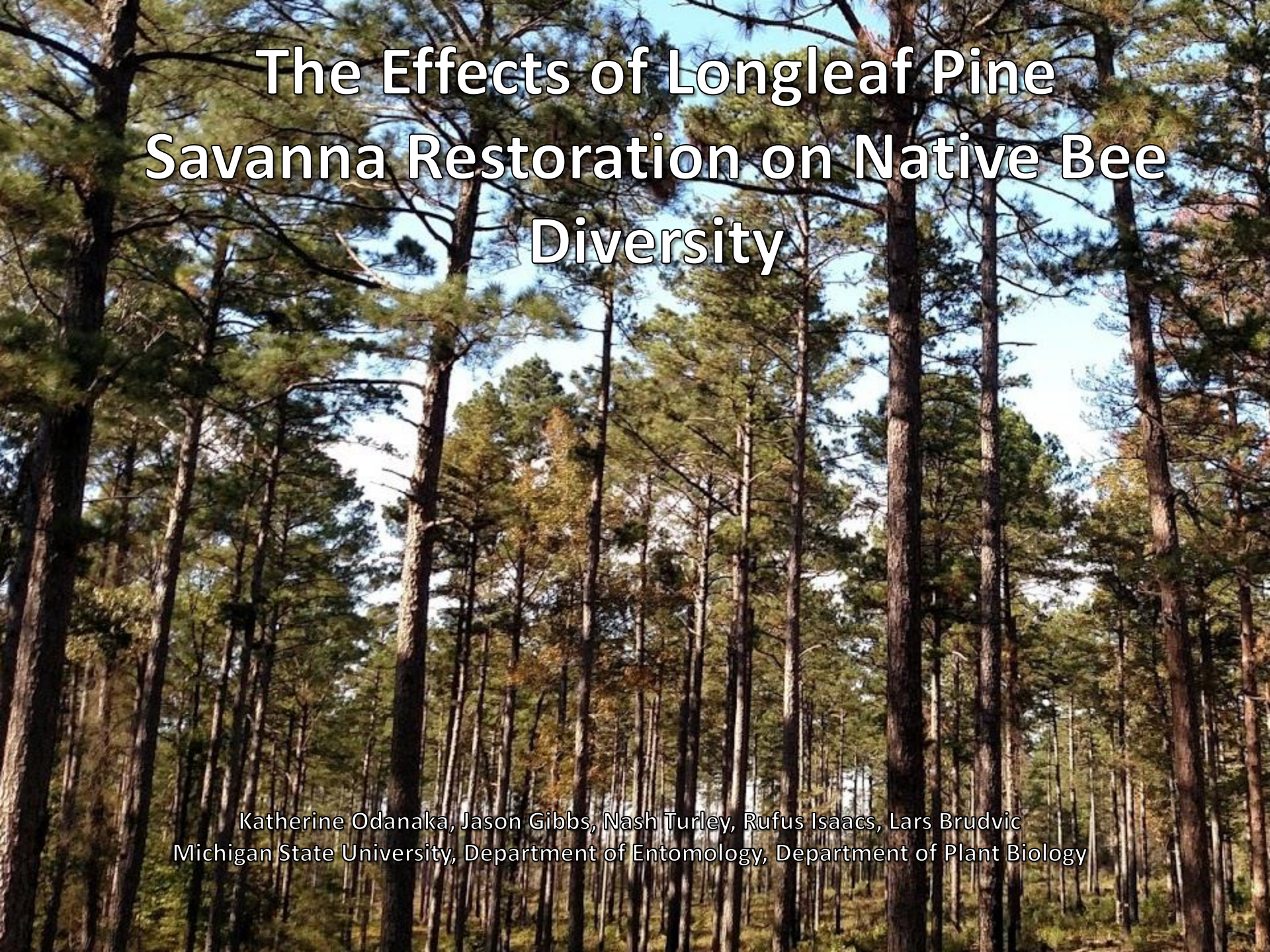
# The Effects of Longleaf Pine Savanna Restoration on Native Bee Diversity



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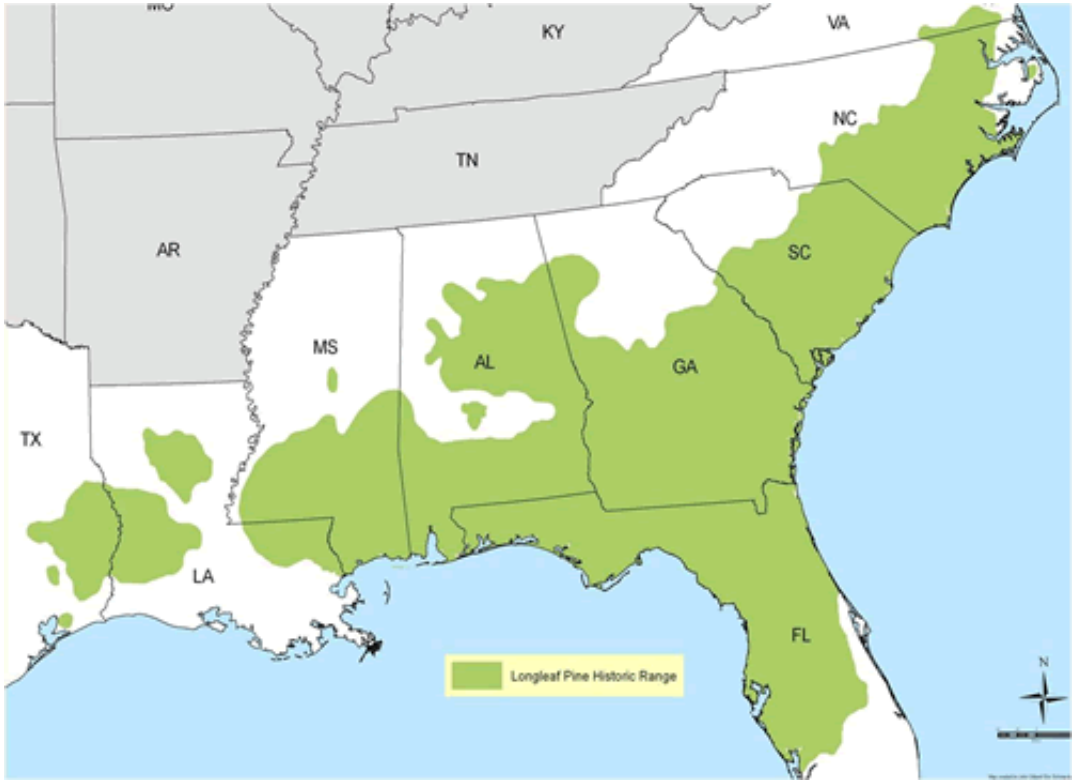
# Longleaf Pine Savanna

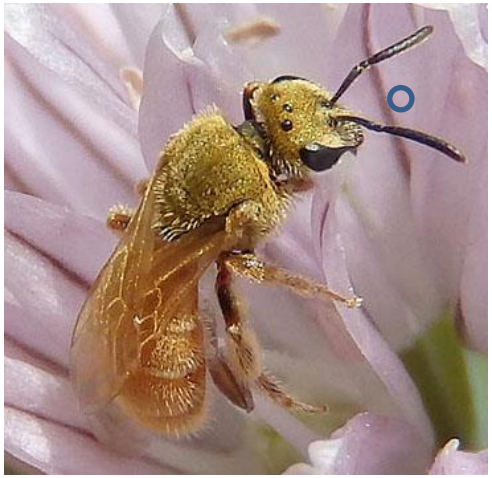
- Highly threatened, fire maintained ecosystem unique to the southeastern U.S.
- Dominated by *Pinus palustris*
- >4% of original pine forests remain
- Degradation caused by many factors including:
  - Fire suppression
  - Logging and naval industry




# Longleaf Pine Savanna

What is being done to restore the savanna?

- Controlled burning
- Thinning/mechanical removal of non native plant species



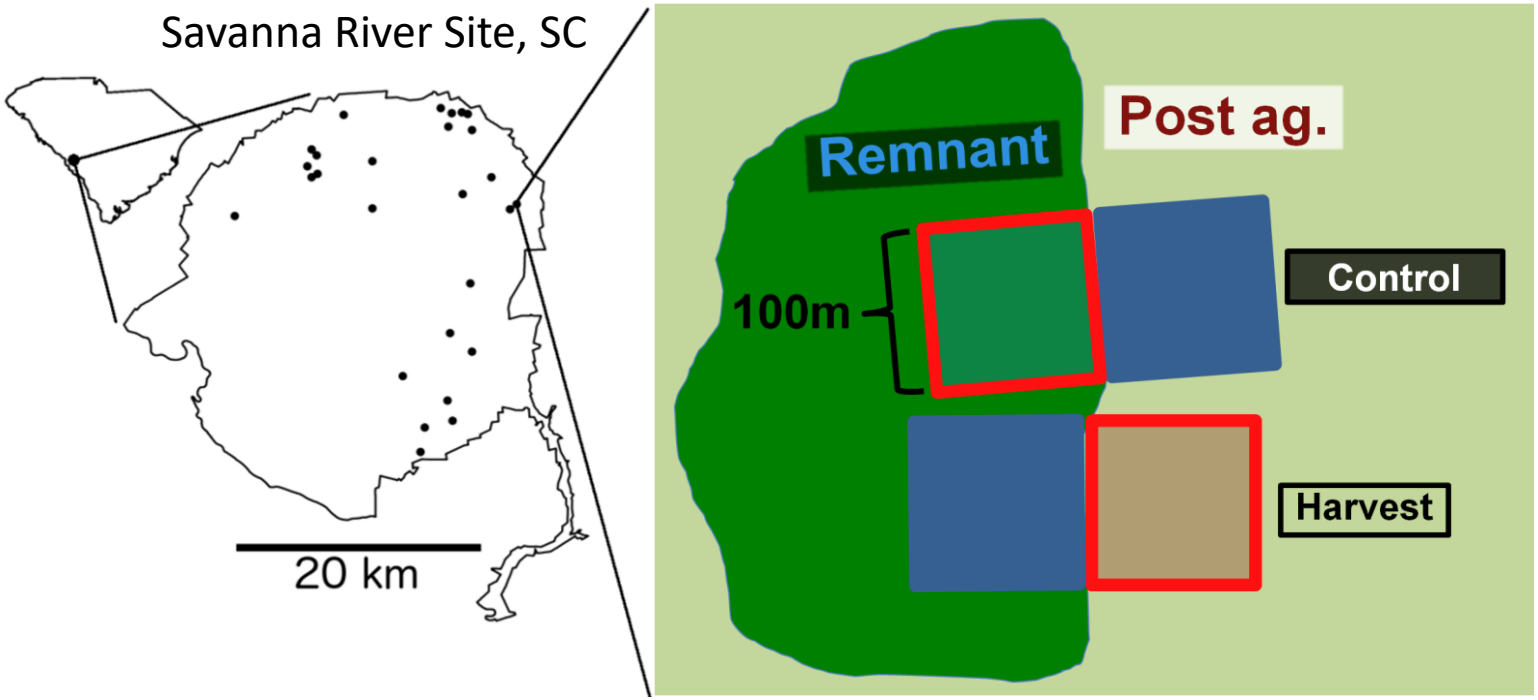
How do these efforts effect native bees?

# Hypotheses

Hypothesis 1:  Harvesting trees to restore savannas will increase native bee diversity

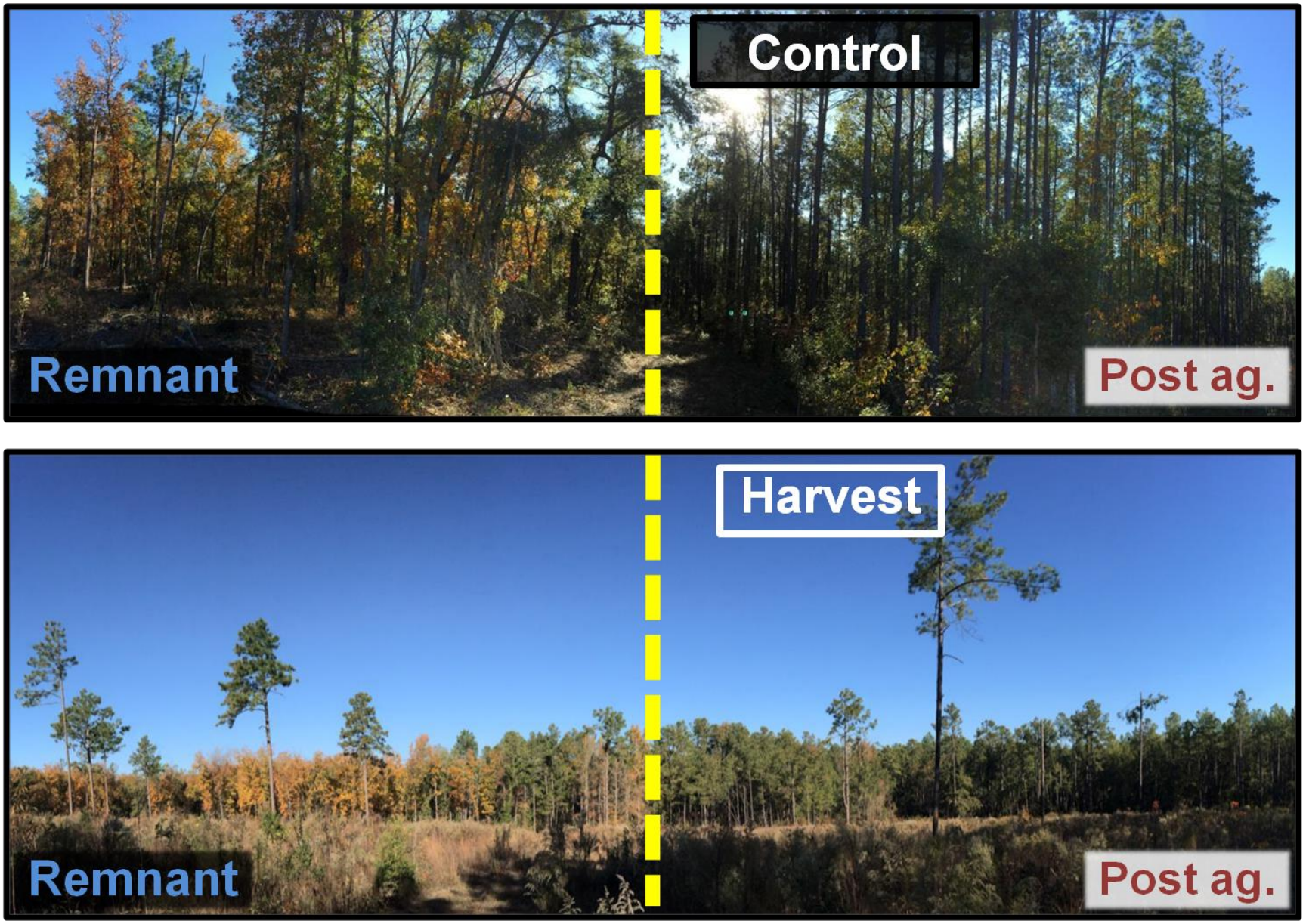
Hypothesis 2: Remnant plots will have greater bee diversity than former agricultural sites

# Sites




- **Remnant** = Undisturbed longleaf pine stands
- **Post ag.** = Former agricultural lands, planted with longleaf pines
- **Control** = no restoration treatments
- **Harvest** = trees removed to restore savanna

# Sites



# Results

Grand total: 1,257 bees
4 families
11 tribes
15 genera
35 species

**Andrenidae**
1 tribe
1 genus
1 species
2 specimens

**Halictidae**
3 tribes
6 genera
21 species
1220 specimens

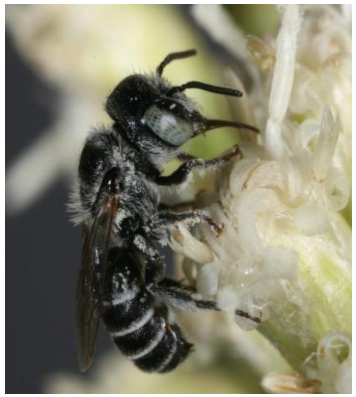
**Megachilidae**
3 tribes
3 genera
7 species
22 specimens

**Apidae**
4 tribes
5 genera
6 species
13 specimens

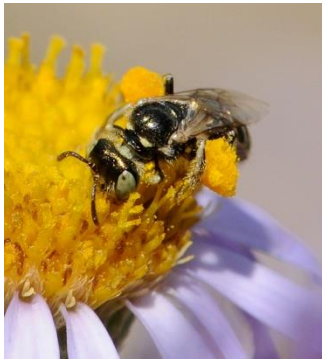
## Apidae

## Halictidae

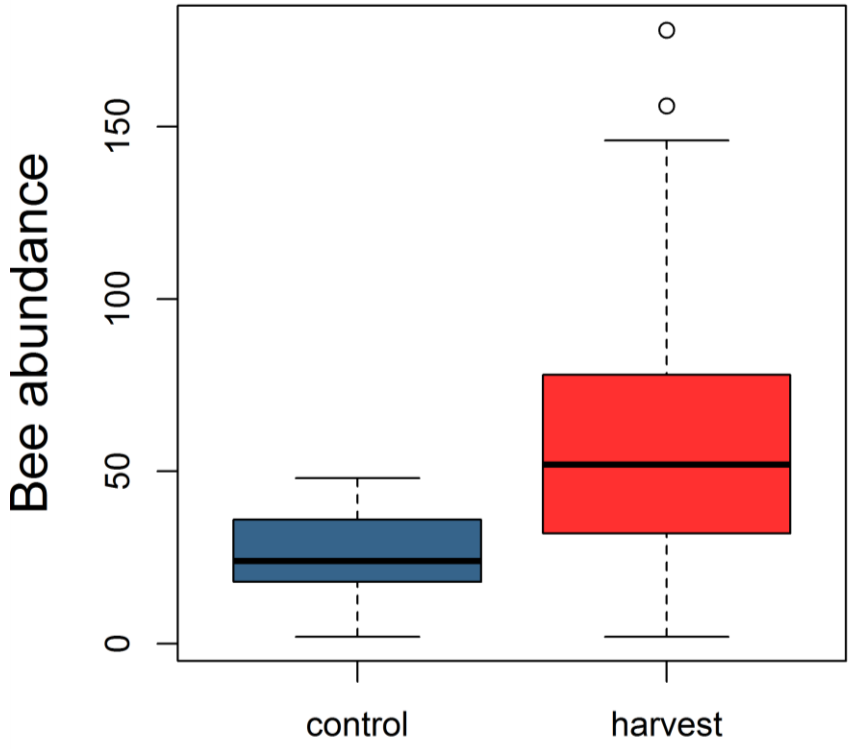
## Megachilidae

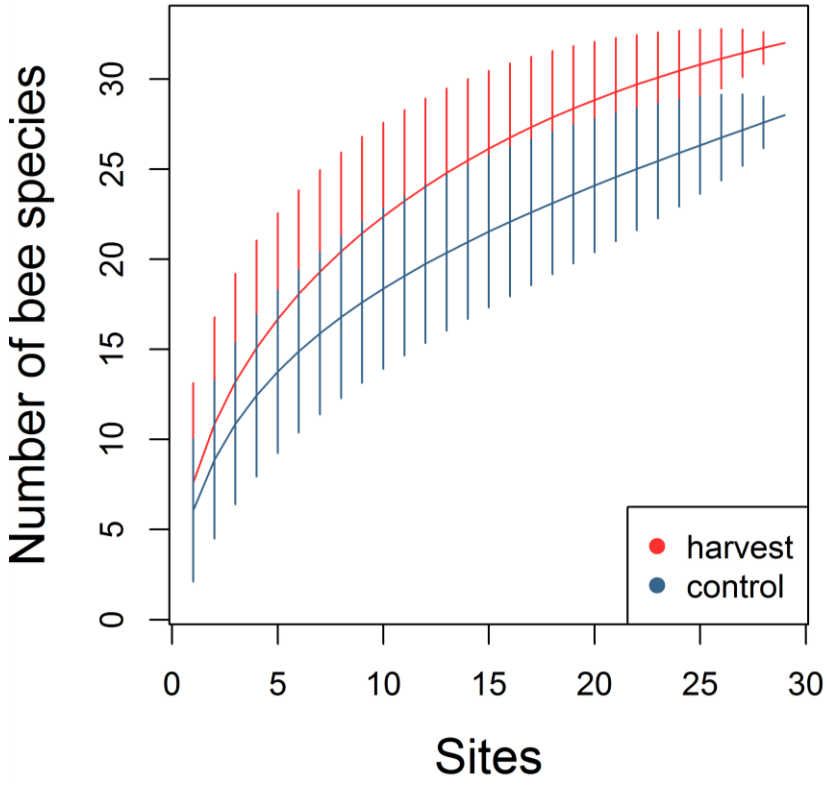


## Andrenidae

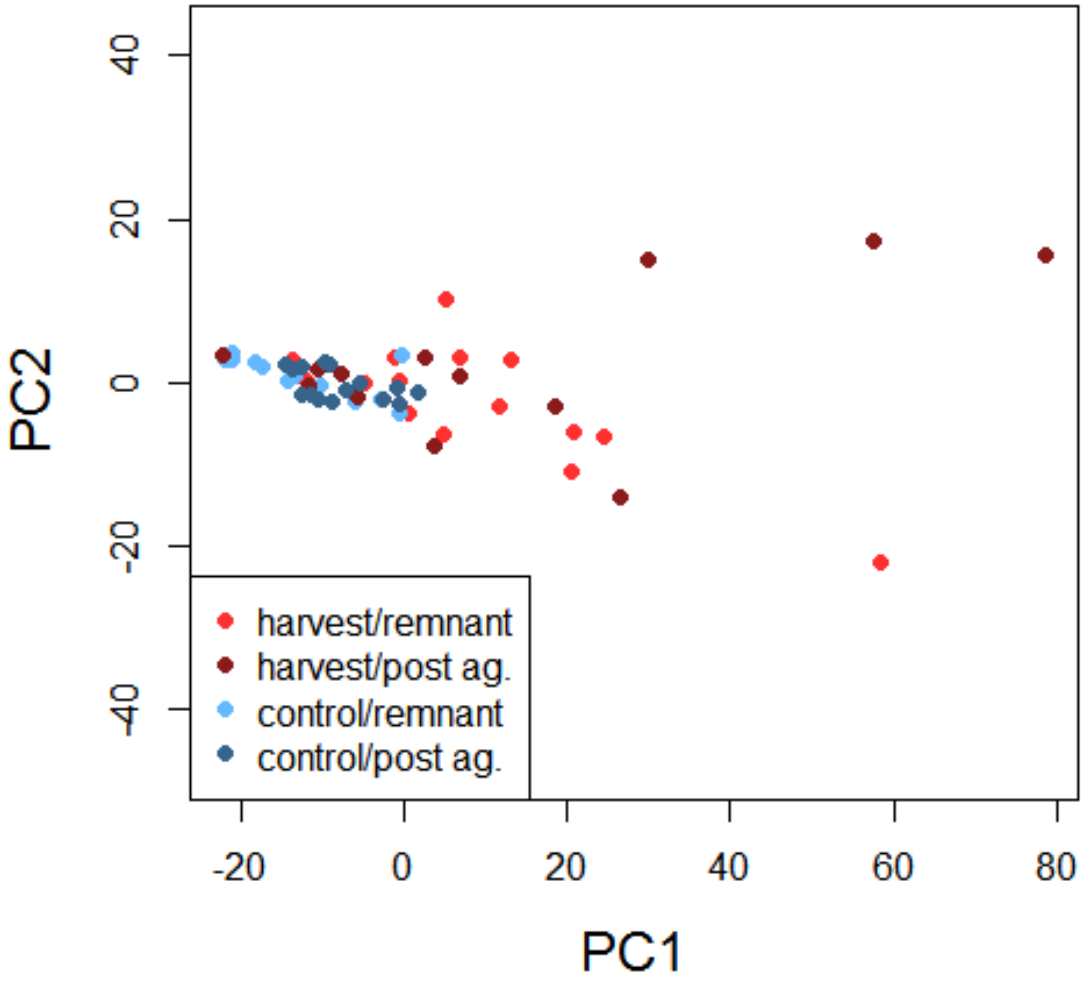


# Restoration Treatment



# Community Composition



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22 specimens

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5 genera
6 species
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# Factors of Native Abundance

| | Estimate ± SE | z value | p-value |
|---|---|---|---|
| (Intercept) | 4.75 ± 1.71 | 2.73 | 0.0064 * |
| % canopy closed | -0.014 ± 0.002 | 5.53 | < 0.0001 * |
| % sand | -0.007 ± 0.019 | 0.34 | 0.73 |
| % vegetation | 0.002 ± 0.005 | 0.31 | 0.76 |
| Litter depth (cm) | 0.005 ± 0.048 | 0.094 | 0.92 |

# Takeaway

## Harvesting

- Opens canopy for more sunlight

## More Resources

- More flowering plants

## Greater Bee Diversity

- Take advantage of increased resources

# Takeaway

Harvesting trees to restore savannas will increase native bee diversity

- Both native bee abundance and richness increased
- Community composition was positively altered

Remnant plots will have greater bee diversity than post agricultural plots

- Land use history had no effect on bee diversity

# Acknowledgements

We would like to thank :
- The United States Forest Service
- Daniel Brickley

# References


Jason Gibbs
Nwf.gov
nrcs.usda.gov
Texastreeid.tamu.edu
Arborday.org
Bugguide.net
Pinterest.net
Nextsuccession.com


# Thanks!