MICHAEL CULSHAW-MAURER

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EDUCATION

University of California, Davis *April 2021*
PhD in Ecology
Advised By: Jay Rosenheim and Sebastian Schreiber
Dissertation: "Bugs Behaving Badly: Insect Pest Behavior and Pathogen-Induced Cannibalism"

Saint John's University *May 2015*
BA in Biology, 3.86 GPA
Graduated Magna Cum Laude with Distinction in Biology
Advised By: William Lamberts and Stephen Saupe
Honors Thesis: "The Induced Heart Rate Response to Fish Kairomones in *Daphnia pulex*"

PUBLICATIONS

Swetnam, T.L, Bartelme, R., Choi, I., Cooksey, A.M., Culshaw-Maurer, M. et al. (*in prep*) CyVerse: cyberinfrastructure for data intensive scientific discovery.

Pollack, L., Munson, A., Zepeda, E., Culshaw-Maurer, M., and Sih, A. (*Animal Behaviour, 2022*) Variation in plastic consumption: social group size influences individual susceptibility to an evolutionary trap.

Bohman, B.J., Culshaw-Maurer, M., et al. (*European Journal of Agronomy, accepted with revisions*) Quantifying the uncertainty in critical N concentration for potato using Bayesian methods.

Culshaw-Maurer et al. (*in prep*) An agent-based model of indirect virulence via pathogen- induced cannibalism.

Culshaw-Maurer, M., Sih, A. and Rosenheim, J.A. (2020) Bugs scaring bugs: enemy-risk effects in biological control systems. Ecology Letters 23(11): 1693-1714
https://doi.org/10.1111/ele.13601

Bernoff A.J., Culshaw-Maurer M., et al. (2020) Agent-based and continuous models of hopper bands for the Australian plague locust: How resource consumption mediates pulse formation and geometry. PLOS Computational Biology 16(5): e1007820.
https://doi.org/10.1371/journal.pcbi.1007820

Rosenheim, J.A., Booster, N.A., Culshaw-Maurer, M. et al. (2019) Disease, contagious cannibalism, and associated population crash in an omnivorous bug, *Geocoris pallens*. Oecologia 190: 69-83
https://doi.org/10.1007/s00442-019-04407-y

HONORS AND AWARDS

USDA NIFA AFRI Predoctoral Fellowship 2019-2021 ($120,000)
Robert and Peggy van den Bosch Scholarship, Center for Biological Control, UC Berkeley 2017 ($15,000)
Robert and Peggy van den Bosch Scholarship, Center for Biological Control, UC Berkeley 2018 ($20,000)
UC Davis Graduate Group in Ecology Fellowship 2015-2018
UC Davis Graduate Group in Ecology Endowment Award 2017
Henry A. Jastro Research Fellowship 2018 ($1500)
St. John's University Honors Thesis
CSB/SJU Regents/Trustees Scholarship
Eldon Siehl Memorial Scholarship
St. John's Undergraduate Biology Research Fellowship

RESEARCH PROJECTS

Modeling Nymphal Locust Movement July 2018 - Present

- Ongoing collaboration with group of mathematicians modeling the movement of nymphal Australian plague locust hopper bands
- Developed agent-based model in R to complement partial differential equations models
- Analyzing movement tracking data from videos of locust movement

Dynamics of Disease-Induced Cannibalism July 2015 - Present

- Dissertation work including field surveys, laboratory behavioral assays, and agent-based modeling
- Conducted extensive field surveys and laboratory assays of cannibalism behavior and viral infection in *Geocoris pallens*
- Developed spatially explicit agent-based model of disease and cannibalism dynamics, conducted simulations and utilized machine learning models to analyze simulation results

Enemy Risk Effects Across Multiple Trophic Levels in an Aphid Parasitoid System July 2019 - Present

- Dissertation work sponsored by a USDA NIFA Predoctoral Fellowship
- Investigated the effects of *Aphidius ervi* parasitoids and ladybeetles on pea aphid behavior
- Conducted caged-plant field study in alfalfa and laboratory mesocosm experiments on fava bean

SJU Honors Thesis September 2014 - May 2015
"*The Induced Heart Rate Response to Fish Kairomones in* Daphnia pulex" *Collegeville*, MN

- Investigated the effects of predatory fish kairomones on *Daphnia pulex* heart rate across varying size classes
- Utilized slow-motion videomicroscopy to measure heart rates

SJU Undergraduate Research Fellow May 2013 – August 2013
"*Shallow Lakes and Wetlands Research*" *Collegeville*, MN

- Studied several aspects of the interconnected lakes, streams, and wetlands on the St. John's campus
- Measured nutrient levels, temperature gradients, water depth, and macrophyte growth

Undergraduate Independent Study January 2013 – May 2013
"*The Effects of Tap Size on Sap Yield in Sugar Maples*" *Collegeville*, MN

- Worked with **Dr. Stephen Saupe**, **St. John's Outdoor University**, and members of **St. John's Abbey** to determine the effects of tap size on maple sap yield in a 1500+ tap, gravity-fed system
- Utilized volunteers for data collection, integrated study into daily syrup operation

OTHER RELEVANT EXPERIENCE

EcoData Technology April 2022 - Present
Consulting Data Scientist *Remote*

- Developing decision-support tools for agronomists, farmers, and researchers
- Utilized public APIs to combine geospatial weather data, scientific pest abundance data, and citizen science data to produce geographically targeted pest phenology models
- Developed a Shiny app as an interface to complex phenology model, allowing for map-based inputs and geographically specific predictions

Group Behavior of Mosquitofish August 2019 - Present

- Collaborating with researchers from UC Davis to study the behavior of mosquitofish groups
- Designed hierarchical Bayesian generalized models to analyze complex group-structured data

- Collected data from mescocosm experiments and behavioral assays

Bayesian Modeling of Potato Nitrogen Use December 2020 - Present

- Collaborating with researchers from the University of Minnesota to study critical nitrogen concentration in potato
- Developed hierarchical, nonlinear Bayesian model incorporating variation across potato varieties and geographic locations
- Created visualizations for complex comparisons of nonlinear model results

MN Dept. Natural Resources Stream Habitat Program May-August 2014, May-July 2015
Intern 2014, Student Worker 2015 *St. Paul, MN*

- As a student worker, trained new interns in field and office skills
- Field work included electroshocking and identifying fish, assessing habitat types, using geodimeter to map river cross-sections
- Analyzed historical stream gauge data for geomorphology group
- Assisted in trout stream restoration project, stream-crossing surveys, and mussel propagation project
- Taught fishing skills to inner-city students through the Fishing in the Neighborhood program

TEACHING EXPERIENCE

The Carpentries April 2021 - Present
Postdoctoral Researcher *Remote*

- Created an updated Data Carpentry R for Ecology lesson utilizing modern R tools and approaches, replacing the current lesson which has been used in 128 workshops in 16 countries and receives over 19,000 unique page views per month
- Leading a task force on lesson publication cycles and authorship assignment
- Managing The Carpentries Incubator, a GitHub-based collection of 123 community-developed Carpentries lessons
- Acting as Editor for The Carpentries Lab, overseeing peer review of community-developed lessons
- Certified as a Carpentries Trainer, led Instructor Training workshop for 15 new Carpentries Instructors

CyVerse, University of Arizona April 2021 - Present
Postdoctoral Researcher *Remote*

- Led development and teaching of 10-week Foundational Open Science Skills workshop for 65 graduate students, postdoctoral researchers, and research faculty from multiple countries
- Developed and maintained cloud-based tools for Bayesian analysis using Stan
- Collaborated with researchers from University of Graz (Austria) on an asynchronous massive open online course (MOOC) teaching Open Science with CyVerse
- Establishing collaborations between The Carpentries and CyVerse to deliver instruction and cloud-computing capabilities to students, researchers, and educators

UC Davis Winters 19,20
Instructor, ECL 298: R-DAVIS *Davis, CA*

- Co-instructed course on R, RStudio, and Git with another graduate student
- Developed curriculum, maintained course website, taught using live-coding technique, live streamed course for remote students
- Course is required for all UC Davis Ecology graduate students

UC Davis Winters 19,20
Instructor, ENT 198: Gentle Intro to R/RStudio *Davis, CA*

- Created and co-instructed course on R, RStudio, with another graduate student
- Developed curriculum, maintained course website, taught using live-coding technique
- Course was developed for students in the Research Scholars in Insect Biology Program who are conducting research in entomology labs

UC Davis Spring 16, Winter/Fall 17
BIS 2B Teaching Assistant *Davis, CA*

- Taught and graded laboratory sections
- Lectured on concepts in ecology and evolution and guided laboratory exercises
- Received a mean 4.75/5 rating from end-of-quarter student evaluation

SERVICE EXPERIENCE

University of Arizona Roots for Resilience September 2021 - Present
Consultant *Tucson, AZ*

- Served as a mentor and consultant to a highly selective program for PhD candidates in environmental research programs
- Provided guidance on data science, open science, and reproducibility topics

U. of Arizona Data Science Resources and Training Steering Committee April 2021 - Present
Committee Member *Tucson, AZ*

- Serving on committee alongside other leaders in data science research and training to coordinate campus-wide initiatives
- Acting as liasion between University of Arizona and The Carpentries to coordinate delivery of computational workshops

UC Davis Quantitative Courses Working Group Spring 2019 - Spring 2021
Committee Member *Davis, CA*

- Provided input on newly created quantitative coursework tracks
- Helped ensure cohesion between computational and quantitative courses
- Worked with faculty to identify gaps in ecological quantitative education

Davis R Users Group Spring 2018 - Spring 2021
Co-coordinator *Davis, CA*

- Organized weekly meetings and presented on data cleaning, analysis, visualization, and other topics in R
- Actively maintained the group website
- Provided assistance and guidance to undergraduates, graduate students, and postdocs seeking help with R

Graduate Group in Ecology Stats Support Group Spring 2019 - Spring 2021
Co-founder and Co-coordinator *Davis, CA*

- Organized weekly meetings, including lectures, group discussions, and group activities
- Provided guidance on statistics and data analysis to graduate students
- Created a welcoming community to discuss topics related to ecological data analysis and statistics

SELECTED PRESENTATIONS

***Invited talk* at Entomological Societies of America / Canada Annual Meeting** November 2022
"*Bugs scaring bugs: enemy risk effects in biocontrol systems*" *Vancouver, Canada*

Arizona Research Bazaar May 2022
"*Iteration with for loops and map functions in R*" *Virtual*

Predator-Prey Ecology Gordon Research Conference February 2020
"*Zombie Bugs: an agent-based model of disease and cannibalism in a beneficial insect*" *Ventura, CA*

UC Davis oSTEM LGBTQIA+ Science Club May 2018
"*Zombie Bugs*" *Davis, CA*

Davis R Users Group Feb 2018
"*Code Optimization in R*" *Davis, CA*

Chabot Space and Science Center May 2017
"*Zombie Bugs*" *Oakland, CA*

UC Davis Ecology Brown Bag Seminar May 2017
"*Disease and Cannibalism in a Beneficial Insect*" *Davis, CA*