

TREE COVER AND CLIMATE IMPACTS ON NORTH AMERICAN MEGACHILIDAE BIODIVERSITY

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UNIVERSITY** 

College of Engineering,
Forestry, and
Natural Sciences



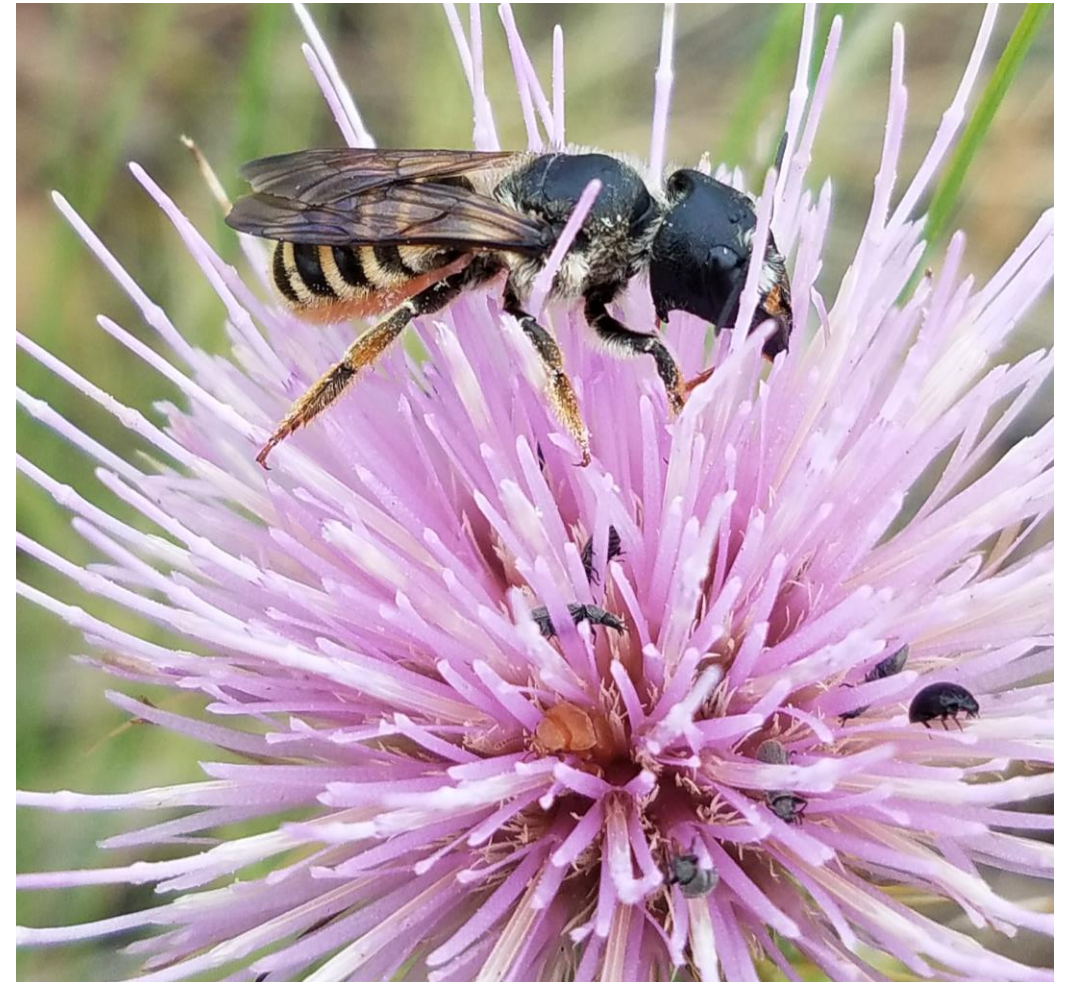


BEE POLLINATORS

- Native bee are important pollinators in almost every ecosystem
- 86% of flowers are pollinated by insects
- 1/3 of all crops are pollinated by bees
- Recently, there has been a decline in bee species

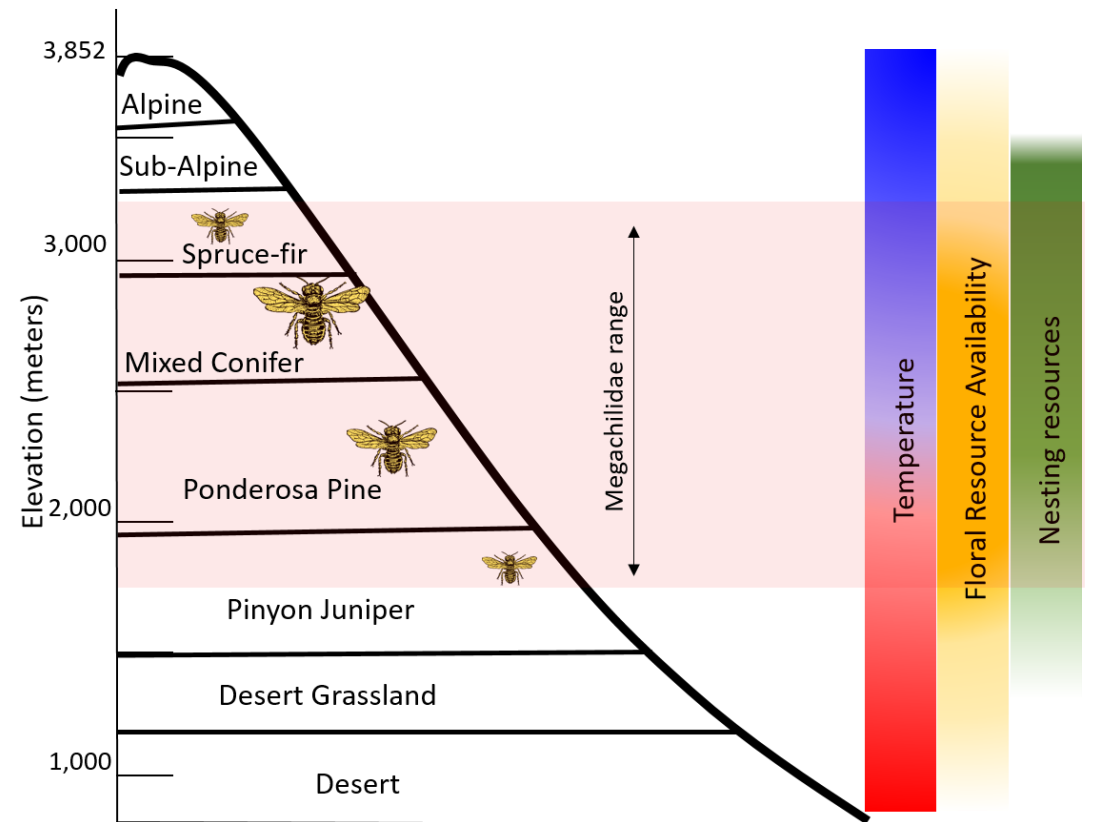
MEGACHILIDAE

- Comprise of leaf cutter bees and mason bees
- Family of bees that mostly nest in dead and down cavities
- Can be a native bee alternative for crop pollination



SAN FRANCISCO PEAKS

- Bee communities change along an elevation gradient
- At the highest elevation 80% of the bee communities was restricted to *Bombus* and Megachilidae
- Megachilidae continued to increase along the gradient until tree line

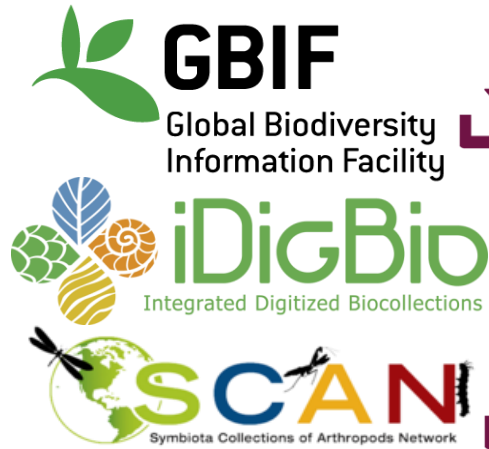


QUESTIONS

1. How does Megachilidae diversity change across North America, and are there regional hotspots?
2. How can biogeographic patterns be explained by climate and nesting resources?
3. Does Megachilidae biogeography correlate with specific types of woody plants?

DATA!

- 6% of US specimens digitized
- 14% of public records for arthropods are bees
- Bees are most digitized higher taxa of arthropods



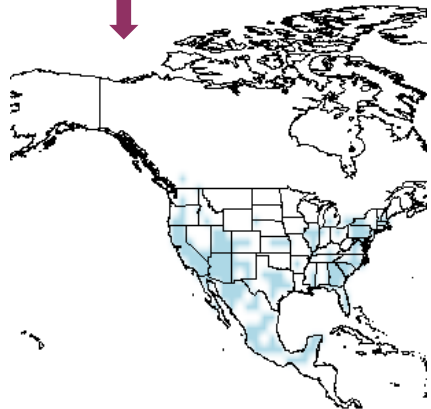
~300,000 records

Aggregated Megachilidae Data Set

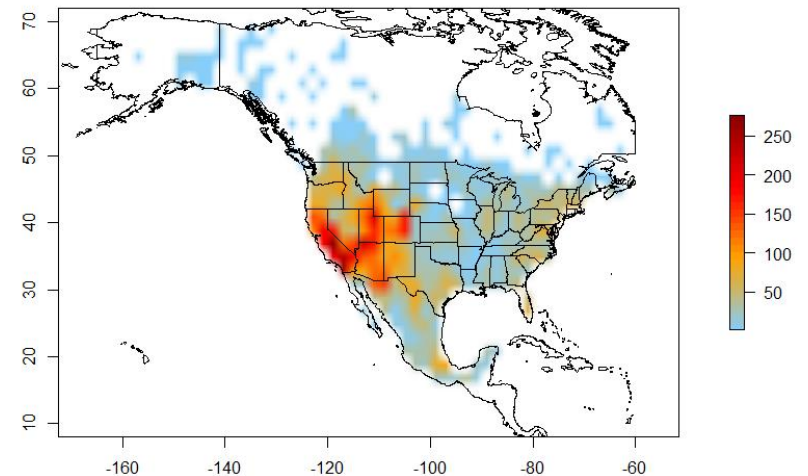
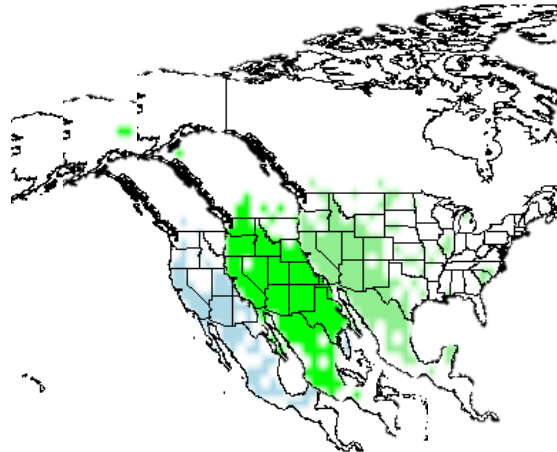


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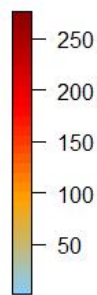
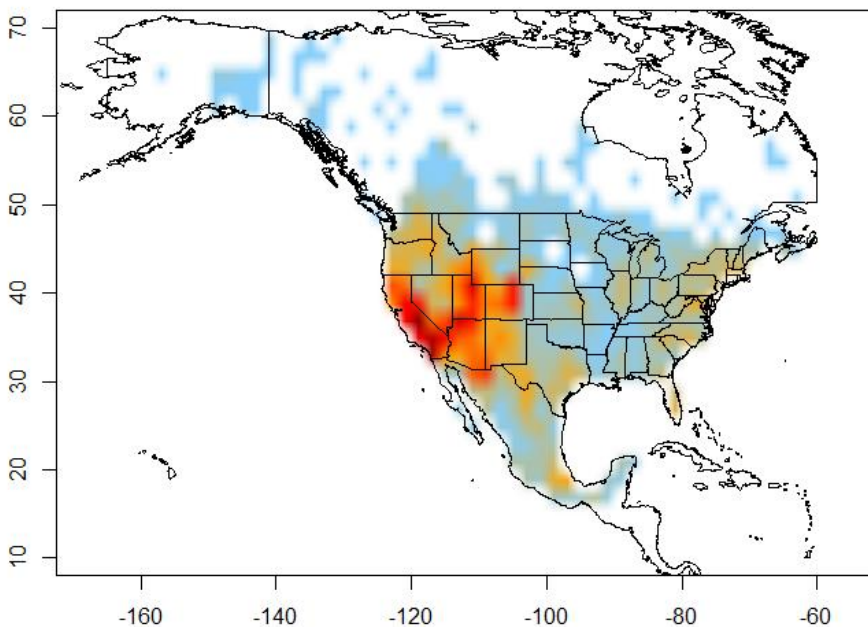
162,000 cleaned records



842 species



ANALYSIS



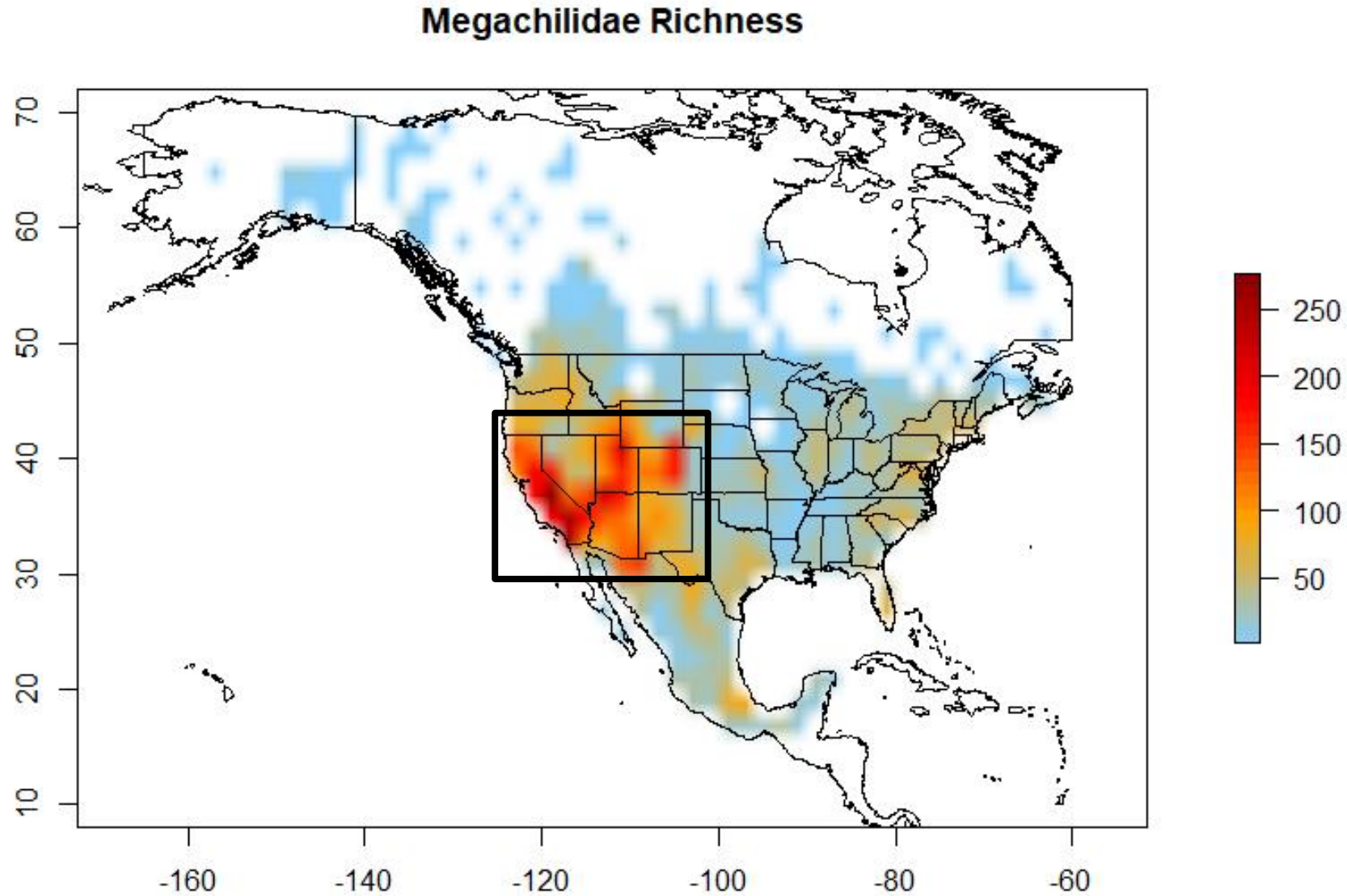
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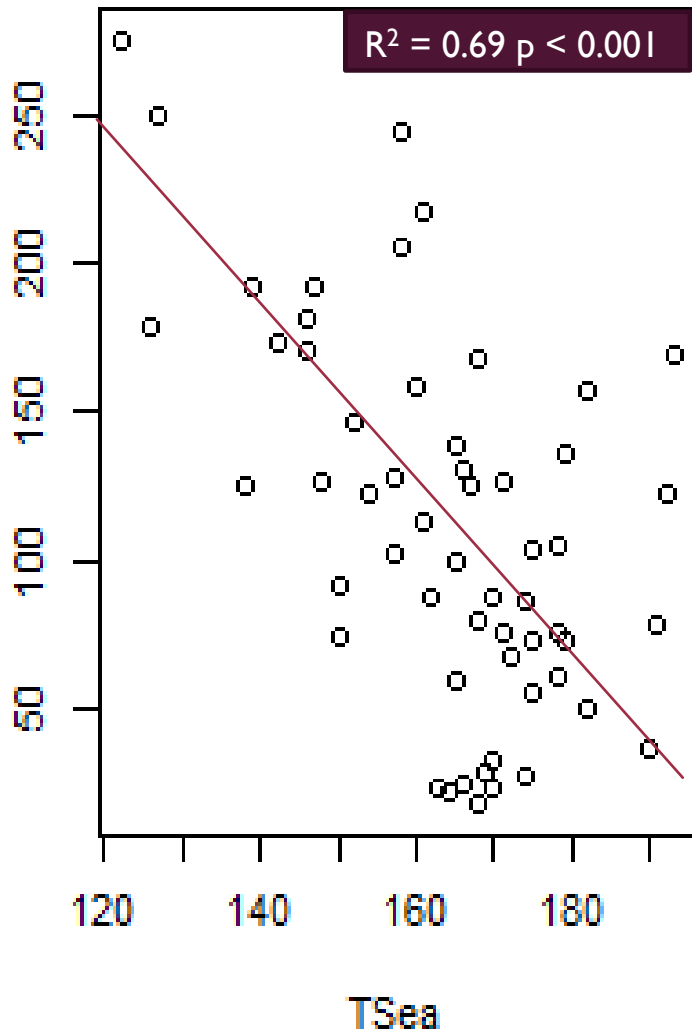


HI: ARE THERE REGIONAL HOTSPOTS OF MEGACHILIDAE BIODIVERSITY?

- Originated 125 MYA between present day S.America & Africa
- Early cavity nesters in evolution
- Distribution is not completely related to trees



Temperature



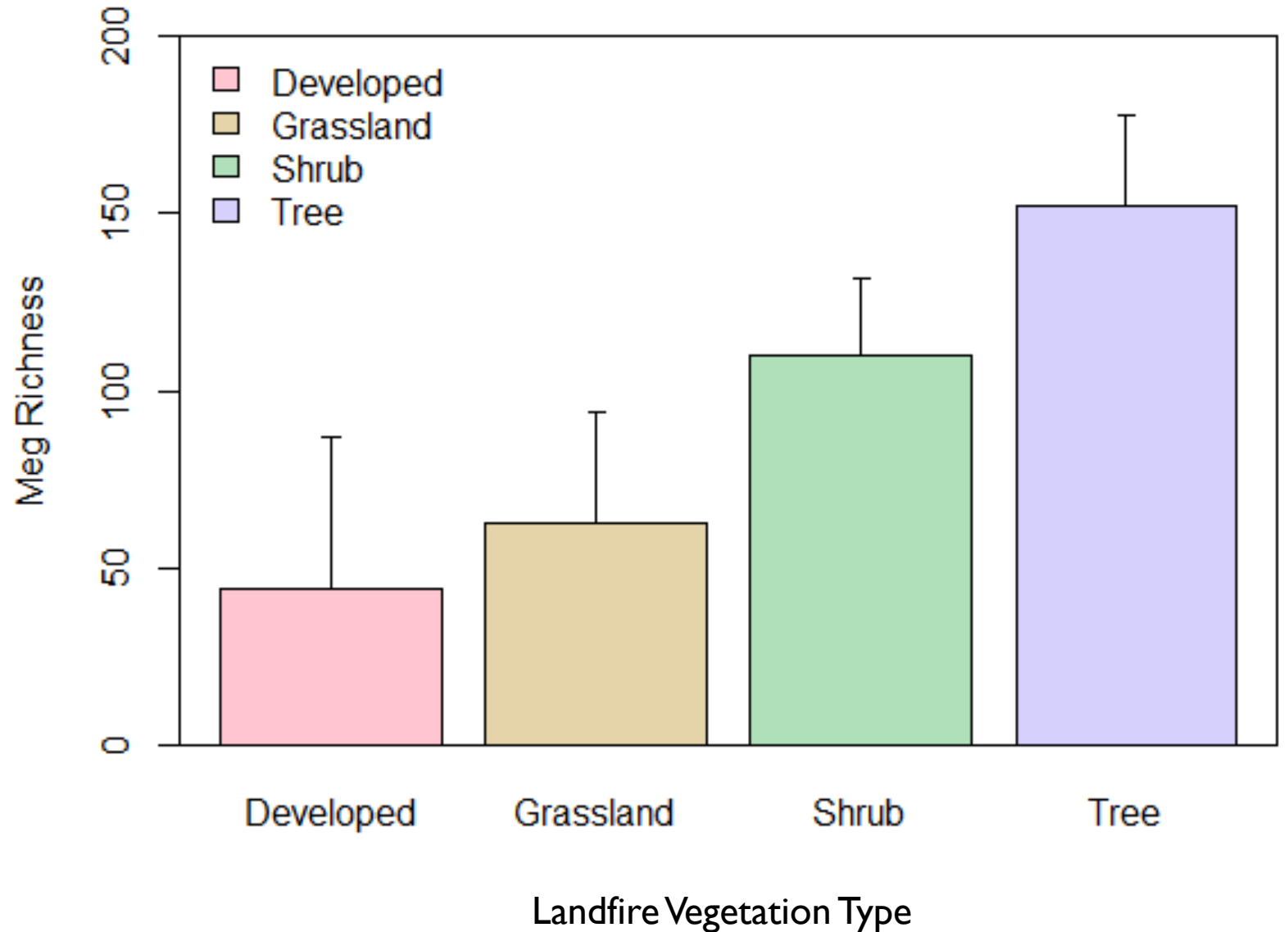
Precipitation

No Patterns with
precipitation

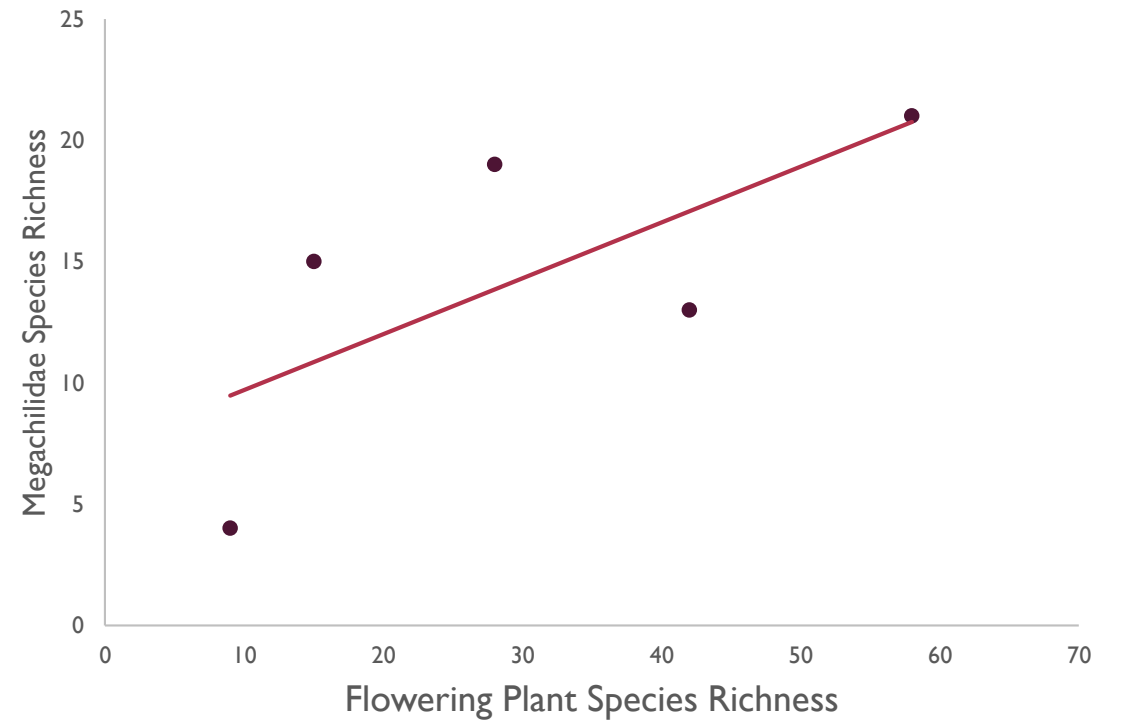
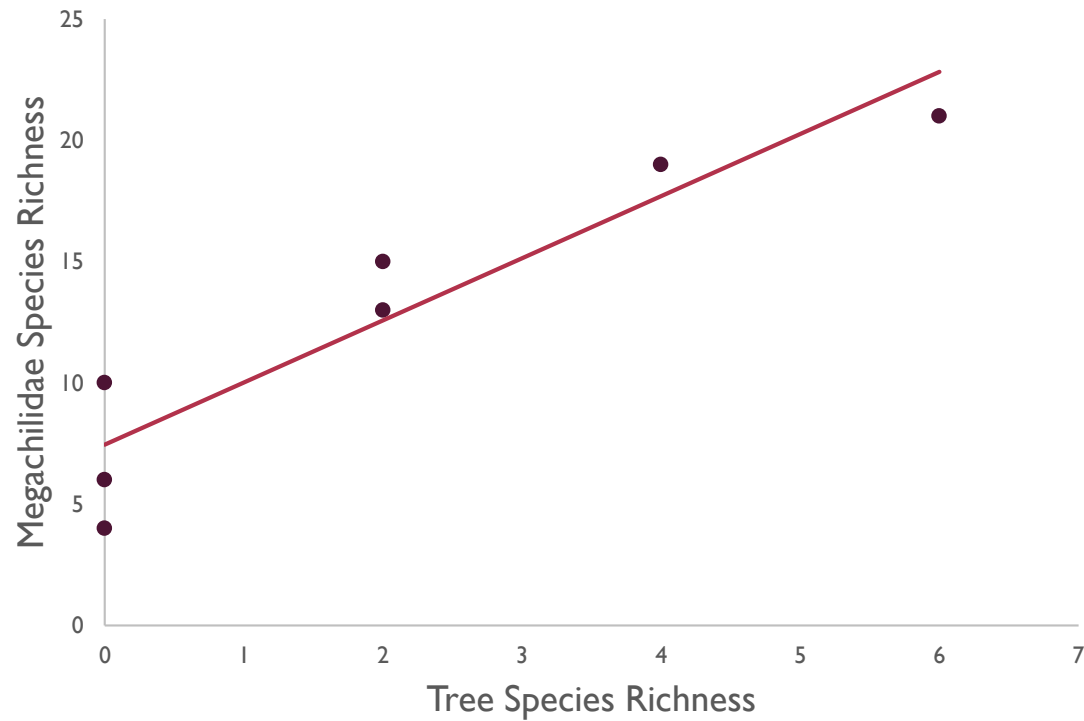
H2: HOW CAN
BIOGEOGRAPHIC
PATTERNS BE
EXPLAINED BY
CLIMATE?

- Negative relationship between temperature variable and species richness
- No clear patterns with precipitation

H2: HOW CAN BIOGEOGRAPHIC PATTERNS BE EXPLAINED BY NESTING RESOURCES?



LOCAL LEVEL TREE/SHRUB & FLORAL DIVERSITY



CONCLUSION

- Geography, Climate and Woody Plants play an important in the diversification of Megachilidae
- Hotspot of Megachilidae
- Forested area are more likely to have higher Megachilidae richness than other habitats
- Temperature limited not precipitation limited
- Floral resources needs to be investigated further
 - Need more data on biotic interactions!!





QUESTIONS?

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