MARTHA TORSTENSON

Ecology, Evolution and Behavior
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EDUCATION

University of Minnesota, Twin Cities, MN 2020-2025
Ph.D., Ecology Evolution and Behavior
Areas of specialization: Mathematical modeling, migration, disease, climate
Dissertation committee: Alison Shaw (advisor), Jessica Hellman, Sarah Hobbie, Kate Meyer
Minnesota Center for Philosophy of Science Graduate Student Fellow
Member of the Mathematics of Climate Research Network

Carleton College, Northfield, MN 2014-2018
B.A., Mathematics, *magna cum laude*
Dean's List 2014-2015, 2016-2017
Phi Beta Kappa

RESEARCH

Publications

1. Shaw AK, Fouda L, Mezzini S, Kim D, Chatterjee N, Wolfson D, Abrahms B, Attias N, Beardsworth CE, Beltran R, Binning SA, Chan Y, Fronhofer EA, Hegemann A, Hurme ER, Iannarilli F, Kellner JB, McCoy KD, Rafiq K, Saastamoinen M, Sequeira AMM, Serota MW, Sumasgutner P, Tao Y, **Torstenson M**, Yanco S, Beck KB, Bertram MG, Beumer LT, Bradarić M, Clermont J, Ellis-Soto D, Faltusová M, Fieberg J, Hall RJ, Kölzsch A, Lai S, Lee-Cruz L, Lorreto MC, Loveridge A, Michelangeli M, Mueller T, Riotte-Lambert L, Sapir N, Scacco M, Teitelbaum CS, Cagnacci F (2025) "Perceived and Observed Biases within Scientific Communities: A Case Study in Movement Ecology." *Proceedings of the Royal Society B: Biological Sciences* 292:2051. https://doi.org/10.1098/rspb.2025.0679.

2. Shao C, **Torstenson M**, Shaw AK (2025) "Effect of Resistant Compartment on Pathogen Strategy in Partially Migratory Populations" *PLOS One,* 20(2) e0316640. https://doi.org/10.1371/journal.pone.0316640.

3. **Torstenson M**, Shaw AK (2025) “Strength of seasonality and type of migratory cue determine how the benefits of migration are affected by changing phenology” *Oikos,* 2025(1): e10862. https://doi.org/10.1111/oik.10862

4. **Torstenson MS,** Wolfson DW, Safran SM, Walton DJ, Hallberg AB, Kim D, Tan YF, Kramer GR, Andersen DE (2024) “Conservation of North American migratory birds: insights from emerging technologies” *Avian Conservation and Ecology.* https://doi.org/10.5751/ACE-02749-190213

5. Shaw AK, Bisesi AT, Wojan C, Kim D, **Torstenson M,** Naven Narayanan, Lutz P, Ales R, Shao C (2024) “Six personas to adopt when framing theoretical research questions in biology” *Proceedings of the Royal Society B*. 291:20240803 https://doi.org/10.1098/rspb.2024.0803.

6. **Torstenson M**, Shaw AK (2024) "Pathogen evolution following spillover from a resident to a migrant host population depends on interactions between host pace of life and tolerance to infection.” *Journal of Animal Ecology,* 93, 475-487. https://doi.org/10.1111/1365-2656.14075

7. Shaw AK, **Torstenson M**, Craft ME, Binning SA (2023) "Gaps in modelling animal migration with evolutionary game theory: infection can favour the loss of migration." *Philosophical Transactions of the Royal Society B* 378:20210506. https://doi.org/10.1098/rstb.2021.0506

Preprints

1. Verzuh T, **Torstenson M**, Tao Y, Fryxell J, Rutz C, Beltran R (preprint, in review) “An urgent call to integrate movement ecology with conservation science” *Authorea.* December 16, 2024. doi: 10.22541/au.173437049.97671356/v1

Papers in progress **-** manuscripts available upon request

1. **Torstenson M.** & Shaw, AK (in press) “Population response to extreme climate events depends on population spatial distribution”

Code

1. **Torstenson, M. S.**, & Shaw, A. K. (2024). Model code associated with: Population response to extreme climate events depends on population spatial distribution. Zenodo. https://doi.org/10.5281/zenodo.14510659

2. **Torstenson, M. S.**, & Shaw, A. K. (2024). Model code associated with: Strength of seasonality and type of migratory cue determine the fitness consequences of changing

phenology for migratory animals. In Oikos. Zenodo. https://doi.org/10.5281/zenodo.13695479

3. **Torstenson, M.**, & Shaw, A. K. (2024). Model code associated with: Pathogen evolution following spillover from a resident to a migrant host population depends on interactions between host life history speed and cost of infection. In Journal of Animal Ecology. Zenodo. https://doi.org/10.5281/zenodo.10723759

Experience

Fulbright Student Fellow 2019-2020
Norwegian University of Science and Technology, Trondheim, Norway

- Built a mathematical model studying the impacts of environmental stochasticity and extreme climate events on community dynamics on Svalbard

Undergraduate Thesis
Carleton College, Northfield, MN 2017-2018

- Investigated the structure of shadows cast by multidimensional Cantor Sets

Research Assistant 2017-2018
Carleton College, Northfield, MN

- Assisted with data collection, statistical analysis and writing on a variety of prairie ecosystem ecology experiments

PRESENTATIONS

Invited Talks

1. Shaw AK, **Torstenson M**, Lutz P, Wojan C. *Theory 'personas' as a tool to frame research questions.* Society for Modeling ans Theory in Population Biology. March 2025.

2. **Torstenson M**. *Applying a flow-kick framework to understand how the spatial spread of populations affects population response to extreme climate events.* University of Minnesota - Mathematics of Climate Seminar. Minneapolis, MN. February 2024.

3. **Torstenson M**. *How does migration affect response to climate change?* University of Bergen - Theoretical Ecology Group. Bergen, Norway. May 2023.

Contributed Talks

1. **Torstenson M**, Kumawat D, Noory J, Kula L, Sárközi Z, Tilsen M, Copp K, Kaspar R. *Ecosystem and Planetary Health Cohort.* University of Minnesota Sustainability Symposium. St. Paul, MN. April 2024.

Posters (* denotes presenting author)

1. **Torstenson M*** & Shaw AK. *Population response to extreme climate events depends on population spatial distribution.* Gordon Research Seminar and Conference on Movement Ecology of Animals. Ventura, CA. July 2025.

2. Shaw AK*, Bisesi AT, Wojan C, Kim D, **Torstenson M,** Naven Narayanan, Lutz P, Ales R, Shao C. *What is your theorist 'persona'? Six ways to frame theoretical questions in ecology.* Ecological Society of America Conference. Long Beach, CA. August 2024.

3. **Torstenson M*** & Shaw AK. *Pathogen evolution following spillover from a resident to a migrant host population depends on interactions between host pace of life and tolerance to infection.* Ecology and Evolution of Infectious Disease Conference. Palo Alto, CA. June 2024.

4. **Torstenson M*** & Kumawat D*. *Ecosystem and Planetary Health Cohort: Model and Process.* University of Minnesota Sustainability Symposium. St. Paul, MN. April 2024. (Won an award for best poster)

5. **Torstenson M*** & Shaw AK. *Historical patterns of seasonality and type of migratory cue determine how the benefits of migration are affected by climate change.* Gordon Research Conference on Movement Ecology of Animals. Lucca, Italy. May-June 2023.

6. **Torstenson M*** & Shaw AK. *How pathogens evolve following spillover from a non-migratory to a migratory host population depends on cost of infection and life history speed.* Gordon Research Seminar on Movement Ecology of Animals. Lucca, Italy. May 2023.

TEACHING

Instructor of Record

Visiting Instructor, BIOL/ENVI 359 **Big Data in Ecology** — Fall 2024, Spring 2025
Macalester College, Saint Paul, MN

Visiting Instructor, BIOL 210 **Global Change Biology** — Winter 2025
Carleton College, Northfield, MN

Teaching Assistantships

Teaching Assistant, EEB 5053 **Ecology: Theory and Concepts** — Fall 2023
University of Minnesota, Twin Cities, MN

- Wrote and graded problem sets
- Led weekly TA sessions
- Graded exams
- Taught 2 class sessions

Teaching Assistant, BIOL 1961 **Foundations of Biology Lab 1** — Fall 2021
University of Minnesota, Twin Cities, MN

- Taught a 20-student lab section for biology majors with a focus on computational biology
- Assisted students with lab work and the development of research proposals
- Graded post-lab assignments, tests, and research proposals.

Course Grader, MATH 120 **Calculus 2** and MATH 321 **Real Analysis** Winter, Spring 2017
Carleton College, Northfield, MN

- Evaluated solutions to problem sets and communicated with professors about patterns in student understanding

Teaching Fellowships

Teaching Fellow, **Algebra 2 and Pre-Calculus** 2018-2019
Conserve School, Land O' Lakes, WI

- Provided one-on-one support for learning material
- Developed curriculum to encourage students to use mathematics to think about the natural world

Guest teaching

BIOL 362: **Arctic Ecology**, Dr. Mary Heskel March 2024
Macalester College, St. Paul, MN

- Developed and executed a 3 class session series on animal migration in the Arctic

BIO 261: **Ecology**, Dr. Jake Grossman May 2024
St. Olaf College, Northfield, MN

- Taught a class session on movement ecology

Other teaching experience

Nature of Life Instructor, **Simulating Animal Migration** July 2024
University of Minnesota, Twin Cities, MN

- Developed and executed a 4 hour module for incoming freshman biology students
- Led and participated in other instructional activities including mini-modules and a symposium

Educational Resources

1. **Torstenson, M. S.**, Balstad, L., Shaw, A. K. (2024). Simulating selection on migration. QUBES Educational Resources. doi:10.25334/G89V-6533

FELLOWSHIPS AND ACADEMIC HONORS

Fellowships

Torske Klubben Fellowship ($32,000) 2022-2024

Fulbright Student Fellowship ($13,300) 2019-2020

Prizes

Steven P. Galovich Prize in Mathematics ($250) 2018

Scholarships

Patricia V. Damon Scholarship ($10,000) 2017

SERVICE

To University

Fulbright Interviewer 2024
Macalester College, Saint Paul, MN
- Interviewed 4 Fulbright applicants

Nature of Life Panelist 2024
University of Minnesota, Twin Cities, MN
- Participated in a panel of graduate students discussing research and graduate school with freshman biology majors

Biology Saves the World Focus Scientist 2024
University of Minnesota, Twin Cities, MN
- Discussed my research and life as a scientist with freshman biology majors across two one-hour sessions

UROP Application Reviewer 2023
University of Minnesota, Twin Cities, MN
- Evaluated and provided feedback on proposals for undergraduate research

To Department

EEB Welcome Week Coordinator 2024, 2025
University of Minnesota, Twin Cities, MN
- Coordinated faculty meetings for prospective graduate students.
- Organized other logistics for welcome week including meals, current student panel, and activities in the Twin Cities.

Winter Gear Drive Coordinator 2023
University of Minnesota, Twin Cities, MN
- Led a panel on winter preparedness and organized a collection of winter gear for graduate students.

Ethics Committee Member 2020-2023
University of Minnesota, Twin Cities, MN
- Developed and facilitated four Ethics Seminars per year for the University of Minnesota's EEB Ph.D. program across four areas (Relationships in the academic and research community, authorship and scientific misconduct, peer review and research conduct)

To the Field

Reviewer for Journal of Ecology, Movement Ecology, Animal Taxonomy and Ecology

MENTORSHIP

Research Mentor 2023-2024
University of Minnesota, Twin Cities, MN

- Mentored an undergraduate student (Jessica Valiarovski) researching the evolution of virulence

REU Mentor 2022-2023
University of Minnesota, Twin Cities, MN
- Mentored an undergraduate student (Cynthia Shao) researching the evolution of virulence resulting in the submission of a manuscript

Directed reading mentor 2022
University of Minnesota, Twin Cities, MN
- Chose papers and guided discussion for an undergraduate student's (Ruby Ales) directed reading on ecological theory and migration

Field Guides Mentor 2020-2024
University of Minnesota, Twin Cities, MN
- Provided mentorship to 4 undergraduate students interested in biology

Mentor Chain Participant 2021-2022
Ecological Society of America Theory Section

Trail Guide 2016-2021
YMCA Camp Widjiwagan, Ely, MN
- Led canoeing and backpacking trips for teens ranging in length from 5 to 35 days in various remote wilderness locations.
- Mentored participants on leadership, teamwork and outdoor skills.

Society for Women in Mathematics and Statistics Mentor 2017-2018
Carleton College, Northfield, MN
- Provided mentorship to first-year math student

Tutor
TORCH, Northfield, MN 2014-2015
- Assisted high school students with math concepts and study skills

OUTREACH

K-12 Education 2023-2024
Summer Youth Camps
Bell Museum, Saint Paul, MN
- Developed and implemented an activity designed to teach 5th and 6th graders about animal migration and mathematical modeling

Cedar Creek EcoExtravaganza May 2022, 2024
University of Minnesota, Twin Cities, MN
- Assisted middle and high school students with a day of ecological research projects

Young Chefs 2015-2016
Carleton College, Northfield, MN
- Taught weekly lessons about science and cooking to middle school students

Green Thumbs 2014-2015
Carleton College, Northfield, MN
- Developed and executed a curriculum to teach 3rd-grade students about science and gardening

Public Talks
Study Club Talk October 2024
Study Club, Wayzata, MN
- Gave a talk on migration in an era of global change to a women's club

Cedar Creek Lunch with a Scientist December 2022
University of Minnesota, Twin Cities, MN
- Gave a public lecture to over 100 participants on my research about animal migration and climate change (Available at https://mediaspace.umn.edu/media/t/1_ioxjyvox)

Other Public Outreach
Market Science 2021-2022
University of Minnesota, Twin Cities, MN
- Led interactive activities about patterns in nature at a local farmer's market

PROFESSIONAL DEVELOPMENT

New Faculty Orientation September 2024
Macalester College, Saint Paul, MN
- Participated in a week of training for new faculty

Entering Mentoring Spring 2024
University of Minnesota, Twin Cities, MN
- Participated in a semester-long workshop series following a curriculum developed by The Center for the Improvement of Mentored Experienced in Research (CIMER)

Institute on the Environment Graduate Leader 2023-2024
University of Minnesota, Twin Cities, MN
- Led an interdisciplinary graduate cohort focused on ecosystem and planetary health and participated in a series of leadership trainings

Preparing Future Faculty Fall 2021 and Spring 2024
University of Minnesota, Twin Cities, MN
- Took coursework focused on preparing faculty and participated in a practicum under the mentorship of Dr. Mary Heskel