NATHAN L. BROUWER PHD

Computational ecologist specializing in complex datasets

I am a computational ecologist, data scientist and educator with 15 years of experience extracting insights from messy data and communicating the results. I specialize in using generalized-linear mixed models (GLMMs) to analyze data from long-term observational studies. Since my PhD I have also taught myself key aspects of bioinformatics, phylogenetics, machine learning and population genomics.

EDUCATION

2002 — **Seattle Pacific University**
B.S. in Biology

2015 — **University of Pittsburgh**
Phd in Biological Sciences

Dissertation: Applying multilevel longitudinal models to plant demographic processes: novel insights into the long-term impacts of invasive species and overabundant herbivores.

RESEARCH & PROFESSIONAL EXPERIENCE

2019-present — **Lecturer - General & Quantitative Biology**
Unv. of Pittsburgh Dept. of Biological Sciences

- Develop and deliver curriculum for updated **Computational Biology** course
- Instructor for **biostatistics**, writing, intro biology courses & intro biology labs.
- Consult on **statistics curriculum** development for laboratory classes.

2015 | 2019 — **Post-doctoral Research Associate**
National Aviary — Pittsburgh, PA

- Use GLMMs to analyze decade-long tropical bird population & community datasets.
- Convert published models on migratory birds into an R package & develop methods
- Develop methods for sensitivity analysis and uncertainty propagation for migration models

2018-2019 (Fall & Winter) — **Adjunct Professor - Biology**
La Roche College — Pittsburgh, PA

- Co-teach introduction to research course (fall)
- Develop new lab and data analysis activities
- Teach writing for biological sciences (winter)

CONTACT INFO

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RELEVANT SKILLS

STATISTICAL MODELING: Multiple publications employing **GLMMs** and **GAMMs**.

DATA VIZUALIZATION: Expert exploring & visualizing complex data with `ggplot2`.

DATA CLEANING: Expert in **data manipulation** & cleaning, including use of **Tidyverse**.

UNSUPERVISED MACHINE LEARNING: Skilled with identifying patterns in **high-dimensional data** with ordination & cluster analysis.

SCIENTIFIC COMMUNICATION: Excellent written, verbal & graphical communication skills.

R PACKAGES: Experience using R packages to distribute scientific software and organize complex analyses.

REPRODUCIBLE WORKFLOWS: Large portfolio of **RMarkdown** products, including books & package documentation.

2017-2018

Adjunct Professor - Biological Data Analysis
Dusquesne Unv. & California Unv. of PA
- Dusquesne: Teach graduate biostatistics lecture course & consult with students on data analysis (Spring 2018)
- CalU: Teach undergraduate biostatistics lecture course & develop curriculum for new R-based lab

2010 | 2015

Graduate Research Assistant
Department of Biological Sciences, University of Pittsburgh
- Manage and analyze decade-long plant population data.
- Design & conduct field research on plant demography.

2004 | 2006

Peace Corps Agroforestry Volunteer
National Agricultural Research Institute — The Gambia, West Africa
- Assist in staff development, including data analysis and experimental design

2002 | 2004

Infecious Disease Research Scientist
University of Washington Department of Allergy & Infectious Disease

SCIENCE COMMUNICATION

2022

Computational Biology for All! An open access book for bioinformatics & computational biology vs 0.9
Open-access computational biology textbook
Brouwer

2022

A Little Book of R for Bioinformatics vs. 2.0
Open-access bioinformatics primer.
Coghlan (au.) & **Brouwer** (ed., au)

R PACKAGES

2021

Population Modeling: redstart: An R package for Periodic Full-Annual Cycle Avian Population Models and Monte-Carlo simulation.
R implementation and replication of Runge & Marra (2005) Modeling Seasonal Interactions in the Population Dynamics of Migratory Birds.
Brouwer *et al.*

- Website & Tutorials: brouwern.github.io/FACavian/index.html

SELECTED PUBLICATIONS

2019

Population Models: Direct effects of a non-native invader erode native plant fitness in the forest understory
Journal of Ecology 108:189–198 / Dryad
Bialic-Murphy, **Brouwer** & Kaliz.

2019 **NMDS: Stream acidification & reduced availability of pollution-sensitive aquatic insects are associated with dietary shifts in a stream-dependent Neotropical migratory songbird.**
PeerJ 6:e5141 / Data & Code
Trevelline, Nuttle, Porter, **Brouwer** *et al.*

2018 **NMDS: DNA metabarcoding reveals the importance of aquatic prey subsidies & the structure of dietary niches in a community of breeding riparian songbirds.**
Oecologia 187: 85-98.
Trevelline, **Brouwer** *et al.*

2018 **GLMM: Avian community characteristics & demographics reveal how conservation value of regenerating tropical dry forests changes with forest age**
PeerJ 6: e5217 / Data and Code: GitHub
Latta, **Brouwer** *et al.*

2017 **GLMM: Long-term monitoring reveals an avian species credit in secondary forest patches of Costa Rica**
PeerJ 6: e3539 / Data and Code: Harvard Dataverse
Latta, **Brouwer** *et al.*

2017 **GAMM: Increased photosynthetic performance of an invasive forest herb mediated by deer overabundance.**
AoB Plants 9: plx011 / Data & Code
Heberling, **Brouwer** & Kalisz.

2015 **GLMM: Mutualism-disrupting allelopathic invader drives carbon stress & vital rate decline in a forest perennial herb.**
AoB Plants 7: plv014
Brouwer, Hale & Kalisz.