Dr. Collin B. Edwards

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School of Biological Sciences   Department of Biology
Washington State University, Vancouver   Tufts University

EDUCATION:

Ph.D, Ecology and Evolutionary Biology, Cornell University   2019

BS, Evolution, Ecology, and Biodiversity, University of California, Davis   2012

SKILLS:

Programming: R, Matlab, C, C++, git and GitHub, LaTeX, markdown, Linux and windows scripting

Mathematical modeling: ODEs, DEs, matrix models, stochastic models, numerical methods.

Statistical methods: A/B testing, generalized linear models, hierarchical models, GAMs, Random Forests, LASSO, ridge regression, machine learning, simulation methods, linking data to mathematical models.

Leadership & Facilitation: Led cross-disciplinary grant on Microbial ecology, co-led 20-person cross-disciplinary grant on butterfly ecology. Formed and coordinated "Data Forensics in Ecology" working group. Lead Instructor for Tufts University course "Ecological Statistics and Data". Formal mentor for three students, hundreds of hours of additional ad-hoc mentorship.

Writing & Communication: 8 peer-reviewed publications (lead author for 4), 19 invited talks and presentations, obtained a total of $134,000 in research grants, obtained 3 graduate fellowships.

EXPERIENCE:

Postdoctoral Research Scholar   September 2019 – present

Tufts University & Washington State University, Vancouver

- Wrote grants to fund interdisciplinary research on butterfly ecology. Facilitated 20-person working group, cleaned and integrated 2.5 million data entries from 35 sources, developed interactive R visualization, developed novel analytical framework and scaleable analysis pipeline in R. Developed R package to support analyses. Developed and published novel statistical methods to identify population dynamics from sparse time-series data, mentored biologists in applying methods to their data.
- Developed novel statistical tools to analyze spatial patterns in citizen science reportings of Western monarch butterflies using R. Used regression framework and the delta method to integrate experimental data and historical records to identify key demographic changes.
- Obtained funding and led cross-disciplinary collaboration to link ecology with microbial biology. Developed a novel statistical approach to link microbial data to ecological theory, an interactive visualization tool for linking mathematical models and data. Served as a math & data science collaborator on three research studies.
- Taught "Ecological Data and Statistics" course at Tufts University. Served as primary theoretical ecology and data science mentor for one undergraduate, one masters, and one PhD students on quantitative biology research projects.
- Developed expertise in learning new scientific literature while reviewing butterfly conservation, phenology, time series analyses, Allee effects, Monarch butterflies, microbial ecology.

NSF Graduate Research Fellow, Cornell Fellow, Graduate Research Assistant   August 2013 – August 2019

Cornell University

- Led cross-disciplinary project to understand plant defense strategies. Designed and carried out multi-year ecological field experiments; learned and used high-performance liquid chromatography (HPLC) and microscopy. Implemented hierarchical regression analysis and LASSO regression analysis, and developed and implemented novel Random Forest analysis. Developed novel mathematical model of species interactions, wrote and optimized scalable framework for numerical simulations.
- Led project to understand species responses to climate change. Developed novel evolutionary model, then developed and optimized scaleable simulation framework to link model to spatially structured climate data.
- Collaborated with a cross-disciplinary team to develop new statistical methods to analyze high-dimensional spatial and temporal data. Primary responsibility was implementing and optimizing methods in R.