

Sean Turner

Oak Ridge National Laboratory
1 Bethel Valley Road, Oak Ridge, TN 37830
Environmental Sciences Lab (1505) 338
+1 (865)-576-3894 | turnersw@ornl.gov

ORCID: 0000-0003-4400-9800
ornl.gov/staff-profile/sean-turner
linkedin.com/in/swdturner
scholar.google.com/citations?user=-5OB18IAAAAJ

EXPERIENCE

Oak Ridge National Laboratory <i>Senior R&D Staff</i> <i>Hydropower Engineer</i>	Oak Ridge, TN 2025 – pres. 2023 – 2025
McKinsey & Company <i>Research Science Specialist</i>	Washington, DC 2022 – 2023
Pacific Northwest National Laboratory <i>Earth Systems Scientist, L3</i> <i>Earth Systems Scientist, L2</i> <i>Postdoc @ Joint Global Change Research Institute</i>	Seattle, WA 2020 – 2022 2018 – 2020 2016 – 2018
Singapore University of Technology and Design <i>Postdoc @ SUTD-MIT International Design Center</i> <i>Teaching Assistant, Power Systems Engineering</i> <i>Teaching Assistant, Water Resources Planning and Management</i>	Singapore 2014 – 2016 2016 2015
United Utilities PLC <i>Research Engineer, Water Resources Planning</i>	Warrington, UK 2011 – 2014
CSIRO & Melbourne Water <i>Intern Researcher, Water Resources Planning</i>	Melbourne, Australia 2013

EDUCATION

Cranfield University <i>EngD (Doctor of Engineering) in Water Resources Planning</i>	Cranfield, UK 2010 – 2014
Newcastle University <i>MSc in Hydrology, with distinction</i>	Newcastle upon Tyne, UK 2009 – 2010
University of Glasgow <i>BSc in Engineering, with first class hon.</i>	Glasgow, UK 2004 – 2008

AWARDS & RECOGNITION

Editors' Highlight <i>Nature Communications</i>	2022
Top 25 Most Read Paper <i>Nature Communications</i>	2022
Best Research Paper of the Year <i>PNNL Earth Systems Science Division</i>	2021
Best Reviewer <i>Journal of Water Resources Planning and Management</i>	2018
Editors' Highlight <i>Hydrology and Earth System Sciences</i>	2017
Top Performing Research Engineer <i>STREAM Industrial Doctorate Center</i>	2011
Pavel Novak Prize for Best Overall Performance in Water <i>Newcastle University</i>	2010
Best Project in Civil Engineering Hydraulics <i>University of Glasgow</i>	2008
Dean's List <i>University of Glasgow</i>	2008

SELECTED PROJECT AND TASK LEADERSHIP

HydroCHiPPs (\$1m) <i>DoE WPTO</i>	Principal Investigator, FY25–27
TVA Hydrothermal Climate Impact Study (\$1m) <i>DoE WPTO</i>	Principal Investigator, FY24–25
HydroSource Data: RectifHydV2 (\$200k) <i>DoE WPTO</i>	Task Lead, FY24–26
Global Water Analytics IP (\$300k) <i>McKinsey & Company</i>	Task Lead, FY23
Western U.S. Hydropower Drought Study (\$120k) <i>DoE WPTO</i>	Principal Investigator, FY22
HydroWIRES B1 Weekly Generation Datasets <i>DoE WPTO</i>	Task Lead, FY21–FY23
HydroWIRES D3 Dynamic Programming Model <i>DoE WPTO</i>	Task Lead, FY21–FY23
IM3 Texas, Res Ops. & Teleconnection tasks (\$500k) <i>DoE Office of Science</i>	Task Lead, FY21–FY22

MEDIA INTERVIEWS

<u>Canada Imports US Electricity as Drought Curb Hydropower</u> <i>Financial Times</i>	November 20th, 2024
<u>What Happens When Drought Strikes?</u> <i>Grist</i>	April 29th, 2024
<u>Divining Peak Groundwater</u> <i>ORNL Press Release</i>	April 25th, 2024
<u>Will Western Hydropower Survive Drought?</u> <i>Grist</i>	October 18th, 2022
<u>Hydro Provides Reliable Electricity Even During Drought</u> <i>WPTO Press Release</i>	September 20th, 2022
<u>What the Western Drought Reveals About Hydropower</u> <i>E&E News</i>	September 13th, 2022
<u>Colorado River Drought Visible From Space</u> <i>Vox</i>	August 17th, 2022
<u>How Western Drought is the Pushing Power Grid to the Brink</u> <i>Vox</i>	August 16th, 2022
<u>A Watershed Moment</u> <i>PNNL Press Release</i>	April 27th, 2022
<u>Drought is causing hydropower to have a rough year</u> <i>Inside Climate News</i>	October 7th, 2021

SERVICE

Industry engagement and leadership

— Co-chair in the *CEATI Climate Change Operations, Risk, and Adaptation (CCORA) Working Group*, 2025-pres.

National Climate Assessment

— Chapter Author (Southeast) on *Sixth National Climate Assessment (NCA6)*, 2025-2027.

Peer review (Approx. 150 reviews conducted)

— Multidisciplinary journals: *Nature*, *Science*, *Nature Comm.*, *ES&T*, *GRL*, *ERL*, *STOTEN*, *JCP*, *JGR*

— Water resources journals: *Nature Water*, *WRR*, *JoH*, *JWRPM*, *Advances in Wat. Res.*, *HESS*, *WIRES*

— Energy journals: *Nature Energy*, *Appl. Energy*, *Energy*, *Renewable Energy*

— Climate journals: *Nature Climate Change*, *Climatic Change*, *CRM*, *Journal of Hydromet.*

— Software and data journals: *Geoscientific Model Dev.*, *Env. Mod. & Software*, *Scientific Data*

Editorial work

— Special Issue Editor: *Hydrology and Earth System Sciences*, 2023-2024.

Proposal and Program Evaluation

— National Academies of Sciences, Engineering, and Medicine: *U.S. Egypt S&T Joint Fund*, Cycle 21. Sep 2022

— Swiss National Science Foundation: *Climate Change and Swiss Hydropower*. Jul 2019

— DoE Office of Science: *Award DE-FG02-94ER61937 (\$2.1M)*. Jul 2019

— DoE: *U.S. China Clean Energy Research Center, Water-Energy Technologies (CERC-WET)*. Nov 2018

Peer reviewed publications

- [42] Turner, S. W. D., Ghimire, G. R., Hansen, C., Singh, D. & Kao, S.-C. Hydropower capacity factors trending down in the United States. *Nat Commun* 15, 5445 (2024).
- [41] Ferencz, S. B., Sun, N., Turner, S. W. D., Smith, B. A. & Rice, J. S. Multisectoral analysis of drought impacts and management responses to the 2008–2015 record drought in the Colorado Basin, Texas. *Nat. Hazards Earth Syst. Sci.* 24, 1871–1896 (2024).
- [40] Niazi, H., Turner, S. W. D., et al. Global peak water limit of future groundwater withdrawals. *Nat Sustain* 7, 413–422 (2024).
- [39] Abeshu, G. W., Turner, S. W. D., et al. Enhancing the representation of water management in global hydrological models. *Geosci. Model Dev.* 16, 5449–5472 (2023).
- [38] Kanyako, F., Lamontagne, J., Baker, E., Turner, S. W. D. & Wild, T. Seasonality and trade in hydro-heavy electricity markets: A case study with the West Africa Power Pool (WAPP). *Applied Energy* 329, 120214 (2023).
- [37] Turner, S. W. D., Voisin, N. & Nelson, K. Revised monthly energy generation estimates for 1,500 hydroelectric power plants in the United States. *Sci Data* 9, 675 (2022).
- [36] Magee, T. M., Turner, S. W. D., et al. Evaluating power grid model hydropower feasibility with a river operations model. *Environ. Res. Lett.* 17, 084035 (2022).
- [35] Cohen, S. M., Turner, S. W. D., et al. A multi-model framework for assessing long- and short-term climate influences on the electric grid. *Applied Energy* 317, 119193 (2022).
- [34] Dyreson, A., Turner, S. W. D., et al. The Role of Regional Connections in Planning for Future Power System Operations Under Climate Extremes. *Earth's Future* 10, e2021EF002554 (2022).
- [33] Steyaert, J. C., Condon, L. E., Turner, S. W. D., & Voisin, N. ResOpsUS, a dataset of historical reservoir operations in the contiguous United States. *Sci Data* 9, 34 (2022).
- [32] Turner, S. W. D. & Voisin, N. Simulation of hydropower at subcontinental to global scales: a state-of-the-art review. *Environ. Res. Lett.* 17, 023002 (2022).
- [31] Turner, S. W. D. et al. Comparison of potential drinking water source contamination across one hundred U.S. cities. *Nat Commun* 12, 7254 (2021).
- [30] Turner, S. W. D., Steyaert, J. C., Condon, L. & Voisin, N. Water storage and release policies for all large reservoirs of conterminous United States. *Journal of Hydrology* 603, 126843 (2021).
- [29] Nelson, K., Turner, S. W. D., Vernon, C. & Rice, J. gamut: A Geospatial R Package to Analyze Multisectoral Urban Teleconnections. *JOSS* 6, 3383 (2021).
- [28] Turner, S. W. D. et al. A multi-reservoir model for projecting drought impacts on thermoelectric disruption risk across the Texas power grid. *Energy* 231, 120892 (2021).
- [27] Galelli, S., Nguyen, H. T. T., Turner, S. W. D. & Buckley, B. M. Time to Use Dendrohydrological Data in Water Resources Management? *J. Water Resour. Plann. Manage.* 147, 01821001 (2021).
- [26] Thurber, T., Turner, S. W. D., et al. mosartwmpy: A Python implementation of the MOSART-WM coupled hydrologic routing and water management model. *JOSS* 6, 3221 (2021).
- [25] Turner, S. W. D. & Jeffrey, P. J. A simple drought risk analysis procedure to supplement water resources management planning in England and Wales. *Water & Environment J* 35, 417–424 (2021).
- [24] Nguyen, H. T. T., Turner, S. W. D., Buckley, B. M. & Galelli, S. Coherent Streamflow Variability in Monsoon Asia Over the Past Eight Centuries—Links to Oceanic Drivers. *Water Resources Research* 56, e2020WR027883 (2020).
- [23] Voisin, N., Turner, S. W. D., et al. Impact of climate change on water availability and its propagation through the Western U.S. power grid. *Applied Energy* 276, 115467 (2020).
- [22] Turner, S. W. D., Doering, K. & Voisin, N. Data-Driven Reservoir Simulation in a Large-Scale Hydrological and Water Resource Model. *Water Resources Research* 56, e2020WR027902 (2020).
- [21] Turner, S. W. D., Xu, W. & Voisin, N. Inferred inflow forecast horizons guiding reservoir release decisions across the United States. *Hydrol. Earth Syst. Sci.* 24, 1275–1291 (2020).
- [20] Graham, N. T., Turner, S. W. D., et al. Humans drive future water scarcity changes across all Shared Socioeconomic Pathways. *Environ. Res. Lett.* 15, 014007 (2020).
- [19] Turner, S. W. D., Hejazi, M., Calvin, K., Kyle, P. & Kim, S. A pathway of global food supply adaptation in a world with increasingly constrained groundwater. *Science of The Total Environment* 673, 165–176 (2019).
- [18] Arango-Aramburo, S., Turner, S. W. D., et al. Climate impacts on hydropower in Colombia: A multi-model assessment of power sector adaptation pathways. *Energy Policy* 128, 179–188 (2019).
- [17] Santos Da Silva, S. R., Turner, S. W. D., et al. The Paris pledges and the energy-water-land nexus in Latin America: Exploring implications of greenhouse gas emission reductions. *PLoS ONE* 14, e0215013 (2019).

- [16] Bond-Lamberty, B., Turner, S. W. D., et al. gcamdata: An R Package for Preparation, Synthesis, and Tracking of Input Data for the GCAM Integrated Human-Earth Systems Model. *JORS* 7, 6 (2019).
- [15] Turner, S. W. D., et al. Influence of Groundwater Extraction Costs and Resource Depletion Limits on Simulated Global Nonrenewable Water Withdrawals Over the Twenty-First Century. *Earth's Future* 7, 123–135 (2019).
- [14] Vernon, C. R., Turner, S. W. D., et al. A Global Hydrologic Framework to Accelerate Scientific Discovery. *JORS* 7, 1 (2019).
- [13] Turner, S. W. D., Voisin, N., Fazio, J., Hua, D. & Jourabchi, M. Compound climate events transform electrical power shortfall risk in the Pacific Northwest. *Nat Commun* 10, 8 (2019).
- [12] Lucena, A. F. P., Turner, S. W. D., et al. Interactions between climate change mitigation and adaptation: The case of hydropower in Brazil. *Energy* 164, 1161–1177 (2018).
- [11] Cui, R. Y. et al., Turner, S. W. D., Regional responses to future, demand-driven water scarcity. *Environ. Res. Lett.* 13, 094006 (2018).
- [10] Turner, S. W. D., Hejazi, M., Kim, S. H., Clarke, L. & Edmonds, J. Climate impacts on hydropower and consequences for global electricity supply investment needs. *Energy* 141, 2081–2090 (2017).
- [9] Turner, S. W. D., Bennett, J. C., Robertson, D. E. & Galelli, S. Complex relationship between seasonal streamflow forecast skill and value in reservoir operations. *Hydrol. Earth Syst. Sci.* 21, 4841–4859 (2017).
- [8] Turner, S. W. D., Ng, J. Y. & Galelli, S. Examining global electricity supply vulnerability to climate change using a high-fidelity hydropower dam model. *Science of The Total Environment* 590–591, 663–675 (2017).
- [7] Ng, J. Y., Turner, S. W. D. & Galelli, S. Influence of El Niño Southern Oscillation on global hydropower production. *Environ. Res. Lett.* 12, 034010 (2017).
- [6] Ekström, M., Grose, M., Heady, C., Turner, S. W. D., & Teng, J. The method of producing climate change datasets impacts the resulting policy guidance and chance of mal-adaptation. *Climate Services* 4, 13–29 (2016).
- [5] Turner, S. W. D. & Galelli, S. Regime-shifting streamflow processes: Implications for water supply reservoir operations. *Water Resources Research* 52, 3984–4002 (2016).
- [4] Turner, S. W. D., Blackwell, R. J., Smith, M. A. & Jeffrey, P. J. Risk-based water resources planning in England and Wales: challenges in execution and implementation. *Urban Water Journal* 13, 182–197 (2016).
- [3] Turner, S. W. D. & Galelli, S. Water supply sensitivity to climate change: An R package for implementing reservoir storage analysis in global and regional impact studies. *Environmental Modelling & Software* 76, 13–19 (2016).
- [2] Turner, S. W. D. & Jeffrey, P. J. Industry views on water resources planning methods - prospects for change in England and Wales: Industry views on water resources planning methods. *Water Environ J* 29, 161–168 (2015).
- [1] Turner, S. W. D. et al. Linking climate projections to performance: A yield-based decision scaling assessment of a large urban water resources system. *Water Resources Research* 50, 3553–3567 (2014).

Technical Reports

- [4] Turner, S.W.D., Voisin, N., Nelson, K.D. and Tidwell, V.C., 2022. Drought impacts on hydroelectric power generation in the Western United States (No. PNNL-33212). Pacific Northwest National Lab.(PNNL), Richland, WA (United States).
- [3] Cohen, S., Miara, A., Tidwell, V., Turner, S.W.D, Voisin, N. and Dyreson, A., 2022. Water and Climate Impacts on ERCOT Long-Term Systems Assessment (No. NREL/TP-6A20-79581). National Renewable Energy Lab.(NREL), Golden, CO (United States).
- [2] Somani, A., Voisin, N., Tipireddy, R., Turner, S.W.D, Veselka, T.D., Ploussard, Q., Koritarov, V., Mosier, T., Mohanpurkar, M., Ingram, M. and Signore, S., 2021. Hydropower value study: Current status and future opportunities (p. 47). Technical Report PNNL-29226. Hydrowires. Richland, WA: Pacific Northwest National Lab.
- [1] Santos Da Silva, S.R., McJeon, H.C., Miralles-Wilhelm, F., Muñoz Castillo, R., Clarke, L., Delgado, A., Edmonds, J.A., Hejazi, M., Horing, J., Horowitz, R., Kyle, P., Turner, S.W.D, et al., 2018. Energy-water-land nexus in Latin America and the Caribbean: A perspective from the Paris agreement climate mitigation pledges (No. IDB-WP-901). IDB Working Paper Series.

Datasets

- [11] Turner, S.W.D., Ghimire, G., Hansen, C., Singh, D., Kao, S.C. 2024. Hydropower Capacity Factor Trends and Analytics for the United States. HydroSource. Oak Ridge National Laboratory, Oak Ridge, Tennessee, USA.
- [10] Turner, S.W.D., Voisin, N., Nelson, K., & Bracken, C. (2024). RectifHyd (1.3) [Data set]. Zenodo.
- [9] Turner, S.W.D., Bracken, C., Voisin, N., & Oikonomou, K. (2024). HydroWIRES B1: Monthly and Weekly Hydropower Constraints Based on Disaggregated EIA-923 Data (Version v1.2.0) [Data set]. Zenodo.
- [8] Turner, S.W.D., Nelson, K., & Vernon, C. (2022). Turner et al., 2021, urban water supply contributions and GAMUT output data (0.0.1) [Data set]. Zenodo.
- [7] Turner, S.W.D. (2021). Formatted inputs for hydrofixr (0.0.1) [Data set]. Zenodo.
- [6] Turner, S.W.D., Nelson, K., Vernon, C., & Rice, J. (2021). Point and Nonpoint Proportion of Potentially Contaminated

Supply (PPCS) for 116 United States cities (1.0) [Data set]. Zenodo.

[5] Turner, S.W.D., Voisin, N., Steyaert, J. C., & Condon, L. (2021). ISTARF-CONUS (0.0.1) [Data set]. Zenodo.

[4] Steyaert, J., Condon, L., Turner, S.W.D., & Voisin, N. (2021). ResOpsUS (Version 2) [Data set]. Zenodo.

[3] Nelson, K., Turner, S.W.D., Voisin, N., & Kao, S.-C. (2020). ERCOT Reservoir Watershed Delineations and Inflow Scenarios (1.1.0) [Data set]. Zenodo.

[2] Turner, S.W.D., Doering, K., & Voisin, N. (2020). IMMM-SFA/Turner_et_al_2020_WRR: CRB reservoir simulations [Data set]. In Water Resources Research (v1.0.0). Zenodo.

[1] Turner, S.W.D., Voisin, N., Steyaert, J. C., & Condon, L. (2021). ISTARF-CONUS (0.0.1) [Data set].