

# Chelsea C. Clifford

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## Education

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- Duke University, Durham, NC 2018
  - [PhD, Environmental Science and Policy](#), Nicholas School of the Environment; Dissertation: “Ecological Limitations and Potentials of Artificial Aquatic Ecosystems.” Advisor: Dr. James B. Heffernan 2018
  - [Certificate of College Teaching](#), Duke Graduate School 2018
- [B.A., Biology](#), Carleton College, Northfield, Minnesota 2010

## Professional Appointments

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- [Coastal Scientist](#), Virginia Institute of Marine Science, Gloucester, VA 2024-2025
- [Post-Doctoral Research Associate](#), Iowa State University Agricultural & Biosystems Engineering, Ames, IA 2019-2023
- Duke University Nicholas School of the Environment, Durham, NC 2013-2018
  - [PhD Candidate](#) 2016-2018
  - [Teaching Assistant](#) 2014-2016
  - [PhD Student](#) 2013-2016
- Chesapeake Environmental Communications, Gloucester, VA 2011-2013
  - [Data Analyst](#) 2012-2013
  - [Communications Assistant](#) 2011-2012
- [Monitoring Assistant](#), The Nature Conservancy, Charlottesville, VA 2011
- MacArthur Agro-Ecology Research Center, Lake Placid, FL 2010-2011
  - [Research Assistant III](#) 2011
  - [Research Assistant II](#) 2010
- Carleton College, Northfield, MN 2006-2010
  - [Teaching Assistant, Biology](#) 2010
  - [Cole Student Naturalist, Arboretum](#) 2008-2010
- [Seasonal Interpretive Ranger](#), Virginia Department of Conservation and Recreation, Surry, VA 2009
- [Lab Aide](#), White Mountain Research Station/Center, Bishop, CA 2008

## Publications

- Seth, J.B; [Clifford, C.C.](#); Helmers, M.J. “[11-Year Study of Cropping System Influence on Subsurface Drainage Flow in Central Iowa.](#)” In prep.
- [Clifford, C.C.](#); Holmquist, J.G.; Voss, K.; Schmidt Gengenbach, J.; Heffernan, J.B. “[Urban ditches and natural creeks house similar invertebrate communities in a](#)” In prep.

- minimally developed California watershed.”
- [Clifford, C.C.](#) “Disability in ecology and evolution.” *Trends in Ecology and Evolution*. TrendsTalk. Submitted
  - [Clifford, C.](#); Bieroza, M.; Clarke, S.J.; Pickard, A.; Stratigos, M.J.; Hill, M.J.; Raheem, N.; Tatariw, C.; Wood, P.J.; Arismendi, I.; Audet, J.; Aviles, D.; Bergman, J.N.; Brown, A.G.; Burns, R.E.; Connolly, J.; Cook, C.; Crabot, J.; Cross, W.F.; Dean, J.F.; Evans, C.D.; Fenton, O.; Friday, L.; Gething, K.J.; Giannico, G.; Habib, W.; Hasselquist, E.M.; Heili, N.M.; van der Knaap, J.; Kosten, S.; Law, A.; van der Lee, G.H.; Mathers, K.L.; Morgan, J.E.; Rahimi, H.; Sayer, C.D.; Schepers, M.; Shaw, R.F.; Smiley, P.C.; Speir, S.L.; Strock, J.S.; Struik, Q.; Tank, J.L.; Wang, H.; Webb, J.R.; Webster, A.J.; Yan, Z.; Zivec, P.; Peacock, M. “Lines in the landscape.” *Communications Earth and Environment* 2025, 6(1), 693. 2025  
<https://doi.org/10.1038/s43247-025-02699-y>
  - Richter, D.D.; Billings, S.A.; Brantley, S.L.; Gaillardet, J.; Markewitz, D.; Schlesinger, W.H.; Amundson, R.; Ashley, G.M.; Bacon, A.R.; Bales, R.C.; Binkley, D.; Brecheisen, Z.; Calvo-Alvarado, J.; Cassar, N.; [Clifford, C.](#); Derry, L.A.; Edgeworth, M.; Eppes, M.; Fan, Y.; Ferguson, T.A.; de Graaff, M.; Handelsman, J.; Hartemink, A.E.; Hofmockel, K.; Huggett, R.J.; Jobbagy, E.G.; Kim, H.S.; Krishnaswamy, J.; Kumar, P.; Lozier, S.; Lu, L.; McDowell, W.H.; McNeill, J.R.; Oh, N.; O’Neill, K.; Prendergast, M.E.; Richardson, C.J.; Richardson, J.B.; Schroeder, P.A.; Scow, K.; Siebe, C.; Thompson, A.; White, T.; Whitlock, C.L.; Wolf, M. “Earth Sciences Are the Model Sciences of the Anthropocene.” *Perspectives of Earth and Space Scientists* 2024, 5(1). 2024  
<https://doi.org/10.1029/2024CN000237>
  - Waring, E.R.; Pederson, C.H.; Lagzdinš, A.; [Clifford, C.C.](#); Helmers, M.J. “Water and soil quality respond to no-tillage and cover crops differently through 10 years of implementation.” *Agriculture, Ecosystems & Environment*, 2024, 360, 108791. 2024  
<https://doi.org/10.1016/j.agee.2023.108791>
  - [Clifford, C.C.](#); Waring, E.R.; Pederson, C.H.; Helmers, M.J. “Corn yield increase under constant fertilizer did not reduce nitrate export.” *Advances in Drainage: Selected Works from the 11th International Drainage Symposium. Journal of the ASABE* 2023, 66(5). <https://doi.org/10.13031/ja.15538> 2023
  - [Clifford, C.C.](#); Heffernan, J.B. “North Carolina Coastal Plain ditch types support distinct hydrophytic communities.” *Wetlands* 2023, 43(5), 56. 2023  
<https://doi.org/10.1007/s13157-023-01703-5>
  - [Clifford, C.C.](#); Heffernan, J.B. “Survey of North Carolina Coastal Plain Ditches for Wetland Characteristics, 2015 ver 1.” *Environmental Data Initiative*. <https://doi.org/10.6073/pasta/e990bec9b635714f8ab9bad1c0bfe05c> 2023
  - [Clifford, C.C.](#); Heffernan J.B. “Artificial Aquatic Ecosystems.” *Water* 2018, 10(8), 1096. <https://doi.org/10.3390/w10081096> 2018
  - Kohman, M.M.; Fraisse, C.W.; [Clifford, C.C.](#); Bohlen, P.J. “The Carbon Footprint for Florida Beef Cattle Production Systems: A Case Study with Buck Island Ranch.” *The Florida Cattleman*. March 2011

## Presentations

- [Clifford, C.C.](#); Kirwan, M. “Mowing supports native high marsh plant communities on Tangier Island.” 28th Biennial Coastal and Estuarine Research Federation Conference. Coastal and Estuarine Research Federation. Richmond, VA. Accepted, 13 Nov. 2025
- [Clifford, C.C.](#) “The underappreciated importance of ditches as diverse ecosystems.” MMM Stream Team Seminar Series. Oregon State University College of Agricultural Sciences Department of Fisheries, Wildlife, and Conservation Sciences. Invited, 10 Nov. 2025

- Virtual.
- [Clifford, C.C.](#); Glasgow, N., Brown, D.A., Harpole, T. “[Ditches of Rosewell.](#)” York River Watershed Symposium. Chesapeake Bay National Estuarine Research Reserve, VA. Gloucester Point, VA. 14 May 2025
  - [Clifford, C.C.](#) “[Artificial aquatic ecosystems, ditch benthic macroinvertebrates, wetland plant communities.](#)” Raising the Profile of Ditch Research. University of Liverpool School of Environmental Sciences Department of Geography and Planning. Liverpool, England. 8 Mar. 2023
  - [Clifford, C.C.](#); Heffernan, J.B. “[North Carolina Coastal Plain ditches unrecognized as novel wetlands despite visibility.](#)” Joint Aquatic Sciences Meeting. Grand Rapids, MI. 16 May 2022
  - Seth, J. B.; [Clifford, C.C.](#); Helmers, M.J. “[11-Year Study of Cropping System Influence on Subsurface Drainage Flow in Central Iowa.](#)” Poster. 2021
    - AGU Fall Meeting. American Geophysical Union. New Orleans, LA. 17 Dec. 2021
    - 76<sup>th</sup> Soil and Water Conservation Society International Annual Conference. Soil and Water Conservation Society. Virtual. 26-28 Jul. 2021
    - Iowa Water Conference. Iowa State University. Virtual. 6-8 April 2021
  - [Clifford, C.C.](#); M.J. Helmers. “[Consistent fertilizer application increased corn yields without change in nitrate export.](#)” 2021
    - 2022 International Drainage Symposium. Soil and Water Conservation Society. Des Moines, IA. 2 Sep. 2022
    - 76<sup>th</sup> Soil and Water Conservation Society International Annual Conference. Soil and Water Conservation Society. Virtual. 28 Jul. 2021
    - Poster. Iowa Water Conference. Iowa State University. Virtual. 6-8 April 2021
  - [Clifford, C.C.](#); M.J. Helmers. “[Tile Drainage Increased Flashiness and Nitrate Concentrations in Midwestern Streams.](#)” Society for Freshwater Science Annual Meeting. Society for Freshwater Science. Virtual. 2021
  - [Clifford, C.C.](#) “[Ecological Limitations and Potentials of Artificial Aquatic Ecosystems.](#)” University of Oklahoma Department of Biology Seminar. 24 Oct 2018
  - [Clifford, C.C.](#); J.B. Heffernan. “[Similar processes explain water quality in artificial and natural US lakes.](#)” Society for Freshwater Science Annual Meeting. Society for Freshwater Science. Detroit, MI. 24 May 2018
  - [Clifford, C.C.](#); J.B. Heffernan. “[North Carolina Coastal Plain ditch types support distinct hydrophytic communities.](#)” Society for Freshwater Science Annual Meeting. Society for Freshwater Science. Raleigh, NC. 8 Jun. 2017
  - [Clifford, C.C.](#); J.B. Heffernan. “[Cultural Biases Limit Ecosystem Services Provided by Ditches and Connected Ecosystems.](#)” 2017 AWRA Spring Specialty Conference: Connecting the Dots: The Emerging Science of Aquatic System Connectivity. American Water Resources Association. Snowbird, UT. 2 May 2017
  - [Clifford, C.C.](#); A.J. Felson. “[Introduction to the Earth Stewardship Initiative Demonstration Projects.](#)” Novel Ecosystems in the Anthropocene. Ecological Society of America. Fort Lauderdale, FL. 12 Aug. 2016
  - [Clifford, C.C.](#); J.B. Heffernan. “[What drives wetland structure in ditches?](#)” Novel Ecosystems in the Anthropocene. Ecological Society of America. Fort Lauderdale, FL. 10 Aug. 2016
  - [Clifford, C.C.](#); J.B. Heffernan. “[Ditch types host different plant communities with similar wetland indicator statuses.](#)” 2016
    - North Carolina Wetlands Symposium. Duke University. Durham, NC. 4 Mar. 2016
    - Freshwater in the North Carolina Coastal Plain: Understanding and Preparing for 21st Century Challenges. North Carolina State University Water Resources Research Institute. New Bern, NC. 16 Feb. 2016
  - [Clifford, C.C.](#) “[Anthropogenic Ecosystems Have Conservation Potential.](#)” Joint 14 Nov. 2015

- Ecology / Marine Lab Symposium. Beaufort, NC.
- [Clifford, C.C.](#); J.G. Holmquist; J. Schmidt Gengenbach; J.B. Heffernan. "[Ecosystem artificiality does not impact aquatic communities.](#)" Ecological Science at the Frontier. Ecological Society of America. Baltimore, MD. 13 Aug. 2015
  - Clifford, C.C.; J. B. Heffernan. "[Artificial Aquatic Systems.](#)" Connections in Ecology. Duke University. Beaufort, NC. 17 Apr. 2015
  - [Clifford, C.C.](#); J.G. Holmquist; J. Schmidt Gengenbach; J.B. Heffernan. "[Artificial vs. natural streams: an invertebrate case study from Bishop, California.](#)" Poster. 2014
    - Joint Aquatic Sciences Meeting. Portland, OR. May 22, 2014
    - Ecology Across Scales. Duke University. Durham, NC. Mar. 21, 2014
    - Water Resources Research Institute Annual Conference. NCSU. Raleigh, NC. Mar. 19, 2014
  - [Clifford, C.C.](#); E.H. Boughton; P.J. Bohlen; P. Quintana-Ascencio; H. Swain. "[Florida ranch wetland plant community response to increased water.](#)" Poster. Mar. 27, 2011  
Southeastern Ecology and Evolution Conference. Auburn University.

## Teaching

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- Virginia Institute of Marine Science
  - Guest lecturer ("Human Impacts/Management") and final project coordinator in MSCI 631, "[Wetland Ecogeomorphology](#)" Spring 2025
- Duke University
  - Environ. 646, "[Urban Ecology](#)"
    - Taught "Human Ecology" section Spring 2018
    - Teaching assistant Fall 2015
  - Teaching assistant for Environ. 102, "[Introduction to Environmental Sciences and Policy](#)" Spring 2016
  - Teaching assistant for Environ. 217, "[Restoration Ecology](#)," within Duke Immerse "Urban Environmental Justice and Social Entrepreneurship" Spring 2015
  - Teaching assistant for Environ. 714, "[Landscape Ecology](#)" Fall 2014
- Carleton College
  - Teaching assistant for BIO 353, "[Population Ecology Lab](#)" Spring 2010

## Mentorship

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- William and Mary undergraduate researchers S. Baker and L. Shriner 2024-present
- Iowa State University undergraduate researchers
  - Seth, J. "[11-Year Study of Cropping System Influence on Subsurface Drainage Flow in Central Iowa.](#)" 2020-present
  - Bishop, D. "[Bioreactor Nitrogen Removal Response to Temperature.](#)" 2022-2023
  - Tong, L. and Faheem, S. "[Flashiness in Drainage Water Management.](#)" 2020-2023
- Duke University high school researcher Malladi, S. 2016

## Honors

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- Publication "Artificial Aquatic Ecosystems" (Clifford and Heffernan 2018) re-printed in Special Issue "[10<sup>th</sup> Anniversary of Water](#)," and awarded [Editor's Choice](#) 2018
- [Anthropocene Farm Fellowship](#), The Kenan Institute for Ethics 2018
- [Duke University Wetland Center Graduate Student Research Support Grant](#) 2017
- [Earth Stewardship Research Fellowship](#), Earth Stewardship Initiative 2014

- Graduate Research Fellowship, National Science Foundation
- Kolenkow-Reitz Fellowship, Carleton College

2013  
2009-2010

## Service/Leadership

• Virginia Master Naturalist, Middle Peninsula Chapter	2025-present
• Founder, Ditch-Integrating Transdisciplinary Collaboration Hub	2022-present
• Session Convener, “Ditches and Other Artificial Aquatic Ecosystems: Structure, Function, and Services,” AGU23, American Geophysical Union	2023
• Judge, State Science and Technology Fair of Iowa	2023
• Scientist, Skype A Scientist	2020
• Duke Women in Science and Engineering	
◦ Sci-Fi Book Club Coordinator	2016-2018
◦ Social Media Editor	2014-2017
• Scientist, Science Research Education Networking Triangle	2014-2018
• Scientist, Durham County Environmental Field Day	2017
• Judge, North Carolina Student Academy of Sciences	2013-2017
• Nicholas PhD Advocacy Council	
◦ Environment Representative, Webmaster	2016-2017
◦ Coordinator, Nicholas School Graduate Afternoon Seminar	2015-2016
• Volunteer steward, Friends of the Mountain-to-Sea Trail	2014-2016
• STEM Days volunteer, Museum of Life and Science	2016
• Duke STEM/MAT Network	2016
• Founder/Coordinator, Duke Nature and People	2015-2016
• Scientist, NC Science Festival Invite-a-Scientist	2014-2015
• Coordinator, Duke River Center Chalk Talks	2015
• Volunteer steward, Ellerbe Creek Watershed Association	2013-2015
• Mentor, Durham Women and Math	2013-2014
• Gloucester Blueways Committee	2012-2013
• Naturalist, Kids Kayak and Conservation Camp	2012-2013
• Naturalist, Beaverdam Parks Spring Festival	2013
• Geologist, Girl Scout Math and Science Day	2010
• Volunteer steward, Carleton College Arbor	2006-2009
• Volunteer trail maintainer, California Backcountry Horsemen	2008

## Certifications

Virginia DGIF Boater Education	2012
Virginia Master Naturalist	2012
PADI Open Water Diver	2010
US (Currently Virginia) Driver’s License	2006

## Affiliations/Memberships

American Geophysical Union	2017, 2023
Ecological Society of America	2014-2016, 2023
Society for Freshwater Science	2017-2018, 2021-2023
American Water Resources Association	2017
Graduate Women in Science (Rho Tau)	2014-2016
North Carolina Association of Water Resources	2014-2016
Sigma Xi	2010-2016