

Gregory W. Characklis

Dept. of Environmental Sciences and Engineering
School of Public Health, Rosenau Hall, CB7431
University of North Carolina at Chapel Hill
Chapel Hill, NC 27599
Phone: (919) 843-5545
Email: charack@email.unc.edu

Research Center Website: <https://sph.unc.edu/cfres/center-on-financial-risk-in-environmental-systems/>

Education

- Ph.D. Environmental Science & Engineering, Rice University, Houston, TX, 1999.
- M.S. Environmental Science & Engineering, Rice University, Houston, TX, 1994.
- B.S. Materials Sci. & Engineering, Johns Hopkins University, Baltimore, MD, 1989.

Languages

Zertifikat Deutsch als Fremdsprache, Goethe Institut, 1991.

French coursework through the A2/B1 level (Common European Framework)

Professional Experience

- W. R. Kenan, Jr.
Distinguished
Professor* University of North Carolina at Chapel Hill, 2020 – present.
- Director* Center on Financial Risk in Environmental Systems, Gillings School of Global Public Health and UNC Institute for the Environment, University of North Carolina at Chapel Hill, 2017 – present.
- Editorial Board* *Water Security*, 2016 – present.
- Affiliate Professor* Montana State University, Dept. of Civil Engineering, 2016 – 2018
- Philip C. Singer
Distinguished
Professor* University of North Carolina at Chapel Hill, 2016-2020
- Editor* *Hydrology and Earth System Sciences*, 2013 - 2019.
- Visiting Professor* Eberhard Karls Universität Tübingen, Germany, Summer 2016.
- Professor* University of North Carolina at Chapel Hill, 2012 - 2016.

Professional Experience (cont'd)

<i>Director</i>	Center for Watershed Science and Management, Institute for the Environment, University of North Carolina at Chapel Hill, 2011-2017.
<i>Associate Professor</i>	University of North Carolina at Chapel Hill, 2007-2012.
<i>Visiting Professor</i>	École Polytechnique Fédérale de Lausanne (EPFL), Switzerland, 2010-2011.
<i>Associate Editor</i>	<i>Water Resources Research</i> , 2003-2010.
<i>Assistant Professor</i>	University of North Carolina at Chapel Hill, 2001-2007.
<i>Director</i>	Resource Development & Management, Azurix Corp. (a division of Enron Corp.), Houston, TX, 1999–2001.
<i>Fellow</i>	National Academy of Engineering, Washington, DC, 1997-1999.
<i>Visiting Scholar</i>	Van Hall Institute, Groningen, Netherlands, Summer 1994.
<i>Graduate Research Assistant</i>	Rice University, Houston, TX, 1992-1997
<i>Associate Scientist</i>	EG&G Idaho, Inc., Idaho National Laboratory (INL), Idaho Falls, ID, 1990–91.

Honors & Professional Activities

- Technical Advisory Group, North Carolina Flood Resiliency Blueprint, North Carolina Department of Environmental Quality, 2023-present.
- Awards Committee, Association of Environmental Engineering and Science Professors (AEESP), 2022-present.
- Representative, University of North Carolina, Consortium of Universities for the Advancement of Hydrologic Science, Inc. (CUAHSI), 2017-present.
- Advisory Board, North Carolina Policy Collaboratory, University of North Carolina at Chapel Hill, 2016-present.
- Outstanding Student Paper Award (Advisee: Rosa Cuppari), American Geophysical Union Fall Meeting, San Francisco, CA, 2023.
- Advisory Group, Strategic Engagement on National Water Resources, Institute of Water Resources, U.S. Army Corps of Engineers, 2020-2023.

Honors & Professional Activities (cont'd)

EOS Research Spotlight (Hamilton et al. 2022), American Geophysical Union, August 2022.

Board Member (elected), Consortium of Universities for the Advancement of Hydrologic Science, Inc. (CUAHSI), 2018-2021.

Association of Environmental Engineering and Science Professors (AEESP) Strategic Planning Steering Committee, 2020-21.

Steering Group, Hydro Research Foundation, 2016-2021.

Quentin Martin Award for Best Practice-Oriented Paper (Baum and Characklis 2020), *Journal of Water Resources Planning and Management*, American Society of Civil Engineers, 2021.

Best Publication in Natural Resources Award (Zeff et al. 2016), Institute for Operations Research and the Management Sciences (INFORMS), 2019.

Co-Chair, Workshop on Managing Financial Risks in Environmental Systems: Efficient and Sustainable Adaptation in the Face of Global Change, Hoover Institution, Stanford University, May 2019.

Co-Organizer, Water/Wastewater Regionalization and Partnership Workshop, Environmental Finance Center and Center on Financial Risk in Environmental Systems, University of North Carolina, Chapel Hill, NC, April 2019.

Service to the Profession Award, American Society of Civil Engineers (ASCE), Environment and Water Resources Institute, 2018.

Lead Organizer, International Workshop on Innovation in Modelling Coupled Natural Human Water Systems, Tübingen, Germany, 2017.

Outstanding Student Paper Award (Advisee: Rachel Baum), American Geophysical Union Fall Meeting, San Francisco, CA, 2016.

Co-Chair, UNC Environmental Programs Task Force, University of North Carolina at Chapel Hill, 2016.

Distinguished Service Award, Association of Environmental Engineering and Science Professors (AEESP), 2016.

President (elected), Association of Environmental Engineering and Science Professors (AEESP), 2015-2016.

Chair, Organizing Committee, National Workshop Series: Redefining Environmental Engineering and Science in the 21st Century, National Science Foundation and Association of Environmental Engineering and Science Professors, 2016. [January – USC/Los Angeles; March – Rice/Houston; May – NSF/Washington, DC]

Honors & Professional Activities (cont'd)

Board Member (elected), Association of Environmental Engineering and Science Professors (AEESP), 2012-2016.

Quentin Martin Award for Best Practice-Oriented Paper (Herman et al. 2016), *Journal of Water Resources Planning and Management*, American Society of Civil Engineers, 2016.

Chair, Committee on Water and Society, American Geophysical Union, 2014-2016.

Session Co-Chair, Fall Meeting of the American Geophysical Union, 2005, 2006, 2007, 2008, 2013, 2014, 2015, 2016, 2017, 2018, 2019.

Session Co-Chair, Spring Meeting of the European Geosciences Union, 2011, 2012, 2015, 2016, 2017, 2018, 2019.

Investment Advisory Committee, Association of Environmental Engineering and Science Professors (AEESP) Foundation, 2013-2015 [Chair 2015].

Fellow, Kavli Frontiers of Science, National Academy of Sciences, Irvine, CA, Nov. 2014

Committee on Water Resources, American Meteorological Society, 2011-2014.

Newton Underwood Award for Excellence in Teaching, University of North Carolina at Chapel Hill, 2012.

Task Force, A New Scientific Agenda for the Hydrologic Sciences, International Association of Hydrologic Sciences, 2011-2012.

Fellow, Aldo Leopold Environmental Leadership Program, Stanford University, 2011

Co-Chair, Workshop on Integrating Economic and Financial Principles into Environmental Engineering Research and Education, National Science Foundation, Arlington, VA, January 2011.

Kenan Competitive Research Leave, University of North Carolina at Chapel Hill, 2010-2011.

Member, Working Group, "Toward a New Water Research Agenda", National Science Foundation, 2010-2011.

Chair, Committee on Expanding Opportunities for Environmental Research using Economic, Financial, and Business Entrepreneurship Principles, Association of Environmental Engineering and Science Professors, 2009-2011.

Co-Chair, Session on "Role of Economics in the Future of Environmental Engineering Education and Research," Bi-annual Meeting of the Association of Environmental Engineering and Science Professors (AEESP), Iowa City, IA, July 2009.

Honors & Professional Activities (cont'd)

Fellow, German-American Frontiers of Engineering, National Academy of Engineering, Potsdam, Germany, April 2009.

Chair (elected), Control Group, ASCE Environmental and Water Resources Committee, 2008, (Secretary, 2006; Vice-Chair, 2007; Past-Chair, 2009)

Technical Advisory Committee, North Carolina Water Resources Research Institute, 2003; 2006-2007.

Chair, ASCE Committee on Systems Analysis and NSF Environmental Observatories, 2006-2008.

Co-Chair, "Managing Water Supplies in the Future: An Informal National Workshop for Practitioners and Academics," University of California-Davis, December 2007 and December 2008.

Fellow, Frontiers of Engineering, National Academy of Engineering, Sept. 2003

Outstanding Doctoral Student, Environmental Science and Eng., Rice University, 1998.

Hudspeth Graduate Research Award, Delange Conference, Houston, TX, March 1997.

Publications

Book Chapters

Characklis, G. W., Foster, B. F. and M. E. Khan, "Improving Price Discovery to Accelerate Adaptation to Climate Change," Chapter 6 in *Adapt and be Adept: Market Responses to Climate Change*, ed. Terry L. Anderson. Hoover Institution Press, Stanford University, 2021.

Wiesner, M. R., G. W. Characklis and D. Brejchova, "Metals and Colloids in Urban Runoff", Chapter 2 in *Metals in the Environment*, ed. H. Allen, A.W. Garrison and G.W. Luther, III. Ann Arbor Press, 1998.

National Research Council

Characklis, G. W. (2004). "Interface of Water Resource Engineering with Economics and Public Policy", *Frontiers of Engineering*, National Academy Press, Washington, D.C., pp. 11-18.

Characklis, G. W. (2003). "Interface of Water Resource Engineering with Economics and Public Policy", *The Bridge* (Journal of the National Academy of Engineering), Winter, pp. 4-9.

Publications (cont'd)

National Research Council (cont'd)

Industrial Environmental Performance Metrics: Challenges and Opportunities (1999).
National Academy of Engineering/National Research Council, National Academy Press, Washington, DC, 252 pp.

Peer-Review Journals

(superscript indicates a Student (M/D), Post-doctoral Fellow (P) or Researcher (R) working with Dr. Characklis)

Pratson, L. F., Foster, B. T.^D and G. W. Characklis. "Threshold Mississippi River Level during Flash Droughts Impacts Grain Markets," *Nature Climate Change* (in review)

Amonkar, Y.^P, Pahel-Short, C.^M, Zeighami, A., Su, Y.^D, Kern, J. D. and G. W. Characklis, "A Composite Index-based Instrument for Managing the Financial Risk of Variable Hydrometeorology for Electric Utilities," *Earth's Future* (in review)

Cuppari, R. I.^P, Denaro, S., Su, Y., Kern, J. D. and G. W. Characklis, "Comparing Alternatives for Managing Hydrometeorological Financial Risk for Hydropower Suppliers," *Journal of Water Resources Planning and Management* (in review)

Cuppari, R. I.^P, Fernandez-Bou, A. S., Characklis, G. W., Nocco, M., Ramirez, M. and M. Abou-Najm, "Drivers of Agrivoltaic Perception in California and North Carolina," *Environmental Research-Food Systems* (in review)

Hirsch, Z. M.^M, Zeff, H.B., Gupta, R. S., Vernon, C. R., Reed, P. M. and G. W. Characklis, "Two-Way Option Contracts that Facilitate Adaptive Water Reallocation in the Western United States," *Earth's Future* (in review)

Zeff, H. B.^R, DeFelice, N., Su, Y., Percha, B., Teitelbaum, S., McGuinn, L. and G. W. Characklis, "Protecting Public Health and Preserving the Financial Viability of North Carolina's Critical Health Care Facilities during Infectious Disease Outbreaks," *PLOS ONE* (in review)

Zeff, H. B.^R, Hadjimichael, A., Reed, P. M. and G. W. Characklis, "Using financial contracts to facilitate informal leases within a Western United States water market based on prior appropriation," *Earth's Future* (in press)

Haley, M.^M, D. Gorelick^P, G. W. Characklis, R. Kleiman, J. Homer and K. Oikonomou (2023). "Improving Resiliency for Large-Scale Water Suppliers Facing Drought-Related Financial Risk," *IEEE Xplore*, doi: 10.1109/RWS58133.2023.10284680.

Gold, D. F., Reed, P. M., Gorelick, D. E.^P and G. W. Characklis (2023). "Advancing regional water supply management and infrastructure investment pathways that are equitable, robust, adaptive and cooperatively stable," *Water Resources Research*, 59, e2022WR033671. <https://doi.org/10.1029/2022WR033671>

Publications (cont'd)

Peer-Review Journals (cont'd)

(superscript indicates a Student (M/D), Post-doctoral Fellow (P) or Researcher (R) working with Dr. Characklis)

- Thomson, H.^M, Zeff, H. B.^R, Kleiman, R.^M, Sebastian, A. and G. W. Characklis (2023). "Systemic financial risk arising from residential flood losses," *Earth's Future*, 11(4), e2022EF003206, <https://doi.org/10.1029/2022EF00320>
- Gorelick, D. E.^P, Gold, D. F., Asefa, T., Svrclin, S., Wang, H., Wanakule, N., Reed, P. M. and G. W. Characklis (2023). "Water supply infrastructure investment requires adaptive financial assessment: an enhanced exploratory modeling framework to evaluate coupled financial and water supply dynamics," *Journal of Water Resources Planning and Management*, 149(3), 04022084. DOI:[10.1061/JWRMD5.WRENG-5863](https://doi.org/10.1061/JWRMD5.WRENG-5863)
- Fernandez-Bou, A. S., Rodríguez-Flores, J. M., Guzman, A., Ortiz-Partida, J. P., Classen-Rodriguez, L. P., Sánchez-Pérez, P. A., Valero-Fandiño, J., Pells, C., Flores-Landeros, H., Sandoval-Solís, S., Characklis, G. W., Harmon, T. C., McCullough, M. and J. Medellín-Azuara (2023). "Water, environment, and socioeconomic justice in California: a multi-benefit framework," *Science of the Total Environment*, 858, 159963, [dx.doi.org/10.1016/j.scitotenv.2022.159963](https://doi.org/10.1016/j.scitotenv.2022.159963)
- Gorelick, D. E.^P, Gold, D. F., Reed, P. M. and G. W. Characklis (2023). "Designing water utility cooperative agreements: Lessons learned in North Carolina," *Journal of the American Water Works Association*, 115(1), pp. 32-40, doi.org/10.1002/awwa.2034
- Kleiman, R.^M, Characklis, G. W. and J. D. Kern (2022). "Managing Weather- and Market Price-related Financial Risks in Algal Biofuel Production," *Renewable Energy*, 200, 111-124, <https://doi.org/10.1016/j.renene.2022.09.104>
- Denaro, S.^P, Cuppari, R. I.^D, Kern, J. D., Su, Y.^D and G. W. Characklis (2022). "Assessing the Bonneville Power Administration's Financial Risk Management Strategies," *Journal of Water Resources Planning and Management*, 148(10), 05022006, DOI: [10.1061/\(ASCE\)WR.1943-5452.0001590](https://doi.org/10.1061/(ASCE)WR.1943-5452.0001590)
- Gorelick, D. E.^D, Gold, D. F., Reed, P. M. and G. W. Characklis (2022), "Impact of inter-utility agreements on cooperative regional water infrastructure investment and management pathways," *Water Resources Research*, 58, e2021WR030700, <https://doi.org/10.1029/2021WR030700>
- ¹Su, Y.^D, Kern, J. D. and G. W. Characklis (2022), "The Effects of Retail Load Defection on a Major Electric Utility's Exposure to Weather Risk," *Journal of Water Resources Planning and Management*, 148(3), [https://doi.org/10.1061/\(ASCE\)WR.1943-5452.0001531](https://doi.org/10.1061/(ASCE)WR.1943-5452.0001531)
[May 2022 Editor's Choice, J. of Water Resources Planning and Management]

¹ Su was co-advised with Professor Jordan Kern, North Carolina State University

Publications (cont'd)

Peer-Review Journals (cont'd)

(superscript indicates a Student (M/D), Post-doctoral Fellow (P) or Researcher (R) working with Dr. Characklis)

Hamilton, A. H.^D, Zeff, H. B.^R, Characklis, G. W. and P. M. Reed (2022). “Resilient California water portfolios require infrastructure investment partnerships that are viable for all partners,” *Earth’s Future*, e2021EF002573

[August 2022 selection for a Research Spotlight in EOS, AGU’s weekly magazine]

Gold, D. F., Reed, P. M., Gorelick, D. E.^D, and G. W. Characklis (2022). “Power and Pathways: Exploring robustness, cooperative stability and power relationships in regional infrastructure investment and water supply management portfolio pathways, *Earth’s Future*, 10, e2021EF002472, <https://doi.org/10.1029/2021EF002472>

²Bales, J., Bhaskar, A., Characklis, G., Flores, A., Gilmore, T., Gomez-Velez, J., Grant, G., Jefferson, A., Khan, S., Ledford, S., Loheide, S., Miller, G., Mishra, A., Nolin, A., VanBriesen, J., Ward, A., Zarnetske, J. and M. Zimmer (2022). “COVID-19 Impacts Highlight the Need for Holistic Evaluation of Research and in the Hydrologic Sciences, *Water Resources Research*, <https://doi.org/10.1029/2021WR030930>

Hamilton, A. L.^D, Characklis, G. W. and P. M. Reed (2022). “From Stream Flows to Cash Flows: Leveraging Evolutionary Multi-Objective Direct Policy Search to Manage Hydrologic Financial Risks,” *Water Resources Research*, 58, e2021WR029747, <https://doi.org/10.1029/2021WR029747>

³Hill, J.^M, Kern, J. D. Rupp, D. E., Voisin, N. and G. W. Characklis (2021). “The Effects of Climate Change on Interregional Electricity Market Dynamics on the U.S. West Coast,” *Earth’s Future*, 9, e2021EF002400, <https://doi.org/10.1029/2021EF002400>

Vicuna, S., Ricalde, I., Melo, O., Tomlinson, J., Harou, J. J. and G. W. Characklis (2021). “Assessing Tradeoffs on the Design of Climate Change Adaptation Strategies for Water Utilities,” *Journal of Environmental Management*, <https://doi.org/10.1016/j.jenvman.2021.114035>

Kleiman, R.^M, Characklis, G. W., Kern, J. D. and R. Gerlach (2021). “Characterizing Weather-related Biophysical and Financial Risk in Algal Biofuel Production,” *Applied Energy*, 294, 116960, <https://doi.org/10.1016/j.apenergy.2021.116960>

Zeff, H. B.^P, Hamilton, A. L.^D, Malek, K., Herman, J. D., Cohen, J. S., Medellin-Azuara, J., Reed, P. M. and G. W. Characklis (2021). “California’s Food-Energy-Water System: An Open-Source Simulation Model of Adaptive Surface and Groundwater Management in the Central Valley, *Environmental Modelling and Software*, 141, 105052 <https://doi.org/10.31224/osf.io/sqr7e>

² Authorship officially credited to the “2021 CUAHSI Board of Directors” all of whom are listed above

³ Hill was co-advised with Professor Jordan Kern, North Carolina State University

Publications (cont'd)

Peer-Review Journals (cont'd)

(superscript indicates a Student (M/D), Post-doctoral Fellow (P) or Researcher (R) working with Dr. Characklis)

- Cuppari, R., I.^M, Higgins, C. W. and G. W. Characklis (2021). "Financial Analysis of Co-locating Agricultural Production and Solar Power Generation," *Applied Energy*, 291, 116809, <https://doi.org/10.1016/j.apenergy.2021.116809>
- Hamilton, A. L.^D, Characklis, G. W. and P. M. Reed (2020). "Managing financial risk tradeoffs for hydropower generation using snowpack-based index contracts," *Water Resources Research*, 2020WR027212, <https://doi.org/10.1029/2020WR027212>
[December 2020 Editor's Highlight in EOS, AGU's weekly magazine]
- Gupta, R. S., Hamilton, A. L.^D, Reed, P. M. and G. W. Characklis (2020). "Can Modern Multi-Objective Evolutionary Algorithms Discover High-Dimensional Financial Risk Portfolio Tradeoffs for Snow-Dominated Water-Energy Systems?," *Advances in Water Resources*, 145, 103718, <https://doi.org/10.1016/j.advwatres.2020.103718>
- ⁴Su, Y.^D, Kern, J. D., Reed, P. M. and G. W. Characklis (2020). "Compound Hydrometeorological Extremes Acting Across Multiple Timescales Drive Volatility in California Electricity Market Prices and Emissions," *Applied Energy*, 276, <https://doi.org/10.1016/j.apenergy.2020.115541>
- Trindade, B., Reed, P. M., Gold, D. F., Zeff, H. B.^P and G. W. Characklis (2020). Water Pathways: An open-source stochastic simulation framework for water supply portfolio management and infrastructure investments, *Environmental Modelling and Software*, 104772, <https://doi.org/10.1016/j.envsoft.2020.104772>.
- Denaro, S.^P, Castelletti, A., Giuliani, M. and G. W. Characklis (2020). "Insurance portfolio diversification through bundling for competing agents exposed to uncorrelated drought and flood risks," *Water Resources Research*, 56, e2019WR026443. <https://doi.org/10.1029/2019WR026443>
- Zeff, H. B.^P, Characklis, G. W. and W. N. Thurman (2020). "How do price surcharges impact water utility incentives to pursue alternative supplies during drought," *Journal of Water Resources Planning and Management*, 146(6), [doi.org/10.1061/\(ASCE\)WR.1943-5452.0001228](https://doi.org/10.1061/(ASCE)WR.1943-5452.0001228).
- Meyer, E. S.^D, Foster, B. F.^D, Characklis, G. W., Brown, C. M. and A. J. Yates (2020). "Integrating physical and financial approaches to manage environmental financial risk on the Great Lakes," *Water Resources Research*, 56, e2019WR024853, doi.org/10.1029/2019WR024853
[May 2020 Editor's Highlight in EOS, AGU's weekly magazine]

⁴ Su was co-advised with Professor Jordan Kern, North Carolina State University

Publications (cont'd)

Peer-Review Journals (cont'd)

(superscript indicates a Student (M/D), Post-doctoral Fellow (P) or Researcher (R) working with Dr. Characklis)

- ⁵Su, Y. ^D, Kern, J. D., Denaro, S. ^P, Hill, J. ^M, Reed, P. M. Sun, Y., Cohen, J. and G. W. Characklis (2020). "An open-source model for quantifying risks in bulk electric power systems from spatially and temporally correlated hydrometeorological processes," *Environmental Modelling and Software*, 126, doi.org/10.1016/j.envsoft.2020.104667
- Baum, R. ^D and G. W. Characklis (2020). "Mitigating drought-related financial risks for water utilities via integration of risk pooling and reinsurance," *Journal of Water Resources Planning and Management*, 146(6): 05020007, doi.org/10.1061/(ASCE)WR.1943-5452.0001202
[2021 ASCE/EWRI Quentin Martin Award for Best Practice-Oriented Paper]
- Gorelick, D. E. ^D, Lin, L., Zeff, H. B. ^P, Kim, Y., Vose, J. M., Coulston, J. W., Wear, D. N., Band, L. E., Reed, P. M. and G. W. Characklis (2019). "Accounting for adaptive water supply management when quantifying climate and landcover change vulnerability," *Water Resources Research*, 56, e2019WR025614, doi.org/10.1029/2019WR025614
- Gold, D. F., Reed, P. M., Trindade, B. C. and G. W. Characklis (2019). "Conflicts in Coalitions: Navigating multi-city robustness conflicts to discover cooperative safe operating spaces for regional water supply portfolios," *Water Resources Research* 55, pp. 9024–9050, doi.org/10.1029/2019WR025462
- Trindade, B., Reed, P. M. and G. W. Characklis (2019). "Deeply Uncertain Pathways: Integrated Multi-City Regional Water Supply Infrastructure Investment and Portfolio Management," *Advances in Water Resources*, 134, 103442, doi.org/10.1016/j.advwatres.2019.103442
- Gorelick, D. E. ^D, Zeff, H. B. ^P, Hughes, J., Eskaf, S. and G. W. Characklis (2019). "Benefits and tradeoffs of cooperation: exploring the relative merits of treatment and capacity sharing agreements between water utilities," *Journal of the American Water Works Association*, 111(9), pp 26-40. doi.org/10.1002/awwa.1359
- Zeff, H. B. ^P, Kaczan, D., Characklis, G. W., Jeuland, M. and B. Murray (2019). "The potential benefits of groundwater trading and reformed water rights in the Diamond Valley, Nevada," *Journal of Water Resources Planning and Management*, 145(6), doi.org:10.1061/(ASCE)WR.1943-5452.0001032.
- Kern, J. D. ^R, Gorelick, D. E. ^D, Characklis, G. W. and C. M. Macklin (2018). "Multi-Objective Optimal Siting of Algal Biofuel Production with Municipal Wastewater Treatment in Watersheds with Nutrient Trading Markets," *Journal of Water Resources Planning and Management*, doi.org/10.1061/(ASCE)WR.1943-5452.0001018.

⁵ Su and Hill were co-advised with Professor Jordan Kern, North Carolina State University

Publications (cont'd)

Peer-Review Journals (cont'd)

(superscript indicates a Student (M/D), Post-doctoral Fellow (P) or Researcher (R) working with Dr. Characklis)

- Gorelick, D. E.^M, Zeff, H. B.^P, Characklis, G. W. and P. M. Reed (2018). "Integrating raw water transfers into an Eastern United States management context," *Journal of Water Resources Planning and Management*, 144 (9), doi.org/10.1061/(ASCE)WR.1943-5452.0000966.
- Baum, R.^D, Characklis, G. W. and M. L. Serre (2018). "Effects of Geographic Diversification on Risk Pooling to Mitigate Drought-Related Financial Losses for Water Utilities," *Water Resources Research*, 54, doi.org/10.1002/2017WR021468.
- Mozenter, Z. D., Yates, A. J., Schnier, K. A., Hughes, J. A. and G. W. Characklis (2018). "Understanding Water Utility Attitudes Toward Water Transfers and Risk: Survey Results," *Journal of Water Resources Planning and Management*, doi: 10.1061/(ASCE)WR.1943-5452.0000895.
- Denaro, S., Castelletti, A., Giuliani, M. and G. W. Characklis (2017). "Fostering Cooperation in Power Asymmetrical Water Systems by Use of Direct Release Rules and Index-based Insurance Schemes," *Advances in Water Resources*, dx.doi.org/10.1016/j.advwatres.2017.09.021.
- Kern, J. D.^R and G. W. Characklis (2017). "Evaluating the Physical and Financial Vulnerability of Power Systems to Drought Under Climate Uncertainty and an Evolving Generation Mix," *Environmental Science & Technology*, 51, pp. 8815-8823, doi:10.1021/acs.est.6b05460.
- Trindade, B. C., Reed, P. M., Herman, J. D., Zeff, H. B.^D and G. W. Characklis (2017). "Reducing Regional Drought Vulnerabilities and Multi-City Robustness Conflicts Using Many-Objective Optimization Under Deep Uncertainty," *Advances in Water Resources*, 104, pp. 195-209, doi: 10.1016/j.advwatres.2017.03.023.
- Su, Y.^M, Kern, J. D.^R and G. W. Characklis (2017). "The Impact of Wind Power Growth and Hydrological Uncertainty on Financial Losses from Oversupply Events in Hydropower-dominated Systems," *Applied Energy*, 194, pp. 172-183, doi:10.1016/j.apenergy.2017.02.067.
- Meyer, E. S.^D, Characklis, G. W. and C. M. Brown (2017). "Evaluating Financial Risk Management Strategies Under Climate Change for Hydropower Producers on the Great Lakes," *Water Resources Research* 53, doi:10.1002/2016WR019889.
- Kern, J. D.^R, Hise, A. M.^M, Characklis, G. W., Gerlach, R., Viamajala, S. and R. D. Gardner (2016). "Using Life-Cycle Assessment and Techno-Economic Analysis in a Real Options Framework to Inform the Design of Algal Biofuel Production Facilities," *Bioresour Technol*, 225, doi.org/10.1016/j.biortech.2016.11.116.

Publications (cont'd)

Peer-Review Journals (cont'd)

(superscript indicates a Student (M/D), Post-doctoral Fellow (P) or Researcher (R) working with Dr. Characklis)

- Kern, J. D.^P and G. W. Characklis (2016). "Horizontal Hydraulic Fracturing, Low Natural Gas Prices and the Financial Cost of Ramp Rate Restrictions at Hydroelectric Dams," *Energy Economics*, 61, doi.org/10.1016/j.eneco.2016.12.002.
- Zeff, H. B.^D, Herman, J. D., Reed, P. M. and G. W. Characklis (2016). "Cooperative Drought Adaptation: Integrating Infrastructure Development, Conservation and Water Transfers into Adaptive Policy Pathways," *Water Resources Research* 52, doi:10.1002/2016WR018771.
[2019 Best Publication in Natural Resources, Institute for Operations Research and the Management Sciences (INFORMS)]
- Herman, J. D., Zeff, H. B.^D, Lamontagne, J. R., Reed, P. M. and G. W. Characklis (2016). "Synthetic Drought Scenario Generation to Support Bottom-Up Water Supply Vulnerability Assessments," *Journal of Water Resources Planning and Management*, DOI: 10.1061/(ASCE)WR.1943-5452.0000701.
[2016 ASCE/EWRI Quentin Martin Award for Best Practice-Oriented Paper]
- Hise, A. M.^M, Characklis, G. W., Kern, J. D.^P, Gerlach, R., Viamajala, S., Gardner, R. D. and A. Vadlamani (2016). "Evaluating the Relative Impacts of Operational and Financial Factors on the Competitiveness of an Algal Biofuel Production Facility," *Bioresource Technology*, 220, pp. 271-281. doi:10.1016/j.biortech.2016.08.050.
- Meyer, E. S.^D, Characklis, G. W., Brown, C. M. and P. Moody (2016). "Hedging the Financial Risk from Water Scarcity for Great Lakes Shipping," *Water Resources Research*, 52, pp. 227-245, doi:10.1002/2015WR017855.
- Brown, C. M., Lund, J. R., Cai, X., Reed, P. M., Zagona, E. A., Ostfeld, A., Hall, J. W., Characklis, G. W., Yu, W. and L. Brekke (2015). "The Future of Water Resource Systems Analysis: Toward a Scientific Framework for Sustainable Water Management," *Water Resources Research*, 51, doi:10.1002/2015WR017114.
- Foster, B. F.^M, Kern, J. D.^P and G. W. Characklis (2015). "Mitigating Hydrologic Financial Risk in Hydropower Generation Using Index-Based Financial Instruments," *Water Resources and Economics*, 10, pp. 45-67, doi:10.1016/j.wre.2015.04.001.
- Kern, J. D.^D, Characklis, G. W. and B. F. Foster^M (2015). "Natural Gas Price Uncertainty and the Cost Effectiveness of Hedging Against Low Hydropower Revenues Caused by Drought," *Water Resources Research*, 51, doi:10.1002/2014WR016533.
- Herman, J. D., Reed, P. M., Zeff, H. B.^D and G. W. Characklis (2015). "How Should Robustness be Defined for Water Systems Planning Under Change," *Journal of Water Resources Planning and Management*, 10.1061/(ASCE)WR.1943-5452.0000509, 04015012.

Publications (cont'd)

Peer-Review Journals (cont'd)

(superscript indicates a Student (M/D), Post-doctoral Fellow (P) or Researcher (R) working with Dr. Characklis)

- Herman, J. D., Zeff, H. B.^D, Reed, P. M. and G. W. Characklis (2014). "Beyond Optimality: Multi-Stakeholder Robustness Tradeoffs for Regional Water Portfolio Planning Under Uncertainty, *Water Resources Research*, doi:10.1002/2014WR015338
- Kern, J. D.^D, Patino-Echeverri, D. and G. W. Characklis (2014). "The Impacts of Wind Power Integration on Sub-Daily Variation in River Flows Downstream of Hydroelectric Dams," *Environmental Science & Technology*, doi:10.1021/es405437h.
- Zeff, H.B.^D, Kasprzyk, J. R., Herman, J. D., Reed, P. M. and G. W. Characklis (2014). "Navigating Financial and Supply Reliability Tradeoffs in Regional Drought Portfolios," *Water Resources Research*, 50, doi:10.1002/2013WR015126.
- Kern, J. D.^D, Patino-Echeverri, D. and G. W. Characklis (2014). "An Integrated Reservoir-Power System Model for Evaluating the Impacts of Wind Integration on Hydropower Resources," *Renewable Energy*, 71, pp. 553-562.
- Fields, M. W., Hise, A.^M, Lohman, E. J., Bell, T., Gardner, R. D., Corredor, L., Moll, K., Peyton, B. M., Characklis, G. W. and R. Gerlach (2014). "Sources and Resources: Importance of nutrients, resource allocation and ecology in microalgal cultivation for lipid accumulation," *Applied Microbiology and Biotechnology*, 98, pp. 4805-4816, doi:10.1007/s00253-014-5694-7.
- Caldwell, C.^M and G. W. Characklis (2014). "Impact of Contract Structure and Risk Aversion on Inter-utility Water Transfer Agreements," *Journal of Water Resources Planning and Management*, 140(1), pp. 100-111.
- Krometis, L. A.^D, Noble, R. T., Characklis, G. W., Blackwood, A.D. and M. D. Sobsey (2013). "Assessment of E. coli partitioning behavior via both a culture-based method and qPCR," *Water Science and Technology*, 68(6), pp. 1359-1369, doi: 10.2166/wst.2013.363.
- Zeff, H.B.^M and G. W. Characklis (2013). "Managing Water Utility Financial Risks through Third-Party Index Insurance Contracts," *Water Resources Research*, 49, doi:10.1002/wrcr.20364.
- Montanari, A., Young, G., Savenije, H., Hughes, D., Wagener, T., Ren, L., Koutsoyiannis, D., Cudenneq, C., Grimaldi, S., Bloeschl, G., Sivapalan, M., Beven, K, Gupta, H., Arheimer, B., Huang Y., Schumann, A., Post, D., Srinivasan, V., Boegh E., Hubert, P., Harman, C., Thompson, S., Rogger, M., Hipsey, M., Toth, E., Viglione, A., Di Baldassarre, G., Schaeffli, B., McMillan, H., Schymanski, S. J., Characklis, G., Yu, B., Pang, Z. and V. Belyaev (2013). "Panta Rhei – Everything Flows: Change in Hydrology and Society – The IAHS Scientific Decade, 2013-2022," *Hydrologic Sciences Journal*, 58:6, 1256-1275.

Publications (cont'd)

Peer-Review Journals (cont'd)

(superscript indicates a Student (M/D), Post-doctoral Fellow (P) or Researcher (R) working with Dr. Characklis)

- Perona, P., Durrenmatt, D. and G. W. Characklis (2013). "Obtaining natural-like flow releases in diverted (hydropower) river reaches from simple riparian benefit economic functions," *Journal of Environmental Management*, 118, pp. 161-169.
- Kirsch, B. R.^D, Characklis, G. W. and H. B. Zeff^M (2013). "Evaluating the Impact of Alternative Hydro-climate Scenarios on Transfer Agreements: A Practical Improvement for Generating Synthetic Streamflows," *Journal of Water Resources Planning and Management*, 139(4), pp. 396-406.
- Kern, J. D.^M, Characklis, G. W., Doyle, M. D., Blumsack, S. and R. B. Whisnant (2012). "Influence of De-regulated Energy Markets on Hydropower Generation and Downstream Flow Regime," *Journal of Water Resources Planning and Management*, 138(4), pp. 342-355.
- Kasprzyk, J. R., Reed, P. M., Characklis, G. W. and B. R. Kirsch^D (2012). "Many-Objective de Novo Water Supply Portfolio Planning Under Deep Uncertainty," *Environmental Modelling and Software*, 34, pp. 87-104.
- Characklis, G. W., Adriaens, P., Braden, J. B., Davis, J., Hamilton, B., Hughes, J. B., Small, M. J. and J. Wolfe (2011) "Increasing the Role of Economics in Environmental Research (or moving beyond the mindset that Economics = Accounting)", *Environmental Science & Technology*, 45, pp. 6235-6236.
- Russo, S. A.^M, Hunn, J.^M and G. W. Characklis (2011). "Considering Bacteria-Sediment Associations in Microbial Fate and Transport Modeling," *Journal of Environmental Engineering*, 137(8), pp. 697-706.
- Krometis, L. A.^D, Characklis, G. W., Drummey, P. N.^M and M. D. Sobsey (2010). "Comparison of indicator organism and *Salmonella* spp. partitioning behavior in an urban watershed," *Journal of Water and Health*, 8(1), pp. 44-59.
- Kasprzyk, J. R., Reed, P. M., Kirsch, B. R.^D, and G. W. Characklis (2009). "Managing Population and Drought Risk Using Many-objective Water Portfolio Planning Under Uncertainty," *Water Resources Research*, 45, W12401.
- Krometis, L. A.^D, Characklis, G. W. and M. D. Sobsey (2009). "Identification of particle size classes inhibiting protozoan recovery from surface water samples via USEPA Method 1623," *Applied Environmental Microbiology*, 75(20), pp. 6619-21.
- Krometis, L. A.^D, Drummey, P. N.^M, Characklis, G. W. and M. D. Sobsey (2009). "The Impact of Microbial Partitioning on Wet Retention Pond Effectiveness," *Journal of Environmental Engineering*, 135(9), pp. 758-767.
- Kirsch, B. R.^D, Characklis, G. W., Dillard, K. E. M. and C. T. Kelley (2009). "More Efficient Optimization of Long-term Water Supply Portfolios," *Water Resources Research*, 45, W03414.

Publications (cont'd)

Peer-Review Journals (cont'd)

(superscript indicates a Student (M/D), Post-doctoral Fellow (P) or Researcher (R) working with Dr. Characklis)

- Palmer, R. N.^M and G. W. Characklis (2009). "Reducing the Costs of Meeting Regional Water Demand through Risk-based Transfer Agreements," *Journal of Environmental Management*, 90, pp. 1703-1714.
- Cizek, A. R.^M, Characklis, G. W., Krometis, L. A.^D, Hayes, J. A., Simmons, O. D., DiLonardo, S., Alderisio, K. A. and M. D. Sobsey (2008). "Comparing the Partitioning Behavior of *Giardia* and *Cryptosporidium* with that of Indicator Organisms in Stormwater Runoff," *Water Research*, 42, pp. 4421-4438.
- Characklis, G. W. and P. M. Reed (2008). "An Evolving Paradigm for Publication in the Water Resources Management Field," *Journal of Contemporary Water Research & Education*, 139, pp. 37-40.
- Fries, J. S.^P, Characklis, G. W. and R. T. Noble (2008). "Sediment-Water Exchange of *Vibrio sp.* and Fecal Indicator Bacteria: Implications for Persistence and Transport in the Neuse River Estuary," *Water Research*, 42, pp. 941-950.
- Fries, J. S.^P, Noble, R. T., Paerl, H. W. and G. W. Characklis (2007). "Particle Suspension as Indicators of Estuarine Water Quality in the Neuse River Estuary," *Estuaries & Coasts*, 30(2), pp. 359-364.
- LoBuglio, J. N.^D, Characklis, G. W. and M. L. Serre (2007). "Cost-effective Water Quality Assessment through Integration of Monitoring Data and Modeling Results," *Water Resources Research*, 43(3), W03435.
- Krometis, L. A.^D, Characklis, G. W., Simmons, O. D., Dilts, M. J.^M, Likirdopoulos, C. A. and M. D. Sobsey (2007). "Intra-Storm Variability in Microbial Partitioning and Microbial Loading Rates", *Water Research*, 41, pp. 506-516.
- Characklis, G. W., Reed, P. M. and B. S. Minsker (2007). "The Role of Systems Analysis in NSF's Environmental Observatories," *Journal of Water Resources Planning and Management*, 133(1), pp. 1-3.
- Fries, J. S.^P, Characklis, G. W. and R. T. Noble (2006). "Attachment of Fecal Indicator Bacteria to Particle Suspensions in Neuse River Estuary, North Carolina, USA," *Journal of Environmental Engineering*. 132(10), pp. 1338-1345.
- Traviglia, A. M.^M and G. W. Characklis (2006). "Considering Location, Compliance, and Storage in Decisions on Brackish Water Resource Development", *Journal of Water Resources Planning and Management*, 132(6), pp. 514-520.
- Kirsch, B. R.^M and G. W. Characklis (2006). "An Equilibrium Approach to Integrating Regional Surface Water Treatment and Limited Groundwater Pumping Capacity", *Journal of Water Resources Planning and Management*, 132(6), pp. 444-454.

Publications (cont'd)

Peer-Review Journals (cont'd)

(superscript indicates a Student (M/D), Post-doctoral Fellow (P) or Researcher (R) working with Dr. Characklis)

- Lund, J. R., Cai, X. and G. W. Characklis (2006). "Economic Engineering of Environmental and Water Resource Systems", *Journal of Water Resources Planning and Management*, 132(6), pp. 399-402.
- Characklis, G. W., Kirsch, B. R.^D, Ramsey, J.^M, Dillard, K. E. M. and C. T. Kelley (2006). "Developing Portfolios of Water Supply Transfers", *Water Resources Research*, 42(5), W05403.
- Characklis, G. W., Dilts, M. J.^M, Simmons, O. D., Likirdopoulos, C. A., Krometis, L. A.^D, and M. D. Sobsey (2005). "Microbial Partitioning to Settleable Particles in Stormwater", *Water Research*, 39, pp. 1773-1782.
- Characklis, G. W., Griffin, R. C. and P. B. Bedient (2005). "Measuring the Long-term Regional Benefits of Salinity Reduction", *Journal of Agricultural and Resource Economics*, 30(1), pp. 69-93.
- Characklis, G. W. (2004) "Economic Decisionmaking in the Use of Membrane Desalination for Brackish Water Supplies", *Journal of the American Water Resources Association*, 40(2), pp. 615-630.
- Aitken, M. D., Novak, J. T., Characklis, G. W., Jones, K. L., and P. J. Vikesland (2004). "The Evolution of Environmental Engineering as a Professional Discipline", *Environmental Engineering Science*, 21(2), pp. 117-123.
- Griffin, R. C. and G. W. Characklis (2002). "Issues and Trends in Texas Water Marketing", *Water Resources Update*, 121, pp. 29-33.
- Characklis, G. W. and D. J. Richards (1999). "The Evolution of Industrial Environmental Performance Metrics", *Corporate Environmental Strategy*, 6(4), pp. 324-336.
- Characklis, G. W., Griffin, R. C. and P. B. Bedient (1999). "Improving the Ability of a Water Market to Efficiently Manage Drought", *Water Resources Research*, 35(3), pp. 823-831.
- Characklis, G. W. and M. R. Wiesner (1997). "Particles, Metals, and Water Quality in Runoff from a Large Urban Watershed", *Journal of Environmental Engineering*, 123(8), pp. 753-759.

Reports and Other Publications

(superscript indicates a Student (M/D), Post-doctoral Fellow (P) or Research Faculty (R) working with Dr. Characklis)

- Association of Environmental Engineering and Science Professors (2017). "Redefining Environmental Engineering and Science in the 21st Century: Workshop Report," AEESP and National Science Foundation, <https://aeesp.org/news/redefining-environmental-engineering-and-science-21st-century>.

Publications (cont'd)

Reports and Other Publications

(superscript indicates a Student (M/D), Post-doctoral Fellow (P) or Research Faculty (R) working with Dr. Characklis)

- Zeff, H.B.^P, Characklis, G. W., Jeuland, M., Kaczan, D., Murray, B., and Locklier, K. (2016). "Benefits, Costs, and Distributional Impacts of a Groundwater Trading Program in the Diamond Valley, Nevada." NI R 16-02. Durham, NC: Duke University. <http://nicholasinstitute.duke.edu/publications>.
- Olander, L., Characklis, G., Comer, P., Efron, M., Gunn, J., Holmes, T., Johnston, R., Kagan, J., Lehman, W., Loomis, J., McPhearson, T., Neale, A., Patterson, L., Richardson, L., Ross, M., Saab, D., Sifleet, S., Stockmann, K., Urban, D., Wainger, L., Winthrop, R. and D. Yoskowitz (2016). "Data Modeling Infrastructure for National Integration of Ecosystem Services into Decision Making: Expert Summaries, National Ecosystem Services Partnership, Working Paper 16-02, Durham, NC: Duke University.
- LoBuglio, J. N.^D and G. W. Characklis (2010). *Burden of Disease from Drinking Water in National Strategy and Action Plan for Environmental Health*, United Arab Emirates, MacDonald-Gibson, J. and A. Brammer, Eds., Environment Agency-Abu Dhabi and University of North Carolina, School of Public Health.
- Krometis, L. A.^D, LoBuglio, J. N.^D, MacDonald-Gibson, J. and G. W. Characklis (2010). *Burden of Disease from Coastal Water Quality in National Strategy and Action Plan for Environmental Health*, United Arab Emirates, MacDonald-Gibson, J. and A. Brammer, Eds., Environment Agency-Abu Dhabi and University of North Carolina, Gillings School of Global Public Health.
- Operating Policies and Administrative Discretion at the John H. Kerr Project (Dam)* (2009), Division of Water Resources, North Carolina Department of Environment and Natural Resources, Raleigh, NC.
- Watershed Restoration Plan to Address Fecal Coliform Impairment of Northeast Creek in Durham, NC* (2009), North Carolina Dept. of Environment and Natural Resources, Division of Water Quality: TMDL program, Raleigh, NC.
- Whisnant, R., Holman, B., Hughes, J. Kleczek, L., Characklis, G. W., Dimmitt, M., LoBuglio, J. N.^D, Schwartz, N., Platt, J., Hughes, S., Eskaf, S., Westbrook, A., Guzman, A., Tate, S., Tiger, M. and H. Polikov (2009). *Report of the Water Allocation Study Team*. North Carolina Environmental Management Commission, Raleigh, NC.
- University of North Carolina Institute for the Environment (2008), *Climate Change Committee Report. Prepared at the request of North Carolina State Senate*, Band, L.B. and D. Salvesen, Eds., University of North Carolina at Chapel Hill, Chapel Hill, NC.
- Caldwell, C.^M and G. W. Characklis (2008). "Optimizing Water Supply through Inter-utility Water Transfer Agreements," NC Urban Water Consortium, Raleigh, NC, pp. 45.

Publications (cont'd)

Reports and Other Publications

(superscript indicates a Student (M/D), Post-doctoral Fellow (P) or Research Faculty (R) working with Dr. Characklis)

Raucher, R. S., Cromwell, J., Henderson, J., Wagner, C., Rubin, S., Goldstein, J., Huber-Lee, A., Young, C., Characklis, G. W. and B. R. Kirsch^D (2006). "Regional Solutions to Water Supply Provision," American Water Works Association Research Foundation and U.S. Environmental Protection Agency, IWA.

Traviglia, A. M.^M and G. W. Characklis (2004). "An Expert System for Decisionmaking in the Use of Desalination for Augmenting Water Supplies", Desalination and Water Purification Research and Development Program, Bureau of Reclamation, U. S. Dept. of the Interior, Denver, June 2004, pp. 41.

Aitken, M. D., Novak, J. T., Characklis, G. W., Jones, K. L., and P. J. Vikesland (2003). "The Evolution of Environmental Engineering as a Professional Discipline", National Science Foundation/Association of Environmental Engineering and Science Professors, Toronto, Ontario, 23 pp.

Invited Presentations

John R. Freeman Lecture, Boston Society of Civil Engineers, Boston, MA, April 2024

Insurance Advisory Partners Summit, Big Sky, MT, March 2024

Board of Directors Meeting, CHS Inc., Houston, TX, March 2024

AGU Fall meeting, San Francisco, CA, December 2023.

Adaptation Futures 2023, Montreal, Canada, October 2023.

Sustainability Research Symposium, University of North Carolina at Chapel Hill, Chapel Hill, NC, April 2023.

Institute for Environmental Health Solutions, University of North Carolina at Chapel Hill, Chapel Hill, NC, April 2023.

Sustainable Business and Social Impact Conference, Fuqua School of Business, Duke University, February 2023.

Data Science Now Lecture Series (virtual), University of North Carolina at Chapel Hill, Chapel Hill, NC, October 2022.

Department of Civil and Environmental Engineering, Colorado School of Mines, Golden, CO, September 2022.

Department of Civil, Environmental and Architectural Engineering, University of Colorado, Boulder, CO, April 2022.

Invited Presentations (cont'd)

- Innovations at the Nexus of Food-Energy-Water Systems (INFEWS) Principal Investigators Workshop (virtual), National Science Foundation, Princeton, NJ, February 2022.
- Water Utility Resilience Forum, Association of Metropolitan Water Agencies & National Association of Clean Water Agencies, Miami, FL, December 2021.
- NAE FOCUS Complex Food and Agricultural Systems: Engineering for Sustainability and Resilience (virtual), National Academies of Science, Engineering and Medicine, Washington, DC, September 2021.
- Tar Heels Together – Earth Day Celebration (virtual), University of North Carolina at Chapel Hill, April 2021.
- Water-Power Systems – Coordination and Planning for Resilience, Pacific Northwest National Laboratory and U.S. Department of Energy (virtual), April 2021.
- Water Resources Program, Oregon State University (virtual), February 2021.
- Multi-Sector Dynamics, U. S. Department of Energy Community of Practice (virtual), November 2020.
- Lightbox Webinar on Exposure of the Commercial Real Estate sector to Flood Risk (virtual), July 2020.
- World Bank, Washington, DC, February 2020.
- Mike Aitken Retirement Celebration, University of North Carolina at Chapel Hill, Chapel Hill, NC, November 2019.
- Congresso Chileno de Ingeniería Sanitaria y Ambiental, Santiago, Chile, October 2019.
- Department of Environmental/Agricultural Economics, Pontificia Universidad Catolica de Chile, Santiago, Chile, October 2019.
- Colorado Water Congress, Steamboat Springs, CO, August 2019.
- Public Power Council, Portland, OR, May 2019.
- Plenary Panel on Grand Challenges in Environmental Engineering, Bi-annual meeting of the Association of Environmental Engineering and Science Professors (AEESP), Arizona State University, Tempe, AZ, May 2019.
- Environmental Engineering Program Leaders Workshop, Bi-annual meeting of the Association of Environmental Engineering and Science Professors (AEESP), Arizona State University, Tempe, AZ, May 2019.
- Department of Civil and Environmental Engineering, Colorado State University, Ft. Collins, CO, April 2019.

Invited Presentations (cont'd)

Water/Wastewater Regionalization and Partnership Workshop, University of North Carolina, Chapel Hill, NC, April 2019.

California Department of Water Resources and California Department of Food and Agriculture, Sacramento, CA, April 2019.

Open Waters Symposium, Nicholas School for the Environment, Duke University, Durham, NC, March 2019.

Water Sustainability and Climate (WSC) and Innovations at the Nexus of Food-Energy-Water Systems (INFEWS) Modeling Workshop, Consortium of Universities for the Advancement of Hydrologic Sciences, Inc. (CUAHSI), Chapel Hill, NC, March 2019

Brief to U.S. Department of Energy Assistant Secretary Bruce Walker, University of North Carolina at Chapel Hill, Chapel Hill, NC, February 2019.

Rotary Club International, Cary, NC, January 2019.

Department of Environmental Sciences, University of Virginia, Charlottesville, VA, December 2018

Department of Environmental Science and Engineering, Nankai University, Tianjin, China, June 2018

Department of Water Resources and Civil Engineering, China Agricultural University, Beijing, China, June 2018

Sino-U.S. Forum on Environment-Enhancing Food, Energy and Water Systems, (U.S.) National Science Foundation and the National Science Foundation of China, Beijing, China, June 2018.

Advancing Food-Energy-Water System Resilience, Sesquicentennial Celebration Symposium, University of Illinois, Urbana-Champaign, April 2018.

Advisory Board, Gillings School of Global Public Health, University of North Carolina at Chapel Hill, March 2018.

Water Resource Systems Analysis Short Course, Universidad de Chile, Santiago, Chile, March 2018.

Department of Earth and Environmental Engineering, Columbia University, February 2018.

International Workshop on Assessing and Mitigating Hydrologic Risk in Hydrology-dominated Energy Systems, International Hydropower Association and World Bank, London, UK, November 2017.

Invited Presentations (cont'd)

Managing Environmental Risks Workshop, Property and Environment Research Center, Duke University, Durham, NC November 2017

Foundation Board, Gillings School of Global Public Health, University of North Carolina at Chapel Hill, November 2017.

Department of Civil and Environmental Engineering, University of Michigan, Ann Arbor, MI, October 2017.

Centro Interdisciplinario en Cambio Global, Pontificia Universidad Catolica de Chile, Santiago, Chile, September 2017.

State Energy Policy Forum, North Carolina Energy Policy Council, Raleigh, NC, August 2017.

Modeling Energy-Water-Land Systems Dynamics Workshop, U.S. Department of Energy, Snowmass, CO, July 2017.

Chairs and Directors Meeting, Association of Environmental Engineering and Science Professors Bi-annual Conference, Ann Arbor, MI, June 2017.

Committee on Grand Challenges in Environmental Engineering, Water Science and Technology Board, National Research Council, Washington, DC, May 2017.

Water for Food Global Conference, Daugherty Water for Food Global Institute, University of Nebraska, Lincoln, NE, April 2017.

Department of Civil and Environmental Engineering, Cornell University, Ithaca, NY, March 2017.

Department of Civil, Construction and Environmental Engineering, North Carolina State University, Raleigh, NC, February 2017.

Basic Research Needs Water Workshop, U.S. Department of Energy, Washington, D.C., January 2017.

Decision Making Under Deep Uncertainty Workshop, World Bank, Washington, D.C., November 2016.

Department of Civil, Structural and Environmental Engineering, University of Buffalo, Buffalo, NY, October 2016.

Department of Civil and Environmental Engineering, Virginia Tech, Blacksburg, VA, September 2016.

Smart Systems for Urban Water Management, Eidgenössische Technische Hochschule (ETH), Monte Verità, Switzerland, August 2016.

Invited Presentations (cont'd)

Department of Applied Geosciences, Eberhard Karls Universität Tübingen, Germany, July 2016.

Institut für Wasser- und Umweltsystemmodellierung (IWS), Universität Stuttgart, Germany, July 2016.

Department of Civil and Environmental Engineering, Missouri University of Science & Technology, Rolla, MO, April 2016.

Weston Roundtable, Nelson Institute, Center for Sustainability and the Global Environment, University of Wisconsin, Madison, WI, February 2016.

North Carolina Disaster Preparedness Press Briefing, Climate Central, Raleigh, NC, November 2015.

NSF Workshop on Food-Energy-Water Systems Challenging Chemists in the 21st Century, Arlington, VA, October 2015.

Environment and Natural Resources Institute and the Penn State Institutes for Energy and the Environment, Pennsylvania State University, State College, PA, September 2015.

Science Cafe, North Carolina Museum of Natural Sciences, Raleigh, NC, August 2015.

Organization for Economic Cooperation and Development (OECD) Roundtable on the Food-Energy-Water Nexus, Paris, May 2015.

International Panel on Zayandeh-Rud River Sustainability, Isfahan University of Technology, Iran, January 2015.

Roundtable on Science & Technology for Sustainability, Water & Energy, National Research Council, Washington, D.C., December 2014.

Kavli Frontiers of Science, National Academy of Sciences, Beckman Center, Irvine, CA, November 2014

Department of Civil & Environmental Engineering, Cornell University, Ithaca, NY, November 2014.

"What's the Big Idea?" Public Lecture Series, University of North Carolina, Chapel Hill, NC, October 2014.

College of Veterinary Medicine, North Carolina State University, Raleigh, NC, October 2014.

North Carolina Urban Water Consortium, High Point, NC, October 2014.

Invited Presentations (cont'd)

- John E. Walker Department of Economics, Clemson University, Clemson, SC,
September 2014.
- ASCE World Environmental and Water Resources Congress, Portland, OR, June 2014
- The Washington Forum, American Meteorological Society, Washington, D.C. April 2013.
- Department of Civil and Environmental Engineering, Rice University, Houston, TX,
March 2013.
- Water Science and Policy Center, University of California, Riverside, Riverside, CA,
February 2013.
- Department of Civil and Environmental Engineering, Rice University, Houston, TX,
January 2013.
- John E. Walker Department of Economics, Clemson University, Clemson, SC,
November 2012.
- Frontiers of Environmental Engineering Education, Association of Environmental
Engineering and Science Professors (AEESP), St. Louis, MO, October 2012.
- Eidgenössische Technische Hochschule (ETH), Institute for Environmental Engineering,
Zurich, Switzerland, June 2012.
- Woods Institute for the Environment, Stanford University, Palo Alto, CA, January 2012.
- Eidgenössische Technische Hochschule (ETH), Institute for Environmental Engineering,
Zurich, Switzerland, June 2011.
- Eidgenössische Anstalt für Wasserversorgung, Abwasserreinigung und Gewässerschutz
(EAWAG-Kastanienbaum Laboratory), Kastanienbaum, Switzerland, May 2011.
- Centre for Climate Change Mitigation Research, University of Cambridge, Cambridge,
UK, April 2011.
- Landolt Chair Symposium, School of Architecture, Civil and Environmental Engineering,
École Polytechnique Fédérale de Lausanne (EPFL), Switzerland, March 2011.
- Eidgenössische Anstalt für Wasserversorgung, Abwasserreinigung und Gewässerschutz
(EAWAG), Dübendorf, Switzerland, December 2010.
- Latsis Symposium on Ecohydrology, École Polytechnique Fédérale de Lausanne
(EPFL), Switzerland, October 2010.
- School of Architecture, Civil and Environmental Engineering, École Polytechnique
Fédérale de Lausanne (EPFL), Switzerland, October 2010.
- North Carolina Urban Water Consortium, Durham, NC, June 2010.

Invited Presentations (cont'd)

Virginia Water Resources Research Center, Virginia Tech University, April 2010.

New York Academy of Sciences, New York, NY, May 2010.

Thomson-Reuters Water Markets Workshop, London, UK, November 2009.

School of Architecture, Civil and Environmental Engineering, École Polytechnique
Fédérale de Lausanne (EPFL), Switzerland, November 2009.

North Carolina Urban Water Consortium, Chapel Hill, NC, September 2009.

"Tribute to Bill Glaze", American Chemical Society Meeting, Wash, DC, August 2009

North Carolina Water Resources Research Institute Advisory Board Meeting, Raleigh,
NC, May 2009.

Rotary International, Chapel Hill, NC, May 2009.

Water CAMPWS Series, University of Illinois at Urbana-Champaign, May 2009.

UNESCO-IHE Institute for Water Education, Delft, Netherlands, April 2009.

Dept. of Civil and Environmental Engineering, Duke University, Durham, NC, April 2009.

Dept. of Civil and Environmental Engineering, United Arab Emirates University, Al Ain,
Abu Dhabi, UAE, February 2009.

National Risk Management Research Laboratory-Urban Wet Weather Flow Division,
Edison, NJ, January 2009.

Global American South Conference, University of North Carolina, Chapel Hill, NC, April
2008.

Current Science Forum, Morehead Planetarium, University of North Carolina, Chapel
Hill, NC, December 2007.

Dept. of Agricultural and Resource Economics, North Carolina State University, Raleigh,
NC, November 2007.

Dept. of Civil and Environmental Engineering, Penn State University, State College, PA,
October 2007.

Property and Environment Research Center (PERC), Bozeman, MT, July 2007.

Nicholas School for the Environment, Duke University, Durham, NC, March 2007.

Property and Environment Research Center (PERC), Bozeman, MT, June 2006.

Invited Presentations (cont'd)

Global Institute of Sustainability, Arizona State University, Tempe, AZ, March 2006.

Institute of Marine Sciences, University of North Carolina, Morehead City, NC,
September 2006.

College of Civil Engineering, Georgia Institute of Technology, Atlanta, GA, April 2005.

Dept. of Civil and Environmental Engineering, Arizona State University, Tempe, AZ,
March 2005.

Kenan-Flagler Business School, Water and Wastewater Executive Education Program,
Chapel Hill, NC, February 2005.

Dept. of Earth & Environmental Engineering, Columbia University, New York, NY,
November 2004.

Dept. of Geography & Environmental Engineering, Johns Hopkins University, Baltimore,
MD, November 2004.

Dept. of Civil & Environmental Engineering, North Carolina State University, Raleigh,
NC, October 2004.

CONCARIBE Environmental Conference, Cartagena, Colombia, May 2004.

Frontiers of Engineering Symposium, National Academy of Engineering, National
Academies Beckman Center, Irvine, CA, September 2003.

Earth Systems Workshop, Nat'l Academy of Engineering, Washington, DC, June 2000.

Conference Papers & Presentations

Cuppari, R. I., Pavelsky, T. and G. W. Characklis, "A Remote Sensing Approach to
Creating a Global Insurance Pool for Weather-Related Risks to Hydropower,"
Fall Meeting of the American Geophysical Union, San Francisco, CA, December
2023.

Garcia, H., Fitzmaurice, K., Characklis, G. W., Zeff, H. B., Thomson, H. and A.
Sebastian, "Validation of Machine Learning Methods for Reconstructing
Repetitive Flood Damage in North Carolina, 1996-2020," Fall Meeting of the
American Geophysical Union, San Francisco, CA, December 2023.

Amonkar, Y., Pahel-Short, C., Zeighami, A., Su, Y., Kern, J. D. and G. W. Characklis,
"Electric Utilities: Managing Financial Risk due to Hydrometeorological
Variability," Fall Meeting of the American Geophysical Union, San Francisco, CA,
December 2023.

Conference Papers & Presentations (cont'd)

Hamilton, A. L., Reed, P. M., Gupta, R., Zeff, H. B. and G. W. Characklis, "Designing Robust Infrastructure Investment Partnerships in Deeply Uncertain Water Supply Systems," Fall Meeting of the American Geophysical Union, San Francisco, CA, December 2023.

Characklis, G. W., Zeff, H. B., Gorelick, D. E., Petagna, C., Gold, D., Herman, J. D. and P. M. Reed, "Adaptive Strategies for Jointly Managing Water Supply Risks and Financial Risks under Uncertainty," Fall Meeting of the American Geophysical Union, San Francisco, CA, December 2023.

Fitzmaurice, K., Garcia, H., Sebastian, A., Thomson, H., Zeff, H. B. and G. W. Characklis, "Repetitive Flooding, Insurance Coverage and Household Financial Stability in North Carolina," Fall Meeting of the American Geophysical Union, San Francisco, CA, December 2023.

Hirsch, Z., Zeff, H. B., Gupta, R., Reed, P. M. and G. W. Characklis. "Using Two-way Option Contracts to Facilitate Temporal Water Reallocation During Drought," ASCE World Environmental and Water Resources Congress, Henderson, NV, May 2023.

Petagna, C., Gorelick, D. E., Amestoy, T., Gold, D., Lau, L., Characklis, G. W., Reed, P. M. and T. Asefa. "Water Utility Infrastructure Planning in the Face of Deep Financial Uncertainty," ASCE World Environmental and Water Resources Congress, Henderson, NV, May 2023.

Cuppari, R. I., Pavelsky, T. M. and G. W. Characklis. "Remote Sensing to Mitigate Financial Risk for Hydropower Producers in Data-Scarce Regions," Fall Meeting of the American Geophysical Union, Chicago, IL, December 2022

Garcia, H., Sebastian, A., Thompson, H., Zeff, H. B. and G. W. Characklis. "Dynamic Vulnerability: Reconstructing Historical Flood Footprints and Exposure in Eastern North Carolina," Fall Meeting of the American Geophysical Union, Chicago, IL, December 2022

Gold, D., Reed, P. M., Gorelick, D. E. and G. W. Characklis. "Robust, Equitable and Stable Infrastructure Investment Pathways Require Cooperating Water Utilities to Understand Counterparty Risks," Fall Meeting of the American Geophysical Union, Chicago, IL, December 2022

Hamilton, A. L., Gupta, R. S., Reed, P. M., Zeff, H. B. and G. W. Characklis. "Discovering robust infrastructure investment partnerships to meet California's water portfolio goals," Fall Meeting of the American Geophysical Union, Chicago, IL, December 2022

Hamilton, A. L., Reed, P. M., Zeff, H. B. and G. W. Characklis. "Integrating human system complexity into water supply planning and risk assessment with exploratory modeling," Fall Meeting of the American Geophysical Union, Chicago, IL, December 2022

Conference Papers & Presentations (cont'd)

- Zeff, H. B., Hadjimichael, A., Reed, P. M. and G. W. Characklis. "Using financial contracts to facilitate increased flexibility of water allocation institutions during drought," Fall Meeting of the American Geophysical Union, Chicago, IL, December 2022
- Zeff, H. B., Sebastian A., Garcia, H., Thompson, H., Kleinman R., Characklis, G. W. "Cascading financial risks in the residential property market as a result of consecutive flood events," Fall Meeting of the American Geophysical Union, Chicago, IL, December 2022
- Zeff, H. B., Characklis, G. W., Reed, P. M., Hadjimichael, A. and A. H. Hamilton. "Adaptively managing water scarcity at multiple scales," American Geophysical Union Chapman Conference, Golden, CO, September 2022.
- Cuppari, R. I., Singh, S., Denaro, S., Su, Y., Kern, J. D., Amos, A., Quirke, D., Quinn, J. and G. W. Characklis. "From the Willamette to Canada: Water Scarcity and Hydropower in the Columbia River Basin," American Geophysical Union Chapman Conference, Golden, CO, September 2022.
- Hamilton, A. H., Zeff, H. B., Gupta, R., P. M. Reed and G. W. Characklis. "How do natural, engineered, and institutional scales impact water availability and infrastructure investment within complex, interconnected water supply systems?" American Geophysical Union Chapman Conference, Golden, CO, September 2022.
- Gorelick, D. E., Characklis, G. W., Oikonomou, K. and J. Homer. "Financial risks of water shortage and power market uncertainty for large water providers: a case study of the Central Arizona Project on the Colorado River," American Geophysical Union Chapman Conference, Golden, CO, September 2022.
- Thompson, H., Characklis, G.W., Zeff, H.B., Sebastian, A., Kleiman, R. "Financial Risks and Equitable Resilience Implications arising from Residential Flood Damages in Eastern North Carolina Communities," ASCE World Environmental and Water Resources Congress, Atlanta, GA, May 2022.
- Thompson, H., Zeff, H.B., Kleiman, R. Sebastian, A. and G. W. Characklis. "Systemic Financial Risk arising from Flood Losses to Residential Properties," Severe Storm Prediction, Education and Evacuation from Disasters (SSPEED) Center Annual Meeting, Rice University, Houston, TX, April 2022.
- Zeff, H. B., Hadjimichael, A., Reed, P. M. and G. W. Characklis. "Real time drought management via joint use of water transfers and financial instruments in institutionally complex river basins," Fall Meeting of the American Geophysical Union, New Orleans, LA, December 2021.

Conference Papers & Presentations (cont'd)

- Hamilton, A. H., Zeff, H. B., Characklis, G. W. and P. M. Reed. "Understanding the Challenges Posed in Developing Fair and Effective Investment Partnerships to Achieve California's Resilient Water Portfolio Goals," Fall Meeting of the American Geophysical Union, New Orleans, LA, December 2021.
- Zeff, H. B., Characklis, G. W., Sebastian, A., Kleiman, R. and H. Thomson. "Treading water: The compounding impact of consecutive floods on household balance sheets and systemic financial risk," Fall Meeting of the American Geophysical Union, New Orleans, LA, December 2021.
- Cuppari, R., Denaro, S., Su, Y., Kern, J. D. and G. W. Characklis. "New Financial Instruments for Managing Hydrometeorological Risk for Hydropower Producers," Fall Meeting of the American Geophysical Union, New Orleans, LA, December 2021.
- Singh, S., Quinn, J., Lamontagne, J., Kern, J. D., Su, Y., Denaro, S., Cuppari, R. and G. W. Characklis. "Exploring the benefits of integrated energy-water management in reducing economic and ecological tradeoffs," Fall Meeting of the American Geophysical Union, New Orleans, LA, December 2021.
- Gold, D., Gorelick, D. E., Reed, P. M. and G. W. Characklis. "Power and Pathways with Multi-actor Cooperation: Exploring how robustness is impacted by cooperative stability and power dynamics in regional water supply planning," Fall Meeting of the American Geophysical Union, New Orleans, LA, December 2021.
- Gorelick, D. E., Gold, D., Svrclin, S., Asefa, T., Medina, M., Lau, L., Petagna, C., Reed, P. M. and G. W. Characklis. "Coupled Adaptive Water Supply and Financial Modeling of Water Utility Infrastructure Planning Under Uncertainty," Fall Meeting of the American Geophysical Union, New Orleans, LA, December 2021.
- Zeff, H. B., Characklis, G. W., Sebastian, A., Thomson, H. and R. Kleiman. "Distribution of Real-Estate Related Financial Risk: Flooding and Debt in Residential and Commercial Real Estate Markets," Commercial Real Estate Data Alliance (CREDA) Annual meeting, Chapel Hill, NC, October 2021.
- Baum, R., Characklis, G. W. and J. D. Herman. "Designing Index Insurance Contracts to Manage Hydrologically-Driven Financial Risks Using Machine Learning," Fall Meeting of the American Geophysical Union, New Orleans, LA, December 2020.
- Cuppari, R. I., Higgins, C. W. and G. W. Characklis. "Co-location of Solar Power and Food Production to Improve Economic Resilience of Farmers, Fall Meeting of the American Geophysical Union, New Orleans, LA, December 2020.
- Gold, D., Gorelick, D. E., Reed, P. M. and G. W. Characklis. "A multi-objective framework for understanding the stability and robustness of cooperative multi-city infrastructure investment pathways addressing changing drought and financial pressures," Fall Meeting of the American Geophysical Union, December 2020.

Conference Papers & Presentations (cont'd)

- Gorelick, D. E., Gold, D., Reed, P. M. and G. W. Characklis. "Contrasting risks of high and low growth: regional water supply planning under future demand uncertainty," Fall Meeting of the American Geophysical Union, December 2020.
- Kleiman, R., Kern, J. D., Gerlach, R. and G. W. Characklis. "Managing Weather- and Market-Related Financial Risk in Algae Production for Biofuel and Co-products," Fall Meeting of the American Geophysical Union, December 2020.
- Zeff, H. B., Characklis, G. W. and A. L. Hamilton. "Evaluating and managing drought-related financial risks in California's North-South Water Transfer System, Fall Meeting of the American Geophysical Union, December 2020.
- Zeff, H. B., Characklis, G. W. and A. Sebastian. "Real estate debt and flood risk: who is financially exposed?" Fall Meeting of the American Geophysical Union, San Francisco, CA, December 2019.
- Denaro, S., Hill, J., Su, Y., Kern, J. D., Rupp, D. and G. W. Characklis. "Designing Strategies to Jointly Manage the Financial Risk of Wet and Dry Periods for Hydropower Generators in a Changing Market," Fall Meeting of the American Geophysical Union, San Francisco, CA, December 2019.
- Gold, D., Trindade, B., Reed, P. M. and G. W. Characklis. "The Consequences of Compromise Exploring the Multi-Actor Implications of Robustness Compromises in Regional Water Supply Investment Pathways," Fall Meeting of the American Geophysical Union, San Francisco, CA, December 2019.
- Gupta, R. S., Hamilton, A. L., Reed, P. M. and G. W. Characklis. "The Role of Evolutionary Algorithms in Optimizing Financial Risk Management Plans for Snow-Dependent Hydropower Utilities, Fall Meeting of the American Geophysical Union, San Francisco, CA, December 2019.
- Zeff, H. B., Herman, J. D., Reed, P. M. and G. W. Characklis. "Cooperative drought adaptation: Integrating infrastructure development, conservation, and water transfers into adaptive policy pathways," Institute for Operations Research and Management Sciences (INFORMS) Meeting, Seattle, WA, November 2019.
[Accepting 2019 INFORMS Award for Best Publication in Natural Resources]
- Kleiman, R. M., Characklis, G. W., Kern, J. D. and R. Gerlach. "Characterizing and Managing Weather-Related Financial Risk for Algal Biofuels," Algal Biomass Summit, Orlando, FL, September 2019.
- Hamilton, A. L., Zeff, H. B., Characklis, G. W., Reed, P. M., Cohen, J. and J. D. Herman. "Estimating and Managing the Financial Risks of Drought for Agricultural Institutions," ASCE World Environmental and Water Resources Congress, Pittsburgh, PA, May 2019.

Conference Papers & Presentations (cont'd)

- Gold, D., Trindade, B., Reed, P. and G. Characklis. "Cooperative and Robust Water Pathways: Redefining robustness to include time evolving infrastructure investments and multi-actor stability," ASCE World Environmental and Water Resources Congress, Pittsburgh, PA, May 2019.
- Denaro, S., Su, Y., Kern, J. D. and G. W. Characklis. "Reducing the costs of managing hydrologic-based financial risk to hydropower generators through bundling of uncorrelated risks of wet and dry years," ASCE World Environmental and Water Resources Congress, Pittsburgh, PA, May 2019.
- Gupta, R., Hamilton, A. L., Reed, P.M. and G. W. Characklis. "A diagnostic assessment of modern multi-objective evolutionary algorithms for addressing high-dimensional financial risk portfolios in snow-dominated water-energy systems," ASCE World Environmental and Water Resources Congress, Pittsburgh, PA, May 2019.
- Characklis, G. W., Kern, J. D., Zeff, H. B. and B. F. Foster. "Managing Environmental Financial Risk in Coupled Natural-Human Systems," Bi-annual meeting of the Association of Environmental Engineering and Science Professors (AEESP), Arizona State University, Tempe, AZ, May 2019.
- Zeff, H. B. and G. W. Characklis. "Evaluating the risks of hydrologic variability on Tulare Basin banking project," California Water and Environmental Modeling Forum, Sacramento, CA, April 2019.
- Characklis, G. W., Kern, J. D., Denaro, S., Zeff, H.B., Baum, R., Foster, B. F., Gorelick, D. E., Su, Y., Hamilton, A. L., Hill, J., Kleiman, R., and R. Cuppari. "Managing Financial Risk Under Environmental Uncertainty," UNC Climate Symposium, April 2019.
- Tesini, V., Denaro, S., Castelletti, A. and G. Characklis. "Integrated infrastructural and financial options to manage weather risk in a multipurpose regulated lake," Meeting of the European Geosciences Union, Vienna, Austria, April 2019.
- Vicuna, S., Ricalde, I., Melo, O., Tomlinson, J., Harou, J. and G. Characklis. "Climate Change Adaptation in Regulated Water Utilities," Meeting of the European Geosciences Union, Vienna, Austria, April 2019.
- Gorelick, D. E., Zeff, H. B., Eskaf, S. Characklis, G. W. and J. Hughes. "Benefits and tradeoffs of cooperation: exploring the relative merits of capacity sharing agreements between water utilities," Annual Meeting of the North Carolina Water Resources Research Institute, Raleigh, NC, March 2019.
- Kern, J. D., Zeff, H. B., Herman, J. D., Reed, P. M., Characklis, G. W., Medellin-Azuara, J. and T. Pavelsky. "Challenges and opportunities in modeling cross-scale, cross-sector feedbacks to inform critical decision-making in food-energy-water systems," Fall Meeting of the American Geophysical Union, Washington, DC, December 2018.

Conference Papers & Presentations (cont'd)

- Gold, D., Trindade, B., Reed, P. and G. Characklis. "Navigating Regional Robustness Conflicts By Discovering Cooperative Safe Operating Spaces for Regional Water Supply Portfolios," Fall Meeting of the American Geophysical Union, Washington, DC, December 2018.
- Nolin, A., Higgins, C., Drake, S., Conklin, D., Kern and G. Characklis. "Modeling Future Scenarios of Snow, Forests, Wildfire, Streamflow, Energy, Agriculture, and Water Rights to Explore the Food-Energy-Water Nexus," Fall Meeting of the American Geophysical Union, Washington, DC, December 2018.
- Gorelick, D. E., Lin, L., Zeff, H. B., Kim, Y., Vose, J. M., Coulston, J. W., Wear, D. N., Band, L. E., Reed, P. M. and G. W. Characklis. "The role of water management systems under hydrologic change," Fall Meeting of the American Geophysical Union, Washington, DC, December 2018.
- Gold, D., Reed, P. M. and G. W. Characklis. "Conflicts in Coalitions: A Stability Analysis of Robust Multi-City Regional Water Supply Portfolios, Decision Making Under Deep Uncertainty Conference, Culver City, CA, November 2018.
- Kern, J. D., Gorelick, D. E. and G. W. Characklis. "Multi-Objective, Optimal Siting of Algal Biofuel Production with Municipal Wastewater Treatment in Watersheds with Nutrient Trading Markets," Algae Biomass Summit, Woodlands, TX, October 2018.
- Nolin, A., Higgins, C., Amos, A., Characklis, G., Hulse, D., Schwartz, C., Rupp, D., Conklin, D., Drake, S. and J. Kern. "Modeling future scenarios of snow, forests, streamflow, energy, agriculture, and water rights to explore the Food-Energy-Water nexus in the Willamette River Basin, Oregon, Biennial Meeting of the Consortium of Universities for the Advancement of Hydrologic Sciences, Inc. (CUAHSI), Shepardstown, WV, July 2018.
- Trindade, B., Reed, P. M. and G. W. Characklis. "Time evolving robustness evaluation for risk-based cooperative long-term water supply development pathways that include short-term drought mitigation actions," International Congress on Environmental Modelling and Software (iEMS), Ft. Collins, CO, June 2018.
- Baum, R. and G. W. Characklis. "Addressing challenges in the design of risk pooling strategies to mitigate hydrologic-related financial losses for water utilities," ASCE World Environmental and Water Resources Congress, Minneapolis, MN, May 2018.
- Hamilton, A. L., Characklis, G. W. and P. M. Reed. "Direct Policy Search for multi-objective financial risk management in snow-dominated systems," ASCE World Environmental and Water Resources Congress, Minneapolis, MN, May 2018.
- Foster, B. F. and G. W. Characklis. "Economic value of river stage forecasts during drought on the Mississippi River," ASCE World Environmental and Water Resources Congress, Minneapolis, MN, May 2018.

Conference Papers & Presentations (cont'd)

- Trindade, B.C., Reed, P.M., Zeff, H.B. and G. W. Characklis. "WaterPaths: a new open source stochastic urban water portfolio simulation framework," ASCE World Environmental and Water Resources Congress, Minneapolis, MN, May 2018.
- Gorelick, D. E. and G. W. Characklis. "Sharing is (not) caring: financial risks of inter-utility capacity sharing agreements," ASCE World Environmental and Water Resources Congress, Minneapolis, MN, May 2018.
- Denaro, S., Castelletti, A., Giuliani, M. and G. W. Characklis. "Insurance portfolio diversification through bundling for competing agents exposed to uncorrelated drought and flood risks," European Geosciences Union Meeting, Vienna, Austria, April 2018.
- Hamilton, A., Characklis, G. W. and P. M. Reed. "Managing Financial Risks to Hydropower in Snow-dominated Systems: The Case of Hetch Hetchy," Fall Meeting of the American Geophysical Union, New Orleans, LA, December 2017.
- Denaro, S., Giuliani, M., Castelletti, A. and G. W. Characklis. "Index-based Insurance Contracts to Foster Cooperation Between Agents Exposed to Uncorrelated Drought and Flooding Risks," Fall Meeting of the American Geophysical Union, New Orleans, LA, December 2017.
- Trindade, B., Reed, P. M., Zeff, H. B. and G. W. Characklis. "WaterPaths: a generalizable open source urban water pathways simulation framework for many-objective risk-based planning and management, Fall Meeting of the American Geophysical Union, New Orleans, LA, December 2017.
- Gold, D., Trindade, B., Reed, P. M. and G. W. Characklis. "Conflicts in Coalitions: A Stability Analysis of Robust Multi-City Regional Water Supply Portfolios," Fall Meeting of the American Geophysical Union, New Orleans, LA, December 2017.
- Vicuna, S., Melo, O., Harou, J., Characklis, G. W. and I. Ricalde. "Climate Change Adaptation in Regulated Water Utilities," Fall Meeting of the American Geophysical Union, New Orleans, LA, December 2017.
- Kern, J. D., Gorelick, D. E. and G. W. Characklis. Multi-Objective, Optimal, Siting of Algal Biofuel Production with Municipal Wastewater Treatment in Watersheds with Nutrient Trading Markets, Algal Biofuel Summit, Salt Lake City, UT, October 2017.
- Trindade, B., Gold, D., Reed, P. M., Zeff, H. B. and G. W. Characklis. "Time Evolving Vulnerabilities and Robustness Tradeoffs for Long-term Risk-based Water Supply Development Pathways," Meeting of the ASCE Environment and Water Resources Institute, Sacramento, CA, May 2017.
- Su, Y., Kern, J. D. and G. W. Characklis. "Financial Losses from Generation Oversupply in Hydropower-dominated Systems with Growing Wind Capacity," ASCE World Environmental and Water Resources Congress, Sacramento, CA, May 2017.

Conference Papers & Presentations (cont'd)

- Gorelick, D. E. and G. W. Characklis. "Integrating Raw Water Transfers into an Eastern U.S. Management Context: A Multi-objective Analysis," ASCE World Environmental and Water Resources Congress Sacramento, CA, May 2017.
- Reed, P. M., Zeff, H. B. and G. W. Characklis. "Robust Water Supply Infrastructure Development Pathways" What, When and Where Matters the Most?" (invited), European Geosciences Union Meeting, Vienna, Austria, April 2017.
- Denaro, S., Castelletti, A., Giuliani, M. and G. W. Characklis. "Financial Tools to Induce Cooperation in Power Asymmetrical Water Systems," European Geosciences Union Meeting, Vienna, Austria, April 2017.
- Meyer, E. S., Foster, B. T. and G. W. Characklis. "Integrating Physical and Financial Approaches to Manage Environmental Financial Risk," European Geosciences Union Meeting, Vienna, Austria, April 2017.
- Characklis, G. W. "Water Research at UNC: Assisting Communities Across North Carolina," CleanTech Summit, Chapel Hill, NC, March 2017.
- Zeff, H. B., Characklis, G. W., Band, L. E., Lin, L. and P. M. Reed. "Adaptation to Observed Changes in Hydrologic Risk," Fall Meeting of the American Geophysical Union, San Francisco, CA, December 2016.
- Foster, B. F., Meyer, E. S. and G. W. Characklis. "Integrating Physical Actions and Financial Instruments to Manage Environmental Financial Risk," Fall Meeting of the American Geophysical Union, San Francisco, CA, December 2016.
- Baum, R. and G. W. Characklis. "Tradeoffs in Financial Hedging Solutions to Mitigate Drought-related Financial Risks for Water Utilities," Fall Meeting of the American Geophysical Union, San Francisco, CA, December 2016.
- Trindade, B., Reed, P. M., Zeff, H. B. and G. W. Characklis. "Time evolving multi-city dependencies and robustness tradeoffs for risk-based portfolios of conservation, transfers, and cooperative water supply infrastructure development pathways," Fall Meeting of the American Geophysical Union, San Francisco, CA, December 2016.
- Lin, L., Zeff, H. B., Stewart, A. N., Band, L. E., Martin, K., Vose, J. M., Coulston, J., Wear, D., Characklis, G. W. and P. M. Reed. "The Role of Canopy Diversity and Complexity on Water Balance and Carbon Sequestration During Dry Conditions: A Modeling Study," Fall Meeting of the American Geophysical Union, San Francisco, CA, December 2016.
- Kern, J. D., Hise, A. M., Characklis, G. W., Gerlach, R., Viamajala, S., and R. Gardner. "Using LCA/TEA in a Real Options Framework to Inform the Design of Algal Biofuel Facilities,"

Conference Papers & Presentations (cont'd)

- Herman, J. D., Zeff, H. B., Reed, P. M. and G. W. Characklis. "Water resources decision support under deep uncertainty: a classification of model-based frameworks and challenges for scenario discovery," Meeting of the International Environmental Modelling and Software Society (iEMSs), Toulouse, France, July 2016.
- Foster, B. F., Characklis, G. W. and W. N. Thurman, "Toward a Better Understanding of the Impact of Drought on Corn Markets and the Mississippi River," ASCE World Environmental and Water Resources Congress, West Palm Beach, FL, May 2016.
- Meyer, E. S., Characklis, G. W., Brown, C. M. and P. Moody, "Mitigating the Financial Risk of Hydropower Producers Under Climate Change," ASCE World Environmental and Water Resources Congress, West Palm Beach, FL, May 2016.
- Zeff, H. B., Characklis, G. W., Herman, J. D. and P. M. Reed. "Financial Risk in Integrated, Dynamic Risk Management Plans," ASCE World Environmental and Water Resources Congress, West Palm Beach, FL, May 2016.
- Bellagamba, L., Denaro, S., Kern, J. D., Giuliani, M., Characklis, G. W. and A. Castelletti. "Designing and assessing weather-based financial hedging contracts to mitigate water conflicts at the river basin scale. A case study in the Italian Alps," European Geosciences Union Meeting, Vienna, Austria, April 2016.
- Kern, J. D. and G. W. Characklis. "Financial Vulnerability of the Electricity Sector to Drought, and the Impacts of Changes in Generation Mix," Fall Meeting of the American Geophysical Union, San Francisco, CA, December 2015.
- Foster, B. T., Thurman, W. N. and G. W. Characklis. "Integrating Engineering and Economics to Characterize Environmental Financial Risk in Corn Markets," Fall Meeting of the American Geophysical Union, San Francisco, CA, December 2015.
- Zeff, H. B., Characklis, G. W., Herman, J. D. and P. M. Reed. "Risk-based Design of Integrated Adaptive Drought Management Pathways," Fall Meeting of the American Geophysical Union, San Francisco, CA, December 2015.
- Trindade, B. C., Reed, P. M., Herman, J. D., Zeff, H. B. and G. W. Characklis. "Reducing Regional Vulnerabilities and Multi-City Robustness Conflicts Using Many-Objective Optimization under Deep Uncertainty," Fall Meeting of the American Geophysical Union, San Francisco, CA, December 2015.
- Baum, R., Characklis, G. W., Hughes, J. and S. Eskaf. "The Value of Risk Pooling in Mitigating Water Utility Financial Risks Arising from Water Scarcity," Fall Meeting of the American Geophysical Union, San Francisco, CA, December 2015.

Conference Papers & Presentations (cont'd)

- Herman, J. D., Zeff, H. B., Lamontagne, J., Reed, P. M. and G. W. Characklis. "Robustness Analysis of Regional Water Supply Portfolios Using Synthetic Inflow Scenarios with Variable Drought Frequency," Fall Meeting of the American Geophysical Union, San Francisco, CA, December 2015.
- Zeff, H. B., Characklis, G. W. Herman, J. D. and P. M. Reed. "Integrating Adaptive Drought Management and Cooperative Infrastructure Investment," ASCE World Environmental and Water Resources Congress, Austin, TX, May 2015.
- Herman, J. D., Reed, P. M., Zeff, H. B. and G. W. Characklis. "How should robustness be defined for water systems planning under change?" ASCE World Environmental and Water Resources Congress, Austin, TX, May 2015.
- Characklis, G. W., Kern, J. D, Foster, B. F., Zeff, H.B. and E.S. Meyer, "Managing the Financial Risks of Water Scarcity," European Geosciences Union Meeting, Vienna, Austria, April 2015.
- Kern, J. D. and G. W. Characklis, "Can Horizontal Hydraulic Fracturing Lead to Less Expensive Achievement of More Natural River Flows?" Fall Meeting of the American Geophysical Union, San Francisco, CA, December 2014.
- Zeff, H. B., Characklis, G. W. Herman, J. D. and P. M. Reed. "When the 'soft-path' gets hard: demand management and financial instability for water utilities," Fall Meeting of the American Geophysical Union, San Francisco, CA, December 2014.
- Meyer, E. S., Characklis, G. W., Brown, C. and P. Moody. Managing the financial risk of low water levels in Great Lakes with index-based contracts," Fall Meeting of the American Geophysical Union, San Francisco, CA, December 2014.
- Herman, J. D., Reed, P. M., Zeff, H. B. and G. W. Characklis. "What is robustness?: Problem framing challenges for water systems planning under change," Fall Meeting of the American Geophysical Union, San Francisco, CA, December 2014.
- Kern, J. D., Characklis, G. W. and B. Foster, "Natural Gas Price Uncertainty and the Cost Effectiveness of Hedging Against Drought," ASCE World Environmental and Water Resources Congress, Portland, OR, June 2014.
- Foster, B., Kern, J. D. and G. W. Characklis, "Environmental Index Insurance: Mitigating Hydrologic Risk in Hydropower Generation," ASCE World Environmental and Water Resources Congress, Portland, OR, June 2014.
- Zeff, H. B., Herman, J. D., Reed, P. M. and G. W. Characklis, "Municipal Credit Ratings and the Importance of Water Demand," ASCE World Environmental and Water Resources Congress, Portland, OR, June 2014.

Conference Papers & Presentations (cont'd)

- Royster, S. and G. W. Characklis, "Utilizing Rate Increases to Fund Non-Rate Based Conservation Programs Among Water Utilities," North Carolina Water Resources Research Institute Conference, Raleigh, NC, March 2014.
- Foster, B., Kern, J. D. and G. W. Characklis, "Managing water supply related financial risk in hydropower generation with index-based financial instruments," Nexus: Water, Food, Climate and Energy Conference, Chapel Hill, NC, March 2014.
- Meyer, E. S. and G. W. Characklis, "Managing Financial Risk in Commercial Navigation on the Great Lakes," Nexus: Water, Food, Climate and Energy Conference, Chapel Hill, NC, March 2014.
- Zeff, H. B., Herman, J. D., Reed, P. M. and G. W. Characklis, "Navigating Financial and Supply Reliability Tradeoffs in Regional Drought Portfolios," Fall Meeting of the American Geophysical Union, San Francisco, CA, December 2013.
- Perona, P., Gorla, L. and G. W. Characklis, "Balancing power production and instream flow regime for small scale hydropower," Fall Meeting of the American Geophysical Union, San Francisco, CA, December 2013.
- Herman, J. D., Zeff, H. B., Reed, P. M. and G. W. Characklis, "Beyond Optimality: Multi-stakeholder robustness tradeoffs for regional water portfolio planning under deep uncertainty," Fall Meeting of the American Geophysical Union, San Francisco, CA, December 2013.
- Foster, B. and G.W. Characklis, "Using financial risk management techniques to enable more sustainable hydropower production," Hydrovision 2013, Denver, CO, July 2013.
- Meyer, E. S. and G. W. Characklis, "Mitigating hydropower generators' financial risk from climate variability in multi-purpose water management systems," Hydrovision 2013, Denver, CO, July 2013.
- Kern, J. D., Patino-Echeverri, D. and G.W. Characklis, "Dynamic hydrologic-economic modeling of tradeoffs in hydroelectric systems," Hydrovision 2013, Denver, CO, July 2013.
- Characklis, G.W. "Integrating Economics into Environmental Engineering Research & Education (or moving beyond the mindset that Economics = Accounting)," Bi-Annual Conference of the Association of Environmental Engineering and Science Professors (AEESP), Golden, CO, July 2013.
- Kern, J. D. and G. W. Characklis, "Wind Power as a Driver of Environmental Flows Downstream of Hydroelectric Dams," North Carolina Water Resources Research Institute Annual Conference, Raleigh, NC, March 2013.

Conference Papers & Presentations (cont'd)

Foster, B. and G. W. Characklis, "Using Financial Risk Management Contracts to Reduce Water Scarcity Risk in Hydropower Production," North Carolina Water Resources Research Institute Annual Conference, Raleigh, NC, March 2013.

Characklis, G. W. and H. B. Zeff, "Using Derivative Contracts to Mitigate Water Utility Financial Risks," Fall Meeting of the American Geophysical Union, San Francisco, CA, December 2012.

Kern, J. D. and G. W. Characklis, "Wind-Driven Ecological Flow Regimes Downstream of Hydroelectric Dams," Fall Meeting of the American Geophysical Union, San Francisco, CA, December 2012.

Zeff, H. B., Kasprzyk, J. R., Herman, J. D., Reed, P. M. and G. W. Characklis, "Many Objective Approach to Developing Adaptive Water Supply Portfolios in the Research Triangle Region of North Carolina," Fall Meeting of the American Geophysical Union, San Francisco, CA, December 2012.

Characklis, G. W., Caldwell, C., Zeff, H. B. and B. R. Kirsch, "Impacts of Risk Aversion on Water Supply Planning," Fall Meeting of the American Geophysical Union, San Francisco, CA, December 2011.

Kern, J. D. and G. W. Characklis, "Influence of Deregulated Electricity Markets on Hydropower Generation and Downstream Flow Regime," European Geosciences Union Annual Meeting, Vienna, Austria, April 2011.

Zeff, H. B. and G. W. Characklis, "Improving Water Utility Financial Stability in the Face of Extreme Weather," European Geosciences Union Annual Meeting, Vienna, Austria, April 2011.

Reed, P. M., Kasprzyk, J. R. and G. W. Characklis. "Many-Objective Risk-Based Planning Within Complex Engineering Systems: An Urban Water Planning Example," International Conference on Vulnerability and Risk Analysis and Management, American Society of Civil Engineers, Hyattsville, MD, April 2011.

Kasprzyk, J. R., Reed, P. M., Characklis, G. W. and B. R. Kirsch. "What is the Non-Dominated Solution? A Demonstration of de Novo Water Supply Portfolio Planning Under Deep Uncertainty," Fall Meeting of the American Geophysical Union, San Francisco, CA, December 2010.

Krometis, L-A. H., Kasturi, K. P. and G. W. Characklis. "Implications of Variation in Best Management Practice Effectiveness on the Selection of a Watershed Restoration Strategy for Microbial Contamination," Annual Meeting of the American Society of Agricultural and Biological Engineers, Pittsburgh, PA, June 2010.

Kasprzyk, J. R., Reed, P. M., Kirsch, B. R., and G. W. Characklis. "Managing Population and Drought Risks Using Many-objective Water Portfolio Planning Under Uncertainty," ASCE World Environmental and Water Resources Congress, Providence, RI, May 2010.

Conference Papers & Presentations (cont'd)

- Kern, J. D., Characklis, G. W. and M. D. Doyle. "Influence of Electricity Markets on Hydropower Generation and Downstream Flow Regime," Annual Meeting of the North Carolina Water Resources Research Institute, Raleigh, NC, March 2010.
- Kirsch, B. R. and G. W. Characklis. "Risk-based Transfer Responses to Climate Change Simulated through Autocorrelated Stochastic Methods," Fall Meeting of the American Geophysical Union, San Francisco, CA, December 2009.
- Kasprzyk, J. R., Reed, P. M., Kirsch, B. R., and G. W. Characklis. "Sensitivity-Informed De Novo Programming for Many-Objective Water Portfolio Planning Under Uncertainty," Fall Meeting of the American Geophysical Union, San Francisco, CA, December 2009.
- Krometis, L-A. H., Characklis, G. W., Noble, R. T. and M. D. Sobsey. Quantification of *E. coli* partitioning via culture-based techniques and qPCR. American Society of Microbiology Annual General Meeting, Philadelphia, PA, May 2009.
- Characklis, G. W., Kirsch, B. R., Ramsey, J., Dillard, K. E. M. and C. T. Kelley. "Developing Portfolios of Water Supply Transfers," German-American Frontiers of Engineering, National Academy of Engineering, Potsdam, Germany, April 2009.
- Caldwell, C. and G. W. Characklis. "Considerations of Risk Tolerance in Developing Probability-Based Inter-utility Transfer Agreements," Annual Conference North Carolina Water Resources Research Institute, Raleigh, NC, October 2008.
- Krometis, L-A. H. and G. W. Characklis. 2008. Use of indicator organisms as bacterial and protozoan pathogen surrogates in an urban watershed. American Society of Agricultural and Biological Engineers (ASABE) Annual International Meeting, Providence, RI, June 2008.
- Characklis, G. W. and C. Caldwell. "Using Water Transfers to Manage Supply Risk," Fall Meeting of the American Geophysical Union, San Francisco, CA, December 2007.
- Krometis, L-A. H., Characklis, G. W., P. N. Drummey and M. D. Sobsey. "Indicator Organism and Salmonella Partitioning in an Urban Watershed," International Water Association (IWA), 14th Annual International Symposium on Health-Related Water Microbiology, Tokyo, Japan, September 2007
- Characklis, G. W., Drummey, P. N., Krometis, L-A. H., Simmons, O. D. and M. D. Sobsey. "The Origins and Attachment Behavior of Nonpoint Source Microbial Contaminants," North Carolina Urban Water Consortium – Stormwater Group, Wilmington, NC, September 2007.
- Krometis, L-A. H., Characklis, G. W. and P. N. Drummey. "Microbial Partitioning in Urban Stormwaters," Association of Environmental Engineering and Science Professors (AEESP) Bi-annual Meeting, Virginia Tech, Blacksburg, VA, July 2007.

Conference Papers & Presentations (cont'd)

- Kirsch, B. R., Dillard, K. E. M., Characklis, G. W. and C. T. Kelley. "Improving the Efficiency of Optimizing Water Supply Portfolios," Association of Environmental Engineering and Science Professors (AEESP) Meeting, Virginia Tech, Blacksburg, VA, July 2007.
- Fries, J. S. Noble, R. T. and G. W. Characklis. "Environmental Controls on Transport of Bacteria in Estuaries: Human Health Implications of Sediment Transport and Hurricanes," ASCE/EWRI World Water and Environmental Resources Congress, Tampa, FL, May 2007.
- Kirsch, B. R., Characklis, G. W., Palmer, R. N., Ramsey, J., Dillard, K. E. M. and C. T. Kelley. "Using Water Transfers to Manage Supply Risk," Annual Meeting of the American Water Works Association, San Antonio, TX, June 2006.
- Krometis, L. A. and G. W. Characklis. "Characterization of Particle Class Sizes Associated with Indicator Organisms in Stormwater," ASCE/EWRI World Water and Environmental Resources Congress, Omaha, NE, May 2006.
- LoBuglio, J. N. and G. W. Characklis. "Utilizing spatiotemporal random field theory and uncertain information to assess and reduce monitoring cost for surface waters subject to TMDLs," ASCE/EWRI World Water and Environmental Resources Congress, Omaha, NE, May 2006.
- Palmer, R. N. and G. W. Characklis. "Reducing the Cost of Meeting Water Demands with Inter-Utility Transfers," Annual Conference North Carolina Water Resources Research Institute, Raleigh, NC, April 2006.
- Characklis, G. W., Kirsch, B. R., Ramsey, J., Dillard, K. E. M. and C. T. Kelley. "Using Water Transfers to Manage Risk, UNC Symposium on Safe Drinking Water: Where Science Meets Policy, Chapel Hill, NC, March 2006.
- Characklis, G. W. "Microbial Partitioning and its Impact on Stormwater Management," , North Carolina Water Resources Research Institute Seminar Series, Raleigh, NC, January 2006.
- Characklis, G. W., Kirsch, B. R., Ramsey, J., Dillard, K. E. M. and C. T. Kelley. "Developing Portfolios of Water Supply Transfers," Fall Meeting of the American Geophysical Union, San Francisco, CA, December 2005.
- Fries, J. S., Noble, R. T., Paerl, H. W. and G. W. Characklis. "Turbidity and Particle Suspensions in the Neuse River Estuary: Identifying Contributions of Resuspension, Runoff, and Phytoplankton", 18th Biennial Conference of the Estuarine Research Foundation, Norfolk, VA, October 2005.
- LoBuglio, J. N. and G. W. Characklis. "Incorporating Uncertainty in Estimating Ecological Endpoints Using Regional Water Resource Models." ASCE Watershed Management Conference, Williamsburg, VA, July 2005.

Conference Papers & Presentations (cont'd)

- Kirsch, B. R., Characklis, G. W. and J. Ramsey. "Optimization of a Water Supply Portfolio in a Stochastic Supply/Demand Environment." ASCE/EWRI World Water and Environmental Resources Congress, Anchorage, AK, May 2005.
- Characklis, G. W., Palmer, R. N. and C. Caldwell. "Reducing the Costs of Meeting Regional Water Demand through Risk-based Transfer Agreements," University Council on Water Resources (UCOWR) Annual Meeting, Boise, ID, July 2007.
- Characklis, G. W., "Water Resource Development: A Private Sector Approach", Dept. of Environmental Science and Engineering, Rice University, Houston, TX, November 2000.
- Krometis, L. A., Characklis, G. W., Dilts, M. J., Simmons, O. D., Sobsey, M. D. and C. A. Likirdopulos. "Intra-storm Variability in Water Quality and its Impact on Microbial Partitioning." ASCE/EWRI World Water and Environmental Resources Congress, Anchorage, AK, May 2005.
- Characklis, G. W., Dilts, M. J., Simmons, O. D., Likirdopulos, C. A., Krometis, L. A., and M. D. Sobsey, "Evaluating Differences in Microbial Partitioning Under Storm and Dry Weather Conditions." ASCE/EWRI World Water and Environmental Resources Congress, Anchorage, AK, May 2005.
- Krometis, L. A., Characklis, G. W., Dilts, M. J., Simmons, O. D., Likirdopulos, C. A. and M. D. Sobsey. "Variability in microbial partitioning to settleable particles in stormwater", 229th American Chemical Society (ACS) National Meeting, San Diego, CA, March 2005.
- Characklis, G. W., Dilts, M. J., Simmons, O. D., Likirdopulos, C. A., Krometis, L. A., and M. D. Sobsey. "Microbial Partitioning to Settleable Particles in Stormwater", North Carolina Urban Water Consortium, Raleigh, NC, March 2005.
- Fries, J. S., Characklis, G. W., Noble, R. T. and J. Hsieh. "Dynamics of Pathogen-Particle Interactions and Implications on the Transport and Ecology of Human Pathogens in the Neuse River Estuary," American Society of Limnology and Oceanography (ASLO) Winter Meeting, Salt Lake City, UT, February 2005.
- Characklis, G. W. and J. Ramsey. "An Integrated Hydrologic-Economic Model to Develop Minimum Cost Water Supply Portfolios," Fall Meeting of the American Geophysical Union, San Francisco, CA, December 2004.
- Characklis, G. W. "Developing Strategies for Regional Water Resource Management", Dept. of Environmental Sciences and Engineering, University of North Carolina at Chapel Hill, Chapel Hill, NC, September 2004.
- Kirsch, B. R. and G. W. Characklis. "Reducing Water Supply Costs through Regionalized Surface Water Systems and Transferable Groundwater Permits", ASCE/EWRI World Water and Environmental Resources Congress, Salt Lake City, June 2004.

Conference Papers & Presentations (cont'd)

- Fries, J. S., G. W. Characklis, A. D. Blackwood, and R. T. Noble. "The Role of Particle-Mediated Transport in the Ecology of Human Pathogens in the Neuse River Estuary", American Society of Limnology and Oceanography (ASLO) Summer Meeting, Savannah, GA, June 2004.
- Dilts, M. J., Characklis, G. W., and O. D. Simmons. "Impact Of Microbial-Particle Interaction on Microbial Fate and Transport in Stormwater," Annual Conference North Carolina Water Resources Research Institute, Raleigh, NC, April 2004.
- Characklis, G. W. and B. R. Kirsch, "Regional Water Supply Management in North Carolina", North Carolina Water Resources Research Institute Seminar Series, Raleigh, NC, January 2004.
- Traviglia, A. M. and G. W. Characklis, "Incorporating Consideration of Location, Compliance, and Reliability into Estimates of Brackish Resource Development Costs", Annual Conference of the American Water Resources Association, San Diego, CA, November 2003.
- Characklis, G. W., and B. R. Kirsch, "Regionalized Surface Water Treatment and Tradable Groundwater Permits in the Central Coastal Plain Capacity Use Area", North Carolina Water Resources Research Institute Advisory Committee Meeting, Raleigh, NC, May 2003.
- Kirsch, B. R. and G. W. Characklis. "An Integrated Analysis of Water Use Alternatives in the Central Coastal Plain Capacity Use Area", Annual Conference North Carolina Water Resources Research Institute, Raleigh, NC, April 2003.
- Kirsch, B. R. and G. W. Characklis. "An Analysis of Water Supply Alternatives in the Central Coastal Plain Capacity Use Area: A Regional Supply Model", Annual Meeting of the AWWA/WEA, NC Section, Winston-Salem, NC, November 2002. (*Graduate Research Award winner*)
- Characklis, G. W. and S. W. Durbin. "Improved Drought Management Through Use of Temporary Transfers", American Society of Civil Engineers (ASCE)-Environmental and Water Resources Institute (EWRI) Water Resources Planning and Management Conference, Roanoke, VA, May 2002.
- Durbin, S.W. and G. W. Characklis. "Optimizing Water Acquisition in the Edwards Aquifer Region", Annual Conference of the North Carolina Water Resources Research Institute, Raleigh, NC, April 2002.
- Characklis, G. W. "Water Marketing and Resource Development", WestWater Research Symposium, Houston, TX, December 2001.
- Characklis, G. W. and R. C. Griffin. "Evaluating Optimal Agricultural and Municipal Responses to Rising Salinity", American Water Resources Association (AWRA)/University Council on Water Resources (UCOWR) Conference on Water Resource Decision Support Systems, Snowbird, UT, June 2001.

Conference Papers & Presentations (cont'd)

- Characklis, G. W., "Industrial Environmental Performance Metrics: Current Practice and Recommendations for Improvement", Environmental Solutions Program, University of Texas at Austin, Austin, TX, November 1998.
- Characklis, G. W., "Improving the Ability of a Water Market to More Efficiently Manage Drought in the Lower Rio Grande", DeLange Conference: Sustainable Development: Managing the Transition, Houston, TX, March 1997.
- Characklis, G. W., "The Effects of Market Inefficiencies on Water Resource Allocation in the Lower Rio Grande", The Annual Meeting of the Society of Environmental Toxicology and Chemistry (SETAC), Washington, D.C., November 1996.
- Characklis, G. W., "Particles and Metals in Urban Runoff", USEPA Hazardous Substance Research Center (HSRC), Five Centers Conference, Salishan Lodge, OR, July 1995.
- Characklis, G. W., "Particles, Metals and Water Quality in Runoff from a Large Urban Watershed", Annual Meeting of the American Institute of Hydrology, Austin, TX, April 1994.
- Characklis, G. W., "Particles in Urban Runoff", Annual Meeting of the Water Environment Association, Austin, TX, June 1993.

Funded Projects

- "Improving Community Resilience to Extreme Events: Strategies for reducing mortgage default and home abandonment after flooding in eastern North Carolina," North Carolina Collaboratory, \$500,000, 7/24-6/26, *Principal Investigator*.
- "Integrated Water-Power Resilience Project: Forecasting Hydropower Generation in the Central Valley Project," U.S. Dept. of Energy, Pacific Northwest National Laboratory, \$186,000, 2/24-5/25, *Principal Investigator*.
- "Transforming High pH/High Alkalinity Cultivation through Beneficial Microbiomes and Improved Pond Design," Energy Efficiency and Renewable Energy Program, U.S. Dept. of Energy, \$2,000,000, 2/21-3/25, *Co-Principal Investigator (Lead PI: Robin Gerlach)*.
- "Integrated Multi-Sector, Multiscale Modeling (IM3), Office of Biological and Environmental Research, U.S. Dept. of Energy, Pacific Northwest National Lab, \$460,000, 10/20-9/24, *UNC Principal Investigator (Lead PNNL PI: Jennie Rice)*.
- "The Coupled, Co-evolving Roles of Drought and Electricity Systems in Humans' Exposure to Air Pollution," Coupled Natural Human (CNH) Systems 2, National Science Foundation, \$1,600,000, 10/20-9/24, *Sr. Personnel (PI: J. Jason West)*.

Funded Projects (cont'd)

- "Integrated Water-Power Resilience Project: Central Arizona Project Financial Risk," U.S. Dept. of Energy, Pacific Northwest National Lab, \$150,000, 2/22-12/23, *UNC Principal Investigator (Lead DOE PI: Juliet Homer)*.
- "Understanding the Demand-Supply-Finance Nexus for Water Supply Planning (extension)," Tampa Bay Water, \$300,000, 11/20-10/23, *Principal Investigator*.
- "Protecting Public Health and Preserving the Financial Viability of North Carolina's Critical Health Care Facilities during an Infectious Disease Outbreak," North Carolina General Assembly via the North Carolina Policy Collaboratory, \$116,000, 6/20-12/20, *Principal Investigator*.
- "Financial Risks of Flooding in Eastern North Carolina: who is exposed?," North Carolina General Assembly via the North Carolina Policy Collaboratory, \$250,000, 4/20-6/21, *Principal Investigator*.
- "Financial Instruments to Value Non-monetized Grid Reliability Services, with Emphasis on Inertia," Idaho National Laboratory, U.S. Department of Energy, \$60,000, 3/19-9/19, *Principal Investigator*.
- "Understanding the Demand-Supply-Finance Nexus for Water Supply Planning," Tampa Bay Water, \$200,000, 11/18-10/20, *Principal Investigator*.
- "Balancing Water Supply and Financial Risks for Water Utilities in North Carolina," North Carolina Policy Collaboratory, \$20,000, 9/18-6/19, *Principal Investigator*.
- "A comprehensive strategy for stable, high productivity cultivation of microalgae with controllable biomass composition," U.S. Department of Energy, \$2,900,000, 6/18-5/21, *Principal Investigator (Other PIs: (Lead) Sridhar Viamajala & Robin Gerlach)*.
- "Sustainable Solutions for Water, Energy and Economic Development (SSWEED)," Duke Energy Foundation, \$195,000, 1/18-12/18, *Principal Investigator*.
- Texas A&M Superfund Research Center: Comprehensive Tools and Models for Addressing Exposures to Mixtures during Environmental Emergency-related Contamination Events, National Institute of Environmental Health Sciences, \$10,000,000, 10/17-9/22, *Co-investigator (Lead PI: Ivan Rusyn)*.
- "Innovations at the Nexus of Food, Energy, Water Systems (INFEWS) – Type 1: Leveraging Natural Resource Concentration and Conveyance in the Energy-Water-Food Nexus to Increase Security and Resilience," National Science Foundation, \$2,500,000, 10/17-9/22, *Co-Principal Investigator (Lead PI: Chad Higgins)*.
- "Sustainable Solutions for Water, Energy and Economic Development (SSWEED)," Duke Energy Foundation, \$180,000, 1/17-12/17, *Principal Investigator*.

Funded Projects (cont'd)

- "Innovations and the Nexus of Food, Energy and Water (INFEWS) – Track 2: The Sustainability-Productivity Tradeoff: Water Supply Vulnerabilities and Adaptation Opportunities in California's Coupled Agricultural and Energy Sectors," National Science Foundation, \$2,958,000, 10/16-9/21, *(Lead) Principal Investigator*.
- "Sustainable Energy, Environment and Economic Development (SEEED)," Duke Energy Foundation, \$100,000, 1/16-12/16, *Principal Investigator*.
- "Redefining Environmental Engineering and Science in the 21st Century," National Science Foundation, \$49,500, 2/16-1/17, *Principal Investigator*.
- "Water Sustainability and Climate (Type III): Designing Robust and Adaptive Water Management Strategies for Regions Transitioning from Abundance to Scarcity," National Science Foundation & U.S. Dept. of Agriculture, \$2,200,000 (\$1,700,000 and \$500,000, respectively), 7/14-7/19, *(Lead) Principal Investigator*.
- "Integration of Nutrient and Water Recycling for Sustainable Algal Biorefineries," U.S. Department of Energy, \$3,000,000, 2/13-1/17, *Principal Investigator* (other PIs: (Lead) Sridhar Viamajala & Robin Gerlach).
- "Alkaliphilic microalgae-based sustainable & scalable processes for renewable fuels and products," National Science Foundation, \$1,900,000, 9/12-8/17, *Principal Investigator* (other PIs: (Lead) Sridhar Viamajala & Robin Gerlach).
- "Sustainable Energy, Environment and Economic Development," Duke Energy Foundation, \$81,000, 4/15-12/15. *Principal Investigator*.
- "Portfolio-based Approaches to Managing Climate Uncertainty in Urban Water Planning," National Oceanic and Atmospheric Administration (NOAA), \$300,000, 9/11-8/14, *Principal Investigator*.
- "Integrating Economic and Financial Principles into Environmental Engineering Research and Education," National Science Foundation, \$50,000, 9/10-8/12, *Principal Investigator*.
- "Ensuring Water Supply Reliability and Financial Stability for North Carolina Utilities," North Carolina Water Resources Research Institute and North Carolina Urban Water Consortium, \$50,000, 03/10-06/11, *Principal Investigator*.
- "Operating Policies and Administrative Procedures Governing Operations of the John H. Kerr (Dam) Project on the Roanoke River", North Carolina Department of Environment and Natural Resources, \$74,282; 09/08–04/09, *co-Principal Investigator* (PI: Richard Whisnant).
- "Linkage of bacterial pathogens to human infectious disease in an estuary subjected to extreme climatic events", National Science Foundation, \$1,527,139, 9/08–8/12, *co-Principal Investigator* (PI: Rachel Noble).

Funded Projects (cont'd)

- National Strategy for Environment and Health for the United Arab Emirates," Environment Agency Abu Dhabi, \$4,562,312, 6/08–5/11, *co-investigator* (PI: Jacqueline MacDonald Gibson).
- "North Carolina Water Allocation Study", North Carolina Environmental Review Commission, \$100,000, 1/08–12/08, *co-Principal Investigator* (PI: Richard Whisnant).
- "Promoting North Carolina's Economic Development through Strategic Water Resource Management", North Carolina Research Competitiveness Fund, \$246,000, 12/07–12/08, *Principal Investigator*.
- "Evaluating Pathogen Partitioning in New York City Water Supply Reservoirs", U.S. Environmental Protection Agency/New York City Department of Environmental Protection, \$385,000, 8/06–9/07, *Principal Investigator*.
- "Improved Regional Supply Strategies using Probability-based Inter-utility Transfer Agreements," Research Triangle Utilities, \$80,000, 9/06-7/08, *Principal Investigator*.
- "Developing a Total Maximum Daily Load for a Biologically Impaired Waterbody", U.S. Environmental Protection Agency/North Carolina Dept. of Environment and Natural Resources, \$200,000, 7/06–6/09, *Principal Investigator*.
- "Identifying the Origins and Attachment Behavior of Non-point Source Microbial Contaminants", North Carolina Water Resources Research Institute/North Carolina Urban Water Consortium, \$49,000, 7/05–12/06, *Principal Investigator*.
- "Reducing the Cost of Maintaining Regional Water Supply Reliability", Progress Energy/North Carolina Urban Water Consortium, \$80,000, 6/04–6/06, *Principal Investigator*.
- "Regional Solutions to Developing Water Supplies", American Water Works Association Research Foundation (AWWARF) and USEPA, \$347,000, 10/03–9/05, *co-Principal Investigator* (PI: Stratus Consulting).
- "Impacts of Anthropogenic Change on the Ecology of Human Pathogens in a Eutrophic Estuary", National Science Foundation/National Institutes of Health, \$1,796,000, 9/03–8/08, *co-Principal Investigator* (PI: Crawford-Brown, D.).
- "Impact of Microbial-Particle Interaction on Microbial Fate and Transport in Stormwater", North Carolina Dept. of Environment and Natural Resources, \$75,000, 6/03-5/04, *Principal Investigator*.
- "Drought vulnerability in the Catawba River Basin", Duke Energy Foundation, \$100,000, 5/03–1/04, *co-Principal Investigator* (PI: Band, L.).

Funded Projects (cont'd)

Reducing the Cost of Maintaining Reliability in Regional Water Supplies”, IBM/UNC Junior Faculty Development Grant, \$5,000, 1/03–12/03, *Principal Investigator*.

“An Expert System for Decisionmaking in the Use of Desalination for Augmenting Water Supply”, U. S. Dept. of Interior/Bureau of Reclamation, \$60,000, 9/02–6/04, *Principal Investigator*.

“Developing a Minimum Cost Portfolio of Water Assets”, University Research Council, University of North Carolina at Chapel Hill, \$3,900, 5/02–4/04, *Principal Invest.*

“Reduced Cost Strategies for Regional Integration of Surface and Ground-water Use”, North Carolina Water Resources Research Institute, \$80,000, 2/02–6/04, *Principal Investigator*.

“Minimizing Regional Cost of Conjunctive Use of Surface and Groundwater”, University Research Council, University of North Carolina at Chapel Hill, \$3,900, 12/01–11/03, *Principal Investigator*.

“Conversion from Conventional Treatment to Microfiltration in a Small Water System”, U. S. Environmental Protection Agency, \$115,000, 12/01–3/03, *co-Principal Investigator (PI: DiGiano, F. A.)*.

Teaching and Advising

Current Courses

Analysis of Water Resource Systems (ENVR 755): taught each Fall

*Programming/R/Python for Environmental Research (ENVR 753): taught each Fall

Managing Environmental Financial Risk (ENVR 788): taught each Spring

* a one credit companion class to ENVR 755 that is co-taught primarily by my graduate students

Previous Courses

Environmental Management and Policy Colloquium (ENVR 200)

Environmental Systems Analysis (ENVR 217) + co-taught with Professor Don Lauria

Design of Water Systems (ENVR 285) + co-taught with Professor Don Lauria

Unifying Concepts (ENVR 401)

Setting Environmental Priorities (ENVR 783)

Surface Water Quality: Modeling and Policy (ENVR 850)

Current Research Group

Research Staff

Dr. Yash Amonkar, Post-Doctoral Researcher

Mr. Hunter Spitzer, Research Associate

Graduate Students (Primary advisor)

Mr. Iain Burnett (Ph.D.)

Ms. Rosa Cuppari (Ph.D.)

Mr. François Daudelin (Ph.D.)

Mr. Kieran Fitzmaurice (M.S.)

Ms. Madison Haley (M.S.P.H.)

Mr. Austin (Mac) Lord (M.S.)

Current Graduate Student Committees (Dept. of ESE at UNC unless otherwise indicated)

Ms. Ece Ari Akdemir, (Ph.D.), Forestry and Environmental Resources, N.C. State

Mr. Kerim Akdemir (Ph.D.), Forestry and Environmental Resources, N.C. State

Mr. Keenan Brame (Ph.D.), Environmental Science, Montana State University

Ms. Alexa Bruce (Ph.D.), Civil & Environmental Engineering, Univ. of Mass-Amherst

Ms. Kelsey Bruning (Ph.D.)

Ms. Aashka Dave (Ph.D.), School of Information and Library Science

Ms. Helena Garcia (Ph.D.), Dept. of City and Regional Planning

Ms. Lauren Grimley (Ph.D.), Dept. of Ecological, Marine and Environmental Sciences

Ms. Carolyn Kowalski (M.P.H.)

Ms. Lin Lin (Ph.D.)

Ms. Huazhen Liu (Ph.D.)

Mr. Carlos Nunes (Ph.D.)

Mr. Luis Prieto (Ph.D.), Forestry and Environmental Resources, N.C. State

Teaching and Advising (cont'd)

Current Graduate Student Committees (cont'd) (Dept. of ESE at UNC unless otherwise indicated)

Mr. Mark Radin (Ph.D.)

Ms. Rui Shan (Ph. D.)

Mr. Riley Vickers (Ph.D.)

Ms. Ying Yu (Ph.D.)

Mr. Amir Zeighami (Ph.D.), Forestry and Environmental Resources, N.C. State

Post-Doctoral Researchers Mentored

Dr. Simona Denaro

Dr. J. Stephen Fries

Dr. David Gorelick

Dr. Jordan Kern

Dr. Harrison Zeff

Students Graduated

Primary Advisor and Committee Chair

Dr. Rachel Baum (Ph.D.), "Risk Pooling to Mitigate Hydrologic-related Financial Losses for Water Utilities," graduated June 2019.

Mr. Casey Caldwell (M.S.E.E.), "Considerations of Risk Tolerance in Developing Probability-based Inter-Utility Transfer Agreements", graduated May 2008.

Mr. Evan Canavan (undergraduate honors thesis), "Characterizing and Managing Financial Risk in Algae Production for Diverse Strains," graduated May 2023.

Ms. Adrienne Cizek (M.S.E.E.), "Comparing the Partitioning Behavior of *Cryptosporidium* and *Giardia* with that of Indicator Organisms in Stormwater Runoff", graduated April 2008.

Ms. Rosa Cuppari (M.S.), "The Financial Impact of Co-Locating Agricultural Production and Solar Power Generation," graduated in May 2020.

Ms. Mackenzie Dilts (M.S.E.E.), "Impact of Microbial-Particle Interaction on Microbial Fate and Transport in Stormwater", graduated June 2004.

Teaching and Advising (cont'd)

Students Graduated (cont'd)

Primary Advisor and Committee Chair (cont'd)

- Ms. Patricia Drummey (M.S.E.E.), "Evaluating Microbial Partitioning Along the Stormwater Transport Chain and its Impact on the Effectiveness of Wet Detention Ponds," graduated August 2007.
- Mr. Scott Durbin (M.S.E.E.), "Utilization of a Water Market to Optimize Water Acquisition in the Edwards Aquifer Region", graduated July 2002.
- Mr. Ben Foster (M.S.), "Managing Water Supply Related Financial Risk in Hydropower Production with Index-Based Financial Instruments," graduated November 2013.
- Dr. David Gorelick (Ph.D./M.S.), "Integrating Raw Water Transfers into an Eastern U.S. Management Context: A Multi-Objective Analysis"; Ph.D.: "Joint mitigation of supply and financial risk in regional water supply management under uncertainty," graduated July 2021.
- Dr. Andrew Hamilton (Ph.D.), "Multi-Objective Management of Financial Risks in Coupled Food-Energy-Water Systems," graduated November 2021.
- Ms. Joy Hill (M.S.), "Climate Change Alters Interregional Electricity Market Dynamics on the West Coast," graduated September 2020.
- Mr. Zachary Hirsch (M.S.), "Two-Way Option Contracts for Facilitating Water Re-Allocation During Drought," graduated June 2023.
- Mr. Adam Hise (M.S.), "Interdependence of Financing Parameters and Processing Improvements in the Design of Economically Competitive Algal Biofuel Production Pathways," graduated August 2015.
- Mr. Joshua Hunn (M.S.), "Optimization of Nonpoint Source Best Management Practices Selection through a Calibrated HSPF Modeling Approach," graduated May 2007.
- Ms. Kavya Kasturi (M.S.E.E.), Implications of Variation in Best Management Practice Effectiveness on the Selection of Watershed Restoration Strategies for Microbial Contamination," graduated August 2009.
- Dr. Jordan Kern (Ph.D./M.S.), M.S.: "Influence of De-regulated Electricity Markets on Hydropower Generation and Downstream Flow Regime"; Ph.D.: "Dynamic Hydrologic-Economic Modeling of Tradeoffs in Hydroelectric Systems," graduated in April 2014.

Teaching and Advising (cont'd)

Students Graduated (cont'd)

Primary Advisor and Committee Chair (cont'd)

Dr. Brian Kirsch (Ph.D./M.S.), M.S.: “An Equilibrium Approach to Integrating Regional Surface Water Treatment and Groundwater Withdrawals”; Ph.D.: “Analytical Tools for Integrating Transfers into Water Resource Management Strategies,” graduated January 2010.

Ms. Rachel Kleiman (M.S.), “Characterizing and Managing Weather-related Financial Risk in Algal Biofuel Production,” graduated in April 2020.

Dr. Leigh-Anne Krometis (Ph.D.), “Microbial Partitioning in Urban Stormwaters,” graduated in April 2009.

Dr. Joseph N. LoBuglio (Ph.D.), “Probability-based Approaches for Incorporating Uncertainty into Water Resources Models,” graduated January 2012.

Dr. Eliot Meyer (Ph.D.), “Managing the Financial Risks of Variable Water Levels in the Great Lakes,” graduated November 2017.

Ms. Corey Pahel-Short (M.S.), “A composite index-based instrument for managing the financial risk of variable hydrometeorology for electric utilities, graduated May 2022.

Mr. Reed Palmer (M.S.), “Reducing the costs of meeting regional water supply reliability goals through risk-based water transfer agreements,” graduated June 2006.

Ms. Christina Petagna (M.S.), “Balancing Supply Risk and Financial Risk in Water Utility Decision Making Under Uncertainty,” graduated August, 2023.

Ms. Jocelyn Ramsey (M.S.E.E.), “Water Transfer Portfolio Development Using Random Market Prices and Anticipatory Decision Rules,” graduated July 2004.

Ms. Sarah Royster (M.S.E.E.), “Softer Development Paths: Assessing the Potential for Municipal Water Conservation to Forestall Supply Expansion Under Uncertainty,” graduated May 2015.

Mr. Steve Russo (M.S.E.E.), “Bacteria-Sediment Associations: Implications for Microbial Fate and Transport Modeling in Support of TMDL Development,” graduated May 2007.

Mr. Yufei Su (Ph.D./M.S.), M.S.: “Financial Losses from Generation Oversupply in Hydropower Dominated Systems with Growing Wind Capacity,”; Ph.D.: “Quantifying Uncertainties and Risks for Bulk Electric Power Systems and Market Participants,” graduated August 2020.

Teaching and Advising (cont'd)

Students Graduated (cont'd)

Primary Advisor and Committee Chair (cont'd)

- Ms. Emma Susick (M.S.), "Relationship of total *Vibrio* spp. and *Vibrio vulnificus* to phytoplankton and water quality parameters in the Neuse River Estuary, North Carolina," graduated April 2010.
- Ms. Hope Thomson (M.P.H.), "Financial Risk of Flood Events in Eastern North Carolina," graduated May 2021.
- Ms. Andrea Traviglia (M.S.E.E.), "Incorporating Consideration of Location, Compliance, and Reliability into Estimates of Brackish Resource Development Costs," graduated in June 2004.
- Dr. Harrison Zeff (Ph.D./M.S.E.E), M.S.E.E.: "Improving Water Utility Financial Stability in the Face of Extreme Weather"; Ph.D.: "Risks, Challenges, Tradeoffs and Opportunities in Dynamic Adaptive Water Supply Systems," graduated January 2016.

Co-Advisor

- Ms. Robin Bolte (M.S.), "Selecting Watershed Restoration Strategies by Using the Analytical Hierarchy Process," graduated August 2009.
- Mr. Tim Healy (M.S.), "Statistical Comparison of Disinfection Efficacy of UV Irradiation and Chlorination at a Wastewater Treatment Plants in North Carolina," graduated in May 2007.
- Mr. Eric Kelly (M.S.), "An Analysis of Jordan Lake Water Quality and its Impact on the Cary/Apex Water Treatment Facility," graduated in August 2007.
- Mr. Matt Richardson (M.S.), "Examination of the Relationship between Public Funding for Water and Sewer Infrastructure and Indicators of Need in the Appalachian Region from 2000 through 2003," graduated in June 2005.
- Ms. Preethi Sama (M.S.), "Northeast Creek TMDL: The Health and Economic Impact of High Concentrations of Fecal Coliform," graduated in June 2007.

Visiting Students

- Ms. Marta Andreoni (M.S.) Politecnico di Milano
- Ms. Laura Bellagamba (M.S.), Politecnico di Milano
- Ms. Simona Denaro (Ph.D.), Politecnico di Milano
- Ms. Vanessa Tesini (M.S.), Politecnico di Milano

Teaching and Advising (cont'd)

Students Graduated (cont'd)

Committee Member (Dept. of ESE at UNC unless otherwise indicated)

Dr. Maura Allaire (Ph.D.), December 2015

Mr. Kerem Akdemir (M.S.), April 2021, Forestry & Env. Resources, N.C. State

Mr. Aaron Archer (M.S.), August 2005

Mr. Brad Bennett (M.S.E.E.), May 2012

Ms. Katie Bland (M.S.E.E.), May 2006

Ms. Amanda Burns (M.S.), May 2007

Ms. Kathryn Bradford (M.S.), March 2018

Dr. Boris Brglez, D.V.M. (M.P.H), August 2003

Mr. Colin Cameron (M.S.), May 2013

Mr. Cheol-Hung Cho (M.S.), December 2003

Dr. Huei-An Chu (Ph. D.), May 2006

Mr. Francesco Cioccia (M.S.), EPFL, Arch/Civil/Env Engineering, May 2011

Mr. Jonny Crocker (M.S.E.E./Ph.D.), May 2011/May 2016

Mr. Nick DeFelice (M.S.E.E./Ph.D.), May 2010/December 2014

Ms. Leigh DeForest (M.S.P.H.), May 2020

Mr. Chris Delcher (M.S.), August 2003

Ms. Karen Dillard (Ph. D.), North Carolina State University, Mathematics, May 2007

Dr. Kristen Downs (Ph.D.), November 2022

Mr. Shadi Eskaf (M.S.E.E.), May 2003

Dr. Ken Fortino (Ph. D.), August 2010

Ms. Clare Gibbons (undergraduate honors thesis), UNC, Kenan-Flagler, April 2019

Dr. Alex Gorzalski (Ph.D.), June 2019

Mr. Jon Hathaway (Ph.D.) N.C. State, Dept. of Biological & Ag. Eng., May 2010

Teaching and Advising (cont'd)

Students Graduated (cont'd)

Committee Member (cont'd) (Dept. of ESE at UNC unless otherwise indicated)

Dr. Thomas Hu (Ph.D), University of Illinois, Dept. of Civil & Env. Eng., May 2009

Dr. Taehee Hwang (Ph.D.), UNC, Dept. of Geography, May 2010

Dr. Marc Jeuland (Ph.D./M.S.E.E.), May 2007/December 2009

Mr. Tom Johnson (M.S.E.E.), May 2003

Ms. Menaka Kalaskar (undergraduate honors thesis), UNC, Philosophy, May 2005

Dr. Joseph Kasprzyk (Ph.D.) Penn State U., Dept. of Civil & Env. Eng., May 2013

Dr. Jeong-Hwan Kim (Ph.D.), December 2005

Ms. Yuyun Liang (M.S.E.E), August 2015

Dr. Brian Maskery (Ph.D.), December 2009

Dr. Brian Miles (Ph.D.), UNC Dept. of Geography, December 2014

Ms. Debbie Medlin (M.S.), December 2006

Dr. Kyle Messier (Ph.D./M.S.), December 2010/May 2015

Dr. Eric Money (Ph.D.), May 2009

Ms. Jennifer Mundt (M.S.P.H.), May 2007

Mr. Arne Newman (M.S.), December 2008

Dr. Amin Niayifar, (Ph.D.), EPFL, Arch/Civil/Env Engineering, April 2019

Dr. Yang Ou (Ph.D.), September 2019

Dr. Semra Ozdemir (Ph.D.), August 2013

Dr. Lauren Patterson (Ph.D.), UNC Dept. of Geography, May 2012

Mr. Matthew Price (Ph.D.), UNC Institute of Marine Sciences, November 2020

Ms. Savita Schlesinger (M.S.E.E.), August 2004

Ms. Jamie Smedsmo (M.S.), August 2015

Mr. Imaan Taghavi (M.S.E.E.), July 2017

Teaching and Advising (cont'd)

Students Graduated (cont'd)

Committee Member (cont'd) (Dept. of ESE at UNC unless otherwise indicated)

Mr. Chris Wedding (Ph.D.), May 2008

Mr. Todd Whitehead (M.S.E.E.), May 2007

Ms. Jessica Wignall (M.S.P.H.), May 2013

Ms. Laura Richards (M.S.E.E.), May 2007

Mr. Jakob Rowny (M.S.), May 2011

Mr. J. R. Sisson (M.S.), August 2003

Dr. Erika Smull (Ph.D.), Nicholas School of the Environment, Duke, September 2022

Ms. Emily Tully (M.S.E.E.), August 2017

Dr. Joe Zabinski (Ph.D.), August 2017

Ms. Alexandra Zapata (M.S.), May 2003

Service Activities

Editorial Positions

Editorial Board, *Water Security*, 2016-present.

Editor, *Hydrology and Earth System Sciences (HESS)*, 2013-2019.

Associate Editor, *Water Resources Research*, 2003-2010.

Journal Reviews

Advances in Water Resources

Algal Research

Earth's Future

Ecological Applications

Environmental Engineering Science

Environmental Modelling & Software

Service Activities (cont'd)Journal Reviews (cont'd)

Environmental Research Letters

Environmental Science and Technology (ES&T)

Frontiers in Environmental Science

Hydrologic Processes

Hydrology and Earth System Sciences (HESS)

Journal of the American Water Resources Association

Journal of the American Water Works Association

Journal of Environmental Economics and Management

Journal of Environmental Engineering

Journal of Environmental Management

Journal of Environmental Quality

Journal of Hydrology

Journal of Industrial Ecology

Journal of Water Resources Planning and Management

Journal of Water, Sanitation and Hygiene for Development

Journal of Waterway, Port, Coastal and Ocean Engineering

Nature Communications

Optimization

Reviews of Geophysics

Utilities Policy

Water International

Water Research

Water Resources Research

Service Activities (cont'd)

Book/Proposal/Report Reviews

Environmental Engineering in the 21st Century: Addressing the Grand Challenges,
National Research Council

Water Resource Economics: Scarcity, Policies and Projects, MIT Press

National Oceanic and Atmospheric Administration (NOAA)

National Science Foundation (NSF)

North Carolina Water Resources Research Institute

Swiss National Science Foundation

Membership in Professional Societies

American Geophysical Union (AGU)

American Society of Civil Engineers (ASCE)

Association of Environmental Engineering and Science Professors (AEESP)

Committee Service

Review Committee, UNC Water Institute Director, University of North Carolina at Chapel Hill, 2023-present.

Appointments, Promotion, and Tenure Committee, Gillings School of Global Public Health, University of North Carolina at Chapel Hill, 2023-present.

Technical Advisory Group, North Carolina Flood Resiliency Blueprint, North Carolina Department of Environmental Quality, 2023-present.

Awards Committee, Association of Environmental Engineering and Science Professors (AEESP), 2022-present.

Chair, Awards Committee, Environmental Sciences and Engineering, University of North Carolina at Chapel Hill, 2021-present.

Chair, Departmental Budget Committee, Environmental Sciences and Engineering, University of North Carolina at Chapel Hill, 2021-present.

Internal Advisory Committee, Institute for Environmental Health Solutions, University of North Carolina at Chapel Hill, 2021-present.

Collaborator, Energy Data Analytics Program, Duke University, 2020-present.

Service Activities (cont'd)

Committee Service (cont'd)

Advisory Board, Sustainable Water Development National Research Traineeship (NRT) Program, University of Iowa, 2017-present.

University of North Carolina Representative, Consortium of Universities for the Advancement of Hydrologic Sciences, Inc. (CUASHI), 2017-present.

North Carolina Policy Collaboratory Advisory Board, University of North Carolina at Chapel Hill, 2016-present.

Tenure and Promotion Committee, Institute for the Environment, University of North Carolina at Chapel Hill, 2015-present.

Faculty Representative, Department of Environmental Sciences and Engineering Alumni Committee, University of North Carolina at Chapel Hill, 2015-present.

Research Committee, Institute for the Environment, University of North Carolina at Chapel Hill, 2014-present.

Search Committee, Vice-Chancellor of Research, University of North Carolina at Chapel Hill, 2023.

Advisory Group, Strategic Engagement on National Water Resources, Institute of Water Resources, U.S. Army Corps of Engineers, 2020-2023.

Chair, Review Committee, UNC Water Institute, University of North Carolina at Chapel Hill, 2023.

Centennial Celebration Planning Committee, Department of Environmental Sciences and Engineering, University of North Carolina at Chapel Hill, 2017-2022.

Board Member (elected), Consortium of Universities for the Advancement of Hydrologic Science, Inc. (CUAHSI), 2018-2021.

Association of Environmental Engineering and Science Professors (AEESP) Strategic Planning Steering Committee, 2020-2021.

Chair Review Committee, Environmental Sciences and Engineering, University of North Carolina at Chapel Hill, 2021.

External Advisory Committee, Presidential Excellence Grant on Pathways to Sustainable Urban Water Security: Desalination and Water Reuse in the 21st Century, Texas A&M University, 2018-2020

Steering Group, Hydro Research Foundation, 2016-2020.

Advisory Team, Center for Sustainable Enterprise, Kenan-Flagler School of Business, University of North Carolina at Chapel Hill, 2017-2019.

Service Activities (cont'd)

Committee Service (cont'd)

Co-Chair, Workshop on Managing Financial Risks in Environmental Systems: Efficient and Sustainable Adaptation in the Face of Global Change, Hoover Institution, Stanford University, May 2019.

Member, Hydrology and Water Resources Search Committee, Environment, Ecology and Energy Program (E3P), University of North Carolina at Chapel Hill, 2018-2019.

Chair, Search Committee, Director of the UNC Water Institute, University of North Carolina at Chapel Hill, 2018-2019.

Committee to Enhance the Gillings Faculty Environment, Gillings School of Global Public Health, University of North Carolina at Chapel Hill, 2017-2019.

Session Co-Chair, Spring Meeting of the European Geosciences Union, 2011, 2012, 2015, 2016, 2017, 2018, 2019.

Session Co-Chair, Fall Meeting of the American Geophysical Union, 2005, 2006, 2007, 2008, 2013, 2014, 2015, 2016, 2017, 2018.

Chair, Space Committee, Department of Environmental Sciences and Engineering, Gillings School of Global Public Health, University of North Carolina at Chapel Hill, 2011-2018.

Lead Organizer, International Workshop on Innovation in Modelling Coupled Natural Human Water Systems, Tübingen, Germany, 2017.

Co-Chair, Task Force to Reorganize Campus Environmental Programs, University of North Carolina at Chapel Hill, 2016.

Chair, Organizing Committee, National Workshop Series: Redefining Environmental Engineering and Science in the 21st Century, National Science Foundation and Association of Environmental Engineering and Science Professors, 2016.
[January – USC/Los Angeles; March – Rice/Houston; May – NSF/Washington, DC]

Faculty Advisor, Emerging Leaders in Science and Society (ELISS), University of North Carolina at Chapel Hill and Duke University, 2016.

President (elected), Association of Environmental Engineering and Science Professors (AEESP), 2015-2016.

Board Member (elected), Association of Environmental Engineering and Science Professors (AEESP), 2012-2016.

Faculty Advisor, Environmental Science and Engineering Student Organization (ENVRSO), University of North Carolina at Chapel Hill, 2006-2010.

Service Activities (cont'd)

Committee Service (cont'd)

Chair, Environmental Sciences and Engineering Chair Search Committee, Gillings School of Global Public Health, University of North Carolina at Chapel Hill, 2016.

External Review Panel, Center for Environmental and Resource Economics Policy (CEnREP), North Carolina State University, 2014.

External Advisory Committee, Interdisciplinary Water Programs, Pennsylvania State University, 2014

Investment Committee, Association of Environmental Engineering and Science Professors (AEESP) Foundation, 2013-2015. [Chair, 2015]

Faculty Search Committee, Environmental Economics, Curriculum on Ecology and the Environment, University of North Carolina at Chapel Hill, 2012.

Task Force, A New Scientific Agenda for the Hydrologic Sciences, International Association of Hydrologic Sciences, 2011-2012.

Co-Chair, Workshop on Integrating Economic and Financial Principles into Environmental Engineering Research and Education, National Science Foundation, Arlington, VA, January 2011.

Working Group, "Hydrologic Synthesis: Toward a New Water Research Agenda", National Science Foundation, 2010-2011.

Chair, Committee on Expanding Opportunities for Environmental Research using Economic, Financial, and Business Entrepreneurship Principles, Association of Environmental Engineering and Science Professors, 2009-2011.

Co-Chair, Session on "Role of Economics in the Future of Environmental Engineering Education and Research," Bi-annual Meeting of the Association of Environmental Engineering and Science Professors (AEESP), Iowa City, IA, July 2009.

Chair, Faculty Search Committee, Dept. of Environmental Sciences and Engineering, University of North Carolina at Chapel Hill, 2007-2008.

Invited Participant, NSF Workshop on Frontier Research Directions in Civil and Environmental Engineering, Arlington, VA, May 2007.

School of Public Health Committee on Designing a Financial Literacy Curriculum, University of North Carolina at Chapel Hill, 2007-2009.

Elected Control Group Member (Secretary 2006; Co-Chair 2007; Chair 2008, Past-Chair 2009), ASCE Standing Committee on Environmental and Water Resource Systems.

Service Activities (cont'd)

Committee Service (cont'd)

Chair, ASCE Task Committee on the Role of Systems Analysis in NSF's Environmental Observatories, 2006-2008.

Ad Hoc Committee on the Establishment of a Global Water Institute, UNC School of Public Health, 2006-2008.

Environmental Sciences and Engineering Chair Search Committee, UNC School of Public Health, 2005-2006.

Technical Advisory Committee, North Carolina Water Resources Research Institute, 2003; 2006-2007.

Admissions Committee, Dept. of Environmental Sciences and Engineering, University of North Carolina at Chapel Hill, 2006-2010.

Strategic Planning Committee, Dept. of Environmental Sciences and Engineering, University of North Carolina at Chapel Hill, 2006 – 2008.

Member/Rapporteur, Association of Environmental Engineering and Science Professors (AEESP), Workshop on the Evolution of Environmental Engineering as a Professional Discipline, July 2002.

Media Interviews/Editorials

Bozeman (MT) Daily Chronicle

Capital Tonight with Tim Boyum (TWC News, channel 14)

CCTV, Global Business America

Chapel Hill News

Chapelboro Radio 97.9FM (Focus Carolina series)

Charlotte Observer

Circle of Blue News Service

Daily Tar Heel

Durham Herald-Sun

ESG Talks (podcast), Kroll Bond Rating Agency

Greensboro News & Record

Houston Chronicle

Service Activities (cont'd)Media Interviews/Editorials (cont'd)

NBC Learn

Public News Service

Raleigh News & Observer

Science News for Students

UNC-TV, North Carolina Now

Waterloop Podcast

Winston-Salem Journal

WUNC Radio's "The State of Things" with Frank Stasio