

# JORDAN D. KERN

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## EDUCATION

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### 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

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### NORTH CAROLINA STATE UNIVERSITY – RALEIGH, NC

Assistant Professor, *Dept. of Industrial and Systems Engineering* **July 2023 - present**

Graduate Faculty, *Operations Research* **Aug 2018 – present**

Graduate Faculty, *Forestry and Environmental Resources* **Aug 2018 - present**

Adjunct Assistant Professor and Graduate Faculty, *Dept. of Civil, Construction, and Environmental Engineering* **Aug 2018 – present**

Assistant Professor, *Dept. of Forestry and Environmental Resources* **Aug 2018 – June 2023**

### UNIVERSITY OF NORTH CAROLINA – CHAPEL HILL, NC

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

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

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

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**Totals:** \$3.21 million directed to Kern Group out of \$43.05 million in collaborative awards.

(co-PI) – **Alfred P. Sloan Foundation** – (2023-2025) “Reservoir dead pool in California: Understanding Sensitivities, Consequences, and Potential for Risk Mitigation”. \$49,000 (out of \$249,000 total award).

(co-PI) – **NSF Hydrologic Sciences** – (2023-2026) “CAS-Climate: Reservoir dead pool in the western United States: probability and consequences of a novel extreme event”. \$130,000 (out of \$800,000 total award).

(co-PI) – **DOE RACER** – (2023-2024) “Resilient Renewable Energy to Diminish Disaster Impacts on Communities”. \$1,000,000 total award.

(Collaborator) – **DOE Water Power Technologies Office** – (2023-2024) “Value of flow forecasts to power system analytics.” \$85,000

(PI) : **NSF CAREER** – (2022-2027) “Navigating a Two-Front Challenge for the Power Grid: Extreme Weather and the Race to Decarbonization” \$503,897.

(co-PI) : **NSF STC** – (2022-2027) “Science and Technologies for Phosphorus Sustainability (STEPS) Center” \$25,000,000 center award.

(co-PI) : **DOE Office of Science** – (2021-2024) “Integrated Multisector, Multiscale Modeling (IM3), Phase 2.” \$346,000

(co-PI) : **NSF Dynamics of Coupled Natural Human Systems (CNH2)** (2020-2023) “CNH2-L: The coupled, co-evolving roles of drought and electricity systems in humans' exposure to air pollution.” \$370,688 (out of \$1,600,000 total award)

(co-PI) : **DOE Advanced Research Projects Agency – Energy (ARPA-E)** (2020-2023) “GRACE: A Grid that’s Risk Aware for Clean Electricity.” \$345,444 (out of \$2,400,000 total award)

(co-PI) : **DOE Bioenergy Technologies Office** (2020-2023) “Agent-based Modeling for the Multi-objective Optimization of Energy Production Pathways.” \$300,000 (out of \$1,000,000 total award)

(co-PI) : **Game-Changing Research Incentive Program for Plant Sciences Initiative (GRIP4PSI)** (2020-2023) “Harnessing (bio-)electrochemical technologies as sustainable sources for on demand precision agriculture.” \$250,281 total award

(co-PI) : **North Carolina Policy Collaboratory** – (2019-2020) “Assessing Operational Flooding Risks for Substations and the Wider North Carolina Power Grid.” \$60,000

(Collaborator) : **DOE Water Power Technologies Office** – (2019-2020) “Value of flow forecasts to power system analytics.” \$75,000

(Collaborator) : **DOE Office of Science** – (2019-2020) “Integrated Multisector, Multiscale Modeling (IM3): Model Intercomparison to Inform the Development of Open Source, Grid Scale, Power System Simulation Tools.” \$73,756

(Collaborator) : **NSF Innovations and the Nexus of Food, Energy and Water Systems (INFEWS)** – **Track 1** (2017-2021) “Scarcity Amid Abundance: Understanding Trade-offs in the Food-Energy-Water Nexus in the Willamette River Basin” \$312,000 (out of \$2,995,151 total award)

(co-PI) : **DOE Productivity Enhanced Algae and Tool-Kits (PEAK)** (2017-2021)  
“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** (2017-2021). “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

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### NSF CAREER

2022

- The National Science Foundation's most prestigious awards in support of early-career faculty who have the potential to serve as academic role models in research and education.

### 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

- PhD 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

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### Peer Review Journals

M = masters student advised, P = PhD student advised

1. <sup>P</sup>Zeighami, A., Kern, J.D., Yates, A., Weber, P., Bruno, A. (2023). “U.S. West Coast Droughts and Heat Waves Exacerbate Pollution Inequality and Can Undermine Emission Control Policies”. *Nature Communications*, 14, 1415. <https://doi.org/10.1038/s41467-023-37080-0>
2. <sup>M</sup>Kleiman, R., Characklis, G., Kern, J.D. (2022) “Managing Weather-Related Financial Risks in Algal Biofuel Production”. *Renewable Energy*. Volume 200, pages 111-124. <https://doi.org/10.1016/j.renene.2022.09.104>
3. Koh, R., Kern, J.D., Galelli (2022) “Hard-coupling water and power system models increases the complementarity of renewable energy sources”. *Applied Energy*. Vol. 321. <https://doi.org/10.1016/j.apenergy.2022.119386>
4. Denaro, S., Cuppari, R., Kern, J.D., Su, Y., Characklis, G. (2022). “Assessing the Bonneville Power Administration’s Financial Vulnerability to Hydrologic Variability”. *Journal of Water Resources Planning and Management*. Vol. 148, Issue 10. doi: 10.1061/(ASCE)WR.1943-5452.0001590
5. <sup>M</sup>Akdemir, K., Kern, J.D., Lamontagne, J. (2022). “Assessing Risks for New England’s Wholesale Electricity Market from Wind Power Losses during Extreme Winter Storms.” *Energy*, Vol. 251, 15 July 2022. <https://doi.org/10.1016/j.energy.2022.123886>
6. <sup>M</sup>Wessel, J., Kern, J.D., Voisin, N., Oikonomou, K., Haas, J. (2022). “Technology pathways could help drive the U.S. West Coast grid’s exposure to hydrometeorological uncertainty.” *Earth’s Future*. Volume 10, Issue 1. <https://doi.org/10.1029/2021EF002187>
7. <sup>P</sup>Su, Y., Kern, J.D, Characklis, G. (2022). “The Effects of Retail Load Defection on a Major Electric Utility’s Exposure to Weather Risk” *Journal of Water Resources Planning and Management*. Volume 148, Issue 3.
8. <sup>M</sup>Hill, J., Kern, J.D, Rupp, D., Voisin, N., Characklis, G. (2021). “The Effects of Climate Change on Interregional Electricity Market Dynamics on the U.S. West Coast” *Earth’s Future*. Volume 9, Issue 12. <https://doi.org/10.1029/2021EF002400>
9. Oikonomou, K., Tarroja, B., Kern, J.D., Voisin, N. (2021). “Review of Core Process Representation in Power System Operational Models: Gaps, Challenges, and Opportunities for Multisector Dynamics Research.” *Energy*. Volume 238, Part C, 1 January 2022, 122049
10. <sup>M</sup>Lucy, Z., Kern, J.D. (2021). “Analysis of Fixed Volume Swaps for Hedging Financial Risk at Large-Scale Wind Projects.” *Energy Economics*. 103, 105603.
11. <sup>M</sup>Kleiman, R., Characklis, G., Kern, J.D., Gerlach, R. (2021). “Characterizing Weather-Related Biophysical and Financial Risk in Algal Biofuel Production”. *Applied Energy*. Vol. 294, 15 July 2021, 116960. <https://doi.org/10.1016/j.apenergy.2021.116960>

12. Boyle, C., Haas, J., Kern, J.D. (2021). “Development of an irradiance-based weather derivative to hedge cloud risk for solar energy systems”. *Renewable Energy*. Vol. 164, February 2021, p. 1230-1243. <https://doi.org/10.1016/j.renene.2020.10.091>
13. <sup>P</sup>Su, Y., Kern, J.D., Reed, P., Characklis, G. (2020). “Compound Hydrometeorological Extremes Across Multiple Timescales Drive Volatility in California Electricity Market Prices and Emissions”. *Applied Energy*. Vol. 276, 15 October 2020, 11554. <https://doi.org/10.1016/j.apenergy.2020.115541>
14. Kern, J.D., <sup>P</sup>Su, Y., <sup>M</sup>Hill, J. (2020). “A retrospective study of the 2012-2016 California drought and its impacts on the power sector.” *Environmental Research Letters*. Vol. 15, Number 9.
15. <sup>P</sup>Su, Y., Kern, J.D., Denaro, S., <sup>M</sup>Hill, J., Reed, P., Sun, Y., Cohen, J., Characklis, G. (2020). “An open source model for quantifying risks in bulk electric power systems from spatially and temporally correlated hydrometeorological processes”. *Environmental Modelling and Software*. Vol. 126, April 2020, 104667. <https://doi.org/10.1016/j.envsoft.2020.104667>
16. Chowdhury, AFM K., Kern, J., Dang, T., Galelli, S. (2020) “PowNet: a power systems analysis model for large-scale water-energy nexus studies”. *Journal of Open Research Software*. <https://doi.org/10.48550/arXiv.1909.12529>
17. Wang, X., Virguez, E., Kern, J., Chen, L., Patino-Echeverri, D., Wang, H. (2019) “Integrating wind, PV, and large hydropower during the reservoir refilling period.” *Energy Conversion and Management*. Volume 198, October 2019.
18. 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.
19. 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).
20. 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.
21. <sup>M</sup>Su, 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.
22. 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.

23. 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.
24. 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
25. 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.
26. 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.
27. 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.
28. 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.
29. 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.

### News Media

**LA Times** (March, 2023). “[Droughts and heat waves could worsen air pollution for vulnerable communities.](#)”

**The Post and Courier** (January, 2023). “[Blackouts experienced during low temps last month are bound to happen again.](#)”

**CBS 17 WNCN** (January, 2023). “[Rolling blackouts can protect power grid from serious damage.](#)”

**E&E News EnergyWire** (September, 2022). “[What the Western drought reveals about hydropower.](#)”

**TIME Magazine** (September, 2022). “[Extreme Weather is Weakening U.S. Hydropower and Stressing Energy Grids](#)”

**Vox** (August, 2022). “[How the Western drought is pushing the power grid to the brink.](#)”

**AP News** (July, 2022). “[Officials investigate after fire, explosion at Hoover Dam](#)”

**E&E News EnergyWire** (May, 2022). “[Southwest megadrought pushes hydropower to the brink.](#)”

**Renewable Energy World** (February, 2022). “[Duke Energy aims to double renewable energy capacity by 2030.](#)”

**Jefferson Public Radio** (January, 2022). “[How global warming could further mess up electric power on the West Coast](#)”

**The Hill** (January, 2022). “[Climate change makes West Coast more susceptible to blackouts](#)”

**Sun Herald** (January, 2022). “[West Coast power grid at mercy of climate change — and prices may soar, study finds](#)”

**ABC News** (October, 2021). “[Hydropower decline adds strain to power grids in drought](#)”

**The Weather Channel** (August, 2021). “Water Supply Dropping in Western Reservoirs”

**Wired Magazine** (July, 2021). “[Extreme Heat Could Also Mean Power and Water Shortages](#)”

**Los Angeles Times** (July, 2021). “[Plummeting reservoir levels could soon force Oroville hydropower offline.](#)”

**National Public Radio** (July, 2021). “[Not Just Wildfire: The Growing Ripple Effects Of More Extreme Heat And Drought.](#)”

**The Guardian (UK)** (June, 2021). “[Less water means more gas’: how drought will test California’s stressed power grid.](#)”

**National Public Radio** (June, 2021). “[How Our Hydropower System Is Impacting The Drought Gripping The American West.](#)”

**San Jose Mercury News** (August, 2020). “[Decline in hydropower hampered by drought will impact utility costs.](#)”

**Greensboro News & Record.** Kern, J.D. (2014). “Solar: A Sound Investment.” Opinion editorial. December 14, 2014.

## **TEACHING**

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### 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 EDITOR**

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Earth's Future (*Associate Editor*), 2022 – present

Current Sustainable/Renewable Energy Reports (*special section editor*), 2023

## **JOURNAL REVIEWER**

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Applied Energy

Energy Economics

Energy Strategy Reviews

Environmental Modelling and Software

Environmental Research Letters

International Journal of Electric Power and Energy Systems

Journal of Cleaner Production

Journal of CO<sub>2</sub> Utilization

Journal of Hydrology

Journal of Water Resources Planning and Management

River Research and Applications

Science

Water Biology and Security

Water Research

Water Resources Research

## **PROFESSIONAL MEMBERSHIPS**

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Association of Environmental Engineering and Science Professors (AEESP)

American Geophysical Union (AGU)

American Society of Civil Engineers (ASCE)

Institute for Operations Research and the Management Sciences (INFORMS)

## **SERVICE ACTIVITIES**

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National Science Foundation Panel Reviewer, EPSCoR Alexandria VA, October 2022

Environmental Water Resource Systems Committee, Vice Chair, 2022-2023

National Science Foundation Panel Reviewer, STC Alexandria VA, May 2022

National Science Foundation Panel Reviewer, URoL Alexandria VA, May 2022

Environmental Water Resource Systems Committee, Secretary, 2021-2022

Steering Committee Track Chair, Algal Biomass Summit, Orlando, FL. October 2019

National Science Foundation Panel Reviewer, INFEWS, Alexandria, VA. February, 2019.

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

## **GRADUATE STUDENT ADVISING**

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M = masters student advised, P = PhD student advised, 1 = primary adviser, 2 = thesis/dissertation committee

<sup>M1</sup>Annie McElvenny, North Carolina State University (in progress)

<sup>P1</sup>Kerem Akdemir, North Carolina State University (in progress)

<sup>P1</sup>Amir Zeighami, North Carolina State University (in progress)

<sup>P1</sup>Cameron Lisy, North Carolina State University (in progress)

<sup>P1</sup>Henry Ssembatya, North Carolina State University (in progress)

<sup>P1</sup>Luis Prieto Miranda, North Carolina State University (in progress)

<sup>P1</sup>Ece Akdemir, North Carolina State University (in progress)

<sup>P1</sup>Jingwei Qian, North Carolina State University (in progress)

<sup>M1</sup>Kerem Akdemir, North Carolina State University (2021)

<sup>M1</sup>Jake Wessel, North Carolina State University (2021)

- <sup>M1</sup>Zach Lucy, North Carolina State University (2021)  
<sup>P1</sup>Yufei Su, University of North Carolina – Chapel Hill (2020)  
<sup>M1</sup>Joy Hill, University of North Carolina – Chapel Hill (2020)  
<sup>M1</sup>Rachel Kleiman, University of North Carolina – Chapel Hill (2020)  
<sup>M2</sup>Colin Boyle, University of Stuttgart (GER) (2020)

## CONFERENCE PRESENTATIONS

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M = masters student advised, P = PhD student advised

- <sup>P</sup>Akdemir, E., Kern, J.D., Quinn, J. “Using Multi-Objective Optimization to Design Low Carbon and Weather Resilient Biofuel Supply Chains.” AGU Annual Meeting, December 2022.
- <sup>P</sup>Akdemir, K., Kern, J.D., Voisin, N., Oikonomou, K. “An open-source framework for customizing grid operations models to balance computational speed and fidelity in weather and climate stress testing.” AGU Annual Meeting, December 2022.
- <sup>P</sup>Ssembatya, H., Kern, J.D. “The dual impacts of heating electrification and climate change on seasonal peaking and reliability of the Texas power grid.” AGU Annual Meeting, December 2022. **(poster)**.
- Voisin, N., Kern, J.D., Steinschneider, S., Turner, S., Ssembatya, H., Wi, S. “Value of medium range inflow forecast for hydropower scheduling flexibility.” AGU Annual Meeting, December 2022.
- <sup>P</sup>Prieto-Miranda, L., Kern, J.D. “Impacts of inland flooding from major hurricanes on the dynamic behavior of the North Carolina power grid.” ASCE EWRI Annual Meeting, June 2022.
- <sup>P</sup>Zeighami, A., Kern, J.D. “The Effects of Drought and Heatwaves on the West Coast Grid and Health Impacts from Power Plant Emissions” ASCE EWRI Annual Meeting, June 2022.
- <sup>P</sup>Akdemir, K., Kern, J.D., Lamontagne, J. “Do Winter Storms Pose Hidden Risks for Offshore Wind and the New England Grid?” AGU Annual Meeting, December 2021.
- <sup>P</sup>Akdemir, K., Kern, J.D., Lamontagne, J. “Do Winter Storms Pose Hidden Risks for Offshore Wind and the New England Grid?” AGU Annual Meeting, December 2021.
- <sup>P</sup>Cuppari, R., Denaro, S., <sup>P</sup>Su, Y., Kern, J.D., Characklis, G. “New financial instruments for managing hydrometeorological risk for hydropower producers.” AGU Annual Meeting, December 2021.

- Singh, S., Quinn, J., Lamontagne, J., Kern, J., <sup>P</sup>Su, Y., Denaro, S., Cuppari, R., Characklis, G. “Exploring the benefits of integrated energy-water management in reducing economic and ecological tradeoffs.” AGU Annual Meeting, December 2021. (**poster**)
- DeCarolis, J., Kern, J.D. “Open Source Modeling to Inform Resilient, Low Carbon Electricity for North Carolina” NC State Energy Conference, April 2021.
- <sup>P</sup>Koh, R., Kern, J.D., Chowdhury, AFM, Galelli, S. “Valuing feedback mechanisms between water and energy systems in hydropower networks”. EGU Annual Meeting, April 2021
- Voisin, N., Kern, J.D., Yan, Hongxiang, Turner, S., Wood, A., Mosier, T. “Valuing Streamflow Forecasts in Centrally Controlled Power Systems”. EGU Annual Meeting, April 2021
- Voisin, N., Kern, J.D, Mosier, T., Wood, A. “Value of flow forecasts to power system analytics.” AGU Annual Meeting, December, 2020.
- Voisin, N., Tidwell, V., Cohen, S., Kern, J.D., Dyreson, A., Oikonomou, K., Tarroja, B., Turner, S. “Advances and gaps on propogating the impact of climate change on future water availability through the energy planning process: a Western U.S. Case Study. AGU Annual Meeting, December 2020.
- Singh, S., Quinn, J., Lamontagne, J., Kern, J.D. “Exploring the benefits of integrated energy-water management in reducing economic and ecological tradeoffs.” AGU Annual Meeting, December 2020.
- <sup>M</sup>Kleiman, R., Characklis, G., Kern, J.D., Gerlach, R. “Managing Weather and Market-Related Financial Risk in Algae Production for Biofuel and Co-Products.” AGU Annual Meeting, December 2020. (**poster**)
- Voisin, N., Kern, J.D., Mosier, T., Wood, A. “Value of flow forecasts to power system analytics.” INFORMS Annual Meeting, November 11, 2020.
- Kern, J.D. “Hydrometeorological extremes in wholesale electricity markets”. Water Resources Research Institute. Raleigh, NC, March 2020.
- Denaro, S., <sup>M</sup>Hill, J., <sup>P</sup>Su, Y., Kern, J.D., Characklis, G. “Designing Strategies to Jointly Manage the Financial Risk of Wet and Dry Periods for Hydropower Generators in a Changing Market”. American Geophysical Union Annual Meeting, December 2019.
- Voisin, N., Kern, J.D., Mosier, T., Wood, A. “A preliminary evaluation framework to assess the value of flow forecasts to power system analytics”. American Geophysical Union Annual Meeting, December 2019. (**poster**)

- <sup>M</sup>Kleiman, R., Characklis, G. Kern, J.D. “Characterizing and managing weather-related financial risk in algal biofuel production.” Algal Biomass Summit, September 2019.
- Kern, J.D., <sup>P</sup>Su, Y. “Quantifying risks from spatially and temporally correlated hydrological and meteorological processes in wholesale electricity markets”. European Geophysical Union. Vienna, Austria, April, 2019.
- Kern, J.D., Zeff, H., Herman, J., Reed, P., Characklis, G., Medellin-Azuara, J., Pavelsky, T. “Challenges and opportunities in modeling cross-scale, cross-sector feedbacks to inform critical decision-making in food-energy-water systems”. American Geophysical Union Fall Congress. Washington, DC, December 2018.
- Nolin, A., Higgins, C., Drake, S., Conklin, D., Kern, J., Characklis, G., Hulse, D. “Modeling Future Scenarios of Snow, Forests, Wildfire, and Hydropower Within the Food-Energy-Water Nexus”. American Geophysical Union Fall Congress. Washington, DC, December 2018.
- <sup>P</sup>Su, 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.
- <sup>M</sup>Su, 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. (**poster**)

Kern, J. D., “Influence of Deregulated Electricity Markets on Hydropower Generation and Downstream Flow Regime,” European Geosciences Union Annual Meeting, Vienna, Austria. April, 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**

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Kern, J.D. “Modeling the multi-scale, multi-variate uncertainties that impact electricity system dynamics under global change.” AGU Annual Meeting, December, 2022.

Kern, J.D. “Market and operational weather risks in the U.S. western power grid”. AGU Annual Meeting. December, 2021.

Kern, J.D. “Power Systems Analysis for Assessing Physical and Financial Risks from Extreme Weather”. Google X Speaker Series. November, 2021.

Kern, J.D. “Weather Risk and Power Markets”. Energy Infrastructure Resilience and National Security Workshop, October 2021.

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Kern, J.D., West, J., Yates, A., Pavelsky, T., Skiles, M., Bowden, J., Characklis, G. “Drought Can Take Your Breath Away.” North Carolina Museum of Natural Science, Science Café. October, 2020.

Kern, J.D., West, J., Yates, A., Pavelsky, T., Skiles, M., Bowden, J., Characklis, G. “Drought Can Take Your Breath Away.” Sigma Xi. January, 2021.

Kern, J.D. “Quantifying risks from spatially and temporally correlated hydrological and meteorological processes in wholesale electricity markets”. Pacific Northwest National Laboratory, June, 2019.

Kern, J.D. “Quantifying risks from spatially and temporally correlated hydrological and meteorological processes in wholesale electricity markets”. University of Stuttgart. Stuttgart, Germany, April, 2019.

Kern, J.D, Zeff, H., Herman, J., Reed, P., Characklis, G., Medellin-Azuara, J., Pavelsky, T. “Challenges and opportunities in modeling cross-scale, cross-sector feedbacks to inform critical decision-making in food-energy-water systems”. European Geophysical Union. Vienna, Austria. April, 2019.

- Kern, J.D, “Challenges and opportunities in modeling cross-scale, cross-sector feedbacks to inform critical decision-making in food-energy-water systems”. Tufts University, Seminar Series in the Dept. of Civil and Environmental Engineering, Boston, MA. March, 2019.
- Kern, J.D. “Addressing Complex, Emergent Risks in 21<sup>st</sup> Century Natural-Engineered Systems”. Lake Johnson Community Center, Raleigh, NC. October, 2018.
- Kern, J.D, “Challenges and opportunities in modeling cross-scale, cross-sector feedbacks to inform critical decision-making in food-energy-water systems”. North Carolina State University, Seminar Series in the Dept. of Civil, Construction and Environmental Engineering. Raleigh, NC. October, 2018.
- Kern, J.D. “Addressing Complex, Emergent Risks in 21<sup>st</sup> Century Natural-Engineered Systems”. BioQUEST Summer Workshop, Harvey Mudd College. June 21, 2018.
- Kern, J.D. “Addressing Complex, Emergent Risks in 21<sup>st</sup> 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.