

Toryn L. J. Schafer

Curriculum Vitae · toryn.netlify.app

Contact Information

Toryn L. J. Schafer
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Experience

Texas A&M University, College Station, Texas
Assistant Professor, Department of Statistics, 2022 – Present

Cornell University, Ithaca, New York
Postdoctoral Associate, Department of Statistics and Data Science, 2020 – 2022
Principal Investigator: David Matteson

Education

University of Missouri, Columbia, Missouri

- Ph.D., Statistics, July 2020
 - NSF Graduate Research Fellow, 2016 – 2020
 - Dissertation: *Alternative Learning Strategies for Spatio-Temporal Processes of Complex Animal Behavior*
 - Advisor: Christopher K. Wikle
- M.A., Statistics, Dec 2018

Colorado State University, Fort Collins, Colorado

- B.S., Statistics and Wildlife Biology, December 2014, Magna Cum Laude with Honors

Publications

Acosta, J. P., Park, S. W., Stewart, D., Lozano-Carvazos, E. A., Webb, S. L., & Schafer, T. L. J. (2026). Applying machine learning to interpolate movement trajectories of desert bighorn sheep. *Environmental and Ecological Statistics*. <https://doi.org/10.1007/s10651-026-00713-w>

Hoose, B. W., Frisbie, M., Schafer, T. L. J., Wu, X. B., Lopez, R. R., & Pierce, B. L. (2026). Landscape drivers of scaled quail occurrence across a broad spatiotemporal scale: Implications for habitat management. *The Journal of Wildlife Management*. <https://doi.org/10.1002/jwmg.70285>

Ren, R., Hooten, M. B., Schafer, T. L. J., Calzada, N. M., Hoose, B. W., Womble, J. N., & Gende, S. (2026). A multi-stage Bayesian approach to fit spatial point process models. *Spatial Statistics*. <https://doi.org/10.1016/j.spasta.2026.100975>

Schafer, T., Feng, M.-L., Che-Castaldo, J., Che-Castaldo, C., Matteson, D., & Getmansky Sherman, M. (2026). Quantifying temporal instability in ecological assemblages using modern portfolio theory. *Preprint; Under Review at Ecography*. <https://doi.org/10.22541/authorea.15009261/v1>

Schafer, T. L. J., & Matteson, D. S. (2024). Locally adaptive shrinkage priors for trends and breaks in count time series. *Technometrics*. <https://doi.org/10.1080/00401706.2024.2407316>

Wu, H., Schafer, T. L. J., & Matteson, D. S. (2024). Trend and variance adaptive Bayesian changepoint analysis and local outlier scoring. *Journal of Business & Economic Statistics*, 1–21. <https://doi.org/10.1080/07350015.2024.2362269>

Wu, H., Schafer, T. L. J., Ryan, S., & Matteson, D. S. (2024). Drift vs Shift: Decoupling trends and changepoint analysis. *Technometrics*, 1–16. <https://doi.org/10.1080/00401706.2024.2365730>

- Davidow, M., Schafer, T. L. J., Merow, C., Che-Castaldo, J. P., Düker, M.-C., Feng, M.-L. E., & Matteson, D. S. (2023). Clustering future scenarios based on predicted range maps. *Methods in Ecology and Evolution*, 14, 1346–1360. <https://doi.org/10.1111/2041-210X.14080>
- Owolabi, O. O., Schafer, T. L. J., Smits, G. E., Sengupta, S., Ryan, S., Wang, L., Matteson, D. S., Sherman, M. G., & Sunter, D. A. (2023). Role of variable renewable energy penetration on electricity price and its volatility across independent system operators in the United States. *Data Science in Science*. <https://doi.org/10.1080/26941899.2022.2158145>
- VonBank, J. A., Cunningham, S. A., Schafer, T. L. J., Weegman, M. D., Link, P. T., Wikle, C. K., Kraai, K. J., Collins, D. P., & Ballard, B. M. (2023). Joint use of location and acceleration data to quantify habitat use transitions in arctic-nesting geese. *Scientific Reports*, 13, 2132. <https://doi.org/10.1038/s41598-023-28937-x>
- Cunningham, S. A., Schafer, T. L. J., Wikle, C. K., Ballard, B. M., VonBank, J. A., Bearhop, S., Hilton, G. M., Walsh, A. J., Griffin, L. R., Fox, A. D., & Weegman, M. D. (2022). Time-varying effects of local weather on behavior and probability of breeding deferral in two Arctic-nesting goose populations. *Oecologia*, 201, 369–383. <https://doi.org/10.1007/s00442-022-05300-x>
- Feng, M.-L. E., Owolabi, O. O., Schafer, T. L. J., Sengupta, S., Wang, L., Matteson, D. S., Che-Castaldo, J. P., & Sunter, D. A. (2022). Analysis of animal-related electric outages using species distribution models and community science data. *Environmental Research: Ecology*, 1(1), 011004. <https://doi.org/10.1088/2752-664X/ac7eb5>
- Schafer, T. L. J., Wikle, C. K., & Hooten, M. B. (2022). Bayesian inverse reinforcement learning for collective movement. *The Annals of Applied Statistics*, 16(2), 999–1013. <https://doi.org/10.1214/21-AOAS1529>
- Schindler, A. R., Cunningham, S. A., Schafer, T. L. J., Sinnott, E. A., Clements, S. J., DiDonato, F. M., Mosloff, A. R., Walters, C., Shipley, A. A., Weegman, M. D., & Zhao, Q. (2022). Joint analysis of structured survey and citizen science data improves precision of bird population trends and the extent of improvement depends on life history strategy. *Scientific Reports*, 12, 20289. <https://doi.org/10.1038/s41598-022-23603-0>
- Che-Castaldo, J. P., Cousin, R., Daryanto, S., Deng, G., Feng, M.-L. E., Gupta, R. K., Hong, D., McGranaghan, R. M., Owolabi, O. O., Qu, T., Ren, W., Schafer, T. L. J., Sharma, A., Shen, C., Sherman, M. G., Sunter, D. A., Wang, L., & Matteson, D. S. (2021). Critical Risk Indicators (CRIs) for the electric power grid: A survey and discussion of interconnected effects. *Environment Systems and Decisions*. <https://doi.org/10.1007/s10669-021-09822-2>
- Schliep, E. M., Schafer, T. L. J., & Hawkey, M. (2021). Distributed lag models to identify the cumulative effects of training and recovery in athletes using multivariate ordinal wellness data. *Journal of Quantitative Analysis in Sports*, 17(3), 241–254. <https://doi.org/10.1515/jqas-2020-0051>
- Schafer, T. L. J., Wikle, C. K., Ballard, B. M., VonBank, J. A., & Weegman, M. D. (2020). Bayesian Markov model with Pólya-Gamma sampling for estimating individual behavior transition probabilities from accelerometer classifications. *Journal of Agricultural, Biological and Environmental Statistics*, 25(3), 365–382. <https://doi.org/10.1007/s13253-020-00399-y>
- Schafer, T. L. J., & Wikle, C. K. (2019). Alternative learning strategies for collective animal movement. *JSM Proceedings, Statistical Computing Section*.
- Schafer, T. L. J., Breck, S. W., Baruch-Mordo, S., Lewis, D. L., Wilson, K. R., Mao, J. S., & Day, T. L. (2018). American black bear den-site selection and characteristics in an urban environment. *Ursus*, 29(1), 25–31. <https://doi.org/10.2192/URSUS-D-17-00004.2>

Works in Progress

Available upon request.

Drennan, D.J., Neal, K., Portone, T., Bandy, R., Khalil, M., and Schafer, T.L.J. *Bayesian discovery for dynamical systems with latent gradients*.

Cho, J.B., Kowal, D.R., Wu, H., Matteson, D.S., and Schafer, T.L.J. *dsp: An R package for Bayesian time-series modeling with dynamic shrinkage processes*.

Software

Kowal D., Wu H., Schafer, T.L.J. (maintainer), Cho J., Matteson D.S. (2026). dsp: Dynamic Shrinkage Process and Change Point Detection. R package version 1.6.0. CRAN.R-project.org/package=dsp

Book Reviews

Schafer, T.L.J. (2023). Review of *Statistics for Ecologists: A Frequentist and Bayesian Treatment of Modern Regression Models* by John Fieberg (Ed.). *Journal of Wildlife Management*, 87: e22464.

Grants and Funding

Source	Role	Amount	Year
Sandia National Labs — “Machine Learning For Data-Driven Closure Models In Earth Systems”	PI	\$270,000	2023
National Park Service — “Generate a quantitative assessment of the implications of, and alternatives to, fully opening Johns Hopkins Inlet to cruise ship visitation”	PI	\$112,000	2023
National Park Service — Supplement to the above	PI	\$48,000	2024
Texas A&M AI Bridge Seed Grant — “Bridging the Gap in Wildlife Monitoring: A Hybrid AI-Ecological Approach for Cryptic Taxa Detection and Multi-Source Data Fusion” (with Cheng Zhang, Engineering)	Co-PI	\$20,000	2026

Oral Presentations

Practical Lessons in Ecological Data Analysis. Joint Statistical Meetings, Nashville, Tennessee. August 2025.

Temporal Embeddings for Animal Movement Trajectory Interpolation. The International Environmetrics Society Conference, Adelaide, Australia. December 2024.

Innovative Bayesian Approaches for Robust Trend Filtering and Changepoint Detection in Complex Time Series.

- (Invited) Department of Statistics, University of California Santa Cruz. March 2025.
- (Invited) National Institute for Applied Statistics Research Australia, University of Wollongong, Australia. December 2024.
- (Invited) Department of Statistics, Purdue University. November 2024.

Drift vs Shift: Decoupling Trends and Changepoint Analysis. (Invited; Technometrics Session) Fall Technical Conference, Nashville, Tennessee. October 2024.

Statistics Machine Learning Data-Driven Closure Models

- ICSA 2025 Applied Statistics Symposium, Storrs, Connecticut. June 2025.
- SIAM Conference on Computational Science and Engineering, Fort Worth, Texas. February 2025.
- USACM Thematic Conference on Uncertainty Quantification for Machine Learning Integrated Physics Modeling, Arlington, Virginia. August 2024.

Bayesian models for complex animal movement data

- International Statistical Ecology Conference, Swansea, Wales. July 2024.
- ISBA World Meeting, Venice, Italy. July 2024.
- (Invited) Conference On Applied Statistics In Agriculture And Natural Resources, Ames, Iowa. May 2024.

Reinforcement Learning and Step Selection Analysis for Animal Movement Data.

- (Invited) Envibayes Workshop, Fort Collins, Colorado. September 2023.
- (Invited) WNAR, Anchorage, Alaska. June 2023.
- Joint Statistical Meetings, Washington, D.C. August 2022.

Trend Filtering with Adaptive Bayesian Changepoint Analysis for Count Time Series.

- Joint Statistical Meetings, Portland, Oregon. August 2024.
- (Invited) Department of Mathematics & Statistics, South Dakota State University. November 2023.
- (Invited) University of Missouri 60th Anniversary Conference, Columbia, Missouri. October 2023.
- Joint Statistical Meetings, Toronto, Ontario, Canada. August 2023.
- (Invited) SRCOS, Waco, Texas. June 2023.

- (Invited) Conference on Advances in Time Series Analysis, Chicago, Illinois. May 2023.
- (Invited) Department of Statistics, University of California Santa Cruz. February 2023.
- Entomological Society of America Annual Meeting, Vancouver, British Columbia, Canada. November 2022.
- (Invited) Department of Statistics, Kansas State University. November 2022.
- (Invited) Institute of Mathematical Statistics Annual Meeting, London, U.K. June 2022.

Bayesian Inverse Reinforcement Learning for Collective Animal Movement.

- (Invited; Discussion) Applied Biodiversity Sciences Reading Group, Texas A&M University. March 2025.
- (Invited) School of Mathematics and Statistics, San Diego State University. February 2022.
- (Invited) Department of Statistics and Applied Probability, University of California Santa Barbara. February 2022.
- (Invited) Department of Statistics, Pennsylvania State University. January 2022.
- (Invited) Department of Statistics, Florida State University. January 2022.
- (Invited) Department of Statistics, University of Kentucky. January 2022.
- (Invited) School of Mathematics and Statistics, University of Melbourne. December 2022.
- (Invited) Department of Mathematical Sciences, University of Arkansas. December 2022.
- (Invited) Department of Statistics, Texas A&M University. December 2022.
- (Invited) Department of Mathematical Sciences, Montana State University. December 2022.

Inverse reinforcement learning for animal movement data.

- The Wildlife Society Annual Conference, Spokane, Washington. November 2022.
- Women in Statistics and Data Science, Virtual. October 2021.

Continuous shrinkage priors with dependence. Joint Statistical Meetings, Virtual. July 2021.

Inverse reinforcement learning for agent-based models.

- The Wildlife Society Annual Conference, Lexington, Kentucky. November 2023.
- (Invited) SAMSI Pros and Cons of ABMs for Epidemic Modeling, Virtual. June 2021.
- Joint Statistical Meetings, Virtual. August 2020.

Inverse reinforcement learning for animal behavior from environmental cues. ENAR 2020 Spring Meeting, Virtual. March 2020.

Alternative learning strategies for collective animal movement. Joint Statistical Meetings, Denver, Colorado. August 2019.

Estimating behavioral transition probabilities of greater white-fronted geese using non-homogenous Markov models. Joint Statistical Meetings, Vancouver, British Columbia. July 2018.

Black Bear Den Characteristics and Site Selection Near Urban Aspen, Colorado. The Wildlife Society Annual Conference, Pittsburgh, Pennsylvania. October 2014. *Awarded best undergraduate contributed paper.*

Poster Presentations

Trend Filtering with Adaptive Bayesian Change-point Analysis for Count Time Series.

- ASA Section for Statistics in the Environment Workshop. October 2022.
- IMS New Researchers' Conference, Washington D.C. August 2022.

Non-linear forecasting with echo state networks. Ecological Forecasting Initiative, Washington D.C. May 2019.

Estimating environmental effects on behavioral transitions of geese.

- Missouri Natural Resources Conference, Osage Beach, Missouri. February 2019.
- Statistics and the Environment section of the American Statistical Association biennial workshop, Asheville, North Carolina. October 2018.

Awards

Award	Year
ConocoPhillips Data Science Faculty Fellow	2023, 2024
NSF Graduate Research Fellowship	2016
Benjamin A. Gilman International Scholarship	2013

Teaching Experience

Professor, Texas A&M University, Statistics Dept., College Station, TX

- Reproducible Computations (STAT 600) — Fall 2024, 2025, 2026
- Database & Computing Tools for Data Science (STAT 624) — Spring 2024, 2025, 2026
- Statistical Computing (STAT 404) — Spring 2023, Fall 2023, 2024
- Frontiers: Reinforcement Learning (STAT 691) — Fall 2023
- Statistical Methods (STAT 303) — Fall 2022, 2026

Graduate Instructor, University of Missouri, Statistics Dept., Columbia, MO, 2015 – 2017

- Introductory Statistical Reasoning (STAT 1200)
- Introduction to Probability and Statistics I (STAT 2500)
- Introduction to Probability and Statistics II (STAT 3500)

Teaching Assistant, Colorado State University, Biology Dept., Fort Collins, CO, 2011

- Biology of Organisms Lab (LIFE 103)

Professional Development

National Center for Faculty Development & Diversity (NCFDD) Faculty Success Program, Spring 2023.

Professional Activities

- Secretary, ASA Section for Statistics and the Environment, 2025
- Treasurer, ASA Section for Statistics and the Environment, 2024
- Associate Editor, Journal of Applied Statistics: Environmental Statistics and Data Science
- Associate Editor, Data Science in Science
- Lead Organizer, Knowledge Discovery and Data Mining (KDD) 2021 Workshop — *Data-Driven Exploration of Interconnected Risks in Complex Human-Natural Systems*, Aug 2021
- Instructor, High school STAT Camp, 2023, 2025, 2026
- Member, Early Career Women in Statistics Mutual Mentoring, 2020 – 2023
- Member, Ecological Forecasting Initiative Student Working Group, 2019 – Current (R-Shiny Working Group Leader, Jun – Nov 2020)
- Twitter Outreach, Code-RLadies, 2019 – 2020
- Organizer and Mentor, ASA Datafest Mid-MO, 2017 – 2020
- Mentor, Sports Statistics Initiative, 2019 – 2020
- Graduate Student Leader, Space-Time Reading Group, 2018 – 2019
- Vice President, Statistics Graduate Student Association, 2015 – 2017

Referee

Biology Letters · Biometrics · Data Science in Science · Ecology · Ecology and Evolution · Environmetrics · Frontiers in Applied Mathematics and Statistics · Journal of Agricultural, Biological and Environmental Statistics · Journal of Applied Statistics · Journal of Applied Statistics: Environmental Statistics and Data Science · Journal of the American Statistical Association · Journal of the American Statistical Association: Applications and Case Studies · Journal of the Royal Statistical Society Series A · Journal of the Royal Statistical Society Series C · Landscape Ecology · Methods in Ecology and Evolution · PLOS ONE ·

PNAS · PRX Life · Sankhya B · Society for Petroleum Engineering Journal · Spatial Statistics · Stat · Statistical Methods in Medical Research · Statistics and Computing · The American Statistician · Ursus

Mentoring Experience

Postdoctoral Research Associates

- Benjamin Hoose, 2023 – 2026

Graduate Students (Current)

- Daniel Drennan (TAMU, PhD-Statistics), Committee Chair
- John Paul Acosta (TAMU, MS-Statistical Data Science), Project Advisor
- Tara McNeil (TAMU, PhD-Entomology), Committee Member
- Maria Teleki (TAMU, PhD-Computer Science), Committee Member
- Vincenzo Donofrio (TAMU, MS/PhD-Astronomy), Committee Member
- Pooja Sandeep Joshi (TAMU, PhD-Math), Committee Member

Graduate Students (Graduated)

- Donald Turner III (TAMU, PhD-Statistics), Committee Chair (with Yang Ni), 2026
- Georgia Smits (Cornell University, PhD-Statistics), Project Advisor, 2025
- Elizabeth Chun (TAMU, MS-Statistical Data Science), Project Advisor, 2025
- Dave Pearce (TAMU, MS-Wildlife Biology), Committee Member, 2025
- Benjamin Hoose (TAMU, PhD-Wildlife Biology), Committee Member, 2024
- Valerie Espinosa (TAMU, MS-Statistics), Project Advisor, 2024
- Madeleine Barham (TAMU, MS-Wildlife Biology), Committee Member, ABD 2023

Professional Memberships

Society for Industrial and Applied Mathematics · The International Environmetrics Society · Institute of Mathematical Statistics · American Statistical Association · Association for Computing Machinery · The Wildlife Society