Synergies and tradeoffs in conserving diverse pollinators: a traits-based approach

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Environmental filtering determines local community composition

Regional species pool

Adapted from Cadotte and Tucker 2017

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Environmental filters

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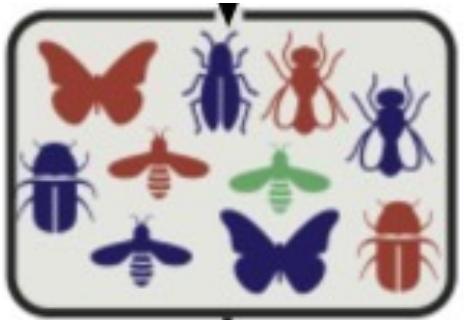
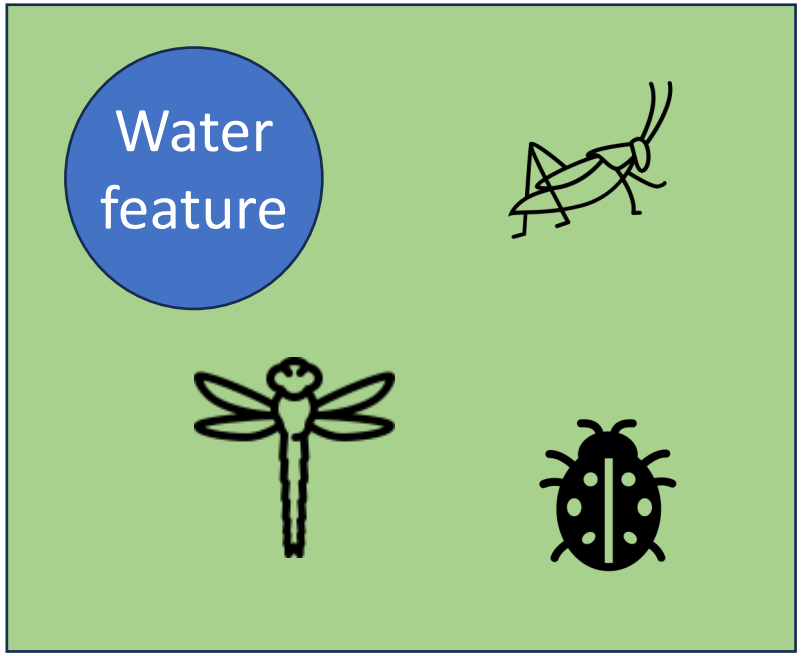
Local community

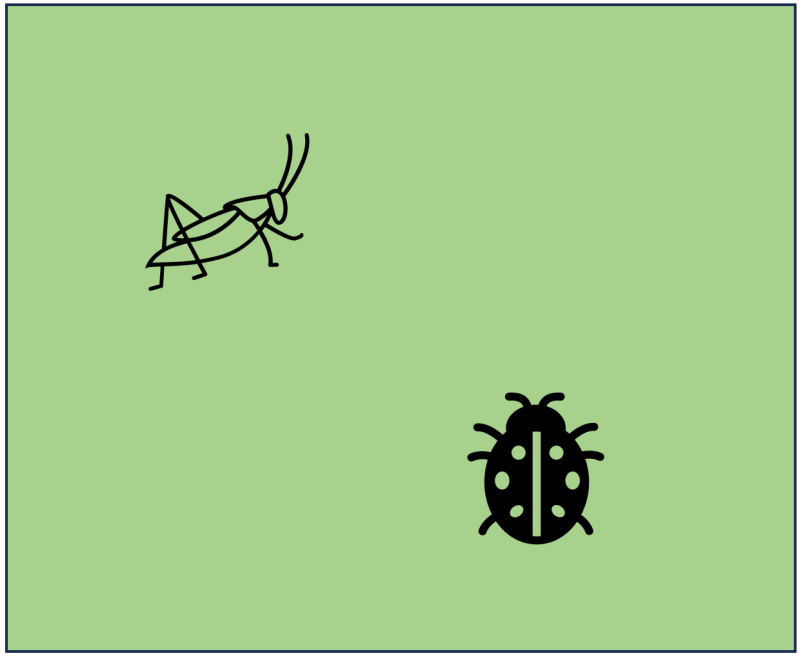


Adapted from Cadotte and Tucker 2017

Traits can influence species' response to environmental filters



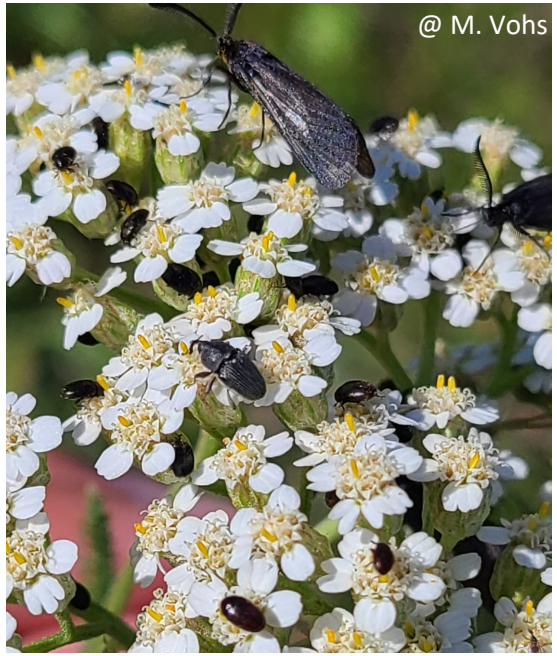
Environment #1



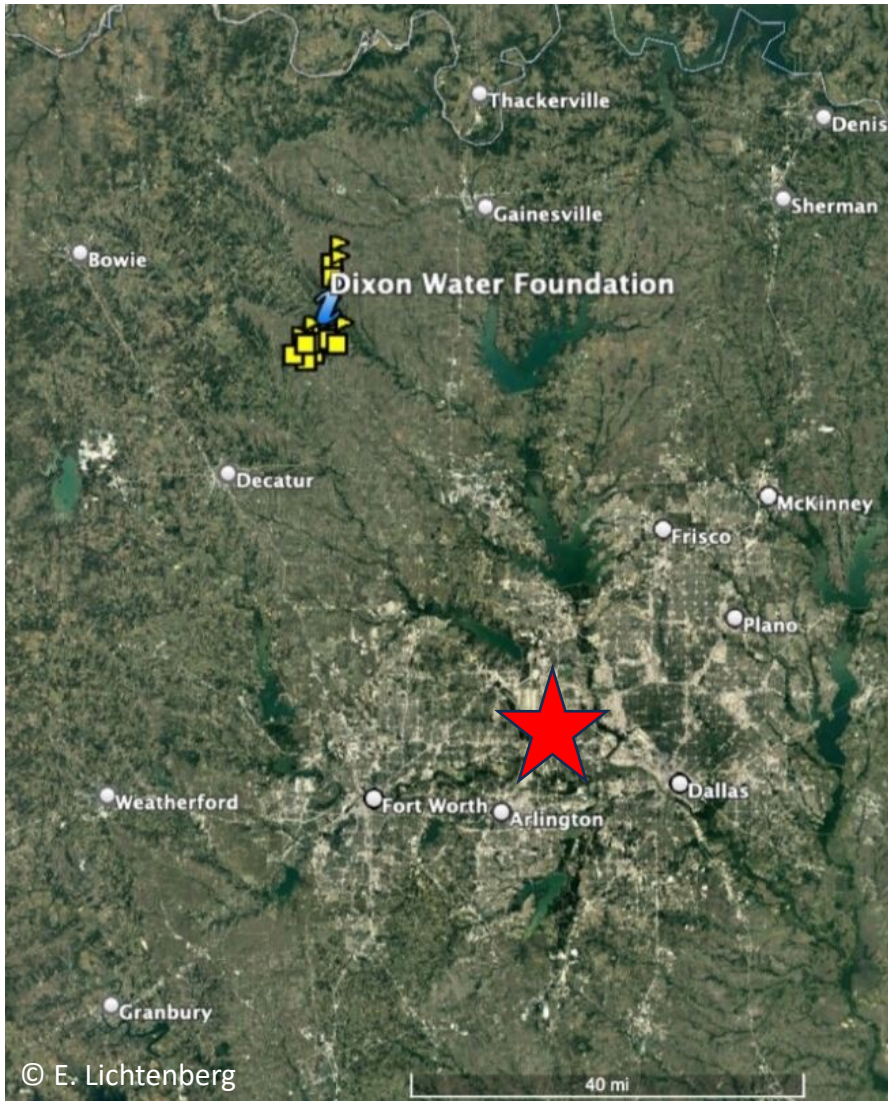
Environment #2

How do traits mediate community response to local resource availability?

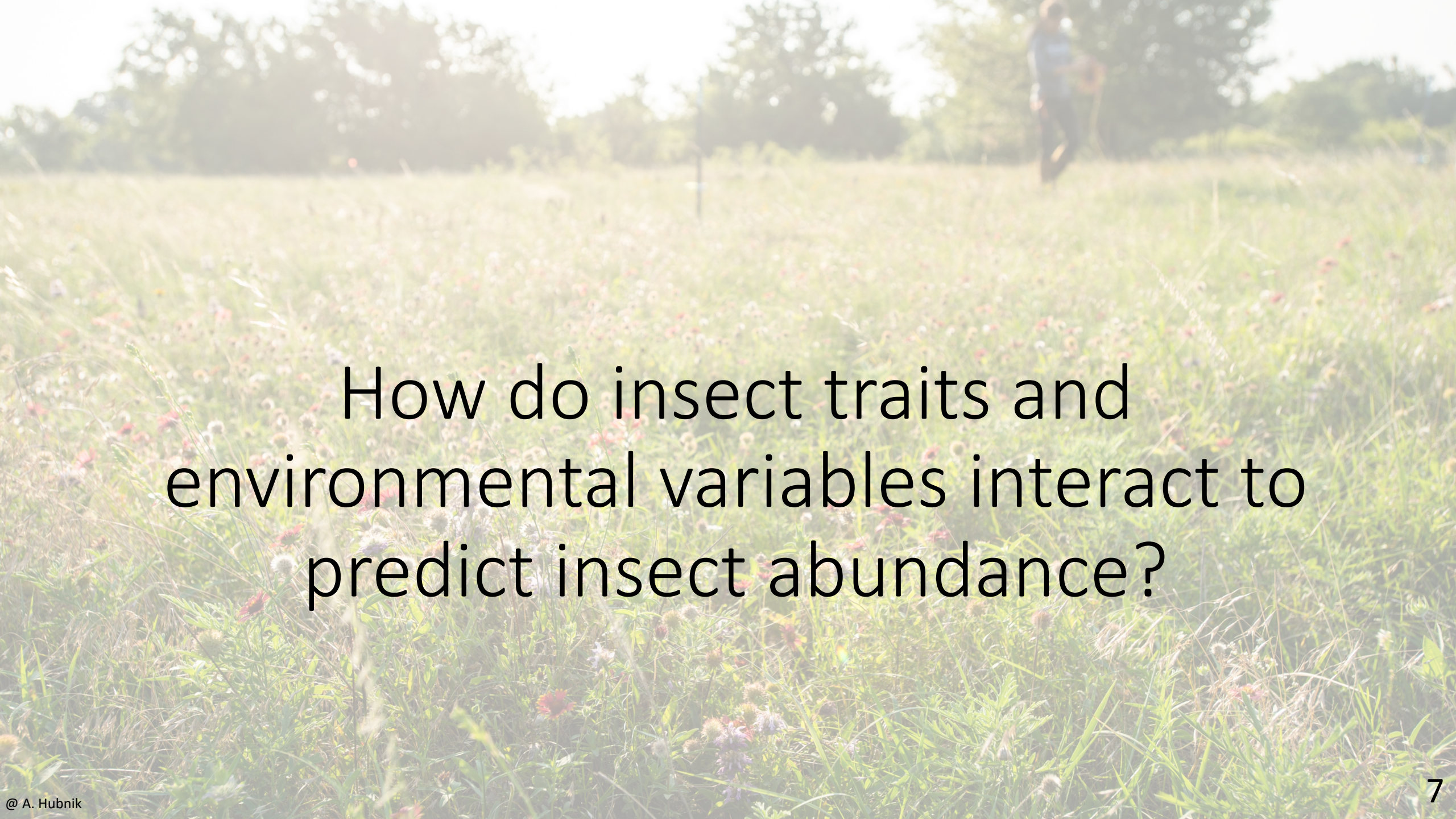
Diverse insects visit flowers



Study system



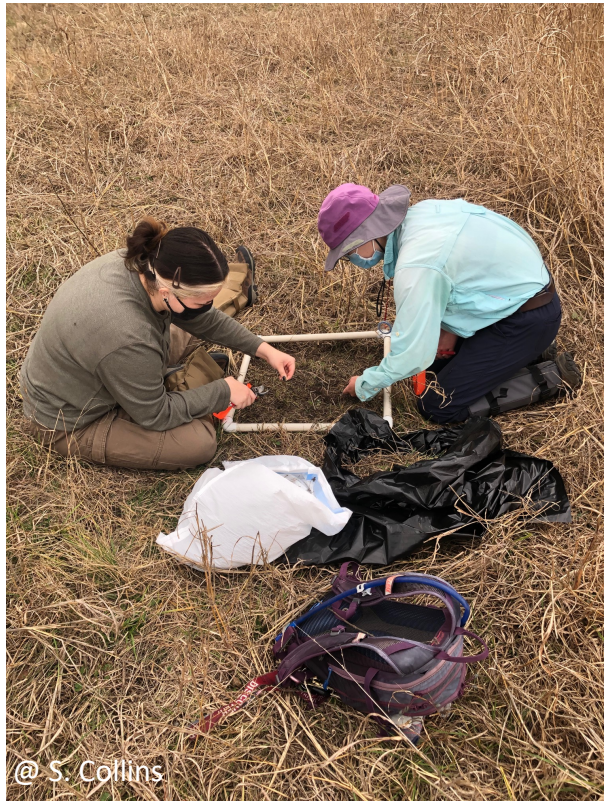
@ Maps for Design



How do insect traits and environmental variables interact to predict insect abundance?

Vegetation sampling

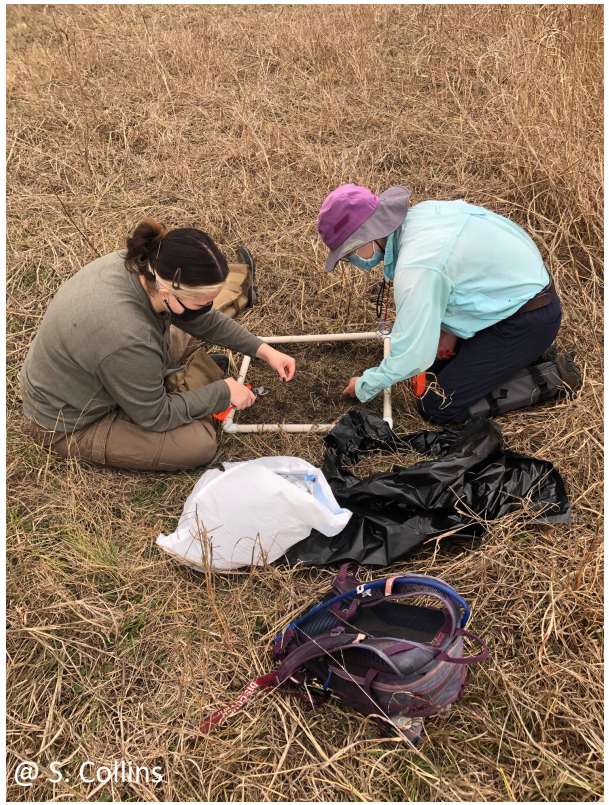
Biomass collection



Ground cover estimation and flower counts

Vegetation sampling

Biomass collection



Ground cover estimation and flower counts

Resource proxies:
cover metrics and flower metrics

Insect sampling

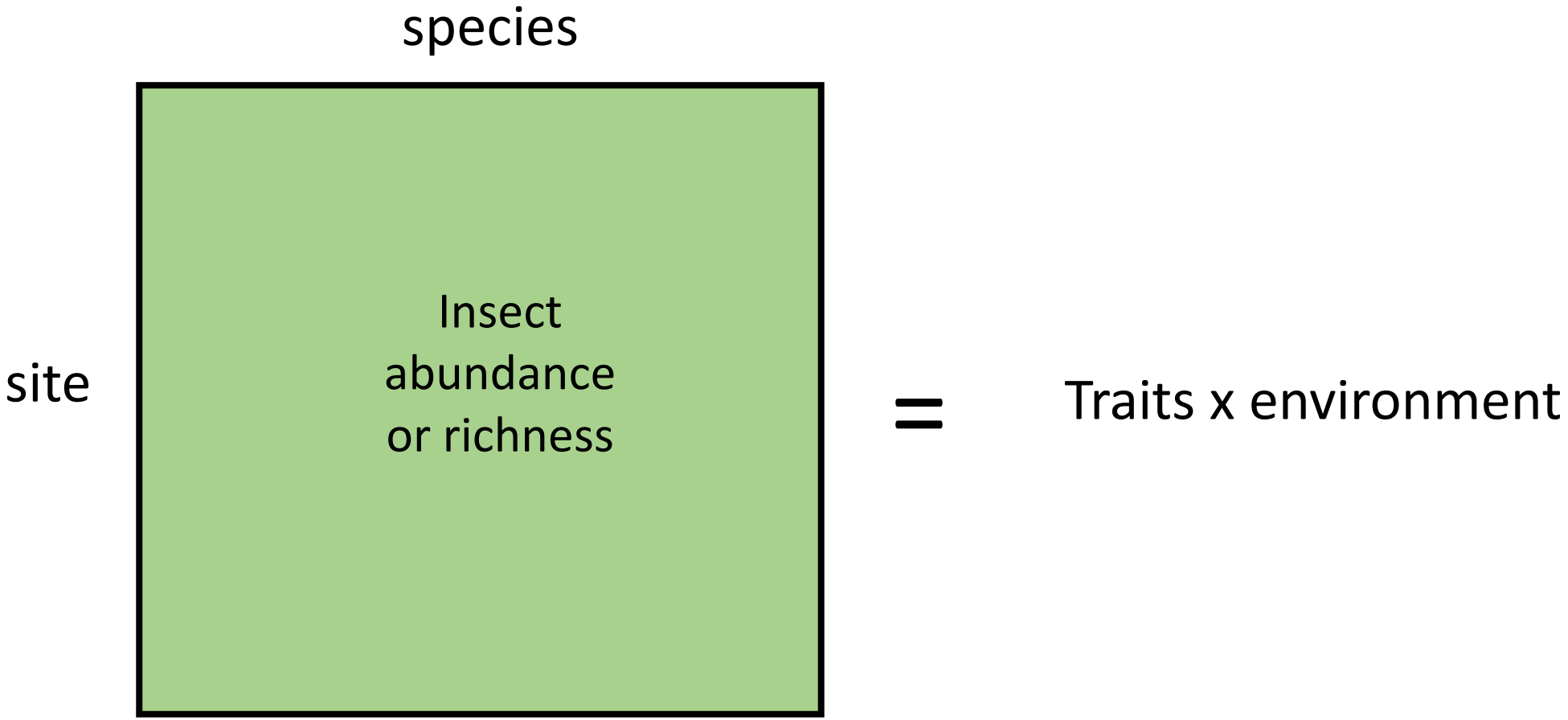
Aerial netting

Passive traps

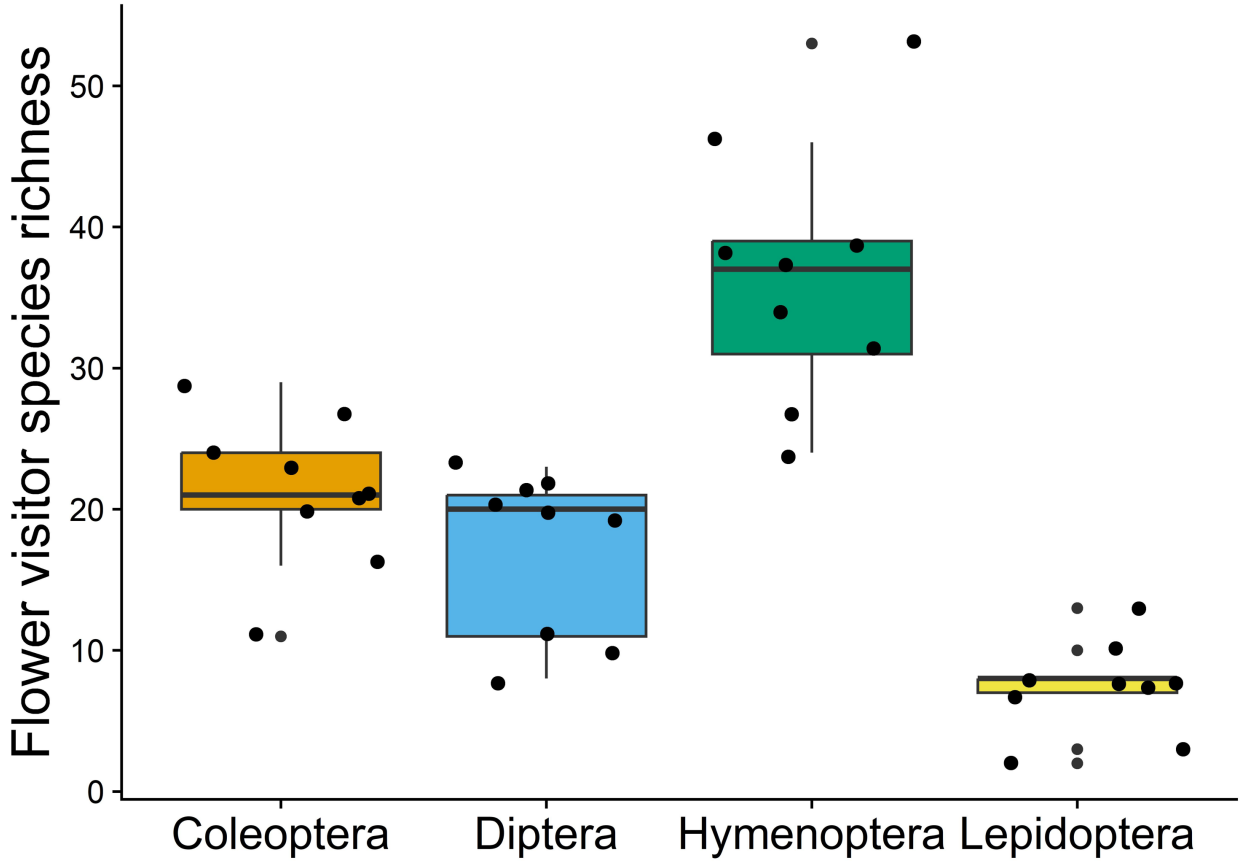
Focal trait
Ground-sheltering
Litter-sheltering
Herbaceous plant-sheltering
Flower-eating
Nectar-eating
Pollen-eating

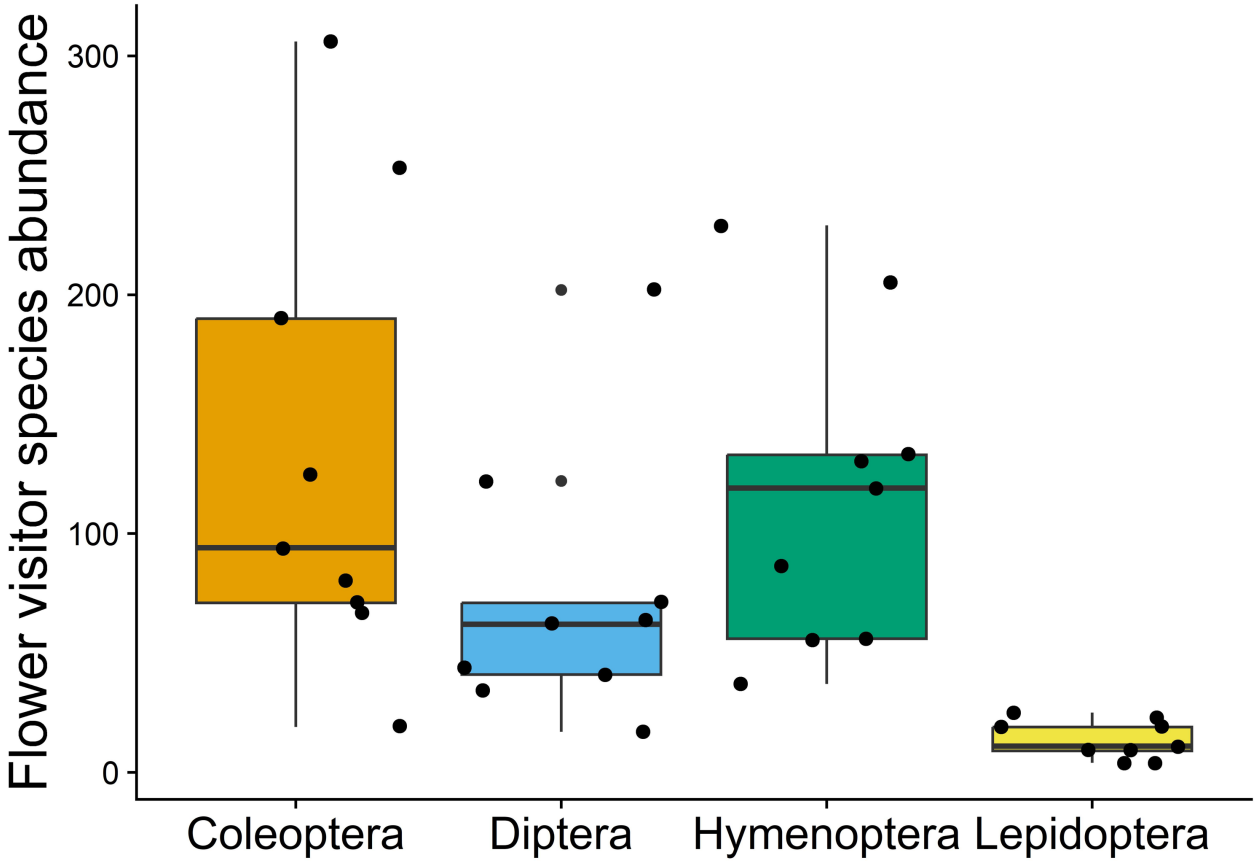
Focal trait	Hypothesized related resource
Ground-sheltering	Bare ground cover
Litter-sheltering	Litter biomass
Herbaceous plant-sheltering	Green canopy cover
Flower-eating	Flower richness
Nectar-eating	Flower richness
Pollen-eating	Flower richness

Analysis approach



Flower visitor biodiversity





Traits and environmental variables interact to predict insect abundance

Insect abundance model

Traits and environmental variables interact to predict insect abundance

Insect abundance model

- Insect order ($p = 0.02135$)
- Herbaceous plant-sheltering x green canopy cover ($p = 0.02111$)
- Ground-sheltering x bare ground cover ($p = 0.04930$)

Conclusions and future directions

- The interaction of species traits and resource availability can influence local species abundance

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- Next steps:
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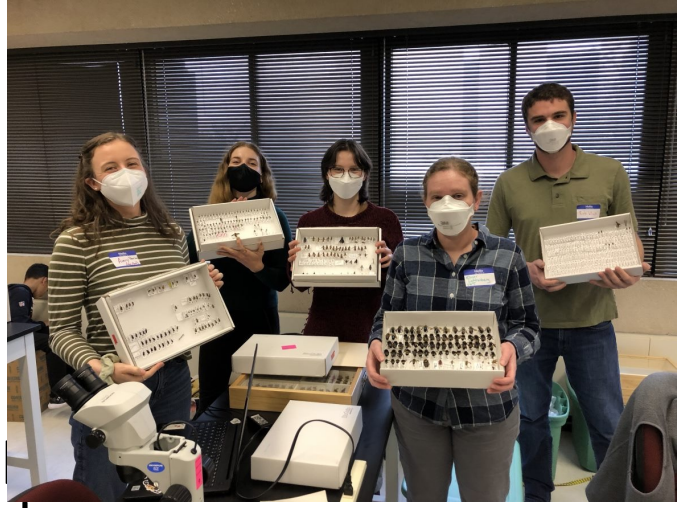
Conclusions and future directions

- The interaction of species traits and resource availability can influence local species abundance
- Next steps:
  - comparing effects of different land management practices
- Traits are a promising tool for predicting broad patterns of community response to land use change

Acknowledgements



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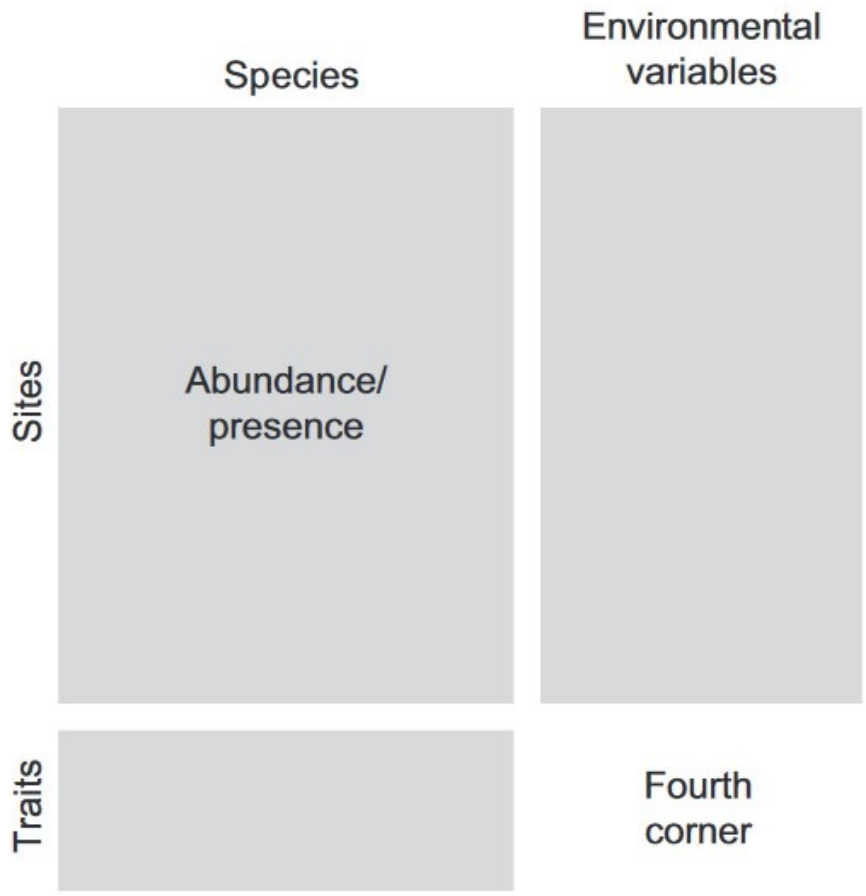
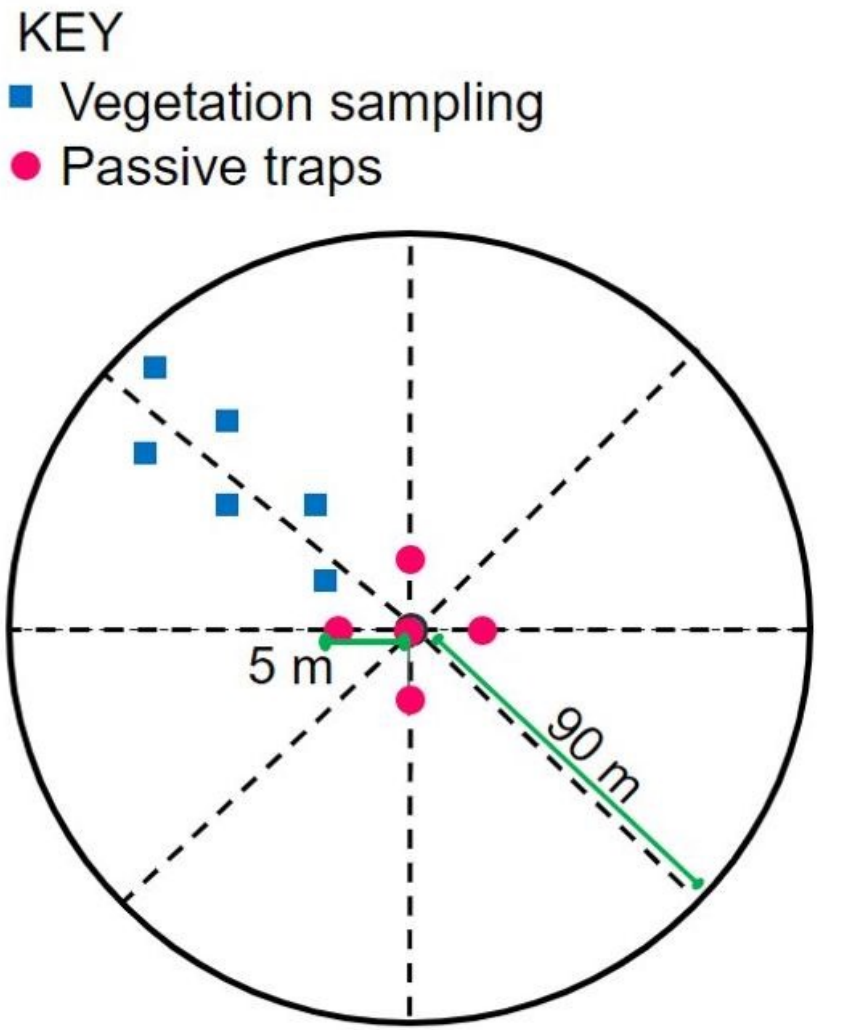
Fourth corner problem



@ E. Lichtenberg et al. 2017

Field site layout



Adapted from S. Collins

Insect abundance model

abundance ~ ID_order + nectar_eating + pollen_eating + flower_eating + ground_shelter + liveplant_shelter + litter_shelter + nectar_eating:flower_rich + pollen_eating:flower_rich + flower_eating:flower_rich + ground_shelter:prop_bare + liveplant_shelter:prop_green_canopy + litter_shelter:dryveg_density_site_litter + (1 | site) + (1 | fieldseason) + (1 | taxon)

Family: nbinom2, link = ‘log’

Ground cover variation