

# Steven E. Bellan

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<http://bellanlab.uga.edu>

## CURRENT POSITIONS

**Assistant Professor of Epidemiology and Biostatistics** *University of Georgia, 2016-present*

**Program Director**, *International Clinics on Infectious Disease Dynamics and Data (ICI3D), 2016-present*

## EDUCATION

**Ph.D. - University of California, Berkeley, 2012**

Department of Environmental Science, Policy and Management

*Applications of Data-driven Modeling to Infectious Diseases in Africa:*

*Anthrax in Wildlife and HIV in Humans*

Committee: Wayne Getz (advisor), Justin Brashares, Perry de Valpine, Alan Hubbard

**M.P.H. - University of the California, Berkeley, 2008**

School of Public Health, Division of Epidemiology

*Assessing mathematical models of dengue and chikungunya control when mosquitoes senesce*

Advisor: Alan Hubbard

**B.A. – Princeton University, 2006**

Honors Thesis: *Reproductive behavioral ecology of the fiddler crab Uca terpsichores*

Ecology and Evolutionary Biology, High Honors

## PREVIOUS POSITIONS

**Post-Doctoral Researcher** *University of Texas at Austin, 2012-2016*

- Applied statistical and mathematical models to better understand infectious disease burden and transmission dynamics with a focus on Ebola and HIV in sub-Saharan Africa, and anthrax and rabies epizootology in Namibian wildlife.

**Consultant** *University of Florida at Gainesville, 2012-2016*

- Organizing and teaching the [International Clinics on Infectious Disease Dynamics and Data](#) and developing course material for publication and distribution.

**PhD Candidate** *University of California at Berkeley and Etosha National Park, Namibia, 2006-2012*

- Conducted doctoral research developing data-driven models of anthrax and HIV surveillance to understand various aspects of their dynamics and implications for disease control.

**MPH Candidate** *University of California at Berkeley, 2007-2008*

- Conducted Master's research on how age dependent mortality in mosquito populations affects the predicted effectiveness of mosquito control measures in reducing transmission of arboviruses.

**Independent Undergraduate Research**, *Princeton U. and Smithsonian Tropical Res. Inst, Panama, 2005-2006*

- Conducted Honor's research investigating why male fiddler crabs (*Uca terpsichores*) display aggressive threat behavior towards females during courtship behavior.

## GRANTS & AWARDS

- NSF Ecology of Infectious Disease Award 1700060, 2016 (PI, \$25,000)
- NIH NIAID K01AI125830 Mentored Career Award, 2017-2021 (PI, \$661,000)
- Conference on Retroviruses and Opportunistic Infections Young Investigator Scholarship, 2014 (\$1480)
- National Institutes of Health, Ecology & Evolution of Infectious Diseases Program (PI Wayne Getz, co-authored grant), 2007-2011 (~\$1.7 million)
- Bob Lane Endowed Graduate Student Award, 2011 (\$1000)
- Chang-Lin Tien Environmental Fellowship, 2009-2010 (\$47,000)
- Rocca Center for African Studies Fellowship, 2009, 2010 (\$12,000)
- Envir Sci, Pol & Mgmt Travel Grant, 2007, 2010-12 (\$4200)
- Entomology Student Organization Travel Grant, 2007, 2009, 2010, 2011 (\$2300)
- Tanada Entomology Fellowship, 2008 (\$1000)
- Behavior Thesis Award, Princeton University, 2006
- Anthony B. Evnin Thesis Research Grant, 2006 (\$1500)
- Princeton Environmental Institute Research Grant, 2005 (\$500)

## PEER-REVIEWED PUBLICATIONS

PDFs available at <http://bellanlab.uga.edu/index.php/publications/>

- Shen M, Xiao Y, Rong L, Meyers LA, **Bellan SE** (2017). Early antiretroviral therapy and potent second-line drugs could decrease HIV incidence of drug resistance. *Proceedings of the Royal Society B*.
- Castro LA, Fox SJ, Chen X, Liu K, **Bellan SE**, Dimitrov NB, Galvani AP, and LA Meyers (2017). Assessing real-time Zika risk in the United States. *BMC Infectious Diseases*.
- Means AR, Risher K, Ujeneza EL, Maposa I, Nondi J and **Bellan SE** (2016). Impact of Age and Sex on CD4+ Cell Count Trajectories Following Treatment Initiation: An Analysis of the Tanzanian HIV Treatment Database. *PLOS One*.
- Sempa JB, Dushoff J, Daniels MJ, Castelnovo B, Kiragga AN, Nieuwoudt M, **Bellan SE** (2016). Reevaluating Cumulative HIV-1 Viral Load as a Prognostic Predictor: Predicting Opportunistic Infection Incidence and Mortality in a Ugandan Cohort. *American Journal of Epidemiology*.
- Champredon D, **Bellan SE**, Delva W, Hunt S, Shi C, Smieja M, Dushoff J (2015). The effect of sexually transmitted co- infections on HIV infectiousness from individuals on antiretroviral therapy: A systematic review and meta- analysis. *BMC Infectious Diseases*.
- Bellan SE**, JRC Pulliam, CAB Pearson, D Champredon, SJ Fox, L Skrip, AP Galvani, M Gambhir, BA Lopman, TC Porco, LA Meyers, J Dushoff (2015). The statistical power and validity of Ebola vaccine trials in Sierra Leone: A simulation study of trial design and analysis. *Lancet Infectious Diseases*.
- Bellan SE**, Dushoff J, Galvani AP, Meyers LA (2015). Re-assessment of HIV-1 acute phase infectivity: adjusting for biases with simulated cohorts. *PLOS Medicine*.
- Bellan SE**, JRCP Pulliam, J Dushoff, LA Meyers (2014). Ebola control: effect of asymptomatic infection and acquired immunity. *Lancet*.
- Cizauskas CA, **SE Bellan**, WC Turner, RE Vance, WM Getz (2014). Frequent and seasonally variable sublethal anthrax infections are accompanied by short-lived immunity in herbivores in an anthrax endemic system. *Journal of Animal Ecology*.

- Terzi B, PCB Turnbull, **SE Bellan**, W Beyer (2014). Failure of Sterne- and Pasteur-like strains of *Bacillus anthracis* to replicate and survive in the urban bluebottle blow fly *Calliphora vicina* under laboratory conditions. *PLOS ONE*.
- Champredon D, **SE Bellan**, J Dushoff (2013). Sexual transmission to single individuals is critical to HIV dynamics: a model-based approach. *PLOS ONE*.
- Bellan SE**, PCB Turnbull, W Beyer, WM Getz (2013). Effects of experimental exclusion of scavengers from anthrax-infected herbivore carcasses on *Bacillus anthracis* sporulation, survival and distribution. *Applied and Environmental Microbiology*. DOI: 10.1128/AEM.00181-13.
- Bellan SE**, Fiorella KJ, Melesse DY, Getz WM, Williams BG, Dushoff J (2013). Extra-couple HIV transmission in sub-Saharan Africa: a mathematical modelling study of survey data. *Lancet* 381(9877): 1561-69.
- Bellan SE**, O Gimenez, R Choquet, WM Getz (2013). A hierarchical distance sampling approach to estimating mortality rates from opportunistic carcass surveillance data. *Methods in Ecology and Evolution* 4(4): 361-69.
- Bellan SE**, JRC Pulliam, J Scott, TC Porco, J Dushoff and the MMED Organizing Committee (2012). How to make epidemiological training infectious. *PLOS Biology* 10(4): e1001295.
- Bellan SE**, CA Cizauskas, J Miyen, K Ebersohn, M Küsters, KC Prager, CT Sabeta, M van Vuren, WM Getz (2012). Black-backed jackal exposure to rabies virus, canine distemper virus, and *Bacillus anthracis* in Etosha National Park, Namibia. *Journal of Wildlife Diseases* 48: 371-81.
- Beyer W, **SE Bellan**, G Eberle, HH Ganz, WM Getz, R Haumacher, KA Hilss, W Kilian, J Lazak, WC Turner, PCB Turnbull (2012). Distribution and molecular evolution of *Bacillus anthracis* genotypes in Namibia. *PLOS Neglected Tropical Diseases* 6: e1534.
- Tambling CT, SD Laurence, **SE Bellan**, EZ Cameron, JT du Toit, WM Getz (2011). Estimating carnivoran diets using a combination of carcass observations and scats from GPS clusters. *Journal of Zoology*.
- Bellan SE** (2010). The importance of age dependent mortality and the extrinsic incubation period in models of mosquito-borne disease transmission and control. *PLOS ONE* 5(4): e10165.

#### COMMENTARIES, NEWS, AND REPORTS

- Pulliam JRC, **Bellan SE**, Gambhir M, Meyers LA, Dushoff J (2015). Evaluating Ebola vaccine trials: insights from simulation. *Lancet Infectious Diseases* 15: 1134.
- Bellan SE**, JRCP Pulliam, J Dushoff, LA Meyers (2014). Ebola Vaccine Trials: The Ethical Mandate for a Therapeutic Safety Net. *BMJ*.
- Rivers C, Alexander K, **Bellan SE**, Valle S Del, Drake JM, Eisenberg JNS, et al. (2014) Ebola: models do more than forecast. *Nature* 515(7528):492–492.
- LA Meyers, **Bellan SE** (2014). Silent Ebola Infections Could Be Key to Controlling Outbreak (2014). *Huffington Post*.
- Bellan SE** (2011). Counting wildlife carcasses: Anthrax surveillance in Etosha National Park, Namibia. *SACEMA Quarterly*.

**Bellan SE**, JRC Pulliam, J Hargrove, B Williams, F Roberts, J Dushoff (2010). Building capacity for meaningful epidemiological modeling. *SACEMA Quarterly*.

## PROFESSIONAL ACTIVITIES & SERVICE

**WHO Workshop on Developing a Clinical Toolbox for Vaccine Trial Design during Public Health Emergencies**, Chamonix, France; Washington, DC, USA; South Africa 2016-present

- Leader of Working Group building a Decision Tree User-Interface for Trial Design (*ongoing*)
- Invited as an external expert to give a research talk and consult on development and generalization of a framework to guide vaccine study design.
- Given a \$25,000 contract (June 2017) to run a workshop providing training on infectious disease epidemiology and clinical trial design in South Africa.

**Models for Program Planning Reference Group, HIV Modeling Consortium**, London, United Kingdom, 2016

- Attended remotely and gave invited presentation on updated estimates for HIV acute phase infectivity and the importance of heterogeneity in HIV infectiousness and susceptibility in transmission dynamics.

**NIAID Simulation Science for HIV Research Meeting**, Bethesda, Maryland, USA, 2016

- Invited as leading HIV modeling expert to help review ways in which modelling and simulation can be used to examine dynamics of HIV transmission and control and to plan future research trajectories.

**UNAIDS Reference Group on Estimates, Modelling and Projections**, Geneva, Switzerland, 2014

- Invited as an external technical expert to consult on methods for understanding HIV epidemics worldwide and providing this information for country decision support.

**Statistics and Nonlinear Dynamics in Biology and Medicine**, Banff, Canada, July, 2014

- Attended workshop intended to consolidate recent advances in methods for inference in dynamical systems, to foster closer collaboration between Epidemiology, Applied Mathematics, Ecology and Systems Biology, and to set priorities for future research directions.

**Evolutionary Dynamics in Cancer: from mathematical models to clinical therapies**, Almagro, Spain, Sep 2010

- Attended James S. McDonnell Foundation workshop intended to bring mathematical approaches from evolution, ecology and epidemiology to cancer treatment research.

**Manuscript Reviewer**. *Nature*, *Science*, *Lancet Infectious Diseases*, *American Journal of Epidemiology*, *Journal of Royal Society Interface*, *Proceedings of the Royal Society B*, *Epidemics*, *BMC Medical Ethics*, *eLife*, *Journal of the Society for Clinical Trials*, *Annals of Applied Statistics*, *Ecology*, *Journal of Animal Ecology*, *PLOS ONE*, *PLOS Neglected Tropical Diseases*, *PeerJ*, *Journal of Wildlife Diseases*, *Conservation Biology*, *Biological Conservation*, *Environmental Modeling and Assessment*, *Movement Ecology*, *African Journal of Ecology*, *Koedoe*.

## TEACHING AND MENTORSHIP EXPERIENCE

**Organizer, Instructor, Mentor**, [International Clinics on Infectious Dynamics and Data \(ICI3D\)](#), 2009-present

- ICI3D Program Director 2016-present
- Faculty at the annual [Meaningful Modeling of Epidemiological Data Clinics](#) in Cape Town, South Africa and the [Dynamical Approaches to Infectious Disease Data Clinics](#) in Gainesville, USA. Provided training in statistics, epidemiology of infectious diseases, and mathematical and statistical modeling (2009-).
- Supervised Joseph Sempa, a statistician from the Infectious Disease Institute in Kampala, Uganda, for a 6-week exchange scholar program at UT Austin on an analysis of an HIV cohort study (2014-).
- Supervised international collaboration to understand HIV patient immune reconstitution with the Tanzanian

Ministry of Health's HIV clinic electronic health records database (6 million observations) (2014-2016).

- Supervising other international collaboration that emerge from workshops.

**Instructor**, *African Institute for Mathematical Sciences, Cape Town, May 2010-present*

- Teach a three week long course (*Topics in Biomedical Sciences*) to University of Stellenbosch B.Sc. Honours Biomathematics students.

**Instructor, Mentor**, *South African Wildlife College, Mpumalanga, South Africa, July-August 2010*

- Mentored student projects and lectured on disease ecology and population dynamics at two week institute and follow-up workshop on quantitative conservation biology (*Advanced Study Institute on Conservation Biology*).

**Undergraduate Mentor**, *University of Texas at Austin, 2014-present*

- Training and supervising an undergraduate student (Kennedy Hudgins-Gravell) on independent research.

**Mentor of undergraduate and master's students**, *University of California at Berkeley, 2007-2011*

- Trained and supervised an undergraduate student (Caroline Jablonicky) on her honor's thesis: *Temporal niche partitioning of scavengers at carcasses in Etosha National Park, Namibia*.
- Trained and supervised a master's student (Matthieu Sales) on his thesis: *The effects of demography and distance to rest camps on black-backed jackal utilization of anthropogenic resources*.
- Mentored an undergraduate student (Melissa Chun) in Environmental Science, Policy & Management through the Undergraduate Mentorship Program (2007-2008).

**Field mentor of master's and undergraduate students and volunteers**

- Trained and supervised students as field technicians (2006-2009), including students from Namibia (Martina Küsters, Heniritha Sibanda, Zepee Havarua) and a student from the US (Carolyn Kobervig).
- Developed and gave short course on statistics to field technicians (Feb-April, 2009).

**Graduate Student Instructor**, *University of California at Berkeley, January-May 2007*

- Led computer lab and discussion component of upper level course in statistics and experimental design (ESPM 174). Majority of students were PhD students in the life sciences.

## CONFERENCE PRESENTATIONS

Quantitative approaches to assessing ethical tradeoffs in study design. *Simulating Intervention Trials in Infectious Diseases*, August, 2016, Fred Hutchinson Cancer Research Institute, Seattle, WA, USA. [invited talk and session chair]

Ethical tradeoffs between alternative vaccine trial designs during acute emerging epidemics: A quantitative simulation-based framework. *Epidemics*5, December, 2015. Clearwater, FL, USA.

Statistical power and validity of Ebola vaccine trials in Sierra Leone. *NIH RAPIDD Workshop on Integrating Models and Clinical Trial Design*, September, 2015. University of Minnesota, MN, USA.

Re-assessment of HIV-1 acute phase infectivity: adjusting for biases with simulated cohorts. *NIGMS MIDAS Meeting*, April, 2015. Atlanta, GA, USA.

Planning and evaluating interventions: Subclinical infections and acquired immunity. *Modeling the Spread and Control of Ebola in West Africa*. January, 2014. Atlanta, USA. [invited talk and panelist]

Transmission rates, not sexual network characteristics, determine HIV epidemic severity in sub-Saharan Africa. *Mathematics and HIV: Operations Research and Network Modeling for HIV Treatment and Prevention*, March, 2014. Vancouver, Canada. [invited talk]

Variation in HIV infectivity drives variation in HIV serodiscordance and prevalence in sub-Saharan Africa. *Epidemics*4, November, 2013. Amsterdam, Netherlands.

Understanding HIV transmission & serodiscordance dynamics from cross-sectional data. *NIGMS MIDAS Meeting*, March, 2013. Austin, USA.

Teasing apart extramarital HIV transmission from within marriage transmission and implications for interventions. *NSF Ecology and Evolution of Infectious Diseases Conference*, March, 2012. Berkeley, USA.

Anthrax incidence estimation using distance sampling and scavenger movement data. *NSF Ecology and Evolution of Infectious Diseases Conference*, March, 2011. Madison, USA.

### OTHER ORAL PRESENTATIONS

Modeling epidemiological study design: Addressing biases in HIV infectivity estimates and planning an Ebola vaccine trial. *Harvard Center for Communicable Disease Dynamics*, May, 2016. Boston, MA. [invited talk]

HIV-1 acute phase infectivity: Reevaluating estimation approaches. *Rakai Health Sciences Program*, May, 2014. Rakai, Uganda. [invited talk]

HIV-1 acute phase infectivity: Reevaluating estimation approaches. *Imperial College London*, May, 2014. London, UK. [invited talk]

Anthrax and scavenger ecology in Etosha National Park. Given to visitors of the Etosha Ecological Institute, Namibia, 2009-2011.

Anthrax and scavenger ecology in Etosha National Park. *Namibian Environment & Wildlife Society*, 2010. Windhoek, Namibia [invited talk]

### POSTER PRESENTATIONS

Transmission rates and not sexual contact patterns drive HIV epidemic intensity in Africa. *Conference on Retroviruses and Opportunistic Infections*, 2014. Boston, USA.

Using scavenger movement for epizootic surveillance: Applications to anthrax outbreaks in zebra. *Ecology and Evolution of Infectious Diseases*, May, 2013. State College, USA.

Muizenberg Fever: Instructive outbreaks of a novel agent. *NSF Ecology and Evolution of Infectious Diseases Conference*, 2012. Berkeley, USA.

Ecology and Epidemiology of Anthrax in Etosha National Park, Namibia. *NSF Ecology and Evolution of Infectious Diseases Conference*, 2011. Madison, USA.

### COMPUTER SKILLS

'R', C++, ArcGIS, Quantum GIS, High Performance Cluster Computing

### LANGUAGES

**Fluent:** English, French

**Intermediate:** Spanish

**Beginner:** Indonesian