

# 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-present
- [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 Center, Bishop, CA 2008

## Publications

- [Clifford, C.C.](#); Bieroza, M.; Clarke, S.J.; Pickard, A.; Stratigos, M.; Anderson, O.; Arismendi, I.; Audet, J.; Aviles, D.; Bergman, J.; Boyle, J.; Brown, A.; Burns, R.E.; Carlson, E.; Cook, C.; Connolly, J.; Crabot, J.; Cross, W.; Dean, J.; Evans, C.; Fiege, M.; Fenton, O.; Gething, K.; Giannico, G.; Habib, W.; Halls, J.; Hasselquist, E.M.; In prep.

Heili, N.; Hill, M.; Kaiser, K.; Kosten, S.; Law, A.; Mathers, K.; Mazor, R.; Molino, G.D.; Morgan, J.; Oosthuizen, S.; Raheem, N.; Ranaivoson, A.; Sayer, C.; Schepers, M.; Shaw, R.; Smiley, P.C.; Speir, S.; Strock, J.; Struik, Q.; Tank, J.; Tatariw, C.; van der Knaap, J.; van der Lee, G.; Wang, H.; Webb, J.; Webster, A.; Wood, P.; Yan, Z.; Zivec, P.; Peacock, M. “[Lines in the landscape: The underappreciated socio-ecological role of ditches.](#)”

- 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 minimally developed California watershed.](#)” In prep.
- “Earth Sciences Are the Model Sciences of the Anthropocene.” *Perspectives of Earth and Space Scientists* 2024, 5(1). <https://doi.org/10.1029/2024CN000237> 2024
- 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. <https://doi.org/10.1016/j.agee.2023.108791> 2024
- [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. <https://doi.org/10.1007/s13157-023-01703-5> 2023
- [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/e990bec9b635714f8ab9bad1e0bfe05c> 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.](#) “[Artificial aquatic ecosystems, ditch benthic macroinvertebrates, wetland plant communities.](#)” University of Liverpool Ditch Workshop. 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. 28 Jul. 2021  
Soil and Water Conservation Society. Virtual.
  - 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 Ecology / Marine Lab Symposium. Beaufort, NC. 14 Nov. 2015
- [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. Southeastern Ecology and Evolution Conference. Auburn University. Mar. 27, 2011

## Teaching

- Duke University
  - Environ 646, "[Urban Ecology](#)"

- Taught “Human Ecology” section Spring 2018
  - Teaching Assistant Spring 2016
- Environ 102, “[Introduction to Environmental Sciences and Policy](#),” as Teaching Assistant Fall 2015
- Environ. 217, “[Restoration Ecology](#),” within Duke Immerse “Urban Environmental Justice and Social Entrepreneurship,” as Teaching Assistant Spring 2015
- Environ 714, “[Landscape Ecology](#),” as Teaching Assistant Fall 2014
- Carleton College
  - Bio 353, “[Population Ecology Lab](#),” as Teaching Assistant Spring 2010

## Mentorship

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- Iowa State University undergraduate researchers
  - Bishop, D. “[Bioreactor Nitrogen Removal Response to Temperature](#).” 2022-present
  - Seth, J. “[11-Year Study of Cropping System Influence on Subsurface Drainage Flow in Central Iowa](#).” 2020-present
  - 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 2013
- [Kolenkow-Reitz Fellowship](#), Carleton College 2009-2010

## Service/Leadership

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- [Session Convener](#), “[Ditches and Other Artificial Aquatic Ecosystems: Structure, Function, and Services](#),” AGU23, American Geophysical Union 2023
- [Founder](#), [Ditch-Integrating Transdisciplinary Collaboration Hub](#) 2022-2023
- [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

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<a href="#">Virginia DGIF Boater Education</a>	2012
<a href="#">Virginia Master Naturalist</a>	2012
<a href="#">PADI Open Water Diver</a>	2010
<a href="#">US (Currently Iowa) Driver's License</a>	2006

### Affiliations/Memberships

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<a href="#">American Geophysical Union</a>	2017, 2023
<a href="#">Ecological Society of America</a>	2014-2016, 2023
<a href="#">Society for Freshwater Science</a>	2017-2018, 2021-present
<a href="#">American Water Resources Association</a>	2017
<a href="#">Graduate Women in Science (Rho Tau)</a>	2014-2016
<a href="#">North Carolina Association of Water Resources</a>	2014-2016
<a href="#">Sigma Xi</a>	2010-2016