

Pollinators in Peril – Are Illinois Native Bees Getting Smaller?

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Question to Answer

Have Illinois native bees been decreasing in size over the past 120 years?

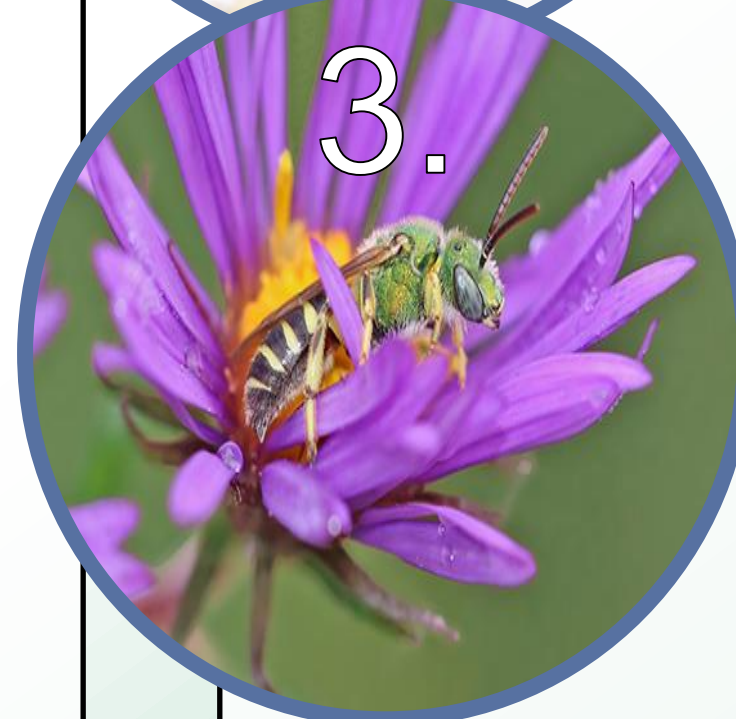
Why it Matters

Pollination services provided by native bees are an important natural process, providing ~150 billion dollars globally in agricultural gains³.

A bee's body size is a trait that is an important indicator of the nutritional environment. A loss of habitat results in a loss of rich nutritional environments as flowers and resource become more fragmented and scarcer.¹



It has been discovered that a bee's body size is a determinant of their foraging range². The smaller the bee, the less distance they can travel for food, therefore, the more susceptible they are to habitat loss and resource limitation.



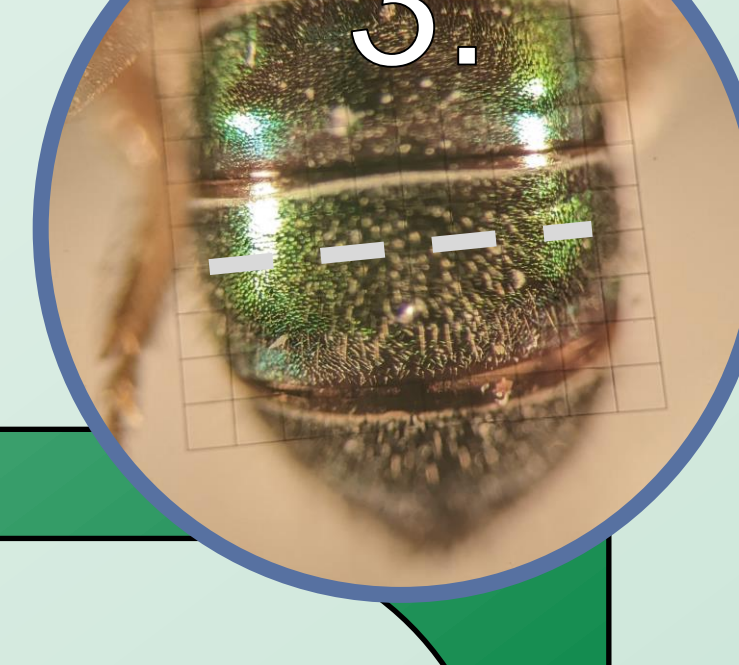
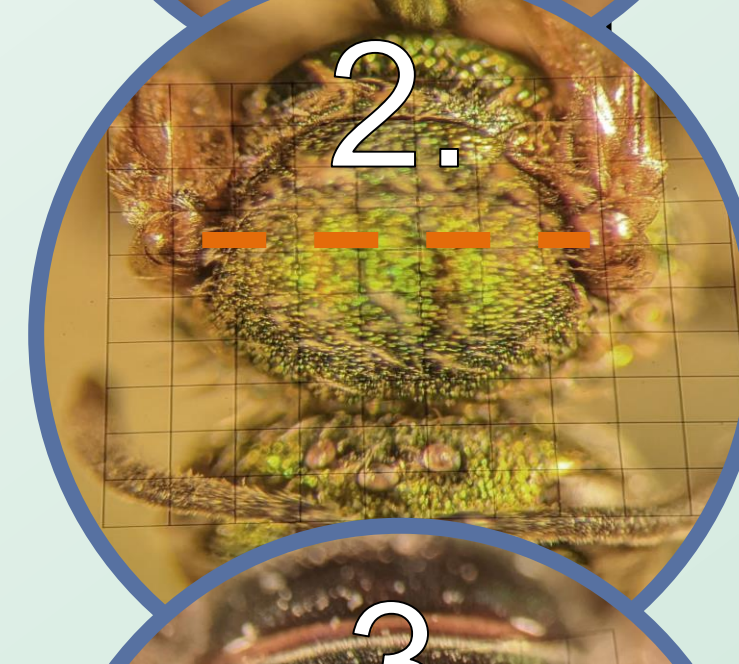
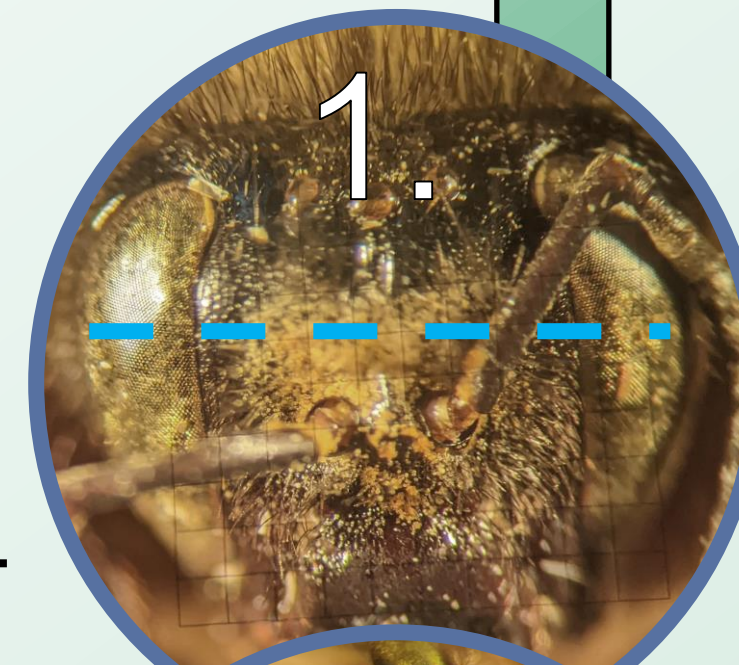
Measuring the Bees

Bees Used:

- Bombus griseocollis*
- Augochlora pura*
- Agapostomen virescens*

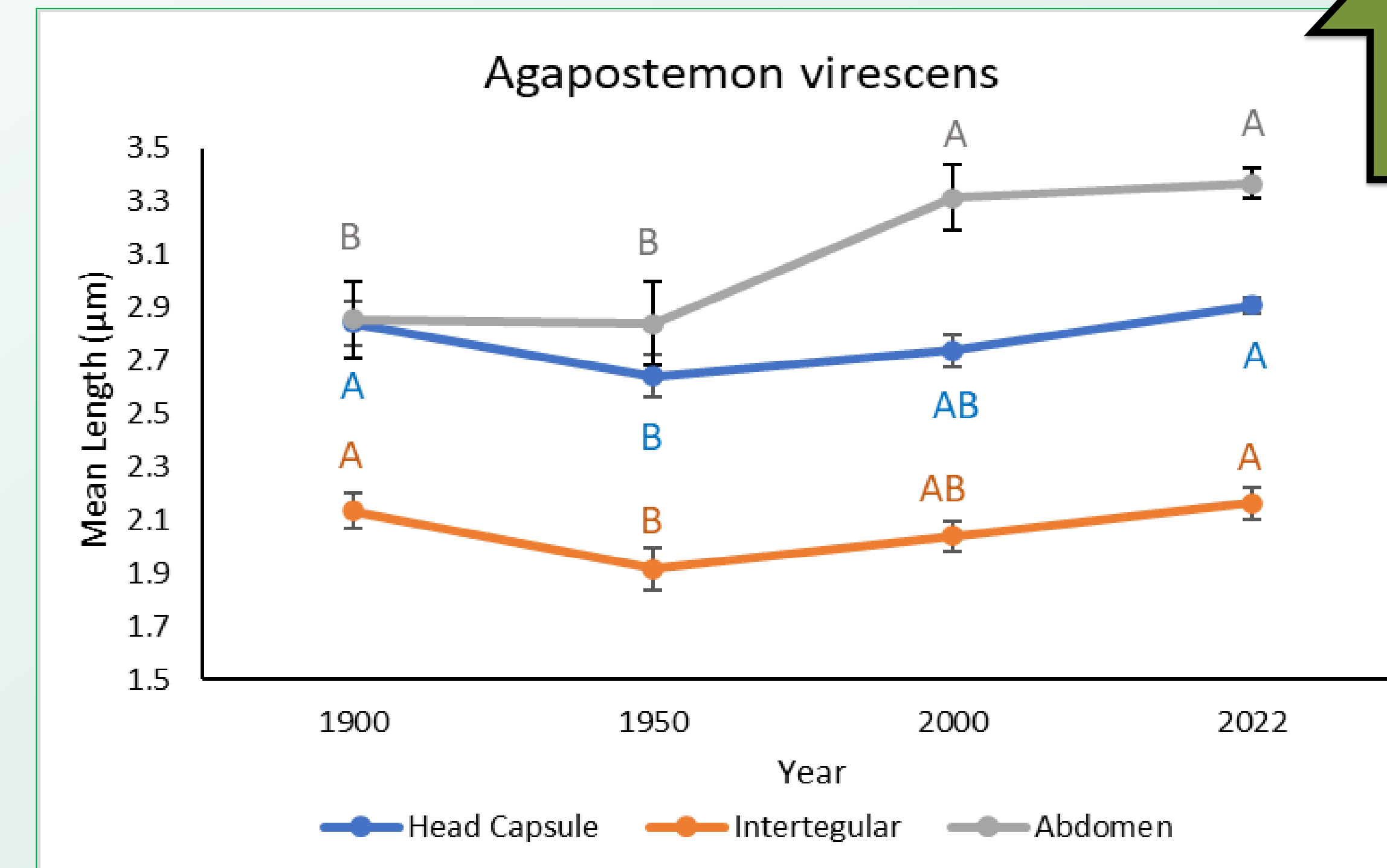
Traits Measured (µm):

- Head Width
- Intertegular Distance
- Abdomen Width

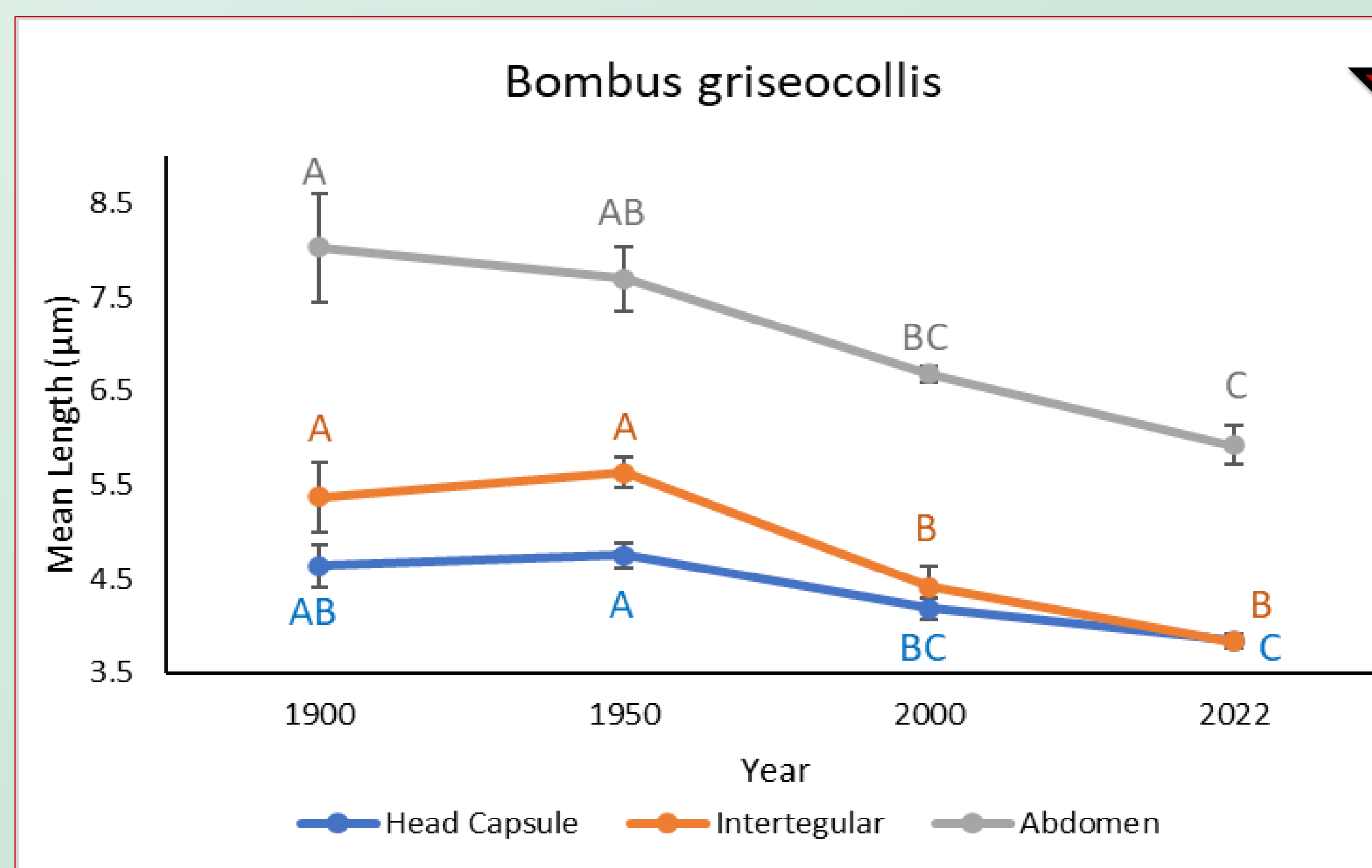


Data and Results

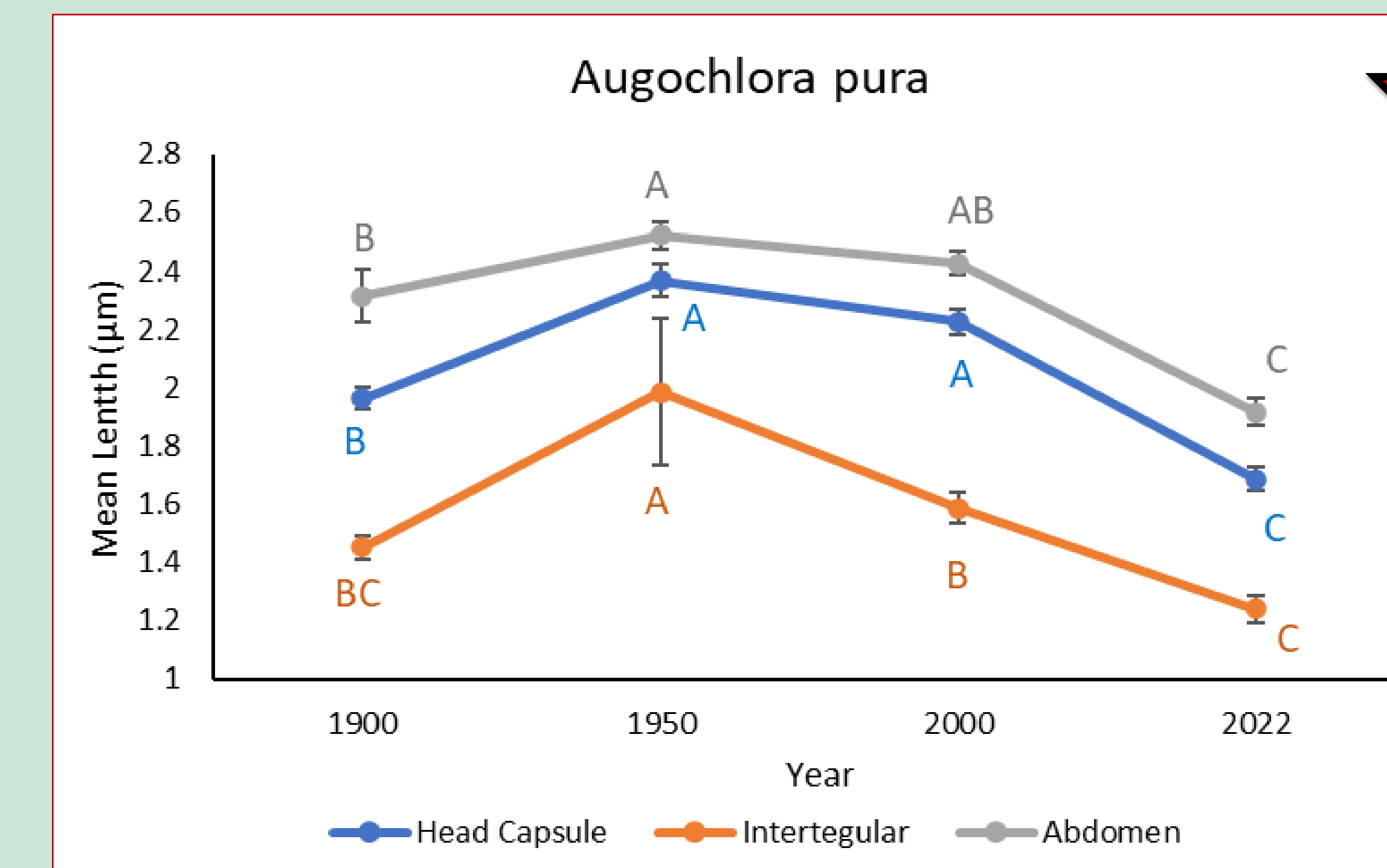
BODY SIZE INCREASED



BODY SIZE DECREASED



BODY SIZE DECREASED



Conclusion

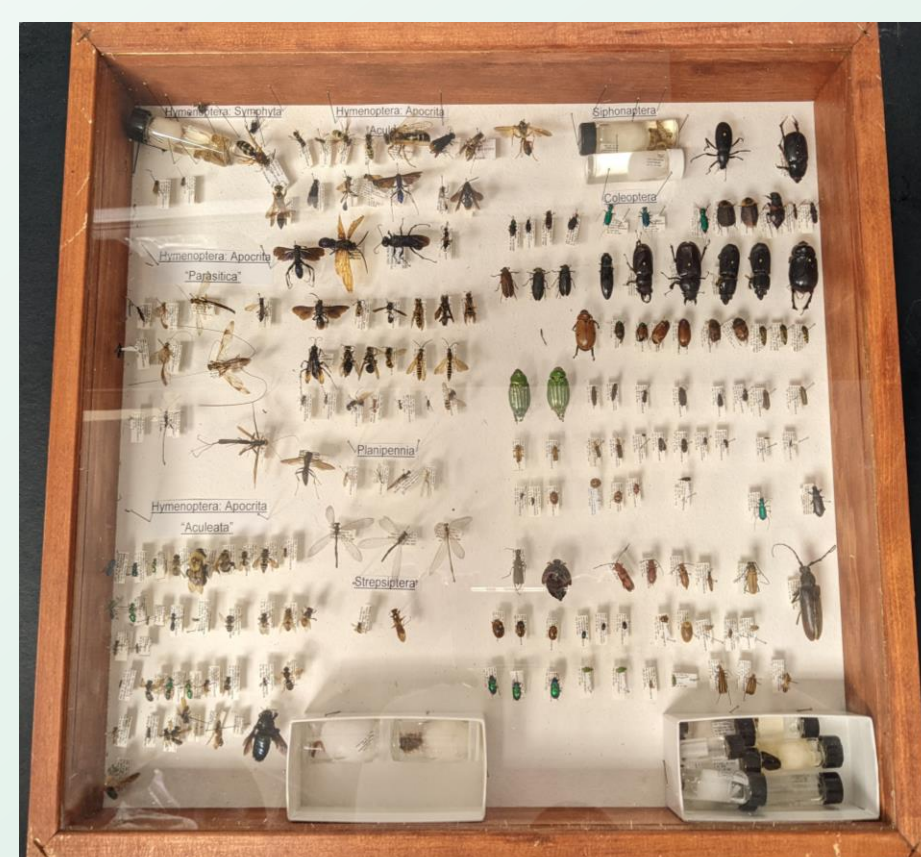
- A. virescens* body size increased over time, unsurprising as this bee is a “generalist” pollinator and is often found in disturbed habitats.
- Two bee species measured showed a significant decrease in size over time ($p < 0.05$). These “specialist” species may have a negative relationship to land use changes that reduce vital resources.

What Next?

- Do we see similar trends among other native bees?
- How does body size over time relate to land use change (e.g., agriculture and urbanization)?

Obtaining the Bees From...

1900, 1950, 2000



- Ten voucher specimens per year range (10-year window)
- Pulled from the Illinois Natural History Survey in Champaign, IL

2022

Targeted Netting
30 minutes of targeted timed netting on alternating weeks at each site in June 2022

Pan Traps
Pan traps up overnight for 24 hours at each site biweekly



1. Fred Samson, Fritz Knopf, Prairie conservation in North America, *BioScience*, Volume 44, Issue 6, June 1994, Pages 418–421
2. D M Mayes, et al. Body Size Influences Stingless Bee (Hymenoptera: Apidae) Communities Across a Range of Deforestation Levels in Rondônia, Brazil, *Journal of Insect Science*, Volume 19, Issue 2, March 2019, 23,
3. Garantonakis N et al. 2016. Comparing the pollination services of honey bees and wild bees in a watermelon field. *Scientia Horticulturae*. 204:138–144.

Acknowledgments

Financial support was provided by the National Science Foundation under grant #NSF REU 1950819/1950786, as part of the Phenotypic Plasticity Research Experience for Community College Students, through the University of Illinois at Urbana-Champaign Institute for Genomic Biology and Parkland College. <http://precs.igb.illinois.edu/>

Thank you to Britt Carlson and Nathan Schroeder for providing the skills and education necessary to progress through the program, and thank you to Ashley St. Clair for providing support on the statistical analysis of the data.