

JORDAN D. KERN

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EDUCATION

UNIVERSITY OF NORTH CAROLINA – CHAPEL HILL, NC

Ph.D. *Environmental Sciences and Engineering* **May 2014**
 ◦ *Advised by Dr. Greg Characklis*

M.S. *Environmental Sciences and Engineering* **May 2010**

B.S. *Environmental Science* **May 2007**

PROFESSIONAL EXPERIENCE

NORTH CAROLINA STATE UNIVERSITY – RALEIGH, NC

Assistant Professor, *Dept. of Forestry and Environmental Resources* **Aug 2018 – present**

UNIVERSITY OF NORTH CAROLINA – CHAPEL HILL, NC

Adjunct Assistant Professor, *Dept. of Environmental Sciences and Engineering* **Sep. 2018 – present**

Associate Director, *Center on Financial Risk in Environmental Systems* **July 2017 – Aug 2018**

Research Assistant Professor, *Institute for the Environment* **July 2015 – Aug 2018**

Post-doctoral Researcher, *Institute for the Environment* **June 2014 – June 2015**

PhD Student, *Dept. of Environmental Sciences and Engineering* **Jan. 2009 – May 2014**

BCS, INCORPORATED – WASHINGTON, DC

Research Associate **June 2007 – June 2008**

FUNDING

(Collaborator) : **NSF Innovations and the Nexus of Food, Energy and Water Systems (INFEWS) – Track 1 (2017-2020)** “Leveraging Natural Resource Concentration and Conveyance in the Energy Water Food Nexus to Increase Security and Resilience” \$312,000 (out of \$2,995,151 total award)

(co-PI) : **DOE Productivity Enhanced Algae and Tool-Kits (PEAK) (2017-2020)**

“A comprehensive strategy for stable, high productivity cultivation of microalgae with controllable biomass composition.” \$120,682 (out of \$2,896,676 total award)

(co-PI) : **NSF Innovations and the Nexus of Food, Energy and Water Systems (INFEWS) – Track 2 (2016-2019)**. “The sustainability-productivity tradeoff: Water supply vulnerabilities and adaptation opportunities in California’s coupled agricultural and energy sectors.” \$330,000 (out of \$2,958,000 total award)

AWARDS

JUNIOR FACULTY DEVELOPMENT AWARD

2015

- Competitive award (\$7,500) given by the office of the Executive Vice Chancellor & Provost based on proposal to integrate research and teaching in development of an upper level undergraduate/masters course in energy systems modeling and analytics

HYDROPOWER RESEARCH FOUNDATION

2010 – 2013

- Competitive fellowship covering full tuition and living stipend awarded to outstanding early-career researchers pursuing research in hydropower; made possible by a grant from the Energy Efficiency and Renewable Energy Program of the U.S. Department of Energy

JOSEPH POGUE SCHOLARSHIP

2003 - 2007

- Merit-based scholarship for tuition, room and board, awarded to incoming undergraduate students at the University of North Carolina at Chapel Hill who demonstrate academic achievement and exhibit strong leadership potential

PUBLICATIONS

Peer Review Journals

M = masters student advised

Anindito, Y., Haas, J., Olivares, M.A., Kern, J.D., Novak, W. (2019). “A new solution to mitigate hydropeaking? Batteries versus re-regulation reservoirs.” *Journal of Cleaner Production*, 210(10), pp.477-489.

Kern, J.D., Gorelick, D.E., Characklis, G.W., Macklin, C.M. (2019). “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*, 145(2).

Kern, J.D., Characklis, G. (2017). “Evaluating the Financial Vulnerability of a Major Electric Utility in the Southeastern U.S. to Drought under Climate Uncertainty and an Evolving Generation Mix.” *Environmental Science and Technology*. Vol. 55 (15), pp. 8815-8823.

- ^MSu, Y., Kern, J.D., Characklis, G. (2017). “The Impact of Wind Energy Growth and Hydrological Uncertainty on Financial Losses from Generation Oversupply in Hydropower Dominated Systems” *Applied Energy*. Vol. 194, pp. 172-183.
- Kern, J.D., Hise, A.M, Characklis, G.W., Gerlach, R., Viamajala, S., Gardner, R. (2017) “Using Life Cycle Assessment and Techno-Economic Analysis in a Real Options Framework to Inform the Design of Algal Biofuel Production Facilities.” *Bioresource Technology*. Vol. 225, pp. 418-428.
- Kern, J.D., Characklis, G.W. (2017). “Low Natural Gas Prices and the Financial Cost of Ramp Rate Restrictions at Hydroelectric dams.” *Energy Economics*. Vol. 61, pp. 340-350.
- Hise, A., Characklis, G., Kern, J., Gerlach, R., Viamajala, S., Gardner, R., Vadlamani, A. (2016). “Evaluating the Relative Impacts of Operational and Financial Factors on the Competitiveness of an Algal Biofuel Production Facility.” *Bioresource Technology*. Nov; 220. pp. 271-281
- Kern, J.D., Characklis, G.W., Foster, B. (2015). “Natural Gas Price Uncertainty and the Cost Effectiveness of Hedging Against Low Hydropower Revenues Caused by Drought.” *Water Resources Research*. Vol. 51, No. 4, pp. 2412-2427.
- Foster, B., Kern, J.D., Characklis, G.W. (2015). “Mitigating Hydrologic Financial Risk in Hydropower Generation Using Index-Based Financial Instruments.” *Water Resources and Economics*. Vol. 10, pp. 45-67.
- Kern, J.D., Patino-Echeverri, D., Characklis, G.W. (2014). “An Integrated Reservoir-Power System Model for Evaluating the Impact of Wind Power Integration on Hydropower Resources.” *Renewable Energy*, Vol. 71, November 2014, pp. 553-562.
- Kern, J.D., Patino-Echeverri, D., Characklis, G.W. (2014). “The Impacts of Wind Power Integration on Sub-Daily Variation in River Flows Downstream of Hydroelectric Dams.” *Environmental Science and Technology*. Vol. 48, No. 16, pp. 9844-9851.
- Kern, J.D., Characklis, G.W., Doyle, M.D., Blumsack, S. and R.B. Whisnant (2012). “The Influence of Deregulated Electricity Markets on Hydropower Generation and Downstream Flow Regime,” *Journal of Water Resources Planning and Management*, Vol. 138, No. 4: pp. 342-355

Reports

- Kern, J.D. (2014). “Analysis of Potential Policy Changes on the Financial Viability of Residential Solar in North Carolina.” UNC Chapel Hill Institute for the Environment.

Trade Magazines & News Media

- Kern, J.D. (2014). “Solar: A Sound Investment.” *Greensboro News & Record*. Op-editorial. December 14, 2014.
- Kern, J.D. (2013). “How Deregulated Markets Influence Hydro Revenue and Downstream Flow.” *HydroReview Magazine*, Vol. 32, No. 9.

TEACHING

Undergraduate

- (NCSU) ES 300 – Energy and the Environment
- (UNC) ENEC 307 – Energy and Material Flow through the Environment and Society

Undergraduate/Graduate

- (UNC) ENEC 490 – Energy Systems Modeling and Analytics

Graduate

- (UNC) ENVR 755 – Analysis of Water Resource Systems (co-taught)
- (UNC) ENVR 890 – Managing Environmental Financial Risk (co-taught)

JOURNAL REVIEWER

Applied Energy

Energy Economics

Energy Strategy Reviews

Environmental Modelling and Software

International Journal of Electric Power and Energy Systems

Journal of CO₂ Utilization

Journal of Hydrology

Journal of Water Resources Planning and Management

River Research and Applications

Water Research

Water Resources Research

PROFESSIONAL MEMBERSHIPS

Association of Environmental Engineering and Science Professors (AEESP)

SERVICE ACTIVITIES

Steering Committee Track Chair, Algal Biomass Summit, The Woodlands, TX. October 2018
Steering Committee Track Chair, Algal Biomass Summit, Salt Lake City, UT. October 2017
Z. Smith Reynolds Foundation Strategic Assessment, Durham, NC, Fall 2016

CONFERENCE PRESENTATIONS

M = masters student advised, P = PhD student advised

- ^PSu, Y., Kern, J.D. "Modeling spatiotemporal covariance in wind and water as a driver of extreme events on the California grid". Environmental and Water Resources Institute Annual Congress, Minneapolis, MN, June 2018.
- Kern, J.D., Gorelick, D.E., Characklis, G.W., Macklin, C.M. "Multi-Objective Optimal Siting of Algal Biofuel Production with Municipal Wastewater Treatment in Watersheds with Nutrient Trading Markets." Algal Biomass Summit. Salt Lake City, UT. October 2017.
- ^MSu, Y., Kern, J.D., Characklis, G. "The Impact of Wind Energy Growth and Hydrological Uncertainty on Financial Losses from Generation Oversupply in Hydropower Dominated Systems". Environmental and Water Resources Institute Annual Congress, Sacramento, CA, June 2017.
- Kern, J.D., "Using Life Cycle Assessment and Techno-Economic Analysis in a Real Options Framework to Inform the Design of Algal Biofuel Production Facilities." Algal Biomass Summit. Phoenix, AZ. October 2016.
- Kern, J.D., "Financial Vulnerability of the Electricity Sector to Drought, and the Impacts of Changes in Generation Mix." American Geophysical Union Annual Meeting, San Francisco, CA, December 2015.
- Kern, J.D., "Natural Gas Price Uncertainty and the Cost Effectiveness of Hedging Against Low Hydropower Revenues Caused by Drought," Environmental and Water Resources Institute Annual Congress, Portland, OR, June 2014.
- Kern, J. D., "The Impacts of Wind Power Integration on Sub-Daily Variation in River Flows Downstream of Hydroelectric Dams," Water Resources Research Institute Annual Meeting, Raleigh, NC, March 2013.
- Kern, J. D., "The Impacts of Wind Power Integration on Sub-Daily Variation in River Flows Downstream of Hydroelectric Dams," American Geophysical Union Annual Meeting, San Francisco, CA, December 2012.
- Kern, J. D., "Influence of Deregulated Electricity Markets on Hydropower Generation and Downstream Flow Regime," European Geosciences Union Annual Meeting, Vienna, Austria, Apr. 2011.

Kern, J. D., "Influence of Deregulated Electricity Markets on Hydropower Generation and Downstream Flow Regime," Water Resources Research Institute Annual Meeting, Raleigh, NC, March 2010.

INVITED TALKS

Kern, J.D. "Addressing Complex, Emergent Risks in 21st Century Natural-Engineered Systems". BioQUEST Summer Workshop, Harvey Mudd College. June 21, 2018.

Kern, J.D. "Addressing Complex, Emergent Risks in 21st Century Natural-Engineered Systems". Oregon State University, Dept. of Biological and Ecological Engineering. June 1, 2018.

Kern, J.D. "Sustainable Energy Infrastructure Systems in an Age of Interconnection, Uncertainty, and Innovation." Duke University Nicholas Institute for Environmental Policy Solutions. June, 2017.

Kern, J.D. "Environment, Economy, Entrepreneurship: Is Clean Energy Good Business?" A Town Hall Discussion, North Carolina Museum of Natural Sciences, July 2016.

Kern, J.D. "Weather and Climate Risk in the Electric Power Sector." Federation of Earth Science Information Partners Summer Meeting, Durham, NC. July 2016.

Kern, J.D. "Implications of a More De-coupled Water-Energy Future." National Science Foundation and Association of Environmental Engineering and Science Professors Grand Challenges Workshop, Washington, DC. May 19-20, 2016.

Kern, J.D. "Environmental Financial Risk in the Electric Power Sector". North Carolina State University, Department of Civil and Environmental Engineering. Seminar Series, October 2015.

Kern, J.D., "Is Solar the Answer?" North Carolina Museum of Natural Science, Raleigh, NC, July 2015.

Kern, J. D., "Can Fracking Lead to Less Expensive Achievement of More Natural River Flows?" American Geophysical Union Annual Meeting, San Francisco, CA, December 2014.

Kern, J.D., "Water, Energy, Finance and the Environment: an Electric Power Perspective." UNC-Chapel Hill Institute for the Environment Energy and Environment Lunch Series, December 2014.