**Maxwell R. W. Beal** Silver Spring, MD
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## Education

**Ph.D. Civil and Environmental Engineering**, 2019–2024
University of Wisconsin–Madison
Dissertation: *Leveraging Hydroclimatic Processes and Remote Sensing for Biological Response in Water Resource Management*

**B.S. Water Resources Science**, Minor: Geographic Information Systems, 2015–2019
Northland College — *Magna Cum Laude*

## Research & Professional Experience

**Senior Research Scientist**
Ocean Ecology Lab, NASA / SSAI, Greenbelt, MD | March 2025–Present

- Develop merged multi-satellite radiometry and chlorophyll-a products using spectral band-shifting methods.
- Diagnose discrepancies among empirical and semi-analytical chlorophyll algorithms to improve coastal retrievals in optically complex waters.
- Develop transferable chlorophyll retrieval approaches for U.S. coastal waters using empirical and inverse modeling methods.

**Federal Postdoctoral Researcher – Ecologist**
U.S. Environmental Protection Agency, ORD, Durham, NC | Sept 2024–Feb 2025

- Developed a machine-learning, spatially distributed cyanobacteria forecasting system for the CyAN Sentinel-3 product.
- Built large-scale R pipelines on HPC systems (SLURM) integrating climate, hydrology, and satellite water-quality data.
- Contributed to validation of a continental-scale lake surface water temperature product.

**Consultant, Scientific Analyst**
Lower Colorado River Authority, Austin, TX (Remote) | 2022–2025

- Developed machine-learning models to predict extreme cold and heat risk across the ERCOT domain at seasonal timescales.
- Evaluated long-term ENSO–streamflow relationships in the Lower Colorado River Basin.

**Graduate Research Assistant**
Water Systems & Society Lab, University of Wisconsin–Madison | 2019–2024

- Developed seasonal to subseasonal forecasting models for cyanobacteria biomass and beach closures using hydroclimate predictors.
- Built and evaluated season-ahead algae forecasting models for 178 lakes across the Midwest and Northeast U.S.
- Developed satellite remote-sensing and machine-learning models for chlorophyll-a, phycocyanin, and dissolved oxygen retrieval.

**Research Associate**
Mary Griggs Burke Center for Freshwater Innovation | 2016–2018

- Managed field crews for invasive aquatic macrophyte research
- Conducted mercury contamination field work on National Parks Service lands

## Selected Peer-Reviewed Publications

- **Beal, M.R.W**., & Schaeffer, B. (2025). Pixel-scale satellite forecasting of cyanobacteria in Florida lakes. Harmful Algae, 103041. https://doi.org/10.1016/j.hal.2025.103041
- **Beal, M.R.W.**, Osorio, J., Ciuoderis, K., Hernandez Ortiz, J. P., & Block, P. (2025). Forecasting dengue: Evaluating the role of hydroclimate information in subseasonal to seasonal prediction. GeoHealth, 9(9), e2024GH001325. https://doi.org/10.1029/2024GH001325
- **Beal, M.R.W**., & Olson, E. R. (2024). Native macrophyte community response to water-level manipulation for an invasive species. *Ecological Engineering*, *208*, 107380. https://doi.org/10.1016/j.ecoleng.2024.107380
- **Beal, M.R.W.**, Mutlu Özdoğan, and Paul J. Block. A machine learning and remote sensing based model for algae pigment and dissolved oxygen retrieval on a small inland lake. Water Resources Research 60.3 (2024): e2023WR035744. https://doi.org/10.1029/2023WR035744
- **Beal, M.R.W.**, Wilkinson, G. M., & Block, P. J. (2023). Large scale seasonal forecasting of peak season algae metrics in the in the Midwest and Northeast US. Water Research, 229, 119402. DOI: 10.1016/j.watres.2022.119402
- **Beal, M.R.W.**, O'Reilly, B. E., Soley, C. K., Hietpas, K. R., & Block, P. J. (2022). Variability of summer cyanobacteria abundance: can season-ahead forecasts improve beach management?. *Lake and Reservoir Management*, 1-16. DOI: 10.1080/10402381.2022.2084799
- **Beal, M.R.W.**, O'Reilly, B., Hietpas, K. R., & Block, P. (2021). Development of a sub-seasonal cyanobacteria prediction model by leveraging local and global scale predictors. Harmful Algae, 108, 102100. DOI: 10.1016/j.hal.2021.102100
- **Beal M.R.W.,** Matzinger P.J., Saborío-R G., Noguera J., Olson E.R. (2020) Survey of medium-sized and large mammals of Piedras Blancas National Park, Costa Rica. *Check List* 16 (4): 939–950. DOI: https://doi.org/10.15560/16.4.939

## Teaching & Mentoring

**Teaching Assistant**, University of Wisconsin–Madison

- Decision Making for Civil and Environmental Engineers (engineering economics, optimization, game theory).

**Guest Lectures**

- *Multi Criteria Decision Analysis.* Decision Making for Civil and Environmental Engineers. April 2023. Department of Civil and Environmental Engineering, University of Wisconsin – Madison.
- *Introduction to Linear Optimization.* Decision Making for Civil and Environmental Engineers. September 2023. Department of Civil and Environmental Engineering, University of Wisconsin – Madison.
- *Hydroclimatic Forecasting and Remote Sensing for Harmful Algae in Small Inland Lakes.* Hydroclimatology for Water Resources Management. September 2023. Department of Civil and Environmental Engineering, University of Wisconsin – Madison.

**Mentoring**

- Trained four undergraduates and a high-school student in water-quality sampling and data analysis.

## Selected Presentations

- **Beal M.R.W.,** Block P.J. Remote Sensing and Modeling of Cyanobacteria Harmful Algae Blooms. 2024. Center for Environmental Measurement and Modeling Community of Practice. Environmental Protection Agency. ***Invited talk.*** *December 2024.*
- **Beal M.R.W.,** Block P.J. Hydroclimatic Forecasting and Satellite Remote Sensing for Harmful Algae in Small Inland Lakes. 2024. Climate, People, and the Environment Program Seminar. University of Wisconsin - Madison. ***Invited talk.*** September 2024.
- **Beal M.R.W.,** Block P.J. Leveraging Hydroclimatic Processes and Satellite Remote Sensing for Monitoring and Forecasting of Harmful Algae in Small Inland Lakes. 2023. Boase Seminar Series in Hydrology and Water Resources Engineering. University of Colorado – Boulder. ***Invited talk.*** March 2023
- **Beal, M.R.W.** and P. Block: Remote Sensing of Harmful Algae Indicators for a Small Inland Lake Using Sentinel- 2 and Sentinel-3 Imagery. *American Geophysical Union Fall Meeting,* Chicago, IL. *Oral Presentation. December 2022*
- **Beal M.R.W.**, Wilkinson G., and Block P.J. Large scale seasonal forecasting of algae abundance for inland lakes across the Midwest and Northeast U.S. 2022. Wisconsin Chapter of the American Water Resources Association Spring Meeting. Oral Presentation. March 2022
- **Beal M.R.W.** and Block P.J. Large Scale Season-Ahead Forecasting of Algae Abundance in Inland Lakes. 2022. North Central Region Water Network Harmful Algal Bloom Symposium. Oral Presentation. March 2022

## Awards & Service

- Grant review panelist, NASA Ocean Biology and Biogeochemistry (2025)
- NSF International Research Experience for Students, Lake Victoria (2022)
- Best Student Presentation Award, Wisconsin AWRA (2022)
- Best Student Poster Award, UW–Madison Global Health Symposium (2021)
- Graduate Student Advisory Committee Representative, UW–Madison

## Broader Impacts

- Cyanobacteria Forecast Bulletin. Season-ahead forecasts for cyanobacteria biomass and beach closings distributed to Wisconsin Department of Natural Resources, and Madison Dane County Public Health. *Summer 2019-2023*
- Citizen Science Microcystin Monitoring Program. Facilitated a citizen science microcystin testing program with the Clean Lakes Alliance during summers. Conducted microcystin test trainings with citizen science volunteers each year of the program. *Summer 2020-2023*
- Developed water quality and remote sensing teaching module targeted towards high school classrooms. *Fall 2023*

## Trainings

- PhycoTech Algal Taxonomy and Ecology Workshop
- NASA PACE Data Hackweek 2025