

Michael W. Belitz

NSF Postdoctoral Research Fellow in Biology
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EDUCATION

- University of Florida and Florida Museum of Natural History** Ph.D. 2023
Gainesville, Florida – Zoology
Dissertation: *Insects in a changing world: Life history traits and thermal niche condition responses to climate change and urbanization*
Advisor: Dr. Rob Guralnick
- Central Michigan University** M.S. 2018
Mount Pleasant, Michigan – Biology
Thesis: *Applying biodiversity informatics and field study approaches to the conservation of Poweshiek skipperling (Oarisma poweshiek)*
Advisor: Dr. Anna Monfils
- Knox College** B.A. 2014
Galesburg, IL – Biology & Environmental Studies
Honors Thesis: *Assessing the invertebrate composition of reconstructed prairies*
Advisor: Dr. Stuart Allison

ACADEMIC APPOINTMENTS

- NSF Postdoctoral Fellow in Biology** 2024 – Present
Michigan State University and University of British Columbia
Mentors: Elise Zipkin and Katie Marshall
- Postdoctoral Research Associate** 2023 – 2024
Michigan State University
Mentor: Elise Zipkin

PEER-REVIEWED PUBLICATIONS

(† signifies equal authorship; * signifies undergraduate mentee)

2024

30. Folk, R.A., Siniscalchi C.M., Doby J., Kates H.R., Manchester S.R., Soltis P.S., Soltis D.E., Guralnick R.P., **Belitz M.W.** 2024. Spatial phylogenetics of Fagales: Investigating the history of temperate forests. *Journal of Biogeography*. DOI: 10.1111/jbi.14840
29. Folk, R.A., Maassoumi A.A., Siniscalchi C.M., Kates H.R., Soltis D.E., Soltis P.S., **Belitz M.W.**†, Guralnick R.P.† 2024. Phylogenetic diversity and regionalization in the temperate arid zone. *Journal of Systematics and Evolution*. DOI:10.1111/jse.13077
28. **Belitz, M.W.**, Sawyer A.*, Hendrick L., Kawahara A., Guralnick R. 2024. Substantial urbanization-driven declines of larval and adult moths in a subtropical environment. *Global Change Biology*. DOI: 10.1111/gcb.17241
27. Federico, N.*, Guralnick R., **Belitz M.W.** 2024. Large uncertainty in trait responses across insects among overall declines in a subtropical city. *Insect Conservation and Diversity*. DOI: 10.1111/icad.12731
26. Larsen E., **Belitz M.W.**, Di Cecco G., Glassberg J., Hurlbert A., Ries L., Guralnick R. 2024. Overwintering strategy regulates phenological sensitivity with consequences for

ecological services in a clade of temperate North American insects. *Functional Ecology*. DOI: 10.1111/1365-2435.14543

25. Folk, R.A., Charboneau J.L.M., **Belitz M.W.**, Singh T., Kates H.R., Soltis D.E., Soltis P.S., Guralnick R.P., Siniscalchi C.M. 2024. Anatomy of a mega-radiation: Biogeography and niche evolution in *Astragalus*. *American Journal of Botany*. e16299. DOI: 10.1002/ajb2.16299

2023

24. Campbell, C.J., Barve V., **Belitz M.W.**, Di Cecco G., Doby J., Hurlbert A., Seltzer C., Guralnick R. 2023. Identifying the identifiers: How iNaturalist facilitates collaborative, research-relevant data generation and why it matters for biodiversity science. *BioScience*. DOI: 10.1093/biosci/biad051
23. McCleery R., Guralnick R., Kang K., Beatty M., Potash A., Jones M., Campbell C., **Belitz M.W.**, Idec J., Fletcher R. 2023. Uniting experiments and big data to advance ecology and conservation. *Trends in Ecology and Evolution*. DOI: 10.1016/j.tree.2023.05.010
22. Guralnick R.P., Campbell L., **Belitz M.W.** 2023. Weather anomalies more important than climate means in driving insect phenology. *Communications Biology*. 6, 490. DOI: 10.1038/s42003-023-04873-4
21. **Belitz M.W.**, Larsen E.A., Shirey V., Li D., Guralnick R.P. 2023. Phenological research based on natural history collections: practical guidelines and a Lepidopteran case study. *Functional Ecology*. DOI: 10.1111/1365-2435.14173
20. Di Cecco, G.J., **Belitz M.W.**, Cooper R.J., Larsen E.A., Lewis W.B., Ries L., Guralnick R.P., Hurlbert A.H. 2023. Phenology in adult and larval Lepidoptera from structured and unstructured surveys across eastern North America. *Frontiers of Biogeography*. E56346. DOI: 10.21425/F5FBG56346

2022

19. Kalkman V.J., Boudot J.P., Futahashi R., Abbott J.C., Bota-Sierra C.A., Guralnick R., Bybee S., Ware J., **Belitz M.W.** 2022. Diversity of Palaearctic dragonflies and damselflies (Odonata). *Diversity*. 14, 966. DOI: 10.3390/d14110966
18. Larsen E.A., **Belitz M.W.**, Guralnick R.P., Ries L. Consistent trait-temperature interactions drive butterfly phenology in both incidental and survey data. 2022. *Scientific Reports*. 12, 13370. DOI: 10.1038/s41598-022-16104-7
17. Abott J.C., Bota-Sierra C.A., Guralnick R., Kalkman V., Gonzalez-Soriano E., Novelo-Gutierrez R., Bybee S., Ware J., **Belitz M.W.** 2022. Diversity of Nearctic dragonflies and damselflies (Odonata). *Diversity*. 14, 575. DOI: 10.3390/d14070575
16. Shirey V., Larsen E., Doherty A., Kim C., Al-Sulaiman F., Hinolan J., Itliong M., Naive M., Ku M., **Belitz M.W.**, Jeschke G., Barve V., Lamas G., Kawahara A., Guralnick R., Pierce N., Lohman D., Ries L. 2022. LepTraits 1.0 A globally comprehensive dataset of butterfly traits. *Scientific Data*. 9, 382. DOI: 10.1038/s41597-022-01473-5
15. Donnelly, A. Yu R., Jones K., **Belitz M.W.**, Li B., Duffy K., Zhang X., Wang J., Seyednasrollah B, Gerst K., Li D., Kaddoura Y., Zhu K., Morisette J., Ramey C., Smith K. 2022. Comparing in situ phenology and remotely derived phenometrics across ecosystems. *Ecosphere*. E3912. DOI: 10.1002/ecs2.3912

2021

14. **Belitz, M.W.**, Barve V, Doby J.R., Hantak M.M., Larsen E.A., Li D., Oswald J.A., Sewnath N., Walters M., Narayani B., Earl K., Gardner N., Guralnick R. †, Stucky B.J. † 2021.

- Climate drivers of adult insect activity are conditioned by life history traits. *Ecology Letters*. 24: 2687-2699, DOI: 10.1111/ele.13889
13. Di Cecco, G.J., Barve V, **Belitz M.W.**, Stucky B.J., Guralnick R.P., Hurlburt A.H. 2021. Observing the observers: How participants contribute data to iNaturalist and implications for biodiversity science. *BioScience*. 71: 1179-1188. DOI: 10.1093/biosci/biab093
 12. Earl, E.†, **Belitz M.W.**†, Laffan S.W., Barve V., Barve N., Soltis D.E., Allen J.M., Soltis P.S., Mishler B.D., Kawahara A.Y., Guralnick R.P. 2021. Spatial phylogenetics of butterflies in relation to environmental drivers and angiosperm diversity across North America. *iScience*. 24, 102239. DOI: 10.1016/j.isci.2021.102239
 11. Shirey, V., **Belitz M.W.**, Barve V., Guralnick R.P. 2021. A complete inventory of North American butterfly occurrence data: narrowing data gaps but increasing bias. *Ecography*. 44: 1-11 DOI: 10.1111/ecog.05396
 10. Montgomery, G.A., **Belitz M.W.**, Guralnick R.P., Tingley M.W. 2021. Standards and best practices for monitoring and benchmarking insects. *Frontiers in Ecology and Evolution*. 8: 579193. DOI: 10.3389/fevo.2020.579193
 9. Li, D., Barve N., Brenskelle L., Earl K., Barve V., **Belitz M.W.**, Doby J., Hantak M.M., Oswald J.A., Stucky B.J., Walters, M., Guralnick, R.P. 2020. Climate, urbanization, and species traits interactively drive flowering duration. *Global Change Biology*. 00:1-12. DOI: 10.1111/gcb.15461

2020

8. Monfils, A.K., Krimmel E.R., Bates J.M., Bauer J.E., **Belitz M.W.**, Cahill B.C., Caywood A.M., Cobb N.S., Colby J.B., Ellis S.A., Krejsa D.M., Levine T.D., Marsico T.D., Mayfield-Meyer T.J., Miller-Camp J.A., Nelson R.M., Phillips M.A., Revelez M.A., Roberts D.R., Singer R.A. Zaspel J.M. 2020. Regional Collections are an essential component of biodiversity research infrastructure. *Bioscience*. 70: 1045-1047 Doi: 10.1093/biosci/biaa102
7. **Belitz, M.W.**, Larsen E.A., Ries L., Guralnick R.P. 2020. The accuracy of phenology estimators for use with sparsely sampled presence-only observations. *Methods in Ecology and Evolution*. 11: 1273-1285. DOI: 10.1111/2041-210X.13448
6. **Belitz, M.W.**, Monfils M.J., Cuthrell D.L., Monfils A.K. 2020. Landscape-level environmental stressors contributing to the decline of Poweshiek skipperling (*Oarisma poweshiek*). *Insect Conservation and Diversity*. 13: 187-200. DOI: 10.1111/icad.12399
5. Barve, V, Brenskelle L., Li D., Stucky B., Barve N., Hantak M., McLean B., Paluh D., Oswald J., **Belitz M.W.**, Folk R.A., Guralnick R.P. 2020. Methods for broad-scale plant phenology assessments using citizen scientists' photographs. *Applications in Plant Sciences*. 8:e11315. DOI:10.1002/aps3.11315

2019

4. Hackett, R.A., **Belitz M.W.**, Gilbert E.E., Monfils A.K. 2020. A data management workflow of biodiversity data from the field to data users. *Applications in Plant Sciences*. 7: e11310. DOI:10.1002/aps3.11310
3. **Belitz, M.W.**, Monfils M.J., Cuthrell D.L., Monfils A.K. 2019. Life history and ecology of the endangered Poweshiek skipperling *Oarisma poweshiek* in Michigan prairie fens. *Journal of Insect Conservation*. 23: 635-649 DOI: 10.007/s10841-019-00158-6
2. Hilts, D.J., **Belitz M.W.**, Gehring T.M., Pangle K.L., Uzarski D. 2019. Climate change and nutria range expansion in the Eastern United States. *Journal of Wildlife Management*. 83:591-598 DOI: 10.1002/jwmg.21629

2018

1. **Belitz, M.W.**, Hendrick L.K.*, Monfils M.J., Cuthrell D.L., Marshall C.J., Kawahara A.Y., Cobb N.S., Zaspel J.M., Horton A.M., Huber S.L., Warren A.D., Forthaus G.A.*, Monfils A.K. 2018. Aggregated occurrence records of the federally endangered Poweshiek skipperling (*Oarisma poweshiek*). *Biodiversity Data Journal*. 6: e29081. DOI: 10.3897/BDJ.6.e29081

SUBMITTED PUBLICATIONS IN REVIEW/REVISION

1. **Belitz, M.W.**, Sawyer A.*, Hendrick L., Guralnick R. Temperature niche and body-size conditions species-specific phenological responses of moths to urbanization in subtropical environments. In revision at *Ecology*
2. Li, D., **Belitz M.W.**, Campbell L., Guralnick R.P. Extreme weather events have strong but different impacts on plant and insect phenology. In revision at *Nature Climate Change*
3. Idec, J., Bybee S., Ware J., Abbott J., Ferreira R.G., Suvorov A., Kohli M., Eppel L., Kuhn W., **Belitz M.W.**, Guralnick R. Interactions between sexual signaling and body size drive ecology and evolution of wing colors in Odonata. In revision at *Scientific Reports*. Preprint: <https://doi.org/10.21203/rs.3.rs-4595447/v1>
4. Folk, R.A., **Belitz M.W.**, Siniscalchi C., Kates H., Soltis D., Soltis P., Guralnick R., Borges L. Phylogenetic diversity and regionalization of root nodule symbiosis. Preprint: <https://doi.org/10.1101/2023.09.08.556918>. In review at *Global Ecology and Biogeography*.
5. Steele Cabrera, S.R.†, **Belitz M.W.**†, Emmel T.C., Khazan E.S., Standridge M.J., Rossetti K., Daniels J. Long-term population dynamics of an endangered butterfly are influenced by hurricane-mediated disturbance. In review at *Biological Conservation*. Preprint: <https://doi.org/10.1101/2024.07.12.603220>
6. **Belitz, M.W.**, Campbell C.J., Drum R., Leuenberger W., Morelli T.L., Nail K., Shirey V., Warner S., Thogmartin W., Zipkin E.F. A case for community-level conservation to address the biodiversity crisis. In review at *Nature Reviews Biodiversity*.

OPEN SOURCE SOFTWARE

1. **Belitz, M.W.**, Campbell C., Li D. 2020. phenesse: Estimate phenological metrics using presence-only data. R Package version 0.1.2. <https://cran.r-project.org/package=phenesse>
2. Pearse, W.D., **Belitz M.W.**, Stemkovski M.S., and Davies T.J. 2018 phest: Calculate PHENological ESTimates. R package version 1.0-0
3. Campbell C., **Belitz M.W.** 2022. geoshift: Metric to Compare Temporally Explicit Species Distribution Models. R package release: <https://doi.org/10.5281/zenodo.7126857>

FELLOWSHIPS, AWARDS & GRANTS

Fellowships

2024: NSF Postdoctoral Research Fellowship in Biology	\$240,000
2019: UF Biodiversity Institute Fellowship	\$20,000
2018: UF Grinter Fellowship	\$6000
2016-2018: Central Michigan University College of Science and Engineering's Dean's Research Fellowship	\$40,000

Honors & Awards

2023: Florida Museum of Natural History Biodiversity Award for graduate student excellence

2021: GBIF Young Researchers Award	€5000
2015: Jefferson County Public Schools Values Award – Exemplary Performance	
2014: Knox College’s Inn-Siang Ooi Award	\$1000
2014: Knox College TRIO Achievement Program: Outstanding Senior Award	

Research Grants

2023: MSU Ecology, Evolution, and Behavior Professional Horizons Grant	\$750
2022: UF Office of Research Travel Grant	\$400
2020: UF Michael L. May Interdisciplinary Grant	\$1000
2017: CMU Marion Whitney Summer Graduate Scholarship	\$2000
2014: Knox College Richter Scholarship	\$1000

TEACHING EXPERIENCE

Co-instructor

June 2022 Dragonfly biodiversity from the field to lab workshop. Pereira, Colombia

Teaching assistant

Fall 2020 Integrated Principles of Biology I Laboratory. U. of Florida BSC 2010L (Online)
 Spring 2019 Integrated Principles of Biology I Laboratory. U. of Florida BSC 2010L

Guest lecturer

Fall 2019 Introduction to Quantitative Biology. 1 lecture. Central Michigan U. BIO105

MENTORING EXPERIENCE

2023 – Mentored three graduate student researchers on scientific writing, data science, and modeling. I am a co-author of papers led by all three graduate students.
 2018 – 2024 Mentored eight undergraduate researchers in data collection, data science in R, scientific writing, insect identification, and field ecology. Co-authored papers with 2 undergraduate mentees, including a paper led by one undergraduate mentee.
 2016 – 2018 Mentored two undergraduate researchers in the field of ecology and biodiversity informatics. Co-authored papers with both undergraduate researchers. Helped one mentee submit and be awarded an NSF Graduate Research Fellowship Program Award.

INVITED PRESENTATIONS

Belitz, M.W. 2024. From local observations to global insights: Integrating collections and community science to understand the effects of global change on insects. Invited Seminar for Natural History Collection of Los Angeles County.
Belitz, M.W. 2024. Uniting diverse data streams to advance conservation and natural-resource management. Invited Seminar for School of Natural Resources and Environment. University of Nebraska.
Belitz, M.W. 2022. Career with butterflies: a popular science talk series. Big Butterfly Month India. Invited virtual presentation sponsored by Nature Mates.

- Belitz, M.W.**, Larsen E.A., Shirey V., Li D., Guralnick R. 2022. Phenological research based on natural history collections: practical guidelines and a Lepidopteran case study. Ecological Society of America. Invited symposium.
- Belitz, M.W.** 2021. Addressing biases in citizen science data to document phenology patterns at broad spatial and taxonomic scales. WeDigBio. Invited Virtual Presentation.
- Belitz, M.W.**, Monfils M.J., Cuthrell D.L., and Monfils A.K. 2019. Poweshiek skipperling research updates and management recommendations. Poweshiek skipperling Research Working Group. Invited Presentation.

SELECTED PRESENTATIONS

- Belitz, M.W.** Drum R., Leuenberger W., Morelli T.L., Nail K., Warner S., Thogmartin W., Zipkin E. 2024. Informing conservation in a rapidly changing world: Opportunities presented by a community approach to data analysis and management interventions. North American Congress for Conservation Biology. Vancouver BC, Canada.
- Belitz, M.W.** Data quality issues associated with iNaturalist data. 2022. 6th Annual digital data in biodiversity research conference. Virtual Presentation.
- Belitz, M.W.**, Barve V, Doby J.R., Hantak M.M., Larsen E.A., Li D., Oswald J.A., Sewnath N., Walters M., Narayani B., Earl K., Gardner N., Guralnick R., Stuck B.J. 2022. Climate drivers of adult insect activity are conditioned by life history traits. 4th Annual collaborations in biodiversity research symposium. Gainesville, FL.
- Belitz, M.W.**, Barve V, Doby J.R., Hantak M.M., Larsen E.A., Li D., Oswald J.A., Sewnath N., Walters M., Narayani B., Earl K., Gardner N., Guralnick R., Stuck B.J. 2021. Climate drivers of adult insect activity are conditioned by life history traits. Ecological Society of America. Virtual Presentation.
- Belitz, M.W.**, Larsen E.A., Ries L., Guralnick R. 2021. Addressing biases in community science data to document phenology patterns at broad spatial and phylogenetic scales. Northeast Natural History Conference. Virtual Presentation.
- Belitz, M.W.**, Barve V., Doby J., Larsen E., Guralnick R.P., Hantak M., Oswald J., Sewnath N., Walters M., Stucky B. 2020. Interactions among climate, urbanization, and life-history traits determine the timing of adult insect activity across broad spatial and taxonomic scales. Entomology. Virtual Annual Meeting.
- Belitz, M.W.** 2019. Digitization and the contribution of small natural history collections in global change biology. Society for the Preservation of Natural History Collections Annual Meeting. Chicago, IL.
- Belitz, M.W.**, Monfils M.J., Cuthrell D.L., and Monfils A.K. 2018. Applying biodiversity informatics and field study approaches to the conservation of Poweshiek skipperling (*Oarisma poweshiek*). Poweshiek skipperling Research Working Group. Webinar.

PROFESSIONAL SERVICE

Manuscript reviewer for:

- 2024 – Ecology Letters; Ecology; Journal of Wildlife Management
- 2023 – Ecosphere; Ecology and Evolution; Insect Conservation & Diversity; Journal of Wildlife Management; Scientific Reports; American Journal of Botany
- 2022 – Nature Ecology and Evolution; Ecography; Ecology and Evolution; Agricultural and Forest Meteorology

- 2021 – Ibis; Insects; Ecology and Evolution
- 2020 – Ecological Entomology

UNIVERSITY AND DEPARMENTAL SERVICE

- 2021 – 2022 Vice President – UF Biology Graduate Student Association
Act as graduate student representative as a voting member at faculty meetings
Poll graduate students before faculty meeting voting
- 2019 – 2020 iDigTRIO Biological Sciences Career Conference & Fair
Invited speaker to TRIO students on developing a passion of biology research and conservation
- 2017 – 2018 BioBuds Chair – CMU: Biology Graduate Student Association
Coordinate Science Education in Mount Pleasant 3rd grade classrooms
Serve on Biology Graduate Student Association’s Executive Board