

# Rebecca K. Borchering, PhD

Department of Biology  
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## EDUCATION

Ph.D. in Mathematics May 2017  
University of Florida, Gainesville, FL  
Advisors: Dr. Scott McKinley (Mathematics), Dr. Juliet Pulliam (Biology)

M.S. in Mathematics May 2014  
University of Florida, Gainesville, FL

B.S. in Mathematics May 2011  
Concurrent Degree: B.A. in Philosophy  
Arizona State University, Tempe, AZ

## EXPERIENCE

*Postdoctoral Scholar* June 2020 - Present  
The Pennsylvania State University, Department of Biology and the Center for Infectious Disease Dynamics (CIDDD), University Park, PA

- National Science Foundation COVID-19 RAPID: Harnessing Multiple Models for Outbreak Management.
- National Science Foundation COVID-19 RAPID: Scenario Modeling Hub to harness multiple models for long-term projections and decision support.

*Postdoctoral Researcher* March 2019 - April 2020  
University of Georgia, Odum School of Ecology, Athens, GA

- Analysis, interpretation, and visualization of CDC FluView data detecting and characterizing anomalies in the 2019/2020 influenza B season in the United states.
- Lead seven member team on influenza B-Victoria project incorporating phylogenetic analysis.
- Professional communication (oral and written) with Massachusetts Department of Public Health to assemble fine-scale (age and spatial resolution) influenza subtype specific datasets.

*Postdoctoral Researcher* May 2017 - March 2019  
University of Florida, Department of Biology and Emerging Pathogens Institute, Gainesville, FL

- Improving Methods for Prediction of Epidemic Transmission Using Spatial Surveillance
- Led eleven member team in researching potential immunological interactions between responses to dengue and Zika virus infections.
- Data collation and digitization of case data from Brazilian and Colombian surveillance systems.
- Problem solving and informatics to adjust for fluctuating probable case data.
- Utilized epidemiological knowledge to model Zika virus introduction in a population with endemic dengue circulation, correctly predicting upcoming atypically large dengue epidemics.
- Guided discussions concerning improvements for collaboration and data maintenance at the Thai Ministry of Public Health.

*Program Administrator* August 2015 - August 2016  
International Clinics on Infectious Disease Dynamics and Data (ICI3D) Program, University of Florida, Emerging Pathogens Institute, Gainesville, FL

- Provided logistical and administrative support for the annual ICI3D workshops on mathematical and statistical modeling of infectious disease dynamics.
- Coordinated travel and financial arrangements for the International Disease Dynamics and Data Research Scholars Exchange Program.
- Assisted with progress reports for the National Institutes of Health and the African Institute for Mathematical Sciences (AIMS).

*Research Intern* July 2013  
Centers for Disease Control and Prevention, Atlanta, GA

- Collaborated with researchers in the Poxvirus and Rabies Branch.
- Studied rabies wildlife surveillance system and analyzed corresponding data.

**TEACHING AND MENTORSHIP** *Course Instructor* May/June 2016, May/June 2017, May/June 2018, May/June 2019  
 Mathematical Modeling in Medicine and Public Health (MedPH), Muizenberg, South Africa

- Co-taught a three week course for University of Stellenbosch B.Sc. Honours and African Institute for Mathematical Sciences M.Sc. students.
- Served as Lead Instructor in 2017-2019.

*Workshop Faculty* December 2015 - Present  
 Clinic on Dynamical Approaches to Infectious Disease Data (DAIDD), Jacksonville, FL

- Developed and presented lecture on epidemiological stochastic simulation methods which included an interactive computer simulation component.
- Mentored break-out sessions of small groups of students to develop skills for building compartmental models of infectious diseases.
- Co-developed and executed the first virtual edition of the course in December 2020, including: lecture recordings publicly available on YouTube, live instruction, activity coordination and mentoring through Microsoft Teams.

Clinic on Meaningful Modeling of Epidemiological Data (MMED), Muizenberg, South Africa

- Led session on stochastic modeling of infectious disease dynamics with computer lab tutorial.
- Designed and mentored group project on distinguishing between biological and observational mechanisms of seasonality.

*University Employment*

- Course Assistant for Survey of Calculus and Calculus II Spring 2017
- Discussion Leader for Calculus I sections Fall 2016
- Discussion Leader for Pre-Calculus sections Fall 2011, Spring 2012

**HONORS AND AWARDS**

UChicago Nat. Postdoc Survey Travel Award - Epidemics<sup>7</sup> Charleston, SC, USA (\$500) Fall 2019  
 American Mathematics Society Travel Award - Joint Mathematics Meeting (\$500) January 2017  
 CLAS Dissertation Fellowship (\$7,000 plus tuition) Summer 2016  
 ICI3D Travel Award - Epidemics<sup>5</sup> in Clearwater, FL, USA (\$700) December 2015  
 Eleanor Ewing Ehrlich Award - UF Mathematics Department (\$500) April 2015  
 IGERT Research Assistantship (\$22,500 plus tuition and fees) Fall 2014 - Summer 2015  
 IGERT Fellowship (\$30,000 annually plus tuition and fees) Fall 2012 - Summer 2014  
 IGERT Travel Award - Epidemics<sup>4</sup> in Amsterdam, Netherlands (\$3100) Fall 2013  
 IGERT Travel Award - Centers for Disease Control and Prevention (\$1870) Summer 2013  
 IGERT Research Assistantship (\$5400) Summer 2012  
 National Merit Scholar June 2007

**PUBLICATIONS**

**R.K. Borchering**, C.E. Gunning, D.V. Gokhale, K.B. Weedop, A. Saeidpour, T.S. Brett, P. Rohani. Anomalous influenza seasonality in the United States and the emergence of novel influenza B/Victoria viruses. *Proceedings of the National Academy of Sciences*, 118(5). (2021)

K. Shea, **R.K. Borchering**, W.J.M. Probert, E.A. Howerton, T.L. Bogich, S. Li, W.G. van Panhuis et al. COVID-19 reopening strategies at the county level in the face of uncertainty: Multiple Models for Outbreak Decision Support. *medRxiv* (2020). <https://doi.org/10.1101/2020.11.03.20225409>

**R.K. Borchering**, A.T. Huang, L. Mier-y-Teran-Romero, D.P. Rojas, I. Rodriguez-Barraquer, L.C. Katzelnick, S.D. Martinez, G.D. King, S.C. Cinkovich, J. Lessler, D.A.T. Cummings. Impacts of Zika emergence in Latin America on endemic dengue transmission. *Nature Communications* 10(1), 1-9. (2019)

**R.K. Borchering** and S.A. McKinley. Continuum Approximation of Invasion Probabilities. *Multiscale Modeling & Simulation* 16(2), 551-582. (2018)

**R.K. Borchering**, S.E. Bellan, J.M. Flynn, J.R.C. Pulliam, and S.A. McKinley. Resource-Driven Encounters Among Consumers and Implications for the Spread of Infectious Disease. *Journal of the Royal Society Interface* 14: 20170555. (2017)

**R.K. Borchering**, H. Liu, M.C. Steinhaus, C.L. Gardner, and Y. Kuang. A Simplistic Spatiotemporal Rabies Model for Skunk and Bat Interaction in Northeast Texas. *Journal of Theoretical Biology* 314: 16-22. (2012)

**INVITED****PRESENTATIONS**

**R.K. Borchering**, S.A. Truelove, C. Viboud, E.A. Howerton, C.P. Smith, M.C. Runge, N.G. Reich, L. Contamin, J. Levander, J. Salerno, W. van Panhuis, K. Shea, J. Lessler and the COVID-19 Scenario Modeling Hub Teams. COVID-19 Scenario Modeling Hub.

- Models of Infectious Disease Agent Study Webinar. (virtual) April 2021.
- World Health Organization Modeling Team Call. (virtual) April 2021.
- Cummings Lab Seminar, Gainesville, FL, USA (virtual) April 2021.
- CIDD Seminar, The Pennsylvania State University, University Park, PA, USA (virtual) April 2021.

**R.K. Borchering**, K. Shea, W. Probert, et al. Multi-Model Outbreak Decision Support. DAIDD Faculty Research Presentation. Stellenbosch University, Stellenbosch, South Africa (virtual) December 2020.

**R.K. Borchering**. Anomalous influenza seasonality in the United States and underlying mechanisms. Virginia Tech MathBio Seminar. Virginia Tech, Blacksburg, VA, USA (virtual) November 2020.

**R.K. Borchering**. Shifting focus from A to B: characterizing recent changes in influenza B dynamics in the United States. Cobey Lab. University of Chicago, Chicago, IL, USA (virtual) March 2020.

**R.K. Borchering**, A. Huang, L. Mier-y-Teran-Romero, S.S. Cinkovich, D.P. Rojas, S.D. Martinez, G.D. King, I. Rodriguez-Barraquer, J. Lessler, and D.A.T. Cummings. Dengue since Zika: characterizing potential impacts of Zika emergence on endemic dengue transmission. Center for the Ecology of Infectious Diseases Seminar. University of Georgia, Athens, GA, USA October 2018.

**R.K. Borchering**, J.M. Flynn, S.E. Bellan, J.R.C. Pulliam, and S.A. McKinley. Resource-driven encounters among consumers and implications for the spread of infectious disease. Mathematical Biosciences Institute Disease Ecology and Eco-epidemiology workshop. Ohio State University, Columbus, OH, USA March 2018.

**R.K. Borchering**, A. Huang, G.D. King, S.D. Martinez, and D.A.T. Cummings. Potential effects of the recent Zika epidemic in Latin America on observed dengue incidence. DAIDD Faculty Research Talk. White Oak Conservation Center, Yulee, FL, USA December 2017.

**R.K. Borchering**. Continuum approximation of invasion probabilities for stochastic population models. Probability and Statistics Seminar. Tulane University, New Orleans, LA, USA Feb. 2017.

**R.K. Borchering**. Impact of resource abundance on pathogen invasion risk.

- South African Center for Epidemiological Modeling and Analysis Seminar. Stellenbosch University, Stellenbosch, South Africa June 2016.
- MMED Faculty Research Talk. African Institute for Mathematical Sciences, Muizenberg, South Africa June 2016.
- Disease Group Seminar. Princeton University, Princeton, NJ, USA May 2016.
- Lloyd-Smith Lab Seminar. University of California, Los Angeles, CA, USA April 2016.
- Disease Ecology Seminar. University of Glasgow, Glasgow, Scotland Feb. 2016.
- DAIDD Faculty Research Talk. White Oak Conservation Center, Yulee, FL, USA Dec. 2015.

**R.K. Borchering**. Impact of resource abundance on consumer encounter rates (with an application to pathogen invasion risk). Probability and Statistics Seminar. Tulane University, New Orleans, LA, USA September 2015.

**R.K. Borchering**. Modeling potential drivers of rabies dynamics in carnivores. Computational Ecology and Epidemiology Study Group. University of Georgia, Athens, GA, USA July 2013.

**OTHER****PRESENTATIONS**

**R.K. Borchering**. Forecasting seasonal influenza: challenges and opportunities. Center for the Ecology of Infectious Diseases Disease Ecology Workshop. University of Georgia, Athens, GA, USA September 2019.

**R.K. Borchering**, A. Huang, L. Mier-y-Teran-Romero, S.S. Cinkovich, D.P. Rojas, S.D. Martinez, G.D. King, I. Rodriguez-Barraquer, J. Lessler, and D.A.T. Cummings. Potential effects of the recent

Zika epidemic in Latin America on observed dengue incidence. Center for Statistics and Quantitative Infectious Diseases Meeting. University of Florida, Gainesville, FL, USA July 2018.

**R.K. Borchering**, J.M. Flynn, S.E. Bellan, J.R.C. Pulliam, and S.A. McKinley. Impact of resource abundance on pathogen invasion risk. Joint Mathematics Meetings. Atlanta, GA, USA Jan. 2017.

**R.K. Borchering**. Investigating conditions for rabies endemicity in jackals. Biomath Seminar. University of Florida, Gainesville, FL, USA October 2014.

**R.K. Borchering** and J.R.C. Pulliam. Assessing seasonal drivers of rabies dynamics in three North American carnivore species. UF Graduate Mathematics Association. University of Florida, Gainesville, FL, USA November 2013.

## CONTRIBUTED POSTERS

**R.K. Borchering**, A. Huang, L. Mier-y-Teran-Romero, D.P. Rojas, I. Rodriguez-Barraquer, S.S. Cinkovich, S.D. Martinez, G.D. King, J. Lessler, and D.A.T. Cummings. Dengue since Zika: characterizing potential impacts of Zika emergence on endemic dengue transmission.

- Ecology and Evolution of Infectious Diseases Annual Conference. Princeton, NJ, USA June 2019.
- Emerging Pathogens Institute Research Day. Gainesville, FL, USA February 2019.

**R.K. Borchering**, A. Huang, L. Mier-y-Teran-Romero, D.P. Rojas, I. Rodriguez-Barraquer, S.D. Martinez, G.D. King, S.S. Cinkovich, J. Lessler, and D.A.T. Cummings. Potential effects of the recent Zika epidemic in Latin America on observed dengue incidence.

- American Society of Tropical Medicine & Hygiene Meeting. New Orleans, LA, USA October 2018.
- Models of Infectious Disease Agent Study Meeting. Bethesda, MD, USA April 2018.

**R.K. Borchering**, L. Mier-y-Teran-Romero, I. Rodriguez-Barraquer, S.S. Cinkovich, A. Huang, G.D. King, S.D. Martinez, and D.A.T. Cummings. Interactions between dengue immunity and Zika virus infection.

- Emerging Pathogens Institute Research Day. Gainesville, FL, USA February 2018.
- Epidemics<sup>6</sup>: Sixth International Conference on Infectious Disease Dynamics. Sitges, Spain November 2017.

**R.K. Borchering** and S.A. McKinley. Approximating the probability of pathogen invasion for stochastic population models. Ecology and Evolution of Infectious Diseases Annual Conference. Santa Barbara, CA, USA June 2017.

**R.K. Borchering**, J.M. Flynn, S.E. Bellan, J.R.C. Pulliam, and S.A. McKinley. The impact of resource abundance on pathogen invasion risk.

- American Institute of Mathematical Sciences Conference. Orlando, FL, USA July 2016.
- Emerging Pathogens Institute Research Day. Gainesville, FL, USA February 2016.

**R.K. Borchering**, S.E. Bellan, J.M. Flynn, J.R.C. Pulliam, and S.A. McKinley. Effects of resource density on encounter rates and disease outcomes.

- Epidemics<sup>5</sup>: Fifth International Conference on Infectious Disease Dynamics. Clearwater, FL, USA December 2015.
- Society for Mathematical Biology Annual Meeting and Conference. Atlanta, GA, USA July 2015.
- Ecology and Evolution of Infectious Diseases Annual Conference. Athens, GA, USA May 2015.

**R.K. Borchering**, C.A.B. Pearson, A.T. Gilbert, J.D. Blanton, R.M. Wallace, and J.R.C. Pulliam. Assessing rabies seasonality in three North American carnivore species.

- Clinic on the Meaningful Modeling of Epidemiological Data. African Institute for Mathematical Sciences, Muizenberg, South Africa June 2014.
- From Within Host Dynamics to the Epidemiology of Infectious Disease Workshop. Mathematical Biosciences Institute, Columbus, OH, USA April 2014.
- Third UF SIAM Gators Student Conference. University of Florida, Gainesville, FL, USA March 2014.

**R.K. Borchering**, C.A.B. Pearson, A.T. Gilbert, J.D. Blanton, R.M. Wallace, and J.R.C. Pulliam. Assessing seasonal drivers of rabies dynamics in three North American carnivore species.

- Epidemics<sup>4</sup>: Fourth International Conference on Infectious Disease Dynamics. Amsterdam, Netherlands November 2013.
- Graduate Student Research Day. Gainesville, FL, USA October 2013.
- Society for Mathematical Biology Annual Meeting, Tempe, AZ, USA June 2013.

**R.K. Borchering**, H. Liu, M.C. Steinhaus, C.L. Gardner, and Y. Kuang. A simple spatiotemporal rabies model for skunk and bat interaction in northeast Texas. Society for Mathematical Biology Annual Meeting and Conference, Knoxville, TN, USA July 2012.

## ACTIVITIES

*Shea Lab Member* June 2020 - Present

- Eberly College of Science at the Pennsylvania State University.

*Rohani Lab Member* March 2019 - April 2020

- Odum School of Ecology at the University of Georgia.

*Cummings Lab Member* Fall 2016 - March 2019

- Department of Biology and Emerging Pathogens Institute at the University of Florida.

*Pulliam Lab Member* Summer 2012 - Fall 2016

- Department of Biology and Emerging Pathogens Institute at the University of Florida.

Pennsylvania State University Center for Infectious Disease Dynamics Member June 2020 -Present

Models of Infectious Disease Agent Study Member February 2020 - Present

University of Georgia Center for the Ecology of Infectious Diseases Member March 2019 - Present

University of Georgia COVID-19 Working Group Member February 2020 - April 2020

Reviewer: Proceedings of the Royal Society B, Philosophical Transactions of the Royal Society B, PLoS Neglected Tropical Diseases, PLoS Pathogens, EcoHealth, Epidemics, Scientific Reports, Journal of Theoretical Biology, Communications Biology, International Journal of Infectious Diseases, BMC Veterinary Research, Journal of the South African Veterinary Association, Zoonoses and Public Health

(updated April 2020)