Michael Dumelle (Dumelle.Michael@epa.gov)

Personal-Website Google-Scholar ResearchGate ORCID-ID

EDUCATION

Oregon State University, Corvallis, Oregon

- Ph.D. in Statistics, 2020
  - Dissertation Title: A Linear Mixed Model Framework to Spatio-Temporal Random Processes using the Separable and Product-Sum Covariance Structures
  - Advisors: Claudio Fuentes & Alix Gitelman
  - Committee Members: Alec Kowalewski, Lisa Madsen, Jay Ver Hoef, Charlotte Wickham, & Harry Yeh
- Graduate Minor in Risk and Uncertainty Quantification in Marine Science, 2019
- M.S. in Statistics, 2016

California Polytechnic State University, San Luis Obispo, California

- B.A. in Political Science (Statistics minor), 2014

EMPLOYMENT

United States Environmental Protection Agency (USEPA) 2020 - Present

- Statistician for the Freshwater Ecology Branch of USEPA's Office of Research and Development (ORD) in Corvallis, Oregon
  - Co-Technical Lead (with Anthony R. Olsen) of Survey Design and Analysis for EPA's National Aquatic Resource Surveys

RESEARCH

Journal Publications

- **Dumelle, Michael**. Olsen, Anthony R., Trangucci, Rob., Nahlik, Amanda., Irvine, Kathryn M., Blocksom, Karen., Ver Hoef, Jay M., & Fuentes, Claudio. 2025. Missing Data in Ecology: Some synthesis, clarification, and recommendations. *In Review*.
- Rumschlag, Samantha L., Gallagher, Brian., Hill, Ryan., Schafer, Ralf B., Schmidt, Travis S., Woods, Taylor., Kopp, Darin., **Dumelle, Michael**., Rohr, Jason R., De Laender, Frederik., Hoffman, Joel., Behrens, Jonathan., Lepak, Ryan., Jones, Devin., Mahon, Michael B. Diverging fish biodiversity trends in cold and warm rivers and streams. *In Review*.
- Dietrich, Matthew., **Dumelle, Michael**., Nahlik, Amanda M., Golden, Heather E., Christensen, Jay R., Lane, Charles R., Moore, Eric M., & Filippelli, Gabriel M. Anthropogenic metal storage in wetlands soils across the conterminous United States. *In Review*
- Isaak, Daniel., **Dumelle, Michael**., Horan, Dona., Mason, Daniel H., Franklin, Thomas W., Nagel, David E., Ver Hoef, Jay M., & Young, Michael K. Incorporating spatial autocorrelation in stream network data sets aggregated from multiple sources improves species distribution models: An assessment of Idaho giant salamander status and climate vulnerability. *In Review*.
- Nahlik, Amanda., Fennessy, Siobhan., Blocksom, Karen., **Dumelle, Michael**., & Weber, Marc. Soil carbon in NWCA 2016 wetlands across CONUS. *In Review*.
- Nahlik, Amanda., Paulsen, Steven., **Dumelle, Michael**., Holdsworth, Susan., Lehmann, Sarah., Tulve, Nicolle., Paul, Sean., & Frey, Christopher. National Aquatic Resource Surveys (NARS): The foundation and source for long-term aquatic ecosystem data across the United States. *In Review*.
- **Dumelle, Michael.**, Higham, Matt., & Ver Hoef, Jay. Spatial Generalized Linear Models in R Using spmodel. *In Review*.

- Handler, Amalia., Weber, Marc., **Dumelle, Michael.**, Jansen, Lara., Carleton, James., Schaeffer, Blake., Barnum, Thomas., Rea, Anne., Compton, Jana., Neale, Anne., & Paulsen, Steven. Ecological condition of mountain lakes in the conterminous US and vulnerability to human development. *Accepted to Ecological Indicators*.
- Lane, Charles R., Nahlik, Amanda M., Christensen, Jay R., Golden, Heather E., **Dumelle, Michael.**, D'Amico, Ellen., & Olsen, Anthony R. Non-floodplain wetlands are carbon-storage powerhouses across the United States. *Accepted to Earth's Future*.
- Dickey, Jacob., Clemens, Benjamin., **Dumelle, Michael.**, & Davis, Melanie. Modeling lamprey distribution using flow, geomorphology, and elevation in a terminal lake system. *Accepted to Transactions of the American Fisheries Society*.
- Dietrich, Matthew., Golden, Heather., Christensen, Jay., Lane, Chuck., & **Dumelle, Michael**. Lake chlorophyll-a linked to upstream nutrients across CONUS. 2024. *Environmental Science & Technology Letters*. PDF
- **Dumelle, Michael.**, Peterson, Erin., Ver Hoef, Jay., Pearse, Alan., & Isaak, Dan. SSN2: The next generation of spatial stream network modeling in R. 2024. *Journal of Open Source Software*. PDF GitHub
- Ver Hoef, Jay., Blagg, Eryn, **Dumelle, Michael**., Dixon, Philip., Zimmerman, Dale., & Conn, Paul. Marginal Inference for Hierarchical Generalized Linear Mixed Models with Patterned Covariance Matrices Using the Laplace Approximation. 2024. *Environmetrics*. PDF GitHub
- **Dumelle, Michael.**, Ver Hoef, Jay., Handler, Amalia., Hill, Ryan., Higham, Matt., & Olsen, Anthony. Modeling lake conductivity using spatial indexing for large spatial data. 2023. *Spatial Statistics*. PDF GitHub
- Higham, Matt., Ver Hoef, Jay., Frank, Bryce., & **Dumelle, Michael**. sptotal: An R Package for Predicting Totals and Weighted Sums from Spatial Data. 2023. *Journal of Open Source Software*. PDF GitHub
- Higham, Matt., **Dumelle, Michael.**, Hammond, Carly., Ver Hoef, Jay., & Wells, Jeff. An Application of Spatio-Temporal Modeling to Finite Population Abundance Prediction. 2023. *Journal of Agricultural, Biological, and Environmental Statistics*. PDF GitHub
- Ver Hoef, Jay., **Dumelle, Michael**., Higham, Matt., Peterson, Erin., & Isaak, Dan. Indexing and Partitioning the Spatial Linear Model for Large Data Sets. 2023. *PLOS ONE*. PDF GitHub
- **Dumelle, Michael.**, Higham, Matt., & Ver Hoef, Jay. spmodel: Spatial Statistical Modeling and Prediction in R. 2023. *PLOS ONE*. PDF GitHub
- Mattox, Clint., **Dumelle, Michael.**, McDonald, Brian., Gould, Micah., Olsen, Connor., Braithwaite, Emily., & Kowalewski, Alec. Iron Sulfate and Phosphorous Acid Affect Turfgrass Surface pH and Microdochium Path Severity on Annual Bluegrass. 2023. *Plant Disease*. PDF
- **Dumelle, Michael.**, Kincaid, Thomas., Olsen, Anthony., & Weber, Marc. spsurvey: Spatial Sampling Design and Analysis in R. 2023. *Journal of Statistical Software*. PDF GitHub
- **Dumelle, Michael.**, Higham, Matthew., Ver Hoef, Jay., Madsen, Lisa., & Olsen, Anthony. A Comparison of Design-Based and Model-Based Approaches for Finite Population Spatial Sampling and Inference. 2022. *Methods in Ecology and Evolution*. PDF GitHub
- **Dumelle, Michael.**, Ver Hoef, Jay., Fuentes, Claudio., & Gitelman, Alix. A Linear Mixed Model Formulation for Spatio-Temporal Random Processes with Computational Advances for the Product, Sum, and Product-Sum Covariance Functions. 2021. *Spatial Statistics*. PDF GitHub

- **Dumelle, Michael.**, Lamb, Jesse F., Jacobson, Kym., Hunsicker, Mary., Morgan, Cheryl., Burke, Brian., & Peterson, William. 2021. Capturing Copepod Dynamics in the Northern California Current Using Sentinel Stations. *Progress in Oceanography*. PDF GitHub
- Mattox, Clint., **Dumelle, Michael**., Kowalewski, Alec., McDonald, Brian., & Gould, Micah. 2020. Reducing Anthracnose on an Annual Bluegrass Putting Green with Frequent Applications of a Soil Surfactant and Hollow-tine Aerification. *Agronomy Journal*. PDF GitHub
- Mattox, Clint., **Dumelle, Michael**., McDonald, Brian., Gound, Micah., Olsen, Connor., Schmid, Chas, & Kowalewski, Alec. 2020. Comparing Rates of Minearal Oil, Sulfur, and Phosphorous Acid on Microdochium Patch Suppression, Green-Cover Percentage, and Turfgrass Quality. *Agronomy Journal*. PDF GitHub
- Mattox, Clint., **Dumelle, Michael**., McDonald, Brian., Gound, Micah., Olsen, Connor., Braithwaite, Emily., & Kowalewski, Alec. 2020. Suppression of Microdochium Patch Using Rotations of Mineral Oil, Sulfur, and Phosphorous Acid. *Agronomy Journal*. PDF GitHub

Software

- *spsurvey*: Spatial Sampling Design and Analysis. CRAN GitHub
  - Role: Author, Maintainer
  - CRAN Downloads: 110,000
- *sptotal*: Predicting Totals and Weighted Sums from Spatial Data. CRAN GitHub
  - Role: Author
  - CRAN Downloads: 15,000
- *spmodel*: Spatial Statistical Modeling and Prediction. CRAN GitHub
  - Role: Author, Maintainer
  - CRAN Downloads: 15,000
- *SSN2*: Spatial Modeling on Stream Networks. CRAN GitHub
  - Role: Author, Maintainer
  - CRAN Downloads: 10,000
- *SSNbler*: Assemble SSN Objects in R. CRAN GitHub
  - Role: Author
  - CRAN Downloads: 2,000

Proceedings and Technical Reports Publications

- Walsh, Kenneth C., **Dumelle, Michael.**, & Williams, Katy. 2020. Tracking Student Engagement with OER Resources and Homework. *Physics Educational Research Conference 2019 Proceedings*. PDF GitHub
- Ko, Harrison., Mayfield, Will., & **Dumelle, Michael.**. Efficient Estimates of Uncertainties in Tsunami Inundation Forecasts. *Eleventh U.S. National Conference on Earthquake Engineering*. PDF GitHub

Presentations

- **Dumelle, Michael** and Higham, Matt. 2025. Introducing spatial statistics using the spmodel R package. Oregon State University. Invited Seminar.
- **Dumelle, Michael**. 2024. Spatial Data Analysis Tools in R. EPA Region 3 R User Network. Invited Seminar.

- Zimmerman, Dale., Ver Hoef, Jay., **Dumelle, Michael**. 2024. Spatial Linear Models for Environmental Data. 2024 Statistics and the Environment Workshop. Invited Workshop.
- Chen, Bryant., **Dumelle, Michael**., Haase, Kenneth., & Klein, Jessica. 2024. Seismic Shifts in the Use of Programming Languages: Implications, Processes, Risks, and Consequences. 2024 Joint Statistical Meetings. Invited Panel. Panel Moderator: Emiliana Patlan. Panel Organizer: Jonaki Bose.
- **Dumelle, Michael.**, Ver Hoef, Jay., Handler, Amalia., Hill, Ryan., Higham, Matt., & Olsen, Anthony. 2024. Characterizing lake conductivity in the contiguous United States using spatially explicit models for big spatial data and the spmodel R package. Society for Freshwater Science 2024 Annual Meeting. Invited Presentation.
- **Dumelle, Michael**, & Hill, Ryan. 2024. Spatial Analysis and Statistical Modeling with R and spmodel. Society for Freshwater Science 2024 Annual Meeting. Workshop. Workbook.
- **Dumelle, Michael**, Higham, Matt., & Ver Hoef, Jay. 2024. spmodel: Spatial Statistical Modeling and Prediction in R. USEPA Pacific Ecological Systems Division Science Seminar. Invited Seminar.
- **Dumelle, Michael**, Higham, Matt., & Ver Hoef, Jay. 2024. spmodel: Spatial Statistical Modeling and Prediction in R. OSU Water Resources Engineering Seminar Series. Invited Seminar.
- **Dumelle, Michael**, Hill, Ryan., & Weber, Marc. 2024. Spatially Explicit Tools for Modeling Aquatic Systems on a National Scale. CPHEA Science Spotlight. Invited Seminar.
- **Dumelle, Michael**, Higham, Matt., & Ver Hoef, Jay. 2024. spmodel: Spatial Statistical Modeling and Prediction in R. OSU Fisheries and Wildlife Seminar Series. Invited Seminar.
- Weber, Marc., & **Dumelle, Michael**. Handling Spatial Data in R. 2023 EPA R User Group Conference. Workshop. Workbook
- **Dumelle, Michael**, Higham, Matt., & Ver Hoef, Jay. 2023. Spatial Statistical Modeling and Prediction in R using spmodel. 2023 Spatial Statistics Conference. Workshop. Workbook
- **Dumelle, Michael**. 2023. spmodel: Spatial Statistical Modeling and Prediction in R. 2023 Spatial Statistics Conference. Contributed Presentation.
- **Dumelle, Michael**., Blocksom, Karen., & Stillings, Garrett. 2023. Survey Design and Analysis for Aquatic Resources in R. 2023 National Water Quality Monitoring Conference. Workshop presentation.
- **Dumelle, Michael**. 2023. Handling item nonresponse via multiple imputation in environmental monitoring programs. 2023 National Water Quality Monitoring Conference. Contributed presentation.
- **Dumelle, Michael**. 2022. spmodel: Spatial Statistical Modeling and Prediction in R. EPA Community of Practice on Statistics. Seminar Presentation.
- **Dumelle, Michael**. 2022. spmodel: Spatial Statistical Modeling and Prediction in R. 2022 ENVR Workshop. Poster Presentation.
- **Dumelle, Michael**. 2022. spmodel: Spatial Statistical Modeling and Prediction in R. EPA R Users Group. Seminar Presentation.
- **Dumelle, Michael**. 2022. A Comparison of Design-Based and Model-Based Approaches for Finite Population Spatial Sampling and Inference. 2022 Joint Statistical Meetings. Topic Contributed Presentation.
- **Dumelle, Michael**. 2022. R Tidyverse Training. EPA's Atmospheric and Environmental Systems Modeling Division. Seminar Presentation.

- **Dumelle, Michael**. 2022. Target Populations, Sampling Frames, and Site Evaluation. 2022 National NARS Meeting. Invited Presentation.
- **Dumelle, Michael**. 2022. Using R in the Quality Assurance process. US EPA's Quality Program Virtual Training Event. Seminar Presentation.
- **Dumelle, Michael**. 2021. Using R in the Quality Assurance process. EPA's Office of Research and Development Quality Assurance Spotlight Seminar. Seminar Presentation.
- **Dumelle, Michael**. 2021. Advice for Undergraduate Students Considering Graduate School in Statistics. California Polytechnic State University. Seminar Presentation.
- **Dumelle, Michael**. 2021. Using R Packages for Reproducible Workflows. 2021 EPA R Workshop. Invited Presentation. Workbook
- **Dumelle, Michael**., Olsen, Tony., Kincaid, Tom., & Weber, Marc. 2021. *spsurvey*: An R Package for Selecting and Analyzing Spatial Probability Samples. 2021 Joint Statistical Meetings. Contributed Presentation.
- **Dumelle, Michael**., Olsen, Tony., Kincaid, Tom., & Weber, Marc. 2021. *spsurvey*: An R Package for Selecting and Analyzing Spatial Probability Samples. EPA R Users Group. Seminar Presentation.
- **Dumelle, Michael.**, Ver Hoef, Jay., Fuentes, Claudio., & Gitelman, Alix. 2021. A Linear Mixed Model Formulation for Spatio-Temporal Random Processes with Computational Advances for the Product, Sum, and Product-Sum Covariance Functions. 2021 Western North American Region of the International Biometric Society. Invited Presentation.
- **Dumelle, Michael**. 2021. A Tidyverse Approach to Data Analyses in R. EPA R Users Group. Seminar Presentation.
- **Dumelle, Michael**., Olsen, Tony., Kincaid, Tom., & Weber, Marc. 2021. *spsurvey* R Package: New Options and Changes for Selecting and Analyzing Probability Samples. 12th National Monitoring Conference. Contributed Presentation.
- **Dumelle, Michael.** 2021. On Being an Effective Statistical Consultant. Oregon State Statistics Winter 2021 Consulting Practicum. Seminar Presentation.
- **Dumelle, Michael.**, Ver Hoef, Jay., Fuentes, Claudio., & Gitelman, Alix. 2021. A Linear Mixed Model Formulation for Spatio-Temporal Random Processes with Computational Advances for the Product, Sum, and Product-Sum Covariances. 2021 Spatial & Temporal Statistics Symposium. Contributed Presentation.
- **Dumelle, Michael**., & Olsen, Tony. 2020. How Sample Size Influences Statistics. Environmental Protection Agency Community of Practice for Statistics. Seminar Presentation.
- **Dumelle, Michael**., Mattox, Clint., & Kowalewski, Alec. 2020. Adjusting Standard ANOVA Methods to Account for Heterogeneous Variances with an Application to Turfgrass Management. OSU Fall 2020 Seminar Series. Seminar Presentation. GitHub
- Mattox, Clint., **Dumelle, Michael.**, Manning, Viola., Weidman, Clara., Trippe, Kristin., & Kowalewski, Alec. 2020. The Importance of Quantifying Media pH at Ambient Temperatures. ASA, CSSA and SSSA International Annual Meetings. Contributed Presentation.
- **Dumelle, Michael.**, Ver Hoef, Jay., Fuentes, Claudio., & Gitelman, Alix. 2020. A Linear Mixed Model Formulation for Spatio-Temporal Random Processes with Computational Advances for the Separable and Product-Sum Covariances. ASA Oregon Chapter Winter 2020 Meeting. Contributed Presentation.
- **Dumelle, Michael**., Mattox, Clint., Braithwaite, Emily., McDonald, Brian., & Kowalewski, Alec. 2019. Adjusting Standard ANOVA Methods to Account for Heterogeneous Variances with an Application to Turfgrass Management. ASA, CSSA and SSSA International Annual Meetings. Contributed Presentation.

- **Dumelle, Michael.**, Ver Hoef, Jay., Fuentes, Claudio., & Gitelman, Alix. 2019. A Mixed Model Approach to the Product-Sum Spatio-Temporal Covariance Function with Computational Advances. Joint Statistical Meetings. Contributed Poster.

Recurring Workshops

- Isaak, Daniel., Peterson, Erin E., Ver Hoef, Jay M., **Dumelle, Michael.**, Nagel, David E., Horan, Dona L., Wollrab, Sherry P., & Payne, Sharon L. Spatial Stream Network Modeling. Boise, ID.
  - May 2023, May 2024, October 2024

Grants

- National Science Foundation Research Traineeship, $ 34,000, 2016.

SERVICE

Sessions Organized

- Conference: 2023 EPA R User Group Conference.
- Webinar: Building Successful Mentor/Mentee Relationships in the Hybrid-Work Era. Sponsored by the American Statistical Association's Justice, Equity, Diversity, and Inclusion (JEDI) Outreach Group. https://datascijedi.org/webinars/past/2023-10-16-mentoring
- Conference: 2021 Joint Statistical Meetings. Session Title: Spatio-Temporal Statistical Applications. Invited Session.
- Conference: 2021 EPA R User Group Conference.

Sessions Chaired

- Conference: 2024 Joint Statistical Meetings. Session Title: Spatio-Temporal Analysis of Health and Methane Emission Data
- Conference: 2022 Joint Statistical Meetings. Session Title: Statistical Methods in Ecology. Contributed Session.
- Conference: 2021 Joint Statistical Meetings. Session Title: Spatio-Temporal Statistical Applications. Invited Session.

Other

- Conference: 2024 Joint Statistical Meetings. Workshop Presenters: Mine Çetinkaya-Rundel and Charlotte Wickham. Workshop Title: Reproducible Publishing with Quarto. Role: Served as a course monitor, responsible for checking in attendees and providing general support.

Journals Refereed

- *Journal of Applied Statistics*
- *Journal of Statistical Software*
- *Spatial Statistics*
- *Journal of Agricultural, Biological, and Environmental Statistics*

Leadership Roles

- Member of ASA's LGBTQ+ Advocacy Committee 2025-2027
- Co-Chair of ASA's JEDI Students and Young Professionals Committee (SYPC) 2025
- Society for Freshwater Science Early Career Committee 2024 - Present
- Organizer of Corvallis-Newport EPA R for Data Science Working Group 2024 - Present
- ASA's GSS Jeanne E Griffith Award Committee 2024 - Present

- Co-Lead of EPA's Community of Practice on Statistics 2024 - Present
- Member of ORD's IDEAS (inclusion, diversity, equity, accessibility in science) workgroup 2023 - Present
- Organized, Mentor, and Judge for ASA Oregon Chapter's 2022 DataFest 2022
- Member of ASA's JEDI Students and Young Professionals Committee (SYPC) 2022 - Present
- Member of EPA's CPHEA DEIA Committee 2022 - Present
- Member of ASA's JEDI Outreach Group 2021 - Present
- Co-Lead of EPA's R User Group 2021 - Present
- EPA R User Group Bi-yearly Workshop Planning Committee 2020 - Present
- Courtesy Faculty in Horticulture at Oregon State University 2020 - Present
- ASA Oregon Council of Chapters Representative 2020 - Present
- Member of EPA's PESD DEIA Committee 2020 - Present
- Member of ORD's DEIA Community of Practice 2020 - Present

Individual/Team Awards

- EPA OW Honor Award for *National Aquatic Resource Surveys Information Management*. 2023.
- Oregon Federal Executive Board DEIA Team Award for *PESD DEIA Committee Work*. 2024.
- EPA ORD Honor Award for *National Aquatic Resource Surveys (NARS) Operational Support*. 2023.
- EPA ORD Honor Award for *2021 PESD DEIA Committee Work*. 2023.
- EPA ORD PESD Division Honor Award for *Using R Packages for Reproducible Workflows*. 2022.
- EPA ORD PESD Division Honor Award for *PESD DEIA Committee Work*. 2022.

PROFESSIONAL AFFILIATIONS

Society Memberships

- Society for Freshwater Science 2024 - Present
- American Statistical Association 2018 - Present
- WNAR Branch of the International Biometric Society 2019 - Present
- American Society of Agronomy 2019 - 2020
- Crop Science Society of America 2019 - 2020
- Soil Science Society of America 2019 - 2020