Justin John **Millar**

PhD Candidate · University of Florida

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Education

University of Florida   *Gainesville, FL*

Ph.D. in Forest Resources and Conservation   *Aug. 2014 - exp. Dec. 2018*

- Dissertation: "Development of Bayesian statistical frameworks and decision support tools for the management of early childhood malaria"
- Affiliate with the UF Emerging Pathogens Institute and the UF Informatics Institute
- Certification in Geospatial Analysis
- Grinter Graduate Fellow

University of Mississippi   *Oxford, MS*

M.Sc. in Biology   *Jan. 2012 - Dec. 2013*

- Thesis: "Bacterial community biogeography of the major tributaries of the Lower Mississippi River"
- GPA: 4.0

Michigan State University   *East Lansing, MI*

B.Sc. in Ecology and Evolution   *Aug. 2007 - May 2011*

- Attended Lyman Briggs College for Natural Sciences
- Graduated on Dean's List

Additional Training

Ecological Forecasting Summer Course   *Boston, MA*

Near-term Ecological Forecasting Initiative   *Aug. 2018*

- Inaugural NSF-funded workshop focused on making predictions and forecasting ecological phenomena (e.g., infectious diseases, phenology, microbiomes, carbon fluxes)
- Topics included Bayesian statistics, fusing multiple data sources, forecast uncertainty, data assimilation, machine learning, decision science
- One of fifteen graduate students, post-docs, and early career academic scientists selected from appx. 150 applicants

Software/Data Carpentry Instructor Training   *Gainesville, FL*

Software/Data Carpentry   *May 2017*

- Learned instructional pedagogy as well as the practicalities of teaching Software and Data Carpentry workshops
- Certified to teach, organize, and host all official Carpentries workshops

Mothur Bioinformatics Workshop   *Detroit, MI*

University of Michigan   *June 2013*

- Learned to use the mothur programming platform for microbial bioinformatic data analysis
- Topics included DNA sequencing technologies (Sanger, 454, Illumina, IonTorrent, PacBio), introduction to mothur, command line interface, and GUI, improving sequence quality, alignment, chimera detection, distance calculations, OTU identification, sequence/OTU classification, measuring alpha and beta diversity, population-level analyses

Work Experience

University of Florida   *Gainesville, FL*

Graduate Research/Teaching Assistant   *Aug. 2014 - Present*

- Adapted a novel approach for detecting malaria risk factors using Bayesian model averaging, providing a semi-parametric framework which produces fully interpretable models that account for uncertainty in model selection and outperformed logistic and LASSO regression in out-of-sample prediction
- Developed a conceptual framework for comparing the cost-effectiveness of presumptive treatment versus test-then-treat for mass malaria interventions, and then used publicly available data to create a web-based decision support tool
- Analyzed the impact of local health facilities on early childhood malaria in northern Ghana, created additive model to optimize location of new health facility, and developed web-based application to provide real-time projections on cases and disease prevalence
- Organized research trip to Ghana to present research findings to collaborators and participate in field collection and lab identification
- Served as a teaching assist for two statistics-focused courses and founded open session for learning R programming (UF R Meetup)

University of Michigan   *Ann Arbor, MI*

Lab Manager/Field Technician   *Feb. 2014 - Jul. 2014*

- Implemented field work on microbial sampling and eDNA in inland lakes throughout Michigan, which involved maintain, transporting, and operating small watercraft, water sample filtration, and supervising graduate and undergraduate technicians
- Microbial lab analyses including DNA extraction and amplification, eDNA quantification, and enzyme assays

University of Mississippi   *Oxford, MS*

GRADUATE RESEARCH/TEACHING ASSISTANT   *Jan. 2012 - Dec. 2013*

- Organized and implemented NSF-funded project on microbial biogeography and nutrient processing throughout the Mississippi River network, which consisted of planning two extended fieldwork periods (> eight weeks), transporting and piloting motor- and man-powered small watercraft, and daily setup of lab equipment at remote locations
- Performed microbial ecological lab procedures including enzyme assays, DNA extraction, PCR, DGGE, and bioinformatics analyses
- Ran a teaching lab and supervised undergradate honors researchers

Cape Eleuthera Institute   *Eleuthera, Bahamas*

RESEARCH FELLOWSHIP   *Jul. - Dec. 2011*

- Collected data on the biographic distribution of bonefish (*Albula vulpes*) using seine netting, hook-and-line, external tagging, and regular data entry and quality control
- Conducted lab experiments on the effects of climate change on bonefish physiology using wet-lab manipulation experiments on fish respirometry

Mote Marine Laboratory   *Sarasota, FL*

REU INTERNSHIP   *Jun. - Aug. 2010*

- Implemented population study of common snook *Centropomus undecimalis* which consisted of daily sampling and external tagging using hand-pulled seine netting
- Prepared statistical analysis of large 10-year data set of biological and hydrological data

Michigan State University   *East Lansing, MI*

UNDERGRADUATE RESEARCH & TEACHING ASSISTANT   *Sep. 2008 - May 2011*

- Conducted field and lab research on soil ecology in the Grandy Lab, which included agricultural field sampling, soil entomology and biogeochemistry assays (microscopy, live culture, C:N pyrolysis)
- Collected meta-analysis of early-life demography across animal phyla under Dr. Richard Hill

Skills

Statistics	Bayesian methods, Generalized (mixed) linear & additive models (GLM(M)/GAM(M)), machine learning (Random Forest, SVM)
Programming	R, JAGS, (r)Stan, SQL (MySQL, PostreSQL, Access), GIS (ArcGIS, QGIS), Git, bash, Python, LaTeX
Web	GitHub, (R)Markdown, (Hu)Go, Jekyll, Overleaf, basic HTML/CSS
Field-related	Open Water SCUBA certification, experience with operating and maintaining small watercraft

Publications

In prog.
J.J. Millar, P.Psychas, B. Abuaku, P. Amratia, K. Koram, K.B. Toh, D. Valle. Assessing and projecting the role of distance from local health facilities on early childhood malaria: a case example from northern Ghana. *In progress*.

D. Valle, K.B. Toh, and **J.J. Millar**. Emergence of software for rapid prototyping of decision support tools by conservation scientists. *Conservation Biology*. In review.

J.J. Millar, K.B. Toh, D. Valle. To screen or not to screen: an interactive framework for comparing cost-effectiveness of mass screening and treatment of malaria. *Malaria Journal. In review*.

P. Amratia, P. Psychas, B. Abuaku, C. Ahorlu, **J.J. Millar**, S. Oppong, K. Koram, and D.R. Valle. 2018. Using a Bayesian geostatistical model to characterize local-scale heterogeneity of malaria risk in Bunkpurugu-Yunyoo district in northern Ghana. *Am. J. Trop. M. Hyg.. In review*.

2018
Millar, J.J., P. Psychas, P. Amratia, B. Abuaku, C. Ahorlu, K. Koram, S. Oppong, and D. Valle. 2018. "Detecting local risk factors for residual malaria in northern Ghana using Bayesian model averaging". *Malaria Journal* 17:343.

2017
Payne, J.T., **J.J. Millar**, C. Jackson, and C. Ochs. 2017. "Patterns of variation in diversity of the Mississippi river microbiome over 1,300 kilometers". *PLoS ONE* 12(3): e0174890.

2016
Valle, D.R., **J.J. Millar**, and P. Amratia. 2016. "Spatial heterogeneity can undermine the effectiveness of country-wide test and treat policy for malaria: a case study from Burkina Faso". *Malaria Journal* 15: 513.

2015
Valle, D.R., J.M. Tucker-Lima, **J.J. Millar**, P. Amratia, and U. Haque. 2015. "Bias in logistic regression due to imperfect diagnostic test results and practical correction approaches". *Malaria Journal* 14: 434.

Millar, J.J., J.T. Payne, C.A. Ochs, and C.R. Jackson. 2015. "Particle-associated and cell-free extracellular enzyme activity in relation to nutrient status of large tributaries of the Lower Mississippi River". *Biogeochemistry* 124(1-3): 255-271.

2014
Jackson, C.R., **J.J. Millar**, J.T. Payne, and C.A. Ochs. 2014. "Free-living and particle-associated bacterioplankton in large rivers of the Mississippi River Basin demonstrate biogeographic patterns". Applied and *Environmental Microbiology* 80(23); 7186-7195.

2013
Jackson, C.R., H.L. Tyler, and **J.J. Millar**. 2013. "Determination of Microbial Extracellular Enzyme Activity in Waters, Soils, and Sediments using High Throughput Microplate Assays". *Journal of Visualized Experiments* 80: 50399.

Reviewer: Ecological Applications

Presentations

American Society of Tropical Medicine & Hygiene (ASTMH)

POSTER PRESENTATION   *New Orleans, LA, USA · 2018*

"Assessing and projecting the role of distance from local health facilities on early childhood malaria prevalence: a case example from northern Ghana"

POSTER PRESENTATION   *Baltimore, MD, USA · 2017*

"To screen or not to screen: An interactive tool that integrates costs and spatial heterogeneity to determine when mass-screen-and-treat is an effective malaria control strategy"

POSTER PRESENTATION   *Atlanta, GA, USA · 2016*

"Identifying malaria risk factors in a hyper-endemic setting using Bayesian model selection"

CarpentryCon

ORAL & POSTER PRESENTATION   *Dublin, Ireland · 2018*

"A Carpentries culture at the University of Florida"

Association for the Sciences of Limnology and Oceanography Meeting (ASLO)

POSTER PRESENTATION   *New Orleans, LA, USA · 2013*

"Microbial nutrient processing via extracellular enzyme activity in major tributaries of the Lower Mississippi River"

American Society of Microbiology (ASM)

ORAL PRESENTATION   *New Orleans, LA, USA · 2013*

"Bacterial community structure in major tributaries of the Lower Mississippi River is driven by habitat differences at regional and micro-scales"

POSTER PRESENTATION   *Starkville, MS, USA · 2012*

Microbial extracellular enzyme activity in large rivers of the Mississippi River Basin"

Teaching and Workshops

UNIVERSITY COURSES (TEACHING ASSISTANT)

Introduction to Applied Statistics

UNIVERSITY OF FLORIDA   *Spring/Fall 2018*

- Online Course (120 to 150 students)
- Description: Conceptual and practical understanding of the application of statistics in the agricultural and life sciences using a combination of lectures, programming demonstrations, data exercises using the programming language R, group activities, and primary literature to teach introductory statistics at the graduate level
- Duties: Grading assignments, monitoring and responding to weekly discussion boards, serving as first contact for questions on content and issues with quizzes/exams, proofing assignments and final exam, holding weekly office hours
- Created additional notes and content and a comprehensive bonus assignment

Introduction to Bayesian Statistics

UNIVERSITY OF FLORIDA   *Spring 2016*

- Description: Introduce life scientists to Bayesian statistics. We will explore basic ideas regarding integration through simulation (Monte Carlo integration), the philosophy and strengths of Bayesian statistics, and the Markov Chain Monte Carlo (MCMC) algorithms needed to fit such models. We will focus on several real world examples and how to transform these problems into statistical models. This course will rely on substantial extra-class work, in order to provide students with extensive hands on experience on conceptualizing, implementing, and interpreting the results of these models. Ideally, this experience will be enough to enable students to develop their own Bayesian models after this course is over. We will try to cover simple (e.g., Normal and Poisson), mixed effect and multi-level regression models but this will fundamentally depend on the speed with which the class is able to follow the course. Implementation of these models will be done both with JAGS as well as customized R code
- Duties: Grade weekly assignments (focused on R and JAGS code), grade group presentations, organize weekly "queries" from students, hold weekly office hours
- Motivated groups to develop webpages outlining their projects and contribute to new course website

Advanced General Microbiology

UNIVERSITY OF MISSISSIPPI   *Spring 2012*

- Description: A survey of the principles and concepts of microbiology including the biochemistry, cell biology, metabolism, genetics, ecology, evolution, and biodiversity of microorganisms, as well as the impacts of microorganisms on human affairs
- Duties: Prepare and maintain material for lab (mix and pour agar plates, culture strains), write and grade quizzes, hold open lab hours

Mangrove Flats Field Ecology

CAPE ELEUTHERA INSTITUTE   *Summer 2011*

- Small group (6) of high school juniors/seniors
- Description: Provide hands-on field research in near-shore mangrove ecology.
- Duties: Supervise weekly field sampling (free dive fish identification, seine netting, fish tagging), write and grade quizzes and assignments, prepare students for presentation for Bahamian Minister of the Environment

Applied Research Techniques (a.k.a. the Popcorn Course)

MICHIGAN STATE UNIVERSITY *Spring 2011*

- Description: Introduce students to how food companies do research to improve their products, and to have students carry out a research project of their own. With generous financial support from ConAgra Foods (makers of Peter Pan Peanut Butter, Reddi-Wip, and Parkay Margarine, among others), students will conduct experiments on a genuine research question associated with either ConAgra's Orville Redenbacher or Act II microwave popcorn
- Duties: Supervise student-developed research projects, create and grade quizzes and group project assignment, travel with class to ConAgra head-quarters and support student presentations to Reseach and Development team

Cell and Molecular Biology Lab

MICHIGAN STATE UNIVERSITY *Fall 2010*

- Description: Study of the building blocks of cells, the gross anatomy of the cell, and the structures and organelles that perform the work necessary for cell function. We will also examine several cellular processes at the molecular level, including the central dogma of molecular biology: RNA transcription and protein translation. We will examine the bioenergetic processes necessary to sustain life; first photosynthesis, the mechanism by which plant chloroplasts capture light energy to make the carbohydrates that bring life to earth. We then discuss the mitochondria and how they break down carbohydrates to release energy. All topics will be framed within the context of the human physiology. Mastery of these topics will provide you with an understanding of modern molecular and cellular biology
- Duties: Prepare lab materials, supervise student labs, grade lab reports, hold open lab hours

WORKSHOPS & TUTORIALS

SOFTWARE & DATA CARPENTRY *University of Florida*

- Served as an instructor and/or a helper in multiple (at least ten) Software (SC) and Data (DC) Carpentry workshops (SW: The Unix Shell, Version Control with Git, Programming with Python, Programming with R, R for Reproducible Scientific Analysis; DC: Data Organization in Spreadsheets for Ecologists, Data Cleaning with OpenRefine for Ecologists, Data Management with SQL for Ecologists, Data Analysis and Visualization in R for Ecologist)
- Piloted an experimental extended workshop series
- Organized one of the first Data Carpentry Geospatial workshops

R-LADIES *Gainesville, FL*

- Introduction to blogdown

UF R MEETUP *University of Florida*

- Introduction to Leaflet (in R)
- Introduction to Shiny
- Introduction to Dataframes in R
- Introduction to R and RStudio

UNDERGRADUATE STATISTICS CLUB - R TUTORIALS *University of Florida*

- Introduction to ggplot
- Introduction to R and RStudio

STATISTICS FOR ECOLOGICAL RESEARCH *The Island School*

- Three-part series covering introductory topics on common statics (descriptive and inferential) for 30 high school juniors & seniors

Grants & Awards

2018	**Travel Grant**, School of Forest Resources and Conservation, Univ. of Florida
	Travel Grant, UF Carpentry Club, Univ. of Florida
	Travel Grant, UF Informatics Institute, Univ. of Florida
	Selected Travel Award, UF Carpentry Club, Univ. of Florida
2017	**Travel Grant**, Graduate School, Univ. of Florida
	Travel Grant, UF Informatics Institute, Univ. of Florida
2014	**Fellowship**, Grinter fellow, School of Forest Resources and Conservation, Univ. of Florida
2013	**Early Career Travel Award**, Association for the Sciences of Limnology and Oceanography
	Travel Grant, Department of Biology, Univ. of Mississippi
2011	**Teaching Award**, Most Outstanding Teaching Assistant, Michigan State Univ.

Extracurricular Activities

UF R Meetup
Gainesville, FL

FOUNDING ORGANIZER *Nov. 2017 - Present*

- Founded an weekly open two-hour session for learning R programming through practical tutorials, topical presentations, and peer-to-peer code debugging
- Organized speakers for weekly presentations, plan and implement tutorials, debug code
- Created website and GitHub Organization for organizing meetup and disseminating information, and managed list-serv

UF Carpentry Club   *Gainesville, FL*

Inaugural Board Member   *Jan. 2018 - Present*

- Served as part of a group of independent members of the UF community dedicated to providing structured pathways for our colleagues to learn informatics skills outside of the traditional university curriculum
- Planned, organized, and implemented Software and Data Carpentry workshops (over 400 participants), attend biweekly meetings, helped create website and GitHub Organization

Software, Tools, and Lessons

Probit regression using Bayesian model averaging (with reversible-jump MCMC) for estimating disease risk factors (example with malaria)   *Data & R Code · Lead Developer*

Projecting the impact of new facilities on childhood malaria in Bunkpurungu-Yunyoo, Ghana   *Shiny App · Lead Developer*

To screen or not to screen?: An interactive tool that integrates costs and spatial heterogeneity to determine when mass-screen-and-treat is an effective malaria control strategy   *Shiny App · Lead Developer*

Comparison of presumptive treatment and test-than-treat scenarios across possible prevalence rates   *Shiny App · Lead Developer*

Probability of malaria infection in Burkina Faso   *Shiny App · Aid Developer*

Regions for presumptive treatment in Burkina Faso   *Shiny App · Aid Developer*

Finding statistics courses across the University of Florida   *Shiny App · Aid Developer*

Introduction to Geospatial Raster and Vector Data with R   *Open-Source Lesson · Contributor*

Data Analysis and Visualization in R for Ecologists   *Open-Source Lesson · Contributor*