

Thomas A. Lake

Postdoctoral Research Scholar, Center for Geospatial Analytics
North Carolina State University
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Education

Postdoctoral Research Scholar North Carolina State University, Center for Geospatial Analytics, Raleigh, NC <u>Advisor:</u> Dr. Ross Meentemeyer	2023-present
Ph.D., Plant & Microbial Biology University of Minnesota Twin Cities, Minneapolis, MN <u>Thesis:</u> Improving predictive models of range expansion in invasive species <u>Advisor:</u> Dr. David Moeller	2018-2023
B.S., Conservation Biology Minor: Geographic Information Sciences University of Minnesota Twin Cities, Minneapolis, MN	2013-2017

Research & Teaching

Graduate Research Assistant , University of Minnesota	2021-2023
Graduate Teaching Assistant , Plant, Algal, and Fungal Diversity and Adaptation University of Minnesota	2019-2020
Graduate Teaching Assistant , Foundations of Biology, University of Minnesota	2019
Researcher 1 , USDA ARS Cereal Disease Lab, St. Paul, MN	2017-2018
Undergraduate Teaching Assistant , Plant Immunity Gene Discovery, University of Minnesota	2017
Undergraduate Research Assistant , UROP, University of Minnesota	2015-2017

Grants, Fellowships, & Awards

NASA-MSU Professional Enhancement Award , NASA-Michigan State University \$1,000. Detecting invasive trees with computer vision. Travel award for outstanding junior scholars.	2024
Doctoral Dissertation Research Fellowship , University of Minnesota Graduate School \$35,000. Predicting biological invasions using remote sensing and artificial intelligence. Competitive internal fellowship, stipend, and tuition for "most accomplished PhD candidates".	2022-2023
Climate Innovation Challenge , Google Remote sensing of biological invasions using high resolution imagery and deep learning. \$13,500 equivalent in Google Cloud research credits.	2022-2023
Hatch Grant , USDA National Institute of Food and Agriculture (PI: D. Moeller) Remote sensing biological invasions: Using satellite imagery to detect and monitor leafy spurge population dynamics across the Northern Great Plains. Contributed to grant writing and submission, awarded \$65,000 for research.	2021-2023
Bill Dahl Graduate Student Research Award , Botanical Society of America \$1,500. Does adaptation facilitate or impede future plant invasions? Award to support PhD field research in adaptation and climate change study.	2020-2021

Bell Museum Dayton Natural History Award , University of Minnesota	2020-2021
\$2,500. Does adaptive genetic differentiation facilitate or impede future plant invasions? Award to support PhD field research and conference travel.	
Earth Observation Grant , European Space Agency	2020-2021
Population monitoring of invasive species using satellite imagery. \$12,000 equivalent to access high-resolution satellite imagery.	
Accelerated Data Science Grant , NVIDIA	2019-2020
\$1,000. Awarded graphics processing unit (GPU) for deep learning model development.	
Grants-in-Aid , University of Minnesota	2018-2022
\$5,000 total. Four small internal grants supporting field research and travel.	
Undergraduate Research Opportunity Program , University of Minnesota	2016-2017
\$3,600. Award for undergraduate research in plant breeding and cytogenetics.	

Publications & Presentations

Refereed Publications

1. **Lake, T. A.**, Runquist, R. D. B., Flagel, L. E., & Moeller, D. A. (2023). Chronosequence of invasion reveals minimal losses of genomic diversity, niche expansion, and trait divergence in the polyploid, leafy spurge. *Evolutionary Applications*, 16(10), 1680-1696. <https://doi.org/10.1111/eva.13593>
2. **Lake, T. A.**, Briscoe Runquist, R. D., & Moeller, D. A. (2022). Deep learning detects invasive plant species across complex landscapes using Worldview-2 and Planetscope satellite imagery. *Remote Sensing in Ecology and Conservation*, 8(6), 875-889. <https://doi.org/10.1002/rse2.288>
3. Briscoe Runquist, R. D., **Lake, T. A.**, & Moeller, D. A. (2021). Improving predictions of range expansion for invasive species using joint species distribution models and surrogate co-occurring species. *Journal of Biogeography*, 48(7), 1693-1705. <https://doi.org/10.1111/jbi.14105>
4. **Lake, T. A.**, Runquist, R. D. B., & Moeller, D. A. (2020). Predicting range expansion of invasive species: Pitfalls and best practices for obtaining biologically realistic projections. *Diversity and Distributions*, 26(12), 1767-1779. <https://doi.org/10.1111/ddi.13161>
5. Briscoe Runquist, R. D., **Lake, T. A.**, Tiffin, P., & Moeller, D. A. (2019). Species distribution models throughout the invasion history of Palmer amaranth predict regions at risk of future invasion and reveal challenges with modeling rapidly shifting geographic ranges. *Scientific Reports*, 9(1), 1-12. <https://doi.org/10.1038/s41598-018-38054-9>

Manuscripts in Prep

1. **Lake, T. A.**, Runquist, R. D. B., & Moeller, D. A. (in-prep). Two decades of satellite images reveal the spatial and temporal dynamics of leafy spurge invasion and improve species distribution models. *bioRxiv*. <https://www.biorxiv.org/content/10.1101/2025.05.09.653185v1>
2. **Lake, T. A.**, Laginhas, B. B., Jones, C. M., & Meentemeyer, R. K. (in-prep). Best practices and challenges for urban tree detection, classification, and geolocation with street-level images across North American cities. *bioRxiv*. <https://www.biorxiv.org/content/10.1101/2025.10.09.681424v1>
3. Sanchez, F., **Lake, T. A.**, Galvis, J.A., Jones, C. M., & Machado, G. (in-prep). Predicting commercial swine premise locations using deep learning and aerial imagery to improve disease monitoring and surveillance.

Selected Presentations

1. **Lake, T. A.**, Briscoe Runquist, R. D., & Moeller, D. A. Two decades of satellite images reveal the spatial and temporal dynamics of leafy spurge invasion and improves species distribution models. Ecological Forecasting Initiative Conference (EFI). Blacksburg, VA. 05/2025.
2. **Lake, T. A.**, Laginhas, B. B., Jones, C. M., & Meentemeyer, R. K. Mapping species occurrences with street-view remote sensing and computer vision. International Association of Landscape Ecology (IALE). Raleigh, NC. 04/2025.

3. **Lake, T. A.** Deep learning, an introduction and applications. Invited Lecturer. Center for Geospatial Analytics. North Carolina State University. 01/2025.
 4. **Lake, T. A.**, Jones, C. M., & Meentemeyer, R. K. Detecting invasive trees with computer vision. International Association of Landscape Ecology (IALE). Oklahoma City, OK. 04/2024.
 5. **Lake, T. A.**, Briscoe Runquist, R. D., & Moeller, D. A. Detecting invasive plant species across complex landscapes using satellite imagery and deep learning. Upper Midwest Invasive Species Conference, Green Bay, WI. 10/2022.
 6. Briscoe Runquist, R. D., **Lake, T. A.**, & Moeller, D. A. Landscape genetics of Common Tansy reveals spatial genetic differentiation. Upper Midwest Invasive Species Conference, Green Bay, WI. 10/2022.
 7. **Lake, T. A.**, Briscoe Runquist, R. D., & Moeller, D. A. Detecting invasive plant species across complex landscapes using satellite imagery and deep learning. Joint Annual Meeting of the Ecological Society of America (ESA) and Canadian Society for Ecology & Evolution (CSEE), Montreal, Canada. 08/2022.
 8. **Lake, T. A.** Ecology and Impacts of Invasive Species. Invited Lecturer. Ecology, Evolution, and Behavior. University of Minnesota. 10/2020.
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Service & Outreach

Mentorship

Brennen Farrell¹, Lindsey Howell¹, Jessica Zhang¹, Nolan Kerr¹, Christina Berg¹, Felipe Sanchez², Brit Laginhas², Joan Barreto Ortiz², Alina Smolskaya²

¹Undergraduate student

²Graduate student

CFANS Mentor Program, University of Minnesota

2018-2022

CFANS Mentor Matching Committee, University of Minnesota

2021, 2022

Peer Reviews

Ecological Applications, Journal of Ecology, Diversity and Distributions, GIScience & Remote Sensing, Urban Ecosystems, Global Ecology and Conservation

References

David Moeller
Professor
Plant and Microbial Biology
University of Minnesota
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Associate Professor
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Ross Meentemeyer
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