

Zachary J. Beneduci

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Education

M.Sc. in Entomology; 4.0 GPA

Jan 2022 - Dec 2024

Auburn University, Auburn, AL, USA

B.Sc. in Wildlife Ecology; 3.75 GPA

Aug 2015 - May 2019

University of Maine, Orono, ME, USA

Employment

Research Technician

Jan 2025 - present

Auburn University, Auburn, AL, USA

Performed inferential statistics on a range of datasets relating to pollinator and plant community ecology. Utilized Generalized Linear Mixed Effects Models (GLMMs), Generalized Additive Mixed Models (GAMMs; for the analysis of time-series data), and Generalized Linear Latent Variable Models (GLLVMs; for the analysis of multivariate abundance data, including individual species responses and community dynamics). Produced automated reports and data visualizations in R Markdown. Developed a Shiny application for the visualization and sharing of data collected by the US Beekeeping Survey in collaboration with the Apiary Inspectors of America and Auburn University. Utilized Git and Github for project version control and sharing. Performed data wrangling tasks, such as reshaping and joining datatables, as well as cleansing prior to processing, utilizing the 'tidyverse' suite of functions. Assisted principal investigator with development of a relational Microsoft Access database with the backend hosted through Microsoft SharePoint for the Auburn University Native Bee Lab insect collection.

Graduate Research Assistant

Jan 2022 - Dec 2024

Auburn University, Auburn, AL, USA

Completed a Master's Thesis entitled "Effects of Biochar on Pollinator Plantings and Foraging Bees in a Southeastern Soil." Established two 4-year long research projects, aimed to understand the effects of 1) fall management practices (no management, mowing, light disking, and mowing + light disking) and 2) a pine-based biochar as a soil amendment on wildflower and foraging-bee density, diversity, and community composition. Created a fully normalized Microsoft Access database for thesis project data, ensuring strict data validation rules via field and form properties, as well as Visual Basic code. Implemented double-data-entry for the detection of data entry errors. Automated insect label creation, including functioning QR codes, between Access queries and Microsoft's Word Merge. Delivered annual project reports to the United States Department of Agriculture (USDA). Presented research findings in poster and oral format to both expert and nonexpert audiences at local and regional conferences/meetings. Coordinated meetings, project timelines, and delivery of research outputs with collaborators at Auburn University and the USDA. Served as a mentor for two students completing undergraduate research projects building off of thesis experiments. Organized fieldwork with undergraduate and post-graduate research technicians, as well as site managers.

Pollinator Habitat Technician**June 2021 - Aug 2021***University of Massachusetts Amherst, Amherst, MA, USA*

Sampled bees and vegetation for the Pollinator Habitat in Log Landings (PHiLL) research project conducted in the Hoosier, Shawnee, and Mark Twain National Forests. Bees were collected by timed netting surveys and bowl traps, while vegetation species composition and cover characteristics were measured in seeded split-plots. Minor duties included bee processing and data entry.

Pollinator Field Research Technician**June 2020 - Sept 2020***North Dakota State University, Fargo, ND, USA*

Surveyed pollinators in rangelands across 30 sites in northwestern North Dakota as part of a statewide monitoring effort. Conducted distance sampling for butterflies. Netted bees during timed surveys along belt transects and passively collected bees using pan traps. Sorted specimens by taxon and labeled for future pinning. Counted floral units along transects and performed vegetation cover surveys. Navigated to sites using Garmin Handheld GPS. Arranged site visits with landowners and managers.

Restoration Ecology Apprentice**May 2019 - Nov 2019***The Wilds, Cumberland, OH, USA*

Collaborated with the Ohio Department of Natural Resources (ODNR) to study pollinator composition and diversity on abandoned surface coal mines. Collected flower-visiting insects via targeted netting. Processed and identified specimens. Entered, managed, and analyzed data in R and designed sitemaps in ArcGIS Pro. Conducted Pollard walk-style butterfly population surveillance in managed tallgrass prairie. Collected capture-mark-recapture data from American burying beetles (*Nicrophorus americanus*) and congeners.

Lab and Field Technician**Oct 2017 - Nov 2018***The University of Maine, Orono, ME, USA*

Collected and entered data to assess population dynamics, pesticide resistance, and parasitism of/on invasive browntail moth (*Euproctis chrysorrhoea*) (BTM) at field sites throughout coastal Maine. Collected live BTM egg masses, larvae, and overwintering and pupation nests. Identified parasitic flies (Tachinids), their puparia, and wasps (Ichneumonids and Chalcidoids) reared from collected BTM nests and pupae. Maintained in-lab experimental assays testing the effect of several pesticides and pathogens on BTM survival and feeding. Developed a leaf area measurement protocol using ImageJ to compare larval browse within and among treatment groups.

Publications (3)

1. Selden, V. L., Campbell, J. W., **Beneduci**, Z. J., & Abbate, A. P. (2025). The importance of vertically stratified, multi-year sampling for understanding native bee assemblages in southeastern temperate deciduous forests. *Biodiversity and Conservation*, 34(12), 4359-4381. <https://doi.org/10.1007/s10531-025-03146-2>
2. Bruckner, S., Straub, L., Villamar-Bouza, L., **Beneduci**, Z. J., Neumann, P., & Williams, G. R. (2024). Life stage dependent effects of neonicotinoid exposure on honey bee hypopharyngeal gland development. *Ecotoxicology and Environmental Safety*, 288, 117337. <https://doi.org/10.1016/j.ecoenv.2024.117337>
3. **Beneduci**, Z. J., Scott, D. A., Byrd, S. M., & Swab, R. M. (2023). We built it; did they come? Pollinator diversity and community structure in a post-mining prairie restoration project. *Ecological Restoration*, 41(4), 180-188. <https://doi.org/10.3368/er.41.4.180>

Presentations (6)

1. Thompson, M. G., **Beneduci**, Z. J., Williams, G. R., & Abbate, A. P. (2025). *Evaluating best fall management practices of pollinator plantings in Alabama croplands* [Poster presentation]. Presented at the Alabama Chapter of the Wildlife Society Meeting, Aniston, AL, USA.
2. **Beneduci**, Z. J., Abbate, A. P., & Williams, G. R. (2024). *Evaluating practices to maintain diverse and abundant CP42-pollinator habitat (USDA: FSA) plantings in the southeastern USA* [Oral presentation]. Presented at the Entomological Society of America Annual Meeting, Phoenix, AZ, USA.
3. **Beneduci**, Z. J., Abbate, A. P., Homan, K., & Williams, G. R. (2024). *Biochar impacts on pollinator planting community characteristics in a southeastern soil* [Oral presentation]. Presented at the Plants, Insects, Microbes Symposium, Auburn, AL, USA.
4. Crochet, A., **Beneduci**, Z. J., Abbate, A. P., & Williams, G. R. (2024). *Assessing the effects of biochar on pollinator-dependent wildflower species native to the southeastern United States* [Oral presentation]. Presented at the Plants, Insects, Microbes Symposium, Auburn, AL, USA.
5. **Beneduci**, Z. J., Abbate, A. P., & Williams, G. R. (2023). *Evaluating suitable practices for maintaining diverse and abundant wildflower plantings under CP42-Pollinator Habitat (USDA: FSA) requirements in the southeastern USA* [Poster presentation]. Presented at the Entomological Society of America Annual Meeting, National Harbor, MD, USA.
6. **Beneduci**, Z. J., & Swab, R. M. (2019). *Pollinator composition and diversity in a post-mining prairie restoration* [Poster presentation]. Presented at the Ohio Mineland Partnership Fall Conference, Zanesville, OH, USA.

Awards

First Place, Oral Presentation **2024**

Plants, Insects, and Microbes Symposium

Student competition award.

Penobscot County Conservation Scholarship **2018 & 2019**

The University of Maine

Awarded to wildlife students who show high promise as potential wildlife biologists and are dedicated to a career in wildlife conservation.

Wayland A. Shands Scholarship **2018**

The University of Maine

Awarded to a student of Entomology with high academic standing.

Teaching

Teaching Assitantships.....

2024: WILD 7150. Advanced Analysis for Ecological Sciences

Peer Review Service

Reviewer for: ACES Newsletter.

Outreach

Non-refereed papers and blogs.....

1. Cates, J. A. L., & Beneduci, Z. J. (2025, June). Bee hotels and their guests: Who's checking in? *ACES Newsletter*. <https://us4.campaign-archive.com/?u=d4bd7a2a13e49ec27e8963cf8&id=696998b994>
2. Flach, A., Beneduci, Z. J., Abbate, A. P., Williams, G. R., & Rogers, S. R. (2024). Using unoccupied aerial systems to study the effects of wilflower planting. *Auburn University Journal of Undergraduate Scholarship*, 13, 65-67. <https://bpb-us-e2.wpmucdn.com/wordpress.auburn.edu/dist/a/151/files/2025/04/Final-2024-AUJUS.pdf>
3. Beneduci, Z. J. (2023, January). Alabama Wildflower of the Month: Woodland sunflower (*Helianthus divaricatus*). *ACES Newsletter*.
4. Beneduci, Z. J. (2022, September). Alabama Wildflower of the Month: Common Sneezeweed (*Helenium autumnale*). *ACES Newsletter*. <https://us4.campaign-archive.com/?u=d4bd7a2a13e49ec27e8963cf8&id=b67be8272f>
5. Beneduci, Z. J. (2022, August). Alabama Wildflower of the Month: Stiff goldenrod (*Oligoneuron rigidum*). *ACES Newsletter*. <https://us4.campaign-archive.com/?u=d4bd7a2a13e49ec27e8963cf8&id=3f9bbc9221>
6. Beneduci, Z. J. (2022, July). Alabama Wildflower of the Month: Northern spider lily (*Hymenocallis occidentalis*). *ACES Newsletter*. <https://us4.campaign-archive.com/?u=d4bd7a2a13e49ec27e8963cf8&id=885dfa435e>
7. Beneduci, Z. J. (2022, July). Alabama Bee of the Month: Nimble squash bee (*Xenoglossa strenua*). *ACES Newsletter*. <https://us4.campaign-archive.com/?u=d4bd7a2a13e49ec27e8963cf8&id=885dfa435e>
8. Beneduci, Z. J. (2022, May). Alabama Wildflower of the Month: Firewheel (*Gaillardia pulchella*). *ACES Newsletter*. <https://us4.campaign-archive.com/?u=d4bd7a2a13e49ec27e8963cf8&id=4526f4a87c>
9. Beneduci, Z. J. (2022, May). Alabama Bee of the Month: Perplexed mining bee (*Andrena perplexa*). *ACES Newsletter*. <https://us4.campaign-archive.com/?u=d4bd7a2a13e49ec27e8963cf8&id=4526f4a87c>
10. Beneduci, Z. J. (2022, April). Alabama Wildflower of the Month: Mountain azalea (*Rhododendron canescens*). *ACES Newsletter*.
11. Beneduci, Z. J. (2022, April). Alabama Bee of the Month: Southeastern blueberry bee (*Habropoda laboriosa*). *ACES Newsletter*.
12. Beneduci, Z. J. (2022, March). Alabama Wildflower of the Month: Eastern redbud (*Cercis canadensis*). *ACES Newsletter*.
13. Beneduci, Z. J. (2022, March). Alabama Bee of the Month: Unequal cellophane bee (*Colletes inaequalis*). *ACES Newsletter*.
14. Beneduci, Z. J. (2022, January). Alabama Wildflower of the Month: Overwintering bees and seed survival. *ACES Newsletter*.

Talks.....

1. Thompson, M. G., & Beneduci, Z. J. (2025, January). *Native bees of Alabama*.
2. Abbate, A. P., Beneduci, Z. J., & Cates, J. A. L. (2022, November). *Native bee importance, conservation, and monitoring*.

3. Beneduci, Z. J. (2022, July). *Turf-adjacent wildflower plantings for pollinators.*

Other.....

1. Cates, J. A. L., & Beneduci, Z. J. (2022, September). *Horticulture Club Bee Lab Tour.*
2. AU Bees Team. (2022, August). *Moore-Pate Visit to the Bee Lab.*
3. Beneduci, Z. J., & Jacobsen, R. (2023, October). *Bama Buzz.*
4. Beneduci, Z. J., Jacobsen, R., & Vinson, N. (2023, July). *Sustainability Picnic.*
5. Jacobsen, R., & Beneduci, Z. J. (2023, April). *Pollinator Power.*
6. Beneduci, Z. J., Jacobsen, R., & Vinson, N. (2022, September). *Sustainability Picnic.*
7. Sitterly, L. (2023, October). *Wildflower Garden* (No. 22). In The Jule Museum Podcast. <https://podcasts.apple.com/us/podcast/episode-22-wildflower-garden/id1605196302?i=1000633234925>

Software Skills

Programs.....

ArcGIS Pro, Microsoft Office Suite, R statistical environment

R packages.....

dagitty, DHARMA, gllvm, glmmTMB, lme4, marginaleffects, mgcv, MuMIn, tidyverse