

Kristen A. Bretz, Ph.D.  
kabretz@vt.edu · (336) 413-3878

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## ***Education***

**Virginia Polytechnic Institute and State University**, Blacksburg, VA  
Doctor of Philosophy in Biological Sciences, Spring 2023  
Interfaces of Global Change Fellow

**University of North Carolina at Chapel Hill**  
Gillings School of Global Public Health  
Master of Science in Environmental Sciences and Engineering, 2012

**Wake Forest University**, Winston-Salem, NC  
Bachelor of Arts, double major in Biology and Philosophy, 2009

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## ***Professional Experience***

### **Environmental Scientist II (Monitoring Specialist – Water)**

Virginia Department of Environmental Quality, Salem, VA  
May 2022 – May 2023

- Analyzed water quality monitoring data and collaborated with field biologists and data science staff to improve workflows, including development of applications to better access and analyze data for state regulatory users.
- Provided technical guidance on program reports pertaining to water quality data inventory and monitoring.

### **Program Coordinator**

Iowa State University, Center for Food Security & Public Health, College of Veterinary Medicine  
*Cooperative Agreement*: USDA Veterinary Services, Surveillance, Preparedness, & Response Services  
Raleigh, NC

September 2015—September 2018

- Coordinated program reporting during veterinary public health emergencies in partnership with USDA, rapidly turning out situation reports for Federal leadership as well as continuously updated guidelines for stakeholders to use in the field.
- Handled and analyzed large, sensitive datasets related to ongoing outbreaks. Recommended policy updates from changes in data trends.
- Published and reviewed publicly available emergency preparedness reports in partnership with public and private subject matter experts to ready the Federally-coordinated response to foreign animal disease outbreaks, ensuring consistency with changing program objectives.

### **Process Editor**

*BioResources*

North Carolina State University, Department of Forest Biomaterials, Raleigh, NC

September 2014—September 2015

- Edited original research manuscripts for English grammar and style to prepare them for publication.
- Advised non-native English-speaking authors on scientific writing to help them understand the changes made to their submissions.

### **Communications Contractor**

Wake County Public Information Office/Human Services, Raleigh, NC

June 2014–November 2014

- Coordinated public messaging and internal communication between county health agency and County Commissioners office. Wrote public statements for commissioner appearances.

### **Project Lead**

LMI

Contract with USDA APHIS Veterinary Services, National Preparedness and Incident Coordination

Riverdale, MD

June 2013–June 2014

- Created and updated animal health emergency preparedness and response guidelines for USDA. Foreign Animal Disease Preparedness and Response (FAD PReP) library; maintained FAD PReP web resources.
- Became responsible for managing contract and relationship with the client after just 6 months.

### **Contract Editor**

American Journal Experts; Dobson, NC (remote position)

December 2012–May 2013

- Edited and reviewed scientific manuscripts on including microbiology, chemistry, and environmental science.

### **Veterinary Assistant**

Timbercreek Veterinary Hospital; Jonesville, NC

Summer 2009

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## ***Research Experience***

### **Graduate Research Assistant**

Virginia Tech, Department of Biological Sciences, Blacksburg, VA

May 2019–August 2020; Summer 2021 and 2022

- Planned, executed, and published original research projects in freshwater biogeochemistry and how carbon cycling and hydrology in ecosystems is affected by global change.
- Mentored students from initially assisting with research through becoming co-authors on multiple publications.

### **Research Assistant**

UNC Chapel Hill, Department of Environmental Sciences and Engineering; Chapel Hill, NC

January 2010–August 2012

- Conducted field and laboratory experiments on greenhouse gas emissions and arctic lake biogeochemistry leading to publication.
- Organized laboratory operations in and between Chapel Hill and a remote Alaskan field station.

### **Intern**

Developing Energy Leaders Through Technology

UNC Institute for the Environment & UNC Department of Geological Sciences; Chapel Hill, NC

January 2012–April 2012

- Managed an undergraduate research team developing a renewable energy outreach strategy.

### **Laboratory Assistant**

Wake Forest University Department of Biology; Winston-Salem, NC

July 2008—May 2009

- Preserved animal study specimens; trained new employees in preparation techniques.

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## ***Teaching and Outreach Experience***

### Virginia Tech

#### **Graduate Teaching Assistant**

- Neuroscience and Society, Spring 2023
- Plant Biology: Fall 2022
- Principles of Biology, BIOL 1105: Fall 2022
- Evolutionary Biology: Spring 2022
- Principles of Biology Laboratory, BIOL 1115: Fall 2018, Fall 2020
- Principles of Biology Laboratory, BIOL 1116: Spring 2019, Spring 2021

### Other

#### **Scientist Advisor**

Michigan Tech, Department of Computer Science, User Interfaces & Human-Computer Interactions CS4760: Spring 2021

- Led a team of 5 undergraduate programmers in developing an application for concurrent tracking of trail usage and stream health at a park in Blacksburg

#### **Intern**

US Fish and Wildlife Service & Kenai Watershed Forum; Soldotna, AK

August 2012—December 2012

- Developed and delivered outreach materials and educational programming on stream science.

#### **Outreach Intern**

North Carolina Aquarium on Roanoke Island; Manteo, NC

Summer 2007

#### **Counselor**

YMCA/Communities in Schools After School Programs; Winston-Salem, NC

September 2007—May 2007

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## ***Publications***

### Peer-reviewed publications

**Bretz, K.A.**, Murphy, N.M., and Hotchkiss, E.R. 2022. Carbon biogeochemistry and export governed by flow in a non-perennial stream. *Water Resources Research*, In Revision.

**Bretz, K.A.**, Jackson, A.R., Rahaman, S., Monroe, J.M., and Hotchkis, E.R. 2021. Integrating Ecosystem Patch Contributions to Stream Corridor Carbon Dioxide and Methane Fluxes. *Journal of Geophysical Research: Biogeosciences*, 126, e2021JG006313. <https://doi.org/10.1029/2021JG006313>.

Lakoba, V., Wind, L., DeVilbiss, S., Lofton, M., **Bretz, K.**, Weinheimer, A., Moore, C., Baciocco, C., Hotchkiss, E., and Hession, W.C. 2020. Salt Dilution and Flushing Dynamics of an Impaired Agricultural–Urban Stream. *ACS ES&T Water*. <http://dx.doi.org/10.1021/acsestwater.0c00160>

**Bretz, K.A.** and Whalen, S.C. 2014. Methane cycling dynamics in sediments of Alaskan Arctic Foothill lakes. *Inland Waters* 4(1): 65–78. <http://dx.doi.org/10.5268/IW-4.1.637>

## Other publications

- Mogan, J.P., Allen, H., and **Bretz, K.A.** 2016. NAHEMS Guidelines: Biosecurity. USDA Foreign Animal Disease Preparedness and Response Plan.  
[https://www.aphis.usda.gov/animal\\_health/emergency\\_management/downloads/nahems\\_guidelines/fadprep\\_nahems\\_guidelines\\_biosecurity.pdf](https://www.aphis.usda.gov/animal_health/emergency_management/downloads/nahems_guidelines/fadprep_nahems_guidelines_biosecurity.pdf)
- Mogan, J.P., Allen, H., and **Bretz, K.A.** 2016. NAHEMS Guidelines: Quarantine and Movement Control. USDA Foreign Animal Disease Preparedness and Response Plan.  
[https://www.aphis.usda.gov/animal\\_health/emergency\\_management/downloads/nahems\\_guidelines/nahems\\_qmc.pdf](https://www.aphis.usda.gov/animal_health/emergency_management/downloads/nahems_guidelines/nahems_qmc.pdf)
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## **Presentations**

- K.A. Bretz.** 2023. A Very Quick Introduction to Non-Perennial Streams. Invited presentation to the Virginia Department of Environmental Quality R Conference. Charlottesville, VA.
- E.R. Hotchkiss. & K.A. Bretz.** 2022. Warming waters, whole-ecosystem metabolism, and carbon fate in streams. American Geophysical Union. Chicago, IL. Invited talk in special session.
- K.A. Bretz,** N.M. Murphy, B.R. Niederlehner, and E.R. Hotchkiss. 2022. How does stream intermittency drive carbon emissions and transport? Poster Presentation. Joint Aquatic Sciences Meeting, Grand Rapids, MI.
- K.A. Bretz.** 2022. Variably Inundated Inland Streams. Invited presentation to the Variably Inundated Environments Workshop hosted through Pacific Northwest National Laboratory.
- K.A. Bretz** and E.R. Hotchkiss. 2022. Headwater stream network connectivity: biogeochemical consequences and carbon fate. Invited presentation to Oak Ridge National Laboratory Working Group.
- K.A. Bretz,** J.P. Gannon, and E.R. Hotchkiss. 2021. Metabolic patterns of non-perennial temperate forest streams. American Geophysical Union Fall Meeting, New Orleans, LA.
- N. Murphy, K.A. Bretz,** and E.R. Hotchkiss. 2021. Spatial Variability of Microbial Metabolism in Mining-Impacted and Reference Streams. Summer Undergraduate Research Symposium
- K.A. Bretz,** N. Murphy, and E.R. Hotchkiss. 2021. Stream fragmentation disrupts carbon emissions and transport. Society for Freshwater Science Annual Meeting.
- E.R. Hotchkiss,** C. Braswell, **K.A. Bretz,** A. Gray, C. López Lloreda, L. Morris, N. Murphy, B. Onozuka, K. Pérez Rivera, and S. Plont. 2021. A global assessment of organic carbon metabolism and spiraling in running waters. Society for Freshwater Science Annual Meeting.
- K.A. Bretz,** A.R. Jackson, S. Rahman, J.M. Monroe, and E.R. Hotchkiss. 2020. Integrating ecosystem patch contributions to stream corridor carbon dioxide and methane fluxes. Poster Presentation. American Geophysical Union Fall Meeting.
- A.R. Jackson, K.A. Bretz,** and E.R. Hotchkiss. 2020. Sinks and Sources: The Dynamic Contributions of Riparian Wetlands to Catchment Carbon Budgets. American Geophysical Union Fall Meeting.
- V. Lakoba, L. Wind, S. DeVilbiss, M. Lofton, K. Bretz, A. Weinheimer, C. Moore, C. Baciocco, E. Hotchkiss,** and W. C Hession. 2020 Salt Dilution and Flushing Dynamics of an Impaired Agricultural–Urban Stream. Interfaces of Global Change Fall Forum, Invited Talk.
- J.M. Monroe, K.A. Bretz,** and E.R. Hotchkiss. 2020. Stream Intermittency Alters Microbial Metabolism and Functional Diversity. Dennis Dean Undergraduate Research Symposium. A.
- Jackson, K.A. Bretz,** and E.R. Hotchkiss. 2020. Sinks and sources: the dynamic contributions of riparian wetlands to carbon emissions. Dennis Dean Undergraduate Research Symposium.
- K.A. Bretz,** J.M. Monroe, and E.R. Hotchkiss, 2020. Stream  $p\text{CO}_2$  and microbial metabolic potential in two forested mountain streams. Poster presentation. Biological Sciences Research Day.
- J.M. Monroe, K.A. Bretz,** and E.R. Hotchkiss. 2019. Microbial metabolic fingerprints of tributary streams. Virginia Tech Undergraduate Summer Research Symposium.
- A. Jackson, K.A. Bretz,** and E.R. Hotchkiss. 2019. Wetlands in a warming world: The importance of

wetlands in headwater carbon cycling. Virginia Tech Undergraduate Summer Research Symposium.

Hotchkiss, E.R., S. Plont, B. O'Donnell, M. Gallagher, & **K. Bretz**. 2019. Integrating diel patterns in dissolved oxygen, carbon dioxide, and methane for an improved understanding of respiration regimes in streams. Society for Freshwater Science. Salt Lake City, UT.

J.M. Monroe, **K.A. Bretz**, and E.R. Hotchkiss. 2019. The effects of hydrologic variations on microbial carbon-substrate metabolism. Poster presentation. Dennis Dean Undergraduate Research and Creative Scholarship Conference.

**K.A. Bretz** and E.R. Hotchkiss. 2019. Expanding and contracting headwater stream networks: biogeochemical consequences and carbon fate. Poster presentation. Biological Sciences Research Day.

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### ***Grants Funded***

Virginia Water Resources Research Center, Student Competitive Grant. 2021. "Biological controls on water quality in contracting and expanding headwater streams." \$4779

NSF REU Supplement. 2019. "Collaborative Research: Headwater stream networks in a warming world: predicting heterotrophic ecosystem function using theory, multi-scale temperature manipulations and modeling." (NSF 1918584). \$7925. Awarded to E. Hotchkiss; written by E. Hotchkiss and **K. Bretz**.

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### ***Honors and Awards***

Robert Patterson Scholarship, Department of Biological Sciences, VT, 2022-2023

AGU Hydrology Section Award: Haiku Your Research 2<sup>nd</sup> Place, Fall Meeting 2020

Society for Freshwater Science General Endowment Award, 2020

William R. Walker Fellowship Award, Virginia Water Resources Research Center, 2019

Sullivan Scholarship for Undergraduate Research, WFU, 2008

Edward M. Armfield Scholarship, WFU, 2005–2009

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### ***Mentoring***

Undergraduate Students Mentored

- Carmen Curry, Spring 2023: Technician
- Kelly Crum, Fall 2021: Technician
- Morgan Wood, Summer 2021: Technician, independent research project
- Natalie Murphy, Fall 2019–Summer 2021: Field study, independent research project
- Alexis Jackson, Summer 2019: REU Fellow
- Jack Monroe, Spring 2019–present: Field study, independent research project
- Emily Byrd, Fall 2018: Field study

Other training

- Hokie Wellness, VT Recovery Community Workshop: Recovery Ally Training, June 2021
- Virginia Tech Office of Undergraduate Research Workshop: Mentoring Undergraduates in Research, January 2021

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## **Service**

### Articles Reviewed

- 2023
  - 1 – *Freshwater Biology*
- 2022
  - 1 – *Nature Communications*
- 2021
  - 1 – *Limnology and Oceanography* (co-reviewed with Dr. Erin Hotchkiss)

### Virginia Tech

- Girls on Outdoor Adventure for Leadership and Science (GALS), Virginia Tech chapter; July 2021–present
  - Proposal to the Blacksburg Junior Women’s Club funded for \$400
  - Proposal to the Virginia Outdoors Foundation funded for \$1500
- Department of Biological Sciences Graduate Mentorship Committee; 2021-2022
- Stream Team Peer Mentorship Program Co-lead; 2021-2022
- Biology Graduate Students Association Treasurer; 2020–2021
- Interfaces of Global Change Graduate Student Organization Treasurer; 2019–2020
- Virginia Tech Science Festival; November 16, 2019
- Research Day Committee; October 2018–February 2020

### Professional Societies

- **Society for Freshwater Science** Student Resources Subcommittee for the Student-Mentor Mixer; August 2020–June 2021
- Volunteer Reader, **Society for Freshwater Science** Strategic Plan Project “Audio Scientific Literature: Increasing Accessibility and Promoting Inclusivity in Science”; August 2020
- **Consortium of Universities for the Advancement of Hydrologic Science, Inc.**, Student Advisor Group; July 2020–August 2021

### Other Service

- Poverty Creek Trails Coalition
  - Board member (Communications and Marketing Lead): August 2022–present
  - Trail Crew: Spring 2019–present
- Renew the New (River Cleanup); 2018-2019
- Volunteer, North Carolina Museum of Science, Raleigh, NC; July 2016–August 2018
- Volunteer and Foster, Wake County Animal Center, Raleigh, NC; March 2015–September 2018
- Engineers Without Borders, Daniel Okun Chapter, Chapel Hill, NC; January 2010–August 2012