
CHRISTIAN E. GUNNING

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BACKGROUND

My research employs a dynamical systems interpretation of population and community ecology, with an emphasis on probabilistic analysis of empirical datasets and discrete stochastic dynamical models. I study metapopulation disease dynamics, including the effect of population size on stochastic extinction as a metapopulation measure of disease persistence.

My research is facilitated by a range of quantitative tools, including probability theory, machine learning methods, linear modeling, and bootstrapping. I am fluent in the R programming language, and have extensive experience with SQL, C++, Python, and multidimensional data visualization.

I believe that training students in advanced quantitative and computational tools is critical in developing the next generation of data-driven scientists. I have extensive experience teaching and mentoring students from diverse backgrounds in probability, statistics, discrete math, and scientific programming.

EDUCATION

University of New Mexico, Albuquerque *Summer 2014*

Ph.D. with Distinction in Biology (Disease Ecology with concentration in Integrative Biology)

Advisor: Dr. Helen J. Wearing

Committee: Drs. Jim Brown, Melanie Moses, and Erik Erhardt

Title: Population and Metapopulation Ecology of Childhood Diseases in the pre-vaccine era United States

University of New Mexico, Albuquerque *Fall 2009*

Masters of Water Resources (Riparian Hydroecology)

Advisors: Drs. Bruce Thomson and Roy Jemison

Title: Estimating Phreatophyte Evapotranspiration from Diel Groundwater Fluctuations in the Middle Rio Grande Bosque

University of Georgia, Athens *Fall 2001*

Bachelor of Science, Biochemistry and Molecular Biology

Advisor: Dr. James Omichinski

GRANTS AND AWARDS

Apr 2013 (\$500). UNM Biology Department Scholarship.

Apr 2013. Graduate oral presentation, 2nd place. UNM Biology Research Day.

Jun 2011 (\$2,000). UNM PiBBS Student Enrichment Opportunities Grant to attend SFI Complex Systems Summer School.

May 2010 (\$500). EEID Conference Workshop travel grant.

Apr 2010 (\$500). UNM SRAC travel grant to attend user2010.

Apr 2010. Graduate poster presentation, 1st place. UNM Biology Research Day.

Mar 2010 (\$80,000). Center for Evolutionary & Theoretical Immunology (CETI) Seed Grant, Waning Immunity in Influenza and Whooping Cough, Contributing author.

Aug 2009 (≈\$50,000). Program in Interdisciplinary Biological and Biomedical Sciences (PIBBS) 2 year fellowship.

May 2007 (\$4,400). UNM Graduate Research and Development grant, Hydrological research in the Middle Rio Grande Bosque.

PUBLICATIONS

C.E. Gunning, E. Erhardt, H.J. Wearing (2014). Conserved patterns of incomplete reporting in pre-vaccine era childhood diseases. *Proc. Roy. Soc. B.* 281(1794), 20140886.

C. Andris, D. Lee, **C.E. Gunning**, M. Martino, M.J. Hamilton, J.A. Selden. The Rise of Partisanship in the U.S. House of Representatives. (In Review, PLoS ONE)

C.E. Gunning & H.J. Wearing. Probabilistic measures of persistence and extinction in measles (meta)populations (2013). *Ecology Letters* 16(8), 985-994.

D.M. Smith, D.M. Finch, **C.E. Gunning**, R. Jemison, J.F. Kelly (2009). Post-wildfire recovery of riparian vegetation during a period of water scarcity in the Southwestern USA. *Fire ecology* 5(1), 38-55.

CONTRIBUTED TALKS

C.E. Gunning, H.J. Wearing. Reporting rate variation in U.S. cities. UNM Biology Research Day. Albuquerque, NM. Apr 2013.

C.E. Gunning. Measles dynamics in the pre-vaccine era United States: Linking models and data. UNM Biology Brownbag seminar series. Albuquerque, NM. Oct 2011.

C.E. Gunning, H.J. Wearing. Measles epidemics in pre-vaccine era United States cities: Linking models and data. Ecological Society of America conference. Austin, TX. Aug 2011.

C.E. Gunning. Spatio-temporal ecology of measles. UNM Biology Research Day. Albuquerque, NM. Apr 2011.

C.E. Gunning. Rwave - Detecting synchrony of influenza between U.S. states. useR 2010 Conference. Gaithersburg, MD. Jul 2010.

CONTRIBUTED POSTERS

C.E. Gunning, E. Erhard, H.J. Wearing. Pre-vaccine era reporting rates of measles and whooping cough. Ecology and Evolution of Infectious Disease (EEID) Conference. Fort Collins, CO. Jun 2014.

C.E. Gunning. Reporting rate variation of acute, immunizing diseases in pre-vaccine U.S. cities. Ecology and Evolution of Infectious Disease (EEID) Conference. State College, PA. May 2013.

C.E. Gunning. Stochasticity, persistence, and extinction in measles (meta)populations. Models of Infectious Disease Agent Study (MIDAS) meeting. Atlanta, GA. Jun 2012.

C.E. Gunning, H.J. Wearing. Stochasticity, persistence, and extinction in measles (meta)populations: Are we measuring what we think we're measuring? Ecology & Evolution of Infectious Disease (EEID) Conference. Ann Arbor, MI. May 2012.

C.E. Gunning. Using wavelets to detect synchrony of influenza between U.S. states. UNM Biology Research Day. Albuquerque, NM. Apr 2010.

C.E. Gunning. Linear Modeling of the Response of Groundwater Level to River Flow in the Middle Rio Grande Bosque, Water Year 2006. National Groundwater Association (NGWA) Conference. Albuquerque, NM. May 2007.

TEACHING EXPERIENCE

Probability for Scientists

Fall 2013, UNM Biology

- Course designer and lead instructor
- Mixed undergraduate/graduate course (primarily undergraduate)
- Hands-on course covering introductory probability, statistics, and data analysis

Statistical Programming

Spring 2013, UNM Statistics

- Teaching assistant
- Mixed undergraduate/graduate course (primarily graduate)
- Assisted Dr. Erik Erhardt with course lectures

UNM R Programming Group

Fall 2010 - Spring 2013, UNM

- Organizer and facilitator of weekly R programming group
- Participants included undergraduate and graduate students and professors

Ecology Workshop

May 2010, University of Michigan

- Assisted workshop participants with use of R programming language
- Workshop was part of the annual Ecology and Evolution of Infectious Disease conference

Undergraduate Biology Courses (various)

2008, 2009, 2014, UNM Biology

- Teaching assistant for Ecology & Evolution, Genetics, and Biology for Non-majors

RESEARCH EXPERIENCE

Post-doctoral Researcher

Oct 2014 - Present

Departments of Entomology and Mathematics, NCSU

Raleigh, NC

- Continue support and development of stochastic & spacially explicit C++ simulation of *Aedes aegypti* in Iquitos, Peru.
- Mentor lab graduate students

Research Assistant

Jan 2010 - Oct 2014

Wearing Lab, UNM Biology

Albuquerque, NM

- Conduct original research for publication
- Assist with grant writing
- Systems administrator and data manager
- Mentor and manager of lab undergraduates

Hydrology Research Technician

Jan 2006 - Jan 2009

Rocky Mountain Research Station, U.S. Forest Service

Albuquerque, NM

- Conduct original research for U.S. Forest Service
- Prepare technical reports
- Collect and managed environmental monitoring data

Plant Genetics Lab Technician

Jun 2003 - Jun 2004

Malmberg Lab, UGA Plant Biology

Athens, GA

- Isolated DNA, Conducted PCR
- Design data entry and management system

NMR Lab Technician

Jan 2001 - Jun 2002

*Omichinski Lab, UGA Biochemistry and Molecular Biology**Athens, GA*

- Administer mixed Unix workstation cluster
- Evaluate linux hardware/software for high-performance NMR data visualization

CONFERENCES AND PROFESSIONAL EVENTS

Nov 2014. American Society of Tropical Medicine and Hygiene Annual Conference. New Orleans, LA.

Jun 2014. Ecology and Evolution of Infectious Disease Conference. Colorado State University. Fort Collins, CO.

May 2013. Ecology and Evolution of Infectious Disease Conference. Pennsylvania State University. State College, PA.

May 2012. Ecology and Evolution of Infectious Disease Conference and Workshop. University of Michigan. Ann Arbor, MI.

Oct 2011. Rcpp R Programming Master Class. San Francisco, CA.

Aug 2011. Ecological Society of America Conference. Austin, TX.

Jun 2011. Santa Fe Institute Complex Systems Summer School. Santa Fe Institute. Santa Fe, NM.

Jul 2010. useR 2010 Conference. Gaithersburg, MD.

May 2010. Ecology and Evolution of Infectious Disease Conference and Workshop. Cornell University. Ithaca, NY.

Aug 2009. Ecological Society of America Conference. Albuquerque, NM.

May 2007. National Groundwater Association Conference. Albuquerque, NM.

PROFESSIONAL SERVICE

Jan 2015. Workshop Assistant, Software Carpentry Workshop. NCSU, Raleigh, NC.

Feb 2014. Reviewer, Theoretical Ecology.

May 2011 - May 2012. Mentored undergraduate Nathan Cournoyer. UNM Biology.

Mar 2009. Grant reader, Graduate Research Allocations Committee (GRAC). UNM Biology.

SOFTWARE DEVELOPMENT

Spring 2013. Wrote code, documentation, and unit tests for **discrimArts**, an R package for probability distribution estimation, according to the specifications of Drs. J. M. Rowland and C. Qualls.

Oct 2010 - Mar 2012. Contributor to **Rcpp**, an R package for C++ development.

2009-2012. Maintainer of **Rwave**, an R package for continuous wavelet transforms.

2010-2011. Submitted bug reports for **xts** and **zoo**, R packages for timeseries handling and analysis.