W. Christopher Strickland

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EDUCATION

Ph.D. in Mathematics December 2013
Colorado State University, Fort Collins, CO
Advisers: Profs. Gerhard Dangelmayr & Patrick Shipman
Dissertation title: The Mathematical Modeling and Analysis of Nonlocal Ecological Invasions and Savanna Population Dynamics (defended 10-16-2013)

M.S. in Mathematics August 2007
University of Florida, Gainesville, FL
Adviser: Prof. Philip Boyland
Thesis title: Bifurcations of the Degree-Two Standard Family of Circle Maps

B.S. in Mathematics and B.A. in French, minor in physics, *summa cum laude* May 2005
University of Mississippi, Oxford, MS
Sally McDonnell Barksdale Honors College Graduate
Honors thesis: Mind, Gödel, and the Incompleteness of Human Thought

PROFESSIONAL APPOINTMENTS

Assistant Professor August 2017-Present
University of Tennessee, Knoxville
Department of Mathematics & adjunct in Department of Ecology and Evolutionary Biology

Postdoctoral Researcher, Joint Appointment August 2014-July 2017
Statistical and Applied Mathematical Sciences Institute (SAMSI) (Aug. 2014 – July 2016), and
University of North Carolina, Chapel Hill, Department of Mathematics
Postdoctoral mentors: Profs. Laura Miller & Richard Smith
Research under the Program on Mathematical and Statistical Ecology involving dispersal dynamics, tipping points, and savanna structure. Helped lead collaborations spanning over six fields of science and mathematics and teams of up to twelve researchers.
Mentor and supervisor for three undergraduate students working on various research projects.

AREAS OF INTEREST

Mathematical & Probabilistic Modeling/Simulation
Mathematical Biology
Dispersal Ecology
Complex Systems
Scientific Computing
Dynamical Systems

PUBLICATIONS

1. Strickland, W.C., Battista, N.A., Hamlet, C.L., Miller, L.A. (2022). Planktos: An agent-based modeling framework for small organism movement and dispersal in a fluid environment with immersed structures. *Bulletin of Mathematical Biology*, 84(72).
2. Smith, K.V., DeLong, K.L, Boyer, C.N., Thompson, J.M., Lenhart, S.M., Strickland, W.C., Burgess, E.R., Tian, Y., Talley, J., Machtinger, E.T., Trout Fryxell, R.T. (2022). A call for the development of a sustainable pest management program for the economically important pest flies of livestock: a beef cattle perspective. *Journal of Integrated Pest Management*, 13(1), 14.
3. Phillips, T., Lenhart, S., Strickland, W.C. (2021). A data-driven mathematical model of the heroin and fentanyl epidemic in Tennessee. *Bulletin of Mathematical Biology*, 83(97).
4. Senter, M., Douglas, D.R., Strickland, W.C., Thomas, S., Talkington, A., Miller, L.A., Battista, N.A. (2020). A semi-automated finite difference mesh creation method for use with immersed boundary software including IB2d and IBAMR. *Bioinspiration & Biomimetics,* 16, 016008.
5. Bernoff, A.J., Culshaw-Maurer, M., Everett, R.A., Hohn, M., Strickland, W.C., Weinburd, J. (2020). Agent-based and continuous models of hopper bands for the Australian plague locust: How resource consumption can mediate pulse formation and geometry, *PLOS Comp. Bio.*, 16(5), e1007820.
6. Ozalp, K., Miller, L., Dombrowski, T., Braye, M., Dix, T., Pongracz, L., Howell, R., Klotsa, D., Pasour, V., Strickland, W.C. (2020). Experiments and agent based models of zooplankton movement within complex flow environments, *Biomimetics*, 5(1), 2.
7. Beckman, N.G., Aslan, C.E., Rogers, H.R., Kogan, O., Bronstein, J.L., Bullock, J.M., Hartig, F., HilleRisLambers, J., Zhou, Y., Zurrell, D., Brodie, J.F., Bruna, E.M., Cantrell, S.R., Decker, R., Effiom, E.O., Fricke, E.C., Gurski, K., Hastings, A., Johnson, J., Loiselle, B.A., Miriti, M.N., Neubert, M.G., Pejchar, L., Poulsen, J.R., Pufal, G., Razafindratsima, O.H., Sandor, M., Shea, K., Schreiber, S.J., Schupp, E.W., Snell, R.S., Strickland, C., Zambrano, J. (2019). Advancing an interdisciplinary framework to study seed dispersal ecology, *AoB Plants*, plz048.
8. Rogers, H., Beckman, N., Hartig, F., Johnson, J.S., Pufal, G., Shea, K., Zurell, D., Bullock, J.M., Cantrell, R.S., Loiselle, B., Pejchar, L., Razafindratsima, O.H., Sandor, M., Schupp, E.W., Strickland, C., Zambrano, J. (2019). The total dispersal kernel: a review and future directions, *AoB Plants*, plz042.
9. Battista, N.A., Pearcy, L.B., Strickland, W.C. (2019). Modeling the prescription opioid epidemic, *Bulletin of Mathematical Biology*, 81(7), 2258-2289.
10. Aslan, C.E., Beckman, N.G., Rogers, H., Bronstein, J., Zurell, D., Hartig, F., Shea, K., Pejchar, L., Neubert, M., Poulsen, J., HilleRisLambers, J., Miriti, M., Loiselle, B., Effiom, E., Zambrano, J., Schupp, E., Pufal, G., Johnson, J., Bullock, J., Brodie, J., Bruna, E., Cantrell, S., Decker, R., Fricke, E., Gurski, K., Hastings, A., Kogan, O., Razafindratsima, O., Sandor, M., Schreiber, S., Snell, R., Strickland, C., Zhou, Y. (2019). Employing plant functional groups to advance seed dispersal ecology and conservation, *AoB Plants*, 11(2), plz006.
11. Snell, R.S., Beckman, N.G., Fricke, E., Loiselle, B., Carvalho, C., Jones, L., Lichti, N., Lustenhouwer, N., Schreiber, S., Strickland, C., Sullivan, L., Cavazos, B., Giladi, I., Hastings, A., Holbrook, K., Jongejans, E., Kogan, O., Montano-Centellas, F., Rudolph, J., Rogers, H., Zwolak, R., Schupp, E. (2019). Consequences of intraspecific variation in seed dispersal for plant demography, communities, evolution, and global change, *AoB Plants*, 11(4), plz016.
12. Battista, N., Strickland, C., Barrett, A., Miller, L.A. (2018). IB2d Reloaded: an updated Python and MATLAB implementation of the immersed boundary method*, Mathematical Methods in the Applied Sciences*, 41(18), 8455-8480.
13. Strickland, C., Miller, L.A., Santhanakrishnan, A., Hamlet, C., Battista, N.A., Pasour, V. (2017). Three-dimensional low Reynolds number flows near biological filtering and protective layers, *Fluids,* 2(62).

14. Strickland, C., Kristensen, N.P., Miller, L.A. (2017). Inferring stratified parasitoid dispersal mechanisms and parameters from coarse data using mathematical and Bayesian methods, *Royal Society Interface*, 14, 20170005.
15. Strickland, C., Pearson, D.A., Shipman, P.D. (2017). Formation of square lattices in coupled pattern-forming systems. *BIOMATH,* 5(2), 1612181.
16. Battista, N., Strickland, C., Miller, L.A. (2017). IB2d: A Python and MATLAB implementation of the immersed boundary method. *Bioinspiration & Biomimetics*, 12(3), 036003.
17. Strickland, C., Liedloff, A., Cook, G.D., Dangelmayr, G., Shipman, P.D. (2016). The role of water and fire in driving tree dynamics in Australian savannas. *Journal of Ecology*, 104(3), 828-840.
18. Strickland, C., Dangelmayr, G., Shipman, P.D., Kumar, S., Stohlgren, T.J. (2015). Network spread of invasive species and infectious diseases, *Ecological Modelling*, 309-310, 1-9.
19. Strickland, C., Dangelmayr, G., Shipman, P. (2014). Modeling the presence probability of invasive plant species with nonlocal dispersal, *Journal of Mathematical Biology*, 69(2), 267-294.
20. Shipman, P.D., Faria, S.H., Strickland, C. (2013). Towards a continuous population model for natural language vowel shift, *Journal of Theoretical Biology,* 332, 123-135.

UPCOMING PUBLICATIONS

Phillips, T., Strickland, W.C., Lenhart, S. Modeling lethal and non-lethal harvest of African Mahogany. Submitted.

Hamlet, C., Strickland, W.C., Battista, N., Miller, L.A. Multiscale flow between the branches and polyps of gorgonians. Submitted.

Elzinga, D.C., Strickland W.C. Generalized stressors on social bee colonies. Submitted.

Gross, L.J., McCord, R.P., LoRe, S., Ganusov, V.V., Hong, T., Strickland, W.C., Talmy, D., von Arnim, A.G., Wiggins, G. Enhancing quantitative and data science education for graduate students in biomedical science. Submitted.

Queen, O., Jodoin, V., Pearcy, L.B., Strickland, W.C. Agent-based dynamics of a SPAHR opioid model on social network structures. Under revision for resubmission.

Pearcy, L., Lenhart, S., Strickland, W.C. Structural instability and linear allocation control in models of substance use disorder. In preparation.

Beckford, C., Elzinga, D., Strickland, W.C. A seasonal model for moose and winter tick with implications for climate change. In preparation.

GRANTS, HONORS & AWARDS

American Institute of Mathematics, SQuaREs (Structured Quartet Research Ensembles). Funded for a week-long collaborative visit at Cal Tech (approx. $3000), 2022.

Auburn University (Prime Sponsor: National Science Foundation). *NSF INCLUDES Alliance: The Alliance of Students with Disabilities for Inclusion, Networking, and Transition Opportunities in STEM (TAPDINTO-STEM)*, **Co-PI**, funded ($237,122), 2021-2026.

Contract work: *Consulting services relating to population modeling with potential connections to the homeless population of Houston, TX.* ($5,000), 2020.

National Institute for Mathematical and Biological Synthesis (NIMBioS) short-term visitor proposal. *Foraging and Social Interaction in the Formation of Locust Hopper Bands*, funded for a four-day, collaborative research visit (approx. $6,100), 2020.

Institute for Advanced Study (IAS) Summer Collaborators Program. Research program chosen for funding by the School of Mathematics for a two-week collaborative visit of six people, 2019.

Simons Foundation. *Collaboration Grant for Mathematicians*, **PI**, funded ($42,000), 2018-2023.

Burroughs Wellcome Fund. *Enhancing Quantitative and Data Science Education for Graduate Students in Biomedical Science*, **Senior Personnel**, funded ($149,823), 2018-2020.

Selected and funded participant in the AMS Mathematics Research Community: Agent-based Modeling in Biological and Social Systems, 2018-2019.
Cross Disciplinary Prize Winner, International Conference on Mathematical Methods and Models 2015.
Yates Summer Graduate Fellowship, 2013.
Summer Graduate Research Assistantship (competitive), CSU Mathematics Department, 2011.
Center for Interdisciplinary Mathematics and Statistics (Colorado State University) Fellowship, 2009.
Honors Societies: Phi Beta Kappa, Phi Kappa Phi, others

COMPUTER SKILLS

Primary languages: Python (9 yrs.) including NumPy, SciPy, Matplotlib, Cython, PyCUDA, Pandas, NetworkX, multiprocessing, Pytest, Pillow, PyMC, VTK/PyVista, and many more. MATLAB (10+ yrs.), Git, and LaTeX incl. BibTeX. See https://github.com/mountaindust for examples.
Intermediate knowledge of Photoshop and VisIt. Some exposure to C/C++, Unix, Mathematica, HTML, and IBAMR. Self-taught almost all computer skills, including MATLAB, Python, and Git. Other software experience includes Acrobat, Beamer, digital audio editing, MS Office.

TEACHING EXPERIENCE

Assistant Professor, University of Tennessee, Knoxville Aug. 2017-Present
Instructor of record for Honors Calc 2 & 3, Intro. Abstract Math, Mathematical Ecology I & II (grad), Models in Biology, Readings in Mathematics, Adv. Math Ecology (grad), Mathematics for the Life Sciences I, Mathematical Biology seminar
Postdoctoral Lecturer, University of North Carolina, Chapel Hill Aug.-Dec. 2015 & 2016
Instructor of record for a senior undergrad course on mathematical modeling (25 students). Duties include supervising a graduate teaching assistant and a university funded graduate research consultant.
Instructor of record for Introduction to Ordinary Differential Equations (55 students).
Mentor and supervisor for an undergraduate student working on research projects (April-Present).
Instructor, Colorado State University January-May 2014
Instructor of record for Calculus for Biologists I and Calculus for Business Majors (200 students)
Graduate Teaching Assistant, Colorado State University Jan.-May 2009 & Jan. 2010-Dec. 2013
Instructor of record for Calculus for Biologists II (3 semesters), a course which covers linear algebra, multivariable calculus, and differential equations; Introduction to Ordinary Differential Eqns (3 semesters); Calculus for Biologists I; and Calculus for Scientists and Engineers I.
Adjunct Faculty, Santa Fe College January-June 2008
Instructor of record for classes of approx. 30 students in Survey of Calculus and College Algebra.
Teaching Assistant, University of Florida August 2005-August 2007
Lectured Survey of Calculus and held discussion class for Survey of Calculus, Pre-Calculus, College Algebra, and Liberal Arts Mathematics.

STUDENT MENTORING

Ryan Campbell, UTK. PhD advisor	Feb. 2022-Present
Kimberlyn Eversman, UTK. PhD advisor	Sept. 2021-Present
Leigh Pearcy, UTK. PhD Mathematics, MS in Statistics advisor	Jan. 2020-Present
David Elzinga, UTK. PhD Mathematics, MS in Statistics advisor	Jan. 2020-Present
Owen Queen, UTK. Undergraduate research	Jan. 2020-May 2022
Vincent Jodoin, UTK. Undergraduate research (Grad School, Univ. Kentucky)	Jan. 2020-July 2020
Tricia Phillips, UTK. PhD co-advisor (TTF Birmingham-Southern)	Oct. 2017-July 2020
James Zak, UNC-CH. Honors thesis advisor, indep. study (KPMG)	Jan. 2017-May 2018
Leigh Pearcy, UNC-CH. Independent study, Directed Exploration in Math	Jan. 2017-May 2018

Ao Zeng, UNC-CH. Independent study (Grad School, Carnegie Mellon) April 2016-June 2017

INVITED CONFERENCES, WORKSHOPS, & SEMINARS

SIAM Life Sciences July 2022
Minisymposium organizer: *Novel Approaches in Compartmental Models of Disease*

ORNL Biostatistics and Multiscale Modelling Seminar June 2022
Invited seminar: *Using mechanistic models to advance theory in opioid use disorder epidemiology*

Workshop meeting of the MRC Locust Group (funded by Harvey Mudd College) May 2022

Southeast Center for Mathematics and Biology June 2021
Invited undergraduate seminar: *Locusts, plankton, and opioid use: examples of agent-based modeling in mathematical biology*

International Cassiopea Workshop May 2021
Invited talk: *Introducing Planktos: an agent-based modeling framework for small organisms in fluid flow*

Center for Quantitative Medicine at UConn Health February 2021
Invited seminar: *Using mechanistic models to advance theory in opioid addiction epidemiology*

Joint Mathematics Meetings January 2021
Invited talk: *Using agent-based models to explore network dynamics in addiction epidemiology*

University of Arizona November 2020
Invited seminar: *Modeling the prescription opioid epidemic*

Claremont Center for the Mathematical Sciences March 2020
Invited colloquium: *Modeling the prescription opioid epidemic*
Invited seminar: *Approaches to modeling dispersal and swarm behavior at multiple scales*

Joint Mathematics Meetings January 2020
Invited talk: *Agent-based and continuous models of locust hopper bands*

The 11th Annual Undergraduate Research Conference at the Interface of Biology and Mathematics November 2019
Invited, plenary talk: *Bugs and drugs: two approaches to modeling systems with social impact in mathematical biology*

AMS Fall Southeastern Sectional Meeting November 2019
Invited talk: *Modeling the prescription opioid epidemic*

Society for Mathematical Biology Annual Meeting, Montreal Canada July 2019
Mini-symposium organizer: *Agent-based models in mathematical biology*
Invited talk: *Modeling movement and persistence of small organisms in flow*

SIAM Conference on Applications of Dynamical Systems May 2019
Invited talk: *Modeling movement, invasion, and persistence of small organisms in flow*

SIAM Mathematics of Planet Earth, 2018 September 2018
Invited talk: *Modeling the opioid epidemic*

Society for Mathematical Biology Annual Meeting, Sydney Australia July 2018
Invited talk: *Flow and movement of organisms through protective layers*

AMS MRC: Agent-based Modeling in Biological and Social Systems June 2018
Invited and fully funded participant, career panelist

SIAM-SEAS Annual Meeting, 2018 March 2018
Invited talk: *Modeling the opioid epidemic*

SIAM Student Chapter Colloquium, Colorado State University February 2018
Invited talk: *Modeling invasive dispersal at multiple scales*

National Socio-Environmental Synthesis Center (SESYNC): May 2016
Seed Dispersal Workshop (participant, fully funded)

Modern Math Workshop and SACNAS annual meeting October 2015
Invited talk as SAMSI postdoctoral representative: *A stochastically driven model for savanna water resource dynamics*
SIAM Conference on Applications of Dynamical Systems May 2015
Mini-symposium co-organizer: *Dynamics on networks and network topology in ecology and epidemiology*
Invited talk: *Network spread and control of invasive species and infectious diseases*
SAMSI Transition Workshop May 2015
Invited talk: *Modeling dispersal patterns of parasitoid wasps*
International Conference on Advances in Interdisciplinary Statistics and Combinatorics October 2014
Invited talk: *Modeling savanna water resource dynamics with stochastic daily rainfall*
AMS 2012 Fall Western Section Meeting October 2012
Invited talk: *Modeling the nonlocal dispersal of invasive species*

OTHER PRESENATIONS AND WORKSHOPS

SIAM Life Sciences July 2022
Contributed talk: *Planktos: An Agent-Based Modeling Framework for Small Organisms in Fluid and Around Structures*
Governor's School Math Open House, UTK June 2021
Invited high-school seminar: *Locusts, plankton, and opioid use: examples of agent-based modeling in mathematical biology*
Dynamics Days US 2018 January 2018
Contributed poster: *Modeling the opioid epidemic*
BIOMATH 2017: Kruger National Park, South Africa June 2017
Contributed talk: *Modelling the spread of parasitoid wasps from point release*
Joint Mathematics Meetings January 2017
Contributed talk: *Modelling the spread of parasitoid wasps from point release*
69th Annual Meeting of The APS Division of Fluid Dynamics November 2016
Contributed talk: *Low Reynolds number flow near tiny leaves, stems, and trichomes*
ECMTB/SMB Annual Meeting, Nottingham UK July 2016
Contributed talk: *Modelling the spread of parasitoid wasps from point release*
Society for Experimental Biology Annual Meeting, Brighton UK July 2016
Contributed talk: *Modelling the spread of parasitoid wasps from point release*
BIOMATH 2015: International conference on Mathematical Methods and Models in Biosciences and Young Scientists School June 2015
Winner of the Cross Disciplinary Prize for the contributed talk: *A stochastically driven model for savanna water resource dynamics*
SAMSI: Developing, Maintaining, and Employing Large Computational Frameworks for the Ecological Sciences April 2015
SAMSI: Multivariate Models in Ecology (attended) March 2015
Society for Integrative and Comparative Biology SouthEast Regional Meeting October 2014
Contributed talk: *A mathematical model for savanna water resource dynamics*
SAMSI Opening Workshop (attended) August 2014
2013 Annual Conference & Meeting for the Society for Mathematical Biology June 2013
Contributed talk: *Modeling non-local invasive spread on continuous domains coupled with a vector-based transportation network*
Joint Mathematics Meetings January 2013
Contributed talk: *Modeling the nonlocal spread of invasive plant species in heterogeneous landscapes*

The 9th AIMS Conference on Dynamical Systems, Differential Equations and Apps. July 2012
Contributed talk: *Modeling the nonlocal dispersal of invasive species*
Nonlocal PDEs, Variational Problems and their Applications, Feb. 2011
Poster Presentation: *Modeling the nonlocal dispersal of invasive plant species*
SIAM Student Workshop: Introductory Matlab Series Oct. & Nov. 2011
Seminar Talk: *Parallel Programming Using MatlabMPI*
Seminar Talk: *Object-Oriented Programming (in Matlab)*

EXTENDED RESEARCH VISITS

CSIRO Darwin laboratory: Berrimah, Australia June-August 2011
Research: Analyzed and restructured the FLAMES model for Australian savanna ecosystems

LANGUAGE SKILLS

Conversational French, Basic Spanish

SERVICE & OUTREACH

- Course Cluster: Mathematical Biology chair Fall 2021-Present
- First-year graduate student advising Summer 2021-Present
- MS committee member, Hoa Thieu Ly (Wally) Summer 2022
- Assistantship & Graduate Admissions Committee Spring 2022
- PhD committee member, Wencel Mackenzie Spring 2022
- MS committee member, Guilherme Silva Spring 2022
- MS committee member, Kyla Linn Fall 2019-Spring 2022
- Honors Day Committee (Chair 2020-22) 2018-2022
- Advisory Committee Fall 2019-Spring 2021
- PhD committee member, Mohammed Al-Mamun Spring 2020-Summer 2021
- PhD committee member, Hannah Thompson Spring 2021
- PhD committee member, Danielle Burton Summer 2020
- Colloquium Committee, (Chair Fall 2019-20) Fall 2018-Spring 2020
- PhD committee member, Le Yin Fall 2018-Spring 2020
- PhD committee member, Logan Perry Spring 2019
- IDP data science concentration steering committee, member Fall 2019
- Allen Medal Committee (Chair 2019) 2018-2019
- NSF Panelist Spring 2018
- Prospective Undergraduate Liaison Fall 2017-Spring 2019
- SAMSI Undergraduate Workshop, Lead Organizer May 2015
- Mathematica Demonstration Programmer Summer 2010 and Fall 2012
  Developed teaching demos for Bio Calc I and an undergraduate geology course
- Incoming Graduate Teaching Assistant Mentor Fall 2012
  Responsible for supervision/performance review of first year graduate teaching assistant
- iGEM Mentor, Colorado State University June-August 2012
  Undergrad math mentor for the International Genetically Engineered Machine competition
- Vice President, SIAM Colorado State University Student Chapter August 2011-June 2012
  VP accomplishments include a trip to the Google Boulder office and a MATLAB workshop.
- Volunteer, Department of Mathematics Math Day, Colorado State University 2009-2013

MEMBERSHIPS

Society for Mathematical Biology

Society for Industrial and Applied Mathematics (SIAM)