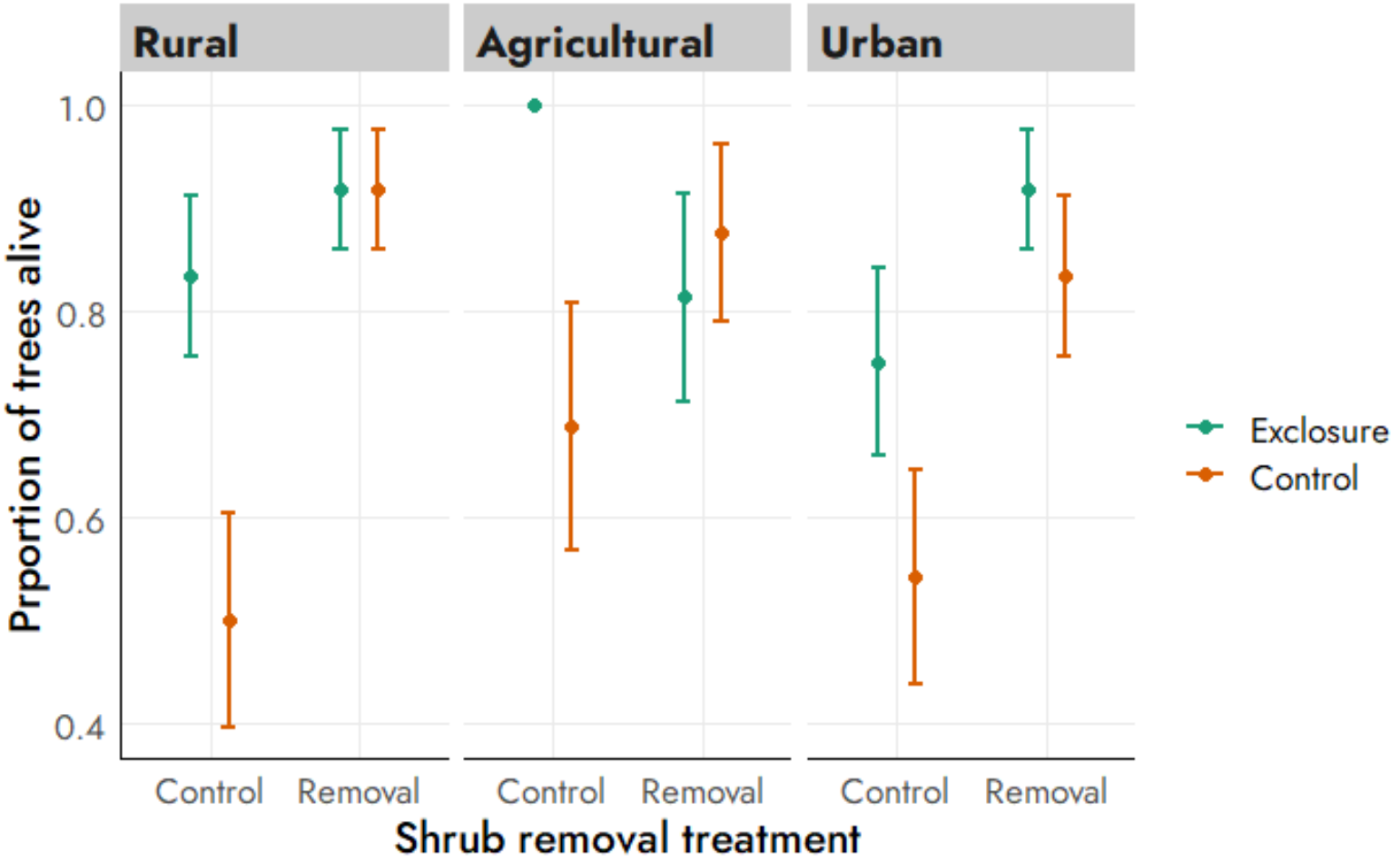
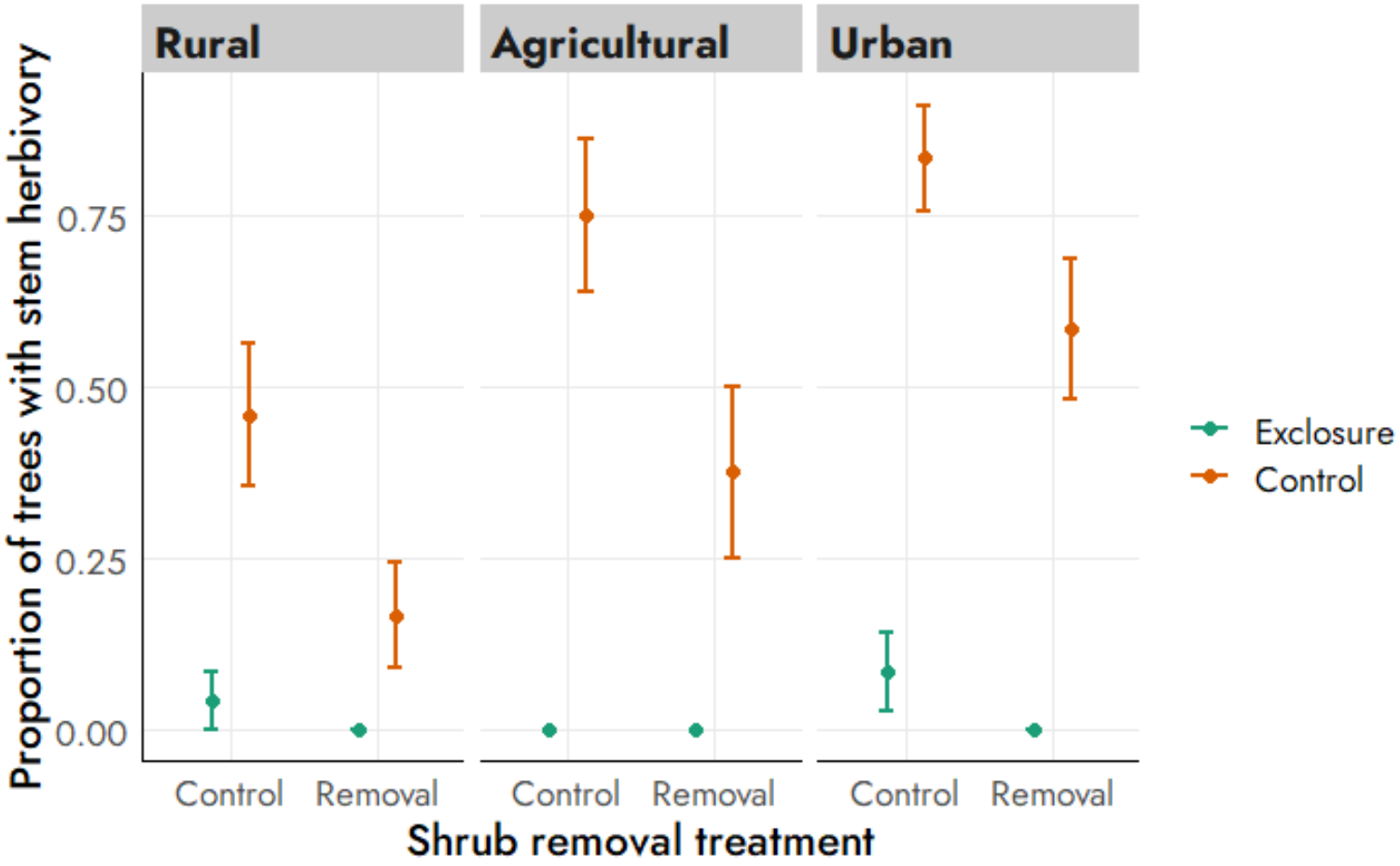
- Prioritize excluding deer in agriculture-adjacent forests, but focus on invasive shrub removal in rural and urban forests



Herbivory on Oak Seedlings



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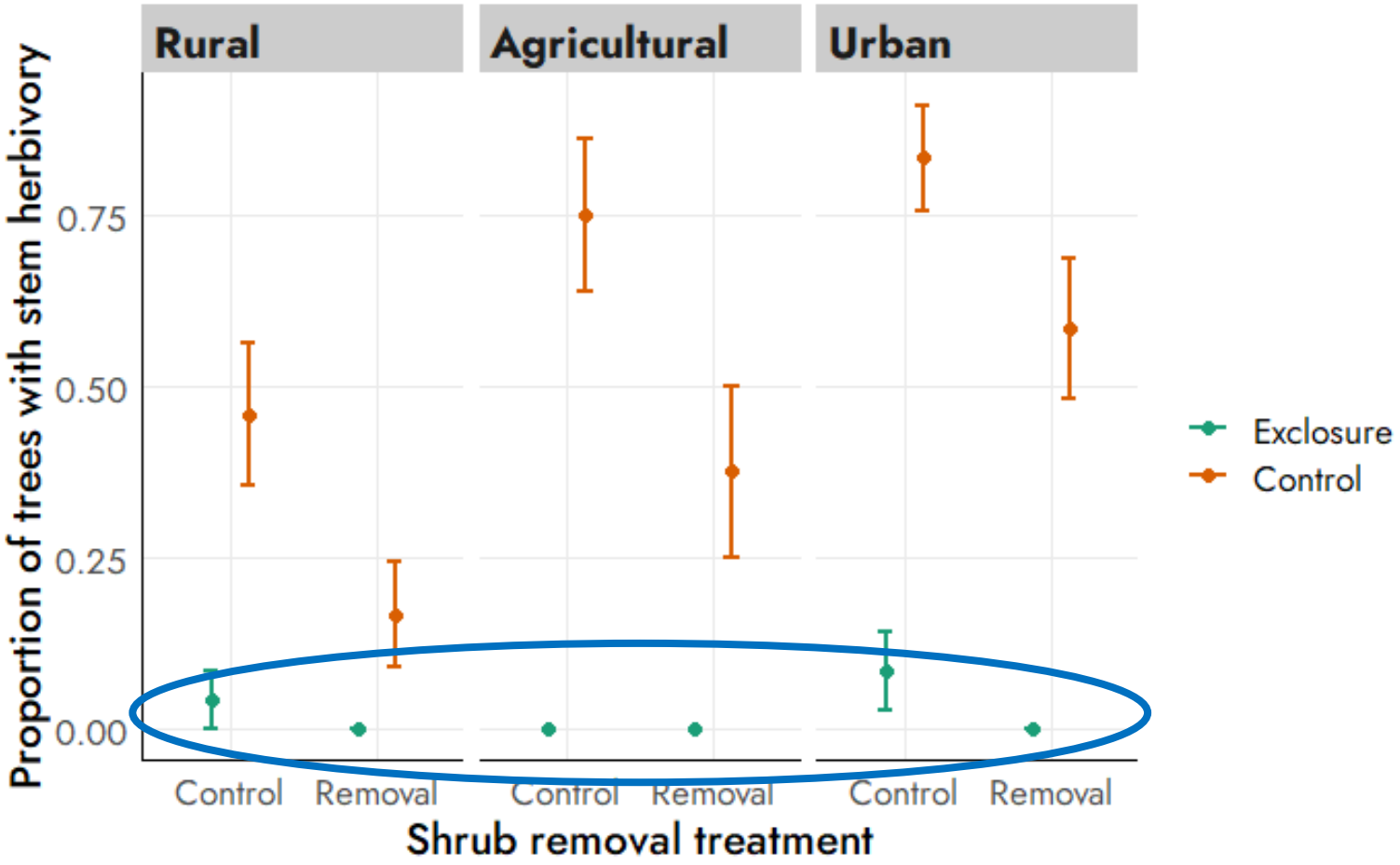
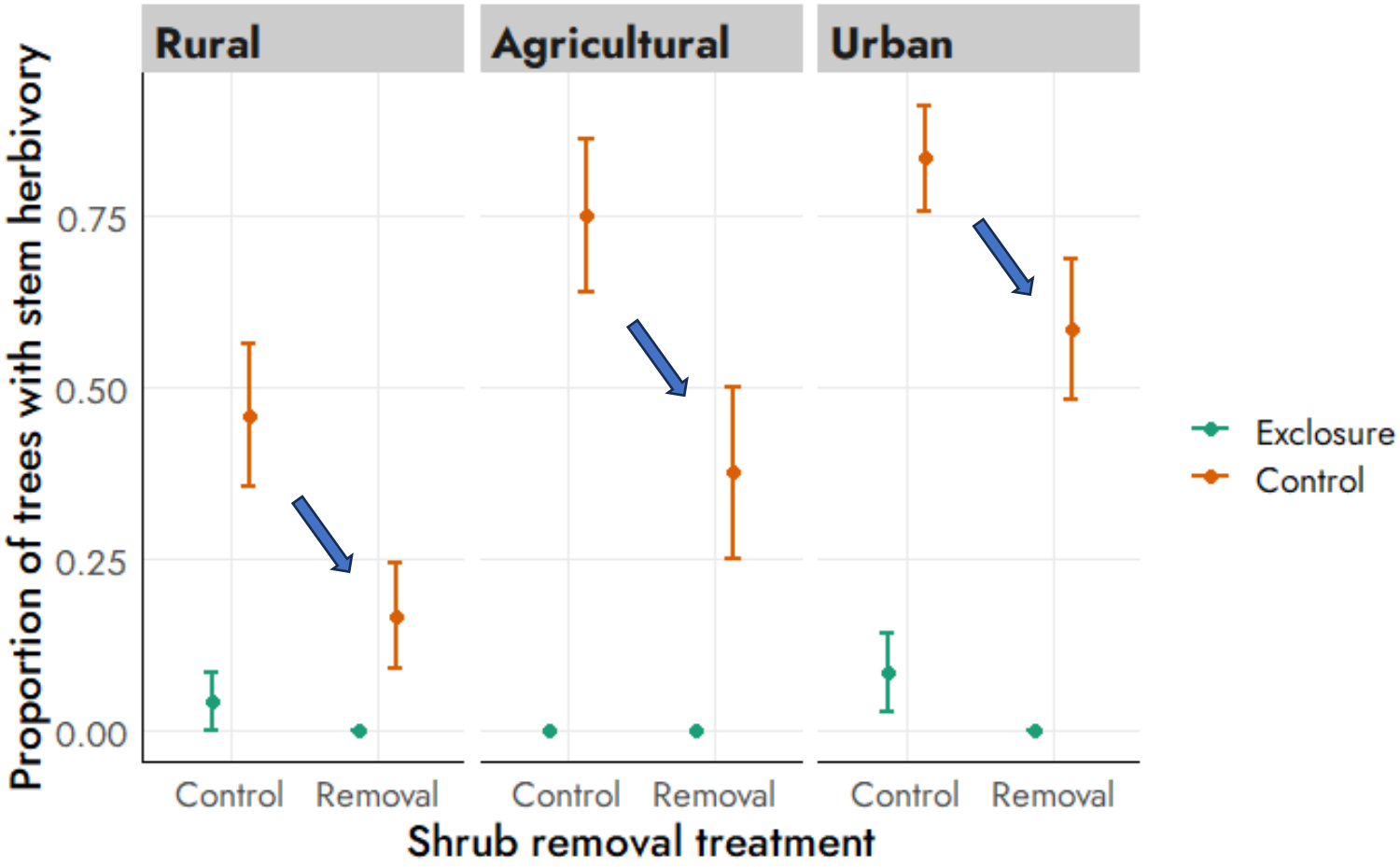


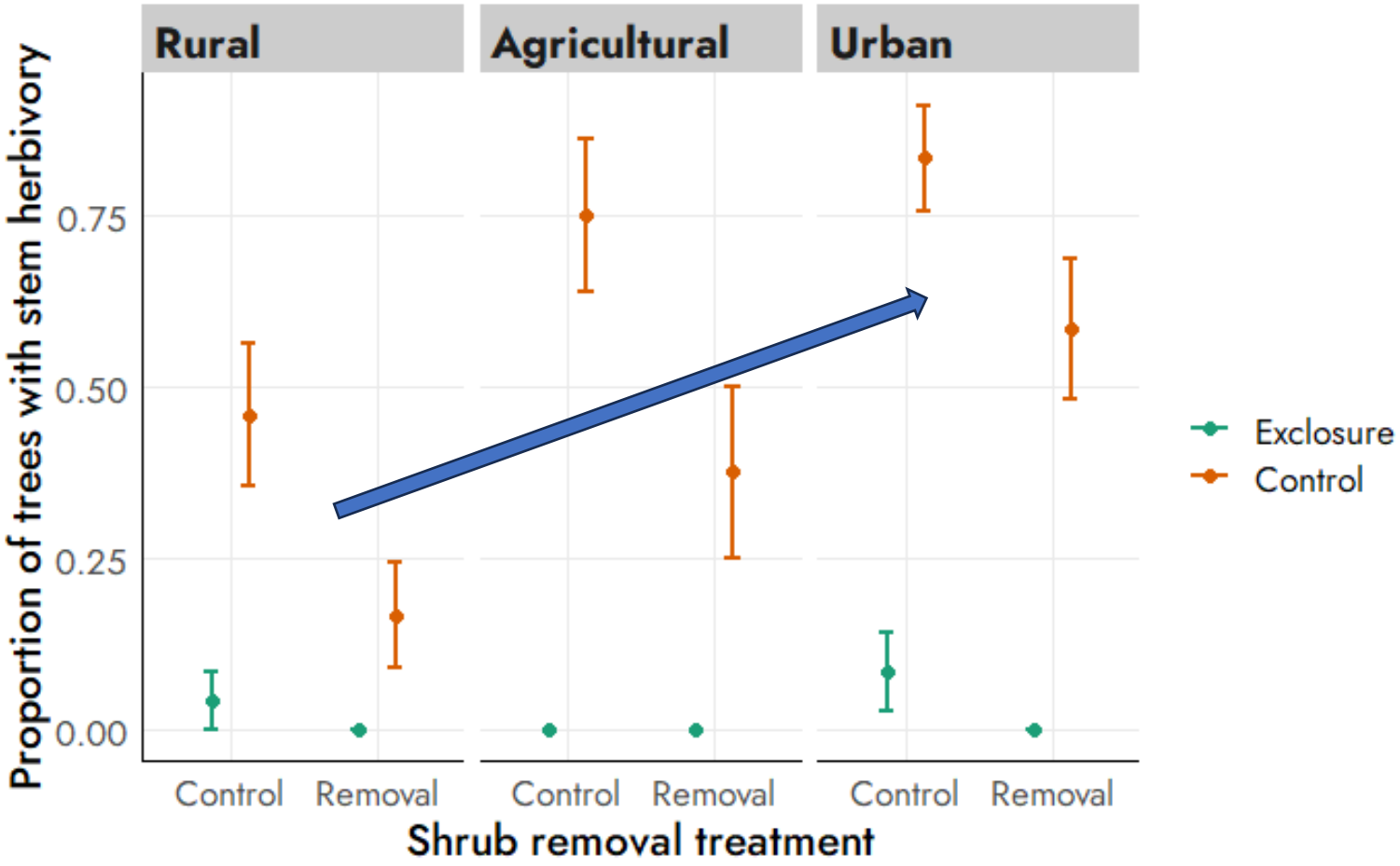
Herbivory on Oak Seedlings

- Less herbivory in plots where invasive shrubs removed



Herbivory on Oak Seedlings

- Less herbivory in plots where invasive shrubs removed
- More deer herbivory observed in Agricultural and Urban woodlots than Rural forests



Herbivory on Oak Seedlings

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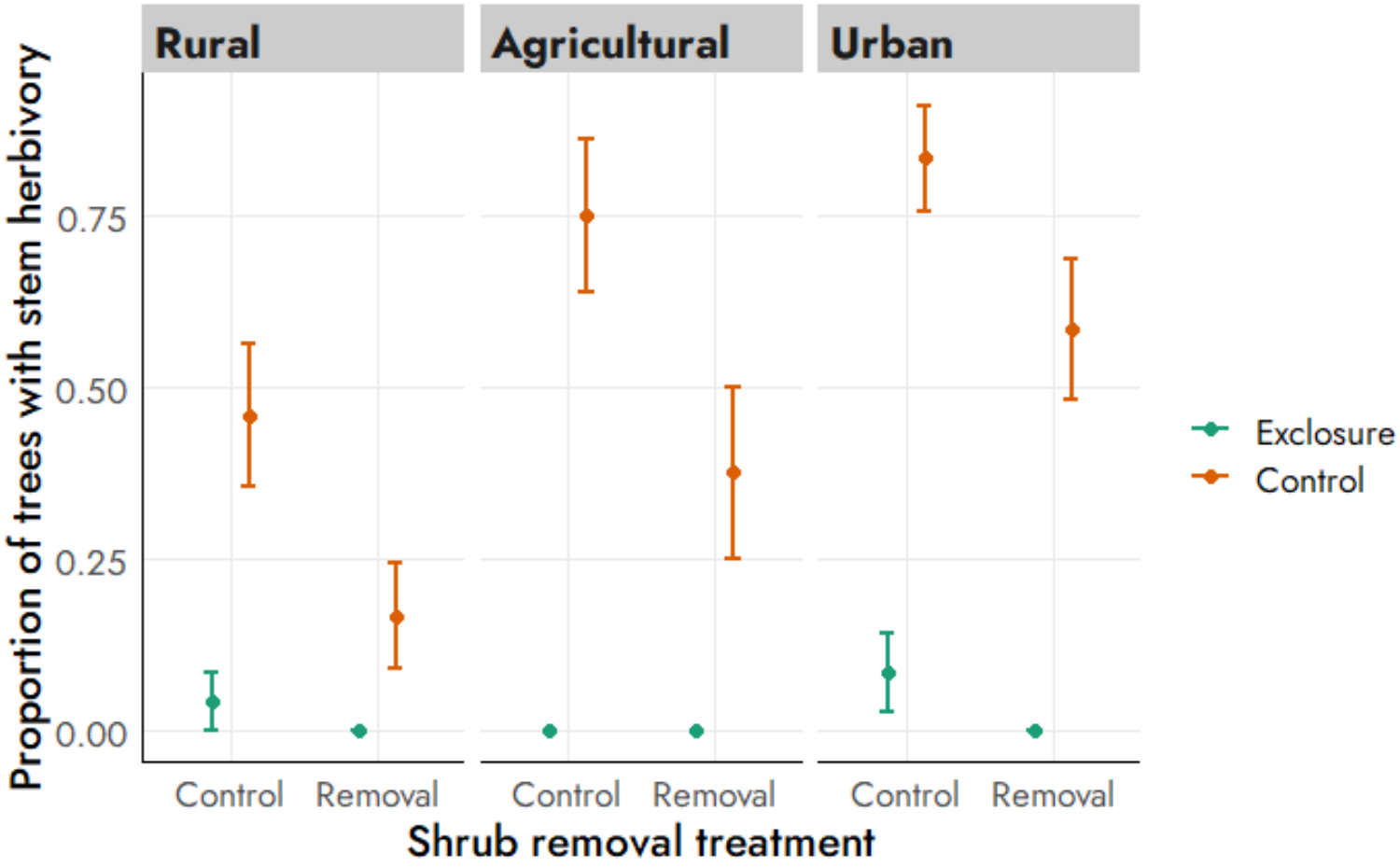
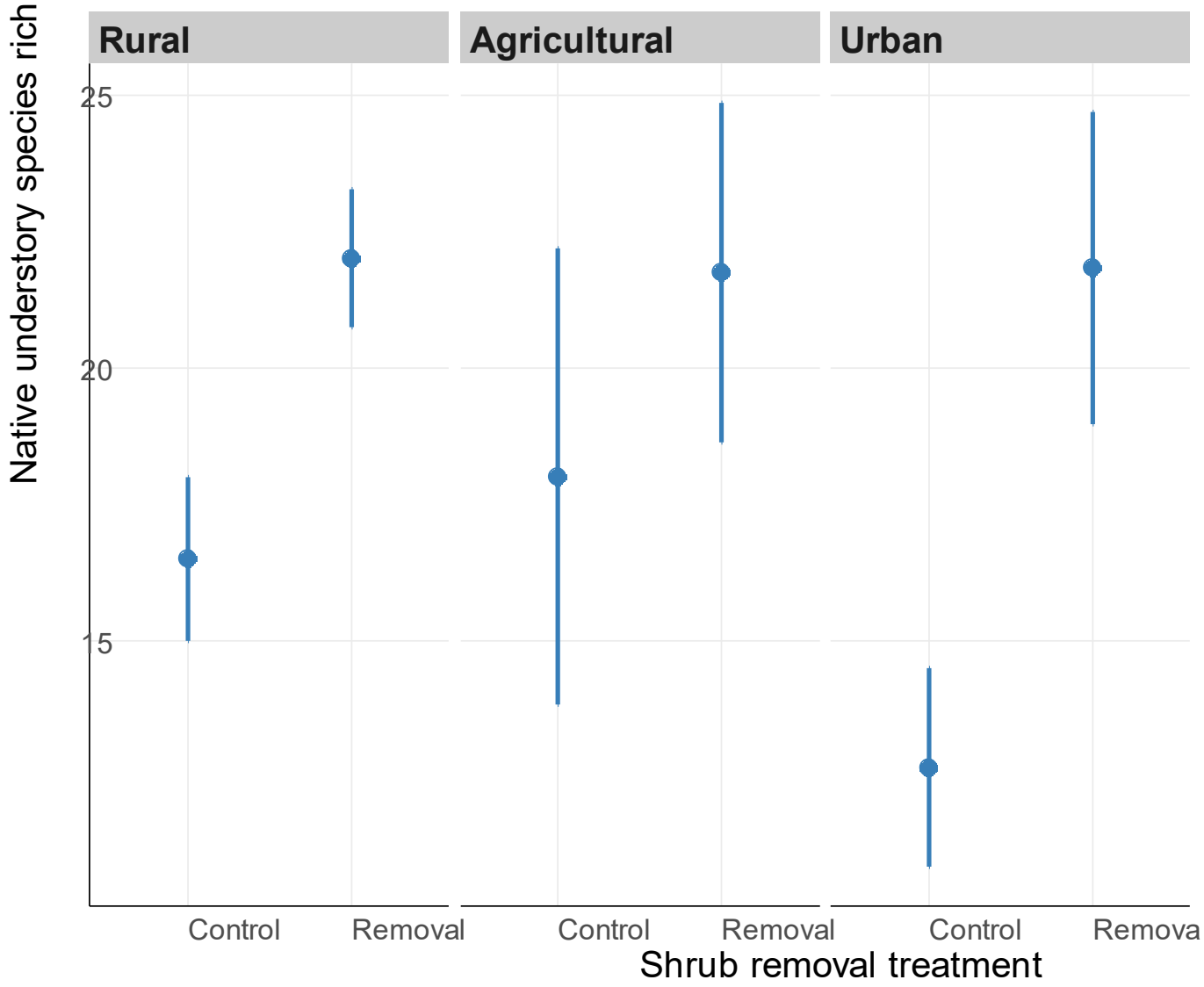
- More deer herbivory observed in Agricultural and Urban woodlots than Rural forests

- Prioritizing pairing deer exclusion with invasive shrub removal in urban and agriculture-adjacent forests

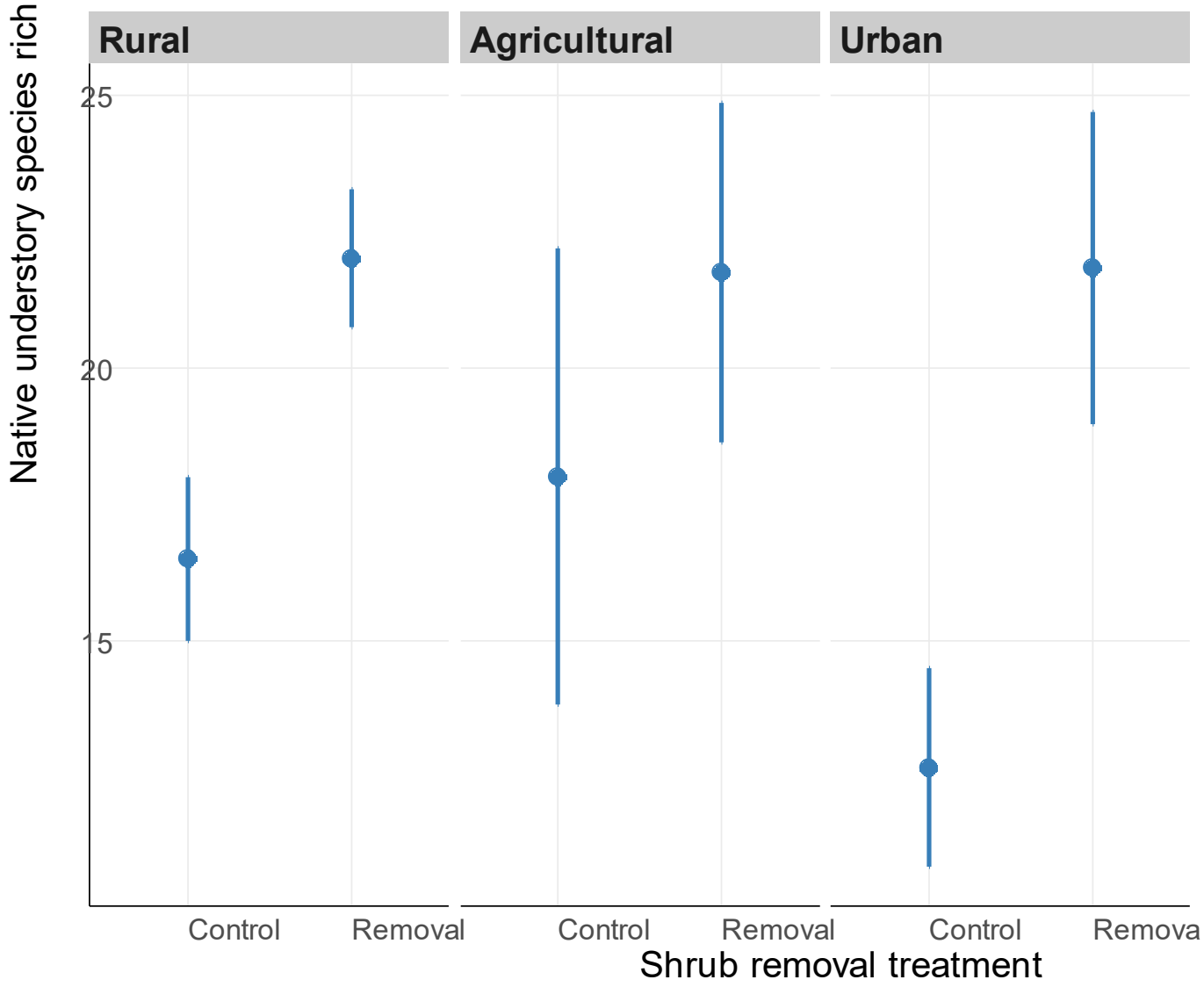


Native Understory Diversity



Native Understory Diversity

- Consistent, positive effects of removing invasive shrubs on species richness



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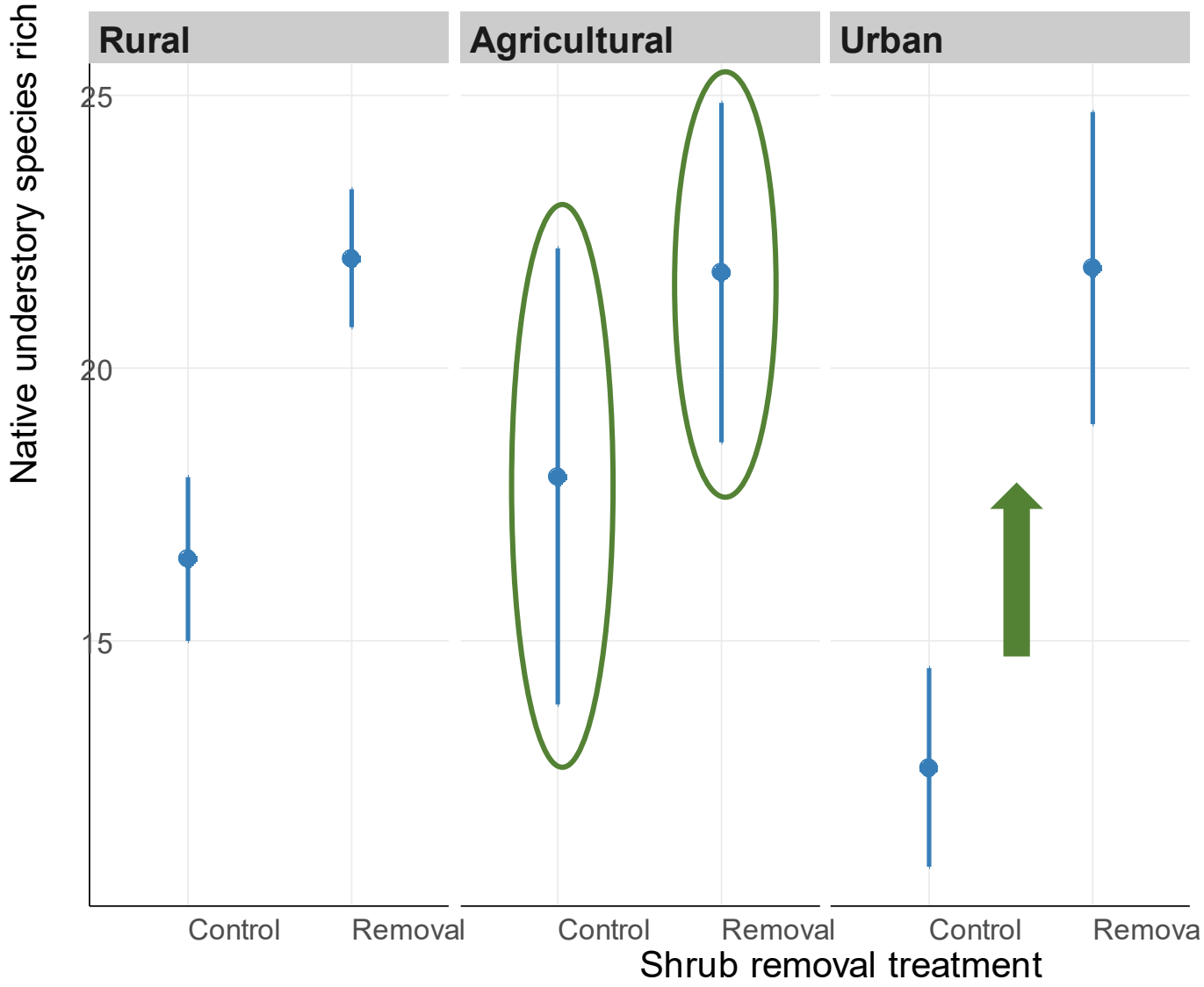
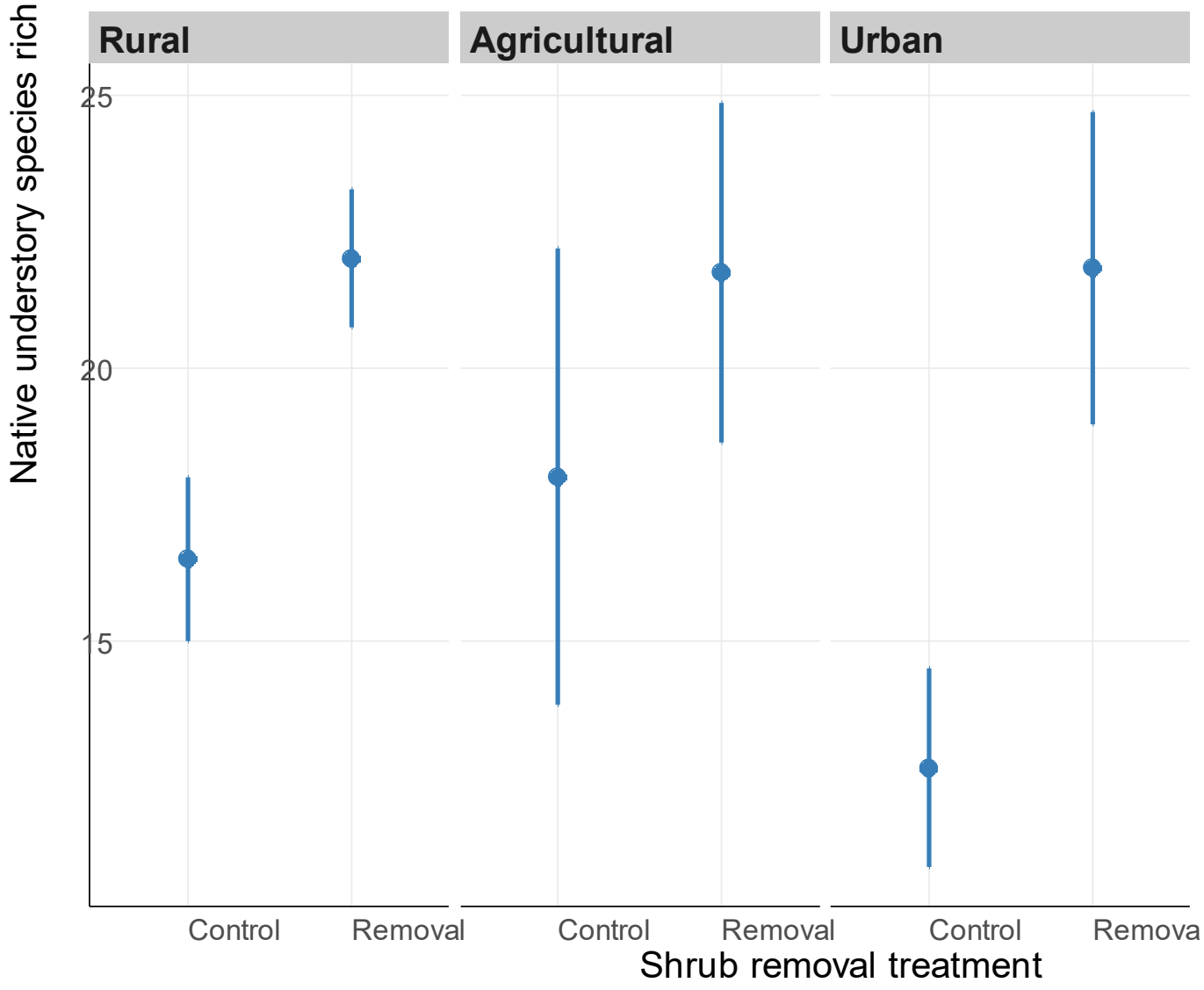
- Effect of shrub removal largest in urban forests, but significant variation in Agricultural forests



Native Understory Diversity

- Consistent, positive effects of removing invasive shrubs on species richness
- Effect of shrub removal largest in urban forests, but significant variation in Agricultural forests

- Shrub removal has the strong effects in urban forests, moderate in rural, and weakest in Ag-adjacent



Final Thoughts

- Ecosystem services are provided by forests, regardless of context, and efficient management will support these services
- Management is expensive, consider a forest's status and context when prioritizing land management approaches
- Positive note: All approaches benefited native plant regeneration – engaging with this process at any level will further native plant regeneration

Questions?

Funding Acknowledgments

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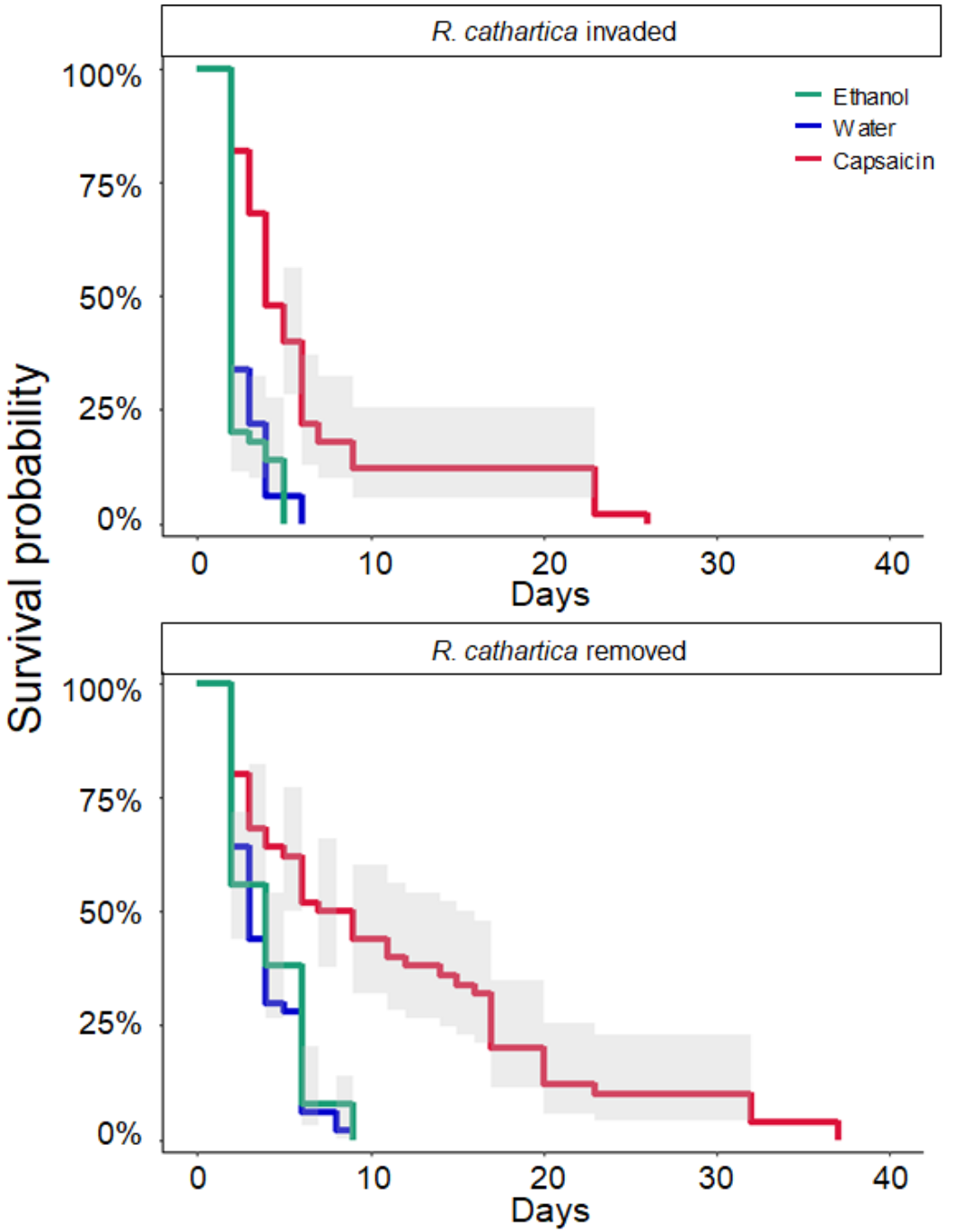
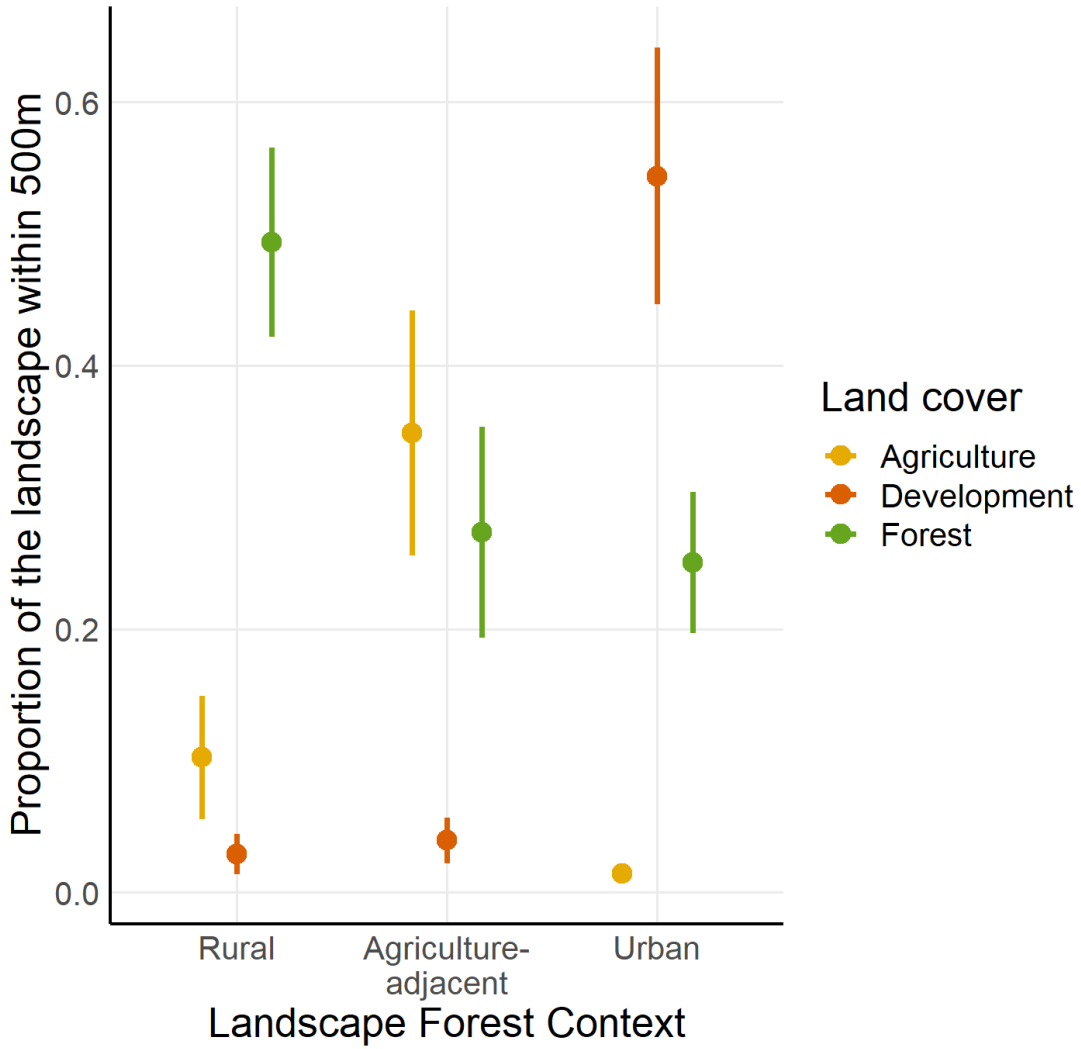
Image Credits

Hot Oak Seeds?




Proportion of the landscape within 500m
0.6
0.4
0.2
0.0
Rural
Agriculture-adjacent
Urban
Landscape Forest Context
Land cover
Agriculture
Development
Forest