

The background features a detailed illustration of various insects, including bees, flies, and beetles, interacting with flowering plants. The scene is set against a dark, muted background. In the foreground, there is a data visualization consisting of a series of overlapping, semi-transparent circles in shades of yellow, orange, blue, and pink. These circles are connected by thin, curved lines that sweep across the bottom of the frame, suggesting a flow of information or data analysis.

Using Digital Collections in Community Ecology



Community Ecology

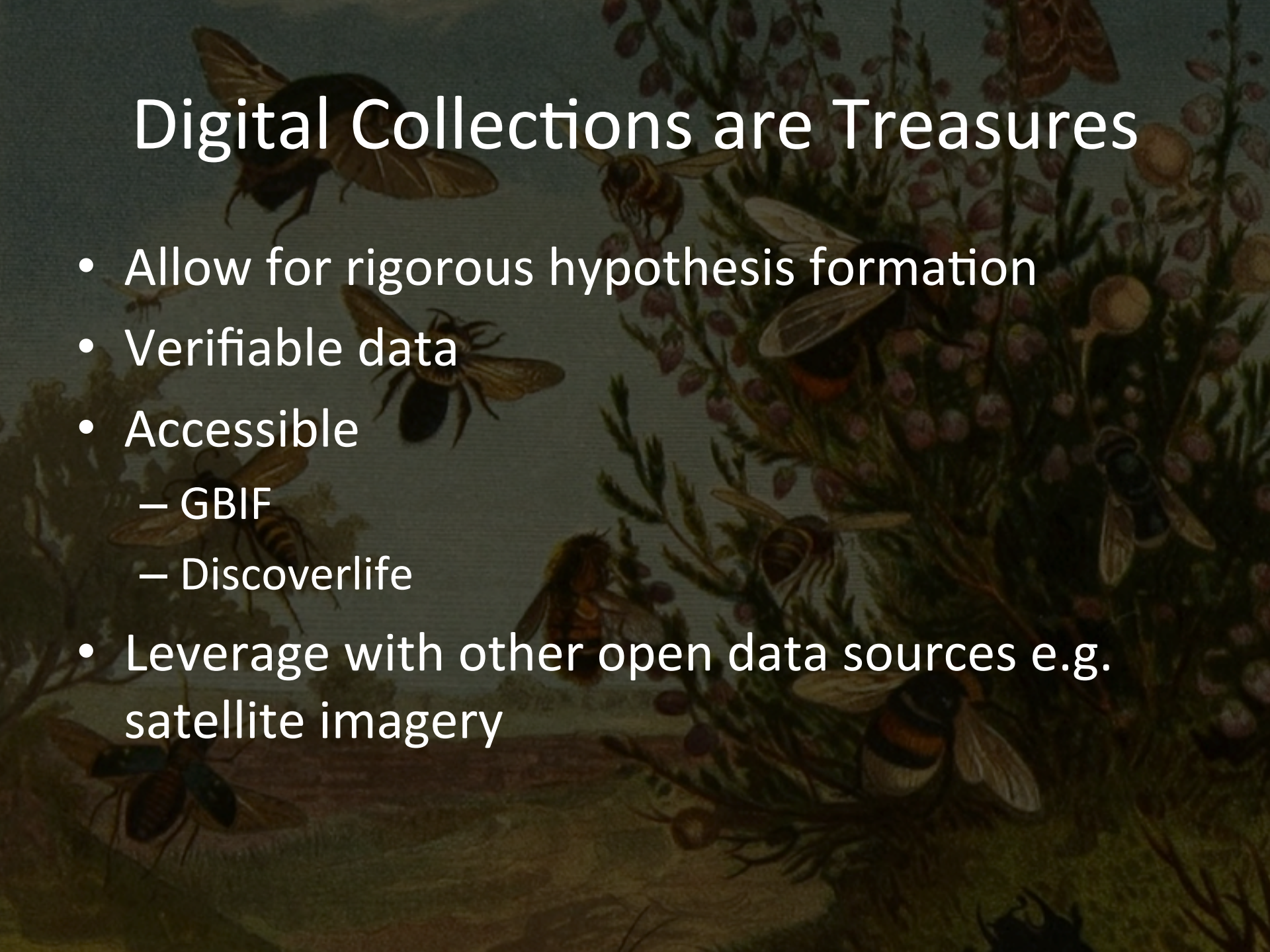
- The study of ecological communities
 - Interactions between organisms
 - Biogeographic patterns
 - Assembly processes
- Data Intensive



Community Ecology

- Limited resources and time
- Naturally rare species
- Trapping biases

Digital Collections are Treasures

The background of the slide is a detailed, dark-toned illustration of a natural scene. It features several bees of different species, some in flight and others on the ground. There are also various plants, including what appears to be a clover-like plant with small purple flowers and some green foliage. The overall style is reminiscent of a scientific or natural history illustration, with fine lines and a rich, muted color palette.

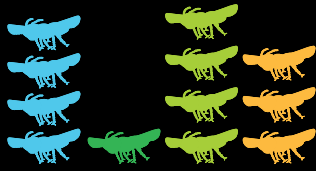
- Allow for rigorous hypothesis formation
- Verifiable data
- Accessible
 - GBIF
 - Discoverlife
- Leverage with other open data sources e.g. satellite imagery

Bees

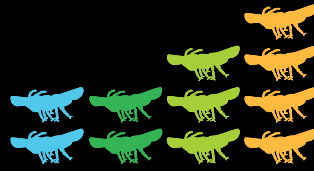


Environmental Filtering

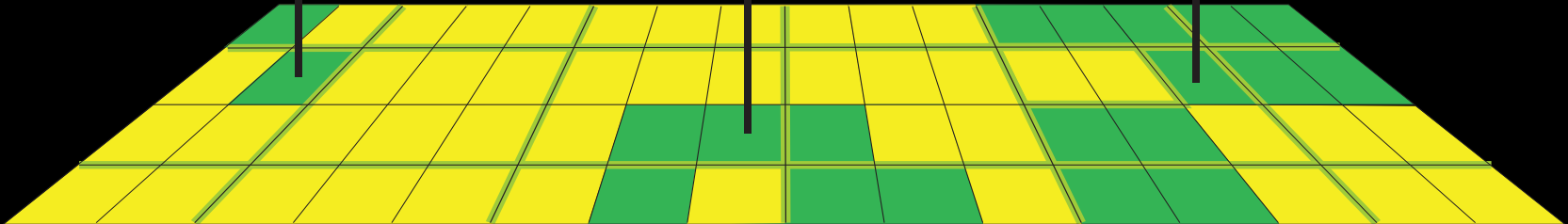
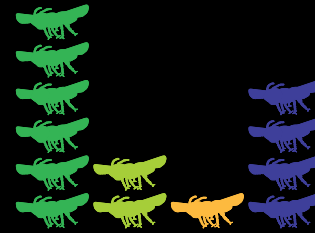
A



B



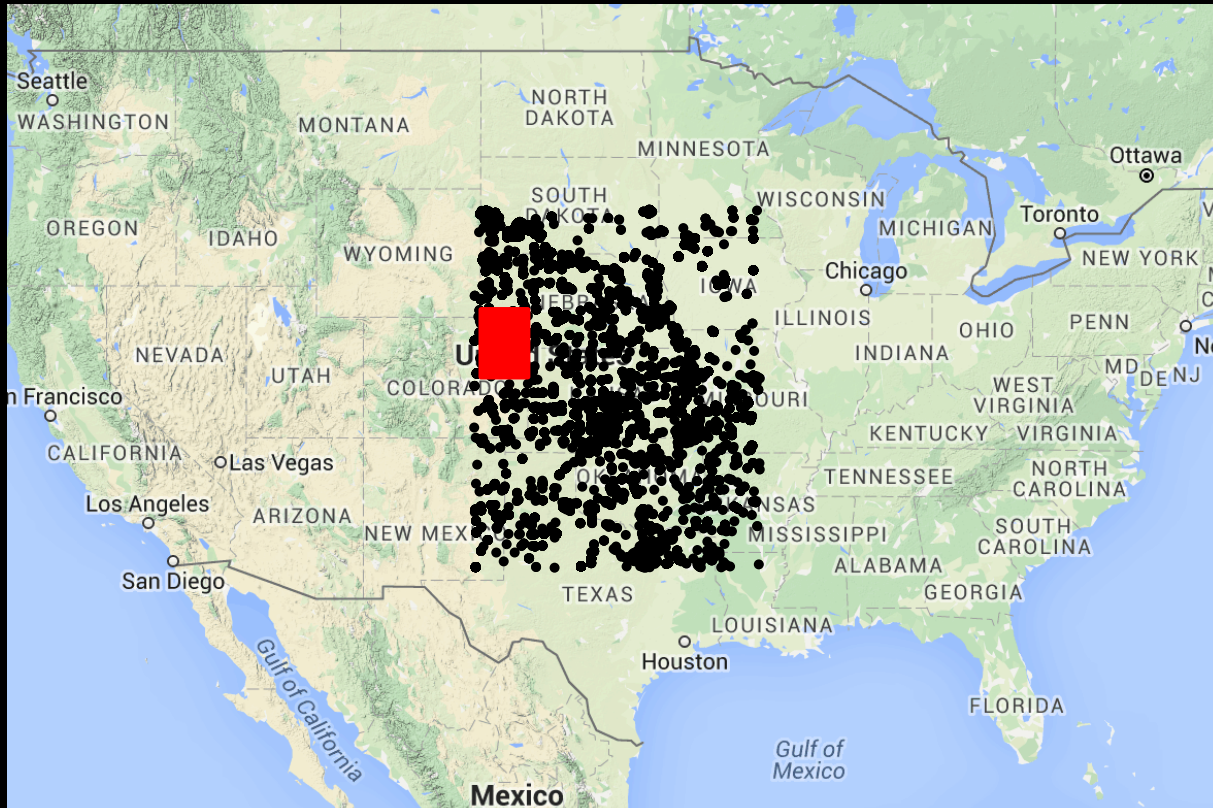
C



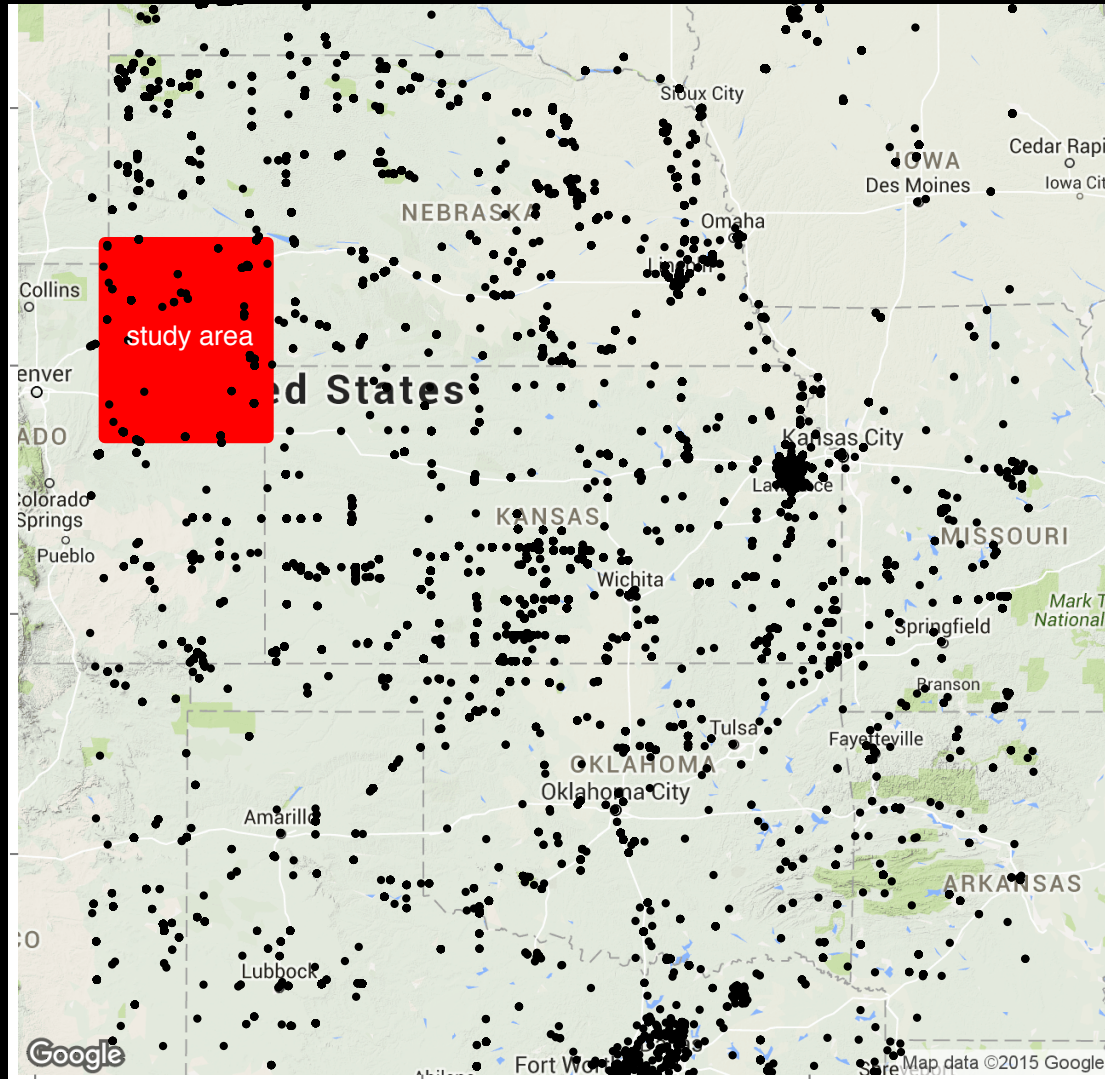
Study Area



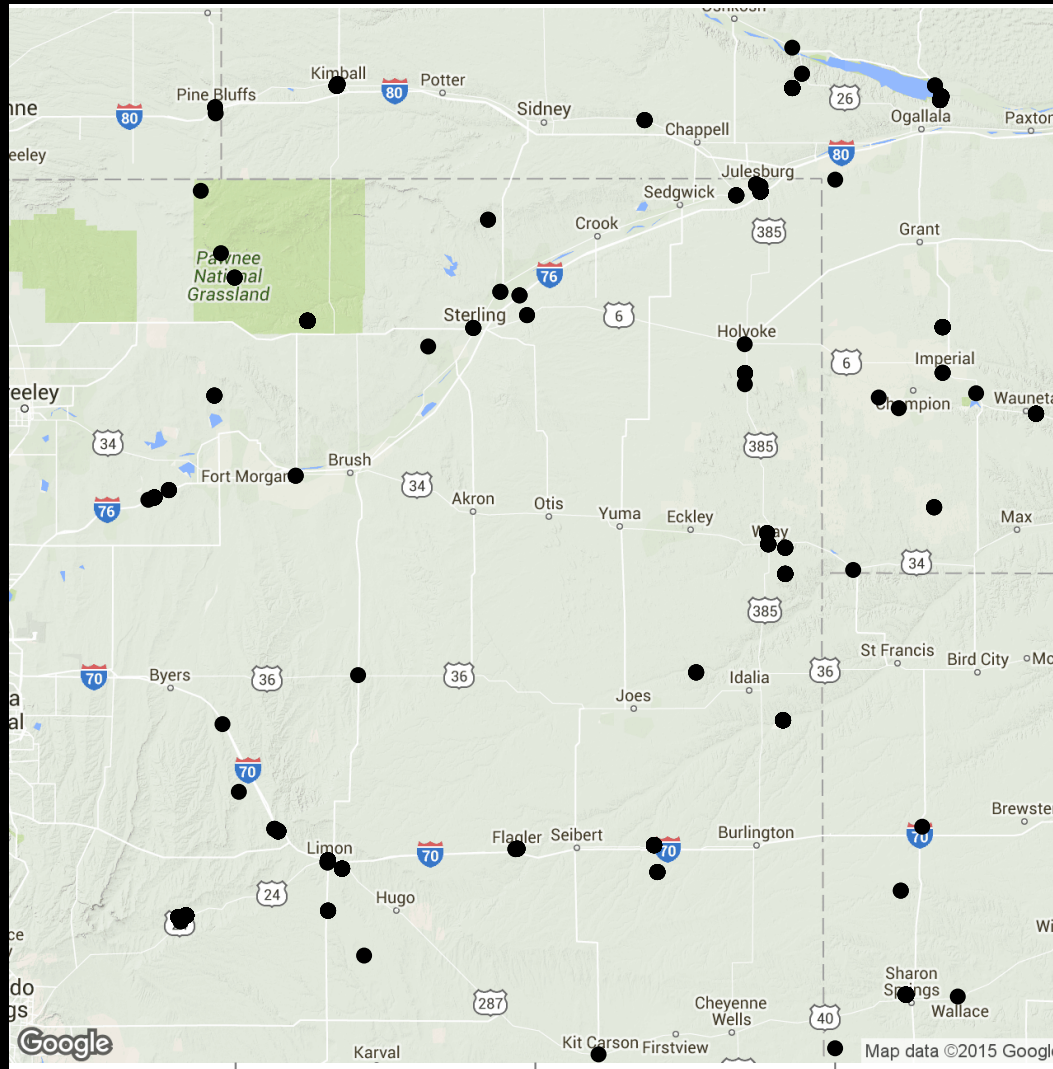
Study Area



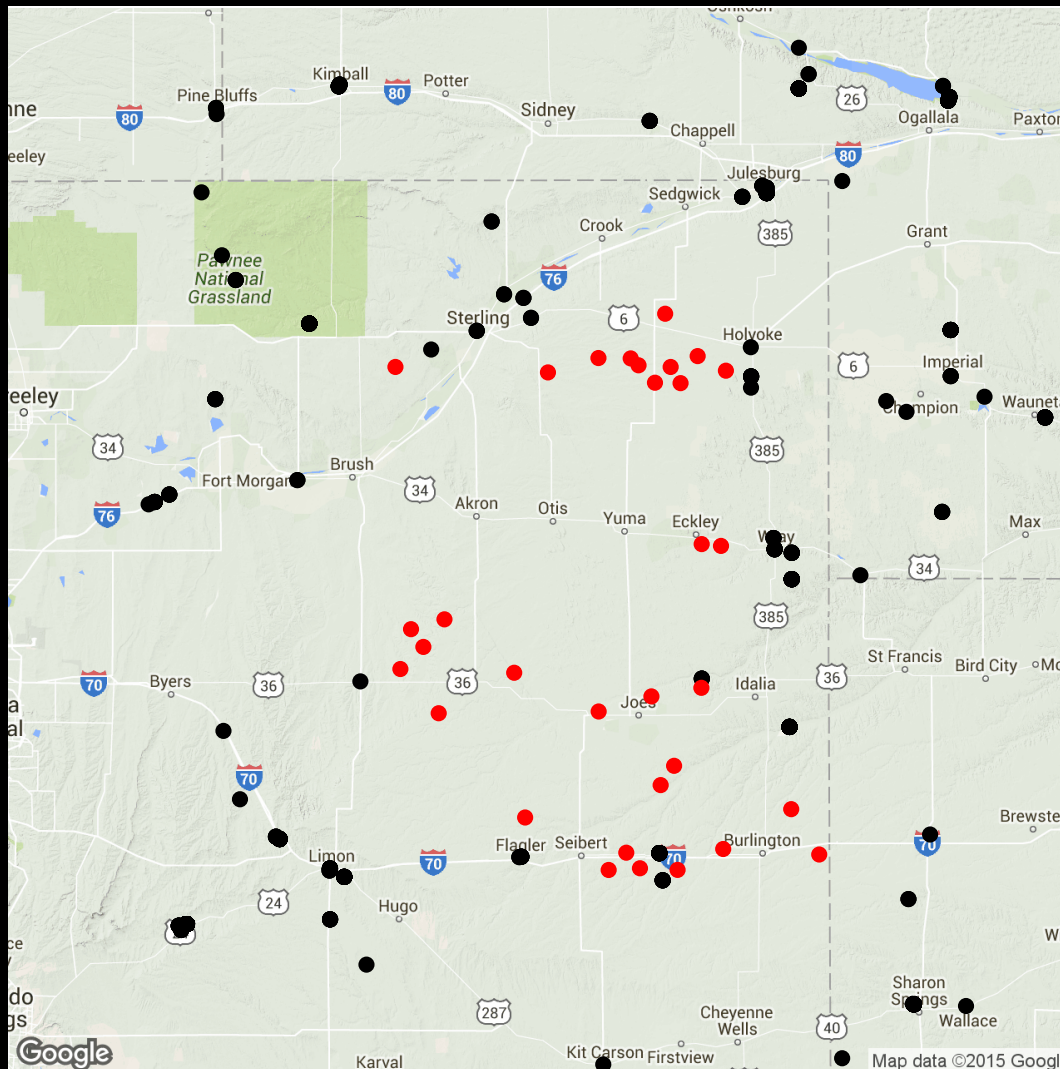
Study Area



Study Area



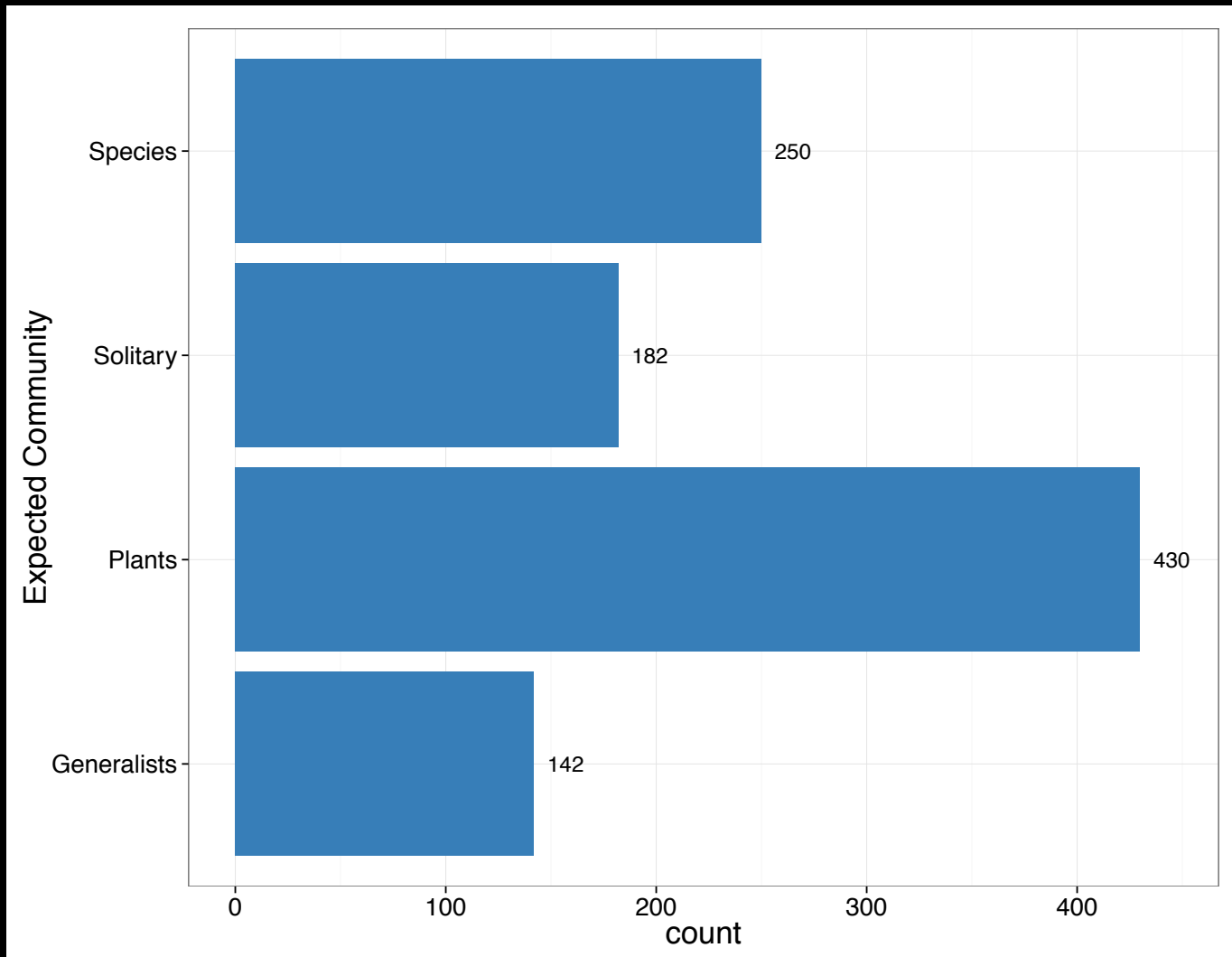
Study Area



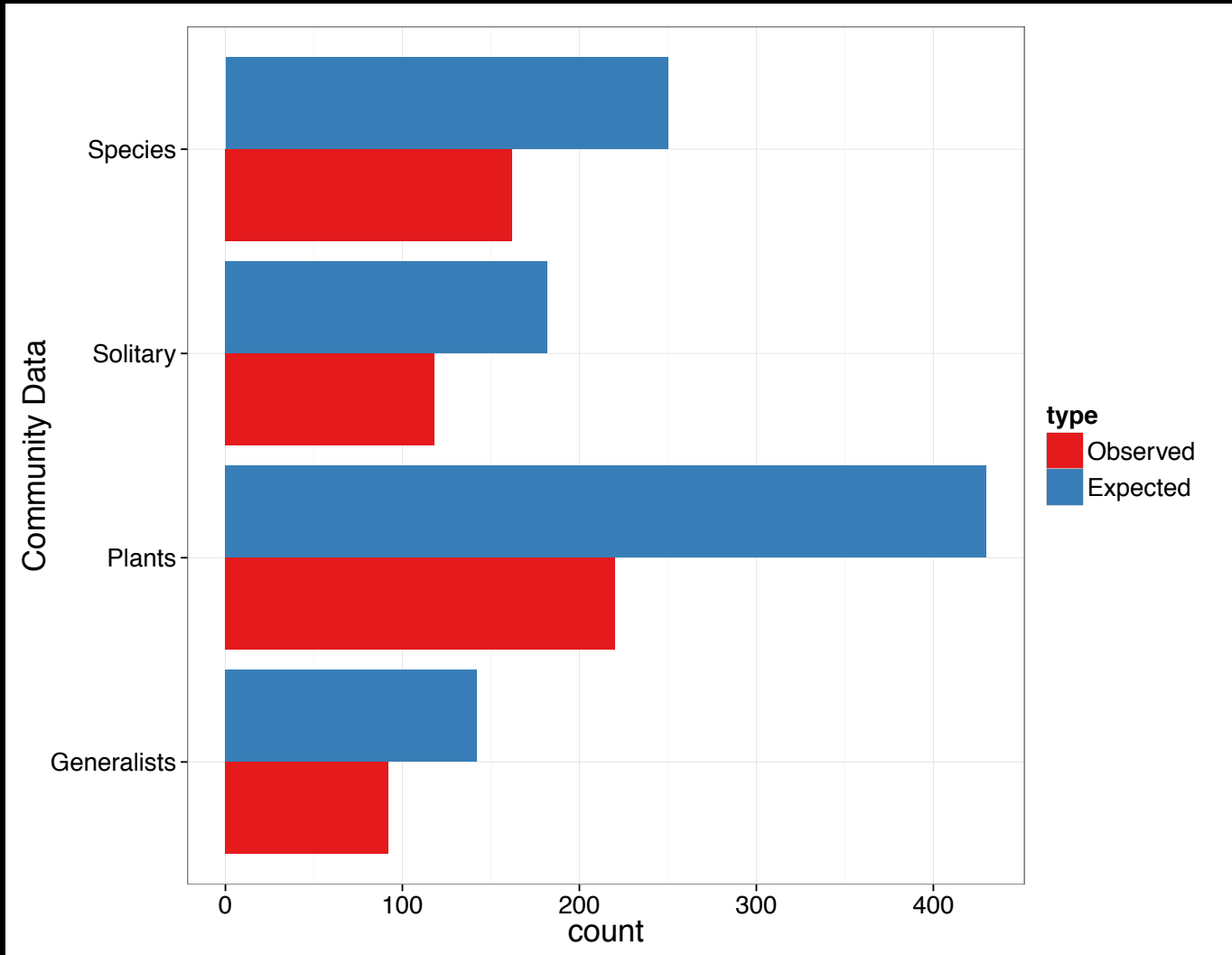
Bee Collection techniques



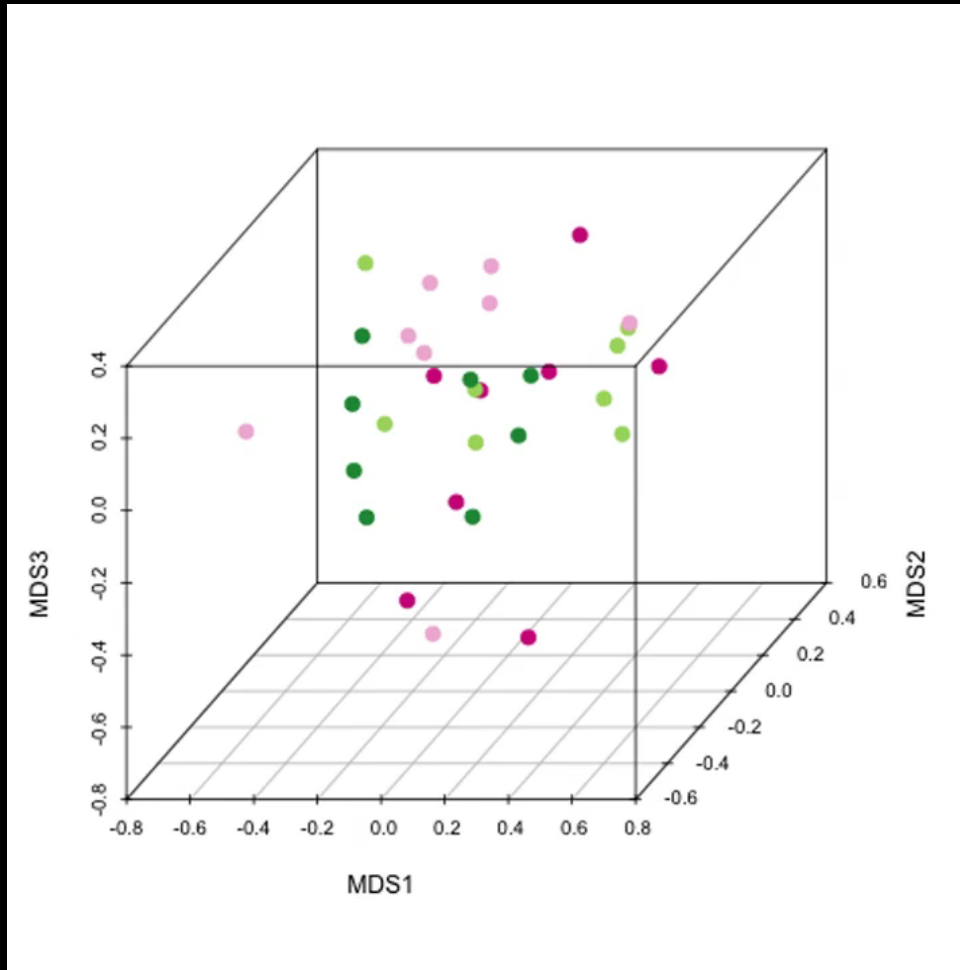
Expected Community



Observed vs Expected

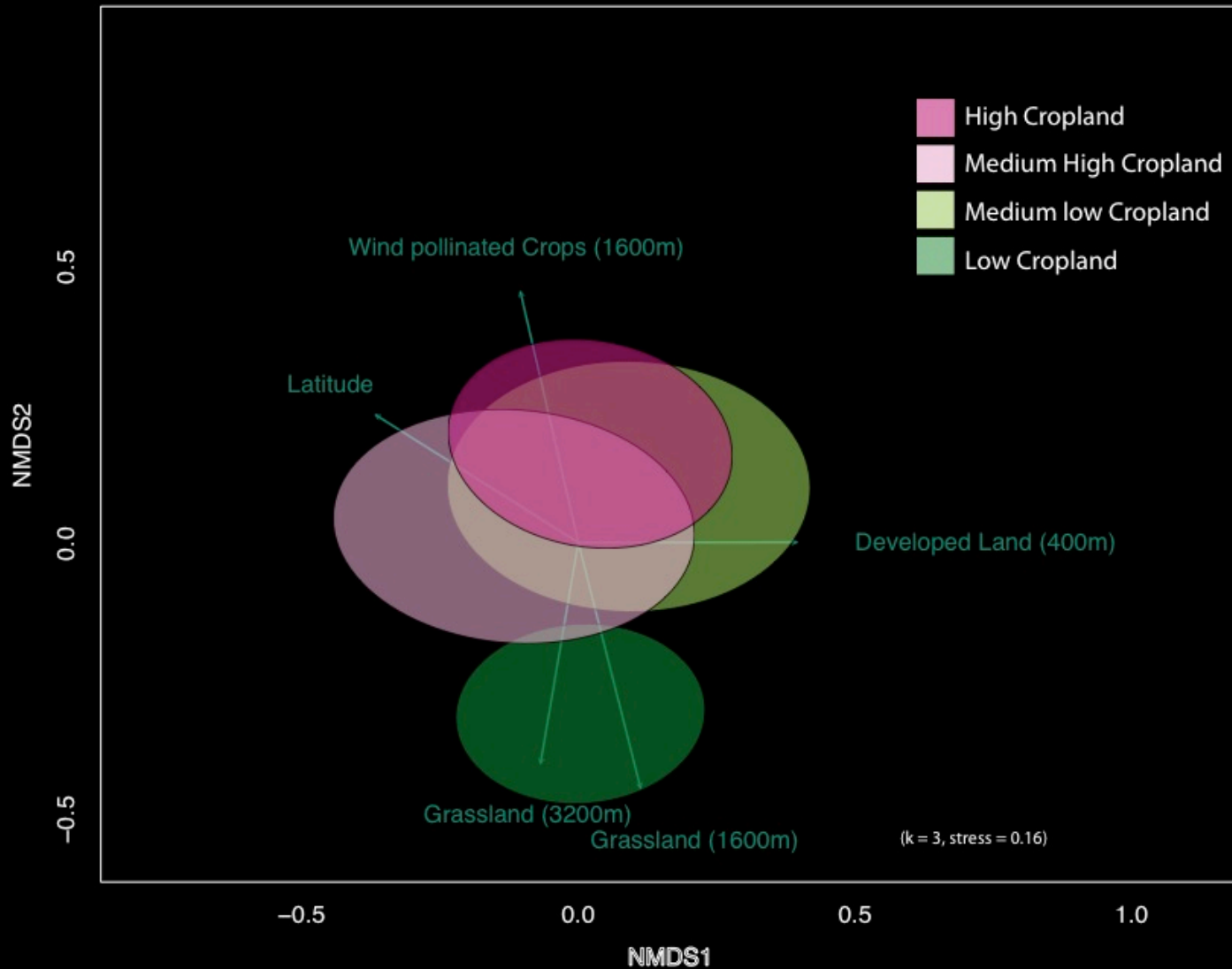


NMDS Visualization

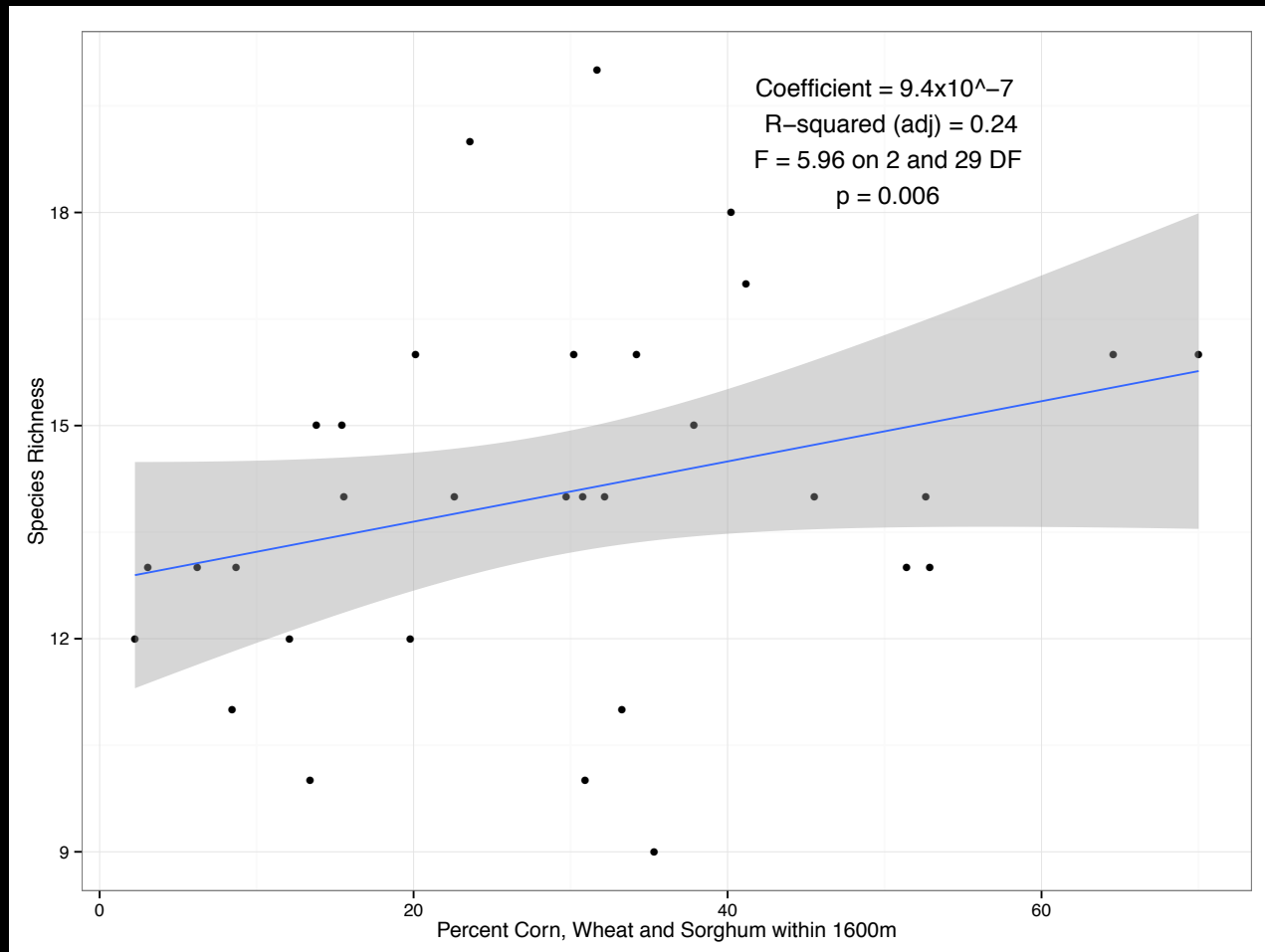


$K = 3$, Stress = 0.16

NMDS plot



Predictive Models

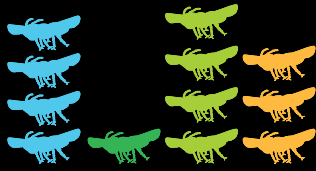


Landscape Effects on Bee Communities

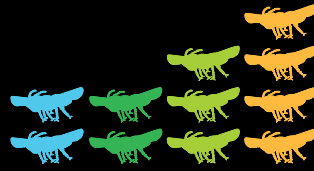


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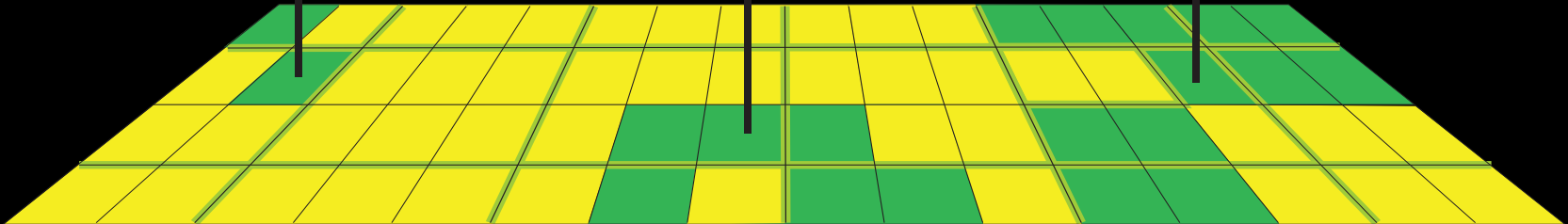
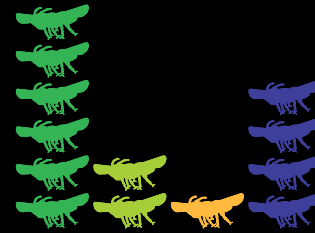
A



B



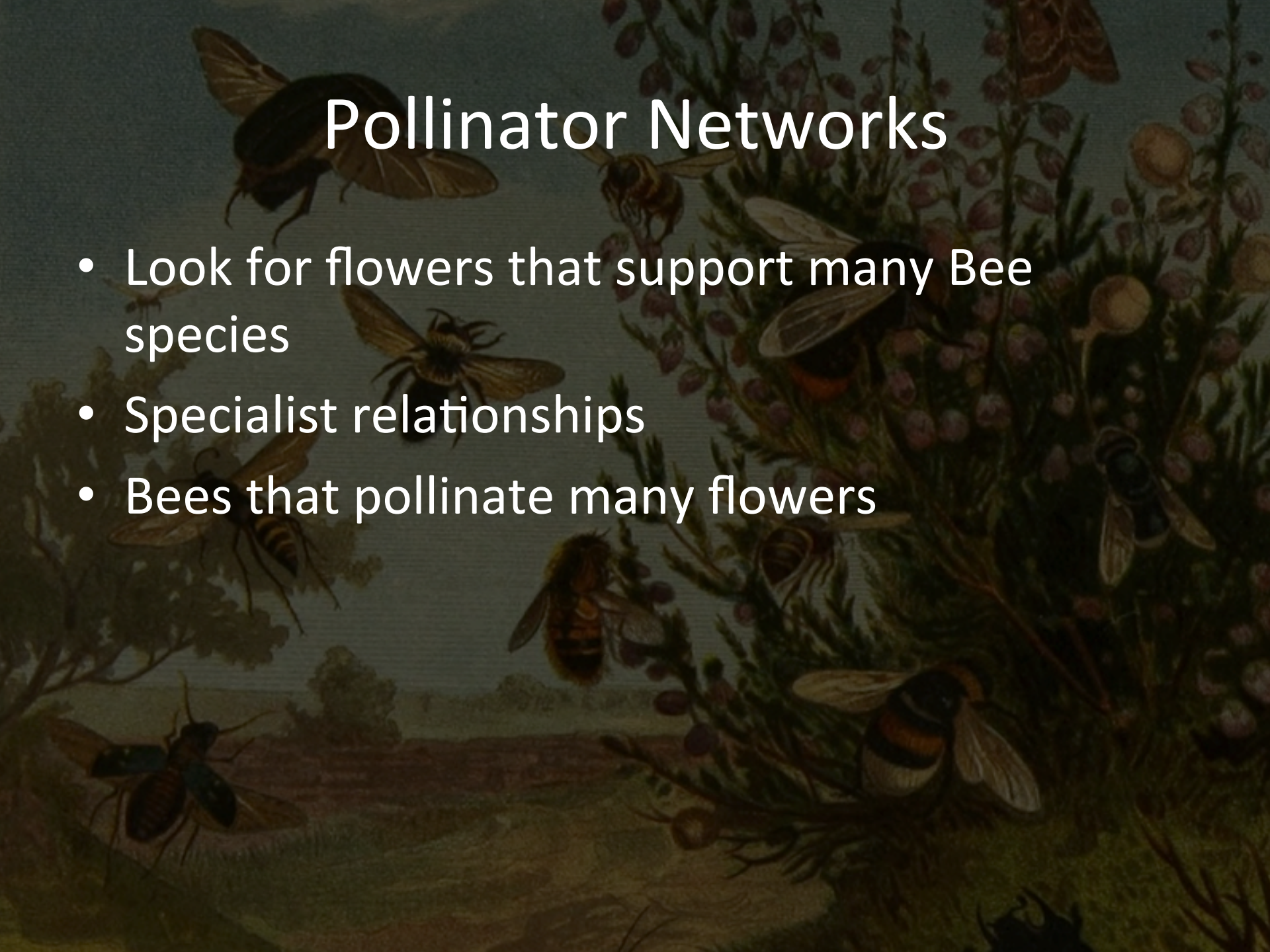
C





Integrating the Digital Data

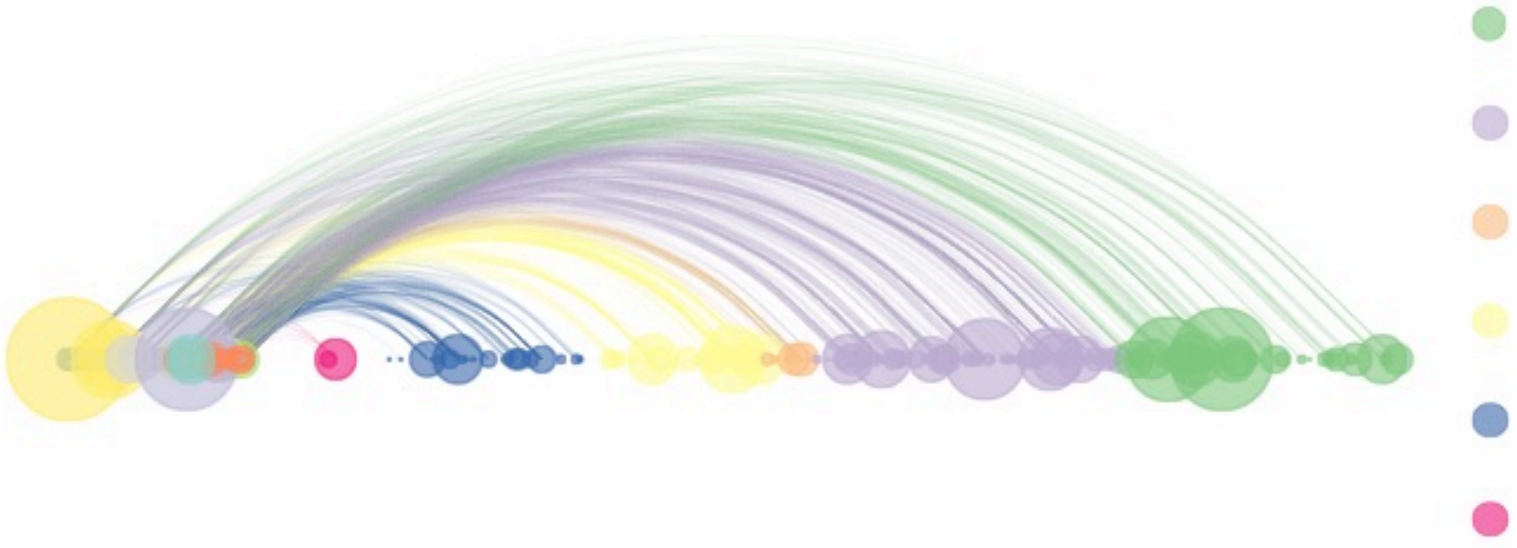
- Using Western Great Plains Data
- Pollination networks
- Identify key food resources



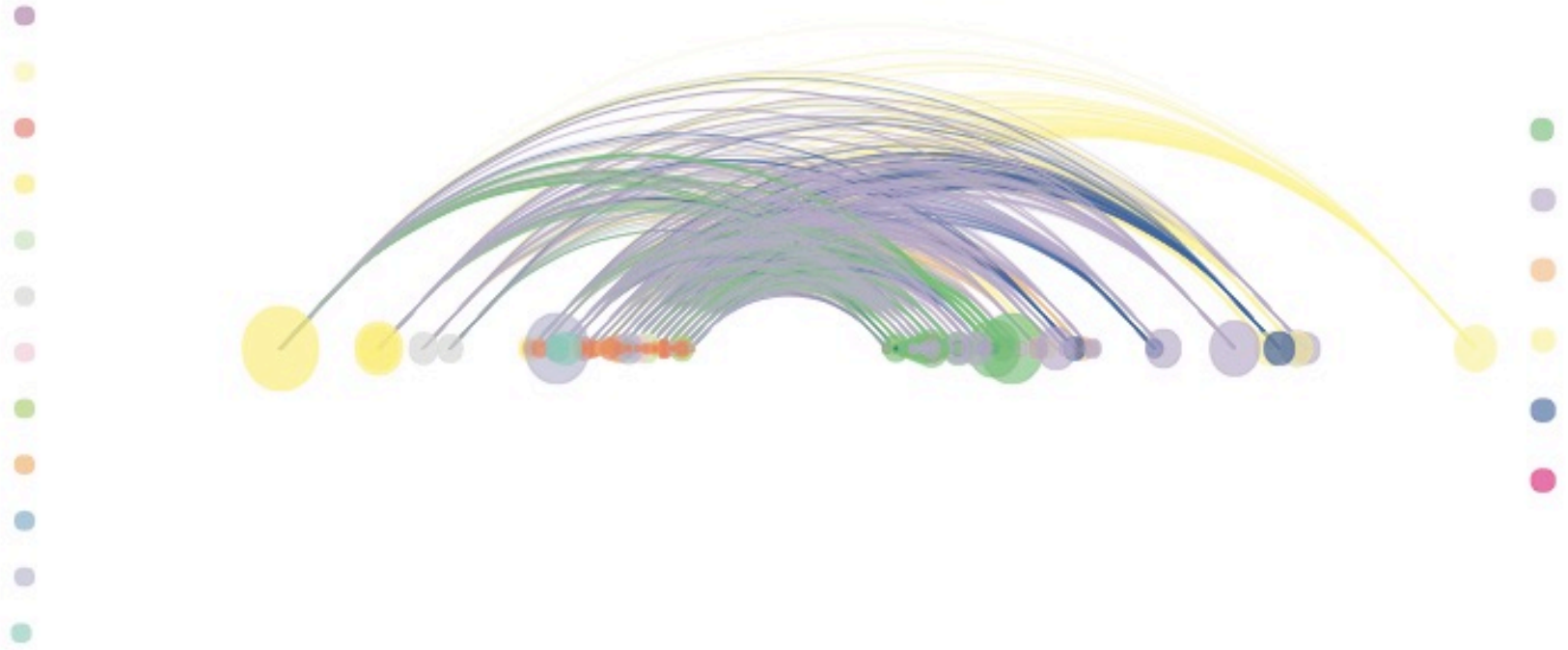
Pollinator Networks

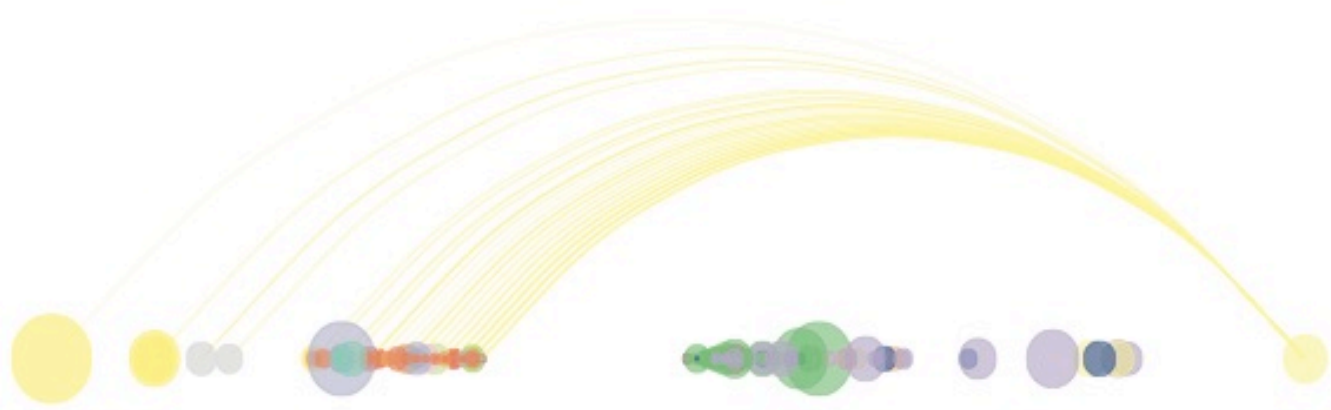
- Look for flowers that support many Bee species
- Specialist relationships
- Bees that pollinate many flowers

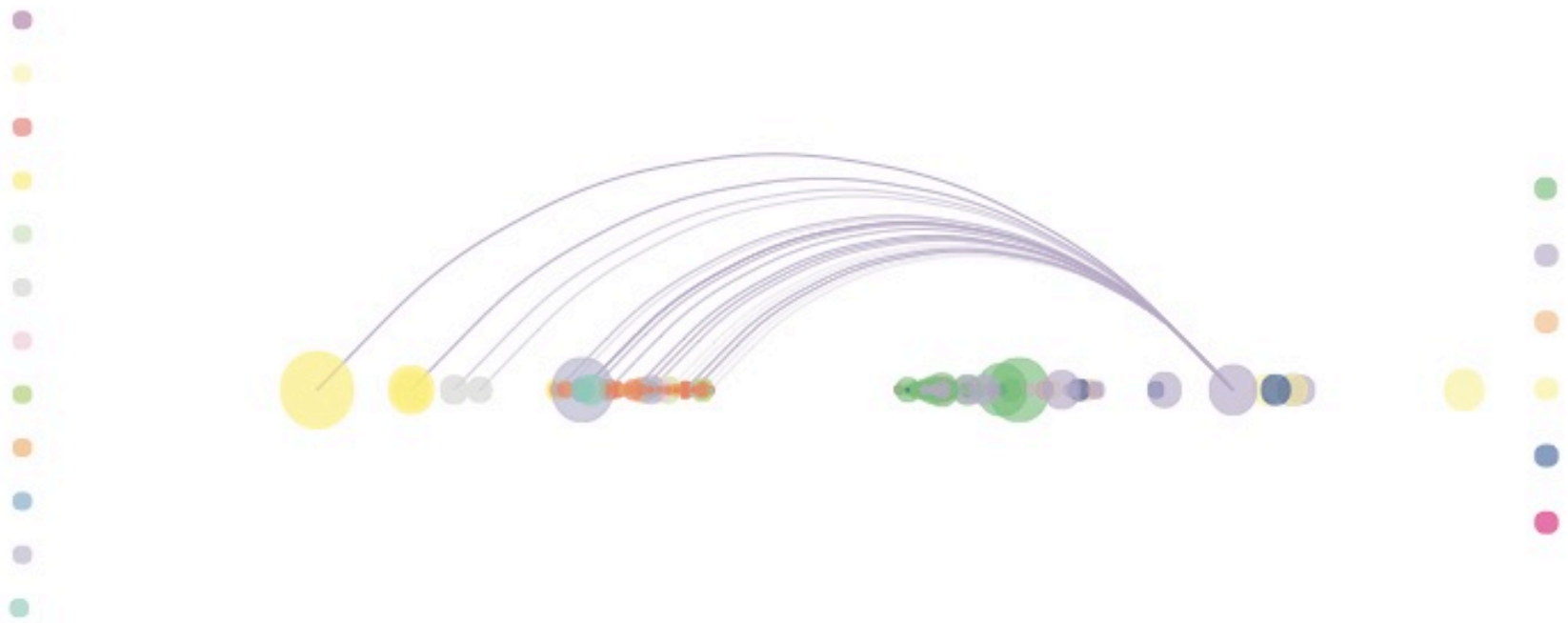
Rolling out Networks

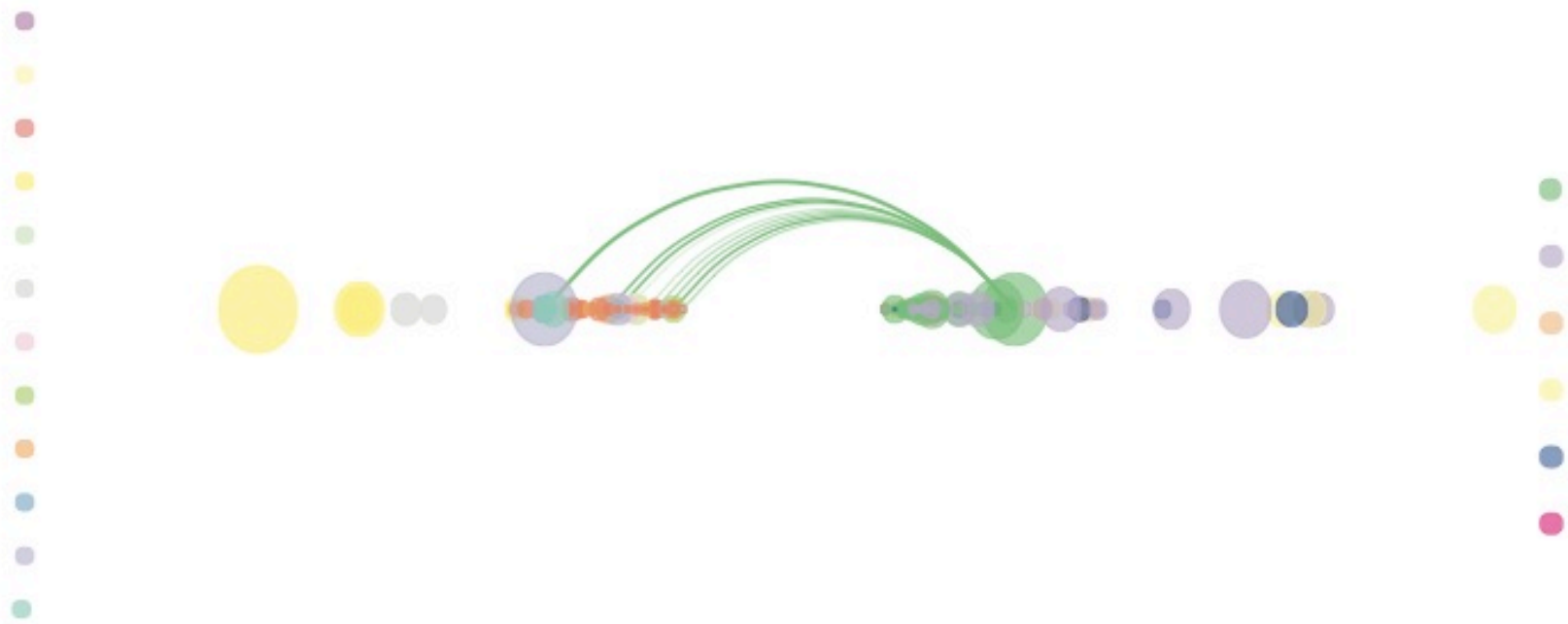


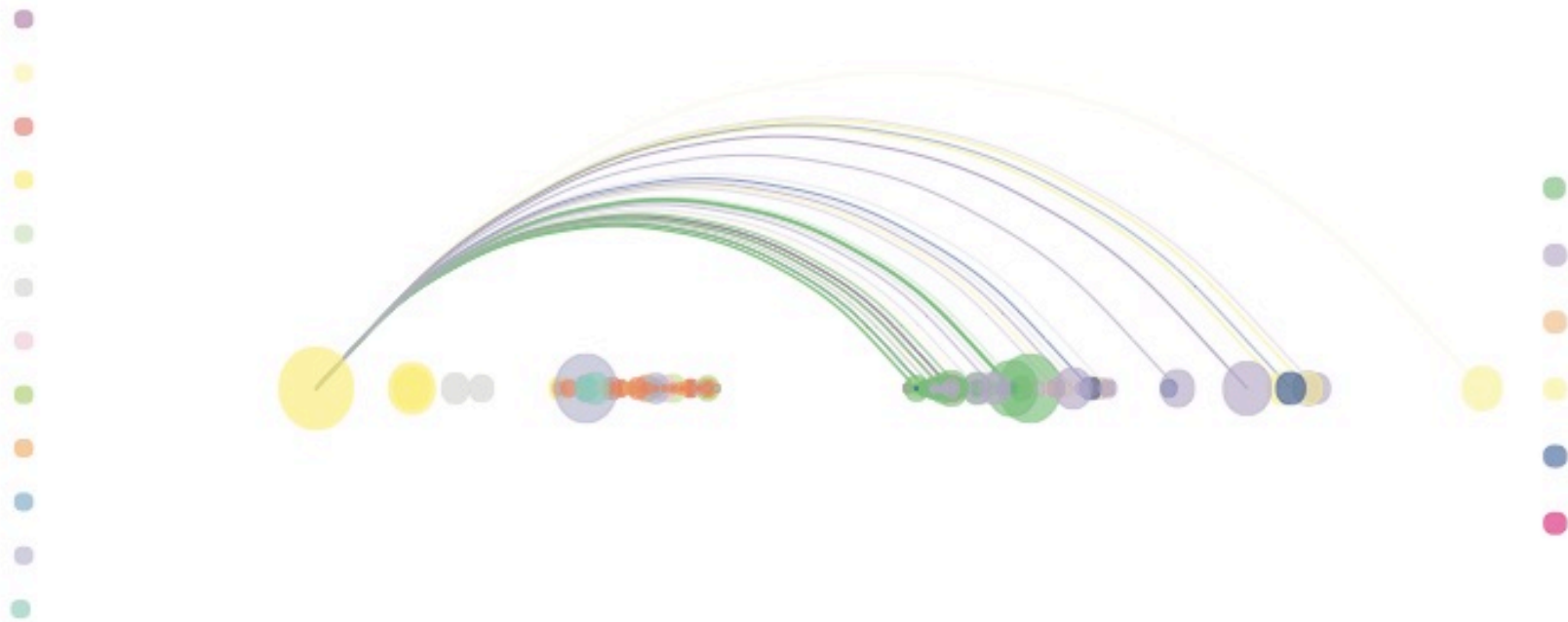




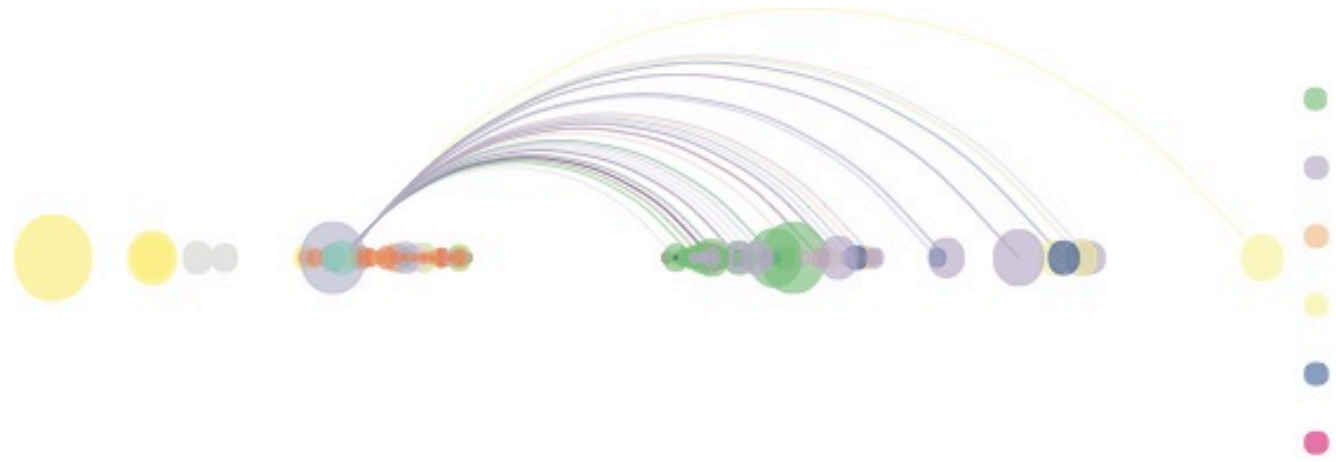






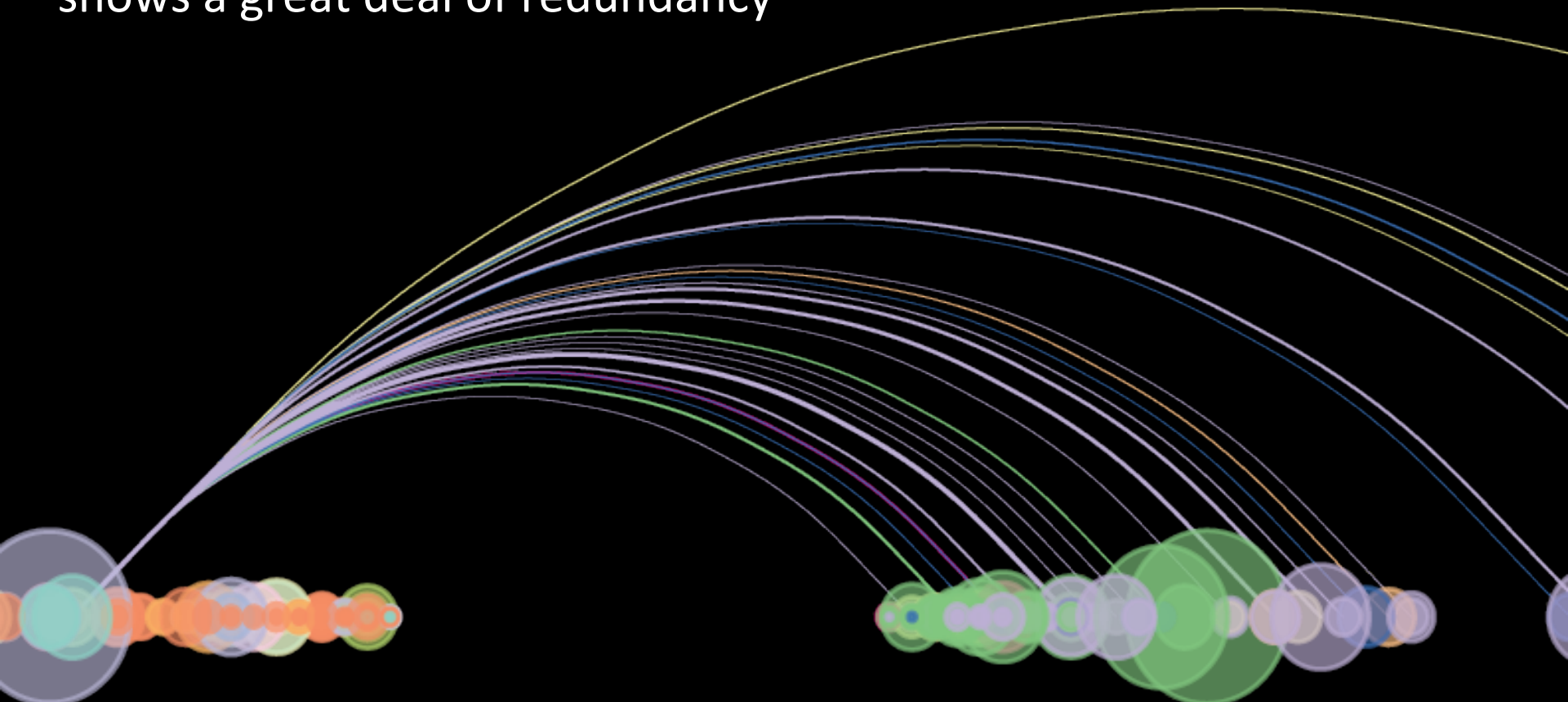


- Purple
- Yellow
- Red
- Orange
- Green
- Grey
- Pink
- Light Green
- Orange
- Blue
- Light Purple
- Teal



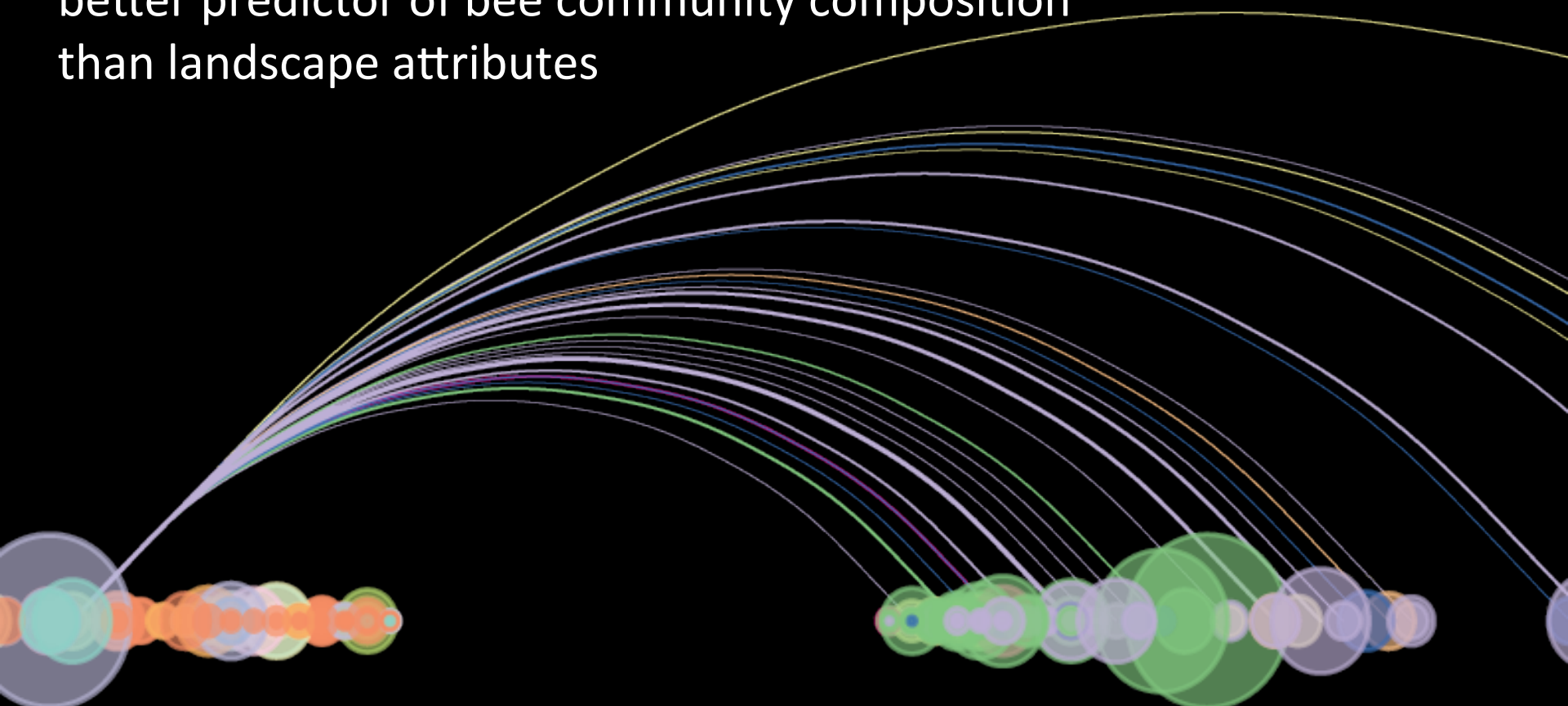
Conclusions

This records based pollinator network shows a great deal of redundancy



Conclusions

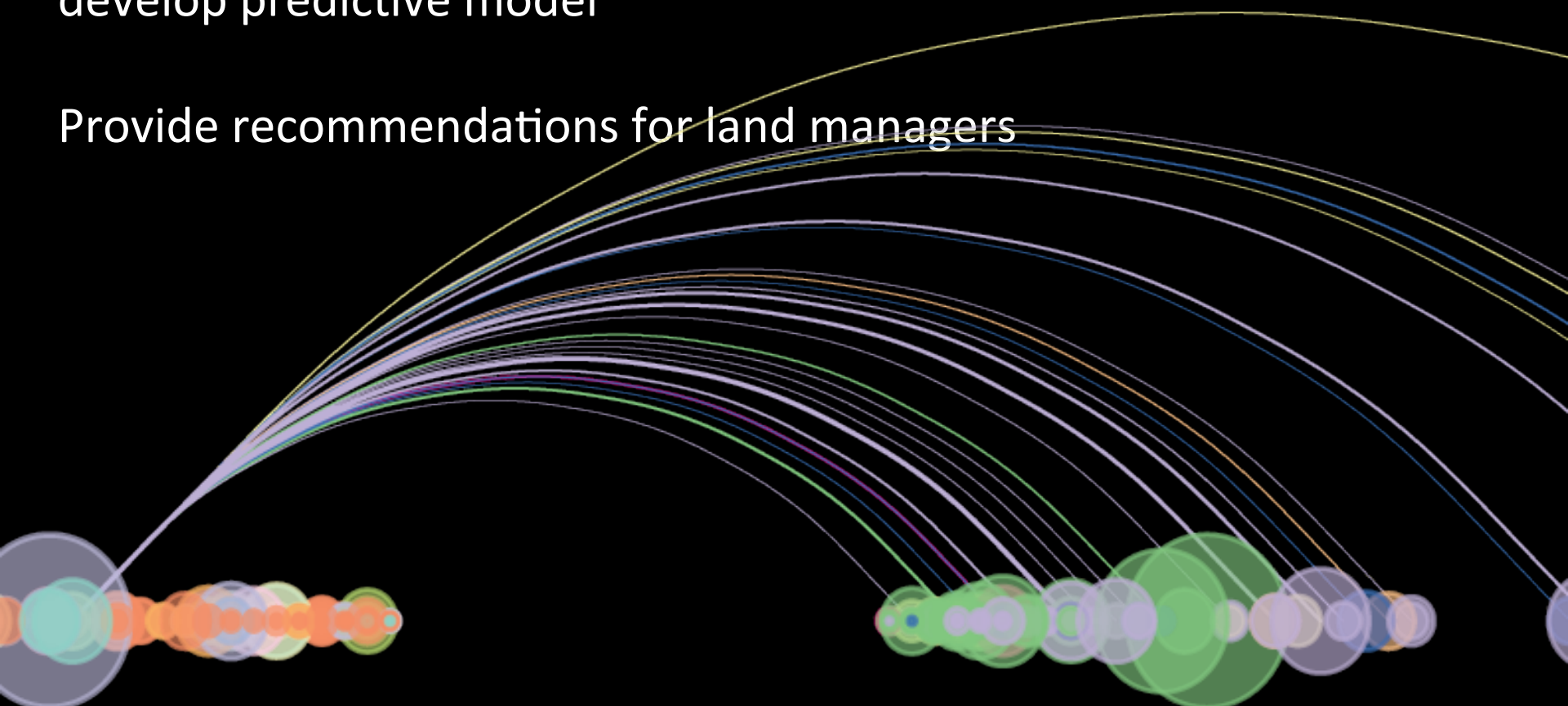
The presence of a plant species may be a better predictor of bee community composition than landscape attributes



Future Directions

Use plant records in combination with landscape attributes to develop predictive model

Provide recommendations for land managers



Acknowledgements

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- Sam Droege
- Collin Schwantes



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Questions?

