Wyatt Madden M.S.

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Department of Biostatistics & Bioinformatics
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EDUCATION

Emory University   *2021 – Present*
Ph.D. in Biostatistics & Bioinformatics

Montana State University   *2017 – 2019*
M.S. in Statistics

University of California, Santa Cruz   *2011 – 2015*
Bachelor of Arts, Economics & Mathematics *With Honors*
Bachelor of Arts, Film & Digital Media *With Honors*

RESEARCH INTERESTS

Bayesian computation, spatio-temporal statistics, probabilistic machine learning & deep learning, with applications in environmental health and infectious disease.

PUBLICATIONS

1. W. Madden, M. Qi, Y. Liu, and H. Chang, "ensembleDownscaleR: R Package for Bayesian Ensemble Averaging of PM2.5 Geostatistical Downscalers," *Remote Sensing*, 2025, Accepted for publication, Accepted for publication.
2. **W. G. Madden**, W. Jin, B. Lopman, A. Zufle, B. Dalziel, C. J. E. Metcalf, B. T. Grenfell, and M. S. Y. Lau, "Deep neural networks for endemic measles dynamics: Comparative analysis and integration with mechanistic models," *PLoS Computational Biology*, vol. 20, no. 11, e1012616, Nov. 2024, Full Paper.
3. J. Lagergren, M. Ruiz-Aravena, D. J. Becker, *et al.*, "Environmental and ecological signals predict periods of nutritional stress for eastern australian flying fox populations," *bioRxiv*, 2023, Under Review.
4. P. Eby, A. Peel, A. Hoegh, **W. Madden**, J. Giles, P. Hudson, and R. Plowright, "Pathogen spillover driven by rapid changes in bat ecology," *Nature*, pp. 1–3, Nov. 2022, Full Paper.
5. D. J. Becker, P. Eby, **W. Madden**, A. J. Peel, and R. K. Plowright, "Ecological conditions predict the intensity of hendra virus excretion over space and time from bat reservoir hosts," *Ecology Letters*, Oct. 2022, Full Paper.
6. M. S. Y. Lau, A. Becker, **W. Madden**, L. A. Waller, C. J. E. Metcalf, and B. T. Grenfell, "Comparing and linking machine learning and semi-mechanistic models for the predictability of endemic measles dynamics," *PLOS Computational Biology*, vol. 18, no. 9, pp. 1–14, Sep. 2022, Full Paper.
7. M. D. Cherne, A. B. Gentry, A. Nemudraia, *et al.*, "Severe acute respiratory syndrome coronavirus 2 is detected in the gastrointestinal tract of asymptomatic endoscopy patients but is unlikely to pose a significant risk to healthcare personnel," *Gastro Hep Advances*, vol. 1, no. 5, pp. 844–852, 2022, Full Paper.
8. A. Hoegh, A. Peel, **W. Madden**, M. Ruiz-Aravena, A. Morris, A. Washburne, and R. Plowright, "Estimating viral prevalence with data fusion for adaptive two-phase pooled sampling," *Ecology and Evolution*, vol. 11, Sep. 2021, Full Paper.
9. W. Rogers, M. Ruiz-Aravena, D. Hansen, *et al.*, "High-frequency screening combined with diagnostic testing for control of sars-cov-2 in high-density settings: An economic evaluation of resources allocation for public health benefit," *medRxiv*, 2021, Under Review.

INVITED PRESENTATIONS

Mechanism-Integrated Machine Learning for Infectious Disease Dynamics Prediction   *Oct 2024*
High Meadows Environmental Institute Workshop
On the Accuracy (and Niceness) of Prediction: from Epidemics to Climate and Weather
Princeton, NJ

Machine Learning Approaches for Epidemic Modeling   *Mar 2023*
Princeton Serology Conference
Princeton, NJ

Compartmental Models: Deterministic & Bayesian Approaches   *Nov 2020*

Rocky Mountain Data Science
Bozeman, MT

R Studio in Action - DataFest   *Oct 2018*
Montana ASA Chapter Meeting
Bozeman, MT

CONTRIBUTED   Neural Network Reveals Gravitational Coupling of Endemic Measles Dynamics   *Dec 2023*
TALKS &   Epidemics9 [Poster]
POSTERS   Bologna, Italy

Bias-Correcting Daily Satellite-Retrieved AOD for Air Quality Research   *Sep 2023*
EnviBayes Workshop [Poster]
Fort Collins, CO

INVITED   Machine Learning Panel   *Mar 2024*
PANELS   CIDMATH Retreat
Atlanta, GA

PROFESSIONAL   **Los Alamos National Laboratory**   Los Alamos, NM
EXPERIENCE   Applied Machine Learning Research Fellow   *May 2024 – Aug 2024*

- Developed deep learning methods for high energy density experiments.
- Designed and implemented PyTorch model fitting pipelines for use on high performance
  computing clusters.

Bozeman Disease Ecology Lab   Bozeman, MT
Statistician   *Jan 2019 – Jul 2021*

- Researched spatio-temporal data integration techniques for viral surveillance and prediction.
- Provided statistics & machine learning consulting for international team of scientists.
- Developed R packages to automate routine statistical analysis, visualization, and wrangling.
- Designed and implemented SQL database and data pipelines, ensuring data quality and access.

Weyerhaeuser   Seattle, WA
Statistics Intern   *May 2018 – Aug 2018*

- Implemented machine learning models aimed at lowering defects in industrial processes, after
  diagnosing issues through exploratory visualization and analyses.
- Formulated mixed-model experimental designs.
- Developed Shiny web applications to automate data cleaning/wrangling workflows.

Accenture   Sacramento, CA
Analyst   *Jul 2016 – Apr 2017*

- Improved loan approval processes through analysis of credit profiles.

CONSULTING &   Collaborator   *Aug 2018 – Dec 2018*
COLLABORATION   Statistical Consulting And Research Services (SCRS)
EXPERIENCE   Department of Mathematical Sciences, Montana State University

Volunteer   *Jan 2018 – Apr 2018*
Statistics Without Borders (SWB)
Under direction of Dr. Nicole Carnegie, Montana State University

TEACHING	Teaching Assistant	*Summer 2024*
	Introduction to Machine Learning for ID Modeling	
	Summer Institute in Statistics and Modeling in Infectious Diseases, Emory University	
	Instructor, Creator	*Spring 2023 – Fall 2024*
	Neural Networks with PyTorch Tutorial	
	Department of Biostatistics and Bioinformatics, Emory University	
	Teaching Assistant	*Fall 2022 – Spring 2024*
	INFO 534 - Applied Machine Learning	
	Department of Biostatistics and Bioinformatics, Emory University	
	Instructor	*Fall 2017 – Fall 2018*
	MATH 105 - Contemporary Mathematics	
	Department of Mathematical Sciences, Montana State University	
AWARDS	Patel-Naik Award (2nd Place), Emory University	*Dec 2023*
	Outstanding Graduate Student Award, Montana State University	*May 2019*
	Excellence in Data Visualization, ASA Data Fest - Montana State University	*Apr 2018*
SERVICE	Emory BIOS Student Council, Pre-quals Representative	*Spring 2022 – Present*
	Georgia Statistics Day 2024, Student Volunteer	*Oct 25th, 2024*
	Georgia Statistics Day 2021, Student Volunteer	*Oct 11th, 2021*
	Bozeman Environmental Statistics Group, Member	*2019 – 2021*
	American Statistical Association Student Chapter at Montana State, Treasurer	*2018 – 2019*
MEMBERSHIP	American Statistical Association	