AMANDA N. LAUBMEIER

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RESEARCH INTERESTS

Modelling, Population Ecology, Parameter Estimation, Control Strategies, Experimental Design

EDUCATION

North Carolina State University August 2014 - May 2018
Ph.D. Applied Mathematics
A Model-Driven Approach to Experimental Validation of Predator-Prey Dynamics in a System of Terrestrial Arthropods, advised by H.T. Banks

University of Arizona August 2010 - May 2014
B.S. Mathematics, Physics Minor

PROFESSIONAL EXPERIENCE

Assistant Professor August 2020 - current
Texas Tech University *Department of Mathematics*

Ongoing development of research concerning predator-prey interactions in agricultural fields and efficient use of ecological data alongside mathematical models. Instruction of courses and internal service.

Marilyn M. Hitz Postdoctoral Faculty Fellow August 2018 - July 2020
University of Nebraska – Lincoln *Department of Mathematics*

Model-based investigation of optimal predator composition in a system of terrestrial arthropods, with an emphasis on questions in biological control. Analysis of continuous competition models with discrete birth pulses. Numerical implementation of observers for partially-sampled populations, using real data. Instruction of undergraduate and graduate courses with minor internal service.

Graduate Research Assistant January 2015 - May 2018
North Carolina State University *Mathematical Biology RTG*

Parameter estimation for a predator-prey model of insect interactions in an agricultural field, with consideration to information content and implications for uncertainty. Model development and proof of convergence for numerical approximations to a delay differential equation model for bumblebee dynamics. Design of experiments and collection of population data in a wet lab.

August T. Larsson Guest Researcher "Tag-Along" June 2017
Swedish University of Agricultural Sciences *Department of Ecology*

Development of optimal experimental design and hands-on experience setting up and conducting mesocosm experiments in a greenhouse, including insect identification and collection in the field.

JOURNAL PUBLICATIONS

***** indicates alphabetical authorship

Glenn Ledder, Terrance Pendleton, Richard Rebarber, **Amanda Laubmeier**, Jonathan Weisbrod. Continuous competition model between trout species with discrete birth pulses. *Submitted to Journal of Biological Dynamics.*

Amanda N. Laubmeier, Bernard Cazelles, Kim Cuddington, Kelley D. Erickson, Marie-Josee Fortin, Orou Gaoue, Kiona Ogle, Christopher K. Wikle, Bo Zhang, Kai Zhu. Bridging analytic, statistical, and empirical methods in ecology. *Submitted to Trends in Ecology & Evolution.*

Amanda N. Laubmeier, Richard Rebarber, Brigitte Tenhumberg. Towards understanding factors influencing the benefit of diversity in predator communities for prey suppression. *Accepted in Ecosphere.*

J.E. Banks, H.T. Banks, N. Myers, **Amanda N. Laubmeier**, and R. Bommarco. Lethal and sublethal effects of toxicants on bumble bee populations: a modelling approach. *Ecotoxicology*, 2020.

J.E. Banks, **Amanda N. Laubmeier**, H.T. Banks. Modelling the effects of field spatial scale and natural enemy colonization behavior on pest suppression in diversified agroecosystems. *Agricultural and Forest Entomology*, 2019.

Alva Curtsdotter, H.T. Banks, J.E. Banks, Mattias Jonsson, Tomas Jonsson, **Amanda N. Laubmeier**, Michael Traugott, and Riccardo Bommarco. Ecosystem functioning in predator-prey food webs - confronting dynamic food web models with population empirical data. *Journal of Animal Ecology*, 2018.

Amanda N. Laubmeier, Kate Wootton, J.E. Banks, Riccardo Bommarco, Alva Curtsdotter, Tomas Jonsson, Tomas Roslin, H.T. Banks. From theory to experimental design - quantifying a trait-based theory of predator-prey dynamics. *PLOS ONE*, 2018.

H.T. Banks, J.E. Banks, Riccardo Bommarco, **Amanda N. Laubmeier***, N.J. Myers, Maj Rundlöf, and Kristen Tillman. Analysis of nonlinear delay systems with applications in bumblebee population models. *Communication in Applied Analysis*, 2017.

H.T. Banks, J.E. Banks, Riccardo Bommarco, Alva Curtsdotter, Tomas Jonsson, **Amanda N. Laubmeier***. Parameter estimation for an allometric food web model. *International Journal of Pure and Applied Mathematics*, 2017.

H.T. Banks, J.E. Banks, Riccardo Bommarco, **Amanda N. Laubmeier***, N.J. Myers, Maj Rundlöf, Kristen Tillman. Modeling bumble bee population dynamics with delay differential equations. *Ecological Modelling*, 2017.

IN-PREP PUBLICATIONS

Kate Wootton, **Amanda N. Laubmeier**, Alva Curtsdotter, Tomas Jonsson, H.T. Banks, Riccardo Bommarco, and Tomas Roslin. From theory to experiment and back again - Challenges in quantifying a trait-based theory of predator-prey dynamics. *In prep.*

Amanda N. Laubmeier and J.E. Banks. Interplay between pesticides and predator movement in agricultural landscapes. *Preliminary work.*

Amanda N. Laubmeier, Richard Rebarber, Brigitte Tenumberg. Dynamic observers for partially-sampled ecological data. *Preliminary work.*

OTHER PUBLICATIONS

Alva Curtsdotter and Amanda N. Laubmeier. "Understanding Ecosystem Function (and Eachother)." Blog post for *Animal Ecology in Focus*, September 2018.

PROPOSALS

AMS Epsilon Fund (awarded) 2019
$4,000 for "*2019 All Girls / All Math Summer Camp*"
Co-PI's: Mikil Foss and Amanda Laubmeier

AMS Graduate Student Travel Grant (awarded) 2018
$500 for travel to the Joint Mathematics Meetings

INVITED TALKS

(cancelled - covid) AMS Sectional: Recent Advances in Mathematical Biology — November 2019
Viability of reduced observations for tracking Astragalus abundance in the field — Fresno, CA

Virginia Commonwealth University Math Department Colloquium — November 2019
Ecological insight from the synthesis of mathematical models and data — Richmond, VA

Texas Tech University Math Department Colloquium — November 2019
Integrating mathematical models and data to understand ecological processes — Lubbock, TX

SIAM Annual Meeting Workshop Celebrating Diversity — July 2018
Data-driven validation of predator-prey dynamics in an agroecosystem — Portland, OR

SIAM Southeast Sectional Conference — March 2018
Mechanisms driving predator-prey interactions between terrestrial arthropods — Chapel Hill, NC

JMM Natural Resource Modelling Session — January 2018
Validating a trait-based model for predator-prey dynamics in a system of terrestrial arthropods — San Diego, CA

Sandia National Laboratories Neural Computing Group — December 2017
A model-driven approach to experimental validation of ecological mechanisms — Albuquerque, NM

PAST AND UPCOMING PRESENTATIONS

Joint Mathematics Meetings — January 2020
Talk, *Applying observers to track Astragalus dynamics with reduced population counts* — Boulder, CO

SACNAS Annual Meeting — October 2019
Talk, *When does predator diversity improve prey suppression? Optimizing pest control as a function of predator traits* — Honolulu, HI

ICMA VII: Populations in Biological Systems — October 2019
Talk, *Interplay between predator traits impacts benefits to biological control from predator biodiversity* — Tempe, AZ

BAMM!: Biology and Medicine Through Mathematics Conference — May 2019
Talk, *Effects of predator diversity on optimal communities for prey suppression* — Richmond, VA

Ecological and Biological Systems Workshop at IMA — June 2018
Poster, *Landscape-level Interactions between Pests and Biological Control Agents* — Minneapolis, MN

ICMA VI: Populations in Biological Systems — October 2017
Poster, *Evaluating the importance of body mass and habitat use in a trait-based model of foodweb dynamics* — Tucson, AZ

Sensor Location in Distributed Parameter Systems Workshop at IMA — September 2017
Poster, *Experimental design for parameter estimation in a system of terrestrial arthropods* — Minneapolis, MN

BAMM!: Biology and Medicine Through Mathematics Conference — May 2017
Talk, *Experimental design for parameter estimation in an allometric foodweb model* — Richmond, VA

Western Alliance to Expand Student Opportunities — March 2017
Poster, *Experimental design for parameter estimation in an allometric foodweb model* — Tempe, AZ

Southeastern Atlantic Regional Conference on Differential Equations — October 2015
Talk, *Parameter estimation on size-based insect communities* — Greensboro, NC

OTHER CONFERENCE AND WORKSHOP ACTIVITY

Joint Mathematics Meetings — January 2020
Co-organizer for *AMS-AWM Special Session on Women in Mathematical Biology* — Denver, CO

Transients in Biological Systems Workshop at NIMBioS — May 2019
Workshop attendee — Knoxville, TN

Tutorial Workshop on Parameter Estimation for Biological Models — July 2016
Workshop attendee — Raleigh, NC

SEMINAR TALKS

Mathematical Biology Seminar, University of Nebraska – Lincoln — February 2020
Bridging analytic and statistical approaches to studying ecological dynamics

Mathematical Biology Seminar, University of Nebraska – Lincoln — September 2019
Factors influencing the benefit of predator diversity for prey suppression

Mathematical Biology Seminar, University of Nebraska – Lincoln — August 2018
Testing a trait-based model for predation between terrestrial arthropods

Applied Math Graduate Student Seminar, North Carolina State University — October 2017
A model-driven approach to experimental validation of predator-prey dynamics in a system of terrestrial arthropods

Applied Math Graduate Student Seminar, North Carolina State University — April 2017
Experimental design for parameter estimation in an allometric foodweb model

Center for Research in Scientific Computation Review, North Carolina State University — April 2016
Parameter estimation on size-based insect communities

TEACHING AND MENTORING

Texas Tech University

Differential Equations (applied) — Fall 2020

University of Nebraska – Lincoln

Mathematical Biology — Spring 2020

Linear Algebra (introductory) — Fall 2019

Calculus III — Fall 2019, Spring 2019

Differential Equations (introductory) — Fall 2018

Undergraduate Projects

Marc Wade (research project, co-mentor Glenn Ledder) — Fall 2019
optimal foraging for a consumer across patchy resources, subject to predation risk

Darin Schlautman (honors contract, linear algebra student) — Fall 2019
projects in electrical engineering to supplement course material for honors credit

North Carolina State University

Substitute Lecturer: Differential Equations — Fall 2017, Spring 2017

PROFESSIONAL DEVELOPMENT

STEM Teaching, Engagement & Pedagogy Program, Texas Tech University	2020
Project NExT, Mathematical Association of America	2020
Postdoc Leadership Institute, SACNAS	2019
Professorial Advancement Initiative Workshop, Big Ten Academic Alliance	2019
Grant Writing Workshop, University of Nebraska–Lincoln	2019
Science Communication Workshop, University of Nebraska Museum of Natural History	2019
Weekly Teaching Seminar, University of Nebraska–Lincoln	2019
K-12 Outreach Workshop, SciREN Triangle Network	2017
"Going Beyond Show and Tell" Outreach Workshop, North Carolina State University	2017

BROADER IMPACTS

Under-Represented Communities

Reviewer for SACNAS annual meeting scientific presentations 2019-2020
providing feedback on abstracts for graduate and undergraduate student presentations

Consultant for *Científico Latino Graduate School Mentorship Initiative* 2019
mentoring an underrepresented student through graduate school applications

Pen-pal in *Letters to a Pre-Scientist* program servicing high-poverty middle schools 2019
exchanging snail-mail about STEM careers, college, and overcoming adversity

Volunteer at "Lighthouse" afterschool program servicing at-risk youth in Lincoln, NE 2018-2020
tutoring and helping with math homework in a group room (2hr/wk)

Founder of mentoring program for under-represented undergraduates in math at NCSU 2015-2017
monitored cohorts of 20-30 undergraduates, matched to graduate mentors with similar interests

Volunteer at "n2n" afterschool program servicing minority students in Raleigh, NC 2014-2018
one-on-one "math mentoring" to get a student up to grade (1hr/wk)

Science Communication

Presented mincourse on infectious disease modelling 2020
Audience: high school girls at *All Girls / All Math* summer camp, hosted by UNL

Designed "Bee Strategic" modelling and optimization game 2019
Audience: K-6 children at *InvestiGate*, hosted by University of Nebraska State Museum

Expanded "Zombie Outbreak" activity to include transmission along networks 2018
Audience: middle school girls on *Kovalevsky Day*, hosted by NCSU's AWM

Designed "Guess the Predator" inverse problem game 2017
Audience: K-6 children at *BugFest*, hosted by North Carolina Museum of Natural History

Developed "Zombie Outbreak" epidemic lesson plan for algebra classes 2017
Audience: middle school educators, hosted by *SciREN Triangle Network* in Raleigh, NC

Designed "Black Box" inverse problem and experimental design game 2017
Audience: K-8 children at *State of the Sciences*, hosted by North Carolina State University

Displayed and discussed current research on water fleas 2015
Audience: adults at *State of the Sciences*, hosted by North Carolina State University

Discussed water fleas and hosted hands-on microscope activity 2015
Audience: children at *BugFest*, hosted by North Carolina Museum of Natural History

INTERNAL SERVICE

University of Nebraska – Lincoln (all 2018-2020)

Organizing committee for "All Girls All Math" summer camp 2018-2020
annual math camp for high school girls, emphasizing applications in cryptography

Faculty sponsor for undergraduate AWM student chapter 2018-2020

Coach and instructor for undergraduate modelling competitions 2018-2019

Volunteer for Nebraska State Math Day high school competitio 2018-2019
annual competition for scholarships, welcoming ∼1,300 students from across Nebraska

North Carolina State University

Linux technical support in Center for Research in Scientific Computing 2016-2018

Volunteer for AWM workshop for local girls 2016-2017
annual Kovalevsky Day event bringing school girls to NCSU campus

Organizing committee for two AMS-funded graduate student conferences 2014-2015
research presentations from students across three universities, ∼40 attendees

Webmaster for graduate chapter of the AMS 2014-2016

PROFESSIONAL MEMBERSHIPS

Society of Mathematical Biology
Society for the Advancement of Chicanos and Native Americans in the Sciences
Association for Women in Mathematics