

# Jonathan R. Behrens, Ph.D

Durham, NC 27708 | [jrb146@duke.edu](mailto:jrb146@duke.edu) | [jonathanbehrens.weebly.com](http://jonathanbehrens.weebly.com)

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## EDUCATION

- Ph.D., Ecology** 2019-2024  
Duke University, Durham, NC  
*Advisors: Dr. Emily Bernhardt (Co-Chair) and Dr. Martin Doyle*  
*Committee: Dr. Nishad Jayasundara, Dr. Dean Urban, Dana Kolpin*
- S.B. (with honors), Chemistry** 2012-2016  
University of Chicago, Chicago, IL  
Minor: Environmental Studies, *Dean's List 2012-2016*
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## RESEARCH INTERESTS

As an urban ecologist I am interested in the impact of human activities on freshwater ecosystems and their influence on human communities. My research has focused on urban and forested stream ecosystems and how anthropogenic stressors (organic and inorganic chemical contaminants, heat, and hydrologic "flashiness") impact primary and secondary production, food web interactions, and the resulting fate and transport of chemical contaminants. I'm particularly interested in engaging stakeholders within the broader community to effectively design field research and communicate results to inform water resource management decisions and policies. My research engages concepts, theories, and methods from the fields of ecosystem and community ecology, biogeochemistry, environmental chemistry, and ecotoxicology.

*Detailed overviews of current and prior research projects are available at [jonathanbehrens.weebly.com/research.html](http://jonathanbehrens.weebly.com/research.html).*

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## RESEARCH and TEACHING EXPERIENCE

- Oak Ridge National Laboratory**, Post-Doctoral Research Assistant 2024 - current
- (Beginning July 2024) Design and conduct field, laboratory, and modeling for the [Watershed Evolution and Dynamics](#) Science Focus Area.
- Duke Science and Technology Initiative**, Research Assistant 2020-2024
- Designed and conducted extensive year-long field sampling of stream biota, water, and physical parameters to assess metabolic and secondary production relative to urban disturbance regimes
  - Modelled and predicted energetic and trace metal movement with Bayesian single station models (StreamMetabolizer) and bootstrap statistics (secpRod) in R and trace metal analysis (ICP-MS)
  - Co-authored grant to secure \$100,000 (no overhead) to fund research costs and salary
  - Managed field team of 5 undergraduate technicians; mentored 3 students for MS&BS thesis projects
- Duke Bass Connections**, Research Team Lead 2021-2023
- Coordinated, designed, and executed an interdisciplinary research project ([1](#), [2](#)) to examine the chemical, biological, and socioeconomic diversity and associated ecotoxicity of an urban watershed
  - Mentored and trained ~25 students, over 2 academic years, to design, conduct, and communicate the results of field, laboratory, and spatial-GIS research, modeling, and analysis
  - Developed novel tiered approach to assess water quality ecotoxicity with trace-metal, PFAS, and organic indicator compound quantification (ICP-MS, HPLC-MS), zebrafish toxicity exposure (behavior/Daniovision, mitochondrial function/SeaHorse), and spatial-GIS modeling of land-use
  - Co-authored grant to secure a 2-year, \$45,000 grant to fund research costs and personnel
  - Presented research at national and international conferences, funder meetings ([NC WRRI](#), [Bass](#)), local community-led watershed association meetings ([ECWA](#) & [Duke Forest](#)), and public events

**Data+ Duke Rhodes Data Initiative**, Team Leader

- Co-designed and facilitated a curriculum for a Duke Data Expeditions [workshop](#) to conduct data downloads, cleaning, and visualization in the R tidyverse with water chemistry timeseries data
- Mentored 3 undergraduate data scientists to design and develop a [ShinyApp website](#) to disseminate research findings from dissertation research with community partners and as a teaching tool

**Duke University**, Teaching Assistant

2021-2023

- *Hydrology*. Designed and led 4 lectures to instruct an interdisciplinary set of professional students USGS-based R packages and custom code. Facilitated classroom and office hour discussion to teach and mentor graduate students in time series and frequency analyses of water sciences in R.
- *Applied Data Analysis for Environmental Social Sciences*. Facilitated lab sessions and office hours to train graduate students in R statistical methods and linear models with social and environmental datasets
- *Ecology for a Crowded Planet*. Graded assignments and conducted office hours to train undergraduates in writing concise scientific summaries on ecological theories and concepts
- *Microbiology*. Presented short lectures and facilitated weekly lab sessions for undergraduate course. Mentored ~20 students, over 2 semesters, on independent research projects and benchtop skills

2014-2016

**University of Chicago**, Teaching and Research Assistant

- *Global Warming: The Science and Modeling of Climate Change*. Facilitated on-line discussion boards for the Massive Online Open Course (MOOC), managed back-end of the website.
- Designed and conducted benchtop experiments and spectroscopy to investigate nutrient uptake of select bacteria to model nutrient cycling in the open and nutrient poor regions of the ocean
- Research culminated into a senior thesis that received honors distinction

**UC San Diego Scripps Institution of Oceanography**, Summer Research Assistant

2015

- Developed analytical methods (GCxGC) to identify fatty acids, a tracer of ecosystem change
- Presented findings at the American Geological Union conference through an NSF scholarship

## WORK EXPERIENCE

**American Institute of Physics**, Science Policy Analyst

2018-2019

- Wrote [19 first author articles](#) assessing federal science policy developments and funding for environmental, health, and energy research
- Edited and co-authored a weekly digest of science policy read by society members inclusive of scientists and policymakers in academia, state and federal agencies, and the U.S. Congress
- Formulated strategy to expand readership by implementing tools to increase usability of website

**IDA Science and Technology Policy Institute**, Science Policy Fellow

2016-2018

- Conducted qualitative and quantitative policy analysis on drinking water contaminants, greenhouse gas emissions, public health, space sciences, national defense strategy, and federal research investment management
- Co-authored 7 reports for Federal Agencies and White House science offices
- Organized and facilitated workshops with over 200 subject matter experts, and conducted text and budget analyses in R, excel, and NVivo
- Presented findings before senior staff at OSTP, NASA (NASA Advisory Council), NIH, and National Science and Technology Council

**Environmental Protection Agency**, Jeff Metcalf Public Engagement Intern

2014

- Wrote briefings and organized engagement meetings for the Administrator and senior staff around 111(d) rules

- Researched media trends and their factual accuracy on key EPA initiatives, implementing a daily memo for staff

## TECHNICAL PROFICIENCIES

**Data Analysis/Coding** (R, ArcGIS, and excel): data wrangling, cleaning and visualization; ecosystem and hydrological modeling; large data time-series analysis; spatial and landscape/land-use analysis

**Chemical Analysis:** trace metals (acid digestion + ICP-MS), e.coli and coliforms (Coli-ert), major ions and nutrients (LC-MS, Lachet), dissolved organic chemical indicators and PFAS (direct injection and solid phase extraction for HPLC-MS)

**Field Analyses:** wildlife collection (biofilm, macrophytes, fish, macroinvertebrates, emergent insects, spiders), water sampling (PFAS, trace metals, organic contaminants, major ions, and nutrients), morphology and transect establishment (pebble counts, depth profiles, rating curves), sensor deployment (dissolved oxygen, temperature, height/flow, conductance)

**Communication:** R ggplot and Shiny data visualization/website development, ArcGIS map layers and storymap spatial data visualization, policy writing and communication

**Ecotoxicity:** survival, deformities, behavioral, and mitochondrial function of zebrafish (DanioVision and Seahorse), wild-caught mosquitofish dissection and organ mitochondrial function (Seahorse)

## GRANTS AWARDED

2022	NC WRRRI Graduate <a href="#">Student Fellowship</a> (\$10,000)
2022	Duke S&T <a href="#">Seed Grant</a> (\$100,000, <i>co-PI with Emily Bernhardt, Nishad Jayasundara, and Heileen Hsu Kim</i> )
2022	Duke Competitive Summer Research Fellowship (\$8,250 + tuition)
2022	Bass Connections Team <a href="#">Project</a> , Co-lead (\$20,000, <i>co-PI with Emily Bernhardt, Lee Ferguson, Nishad Jayasundara, and Steven Anderson</i> )
2021	Bass Connections Team <a href="#">Project</a> , Co-lead (\$24,700, <i>co-PI with Emily Bernhardt, Christopher Timmins, Sarah Raviola, Steven Anderson, and Jasmine Parbam</i> )
2020	Lamb Family Graduate Summer Research Fellowship (\$5,500 + tuition)
2019	Duke Biology Departmental Fellowship (\$29,500 + tuition)

## PUBLICATIONS

### Peer Reviewed

2023	Samantha Rumschlag, Michael Mahon, Devin Jones, William Battaglin, <b>Jonathan R. Behrens</b> , Emily Bernhardt, Paul Bradley, Ethan Brown, Frederik De Laender, Ryan Hill, Stefan Kunz, Sylvia Lee, Emma Rosi, Ralf Schäfer, Travis Schmidt, Marie Simonin, Kelly Smalling, Kristofor Voss, Jason Rohr, “Density Declines, Richness Increases, and Composition Shifts in Stream Macroinvertebrates.” <i>Science Advances</i> 3, no. 18 (2023). <a href="https://doi.org/10.1126/sciadv.adf4896">https://doi.org/10.1126/sciadv.adf4896</a> .
2019	<b>Jonathan R. Behrens</b> and Bhavya Lal. "Exploring Trends in the Global Small Satellite Ecosystem." <i>New Space</i> 7, no. 3 (2019): 126-136. <a href="https://doi.org/10.1089/space.2018.0017">https://doi.org/10.1089/space.2018.0017</a> .
In-Progress	<b>Jonathan R. Behrens</b> , Emily Bernhardt, Nick Marzolf, Alice Carter, Steve Anderson, Brooke Hassett. “Energy Dynamics and Efficiency Loss in

Heterotrophic Urban-Stressed Streams: Bridging Primary and Secondary Production” *In progress, submission anticipated in spring 2023.*

In-Progress **Jonathan R. Behrens**, Emily Bernhardt, Nick Marzolf, Steve Anderson, Brooke Hassett. “The Light and Dark Side of Subsidies in an Urbanized and Forested Watershed.” *In progress, submission anticipated in early spring 2024.*

In-Progress **Jonathan R. Behrens**, Jonathan Behrens, Emily Bernhardt, Lee Ferguson, Abigail Joyce, Brooke Hassett. “Indicators of Contaminant Mixtures and Their Sources in an Urbanized Watershed.” *In progress, submission anticipated in early spring 2024.*

### Technical Reports and Articles

2018 Vanessa I. Peña, Chelsea A. Stokes, **Jonathan R. Behrens**. “Innovation Toolkit White Papers.” IDA, March 2018.

2017 Sally S. Tinkle, William E. J. Doane, Justin C. Mary, **Jonathan R. Behrens**, Cassidy A. Pomeroy-Carter. “Pilot Study on the Identification of New Artificial Intelligence and Machine Learning Applications for Portfolio Evaluations.” IDA, Nov. 2017.

2017 Susannah V. Howieson, Alexis M. W. McKittrick, Christopher T. Clavin, **Jonathan R. Behrens**, Becaja M. Caldwell, Rebecca K. Miller. “Final Report on Agreements for Commercializing Technology (ACT) Evaluation.” IDA, Sep. 2017.

2017 Bhavya Lal, Elena de la Rosa Blanco, **Jonathan R. Behrens**, Benjamin A. Corbin, Ellen K. Green, Alyssa A. Picard, Asha Balakrishnan. [“Global Trends in Small Satellites.”](#) IDA Paper P-8638, July 2017.

2017 Anne Ressler, **Jonathan R. Behrens**, Ellen Green, Alexis M. W. McKittrick. “Background on Sector-Specific Methane Emissions.” IDA, June 2017.

2017 Vanessa Peña, Susannah V. Howieson, Bhavya Lal, **Jonathan R. Behrens**, Brian L. Zuckerman, Martha V. Merrill, and Julian L. Zhu. [“Early Stage Research and Technology at U.S. Federal Government Agencies.”](#) IDA Document D-8481, April 2017.

2016 Christopher T. Clavin, Anne E. Ressler, Leslie S. Abrahams, **Jonathan R. Behrens**, Alexis M. W. McKittrick. “White Paper on Research Strategies to Address Oil and Gas Sector Methane Emissions.” IDA, Nov. 2016.

### Web-based Publications (select)

A full list of articles can be [found here](#).

2019 **Jonathan R. Behrens**. [“EPA Advisory Panel Changes Split Science Committee.”](#) American Institute of Physics: FYI Science Policy News. July 2019.

2019 **Jonathan R. Behrens**. [“Top Appropriator Looking to Address Looming Lab Workforce Shortfall.”](#) American Institute of Physics: FYI Science Policy News. May 2019. [[Republished](#) by American Physics Society News, July 2019]

2019 **Jonathan R. Behrens**. [“NOAA Warns 5G Spectrum Interference Presents Major Threat to Weather Forecasts.”](#) American Institute of Physics: FYI Science Policy News. May 2019. [[Republished](#) by Physics Today, May 2019] [[Interviewed](#) by Texas Standard, May 2019]

- 2019 **J. Behrens.** "[Congress Bolstering Its Access to S&T Expertise.](#)" American Institute of Physics: FYI Science Policy News. May 2019. [\[Republished\]](#) by American Physics Society News, June 2019]
- 2019 **J. Behrens.** "[FY20 Budget Request: DOD Science and Technology.](#)" American Institute of Physics: FYI Science Policy News. March 2019.
- 2019 **J. Behrens.** "[Final FY19 Appropriations: National Oceanic and Atmospheric Administration.](#)" American Institute of Physics: FYI Science Policy News. Feb 2019.
- 2019 **J. Behrens.** "[House Hearings Open New Chapter in Congressional Climate Change Debate.](#)" American Institute of Physics: FYI Science Policy News. Feb 2019.
- 2018 **J. Behrens.** "[Interagency Report Charts Ten-Year Vision for Ocean Science and Technology.](#)" American Institute of Physics: FYI Science Policy News. Nov. 2018.

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## PRESENTATIONS

\*Denotes presentations given by J. Behrens

- 2023 **\*J. Behrens,** Emily S. Bernhardt, Lee Ferguson, Abigail Joyce, Brooke Hassett. "Quantifying and Attributing PFAS in an Urbanized Watershed Alongside Indicator Compounds." Presentation at the NC WRRI Board Meeting, Raleigh, NC, Nov. 2023.
- 2023 **\*Jonathan R. Behrens,** Emily S. Bernhardt, Nicholas Marzolf, Steven M. Anderson, Brooke Hassett. "Connecting Primary and Secondary Production in an Urban and Forested Watershed." Presentation at the Southeast Society for Freshwater Sciences Meeting, Columbia, GA, Nov. 2023.
- 2023 **\*J. Behrens,** Emily S. Bernhardt, Nicholas Marzolf, Steve M. Anderson, Brooke Hassett. "Light and Dark Side of Subsidies in an Urban and Forested Watershed." Presentation at Society for Freshwater Science, Brisbane, Australia, June 2023.
- 2023 **\*J. Behrens,** Emily S. Bernhardt, Lee Ferguson, Abigail Joyce, Brooke Hassett. "Indicators of Contaminant Mixtures and Their Sources in an Urbanized Watershed." Presentation at the 6<sup>th</sup> Symposium on Urban Stream Ecology, Brisbane, Australia, May 2023.
- 2023 **\*J. Behrens,** Rena Ouyang, Nicholas Marzolf, Emily S. Bernhardt. "Can Functional Feeding Groups of Benthic Invertebrate Communities Exemplify Energy Dynamics and Efficiency Loss in Heterotrophic Urban-Stressed Streams?" Presentation at Carolina Area Benthologists' Workshop, Boone, NC, March 2023.
- 2022 **\*J. Behrens,** Emily S. Bernhardt, Nicholas Marzolf, Steven M. Anderson, Brooke Hassett, Xitlali Ramirez, Tyler Edwards, Lindsay Hu, Helene Gu. "Smaller Bugs and Heavier Metals in the Aquatic to Terrestrial Subsidies of Urban Streams?" Presentation at the Joint Aquatic Science Meeting, Grand Rapids, MI, May 2022.
- 2021 **\*J. Behrens,** Nishad Jayasundra, Emily S. Bernhardt. "Exploring the Effects of Contaminant Mixtures in an Urban Stream Using Zebrafish Assays." Presentation at Society for Environmental Toxicology and Chemistry, Virtual, Nov. 2021.
- 2021 **\*J. Behrens,** Nishad Jayasundra, Emily S. Bernhardt. "Towards a Tiered Approach to Assess the Effects of Contaminant Mixtures in Urban Streams." Poster at the Conference on Emerging Contaminants (EmCon) 2021, Virtual, Sep.

2021. *Awarded Royal Society of Chemistry Best Student Poster Award*

- 2021 \***J. Behrens**, Emily S. Bernhardt, Alyssa Miannecki, Gregory H. Lefevre, Dana W. Kolpin, Heather M. Stapleton, and George Tait. "Riparian Spiders: A Sentinel Biosensor for Organic Contaminants?" Poster at Society for Freshwater Science, Virtual, June 2021.
- 2021 S. Anderson, **J. Behrens**, J. Parham, S. Raviola, C. Wise, K. Satterwhite, R. White, L. Ferguson, N. Jayasundara, C. Timmons, E. Bernhardt. "[A City and Its River: Ellerbe Creek Watershed, Durham NC.](#)" Poster at Society for Freshwater Science, Virtual, June 2021.
- 2021 \***J. Behrens**. "Catch Them if You Can! Using Spiders and Bugs to Track Water Contaminants in Our Streams and Rivers." Presentation at UNC's 5th Graduate Research and Policy Expo (GRaPE), Virtual, April 2021.
- 2021 \***J. Behrens**. "Catch 'em if You Can! Using Spiders to Detect Dangerous Chemicals in Streams." Presentation at 8<sup>th</sup> Annual Duke GradX, Virtual, March 2021.
- 2020 \***J. Behrens**, Emily Bernhardt, Martin Doyle. "Transport of Contaminant Mixtures through Urban Riparian Ecosystems: A Novel Biosensor." Poster at the Society for Freshwater Science, Virtual, June 2020.
- 2018 \***J. Behrens**, Reina S. Buenconsejo, Bhavya Lal, Susannah V. Howieson. "[Developing a Launch Approval Process for Nuclear Fission Reactors: Lessons Learned from Risk Mitigation and Approval Processes in Other Sectors.](#)" Presentation at Nuclear and Emerging Technologies for Space, American Nuclear Society, Las Vegas, NV, Feb. 2018.
- 2017 \***J. Behrens**, Bhavya Lal. "Trends in the Global Small Satellite Ecosystem: Implications for Science Missions." Presentation at the American Geological Union Fall Meeting, New Orleans, Louisiana, Dec. 2017.
- 2017 \***J. Behrens**, Susannah V. Howieson, Vanessa Peña. "The Organization and Management of Early Stage Science Research and Technology at U.S. Federal Government Agencies." Presentation at the American Evaluation Association, Evaluation 2017, Washington, DC, Nov. 2017.
- 2015 \***J. Behrens**, Lihini Aluwihare, Brandon M. Stephens. "Fatty Acids as Biomarkers for Food Web Structure in the Eastern North Pacific Ocean." Poster at the American Geological Union Fall Meeting, San Francisco, CA, Dec. 2015.
- 2019 Susannah V. Howieson, **J. Behrens**, and Katherine M. Kowal. "[Potential Launch Approval Process for Commercial Space Nuclear Systems.](#)" Presentation at Nuclear and Emerging Technologies for Space, American Nuclear Society, Las Vegas, NV, Feb. 2019.
- 2018 Bhavya Lal, Reina S. Buenconsejo, **J. Behrens**, Susannah V. Howieson. "[Current Status and Future of Space Nuclear Power.](#)" Presentation at Nuclear and Emerging Technologies for Space, American Nuclear Society, Las Vegas, NV, Feb. 2018.
- 2018 Reina S. Buenconsejo, Susannah V. Howieson, **J. Behrens**, and Bhavya Lal. "[Evolution of the Space Nuclear Launch Safety Review Process.](#)" Presentation at Nuclear and Emerging Technologies for Space, American Nuclear Society, Las Vegas, NV, Feb. 2018.

- 2018 Susannah V. Howieson, Reina S. Buenconsejo, Bhavya Lal, and **J. Behrens**. [“Legal Requirements of Nuclear Launch Approval.”](#) Presentation at Nuclear and Emerging Technologies for Space, American Nuclear Society, Las Vegas, NV, Feb. 2018.
- 2017 **J. Behrens**, Bhava Lal. “Trends in the Global Small Satellite Ecosystem.” Presentation at 68th International Astronautical Congress (IAC), Adelaide, Australia, 25-29 Sep. 2017.
- 2017 Bhava Lal, **J. Behrens**. “A Theoretical Construct to Assess the Role of Government in Supporting the Small Satellite Sector.” Presentation at 68th International Astronautical Congress (IAC), Adelaide, Australia, 25-29 Sep. 2017.

## MENTEE PRESENTATIONS

\*Denotes individuals mentored by J. Behrens

- 2023 \*Nadia Barbo. “Toxicity of an Urban Creek: Effects of Developmental Exposure to Water from Ellerbe Creek Watershed on Zebrafish Swimming Behavior.” Duke Nicholas School Masters Oral Defense Showcase, Durham, NC May 2023.
- 2023 \*Rithik Castelino, \*Caroline Dear, “A City and Its River: Contaminant Risk in Durham's Ellerbe Creek Watershed.” Invited Flash Talk at the Fortin Foundation Bass Connections Showcase, Durham, NC, April 2023.  
*Full project team awarded “Best Interactive Display” at both 2022 and 2023 Showcases*
- 2022 \*Rena Ouyang, **J. Behrens**, Emily S. Bernhardt. “A Tale of Two Rivers: The Ecological Story of 3,000 Macroinvertebrates.” Poster at the Biological Sciences Undergraduate Research Fellowship Showcase, Durham, NC, Aug. 2022.
- 2022 \*Jack Tsenane, \*Ryan Yu, \*Joanna Huertas, **J. Behrens**. “A City and its River.” Poster at the Duke Data+ Showcase, Durham, NC, Aug. 2022.
- 2021 \*Xitlali Ramirez, **J. Behrens**, Emily Bernhardt. “Watershed Development Negatively Impacts Aquatic Insect Diversity and Ecosystem Health in Urban Rivers.” Poster at the Biological Sciences Undergraduate Research Fellowship Showcase, Durham, NC, Aug. 2021.

## ACADEMIC SERVICE

- Duke Graduate Student Union**, Organizing Committee & Membership/Data Lead 2019-present  
*Develop new structures, policies, and trainings to manage the data of and organize a 2,200-person bargaining unit.*
- Ellerbe Watershed Association**, Volunteer 2021-present  
*Lead nature walks with community members through Ellerbe Creek, educating on urban stream ecology and wildlife*
- Duke Water Network**, Board Member (Ph.D. Representative) 2021-present  
*Organize and communicate professional development opportunities with committee of professional and graduate students.*
- Duke Ecology Programming Committee** 2021-present  
*Plan and organize academic program and logistics for the annual ecology retreat and symposium.*
- Duke Biology Graduate Steering Committee**, President 2020-2022  
*Liaison between graduate students and department leadership. Established graduate committee to synthesize input for department's decadal review. Facilitated welcome events for incoming graduate students.*
- Society for Freshwater Science Student Committee**, Virtual Event Coordinator 2020-2021  
*Organize and facilitate virtual events with student members of the society during COVID lockdown.*

## PROFESSIONAL MEMBERSHIPS

Ecological Society of America, Society of Environmental Toxicology and Chemistry, Society for Freshwater Science, Water Environment Federation

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## RESEARCH and ACADEMIC AWARDS

2023	ESA Katherine S. McCarter Graduate Student Policy <a href="#">Award</a>
2021	NSF Graduate Research Fellowship Program, Honorable Mention
2021	Society for Env Toxicology and Chemistry, Student Conference Travel Award
2021	EmCON Student Poster Award, Royal Society of Chemistry
2019	NSF Graduate Research Fellowship Program, Honorable Mention
2015	NSF BIO/Ocean Sciences REU Travel Scholarship (\$1,000)
2015	NSF REU: Scripps Undergraduate Research Fellowship (\$5,000 + housing)