

Michael W. Belitz

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[Google Scholar](#)

Education

- University of Florida, Gainesville, Florida – Zoology Ph.D 2023
4.00/4.00 GPA
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
4.00/4.00 GPA
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 B.A. 2014
3.63/4.00 GPA
Honors Thesis: Assessing the invertebrate composition of reconstructed prairies
Advisor: Dr. Stuart Allison

Professional Experience

- Postdoctoral Research Associate, Michigan State University 2023 – Present
Graduate Assistant, University of Florida 2018 – 2023
Graduate Assistant, Central Michigan University 2016 – 2018
Field Technician, Michigan Natural Features Inventory 2016
Wilderness Stewardship Coordinator, Sitka Conservation Society 2014 – 2015
Leadership Instructor, Mt. Evans Outdoor Lab School 2015
Field Biology Intern, Sitka Conservation Society 2013 – 2014

Peer-reviewed Publications (** signifies equal authorship; * signifies undergraduate author)
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 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.** , Stuck 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. Hiltz, 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

Publications in Review

1. Larsen, E.A., **Belitz M.W.**, Di Cecco G.J., Glassberg J., Hurlbert A.H., Ries L., Guralnick R. *in Review*. Overwintering strategy regulates phenological sensitivity with consequences for ecological processes in a clade of temperate North American insects.
2. 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 Review*. Spatial phylogenetics of Fagales: Investigating the history of temperate forests. Preprint: <https://doi.org/10.1101/2023.04.17.537249>
3. 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. *in Review*. Anatomy of a mega-radiation: Biogeography and niche evolution in *Astragalus*. Preprint: <https://doi.org/10.1101/2023.06.27.546767>
4. Federico, N.*, Guralnick R., **Belitz M.W.** *in Review*. Urbanization decreases insect abundance and richness across multiple Orders and functional traits.
5. **Belitz, M.W.**, Sawyer A.*, Lillian H., Guralnick R. *in Review*. Temperature niche and body-size conditions species-specific phenological responses of moths to urbanization in subtropical environments.

Presentations

17. **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
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.** Macroecología 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. 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>

Grants, Honors, and Awards

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:

- 2023 – Ecosphere, Ecology and Evolution, Insect Conservation & Diversity, Journal of Wildlife Management
- 2022 – Nature Ecology and Evolution, Ecography, Ecology and Evolution, Agricultural and Forest Meteorology
- 2021 – Ibis; Insects; Ecology and Evolution
- 2020 – Ecological Entomology

Teaching Experience

Summer 2022 – Workshop instructor for Dragonfly biodiversity from the field to lab | Pereira, Colombia
 Fall 2020 – Integrated Principles of Biology I Laboratory | UF BSC 2010L
 Spring 2019 – Integrated Principles of Biology I Laboratory | UF BSC 2010L

University and Community Service

Vice President – UF Biology Graduate Student Association 2021 – 2022

- Act as graduate student representative as a voting member at faculty meetings
- Poll graduate students before faculty meeting voting
- Assists the President with duties

iDigTRIO Biological Sciences Career Conference & Fair 2019

- Invited speaker to TRIO students on developing a passion of biology research and conservation

BioBuds Chair – CMU: Biology Graduate Student Association 2017 - 2018

- Coordinate Science Education in Mount Pleasant 3rd grade classrooms
- Serve on Biology Graduate Student Association's Executive Board

Memberships

Ecological Society of America 2021 –

Entomological Society of America 2020 –