

The Effects of Microhabitat Characteristics on *Echinacea angustifolia* Seedling Survival

The Echinacea Project

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Background: the Echinacea Project

- Prairie ecology research lab with field sites in rural western MN
- Interested in conservation and evolutionary ecology in fragmented prairie habitats
- Investigate these questions using the model species *Echinacea angustifolia*
- Why Echinacea? Long-lived, self-incompatible perennial plant



Team Echinacea summer 2020

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Seedling establishment research

- Tracks seedlings that originated between 2007-2013 in prairie remnants
- Investigates the factors contributing to seedling establishment and fitness
- Started with 955 seedlings; 69 surviving today



My project: seedling establishment and microhabitat



Do microhabitat characteristics differ between living and dead juvenile *Echinacea*?

- Fieldwork took place at 14 different prairie remnant sites ranging from small roadside remnants to a Nature Conservancy preserve
- Data collected: litter depth, vegetation cover, slope, aspect, distance to roads and fields, community composition, and floral neighborhood¹



1. Richardson, L. K., M. K. Gallagher, T. E. Hayes, et al. Competition for pollination and isolation from mates differentially impact four stages of pollination in a model grassland perennial. *Journal of Ecology* 2020:1–14. <https://doi.org/10.1111/1365-2745.13562>

Descriptive statistics

- Most abundant flowering species was *Andropogon gerardii* with an average of 41 inflorescences per circle, while the rarest were *Dalea candida* and *Pediomelum argophyllum* which each had 1 flower at 1 circle
- Floral diversity per circle ranged from 2 to 18 flowering species



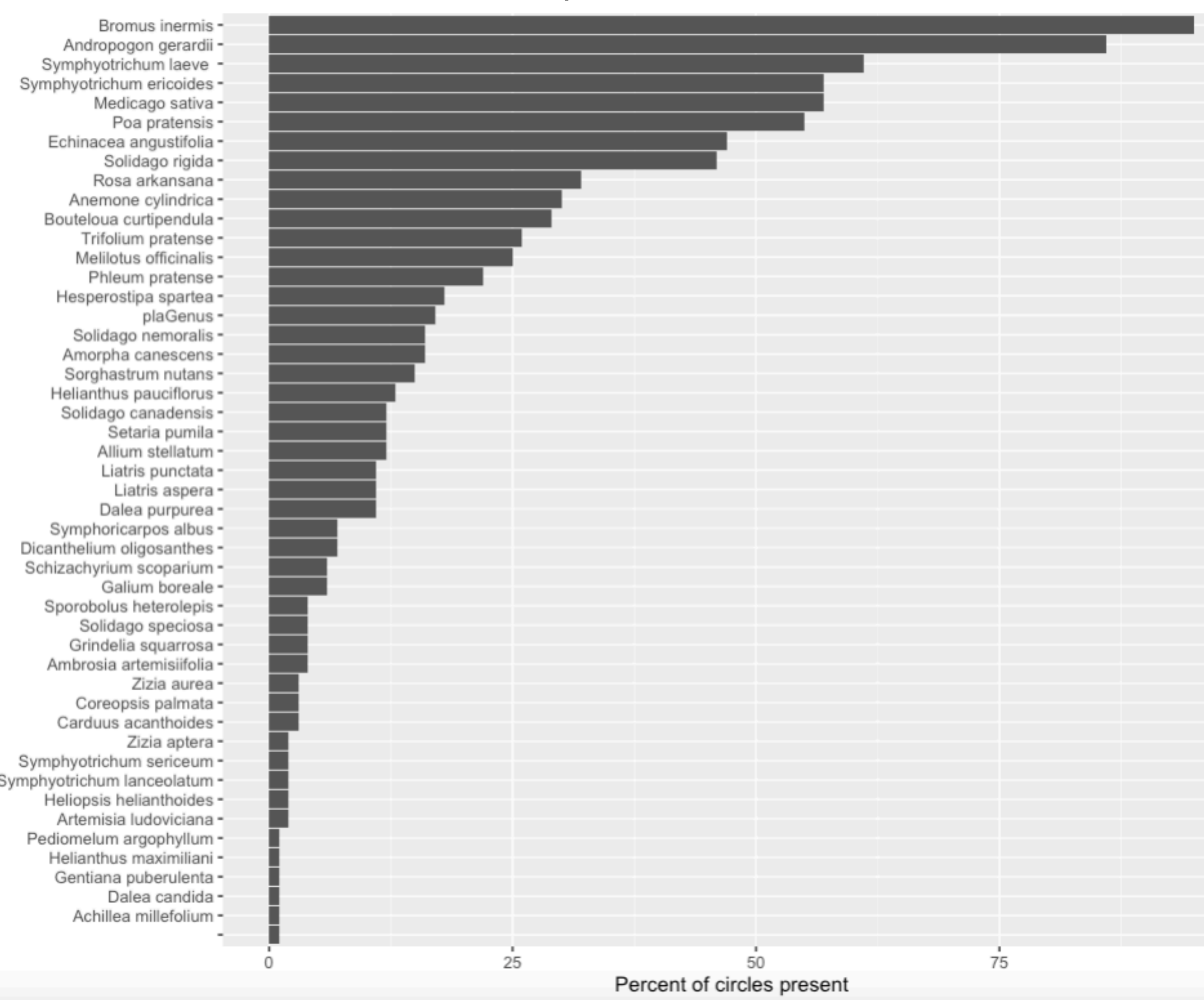
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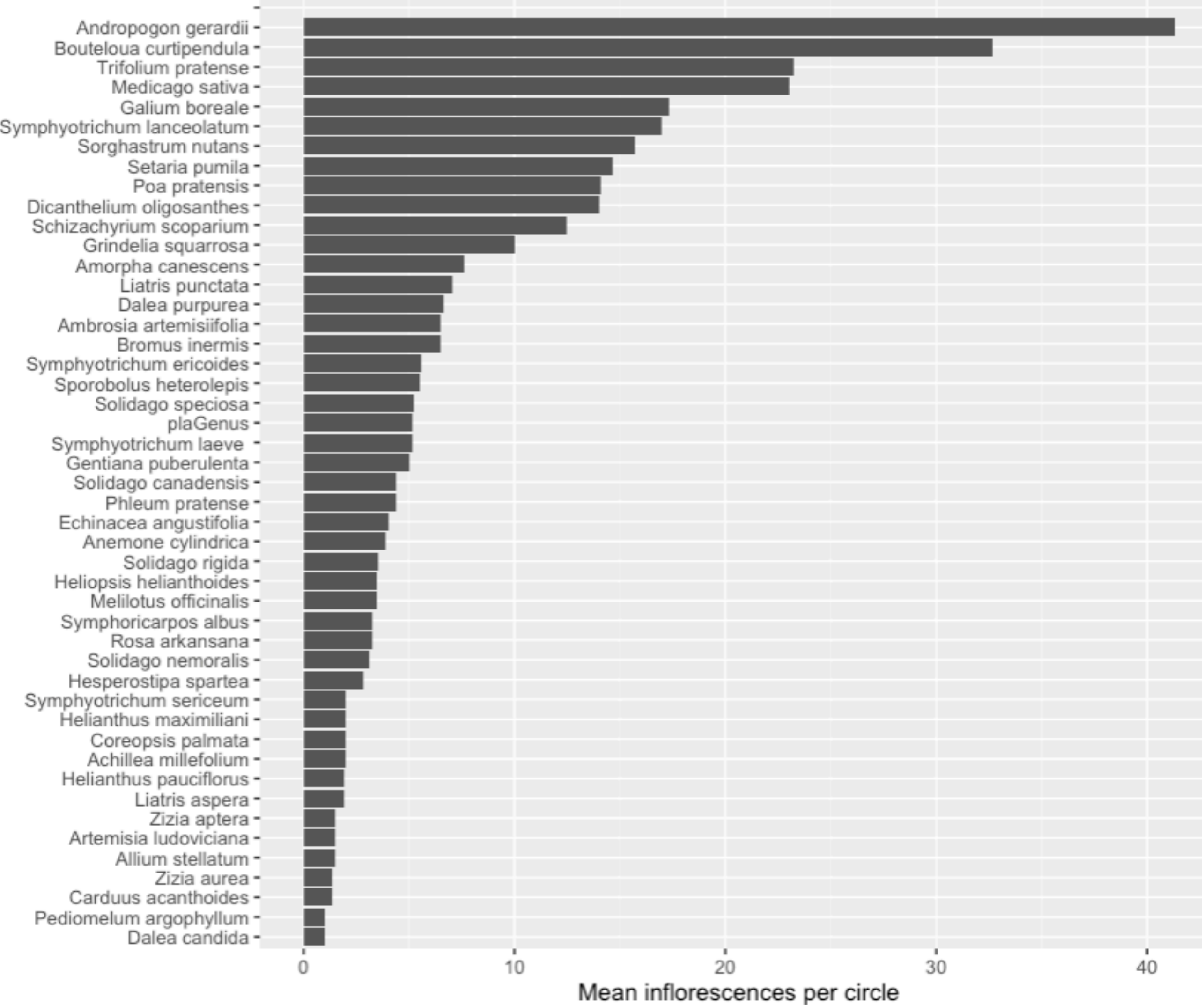


Floral neighborhood

Species abundance



Inflorescence abundance





Solidago speciosa



Gentiana puberulenta



Symphyotrichum laeve



Symphyotrichum ericoides



Symphyotrichum sericeum

Results: Microhabitats of surviving vs. dead juvenile *Echinacea*

No significant difference:

- Species richness ($p=0.09$)
- Inflorescence count ($p=0.21$)
- Distance to roads ($p=0.24$)
- Distance to fields ($p=0.80$)
- Litter depth ($p=0.38$)

Statistically significant difference:

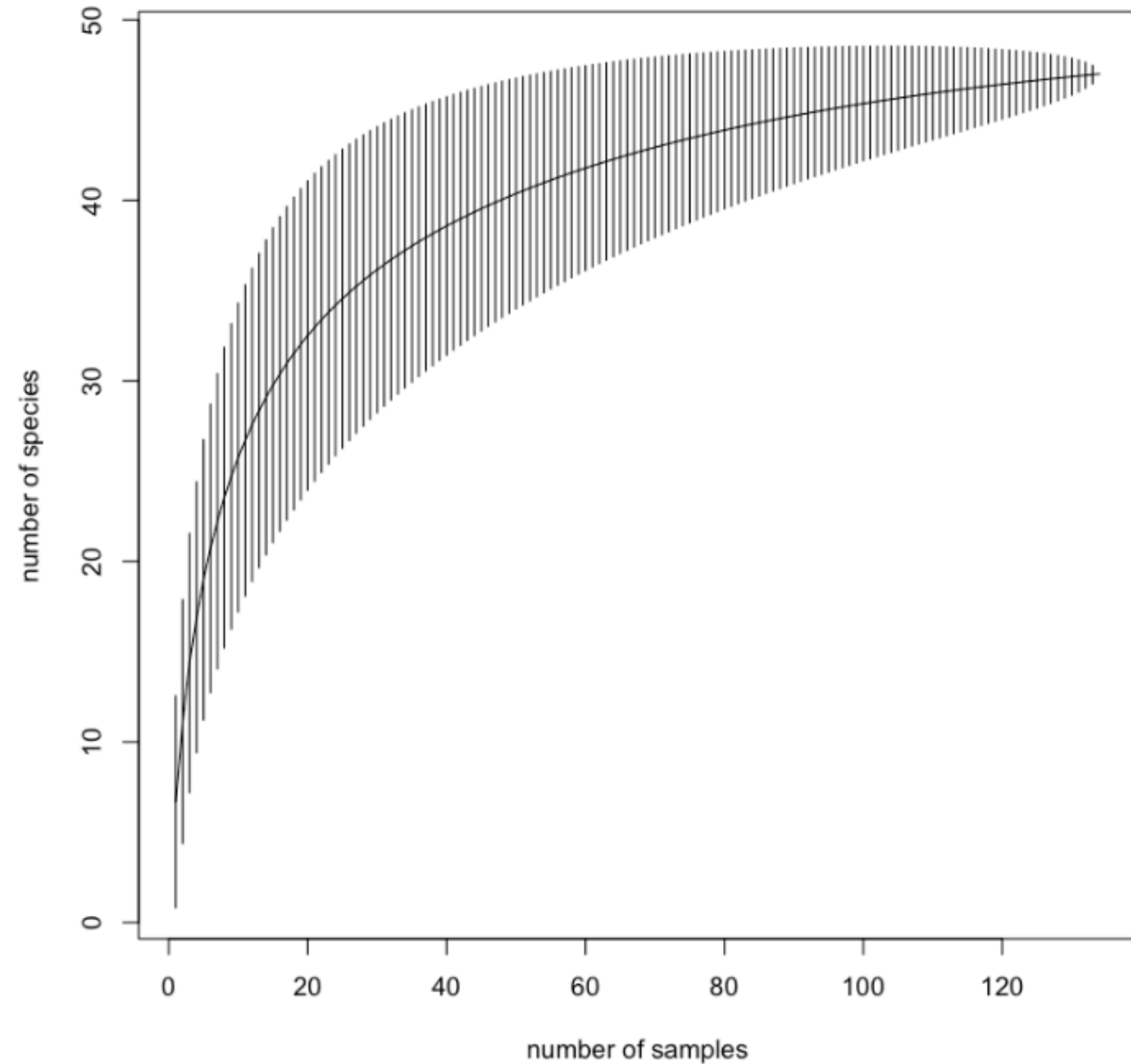
- Vegetation cover ($p=0.02$)

Living group mean: 8.55 cm
Dead group mean: 11.41 cm

- Slope ($p=0.04$)

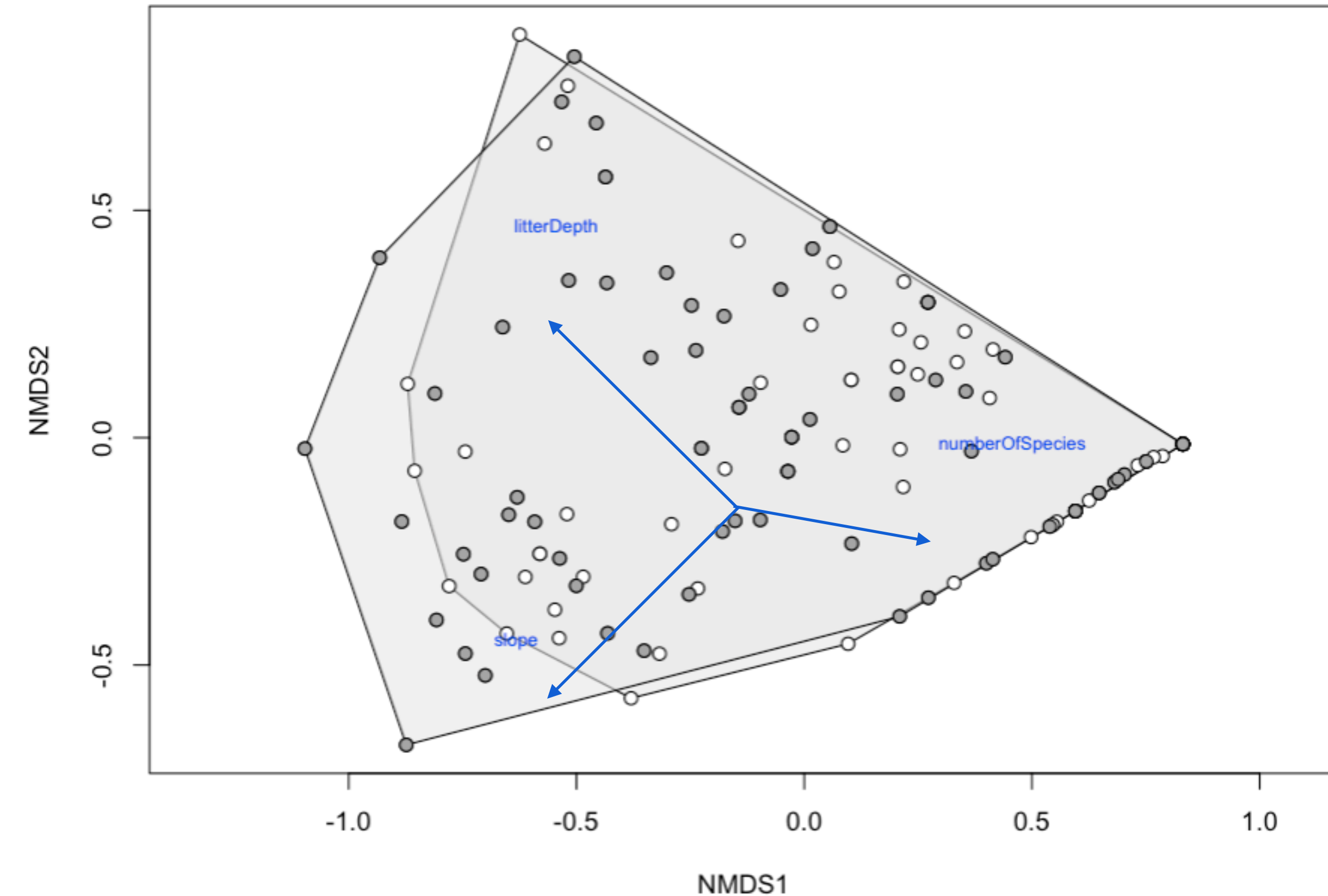
Living group mean: 8.38°
Dead group mean: 7.15°

Diversity data

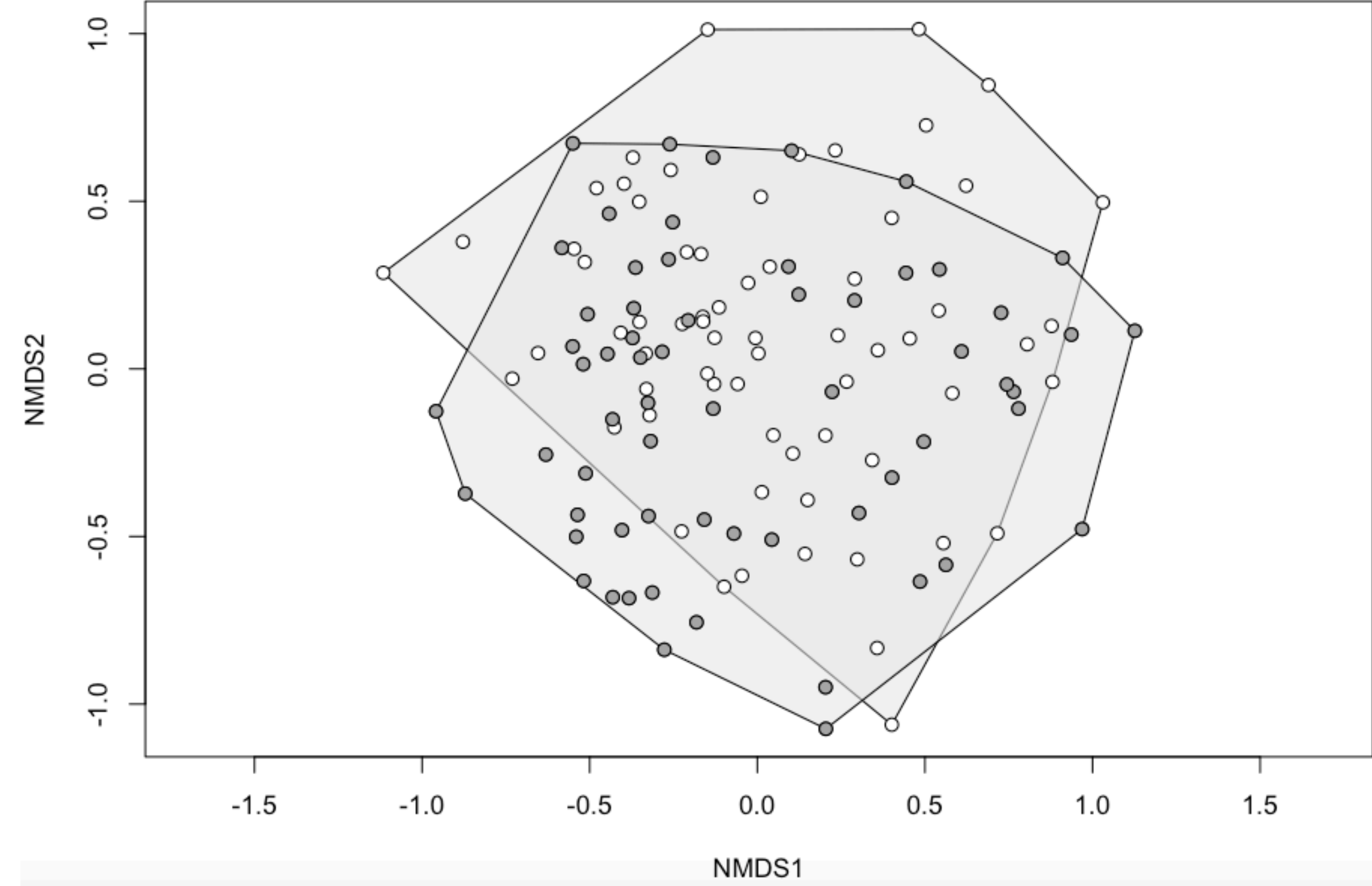


| Diversity index | Surviving circles mean | Dead circles mean |
|-----------------|------------------------|-------------------|
| Shannon's | 1.18 | 1.37 |
| Simpson's | 0.56 | 0.64 |

High similarity between living and dead groups



Ordination with litter depth, slope, and species richness

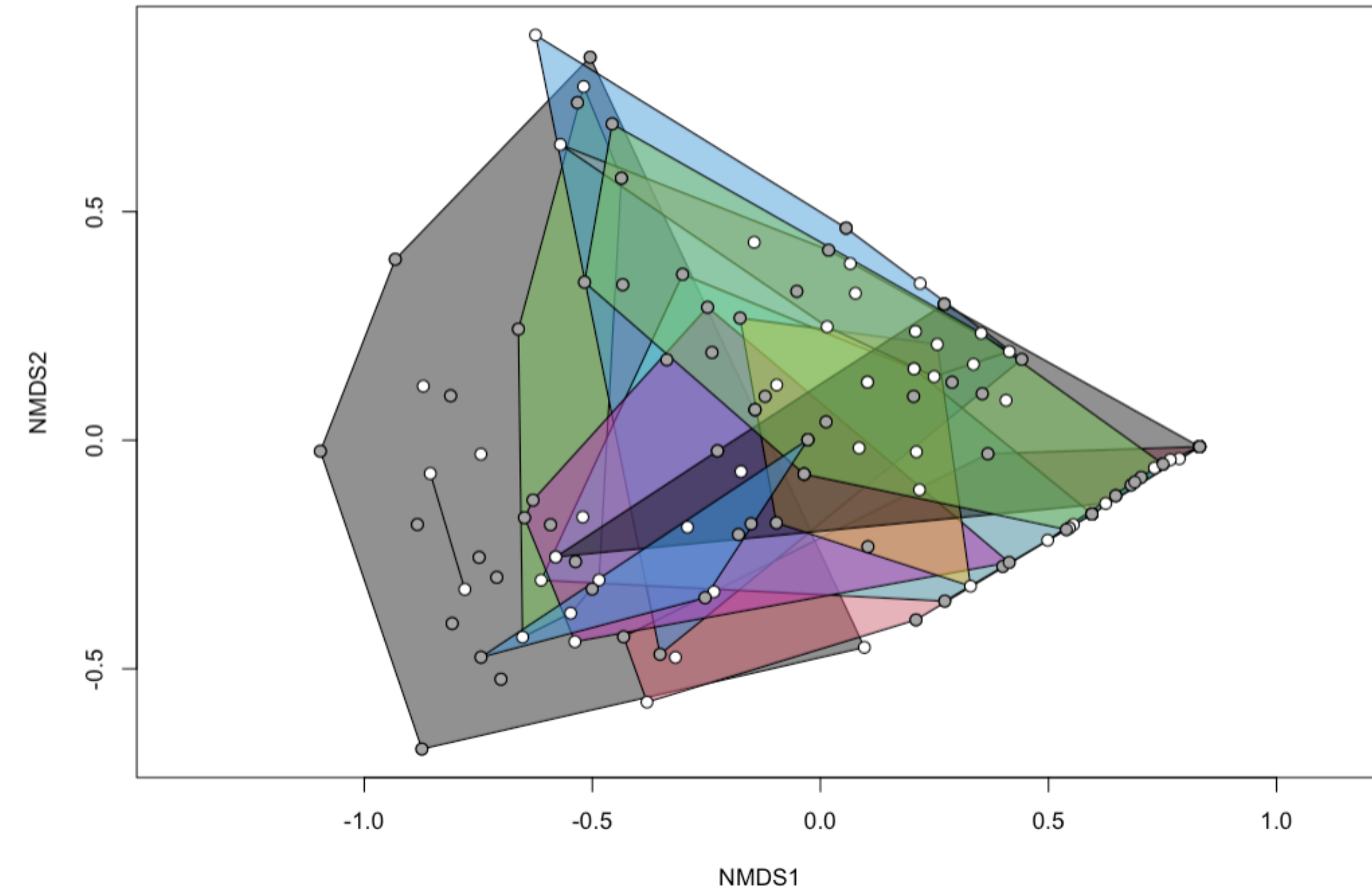


Ordination with floral neighborhood data

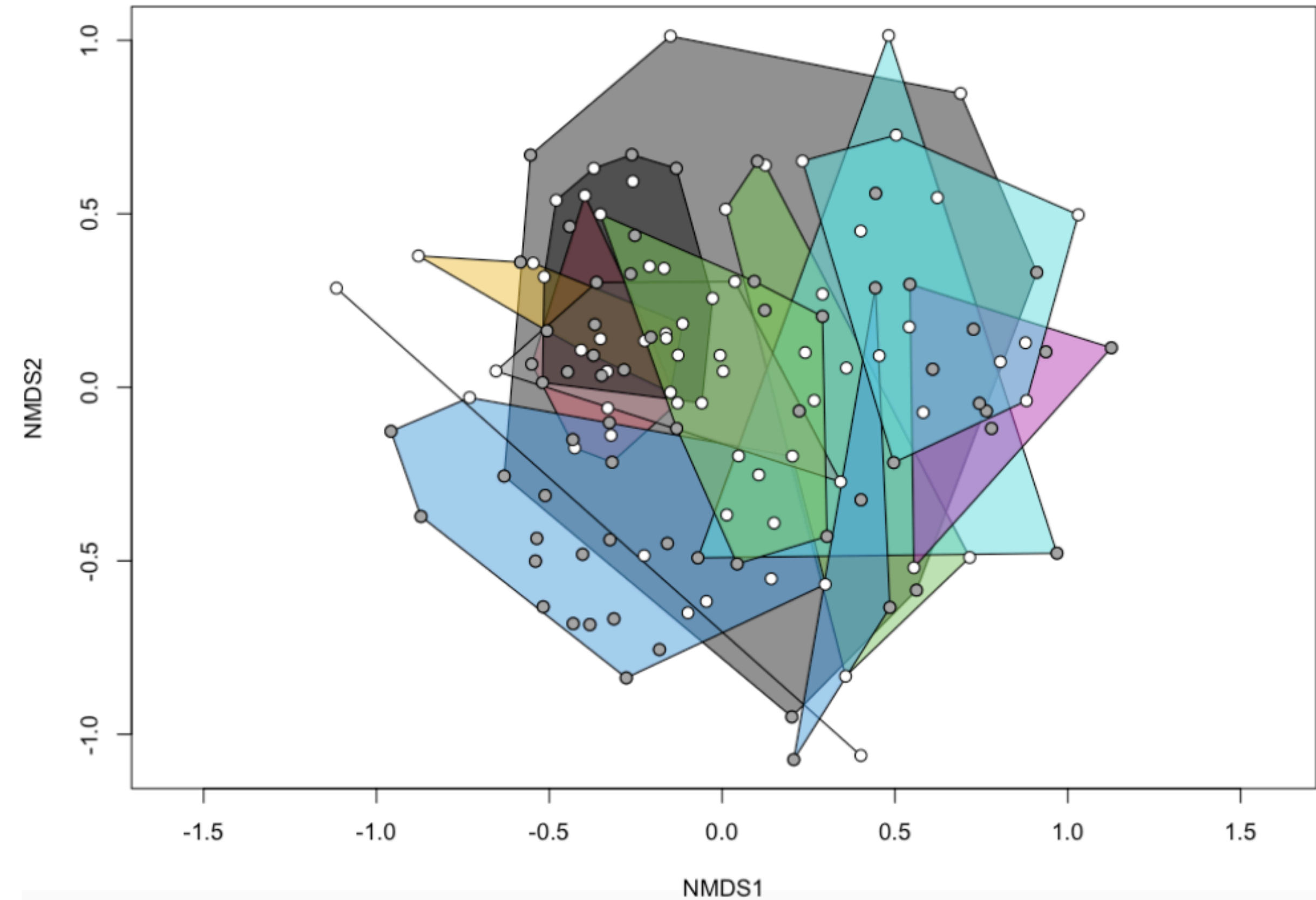
- Living circles
- Dead circles

Hulls represent living
and dead groups

High similarity among sites



Ordination including litter depth, slope, and species richness



Ordination using floral neighborhood data

● Living circles

○ Dead circles

Hulls represent sites

Discussion

- Little evidence of microhabitat differences between living and dead groups
- No evidence of differences in seedling survival by site
- Other characteristics that may affect seedling survival—climate, soil moisture & nutrients, pesticide drift, light limitation, herbivory, genetic factors



Thank you for listening!

**For more information on the Echinacea Project, visit
<http://echinaceaproject.org>**



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their help with this project!

Questions?