

CHRISTIAN A. STRATTON

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SUMMARY

Post-doctoral researcher in statistics with consulting, research, and teaching experience. Strong analytical skills pertaining to spatial statistics, Bayesian computation, and analysis of ecological data types. Research interests include: Bayesian computation, spatial statistics, species distribution modeling, modeling of wildlife disease, data visualization, and teaching techniques for data science.

EDUCATION

Montana State University

Bachelor of Science with Honors in Mathematics (focus: Statistics)

Bozeman, MT

December 2016

Montana State University

Master of Science in Statistics

Bozeman, MT

May 2018

Montana State University

Doctor of Philosophy in Statistics

Bozeman, MT

May 2022

Dissertation: *Bayesian Hierarchical Latent Variable Models for Ecological Data Types*

Advisors: Dr. Andrew Hoegh and Dr. Jennifer Green

PEER-REVIEWED JOURNAL ARTICLES

IN REVIEW

Stratton, C., A. Hoegh, T.J. Rodhouse, J.L. Green, K.M. Banner, and K.M. Irvine. “Clustering and unconstrained ordination with Dirichlet process mixture models.” In review in *Methods in Ecology and Evolution*.

Stratton, C., K.M. Irvine, K.M. Banner, E.S. Almberg, D. Bachan, and K. Smucker. “Joint spatial modeling bridges the gap between disparate disease surveillance and population monitoring efforts informing conservation of at-risk bat species.” In review in the *Journal of Agricultural, Biological, and Environmental Statistics*.

Oram, J., K.M. Banner, **C. Stratton**, and K.M. Irvine. “Verifying species classification labels using stratified-by-species sampling reduces cost of long-term acoustic monitoring.” In review in *Methods in Ecology and Evolution*.

Retel, C., A.J. Strien, K.M. Irvine, and **C. Stratton**. “Trends in plant cover derived from vegetation-plot data using ordinal zero-augmented beta regression.” In review in the *Journal of Vegetation Science*.

ACCEPTED

Stratton, C., K.M. Irvine, K.M. Banner, W.J. Wright, C. Lausen, J. Rae. 2022. “Coupling validation effort with *in situ* bioacoustic data improves estimating relative activity and occupancy for multiple species with cross-species misclassifications.” *Methods in Ecology and Evolution*, 13(6), p. 1288 – 1303.

Stratton, C., J.L. Green, and A. Hoegh. 2021. “Not just normal: Exploring power with Shiny apps.” *Technology Innovations in Statistics Education*, 13(1), p. 1 – 37.

Stratton, C., A.J. Sepulveda, and A. Hoegh. 2020. “**msocc**: Fit and analyze computationally efficient multi-scale occupancy models in R.” *Methods in Ecology and Evolution*, 11(9), p. 1113 – 1120.

Hoegh, A., K. Flagg, and **C. Stratton**. 2018. Contributed comment on Article by Bradley, Holan, and Wike Invited commentary on “Computationally efficient multivariate spatio-temporal models for high-dimensional count-valued data” by Jonathan R. Bradley, Scott H. Holan, and Christopher K. Wike. *Bayesian Data Analysis*, 13(1), p. 253 – 310.

Irvine, K.M., K.M. Banner, **C. Stratton**, W.M. Ford, and B.E. Reichert. 2022. “Statistical assessment on determining local presence of rare bat species.” *Ecosphere*, 13(6), p. e4142.

Khalighifar, A., B.S. Gotthold, E. Adams, J. Barnett, L.O. Beard, E.R. Britzke, P.A. Burger, K. Chase, Z. Cordes, P.M. Cryan, E. Ferrall, C.T. Fill, S.E. Gibson, G.S. Haulton, K.M. Irvine, L.S. Katz, W.L. Kendall, C.A. Long, O.M. Aodha, T. McBurney, S. McCarthy, M.W. McKown, J. O’Keefe, L.D. Patterson, K.A. Pitcher, M. Rustand, J.L. Segers, K. Seppanen, J.L. Simers, **C. Stratton**, B.R. Straw,

T.J. Weller, and B.E. Reichert. 2022. “NABat ML: Utilizing deep learning to enable crowdsourced development of automated, scalable solutions for documenting North American bat populations.” *Journal of Applied Ecology*, 56(11), p. 2849 – 2862.

Sepulveda, A.J., A. Hoegh, J.A. Gage, S.L Caldwell-Eldridge, J.M. Birch, **C. Stratton**, P.R. Hutchins, E.P. Barnhart. 2021. “Integrating environmental DNA results with diverse data sets to improve biosurveillance of river health.” *Frontiers in Ecology and Evolution*, 9, p. 1 – 13.

Sepulveda, A. J., C. Schmidt, J. Amberg, P. Hutchins, **C. Stratton**, C. Mebane, M. B. Laramie, and D. S. Pilliod. 2019. “Adding invasive species biosurveillance to the U.S. Geological Survey streamgage network.” *Ecosphere*, 10(8), p. 1 – 17.

PEER-REVIEWED TECHNICAL REPORTS

Stratton, C., B.R. Straw, J.H. Cox, K.M. Irvine, F.C. Tousley, and B.E. Reichert. 2023. “Attributed North American Grid-Based Offshore Sampling Frames: U.S. Geological Survey data release.”

Stratton, C., K.M. Irvine. 2022. Summertime analysis statistical report for Little Brown, Northern Long-eared, and Tricolored bat species status assessment. Chapter B in Straw, B.R., J. A. Martin, J.D Reichard, and B.E Reichert, editors. “Analytical assessments in support of the U.S. Fish and Wildlife Service 3-Bat species status assessment. Cooperator report prepared in cooperation with the U.S. Geological Survey, United States Fish and Wildlife Service and Bat Conservation International.”

Stratton, C., A. Hoegh, K. M. Irvine, K. Legg, K. McCloskey, E. Shanahan, M. Tercek, and D. Thoma. 2019. “Assessing spatial and temporal patterns in sagebrush steppe vegetation communities, 2012-2018: Grand Teton National Park.” Natural Resource Report NPS/GRYN/NRR-2019/2020. National Park Service, Fort Collins, Colorado.

Irvine, K.M., and **C. Stratton**. 2021. “Rangewide summertime model predictions for three bat species (*Myotis lucifugus*, *Myotis septentrionalis*, and *Perimyotis subflavus*) from acoustic and mist net data 2010 to 2019: US Geological Survey data release.”

Udell, B.J., B.R. Straw, T.L. Cheng, K. Enns, W.F. Frick, B. Gotthold, K.M. Irvine, C. Lausen, S. Loeb, J.D. Reichard, T.J. Rodhouse, D. Smith, **C. Stratton**, W.E. Thogmartin, and B.E. Reichert. 2022. “Status and trends of North American bats: Summer occupancy analysis 2010-2019.” U.S. Fish and Wildlife Service.

Wessel, S.A., L. Jones, E. Kramer, **C. Stratton**, L. Shoemaker, and D. Laughlin. 2020. “Predictability and stability of sagebrush-steppe restoration in a changing climate.” National Park Service Annual Report Vol. 43.

PRESENTATIONS

Stratton, C., K.M. Irvine, K.M. Banner, E. Almberg, D. Bachen, and K. Smucker. “Joint spatial modeling of ecological response and disease processes improves estimator precision.” 2023. Talk given at the Joint Statistical Meetings. Toronto, Ontario, Canada.

Stratton, C., K.M. Irvine, K.M. Banner, E. Almberg, D. Bachen, and K. Smucker. “A statistical framework for integrating White-nose syndrome surveillance data and acoustic population monitoring data.” 2023. Talk given to the U.S. Geological Survey Disease Coordination Group. Virtual.

Stratton, C., K.M. Irvine, K.M. Banner, E. Almberg, D. Bachen, and K. Smucker. “Leveraging WNS surveillance and NABat data improves estimation of disease spread and bat activity.” 2023. Poster presented at the Whitenose Syndrome National Meeting. Palm Springs, California, USA.

Stratton, C., K.M. Irvine, E. Almberg, K. Smucker, and J. Gude. “Joint spatial modeling of relative activity and disease processes.” 2022. Poster presented at the ENVR 2022 Workshop: Environmental and Ecological Statistical Research and Applications with Societal Impacts. Provo, Utah, USA.

Stratton, C., K.M. Irvine, E. Almberg, K. Smucker, and J. Gude. “Bats & Stats: Assessing Impacts of White-nose Syndrome on Western Bat Species.” 2022. Talk given at the Northern Rocky Mountain Science Center. Bozeman, Montana, USA.

Stratton, C., A. Hoegh, K.M. Irvine, K.M. Banner. 2021. “Clustering and ordination with Dirichlet process mixture models.” Invited talk given at the Joint Statistical Meetings. Virtual.

Stratton, C., J.L. Green. 2021. “Beyond normal: Understanding power through R Shiny.” Poster presented at the United States Conference on Teaching Statistics. Virtual.

Stratton, C., A. Hoegh, and J.L. Green. 2018. “Predicting pitch type: A case study in Bayesian hierarchical multinomial regression.” Invited talk given at the Joint Statistical Meetings. Vancouver, Canada.

Stratton, C., A. Hoegh, and J.L. Green. 2018. “Unraveling Kershaw’s dominance.” Poster presented at The Cascadia Symposium on Statistics in Sports. Vancouver, Canada.

Stratton, C. and J.L. Green. 2018. “The power of technology: A Shiny applet assisted approach to teaching statistical power.” Poster presented at the Electronic Conference on Teaching Statistics. Virtual.

PEER-REVIEWED SCIENCE SOFTWARE

Stratton, C., A. Hoegh, A. Sepulveda, and K.M. Banner. 2020. “msocc.” R package to support computationally efficient implementation of Bayesian multi-scale occupancy models.

EXPERIENCE

Montana State University

Post-doctoral researcher

Bozeman, MT

July 2022 | Present

Advisors: Dr. Kathryn Irvine (USGS) and Dr. Katharine Banner (MSU)

- Developed statistical modeling frameworks for ecological data structures
- Authored multiple peer-reviewed journal articles and technical reports
- Communicated complicated statistical models to domain experts from multiple agencies
- Co-mentored a graduate-level statistician in support of research and analyses

U.S. Geological Survey

Student contractor

Bozeman, MT

August 2020 | July 2022

Supervisor: Dr. Kathryn Irvine (USGS)

- Provided analyses for Endangered Species Act listing decisions
- Authored peer-review journal articles and technical reports
- Collaborated with scientists from multiple domains

Montana State University

Math Learning Center Supervisor

Bozeman, MT

June 2019 | December 2019

- Supervised graduate and undergraduate tutors
- Coordinated monthly meetings
- Proposed and implemented logistical improvements including novel tutoring practices
- Coached new tutors on how to effectively communicate mathematics

Montana State University

Graduate Research Assistant

Bozeman, MT

January 2019 | August 2020

- Resolved a wide scope of ecological problems using various techniques
- Collaborated and communicated with domain experts in ecology and land-resource management
- Developed models and tools to aid collaborators
- Authored papers, web applications, and R packages

Montana State University

Statistical Consultant

Bozeman, MT

August 2017 | May 2018

- Communicated with clients
- Identified solutions to a wide scope of problems
- Successfully collaborated across departments to resolve problems

Montana State University
Graduate Teaching Assistant

Bozeman, MT
January 2017 | December 2018

- Implemented active learning teaching strategies for introductory statistics
- Planned and prepared course materials
- Coached students in a collaborative learning environment

Montana State University
Math Learning Center Tutor

Bozeman, MT
August 2014 | December 2016

- Tutored students in a wide array of mathematics and statistics
- Implemented active learning tutoring strategies
- Facilitated management of operations in tutoring center

TEACHING EXPERIENCE

Guest Lecturer

Bozeman, MT
S22

STAT 408: Statistical Computing and Graphics Analysis

Provided guest lectures on data visualization with the **tidyverse** and implementing version control software in statistical analyses to undergraduate-level statistics students.

Guest Lecturer

Bozeman, MT
S19

STAT 402/502: Intermediate Mathematical Statistics

Provided guest lecture on interpreting statistical power to undergraduate-level and graduate-level mathematical statistics students using an **R Shiny** app I created.

Teaching Assistant

Bozeman, MT
S19

STAT 411/511: Methods for Data Analysis I

Teaching assistant responsibilities included: grading homeworks and exams, writing and leading interactive lab assignments, and providing intermittent lectures on coding in **R** with an emphasis on data visualization.

Instructor of Record

Bozeman, MT
F18

STAT 217: Intermediate Statistical Concepts

Lead instructor responsibilities included: leading lectures, writing lecture notes, writing and grading homeworks and exams, writing lab assignments, and supervising teaching assistants.

Instructor of Record

Bozeman, MT
S17, F17, S18

STAT 216: Introduction to Statistics

Lead instructor responsibilities included: leading lectures, writing lecture notes, writing and grading homeworks and exams, and writing lab assignments

SERVICE

Montana Chapter of the American Statistical Association

Bozeman, MT
Sept 2022 | Present

Chapter Secretary and Council of Chapters Representative

Responsibilities included facilitating coordination of annual meetings, keeping meeting notes, and attending the CoC session at the Joint Statistical Meetings.

Bozeman Environmental and Ecological Statistics (BEES)

Bozeman, MT
Sept 2022 | Present

Co-President

The BEES research group is an group focused on mentoring graduate students with interest in statistical research motivated by environmental and ecological applications. Responsibilities as co-president include coordinating bi-weekly meetings, mentoring graduate students, providing papers for literature review sessions, maintaining the group website, and coordinating invited speaker presentations.

Annals of Applied Statistics

Referee 2023

Refereed papers for the *Annals of Applied Statistics* journal.

Montana State University STEAM Day

Bozeman, MT
April 2023

Workshop Presenter

MSU STEAM Day is a one-day conference that includes hands-on workshops in the STEAM fields of science, technology, engineering, art and math for girls in grades six, seven, and eight. Responsibilities

included presenting an interactive activity introducing statistical inference using the dice game Pass the Pigs.

DataFest Bozeman, MT
Volunteer judge 2019, 2022
Volunteer responsibilities included providing guidance to undergraduate-level and graduate-level students competing in DataFest competition.

SKILLS

Statistical computing languages:	R, Julia, SAS
Other programming languages:	HTML, Markdown, Quarto, R Shiny, Tableau
Probabilistic programming languages:	BUGS, JAGS, NIMBLE, Stan
Database management systems:	SQL, SQLite, Microsoft Excel
Word processors:	LaTeX, Microsoft Word
Operating systems:	Windows, Mac OS

AWARDS

Three Minute Thesis Competition Finalist Finalist for the Three Minute Thesis competition	Bozeman, MT February 2020
Dr. William A. Stannard Award for Excellence Recognition of outstanding graduate student teaching	Bozeman, MT May 2018
Outstanding Graduate Student Award Recognition of superior academic achievement among graduate students	Bozeman, MT May 2017
John L. Magaret Math/Science Scholarship Recipient of scholarship for outstanding academic achievement	Bozeman, MT January 2017
Milton-Chauner Math Scholarship Recipient of scholarship for outstanding academic achievement	Bozeman, MT August 2016
Outstanding Undergraduate Student Award Recognition of superior academic achievement among undergraduate students	Bozeman, MT May 2016
Outstanding Scholar Award Recognition of superior academic performance	Bozeman, MT May 2016
Montana State University System Award Scholarship for outstanding academic performance	Bozeman, MT December 2015
Phi Kappa Phi Member of Phi Kappa Phi, a national multi-disciplinary honor society	Bozeman, MT March 2015
Pi Mu Epsilon Member of Pi Mu Epsilon, a national mathematics honor society	Bozeman, MT December 2014

REFERENCES

Dr. Katharine Banner <i>Montana State University</i> Assistant professor of statistics.	Bozeman, MT katharine.banner@montana.edu
Dr. Andrew Hoegh <i>Montana State University</i> Assistant professor of statistics.	Bozeman, MT andrew.hoegh@montana.edu
Dr. Kathryn Irvine <i>U.S. Geological Survey</i> Research statistician.	Bozeman, MT kirvine@usgs.gov