

# AARON SPRINGFORD<sup>GStat</sup>

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## Personal Statement

What I love about being a statistician is helping others ask and answer questions using data. One of my strengths is my ability to cross boundaries when problem-solving; by combining different ideas, techniques, and approaches, I am able to create new solutions for collaborators and clients. I'm looking for a job as a consulting statistician either within an organization or for a consulting firm. I would also like to continue teaching statistics and promoting statistical literacy, because I think these are areas in which statisticians can have a significant positive impact within their organizations and on society. John Tukey once said that "the best thing about being a statistician is that you get to play in everyone's backyard", and I couldn't agree more.

## Education

- **PhD Statistics, Queen's University, Kingston, ON** 2017  
*Department of Mathematics & Statistics*  
Supervisor: David Thomson, FRSC.
- **Master of Resource Management, Simon Fraser University (SFU), Burnaby, BC** 2008  
*School of Resource and Environmental Management*  
Supervisor: Sean Cox.
- **BSc Honours, Simon Fraser University, Burnaby, BC** 2004  
*Environmental Science: Environmetrics (Major), Environmental Chemistry (Minor)*  
Advisor: Rick Routledge.

## Work and Research Experience

- **Statistician, Weyerhaeuser** 2017-2019  
*Supervisor: Jay Jones*

As a Statistician at Weyerhaeuser (WY), I provided statistical assistance and expertise on a variety of projects and initiatives. I was internally recognized (see Awards and Research Grants) for my contribution to process improvements, including the introduction of a company R package repository, software deployment using gitlab CI, and statistical training in the design of experiments, data wrangling, and graphics/visualization. Projects included:

- Analysis of existing survey data for the marbled murrelet – an endangered species – and development of a new survey protocol, in collaboration with the Pacific Seabird Group.
- Market delineation and price curve estimation for the WY strategic planning group.

- Analysis of experimental forestry data and scientific publication of research results, e.g. survival of created snags and the impact of intensive forestry on bird communities.
  - Use of remote sensing data for silviculture decision-making.
  - Seedling nursery inventory, forecasting of marketable seedling counts, and a case-control study examining the causes of seedling stunting.
  - Development of R packages and Shiny apps to streamline various processes.
- **Research Assistant, Dept. of Math. & Statistics, Queen's University** **2010-2017**  
*Supervisor: David Thomson*

In addition to my PhD research, I provided statistical consulting and scientific research for government agencies and industry, under the following projects and contracts:

- HEALTH CANADA 2016 — 2019  
*Development of a three-pollutant air pollution risk model*  
 PI: Dr. Glen Takahara; Supervisor at Health Canada: Hwashin Shin  
 This project seeks an air quality indicator for Health Canada that is able to properly capture the combined effects of ozone, nitrogen dioxide, and fine particulate matter on human mortality and morbidity. With David Riegert, I analysed 13 years of data from 23 Canadian cities, examining the coherence between pollutants and mortality and estimating linear filters to predict mortality from pollutant inputs.
- NATURAL RESOURCES CANADA 2015 — 2016  
*Preservation of magnetogram data by digitization: Development of software tools for digitization and storage*  
 Supervisor at Natural Resources Canada: Lorne McKee  
 Developed methods and software for digitization of trace data recorded on photographic paper (historical data of the Earth's magnetic field).
- HEALTH CANADA 2015 — 2016  
*Statistical method development for long-term missing ozone based on relationships to precursors, solar and climate data*  
 Supervisor: Hwashin Shin  
 Data analysis for the purpose of filling large gaps in ground-level ozone records, using machine learning techniques.
- HEALTH CANADA and ENVIRONMENT CANADA 2014 — 2015  
*Upgrading ground-level ozone data based on precursors and climate data*  
 Supervisor at Health Canada: Hwashin Shin  
 Supervisor at Environment Canada: Claire Austin  
 Wrote an R software package for data management and validation of pollutant data in Canada. The package generated an SQL database back-end from flat file inputs, and defined a set of S4 classes and methods for the pollutant data.
- BONNEVILLE POWER ADMINISTRATION Oct 2012 — Apr 2015  
*Modeling high impact low frequency geomagnetic disturbances*  
 Collaborators: Dave Thomson, Dave Riegert  
 This project was funded by two *Bonneville Power Administration Technology Innovation Grants* which I co-authored. We used data from solar-orbiting spacecraft to predict

solar flare / coronal mass ejections and their local effects on geomagnetically induced currents in power systems.

- **Statistical Consultant, Queen's University** 2015 — 2016  
*Legacy, Leisure and the "Work Hard - Play Hard" Hypothesis.*  
Statistical consulting and data analysis for Lonnie Aarssen at Queen's University on clustering of patterns in social science data.  
Published in The Open Psychology Journal 9(1):7-24, May 2016.
- **Research Assistant, School of Resource & Environmental Management (SFU)** 2008 — 2010  
*Supervisor: Sean Cox*  
Project and research involvement:
  - *Evaluation of in-season management strategies for Fraser River sockeye salmon fisheries using a migration simulator.*  
(a project for DEPARTMENT OF FISHERIES AND OCEANS CANADA)  
Created a package for the R environment that simulates co-migrating populations subject to cumulative effects. I designed the simulator for evaluation of population surveys and to test fishery management strategies for Fraser River sockeye salmon.
  - *mseR: Management Strategy Evaluation in R, Version 2.0*  
Authored a spatial survey module for this general-purpose natural resource management strategy evaluation package.
  - *An exposure-response methodology for assessing the impacts of bottom-fishing gear on benthic marine ecosystems.*  
Developed a spatial survey design to assess the impact of bottom fisheries on benthic macrohabitat structure.
- **Statistical Consultant, contract work for DEPT. OF FISHERIES & OCEANS** 2008  
*Strait of Georgia Ecosystem Initiative*  
Analysis of juvenile salmon survey data.
- **Statistical Consultant, contract for the RAINCOAST CONSERVATION SOCIETY** 2008  
*Prospective evaluation of a management strategy for Rivers Inlet sockeye salmon (Oncorhynchus nerka)*  
Consulted with Raincoast and did a management simulation showing the effect of a potential fishery reopening.
- **Professional Figure Skater, Feld Entertainment (Disney on Ice)** Dec 2004 — Aug 2005  
*Supervisor: Corey Obst*  
Performed in over 250 shows in North and South America. Other duties included Public Relation events such as TV shows, radio interviews, and volunteering. In addition to performing, also hired as an assistant electrician while on tour in South America.
- **Research Assistant, School of REM (SFU)** Summer 2003, Fall 2004  
*Supervisor: Sean Cox*  
Assisted with a project to determine optimal stocking strategies for rainbow trout in British Columbia lakes considering the effects of climate change.

## Awards and Research Grants

- **Weyerhaeuser Recognition Award, \$1,600** **Feb 2019**  
*Advanced Forestry Systems team: Data Science Tools and Statistical Training*  
Created and led statistics and software training sessions across the company's geography, improving statistical acumen and use of critical analysis software. Implemented a suite of software tools that enabled Science and Technology to streamline the deployment of reliable, business-facing technologies. "Their performance is a great example of leadership in simplifying complex processes, innovation through creative adoption of technologies (internal and external), and operational excellence in finding low-cost, efficient solutions."
- **Natural Resources Canada Grant, \$24,200** **Jan 2016 — Mar 2016**  
*Preservation of magnetogram data by digitization: Development of software tools for digitization and storage*  
Wrote the proposal for this grant with Dave Riegert and Dr. Thomson at Queen's University.
- **Health Canada Grant, \$12,000** **Sep 2015 — Mar 2016**  
*Statistical method development for long-term missing ozone based on relationships to precursors, solar, and climate data*  
Wrote the proposal for this grant with Dr. Thomson at Queen's University.
- **Bonneville Power Admin. Technology Innovation Grant, \$81,000** **May 2014 — Apr 2015**  
*Modeling high impact low frequency geomagnetic disturbances: Prediction of the magnitude of solar flare / coronal mass ejections and of local effects on geomagnetically induced currents*  
Wrote the proposal for this grant with Dave Riegert and Dr. Thomson at Queen's University.
- **Ontario Graduate Scholarship, \$15,000** **2013 — 2014**  
*Provincial-level competitive scholarship*  
Held at Queen's University during PhD degree
- **Bonneville Power Admin. Technology Innovation Grant, \$169,000** **Oct 2012 — Sep 2013**  
*Modeling high impact low frequency geomagnetic disturbances using magnetic field data from solar-orbiting spacecraft*  
Initiated the project and wrote the proposal for this grant with Dave Riegert and Dr. Thomson at Queen's University.
- **NSERC Postgraduate Scholarship - Doctoral, \$21,000 per year** **2010 — 2012**  
*(National Sciences & Engineering Research Council of Canada)*  
*National-level competitive scholarship*  
Held at Queen's University during PhD degree
- **NSERC Strategic Grant, \$324,000** **2010**  
*An exposure-response methodology for assessing the impacts of bottom-fishing gear on benthic marine ecosystems*  
Wrote the proposal for this grant with Jonathan Martin and Dr. Sean Cox at Simon Fraser University.
- **Graduate Fellowship, \$6250** **2008**  
*Faculty of Applied Sciences, SFU*  
Held at SFU during MRM degree
- **NSERC Industrial Postgraduate Scholarship, \$15,000** **2006 — 2007**  
*National-level competitive scholarship*  
Held at SFU during MRM degree

- **NSERC Undergraduate Semester Research Award, \$6000**  
*Institutional-level competitive scholarship funded by NSERC*  
 Held at SFU during BSc degree

2004

## Publications and Industry Reports

1. **Springford, A**, GM Eadie, and DJ Thomson (2019). *Improving the Lomb-Scargle Periodogram with the Thomson Multitaper*. In review for The Astronomical Journal.
2. Kroll, AJ, J Verschuyt, and **A Springford** (2019). *Functional groups respond to disturbance intensity in a near-to-nature management experiment*. In review for Ecological Applications.
3. **Springford, A**, and J Jones (2019). *Evaluation of a set of survey protocols for marbled murrelets*. Report delivered to The Pacific Seabird Group marbled murrelet Inland Survey Protocol statistical subcommittee.
4. Eadie, GM, D Huppenkothen, **A Springford**, and T McCormick (2019). *Introducing Bayesian Analysis With m&m's®: An Active-Learning Exercise for Undergraduates*. Journal of Statistics Education, 27(2), 60.
5. Hane, ME, AJ Kroll, **A Springford**, J Giovanini, M Rochelle, and EB Arnett (2019). *Survival dynamics of mechanically topped Douglas-fir (*Pseudotsuga menziesii*) and western hemlock (*Tsuga heterophylla*) snags in Douglas-fir plantations, Oregon, USA*. Forest ecology and management, 433, 105
6. Craine, WB, A Leung, and **A Springford** (2019). *Stats, Data and Models: Instructor's Solution Manual (3rd Canadian Edition)*. Toronto: Pearson.
7. **Springford, A** (2017). *Spectral analysis of time series with latent and irregular times*. Doctoral dissertation, Queen's University at Kingston.
8. Weygang, M, **A Springford**, and WS Burr (2017). *Magnetograms: Digitization and error correction*. Journal of Coupled Systems and Multiscale Dynamics, 5(2), 164.
9. Takahara, G, and DJ Thomson (2017). *3-Pollutant Model Project: Final Report Delivered to Hwashin Shin, Population Studies, Health Canada (A Springford was a subcontractor and co-author of this report)*.
10. Eadie, G, **A Springford**, and W Harris (2017). *Bayesian Mass Estimates of the Milky Way: Including Measurement Uncertainties with Hierarchical Bayes*. The Astrophysical Journal, 835(2), 167.
11. **Springford, A**, and DJ Thomson (2016). *Statistical method development for long-term missing ozone based on relationships to precursors, solar and climate data*. Report delivered to Hwashin Shin, Population Studies, Health Canada.
12. **Springford, A**, and DL Riegert (2016). *Preservation of magnetogram data by digitization: Development of software tools for digitization and storage*. Report delivered to Lorne McKee, Natural Resources Canada.
13. Thomson, DJ, D Riegert, and **A Springford** (2015). *Final Report BPA TIP-290: Modeling high impact low frequency geomagnetic disturbances: Prediction of the magnitude of solar flare / coronal mass ejections and of local effects on geomagnetically induced currents*. Report delivered to Bonneville Power Administration.
14. **Springford, A**, and DJ Thomson (2015). *Application of a Hierarchical Model to Paleoenvironmental Time Series with Latent Times*. In JSM Proceedings, Section on Statistics and the Environment. Alexandria, VA: American Statistical Association. pp. 3263-3269.

15. Craine, WB, A Leung, and **A Springford** (2015). *Stats, Data and Models: Instructor's Solution Manual (2nd Canadian Edition)*. Toronto: Pearson.
16. **Springford, A**, D Riegert, and DJ Thomson (2014). *Forecasting Solar Flare Activity Using an Inferred Solar Stress Index*. In JSM Proceedings, Section on Physical and Engineering Sciences. Alexandria, VA: American Statistical Association. pp. 3823-3834.
17. Thomson, DJ, D Riegert, and **A Springford** (2013). *Final Report, BPA TIP-290: Detection of Solar G-Modes in Flare Data*. Report delivered to Bonneville Power Administration.
18. **A Springford** (2013). *A Bayesian Hierarchical Chronology Model for Time Series Analysis of Paleoenvironmental Data*. In JSM Proceedings, Section on Statistics and the Environment. Alexandria, VA: American Statistical Association. pp. 3358-3369.
19. **Springford, A** (2008). *A novel Bayesian method for making the most of spatial fishery catch and effort data*. School of Resource and Environmental Management, Simon Fraser University, Report No. 458.
20. Benson, AJ, and **Springford, A** (2008). *Strait of Georgia Ecosystem Initiative Progress Report*. Report delivered to RJ Beamish, Department of Fisheries and Oceans Canada, Pacific Biological Station, Nanaimo, Canada.
21. **Springford, A** (2008). *Prospective evaluation of a management strategy for Rivers Inlet sockeye salmon (*Oncorhynchus nerka*)*. Report delivered to Raincoast Conservation Society, Sidney, BC, Canada.

## Conferences and Workshops

1. **Springford, A** and J Jones (2019). *Predictive model checking of a wildlife occupancy model with a partially-known stopping rule*. Joint Statistical Meetings, Denver, CO, USA.
2. Riegert, D, DJ Thomson, and **A Springford** (2018). *Identification of Problematic Data Sections and Interpolation of Air Pollution Time-Series*. ISES-ISEE Joint Annual Meeting, Ottawa, ON, Canada.
3. **Springford, A** and DJ Thomson (2017). *Bayesian Analysis of Time Series with Irregular or Latent Observation Times*. SPEED Session (Oral and Poster): Joint Statistical Meetings 2017, Baltimore, MD, USA.
4. Eadie, G, B Keller, W Harris, and **A Springford** (2017). *Testing Bayesian Galactic Mass Estimates Using Outputs from Hydrodynamical Simulations*. Invited Poster Session: Joint Statistical Meetings 2017, Baltimore, MD, USA.
5. **Springford, A**, DJ Thomson, and D Riegert (2016). *Rescuing 100 Years of Geomagnetic Records: Inferring Scales Using Spectral Properties*. Oral Presentation: Joint Statistical Meetings 2016, Chicago, IL, USA.
6. **Springford, A** and DJ Thomson (2016). *Predicting long-term missing ground-level ozone using precursors, solar and climate data*. Statistical Society of Canada Meetings 2016, St Catharines, ON, Canada.
7. **Springford, A** and DJ Thomson (2015). *Application of a Hierarchical Model to Paleoenvironmental Time Series with Latent Times*. SPEED Session (Oral and Poster): Joint Statistical Meetings 2015, Seattle, WA, USA.
8. **Springford, A**, D Riegert, and DJ Thomson (2014). *Rescuing 100 Years of Data from the Toronto and Agincourt Magnetic Observatories*. American Geophysical Union Fall Meeting 2014, San Francisco, CA, USA.

9. **Springford, A** and DJ Thomson (2014). *Analysis of Time series with Unknown Times Using a Hierarchical Chronology Model*. Statistical Society of Canada Meetings 2014, Toronto, ON, Canada.
10. Riegert, D, **A Springford** and DJ Thomson (2014). *Forecasting the Likelihood of Solar Flares Using an Inferred Solar Stress Index*. Statistical Society of Canada Meetings 2014, Toronto, ON, Canada.
11. **Springford, A** (2013). *Unsupervised digitization of magnetogram images for time series analysis*. Canadian Solar Workshop 2013. La Petite Rouge, QC, Canada.
12. **Springford, A** (2012). *Identification of time series outliers applied to Schumann Resonance data*. Statistical Society of Canada Meetings, Guelph, ON, Canada.
13. **Springford, A** and SP Cox (2012). *FSmod: An R package for simulating in-season Fraser River sockeye salmon management*. Workshop for various assessment and management agencies, Vancouver, BC, Canada.
14. Cox, SP, **A Springford**, J Martin, M Grinnell, C Caron, C Lagasse, B Zuehlke (2009). *An exposure-response methodology for assessing the impacts of bottom-fishing gear on benthic marine ecosystems: Survey design workshop*. Workshop for collaborators and fishing industry representatives, Vancouver, BC, Canada.
15. **Springford, A** (2009). *A simulation framework for migrating Fraser sockeye salmon*. Technical working group, Pacific Salmon Commission, Vancouver, BC, Canada.
16. Cox, SP, AR Kronlund, J Cleary, **A Springford** (2009). *Linking fishery-independent surveys to management advice in Canadian fisheries*. Workshop for the Department of Fisheries and Oceans Canada, Ottawa, ON, Canada.
17. **Springford, A** and SP Cox. (2008) *Wasted space? Available spatial information can improve analysis of fishery catch and effort data*. Mote International Symposium in Fisheries Ecology, Sarasota, FL, USA.
18. Benson, AJ, SP Cox, and **A Springford** (2007). *Evidence for loss of resilience in a Pacific herring stock*. PICES Annual Meeting, Victoria, BC, Canada.
19. **Springford, A** and SP Cox (2007). *Bayesian hierarchical models for the analysis of spatial fishery data*. Fisheries and Marine Ecosystems Conference, Gibsons, BC, Canada.
20. Amos, J, G Cooper, T Gray, M Hamilton, **A Springford**, L Taylor, K Wieckowski, L Williston, and WK de la Mare (2006). *Evaluating US fisheries management for data rich and data poor fisheries: a look at the 40-10 rule*. Fisheries and Marine Ecosystems Conference, White Rock, BC, Canada.

## Teaching Experience

- **Instructor, Dept. of Mathematics & Statistics, Queen's University**      2013 — 2014  
 STAT 462/862: Computational Data Analysis (Winter 2014)  
 STAT 462/862: Computational Data Analysis (Fall 2014)  
 STAT 263: Introduction to Statistics (Summer 2013)
- **Teaching Assistant, Dept. of Mathematics & Statistics, Queen's University**      Winter 2013  
 MTHE 367: Statistics for Engineering

- **Instructor, School of Resource and Environmental Management, SFU** 2009 — 2010  
*REM 612: Simulation Modelling in Natural Resource Management*  
*REM 614: Advanced Methods in Fisheries Assessment*

## Technical Skills and Training

- **Computing & Quantitative Skills:**
  - Proficient in R, R package development, L<sup>A</sup>T<sub>E</sub>X, BUGS, git, Stan, SAS, MS Excel
  - Experience with Shiny, gitlab CI, C, SQL, Matlab, JMP, Fortran, Python, SPSS, Access, ADMB, VBasic for Apps
  - Data analysis and graphics
  - Bayesian modelling, hierarchical models
  - Statistical modelling, experimental design, and programming
  - Statistical consulting
- **Courses Completed:**
  - Spectrum Estimation
  - Time Series Analysis
  - Statistical Theory, Probability, Statistical Design, Data Analysis
  - Generalized Linear Models, Survival Analysis
  - Pacific Institute for the Mathematical Sciences: International Graduate Institute on Modeling Environmental Space-Time Processes Summer School
  - SSC 2016 Business and Industrial Statistics Workshop: Uncertainty Quantification and Optimization for Complex Models with Gaussian Processes
  - Advanced Methods for Fisheries Assessment
  - Bayesian Hierarchical Spatial Models for Fisheries Assessment
  - Simulation Modelling in Natural Resource Management

## Service and Volunteer Activities

- **Puget Sound Chapter Representative, American Statistical Association** 2018 — 2019  
*Seattle, WA, USA*  
 As Chapter Representative, I was in charge of communication between the local Chapter and the rest of the ASA. I was also an active member of the local Chapter executive, helping to organize and execute local events.
- **Figure skating coach and choreographer, Ontario University Athletics** 2010 — 2017  
*Varsity Clubs*  
 Queen's Gaels Varsity Figure Skating Team (2010 - 2013)  
 McMaster University's Varsity Figure Skating Team (2014 - 2017)
- **Topic-Contributed Session Organizer, Joint Statistical Meetings 2016** Aug 2016  
*Chicago, IL*  
 Session Title: "Estimating the Properties of Physical Time Series by Leveraging the Power of Spectral Analysis"

- **Outreach, *Let's Talk Science*** **June 2016**  
*Hamilton, ON, Canada*  
 Science of sports themed activities.
- **Telescope operator, *McMaster Sidewalk Astronomy*** **May 2016**  
*Westfield, ON, Canada*  
 Westfield Heritage Village Victorian Star Party.
- **Event photographer, *Canadian Astronomical Society Annual Meeting*** **May 2015**  
*Hamilton, ON, Canada*
- **Graduate Representative, *Appointments Committee*** **2013 — 2015**  
*Department of Mathematics & Statistics, Queen's University*  
 The appointments committee is responsible for hiring new faculty and promoting existing faculty within the department. I was involved in both of these functions during my time as graduate representative.
- **Founding Executive Member, *Graduate Mathematics Society*** **2011 — 2015**  
*Department of Mathematics & Statistics, Queen's University*  
 Drafted the Society's constitution with Charlotte Haley.  
 Secretary 2011 - 2012  
 President 2012 - 2013
- **Volunteer, *International Year of Astronomy*** **2009**  
*Simon Fraser University*  
 Telescope workshops for grade-school students  
 Volunteer at observing nights and public outreach events
- **Chair, *International Fisheries and Marine Ecosystems Conference*** **2007**  
*Gibsons, British Columbia*  
 I was involved in all aspects of organization and execution of this international graduate student conference.