JODY REIMER

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EDUCATION

PhD University of Alberta, Canada — 2019
Department of Mathematical and Statistical Sciences
and Department of Biological Sciences
Mentors: Mark Lewis & Andrew Derocher

MSc University of Oxford, United Kingdom — 2013
Mathematical Institute
Mentors: Philip Maini & Michael Bonsall

BA University of Manitoba, Canada — 2011
Department of Mathematics

ACADEMIC APPOINTMENTS

2022– **Assistant Professor**, Department of Mathematics and School of Biological Sciences, University of Utah, Salt Lake City, United States of America

2019–2022 **Wylie Assistant Professor (Lecturer),** Department of Mathematics, University of Utah, Salt Lake City, United States of America

RESEARCH FOCUS AREAS

- Mathematical modeling of biological systems
- Analysis and simulation of dynamical systems models
- Uncertainty quantification for biological systems
- Optimization and optimal control (e.g., dynamic programming)
- Polar marine ecology, global change biology, wildlife management

PUBLICATIONS

Peer-reviewed publications

19. Arehart, E., **Reimer, J. R.**, & Adler, F. R. (2023). Strategy maps: Generalised giving-up densities for optimal foraging. *Ecology Letters,* 26(3):398-410. DOI: 10.1111/ele.14160

18. Swadling, K. M., Constable, A. J., Fraser, A. D., Massom, R. A., … **Reimer, J. R.**, … & Wotherspoon, S. (2022). Biological responses to change in Antarctic sea ice habitats. *Frontiers in Ecology and Evolution*, 10:1254. DOI: 10.3389/fevo.2022.1073823

17. **Reimer, J. R.**, Adler, F. R., Golden, K. M., & Narayan, A. (2022) Uncertainty quantification for ecological models with random parameters. *Ecology Letters.* 25(10):2232-2244. DOI: 10.1111/ele.14095

16. **Reimer, J. R.**, Arroyo-Esquivel, J., Jiang, J., Scharf, H. R., Wolkovich, E. M., Zhu, K., & Boettiger, C. (2021) Noise can create or erase long transient dynamics. *Theoretical Ecology.* DOI: 10.1007/s12080-021-00518-6

15. Berg, J., **Reimer, J. R.**, Smolko, P., Bohm, H., Hebblewhite, M., & Merrill E. (2021) Mothers' movements: Shifts in calving area selection by partially migratory elk. *Journal of Wildlife Management*, 85(7):1476-1489. DOI: 10.1002/jwmg.22099

14. Peers*, M. J. L., **Reimer*, J. R.**, Majchrzak, Y. N., Menzies, A. K., Studd, E. K., Boonstra, R., Kenney, A., Krebs, C. J., O'Donoghue, M., & Boutin, S. (2021) Contribution of late-litter juveniles to the population dynamics of snowshoe hares. *Oecologia.* 195:949-957. DOI: 10.1007/s00442-021-04895-x **(*shared first author)**

13. **Reimer, J. R.**, Ahmed, S. M., Brintz, B., Shah, R. U., Keegan, L. T., Ferrari, M. J., & Leung, D. T. (2021) The effects of using a clinical prediction rule to prioritize diagnostic testing on transmission and hospital burden: a modeling example of early Severe Acute Respiratory Syndrome Coronavirus 2. *Clinical Infectious Diseases.* DOI: 10.1093/cid/ciab177

12. Nagy-Reis*, M. B., **Reimer*, J. R.,** Lewis, M. A., Jensen, W., & Boyce, M. S. (2021) Aligning Population Models with Data: Adaptive Management for Big Game Harvests. *Global Ecology and Conservation,* 26:e01501. DOI: 10.1016/j.gecco.2021.e01501 **(*shared first author)**

11. Johnson, A. C., **Reimer, J. R.,** Lunn, N. J., Stirling, I. McGeachy, D., & Derocher, A. E. (2020) Influence of sea ice dynamics on population energetics of Western Hudson Bay polar bears. *Conservation Physiology*, 8(1):coaa132. DOI: 10.1093/conphys/coaa132

10. Klappstein, N., Togunov, R., **Reimer, J. R.,** Lunn, N., & Derocher, A. E. (2020) Patterns of sea ice drift and polar bear (*Ursus maritimus*) movement in Hudson Bay. *Marine Ecology Progress Series,* 641:227-240. DOI: 10.3354/meps13293

9. Upham-Mills, E., **Reimer, J. R.,** Haché, S., Lele, S., & Bayne, E. (2020) Can singing rate be used to predict male breeding status of forest songbirds? A comparison of three calibration models. *Ecosphere*, 11(1):e03005. DOI: 10.1002/ecs2.3005

8. **Reimer, J. R.,** Mangel, M., Derocher, A. E., & Lewis, M. A. (2019) Matrix methods for stochastic dynamic programming in ecology and evolutionary biology. *Methods in Ecology and Evolution*, 10(11):1952-1961. DOI: 10.1111/2041-210X.13291 **[shortlisted for the Robert May Prize, 2019]**

7. **Reimer, J. R.,** Mangel, M., Derocher, A. E., & Lewis, M. A. (2019) Modelling optimal responses and fitness consequences in a changing Arctic. *Global change biology*, 25(10): 3450-346. DOI: 10.1111/gcb.14681

6. **Reimer, J. R.**, Caswell H., Derocher A. E., & Lewis M. A. (2019) Ringed seal demography in a changing climate. *Ecological applications*, 29(3):e01855. DOI: 10.1002/eap.1855

5. **Reimer, J. R.**, Brown H., Beltaos-Kerr E., & de Vries G. (2018) Evidence of intraspecific prey switching: stage-structured predation of polar bears on ringed seals. *Oecologia*, 189(1):133-148. DOI: 10.1007/s00442-018-4297-x

4. Yee, M., **Reimer, J. R.**, Lunn, N. J., Togunov, R. R., Pilfold, N. W., McCall, A. G., & Derocher, A. E. (2017) Polar bear (Ursus maritimus) migration from maternal dens in western Hudson Bay. *Arctic*, 70(3):319-327. DOI: 10.14430/arctic4668

3. **Reimer, J. R.**, Bonsall, M. B., & Maini, P. K. (2017) The critical domain size of stochastic population models. *Journal of mathematical biology*, 74(3):755-782. DOI: 10.1007/s00285-016-1021-5

2. **Reimer, J. R.**, Bonsall, M. B., & Maini, P. K. (2016) Approximating the critical domain size of integrodifference equations. *Bulletin of mathematical biology*, 78(1):72-109. DOI: 10.1007/s11538-015-0129-x

1. Malik, T., **Reimer, J. R.**, Gumel, A., Elbasha, E. H., & Mahmud, S. (2013) The impact of an imperfect vaccine and pap cytology screening on the transmission of human papillomavirus and occurrence of associated cervical dysplasia and cancer. *Mathematical Biosciences & Engineering*, 10(4):1173-1205. DOI: 10.3934/mbe.2013.10.1173

White papers

Dunbar, O., Hastings, A., Lin, G., Nadeau, A. Quaini, A., **Reimer, J. R.**, Rouleau, T., Ruiz-Mercado, G. (2022) Unraveling the climate vulnerability web: Integration of Physical, Biological, Human Social, and Economic Models in Time and Space. Created as part of the SIAM Convening on Climate Science, Sustainability, and Clean Energy.

HONORS AND AWARDS

2022 Honorable mention for Outstanding Paper Award (ESA, Theory Section)
2021 Contributed Talk Prize (Society for Mathematical Biology Annual Meeting 2021)
2021 Don H. Tucker Postdoctoral Fellow Award (U. of Utah, UT, USA)
2020 Outstanding Postdoc Award (U. of Utah, UT, USA)
2020 Shortlisted for the Robert May Prize (*Methods in Ecology and Evolution*)
2019 Anton Alexander Cseuz Gold Medal in Mathematics (U. of Alberta, AB, Canada)
2017 Izaak Walton Killam Memorial Scholarship (The Killam Trusts, Canada)
2017 3rd place winner in Elevator Pitch Competition (ArcticChange, QB, Canada)
2016 Alberta Innovates Technology Futures Graduate Scholarship (AITF, AB, Canada)
2016 2nd place winner in Poster Competition (SMS Conference, AB, Canada)
2016 Michael Smith Foreign Study Supplement (NSERC, Canada)
2016 ArcticNet Training Fund (ArcticNet Centre of Excellence, Canada)
2013 Vanier Canada Graduate Scholarship (NSERC, Canada)
2013 Graduate Scholarship top-up (Alberta Innovates Technology Futures, AB, Canada)
2013 President's Doctoral Prize of Distinction (U. of Alberta, AB, Canada)
2011 NSERC Postgraduate Scholarship (NSERC, Canada)
2011 Rhodes Scholarship (The Rhodes Trust, United Kingdom)

RESEARCH GRANTS

2021: NSF Research Training Group (RTG)
Project title: Optimization and Inversion for the 21st Century Workforce
Role: Senior Personnel
Proposal status: awarded, 2022

INVITED TALKS

* online talk

2023 U. of Pennsylvania, USA. Mathematical Biology Seminar (Oct.)
2023 U. of Pennsylvania, USA*. Modeling Practices Across Disciplines Seminar (Mar.)
2022 AMS Western Sectional Meeting. Invited mini-symposium talk as part of Mathematical Modeling of Biological and Social Systems (Oct.)
2022 U. of Potsdam, Germany. BioMove Seminar Series (July)
2022 U. of Pennsylvania, USA*. Modeling Practices Across Disciplines Seminar (Mar.)
2022 Antarctic Sea Ice and Southern Ocean Seminar* (Feb.)
2022 U. C. Santa Cruz, USA*. Ecology and Evolutionary Biology Seminar (Jan.)
2021 U. C. Davis, USA*. Mathematical Biology Seminar (Nov.)
2021 U. of Leeds, UK*. Applied Mathematics Seminar (Oct.)
2021 SIAM Annual meeting*. Invited mini-symposium talk as part of Modeling Species Distributions in Ecosystems Altered by Climate Change (July)
2021 U. of Calgary, Canada*. Applied Mathematics Seminar (June)

2021	Institute for Science and Technology, Austria* (Feb.)
2021	U. of Washington, USA*. Applied Mathematics Seminar (Feb.)
2021	U. of Ottawa, Canada*. Applied Mathematics Seminar (Jan.)
2020	Cardiff University, UK*. Applied and Computational Maths Seminar (Nov.)
2020	U. of Minnesota, USA*. Mathematical Biology Seminar (Nov.)
2020	CDC working group on COVID healthcare modeling* (June)
2020	Utah State University, USA. Mathematical biology seminar (Feb.)
2020	Utah State University, USA. WILD seminar series (Jan.)
2019	U. of Tasmania, Australia. Institute for Marine and Antarctic Studies seminar series (Sept.)
2017	Alberta Mathematics Dialogue Day. Edmonton, Canada (May)
2016	U. of Amsterdam, Netherlands. Institute for Biodiversity and Ecosystem Dynamics seminar series (Dec.)

OTHER SELECT CONFERENCE PRESENTATIONS

2021 Annual Society for Mathematical Biology (SMB) meeting. Online. 'Beyond the mean: incorporating small scale heterogeneity into algal bloom models using generalized polynomial chaos'. Oral presentation. (June 2021)

2020 Annual Society for Mathematical Biology (SMB) meeting. Online. **'**Long transient dynamics in the presence of noise'. Oral presentation. (Aug. 2020)

2020 Canadian Applied and Industrial Mathematics Society (CAIMS) and Pacific Institute for the Mathematical Sciences (PIMS) Coronavirus Modelling Conference. Online. 'Modeling reductions in COVID-19 transmission and hospital burden achieved by prioritizing testing using a clinical prediction rule'. Oral presentation. (June 2020)

2018 SIAM Mathematics of Planet Earth meeting. Philadelphia, USA. 'Insights into stochastic dynamic programming from ergodic theory'. Oral presentation. (Sept. 2018).

2017 ArcticChange conference. Quebec City, Canada. 'Adding insult to injury? Polar bear predation on a weak ringed seal cohort'. 3 min. elevator pitch. (Dec. 2017).

2017 ArcticChange conference. Quebec City, Canada. 'Ringed seal demography in a changing climate'. Oral presentation and poster. (Dec. 2017)

2017 PIMS Graduate Summit in Mathematical Biology and Applied PDEs. Jasper, Canada. 'Series of unfortunate events: How autocorrelation affects population growth and structure'. Poster. (May 2017)

2016 PIMS Young Researchers Conference. Edmonton, Canada. 'The critical domain size of stochastic population models'. Oral presentation. (June 2016)

2016 Seminaire de Mathematiques Superieures: Dynamics of Biological Systems. Edmonton, Canada. 'Optimal polar bear foraging habitat: which life history stages hunt where, and why?' Poster presentation. (June 2016).

2015 ArcticNet Annual Scientific Meeting. Vancouver, Canada. 'Interactions between polar bears, ringed seals, and their dynamic sea ice habitats'. Oral presentation. (Dec. 2015).

2015 Association of Canadian Universities for Northern Studies, Student Conference. Calgary, Canada. 'Who eats what, where, and why'. Oral presentation. (Nov. 2015)

2013 Isaac Newton Institute for Mathematical Sciences, Women in Mathematics Day. Cambridge, United Kingdom. 'Approximating the critical domain size necessary for marine reserve design'. Poster presentation. (Apr. 2013)

TEACHING

Instructor

BIOL 6500 – Advanced Statistical Modeling for Biologists – spring 2023
MATH 1170 - Calculus for Biologists – fall 2022
MATH 1030 - Intro to Quantitative Reasoning – spring 2022
MATH 1210 - Calculus I, University of Utah – spring 2020 (x2), fall 2020, spring 2021
MATH 1220 - Calculus II, University of Utah – fall 2021

Teaching Assistant (various undergraduate mathematics courses)

Bamfield Marine Sciences Centre; Ecological Models and Data course	Summer 2017
University of Alberta; Mathematics Department	2015 – 2017
University of Oxford; Mathematical Institute	2011 – 2012
University of Manitoba; Mathematics Department	2009 – 2011

STUDENT MENTORSHIP

High School Students

2023– Anthony Lee. Inverse problems and uncertainty quantification. Weekly meetings. Co-mentoring with K. M. Golden.

Summer, 2020 Tarun Martheswaran. Optimal control of infectious diseases. Summer research experience. Weekly meetings.

Undergraduate Students

2020– Nicole Forrester (Mathematics). Optimal polar bear movement on a fractal landscape. Co-mentoring with K. M. Golden.

2020–2022 Grant Poulson (Mathematics and Computer Science). Influence of stochasticity on ecological models with long transient dynamics. Publication in prep. Undergraduate senior project.

2020–2021 Linda Zhao (Biology and Mathematics). Integrating math and biology in K-12 education. Internship project in collaboration with Polar Bears International.

Summer, 2020 Spencer Tennant (Environmental Science). Pilot lab studies on sea ice structure. Summer internship.

2019–2020 Kayla Stewart (Mathematics). Nutrient-phytoplankton models of sea ice algal dynamics. Research Experiences for Undergrads research project. Co-mentored with K. M. Golden.

2019–2020 Anna Hyde (Mathematics). Extracellular polymeric substances and sea ice algae. ACCESS student project. Co-mentored with K. M. Golden.

Fall, 2019 Spencer Fajardo (Mathematics). Directed reading in mathematical biology.

2018-2020 Natasha Klappstein (Biology). Sea ice drift and polar bear movement, resulting in publication [10]. Undergraduate senior project. Co-mentored with A. E. Derocher.

2016–2017 Hannah Brown (Mathematics). Stage structured predation models, resulting in publication [5]. Undergraduate senior project. Co-mentored with G. de Vries and E. Beltaos-Kerr.

2016–2017 Meredith Yee (Biology). Polar movement around maternal dens, resulting in publication [4]. Undergraduate senior project. Co-mentored with A. E. Derocher.

Graduate Students

Spring, 2023 Abby Hardin-Kohli (Mathematics). Directed reading course on mathematical models of sea ice microbial ecology.

Fall, 2020 Samantha Linn (Mathematics). Directed reading course in mathematical models of polar physics and biology. Co-mentored with K. M. Golden.

2019–2021 Julie Sherman (Mathematics). Modeling nematode ecology and carbon cycling in the Dry Valleys of Antarctica. Co-mentored with K. M. Golden.

GRADUATE STUDENT COMMITTEES

Math Theresa Sheets (PhD defense, summer 2023)
Patrick Talley (Oral exam, spring 2023)

Biology Amy Buxton (First year exam, spring 2023)
Madelyn Purnell (First year exam, spring 2023)
David Blount (Committee meeting, fall 2022)

WORKSHOP AND WORKING GROUP PARTICIPATION

* denotes invited participation

2022 Ecological Forecasting Workshop
University of Boston (June, 2022)

2020-2022 *Markov decision processes in non-autonomous socio-ecological systems
Patuxent Wildlife Research Center, MD, USA. (working group)

2020 NIMBIoS 2020, Adaptive Management Tutorial
NIMBIoS, online. (Oct. 2020)

2019 *NSF Workshop to Advance Theory in Ecology
Pennsylvania State University, PA, USA. (Oct. 2019)

2019 NIMBIoS Investigative Workshop: Transients in Biological Systems
NIMBIoS, TN, USA. (May 2019)

PROFESSIONAL SERVICE

Editorial

2021– Associate Editor for Models in Ecology and Evolution (Frontiers in Ecology and Evolution)

Committees and organizational roles

2022 Steering committee member. SIAM Convening on Climate Science, Sustainability, and Clean Energy. Washington DC. (Oct. 2022) Resulted in the Report of the SIAM Convening on Climate Science, Sustainability, and Clean Energy in addition to 9 white papers with funding priority recommendations.

2022–2023 Undergraduate Scholarship, Engagement and Research (USER) committee member, School of Biological Sciences, University of Utah

2022–2023 EDI committee member, School of Biological Sciences, University of Utah

2022–2023 Colloquium committee member, Dept. of Mathematics, University of Utah

2021 Applied Math Seminar organizer, Dept. of Mathematics, University of Utah

2021 Search committee member. RISE Global Youth Scholarships.

2017–2019 Founder and organizer of Philosophy Pints, a monthly meeting of graduate students at the University of Alberta to discuss scientific best practices, challenges, and ethics

2015–2016 Organizing committee member. Pacific Institute for the Mathematical Sciences (PIMS) Young Researchers Conference. Edmonton, Canada. (June 2016)

2014-2015 University of Alberta International Peer Program mentor, Canada.

2012–2013 Graduate student representative. Good Practice Steering Committee. Mathematical Institute, University of Oxford.

2010–2011 Student committee member. Canadian Mathematical Society (CMS).

Contributed Peer Reviews

I have reviewed for The American Naturalist, Animal Behaviour, Applied Mathematical Modelling, Ecological Applications, Ecology Letters, Evolutionary Ecology, Frontiers in Ecology and Evolution, Journal of Theoretical Biology, Methods in Ecology and Evolution, North Pacific Research Board (grant proposal review), Oxford Bibliographies, Polar Research, Theoretical Ecology

Professional Memberships

2020– Society for Mathematical Biology
2019– Association for Women in Mathematics
2019– Ecological Society of America
2015– SIAM – Life Sciences, Optimization, & Mathematics of Planet Earth

POLAR FIELD EXPERIENCE

2018 Sea ice and marine fieldwork from the icebreaker CCGS Amundsen in Baffin Bay, Canada for the Sentinel North PhD Field School: Shedding light on Arctic Marine ecosystem services. (June 2018)

2018 Polar bear fieldwork, by helicopter, on the fast and pack ice in Hudson Bay, Canada. (Apr. 2018)

2017 & Arctic naturalist for One Ocean Expeditions, a ship-based tour operator, guiding

2016 through the Canadian Arctic and Greenland (Aug. 2016 & 2017)

2016 Sea ice fieldwork on the fast ice near Sveagruva, Svalbard for the course Ecosystems in Ice-covered Waters. University of the North in Svalbard, Norway. (May 2016)

2014 Polar bear fieldwork, by helicopter, near Churchill, Canada. (Sept. 2014)

OUTREACH AND PUBLIC ENGAGEMENT

2020, 2021 2022 Speaker for ACCESS, an undergraduate program to support the success of freshmen women in STEM fields

2020–2021 Middle and high school outreach with minority-serving institutions in Salt Lake city; organized and hosted 5 integrated STEM sessions using mathematics to answer questions about polar ecology and climate change

2014– Outreach with Polar Bears International, including:

- Creation of 4 integrated mathematics lesson plans for K-12 students, motivated by polar biology, with undergraduate student intern, Linda Zhao. (2020–2021) → put links here
- two trips to Churchill, MB, Canada, to be a scientific panelist for their week-long live-streamed Tundra Connections Program (2014, 2018)
- >10 live video outreach sessions with classrooms and community groups
- 8 recorded presentations available on YouTube, including *At the top of the world with polar bears* (2018), *What is a model? And how are models used with polar bears?* (2015), *Polar bears by the numbers + math challenge* (2014)
- 4 education blog entries, including *Understanding polar bears – with math!* (2017) and *It's the little things: from ice algae to polar bears* (2019)

2014–2016 Departmental outreach coordinator, Society for Graduate Mathematics and Statistics, University of Alberta, Canada

Media Coverage

Written articles:

Counting on mathematicians to help save the planet, part of the BBC and International Science Council series *Unlocking Science.* Sarah Griffiths, Nov. 2021.

Canadian Geographic, Audio recordings of birdsong could help estimate breeding status, Angelica Haggert, March 2020

CBC News, How listening to birdsong may help scientists conserve at-risk species, Madeleine Cummings, Feb. 2020

El Ágora, La pérdida de hielo en el océano Ártico expande epidemias entre la fauna, Laura Chaparro, Nov. 2019

Hakai Magazine, The Precarious Protection of Alaska's Ringed Seals, Sarah Keartes, June 2019

Hakai Magazine, Bearded Seals Are Maturing Younger and Having More Pups, Sarah Keartes, May 2019

The Wildlife Society newsletter, Predictions of less snow may be bad news for ringed seals, Dana Kobilinsky, Feb. 2019

Forbes, Climate Change Is Melting Arctic Sea Ice - And That's Endangering Ringed Seal Populations, Fiona McMillan, Jan. 2019

Science Daily, An icy forecast for ringed seal populations; new mathematical models show dramatic decreases in ringed seal populations due to projected low snow conditions, Jan. 2019

Video features:

A Math Professor in Antarctica? Featured in a video highlighting mathematics and polar research as part of the University of Utah's *Frontiers of Science* event.

Sentinel North International PhD School - Baffin Bay, Nunavut. July 2018. Featured in the video synopsis of the expedition.