Michael W. Belitz
Postdoctoral Research Associate, Michigan State University
michaelbelitz06@gmail.com; belitzmi@msu.edu
Google Scholar

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, Mount Pleasant, Michigan – Biology — M.S. 2018
Thesis: *Applying biodiversity informatics and field study approaches to the conservation of Poweshiek skipperling (*Oarisma poweshiek*)*
Advisor: Dr. Anna Monfils

Knox College, Galesburg, IL – Biology & Environmental Studies — B.A. 2014
Honors Thesis: *Assessing the invertebrate composition of reconstructed prairies*
Advisor: Dr. Stuart Allison

Academic Appointments

Postdoctoral Research Associate, Michigan State University — 2023 – Present
Graduate Assistant, University of Florida — 2018 – 2023
Graduate Assistant, Central Michigan University — 2016 – 2018

Peer-reviewed Publications

(† signifies equal authorship; * signifies undergraduate author)

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.** In Press. Spatial phylogenetics of Fagales: Investigating the history of temperate forests. *Journal of Biogeography*.
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. † In Press. Phylogenetic diversity and regionalization in the temperate arid zone. *Journal of Systematics and Evolution*.
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: 10.1111gcb.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 AK. 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*
2. 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*.
3. Li, D., **Belitz M.W.**, Campbell L., Guralnick R.P. Extreme weather events have strong but different impacts on plant and insect phenology. *In Review*

Presentations

19. **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.
18. **Belitz, M.W.** 2023. Insects in a changing world: Life history traits and thermal niche condition responses to climate change and urbanization. Dissertation Defense Seminar. University of Florida
17. **Belitz, M.W.** 2022. Career with butterflies: a popular science talk series. Big Butterfly Month India. Invited virtual presentation sponsored by Nature Mates.
16. **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.
15. **Belitz, M.W.** Macroecologia y distribuciones de especies. 2022. Presented during the Dragonfly society of Americas' "Dragonfly biodiversity from the field to lab" workshop. Tatama National Park, Colombia.
14. **Belitz, M.W.** Data quality issues associated with iNaturalist data. 2022. 6th Annual digital data in biodiversity research conference. Virtual Presentation.
13. **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.
12. **Belitz, M.W.** 2021. Addressing biases in citizen science data to document phenology patterns at broad spatial and taxonomic scales. WeDigBio. Virtual Presentation.
11. **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.
10. **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.
9. **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.

8. **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.
7. **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 Webinar.
6. **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.
5. **Belitz, M.W.**, Monfils M.J., Cuthrell D.L., and Monfils A.K. 2018. Poweshiek skipperling update. Trail Water Land Alliance Meeting. Davisburg, MI.
4. **Belitz, M.W.**, Monfils M.J., Cuthrell D.L., and Monfils A.K. 2018. Prairie Fen Research Collaborative: Results and implications of 2017 field surveys. 2018 Winter Poweshiek skipperling Meeting. Davisburg, MI.
3. **Belitz, M.W.**, Monfils M.J., Cuthrell D.L., and Monfils A.K. 2018. Prairie Fen Research Collaborative: Applying ecological niche models to Poweshiek skipperling conservation. 2018 Winter Poweshiek skipperling Meeting. Davisburg, MI.
2. **Belitz, M.W.**, S. Allison, and L. Dybas. 2014. Assessing the invertebrate composition of reconstructed prairies. Poster. Illinois State Academy of Science, University Park, IL. First prize for undergraduate poster in environmental science.
1. **Belitz, M.W.** and Allison S. 2014. Evaluating the arthropod community of reconstructed prairies. Poster. Horizons: A celebration of student research. Knox College, Galesburg, IL.

Open Source Software

1. **Belitz, M.W.**, Campbell C., Li D. 2020. phenessse: 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

Grants, Honors, and Awards

2023: MSU Ecology, Evolution, and Behavior Professional Horizons Grant - $750
2023: Florida Museum of Natural History Biodiversity Award for graduate student excellence
2022: UF Office of research travel grant - $400
2021: GBIF Young Researchers Award - €5000
2020: UF Michael L. May Interdisciplinary Grant - $1000
2019: UF Biodiversity Institute Fellowship - $20,000 + tuition stipend
2018: UF Grinter Fellowship Award - $6000
2018: CMU Biology Graduate Student Association Scholarship - $100
2017: Marion Whitney Summer Graduate Scholarship - $2000
2016-2018: Central Michigan University College of Science and Engineering's Dean's Research Assistantship – $40,000 and 24 months of tuition
2015: Jefferson County Public Schools Values Award – Exemplary Performance
2014: Knox College's Inn-Siang Ooi Award - $1000 for demonstrated skill in field biology
2014: Knox College TRIO Achievement Program: Outstanding Senior Award

2014: Richter Scholarship - $773.41 to cover cost of undergraduate independent research

Professional Service

Manuscript reviewer for:

- 2024 – Ecology Letters
- 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

Teaching Experience

June 2022	Dragonfly biodiversity from the field to lab workshop. Pereira, Colombia
Fall 2020	Integrated Principles of Biology I Laboratory. U. of Florida BSC 2010L
Spring 2019	Integrated Principles of Biology I Laboratory. U. of Florida BSC 2010L
Fall 2019	Introduction to Quantitative Biology guest lecture. Central Michigan U. BIO105

Mentoring Experience

2023 –	Mentored one graduate student researcher on scientific writing and data science.
2018 – 2023	Mentored eight undergraduate researchers in data collection, data science in R, scientific writing, insect identification, and field ecology.
2016 – 2018	Mentored two undergraduate researchers in the field of ecology and biodiversity informatics.

University and Community 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

Popular Media Coverage

The article of *Substantial urbanization-driven declines of larval and adult moths in a subtropical environment* was covered by a variety of sources and blogs such as *EurekaAlert!*, *Earth, Phs.org*, *ScienMag*, *Bioengineer.org*, *Phys.org*. 25 March 2024. Metrics: https://wiley.altmetric.com/details/161150316/news

Guidelines for using Natural History Collections to better understand how biological events are responding to global change. Interview with *British Ecological Society Journals*, 13 Sep. 2023. https://soundcloud.com/besjournals/guidelines-for-using-nhcs-to-better-understand-how-biological-events-are-responding-to-global-change

The article of *Weather anomalies more important than climate means in driving insect phenology* was covered a variety of news sources and blogs such as *EurekaAlert!*, *Mirage*

News, *Phs.org*, *ScienMag*, *Bioengineer.org*, *Futurity*, *Science Daily*, *Noticias de la tierra*, *Nature Ecology & Evolution Community*, and *NSF Discoveries.* June 2023. Article metrics: https://www.nature.com/articles/s42003-023-04873-4/metrics

Who observes the observers? Scientists conduct large-scale study of iNaturalist users. Florida Museum of Natural History Research News. 8 Sep. 2021. https://www.floridamuseum.ufl.edu/science/scientists-conduct-large-scale-study-of-inaturalist-users/

The article *Spatial phylogenetics of butterflies in relation to environmental drivers and angiosperm diversity across North America* was covered by multiple news sources including *United Press International*, *NewsBreak*, *Phys.org*, and *EurekaAlert!* March 2021. Article metrics: https://plu.mx/plum/a/news?doi=10.1016/j.isci.2021.102239

Coverage as expert on use of citizen science data in research, *Record a prized catch for science without revealing your favorite fishing hole*. *Great Lakes Echo*, 4 Sep. 2019 https://greatlakesecho.org/2019/09/04/record-a-prized-catch-for-science-without-revealing-your-favorite-fishing-hole/