

JOSIE HUGHES

Applied Quantitative Ecologist

josie.s.hughes@gmail.com | jshughes.org | 416-526-9756

Education

- 09/2006 - 04/2012 PhD. University of Toronto. Ecology and Evolutionary Biology.
Patterns and processes in forest insect population dynamics. With M.J. Fortin.
- 09/1999 - 12/2002 MRM. Simon Fraser University. Resource and Environmental Management.
Modeling the effect of landscape pattern on mountain pine beetles. With K. Lertzman.
- 09/1994 - 04/1998 BSc. University of British Columbia. Ecology and Environmental Biology.
Ecology and the evolution of biphasic life cycles. With S.P. Otto.

Experience

Professional Experience

- 09/2016 - present Quantitative ecologist at [Apex Resource Management Solutions Ltd.](#)
Implemented [rsyncrosim](#), an R interface to the [SyncroSim/ST-Sim](#) software framework for stochastic landscape simulation modelling. Parameterized and analyzed a caribou demographic model for Environment Yukon using hierarchical Bayesian techniques. Assisted with parameterization and analysis of land cover change models for The Ontario Ministry of Natural Resources and Forestry and The Nature Conservancy.
- 11/2003 - 03/2011 [BCMPB: Mountain pine beetle projection model](#)
Consultant to the BC Forest Service and Gowlland Technologies Ltd.
Assisted with a provincial-scale spatial model to inform mountain pine beetle control and salvage policy that continues to be used. Responsible for implementing and supporting the beetle submodel using the SELES landscape simulation modelling platform.
- 02/2003 - 12/2005 [LuMPB: Mountain pine beetle decision support](#)
Consultant to Gowlland Technologies and the Canadian Forest Service.
Assisted with analysis of a mountain pine beetle management model using the SELES landscape simulation modelling platform.
- 2001 [Salvaging Solutions: Science-based management of BC's pine beetle outbreak](#)
Consultant to The David Suzuki Foundation, Forest Watch of B.C. and The Canadian Parks and Wilderness Society.
Co-wrote a review and critique of mountain pine beetle management in BC.

Research Experience

- 09/2013 - 08/2016 Modelling and analysis to support antimicrobial stewardship
Postdoctoral Fellow. York University. Supervised by J. Wu and A. Morris.
Developed [indices to summarize the impact of antibiotic resistance on empiric therapy](#), modelled [the impact of antimicrobial de-escalation](#), analyzed variation in resistance over time and among units, and analyzed [variation in drug use over time](#).

Experience (continued)

- 09/2006 - 05/2012 Patterns and processes in forest insect population dynamics
PhD. University of Toronto. Supervised by M.J. Fortin.
Investigated [effects of landscape configuration on spatial models of host-parasitoid \(forest tent caterpillar and larch budmoth\) population dynamics](#). Developed [an approximation technique to simplify integrodifference model analysis and parameter estimation](#). Analyzed [the effects of jack pine budworm defoliation on pollen cone production](#) in collaboration with V. Nealis and J. Régnière (Canadian Forest Service). Analyzed [mountain pine beetle spread patterns](#). Developed R and Python coding skills to efficiently handle computationally demanding models using clusters.
- 09/1999 - 11/2002 [Modelling the effect of landscape pattern on mountain pine beetles](#)
MRM. Simon Fraser University. Supervised by K. Lertzman
Built a spatial model of mountain pine beetle population dynamics using the SELES modelling platform in collaboration with A. Fall (Gowlland Technologies) and L. Safranyik (Canadian Forest Service).
- 05/1998 - 10/1998 Fire history in a steep southern BC valley.
Field assistant. Simon Fraser University. Supervised by K. Lertzman
Tree coring, vegetation id, orienteering and camp management.
- 05/1997 - 04/1998 [Ecology and the evolution of biphasic life cycles](#)
Honours thesis. University of British Columbia. Supervised by S.P. Otto
I constructed and analyzed a model of haplo-diploid life cycle evolution.
- 05/1996 - 09/1996 Snowshoe hare population dynamics.
Field assistant. University of British Columbia. Supervised by C. Krebs
Radio telemetry for a study of juvenile snowshoe hare mortality.

Teaching Experience

- Spring 2016 Guest lecture - ENVS 3440 Resource Management
Environmental Studies, York University.
Lectured on mountain pine beetle ecology and management.
- Fall 2011 Teaching assistant - BIO 120 Adaptation and Biodiversity
Ecology and Evolutionary Biology, University of Toronto.
Responsible for answering questions about lecture content (1200 students) and proofing test questions.
- Spring 2009, 2010, and 2011 Teaching assistant - EEB 319 Population Ecology
Ecology and Evolutionary Biology, University of Toronto.
Responsible for teaching a lab section and marking.
- Spring 2010 and 2011 Teaching assistant - EEB 225 Biostatistics
Ecology and Evolutionary Biology, University of Toronto.
Lectured on logistic regression and linear modelling. Assisted with development of tutorials, answering tutorial questions, and marking.
- Spring 2009 and Fall 2011 Guest lecture - EEB 375 Environmental Factors and
FOR 307 Forest Insect Ecology and Management
Ecology and Evolutionary Biology and Forestry, University of Toronto.
Lectured on mountain pine beetle ecology and management.
- Spring 2009 Graduate seminar - Toolbox Talks
Ecology and Evolutionary Biology, University of Toronto.
Lectured on tools and techniques for automated (repeatable) computing.

Experience (continued)

- Fall 2008 Teaching assistant - EEB 321 Community Ecology Ecology and Evolutionary Biology, University of Toronto. Assisted with tutorials and marking.
- Fall 2001 Teaching assistant - Environmental Modelling Resource and Environmental Management, Simon Fraser University. Taught and helped design the computer lab for a 4th year undergrad course.

Invited Seminars and Working Groups

- 9/2016 Workshop on integrodifference equations in ecology at the Banff International Research Station for Mathematical Innovation and Discovery.
- 9/2013 Seminar. Biology, Memorial University of Newfoundland. Host: A. Hurford.
- 10/2011 Seminar. Ecology and Evolution, University of Chicago. Host: G. Dwyer.
- 02/2011 Working group on risks associated with mountain pine beetle spread into the boreal forest for the Canadian Forest Service. Organizer: V. Nealis.
- 01/2011 Seminar. Centre for Mathematical Biology, University of Alberta. Host: M. Lewis.
- 10/2010 - 04/2011 Working group on forest insects at the National Institute for Mathematical and Biological Synthesis (NIMBios). Organizers: M. Pinēda-Krch, M. Lewis and A. Liebhold.
- 10/2007 Working group on spatial models for non-equilibrium systems at the Australian Centre of Excellence for Risk Analysis (ACERA). Organizers: J. Elith, B. Wintle, M. Burgman, M. Wand, and D. Leonte.

Selected Awards

- 2006 - 2008 NSERC Canadian Graduate Scholarship
- 1999 - 2001 NSERC Postgraduate Scholarship A
- 1998 Governor General's Canada Scholarship in Environmental Science
- 1996 - 2000 Paul and Helen Trussell Scholarship
- 1994 - 1998 Canada Scholarship in Science and Engineering
- 1994 UBC President's Entrance Scholarship

Publications

Submitted

Hughes, J.S., A. Hurford, D.M. Patrick, J. Wu and A.M. Morris. Historical trends in antibiotic coverage and options: measuring the combined effect of drug discovery and resistance evolution. *Submitted to The Lancet Infectious Diseases*.

In Revision

Chalise, S.R., J.S. Hughes, A.M. Morris, J. Wu and A. Hurford. Biodiversity measures to summarize antibiotic resistance. *In revision for Royal Society Open Science*.

Publications (continued)

Published

- Hughes, J.S., X. Huo, L. Falk, B. Coburn, A. Hurford, K. Lan, A.M. Morris and J. Wu. 2017. Benefits and unintended consequences of antimicrobial de-escalation. *PLOS One* 12(2):e0171218 <https://doi.org/10.1371/JOURNAL.PONE.0171218>
- Hughes, J.S., A. Hurford, R.L. Finley, D.M. Patrick, J. Wu and A.M. Morris. 2016. How to measure the impacts of antibiotic resistance and antibiotic development on empiric therapy: new composite indices. *BMJ Open*. 6:e012040. <http://bmjopen.bmj.com/content/6/12/e012040.abstract>
- Hughes, J.S., C.A. Cobbold, K. Haynes, and G. Dwyer. 2015. Effects of forest spatial structure on insect outbreaks: insights from a simple host-parasitoid model. *The American Naturalist*. 185(5): E130-E152. <http://www.jstor.org/stable/10.1086/680860>
- Hughes, J.S., M.J. Fortin, V. Nealis, and J. Régnière. 2014. Pollen cone production in jack pine: spatial and temporal patterns subject to natural disturbance by the jack pine budworm. *The Canadian Journal of Forest Research*. 44(3): 195-211. <http://www.nrcresearchpress.com/doi/abs/10.1139/cjfr-2013-0089>
- Shore, T.L., A. Fall, W.G. Riel, J. Hughes and M. Eng. 2008. Methods to assess landscape scale risk of bark beetle infestation to support forest management decisions. *Forest Encyclopedia Network: Environmental Threats: Pests/Biota: Native*. USDA Forest Service, Asheville, NC. Online pub. <http://www.forestencyclopedia.net/p/p5/p3267/p3282/p3245>
- Hughes, J.S., A. Fall, L. Safranyik, and K. Lertzman. 2007. Modeling the effect of landscape pattern on mountain pine beetles. Natural Resources Canada, Canadian Forest Service, Pacific Forestry Centre, Victoria, British Columbia. Information Report BC-X-407. <http://cfs.nrcan.gc.ca/pubwarehouse/pdfs/26716.pdf>
- Schlesier, L., J. Hughes, A. Fall, and M. S. T. Carpendale. 2006. The LuMPB Key: A Multiple View Interface to Explore High Dimensional Mountain Pine Beetle Simulation Data. In *Proceedings of the Fourth International Conference on Coordinated and Multiple Views in Exploratory Visualization (CMV 2006, July 4th, 2006, London, Great Britain)*, pages 31-41, 2006. IEEE Press. <http://lumpbkey.divnull.net/#about>
- Hughes, J.S. and S.P. Otto. 1999. Ecology and the evolution of biphasic life cycles. *The American Naturalist* 154(3): 306-320. <http://www.jstor.org/stable/10.1086/303241>

Reports

- Hughes, J.S., L. Frid and C. Daniel. 2017. Simulating the Fortymile caribou herd using DG-Sim. Prepared by Apex Resource Management Solutions for Environment Yukon.
- Frid, L., J.S. Hughes and C. Daniel. 2017. Forest management guide for Great Lakes - St. Lawrence landscapes: review of simulated range of natural variation. Prepared by Apex Resource Management Solutions for The Ontario Ministry of Natural Resources and Forestry
- Frid, L., C. Daniel and J.S. Hughes. 2017. Using ST-Sim as the LANDFIRE update engine. Prepared by Apex Resource Management Solutions for The Nature Conservancy LANDFIRE Project.
- Hughes, J.S., M. Eng and A. Fall. 2006. Provincial-level projection of the current mountain pine beetle outbreak Appendix 3: Mountain pine beetle projection. British Columbia Ministry of Forests Technical Report, Victoria. <http://www.for.gov.bc.ca/hre/bcmpb/year2.htm>
- Eng, M., A. Fall, J. Hughes, T.L. Shore, W.G. Riel, P. Hall, A. Walton. 2005. Provincial-Level Projection of the Current Mountain Pine Beetle Outbreak: An Overview of the Model (BCMPB v2) and Results of Year 2 of the Project. Natural Resources Canada, Canadian Forest Service, Pacific Forestry Centre, Victoria, B.C. Mountain Pine Beetle Initiative Working Paper 2005-20. <http://www.for.gov.bc.ca/hre/bcmpb/year2.htm>

Publications (continued)

Hughes, J. and R. Drever. 2001. Salvaging solutions: science-based management of BC's pine beetle outbreak. Commissioned By the David Suzuki Foundation, Forest Watch of British Columbia (a project of the Sierra Legal Defence Fund), and the Canadian Parks and Wilderness Society - B.C. Chapter. Vancouver, B.C. http://www.davidsuzuki.org/files/salvaging_solutions.pdf

Conference presentations

Hughes, J.S., A. Hurford, D.M. Patrick, J. Wu and A.M. Morris. Monitoring the net clinical impact of resistance: composite indices show improvement in our ability to cover severe device-associated infections in an academic ICU since 2000. Incubator poster at AMMI Canada. Apr 2016. Vancouver, BC.

Dresser L., J.S. Hughes, M. McIntyre, S. Nelson, N. Ferguson, S. Lapinsky, N. Lazar, S. Mehta, L. Burry, J. Singh, C. Bell and A.M. Morris. Antimicrobial stewardship programs reduce daily prescribing variability in academic ICUs. Oral presentation at AMMI Canada. Apr 2016. Vancouver, BC.

Dresser L., J.S. Hughes, M. McIntyre, S. Nelson, N. Ferguson, S. Lapinsky, N. Lazar, S. Mehta, L. Burry, J. Singh, C. Bell and A.M. Morris. Antimicrobial stewardship programs reduce daily prescribing variability in academic ICUs. Oral poster at the Critical Care Canada Forum. Oct 2015. Toronto, ON. <http://cccf.multilearning.com/cccf/2015/eposter/114781/linda.dresser.antimicrobial.stewardship.programs.reduce.daily.prescribing.html?f=p6m2e884o11351>

Hughes, J.S., A. Hurford, R.L. Finley, D.M. Patrick, J. Wu and A.M. Morris. How to measure antibiotic resistance using empiric therapy indices. Poster at IDWeek. Oct 2015. San Diego, CA. <https://idsa.confex.com/idsa/2015/webprogram/Paper52907.html>

Hughes, J.S., A. Hurford, J. Wu and A.M. Morris. Constructing Syndrome-Specific Antibigrams for Catheter-Associated Bloodstream Infections Using Uncertainty Estimation and Colour. Poster at the Interscience Conference on Antimicrobial Agents and Chemotherapy. Sept 2014. Washington, DC.

Hughes, J., C. Cobbold, B. Cooke, G. Dwyer, K. Haynes, and M. Pineda-Krch. 2011. The effect of landscape configuration on forest insect outbreak dynamics - insights from a simple host-parasitoid model. Presentation to the North American Forest Ecology Workshop. June 2011. Roanoke, VA.

Hughes, J. and M.J. Fortin. 2010. Does density-dependent dispersal explain mountain pine beetle spread? Performance of models across years and regions in BC (Canada). Presentation to The Ecology Society of America. Aug 1-6. Pittsburgh, PA.

Fortin, M.J. and J. Hughes. 2010. Statistics needed to study global change: Which ones to use? Invited presentation to The Ecology Society of America. Aug 1-6. Pittsburgh, PA.

Hughes, J., M.J. Fortin and V. Nealis. 2010. Untangling reciprocal interactions in space-time data: the effects of jack pine budworm defoliation on jack pine flowering. Presentation to The Canadian Society for Ecology and Evolution. May 9-12. Quebec, QC.

Hughes, J., M. Eng, A. Fall, M.J. Fortin, A. Walton, T. Shore, B. Riel. 2008. Lessons from an applied mountain pine beetle model: Simple answers are important, interesting questions remain. Invited presentation to The International Association of Landscape Ecology - U.S. Chapter. Apr 6-10, 2008. Madison, WI.

Hughes, J.S., A. Fall, T. Shore, B. Riel, M. Eng, and P. Hall. 2005. Understanding landscape pattern and mountain pine beetle management in British Columbia. Poster for The Ecological Society of America. Aug 8 to 12. Montreal, QC.

Hughes, J.S., A. Fall, T. Shore, B. Riel, M. Eng and P. Hall. 2005. Generalizing specific models and landscape conditions to gain insight into landscape scale interactions between forest patterns, mountain pine beetles and management. Presentation to The International Union of Forest Research Organizations Meeting on Forest Insect Epidemics. July 11-14. Prince George, BC.

Hughes, J., A. Fall, and K. Lertzman. 2003. Modeling the effect of landscape pattern on mountain pine beetles. Presentation to The International Association of Landscape Ecology - U.S. Chapter. Apr 2-6. Banff, AB.

Publications (continued)

Hughes, J., A. Fall, M.J. Fortin, and K. Lertzman. 2001. Predicting the effect of pattern on congregative dispersal: A comparison of landscape indices. Presentation to The International Association of Landscape Ecology - U.S. Chapter. Apr 25-29. Pheonix, Arizona.