

Kevin M. Bakker

Curriculum Vitae

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*infectious diseases, spatiotemporal population dynamics,
statistical inference, mathematical modeling, seasonal
biology, and immunization*

Postdoctoral Experience

May 2018–April 2021 **NIH F32 Research Fellow**, UNIVERSITY OF MICHIGAN, Ann Arbor, MI, Department of Statistics.

I will utilize state-of-the-art modeling approaches with historical Wild Poliovirus (WPV) incidence data to identify the mechanism(s) which are most strongly associated with historical WPV transmission across Africa, Asia, the Middle East, Europe, and the Americas. This work will result in mathematical transmission models that can be used to identify the ideal timing for immunization or mop-up campaigns, to maximize Oral Polio Vaccine coverage via indirect shedding. This work will play a crucial role towards eradication, and will also provide epidemiologists with the knowledge of when to look for the re-emergence of WPV or circulating vaccine derived poliovirus (cVDPV) following WPV elimination. Advisors: Edward Ionides & Mercedes Pascual.

Sept 2017–April 2018 **Postdoctoral Researcher**, UNIVERSITY OF GLASGOW, Glasgow, Scotland, Institute of Biodiversity, Animal Health and Comparative Medicine.

Analyzed multiple years of vampire bat mark/recapture data to create theoretical models to test various vaccination strategies to reduce rabies spread across Latin America. Biomarker transmission estimates were fit from 2017 field data and incorporated into dynamic models at both colony and regional scales. Advisor: Daniel Streicker.

Education

Sept 2013–Aug 2017 **Ph.D.**, THE UNIVERSITY OF MICHIGAN, Ecology and Evolutionary Biology, Michigan Institute for Computational Discovery & Engineering Certificate.

Sept 2012–Dec 2014 **Master of Science**, THE UNIVERSITY OF MICHIGAN, Ecology and Evolutionary Biology.

May 2005–April 2006 **Bachelor of Science**, MICHIGAN STATE UNIVERSITY, Zoology.

Sept 2000–Dec 2004 **Bachelor of Science**, MICHIGAN STATE UNIVERSITY, Human Biology.

Publications

[4] **Kevin M Bakker**, Micaela Elvira Martinez-Bakker, Barbara Helm, and Tyler J Stevenson. “Digital epidemiology reveals global childhood disease seasonality and the effects of immunization”. In: *Proceedings of the National Academy of Sciences* 113.24 (2016), pp. 6689–6694.

- [3] *Micaela Martinez-Bakker, ***Kevin M Bakker**, Aaron A King, and Pejman Rohani. "Human Birth Seasonality: Latitudinal Gradient and Interplay with Childhood Disease Dynamics". In: *Proceedings of the Royal Society B: Biological Sciences* 281.1783 (2014), *Co-first authors.
- [2] Laura Alonso-Sáez, Alison S Waller, Daniel R Mende, **Kevin Bakker**, Hanna Farnelid, Patricia L Yager, Connie Lovejoy, Jean-Éric Tremblay, Marianne Potvin, Friederike Heinrich, et al. "Role for urea in nitrification by polar marine Archaea". In: *Proceedings of the National Academy of Sciences* 109.44 (2012), pp. 17989–17994.
- [1] Jean-François Ghiglione, Pierre E Galand, Thomas Pommier, Carlos Pedrós-Alió, Elizabeth W Maas, **Kevin Bakker**, Stefan Bertilson, David L Kirchman, Connie Lovejoy, Patricia L Yager, et al. "Pole-to-pole biogeography of surface and deep marine bacterial communities". In: *Proceedings of the National Academy of Sciences* 109.43 (2012), pp. 17633–17638.

Book Chapters

- 2013 **The Chukchi Sea**, *Biomes and Ecosystems: An Encyclopedia*, Salem Press, ed:Robert Warren Howarth.

Grants & Fellowships

- 2018–2021 **\$175,974** NIH National Research Service Award F32AI134016
- 2016–2017 **\$47,400** University of Michigan Rackham Predoctoral Fellowship
- 2017 **\$1,500** University of Michigan, Undergraduate Research Grant
- 2014–2017 **\$10,775** University of Michigan Ecology and Evolutionary Biology Grants
- 2013-2017 **\$9,250** University of Michigan Rackham Grants
- 2015 **\$4,000** University of Michigan, Michigan Institute for Computational Discovery and Engineering Fellowship
- 2015 **\$1,350** University of Washington Summer Institute in Statistics and Modeling in Infectious Diseases Summer Institute Grant

Teaching

- Winter 2016 University of Michigan, Introduction to Ecology and Evolutionary Biology
- Fall 2015 University of Michigan, Introduction to Ecology and Evolutionary Biology
- Winter 2013 University of Michigan, Ecology and Evolution of Infectious diseases
- Fall 2012 University of Michigan, Introduction to Ecology and Evolutionary Biology

Media (hyperlinks)

- Fox News
- Slate Magazine
- LiveScience 1
- LiveScience 2
- NYmag.com
- Business Insider
- MedPageToday
- University of Michigan News 1
- Science
- The Pharmaceutical Journal
- AAAS Radio
- ResearchGate News
- ABC News
- Medical Economics
- University of Michigan News 2
- Discovery News
- Daily Mail
- Boston Globe
- New Scientist
- Michigan Radio
- The Express
- University of Michigan News 3

National and International Conference Presentations

- 2017 **Bakker, K.M.** and M. Martinez. Jacques Monod: Open Questions in Disease Ecology and Evolution: From Basic Research to Evolutionary Medicine. Roscoff, France
- 2017 **Bakker, K.M.** and D. Streicker. Ecological Society of America. Portland, OR
- 2017 **Bakker, K.M.** M. Martinez. Ecology and Evolution of Infectious Diseases. Santa Barbara, CA
- 2016 **Bakker, K.M.**, M. Martinez-Bakker, B. Helm, and T.J. Stephenson. Ecology and Evolution of Infectious Diseases. Ithaca, NY
- 2015 **Bakker, K.M.**, M. Martinez-Bakker, B. Helm, and T.J. Stephenson. British Ecological Society. Edinburgh, Scotland
- 2015 **Bakker, K.M.** and M. Pascual. Ecological Society of America. Baltimore, MD
- 2014 **Bakker, K.M.** and P. Rohani. Ecological Society of America. Sacramento, CA
- 2014 **Bakker, K.M.** and P. Rohani. Ecology and Evolution of Infectious Diseases. Fort Collins, CO
- 2013 **Bakker, K.M.**, Martinez-Bakker, M., King, A.A., and P. Rohani. Ecology and Evolution of Infectious Diseases. State College, PA

Local Presentations, Invited Talks, and Other Presentations

- 2018 **Bakker, K.M.**, Complex Systems Networks Group. Ann Arbor, MI
- 2017 **Bakker, K.M.**, Disease Ecology and Wild Immunology. Glasgow, Scotland
- 2017 **Bakker, K.M.**, Department of Ecology and Evolutionary Biology Seminar Speaker. Ann Arbor, MI
- 2016 **Bakker, K.M.**, POMP in R, a tutorial. Ann Arbor, MI
- 2016 **Bakker, K.M.**, Polio and Varicella Zoster Virus. Athens, GA
- 2016 **Bakker, K.M.**, M. Martinez-Bakker, B. Helm, and T.J. Stevenson. Michigan Institute of Computational Discovery and Engineering. Ann Arbor, MI
- 2016 **Bakker, K.M.**, Modeling Infectious Diseases Across Scales. Ann Arbor, MI
- 2015 **Bakker, K.M.**, Institute for Disease Modeling. Seattle, WA

- 2015 **Bakker, K.M.**, and M. Pascual. Computational Discovery in Complex Systems Biology. Ann Arbor, MI
- 2015 **Bakker, K.M.**, E. Ionides, M. Eisenberg, and M. Pascual. Early Career Scientist Symposium. Ann Arbor, MI
- 2014 **Bakker, K.M.**, Student Evaluation Seminar Talk. Ann Arbor, MI
- 2014 **Bakker, K.M.**, 5 Minute Speed Talk â€” Recruitment Weekend. Ann Arbor, MI
- 2014 **Bakker, K.M.**, 5 Minute Speed Talk â€” Departmental Seminar. Ann Arbor, MI
- 2014 **Bakker, K.M.**, Theory Group Seminar Talk. Ann Arbor, MI

Mentoring (Undergraduates)

- 2016-2018 Alyah Chmiel, Independent study (Jr.)
- 2016-2018 Logan Austin, Independent study (Sr.)
- 2016-2017 Nathan Warriner, UROP & Independent study (Sr.)
- 2016-2017 Madeleine Schmitter, UROP (Jr.)
- 2016-2017 Molly Stachurski, UROP (Jr.)
- 2016 Lauren Rollins, Independent study (Jr.)
- 2016 Aidan O 'Connor, Independent study (TechArb Fellow)
- 2015 Emilia Iglesias, Independent study (Biomedical Engineer, Wayne State University)
- 2014 Tabea Schatz, Volunteer (Research Lab Tech, Cardiac Surgery)

Research Experience

- Dec 2010–Aug 2017 **University of Michigan**, Disease modeling, statistical methods, and POMP (Partially observed Markov Process) model fitting with extensive coding experience with R, C++, and L^AT_EX.
- Aug 2007–Oct 2010 **University of Georgia**, Set up and ran CARD-MAR-FISH and DNA sequencing labs, 650+ hours on Fluorescent microscope, trained in PCR, qPCR, DNA extraction, and other microbial and molecular lab techniques.
- July 2008 **Uppsala University, Sweden**, Learned MAR-FISH technique to identify bacterial activity and community structure, collaborated with Laura Alonso-Sáez.
- May 2008–Jun 2009 **Interdisciplinary sea ice research course (MSL 695) in Barrow, Alaska**, Intensive course on data analysis and collection involving fieldwork, volunteered for an additional week to collect genetic samples of Ringed Seals.
- Nov 2007–Jan 2008 **Antarctic research cruise aboard the Swedish Icebreaker Oden**, Research focus on the Southern Oceans bacterial community structure, collected organic matter through for DOM/POM analysis, DNA samples filtered for later extraction and 454 sequencing, respiration bottles filled for CO₂ analysis, MAR-CARD-FISH samples produced from separate filtration process.

- May 2006 **Bahamas summer study**, Marine fish, coral, and invertebrate identification/physiology, studied the behavior, reproduction, competition and feeding of marine organisms, sea urchin research project on the inverse relationship between test size and population density.
- May 2005 **Ecology Lab–Kellogg Biological Station**, Research orientated course revolving around planning and implementing field experiments and conducting data analyses.
- Dec 2005–Jan 2006 **Antarctic research cruise aboard the Russian Icebreaker M/S Orlova**, Southern Ocean circulation, chemistry, food webs, and organism interactions, research project on human interactions and their impact on the environment.
- May 2003–Jun 2003 **Belize summer study**, Tropical and marine ecology, research project outlining human impact on the coastal ecosystem.

Service, Outreach, & Workshops

- Aug 2015–Dec 2015 **University of Michigan**, Graduate Student Mentor: Mentored six new Graduate Student Instructors.
- Aug 2015 **Ecological Society of America**, Served as ESA student Mentor for Disease Ecology.
- July 2015 **University of Washington**, Summer Institute in Statistics and Modeling Infectious Disease (SISMID): Simulation Based Inference for Epidemiological Dynamics and Spatial Statistics.
- July 2015 **Chumakov Institute of Poliomyelitis (Moscow, Russia)**, Visit, data collection, and developing collaborations with Russian polio researchers.
- Mar 2015 **Dewitt Middle School (Dewitt, MI)**, Science outreach for 240 students via interactive learning on the scientific method, global demography, and disease ecology.
- Aug 2014–July 2015 **University of Michigan**, President - Graduate students in Ecology & Evolutionary Biology (GREEBS). Activities included: Organization of Coffee-Match, Advanced R workshop, Grad Hacks workshop, and Professional development workshops with Robert Woods, Elizabeth Pringle, and Chelsea Wood.
- Apr 2014 - Aug 2014 **The University of Michigan**, Coded all models from *Modeling Infectious Diseases* (ISBN: 9780691116174) in R Programming Language.
- May 2014 **University of Michigan**, Qualifying exams preparation meeting, lead organizer, and speaker.
- Jan 2012–Jun 2012 **University of Michigan**, Event Leader, 10th annual Ecology and Evolution of Infectious Disease conference and workshop.

Professional Societies

- 2015–present **British Ecological Society.**
- 2010–present **Ecological Society of America.**
- 2009–present **American Geophysical Union.**