

A detailed botanical illustration background featuring various plants and flowers. In the top left, there are pink and purple flowers with green leaves. In the top right, there are white flowers with green leaves. In the bottom left, there is a large yellow flower with a dark red center and green leaves. In the bottom right, there is a yellow lemon with green leaves and a small white flower. The central text is enclosed in a white rectangular box with a thin black border.

# Give Bees A Chance

Potential loss of pollinator diversity  
and abundance

# Background

- Native pollinator significance
- General trend of decline
  - Habitat loss/fragmentation
  - Pesticides, other pollutants
- Echinacea study area surrounded by expanding crop lands





# Habitat Loss

## Ben Lee GIS Analysis

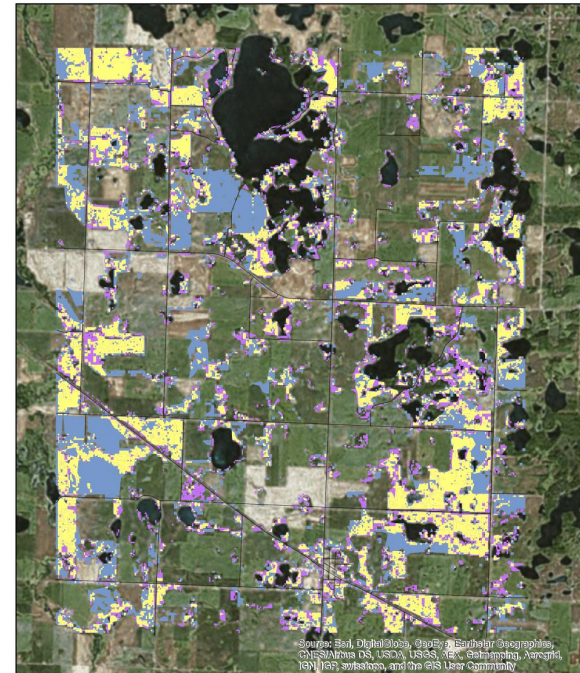
- Pollinator Habitat: “grass/pasture or as herbaceous wetlands”

In 2004: 10.4 mi<sup>2</sup>

In 2014: 7.7 mi<sup>2</sup>

## Pollinator Habitat between 2006 and 2014

Ben Lee



0 0.5 1 2 3 4  
Kilometers

### Legend

- Intersection of 06 and 14
- Pollinator habitat 2014
- Pollinator habitat 2006



# Pan Collection

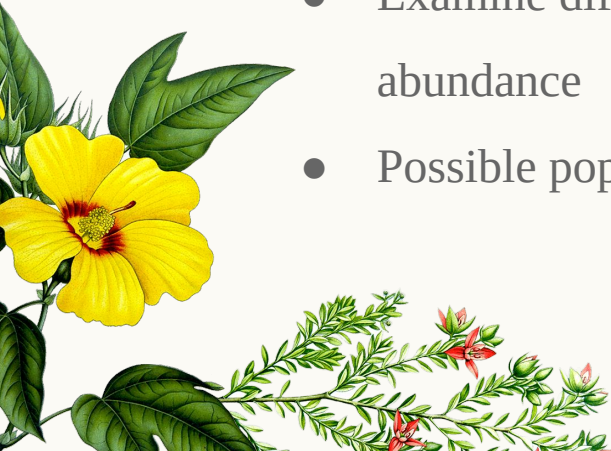


- Pan traps set in 2004, rebooted in 2017
  - **2004:** 20 sites
  - **2018:** 39 sites
- “Sites are located within a gradient of various surrounding landscapes, some surrounded by **natural areas, semi-natural areas, agricultural fields, development, or a mixture of the above.**”



# Aim

- Given importance of pollinators, habitat loss
- Examine differences between 2004 and 2018 pollinator diversity, abundance
- Possible population declines and/or loss of diversity







# Results

Families present:

**2004** - Apidae, Halictidae, Colletidae, Megachilidae, Andrenidae, Anthophoridae

**2018** - Apidae, Halictidae, Colletidae, Megachilidae

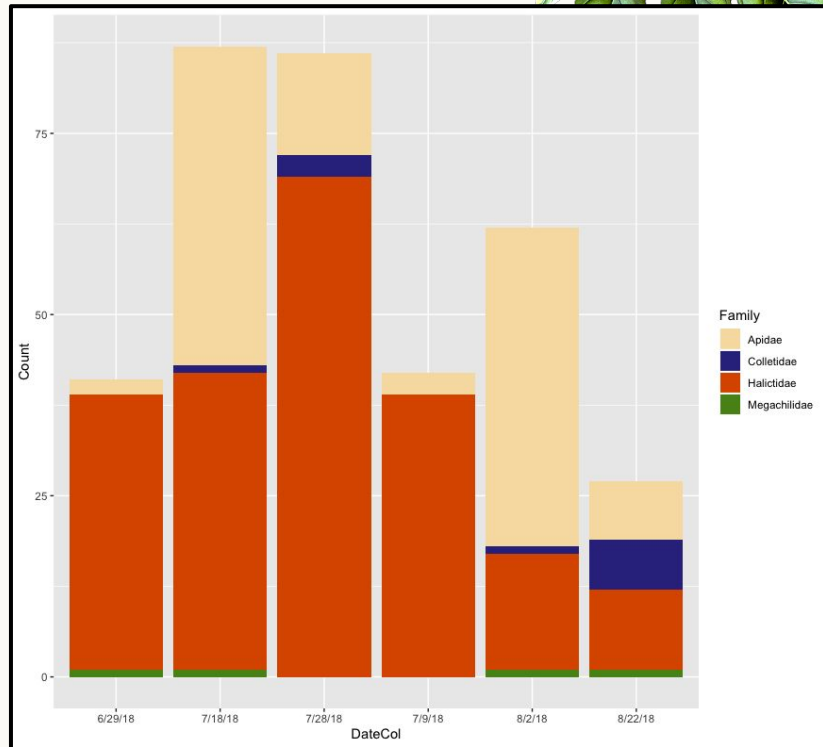
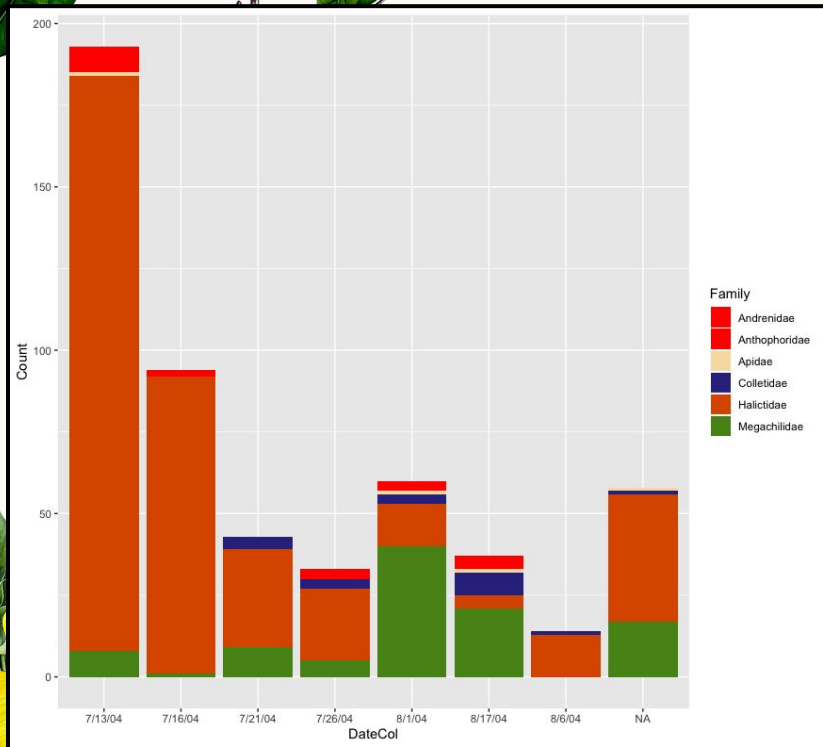
Shannon Index: *Quantifies uncertainty when taking a random sample of a population*

**2004** - 0.85

**2018** - 0.83

Small, but measurable decrease

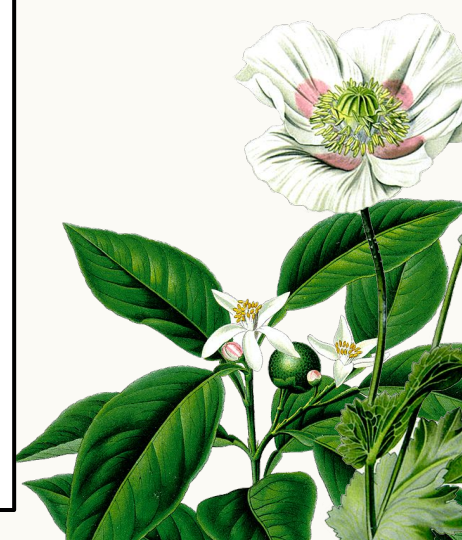






Year-Trap#	ShannonDiversity
2018-4	0.61
2004-4	1.00
2018-5	0.96
2004-5	0.68
2018-9	0.83
2004-9	0.08
2018-15	<b>0</b>
2004-15	<b>0.70</b>
2018-17	0.91
2004-17	1.00
2018-18	<b>0</b>
2004-18	<b>0.38</b>
2018-20	<b>0</b>
2004-20	<b>0.46</b>
2018-21	0.41
2004-21	0.21

Year-Trap#	ShannonDiversity
2018-22	0.67
2004-22	1.07
2018-24	<b>0</b>
2004-24	<b>0.56</b>
2018-26	<b>0</b>
2004-26	<b>0.20</b>
2018-29	<b>0</b>
2004-29	<b>0.33</b>
2018-27	<b>0.69</b>
2004-27	<b>1.10</b>
2018-33	<b>0.38</b>
2004-33	<b>1.22</b>
2018-34	0.50
2004-34	0
2018-37	0
2004-37	0.12
2018-NA	0.64
2004-NA	0.84







# Constraints - It Bee Like That Sometimes

- 2017: Opportunity for further analysis (~a few months)
- 7 collection days in 2004, 6 in 2018
- Broadness of Family





# Conclusions

- Difference in abundances collected over similar time range
  - 532 ID'd pollinators in 2004 → 345 in 2018
  - Even with more sample sites (19)
- Measurable decrease in diversity, though small (0.02)
  - 2 Pollinator Families not present
  - More stark by site



# Sources

- [Echinaceaproject.org](http://Echinaceaproject.org) (Flog, Ben Lee work)
- Shannon, C. E. (1948) A mathematical theory of communication. The Bell System Technical Journal, 27, 379–423 and 623–656.







**Thanks!**  
*Any questions?*

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