Christian A. Stratton

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Summary

Assistant professor of 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 — Bozeman, MT
Doctor of Philosophy in Statistics — May 2022
Dissertation: *Bayesian Hierarchical Latent Variable Models for Ecological Data Types*
Advisors: Dr. Andrew Hoegh and Dr. Jennifer Green

Montana State University — Bozeman, MT
Master of Science in Statistics — May 2018

Montana State University — Bozeman, MT
Bachelor of Science with Honors in Mathematics (focus: Statistics) — December 2016

Peer-reviewed Journal Articles

Published

10) Stratton, C., A. Hoegh, T.J. Rodhouse, J.L. Green, K.M. Banner, K.M. Irvine. 2024.Clustering and unconstrained ordination with Dirichlet process mixture models. *Methods in Ecology and Evolution*.

9) Stratton, C. K.M Irvine, K.M. Banner, E.S. Almberg, D. Bachen, and K. Smucker. 2024. "Joint spatial modeling bridges the gap between disparate disease surveillance and population monitoring efforts informing conservation of at-risk bat species.". *Journal of Agricultural, Biological, and Environmental Statistics*.

8) 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.

7) 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.

6) 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.

5) 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.

4) 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.

3) 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.

2) 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.

1) Hoegh, A., K. Flagg, and **C. Stratton**. 2018. Contributed comment on Article by Bradley, Holan,

and Wikle 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. Wikle. *Bayesian Data Analysis*, 13(1), p. 253 – 310.

In Review

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*.

Peer-reviewed Technical Reports

8) Stratton, C., K.M. Banner, and K.M. Irvine. 2023. "Code vignette for application of the spatially misaligned regression model described in 'Joint spatial modeling bridges the gap between disparate disease surveillance and population monitoring efforts informing conservation of at-risk bat species,' U.S. Geological Survey software release"

7) Udell, B.J., **C. Stratton**, B.R. Straw, K.M. Irvine, J.D. Reichard, S.M. Gaulke, J.T.H. Coleman, F. Tousley, R.D. Inman, A.N. Schuhmann, R. Shively, and B.E. Reichert. 2023. "North American Bat Monitoring Program (NABat) Integrated Summer Species Distribution Model: Predicted Tricolored Bat Occupancy Probabilities: U.S. Geological Survey data release."

6) 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."

5) 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."

4) 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.

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

2) 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.

1) 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.

Presentations

11) Stratton, C., K.M. Irvine, K.M. Banner, E. Almberg, D. Bachen, and K. Smucker. September 2023. "Joint spatial modeling bridges the gap between disparate disease surveillance and population monitoring efforts informing conservation of at-risk bat species" Invited talk given at the MT Chapter of the ASA annual meeting. Bozeman, MT, USA.

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

9) Stratton, C., K.M. Irvine, K.M. Banner, E. Almberg, D. Bachen, and K. Smucker. June 2023. "A statistical framework for integrating White-nose syndrome surveillance data and acoustic population

monitoring data." Talk given to the U.S. Geological Survey Disease Coordination Group. Virtual.

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

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

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

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

4) Stratton, C., J.L. Green. June 2021. "Beyond normal: Understanding power through `R` Shiny." Poster presented at the United States Conference on Teaching Statistics. Virtual.

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

2) Stratton, C., A. Hoegh, and J.L. Green. August 2018. "Unraveling Kershaw's dominance." Poster presented at The Cascadia Symposium on Statistics in Sports. Vancouver, Canada.

1) Stratton, C. and J.L. Green. May 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.

Research and Collaboration Experience

Middlebury College — Middlebury, VT
Assistant professor — July 2024 - Present

- Developed new courses in statistics
- Mentored and advised undergraduate students
- Led collaborative research projects with faculty and students

Montana State University — Bozeman, MT
Post-doctoral researcher — July 2022 - May 2024
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 — Bozeman, MT
Student contractor — 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 — Bozeman, MT
Graduate Research Assistant — 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 Bozeman, MT
Statistical Consultant August 2017 - May 2018

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

Teaching Experience

Instructor of Record Middlebury, VT
STAT 0219: Time Series Analysis F24
Lead instructor responsibilities included: developing course materials, facilitating active learning environments, holding office hours for students.

Instructor of Record Middlebury, VT
STAT 0116: Introduction to Statistical Science F24
Lead instructor responsibilities included: developing course materials, facilitating active learning environments, holding office hours for students.

Guest Lecturer Bozeman, MT
STAT 408: Statistical Computing and Graphics Analysis S22
Provided guest lectures on data visualization with the `tidyverse` and implementing version control software in statistical analyses to undergraduate-level statistics students.

Supervisor Bozeman, MT
Math and Stat Learning Center F19
Supervised undergraduate and graduate tutors in the Mathematics and Statistics Learning Center. Responsibilities included coordinating monthly meeting, proposing and implementing logistical improvements, instructing tutors on how to effectively communicate mathematics and statistics, and tutoring undergraduate students in a variety of courses, including Calculus I-III, Linear Algebra, Introduction to Statistics, and Intermediate Statistical Concepts.

Guest Lecturer Bozeman, MT
STAT 402/502: Intermediate Mathematical Statistics S19
Provided guest lecture on interpreting statistical power to undergraduate-level and graduate-level mathematical statistics students using `R Shiny`.

Graduate Teaching Assistant Bozeman, MT
STAT 411/511: Methods for Data Analysis I S19
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
STAT 217: Intermediate Statistical Concepts F18
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
STAT 216: Introduction to Statistics S17, F17, S18
Lead instructor responsibilities included: implementing active learning teaching strategies in class, planning and preparing course materials, holding office hours for students.

Undergraduate Teaching Assistant Bozeman, MT
STAT 216: Introduction to Statistics F15, S16, F16
Teaching responsibilities included: facilitating discussion during in-class activities and holding office hours for students.

Tutor Bozeman, MT

Math and Stat Learning Center F14, S15, F15, S16, F16
Tutored undergraduate students in the Mathematics and Statistics Learning Center in a wide variety of courses, including: College Algebra, Calculus I-III, Linear Algebra, Introduction to Statistics, and Intermediate Statistical Concepts.

Service

Montana Chapter of the American Statistical Association Bozeman, MT
Chapter Secretary and Council of Chapters Representative Sept 2022 - Present
Responsibilities included facilitating coordination of annual meetings, keeping meeting notes, and attending the Council of Chapters session at the Joint Statistical Meetings.

Bozeman Environmental and Ecological Statistics (BEES) Bozeman, MT
Co-President Sept 2022 - Present
The BEES research group is a 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
Workshop Presenter April 2023
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 April 2019, April 2022
Volunteer responsibilities included providing guidance to undergraduate-level and graduate-level students competing in DataFest competition.

Awards

Three Minute Thesis Competition Finalist Bozeman, MT
Finalist for the Three Minute Thesis competition February 2020

Dr. William A. Stannard Award for Excellence Bozeman, MT
Recognition of outstanding graduate student teaching May 2018

Outstanding Graduate Student Award Bozeman, MT
Recognition of superior academic achievement among graduate students May 2017

John L. Magaret Math/Science Scholarship Bozeman, MT
Recipient of scholarship for outstanding academic achievement January 2017

Milton-Chauner Math Scholarship Bozeman, MT
Recipient of scholarship for outstanding academic achievement August 2016

Outstanding Undergraduate Student Award Bozeman, MT
Recognition of superior academic achievement among undergraduate students May 2016

Outstanding Scholar Award Bozeman, MT
Recognition of superior academic performance May 2016

Montana State University System Award Bozeman, MT
Scholarship for outstanding academic performance December 2015

Phi Kappa Phi Bozeman, MT
Member of Phi Kappa Phi, a national multi-disciplinary honor society March 2015

Pi Mu Epsilon Bozeman, MT
Member of Pi Mu Epsilon, a national mathematics honor society December 2014

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
Operating systems:	Windows, Mac OS