CELIA D. HEIN

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PROFILE

I am a motivated and creative PhD candidate with over 6 years of experience in designing and conducting research projects, data analysis and interpretation at the University of Toronto. I have a broad skillset including coding, data manipulation, biostatistics, spatial analysis, and machine learning (supervised and unsupervised) with advanced experience using regression-based modelling (including Bayesian methods). Through research, I have developed strong project management, mentorship, and scientific communication skills. I am looking for a position that will allow me to continue the growth and development of my analytical and coding skillset.

EDUCATION

PhD - Ecology and Evolutionary Biology expected 2024
University of Toronto
The influence of spatial scale on species modelling

Bachelor of Science December 2016
University of Wisconsin-Stevens Point
Double major in **Biology** & **Wildlife Ecology Research and Management**; Minor in **Spanish**
Cumulative grade point average: 4.00/4.00 (99th percentile) Dean's List with Highest Honors

SKILL SUMMARY

- **Advanced** data processing and visualization, statistical analysis, biological interpretation and communication
- **Microsoft Office 365** (advanced level): Word, Excel, PowerPoint
- **R (programming language**; advanced level**)**: base, tidyverse, ggplot, MCMCglmm, brms, glmmTMB, MuMIn, lme4, Rmarkdown
- **Python (programming language**; intermediate level): Pandas, NumPy, scikit-learn, matplotlib, TopHat, Bowtie
- **High performance computing** (intermediate level) and **parallel programming** with the Digital Research Alliance of Canada (formerly Compute Canada)
- **Git, Bash, SQL, ArcGis Pro Desktop** (beginner/intermediate level)
- Currently attending Compute Ontario summer workshops on **deep learning (neural networks) in Python**

PROJECTS

Assessing scale-dependency in species-landcover associations

- Cleaned, processed, and organized a spatial, quantitative dataset of over 10,000 individuals.
- Independently gathered, edited, and reclassified large landcover maps from Agriculture and AgriFood Canada.
- Wrote R code to **extract data** from map (raster) files at 45 different spatial scales and fit over 36,500 **generalized linear mixed models** (logistic, Poisson, negative binomial, and hurdle models) using a job array on **high performance computing clusters** on Niagara through the Digital Research Alliance of Canada.
- Wrote R code to automate model selection, fit and select secondary regression models to scale-trends (including 2nd and 3rd degree polynomials), and **wrote several algorithms** to calculate the optimum scale of effect.
- Manuscript in-preparation (first author)
- Oral and poster presentations at the Ecological Society of America Annual Conference

Assessing the specificity of scale of effect in species-landcover associations

- Used bootstrap resampling to create confidence intervals and statistically compare scale of effect between and within species
- Used **Bayesian modelling** (MCMC) to test the influence of species traits and phylogeny on scale of effect
- Manuscript in-preparation (first author)

Comparing the strength of spatial genetic structure between species and studies

- **Simulated genetic data** and performed a **sensitivity analysis** to test for bias due to variation in number and spatial configuration of data sampling sites in three effect size metrics: **Fst**, **R-squared**, and **Moran's I**
- Published in *Frontiers in Ecology and Evolution*, *9*, 612718 (first author)
- Oral and poster presentations at: Swiss Federal Institute for Forest, Snow, and Landscape Research; ETH Zurich, North American International Association of Landscape Ecology, and the University of Toronto Atwood Colloquium

PROFESSIONAL EXPERIENCE

University of Toronto Mississauga, Department of Biology

Course Instructor

Biometrics I (Bio360) 2023

- Using real data from published peer-reviewed case studies in the health research, I walked students through step-by-step from experimental design to interpretation and application in lecture, exams, and tutorials (via R and Rstudio)
- Prepared and delivered 3 hours of biostatistics lectures per week
- Managed a large, relational database of course material and made is accessible to students (via Canvas)
- Supervised and managed a team of 5 teaching assistants
- Maintained regular office hours over the minimum requirement

Teaching Assistantships (teaching, marking, and admin positions) 2017 – 2024

Biometrics II (Bio361)

- Taught an intensive, in-person course on regression-based modelling (conceptual and applied) in RStudio
- Created and evaluated case study assignments, written reports, and oral presentations

Biometrics I (Bio360)

- Taught and ran both in-person and remote sessions on basic statistics and data manipulation in R and RStudio
- Evaluated biological papers and technical reports
- Trained and mentored new employees
- Created and evaluated statistics exams (applied and conceptual) using data from published peer-reviewed papers

Ecology (Bio 205)

- Managed a team's observational data collection, manipulation, basic statistical analysis, and experiment interpretation for a large citizen-science project

LEADERSHIP & MENTORSHIP

University of Toronto

Vice-President of Science Career Committee 2020-2021

Supervised four Work Study and ROP undergraduates on three separate projects 2018-2019

REFERENCES

Available on request