

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

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

RESEARCH FOCUS AREAS

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

PUBLICATIONS

Peer-reviewed publications

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

HONORS AND AWARDS

Significant awards

- | | |
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| 2019 | Anton Alexander Cseuz Gold Medal in Mathematics
University of Alberta, AB, Canada |
| 2017 | Izaak Walton Killam Memorial Scholarship
The Killam Trusts, Canada |
| 2016 | Alberta Innovates Technology Futures Graduate Scholarship
Alberta Innovates Technology Futures, AB, Canada |
| 2013 | Vanier Canada Graduate Scholarship
Natural Sciences and Engineering Research Council of Canada |
| 2011 | Rhodes Scholarship
The Rhodes Trust, United Kingdom |
| 2011 | NSERC Postgraduate Scholarship (PGSM)
Natural Sciences and Engineering Research Council of Canada |

Additional honors and awards

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| 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 (<i>Methods in Ecology and Evolution</i>) |
| 2017 | 3 rd place winner in Elevator Pitch Competition (ArcticChange, QB, 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 Graduate Scholarship top-up (Alberta Innovates Technology Futures, AB, Canada)
- 2013 President's Doctoral Prize of Distinction (U. of Alberta, AB, Canada)

INVITED TALKS

- 2021 Invited mini-symposium talk at SIAM Annual meeting. Online. 'Modeling Optimal Responses in a Changing Arctic'. Part of minisymposium: Modeling Species Distributions in Ecosystems Altered by Climate Change. (July 2021)
- 2020 Applied and Computational Maths Seminar. Cardiff University, UK. 'Should we be worried about ghosts? Parametric versus non-parametric approaches to understanding long transient dynamics'. (Nov. 2020)
- 2020 Mathematical Biology Seminar. University of Minnesota, USA. 'Magic, Ghandi, and balding: matrix methods for stochastic dynamic programming'. (Nov. 2020)
- 2020 CDC working group on COVID healthcare modeling. online. 'Modeling reductions in COVID-19 transmission and hospital burden achieved by prioritizing testing using a clinical prediction rule'. (June 2020)
- 2020 Mathematical biology seminar. Utah State University, Utah, USA. 'Magic, Ghandi, and balding: matrix methods for stochastic dynamic programming'. (Feb. 2020)
- 2020 WILD seminar series. Utah State University, Utah, USA. 'Modelling optimal responses and fitness consequences in a changing Arctic'. (Jan. 2020)
- 2019 Institute for Marine and Antarctic Studies seminar series. University of Tasmania, Australia. 'From polar bears to diatoms – models in polar ecology'. (Sept. 2019)
- 2017 Alberta Mathematics Dialogue Day. Edmonton, Canada. 'When living longer isn't the same as dying later'. (May 2017)
- 2016 Institute for Biodiversity and Ecosystem Dynamics seminar series. University of Amsterdam, Netherlands. 'Ringed seal demography and sea ice.' (Dec. 2016)

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

Calculus I, University of Utah - spring 2020 (2 sections), fall 2020, spring 2021

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 Research Students

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

Undergraduate Research Students

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

2020– Grant Poulson (Mathematics and Computer Science). Influence of stochasticity on ecological models with long transient dynamics. 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-supervised with K. M. Golden.

2019–2020 Anna Hyde (Mathematics). Extracellular polymeric substances and sea ice algae. ACCESS student project. Co-supervised 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-supervised with A. E. Derocher.

- 2016–2017 Hannah Brown (Mathematics). Stage structured predation models, resulting in publication [5]. Undergraduate senior project. Co-supervised 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-supervised with A. E. Derocher.

Graduate Research Students

- Fall, 2020 Samantha Linn (Mathematics). Directed reading course in mathematical models of polar physics and biology. Co-supervised with K. M. Golden.
- 2019– Julie Sherman (Mathematics). Nematode ecology and carbon cycling in the Dry Valleys of Antarctica. Co-supervising with K. M. Golden.

WORKSHOP AND WORKING GROUP PARTICIPATION

* denotes invited participation

- 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

- 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 contributed peer reviews for the following journals: American Naturalist, Animal Behaviour, Applied Mathematical Modelling, Ecological Applications, Ecology and Evolution, Evolutionary Ecology, Frontiers in Ecology and Evolution, Journal of Theoretical Biology, Methods in Ecology and Evolution, North Pacific Research Board (grant proposal review), Theoretical Ecology, Polar Research

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 & 2016 Arctic naturalist for One Ocean Expeditions, a ship-based tour operator, guiding 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 Speaker for ACCESS, an undergraduate program to support the success of freshmen women in science and mathematics

2014– Outreach with Polar Bears International, including:

- a current project designing integrated mathematics educational resources for K-12 students, motivated by polar biology, with undergraduate student intern, Linda Zhao. (2020–2021)
- two trips to Churchill, MB, Canada, to be a scientific panelist for their week-long live-streamed Tundra Connections Program (2014, 2018)
- >10 video outreach sessions with classrooms and community groups

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

Media Coverage

My research has been featured in the following publications and news outlets: Forbes, Canadian Geographic, CBC news, Hakai Magazine, and the Spanish magazine, El Ágora.