CARLY HYATT HANSEN, PhD

WATER RESOURCES ENGINEER

CONTACT

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EDUCATION

2014-2018
PhD, Civil and Environmental Engineering: University of Utah
Dissertation: Using Remote Sensing to Evaluate Historical Trends and Contributing Factors to Algal Bloom Dynamics and Forecasting Future Conditions in the Great Salt Lake System

2013-2014
MS, Civil and Environmental Engineering: Water Resources: Brigham Young University
Thesis: Development and Regional Application of Sub-Seasonal Remote-Sensing Chlorophyll Detection Models

2008-2013
BS, Civil and Environmental Engineering: Brigham Young University

SOCIAL

linkedin.com/in/carlyhyatthansen

twitter.com/carlymnology

github.com/cahhansen

Portfolio: www.cahhansen.com

PROFILE

I am a water resources engineer who is interested in improving management of water quality and quantity. In both professional and academic settings, I have leveraged a variety of modeling techniques to address water resource management challenges. My research interests include statistical analysis of hydrology and water quality, systems modeling, and using remote sensing, hydroinformatics, and geospatial tools in creative ways to study the engineered/natural water interface.

RESEARCH AND TEACHING EXPERIENCE

SEPT 2019—PRESENT: **Water Resources Engineer, Oak Ridge National Laboratory**
♦ Conduct hydrologic modeling/analysis in the Water Resources Science & Engineering Group
♦ Greenhouse gas emissions and water quality modeling using GIS and remote sensing
♦ Spatial analysis of hydropower assets and environmental datasets
♦ Statistical exploration of streamflow and regulated flow patterns

SEPT 2018—JULY 2019: **Postdoctoral Instructor & Research Assistant, University of Utah**
♦ Led modeling efforts for major EPA-funded integrated water resource/water quality modeling study exploring effects of climate & development changes in the Jordan River Watershed
♦ Prepared curriculum and deliver several courses in the Civil and Environmental Engineering Department (Engineering Probability and Statistics, Engineering Economic Analysis, and Engineering Informatics/Computer Tools)

AUG 2014—AUG 2018: **Research Assistant/Hydroinformatics Co-Instructor, University of Utah**
♦ Created climate data processing, downscaling, & analysis programs for Python and R
♦ Prepared manual for data and modeling needs for hydrologic/water quality for Los Alamos National Lab
♦ Developed learning modules (including exercises, resources, and in-class assignments) for Hydroinformatics course (programming and data analysis in R and Python)

DEC 2011—JUNE 2014: **Research/Teaching Assistant, Brigham Young University (Part-time)**
♦ Managed five other research assistants, field sampling, and lab work
♦ Provided individual assistance and regular topical reviews for Introduction to Environmental Engineering Course

PROFESSIONAL EXPERIENCE

JULY 2016—JULY 2018: **WaDE Program Intern, Western States Water Council (Part-time)**
♦ Built data portals & web applications for accessing/visualizing water data using R & ArcGIS
♦ Prepared reports and conference materials for inter-agency scientific workshops
♦ Managed components of Water Data Exchange (WaDE) program using GitHub
♦ Assisted in drafting grant applications

JAN—NOV 2014: **GIS Analyst/Hydrologic Modeling Intern, Stanley Consultants (Part-time)**
♦ Modeled management practices for soil salinity remediation for agriculture
♦ Created complex 1D/2D Hydrologic models using GSSHA, HEC-1 , HEC-HMS
♦ Prepared internal and client-facing modeling documentation, training material, map products and reports
♦ Managed geodatabases for various projects

ADDITIONAL MAJOR RESEARCH EXPERIENCE

JUNE—JULY 2017: **CUAHSI Summer Institute, National Water Center, Tuscaloosa, AL**

- Evaluated retrospective streamflow models during low-flow conditions
- Created an interactive web-based application using Geoserver and Python and documentation using ESRI Story Maps

MAY—AUG 2013: **RISE Professional Scholar, Forschungszentrum-Jülich, Germany**

- Performed field measurements with ground penetrating radar for mapping of sub-surface hydro-geological structures
- Improved efficiency in data processing programs

PUBLICATIONS

- Getting lost tracking the carbon footprint of hydropower, *Renewable and Sustainable Energy Reviews,* July 2022 (Co-author)
- Hydropower development potential at non-powered dams: Data needs and research gaps, *Renewable and Sustainable Energy Reviews*, July 2021
- Assessing Retrospective National Water Model Streamflow with Respect to Droughts and Low Flows in the Colorado River Basin, *Journal of American Water Resources Association*, August 2019
- Evaluating historical trends and influences of meteorological and seasonal climate conditions on lake chlorophyll a using remote sensing, *Lake and Reservoir Management,* July 2019
- Evaluating Remote Sensing Model Specification Methods for Estimating Water Quality in Optically Diverse Lakes throughout the Growing Season, *Hydrology*, November 2018
- Downscaling Precipitation for Local-Scale Hydrologic Modeling Applications: Comparison of Traditional and Combined Change Factor Methodologies, *Journal of Hydrologic Engineering,* June 2017
- Spatiotemporal Variability of Lake Water Quality in the Context of Remote Sensing Models, *Remote Sensing,* April 2017
- How does climate change affect combined sewer overflow in a system benefiting from rainwater harvesting systems?, *Sustainable Cities and Society,* July 2016 (Co-author)
- Reservoir Water Quality Monitoring using Remote Sensing with Seasonal Models: Case Study of Five Central-Utah Reservoirs, *Lake and Reservoir Management,* September 2015

CONFERENCE AND PROFESSIONAL MEETING PRESENTATIONS

- Reservoir management strategies to reduce GHG emissions at hydropower facilities, *EWRI World Water Congress,* Atlanta, GA, June 2022
- Building bridges between big datasets to better describe US hydropower reservoirs, *Joint Aquatic Sciences Meeting,* Grand Rapids, MI, May 2022
- Tools to facilitate large-scale analysis of non-powered dam opportunities for hydropower development, HYDRO2022, Strausburg, France, April 2022
- Approaches to Quantify Energy Storage at National Hydropower Reservoirs, *EWRI World Water Congress*, Virtual, June 2021
- Historical Streamflow Reanalysis at the National Scale using Hierarchical Routing and Data Assimilation, *AGU Fall Meeting,* Virtual, December 2020
- Assessment of remote sensing for hydropower projects in the US, *North American Lake Management Symposium,* Virtual, November 2020
- Implications and Context for Effects of Climate Change on Urban Water Demands in the Mountain-West, *American Water Resources Association Annual Meeting,* Salt Lake City, UT, November 2019
- Developing and Implementing and Early Warning System for HABs in Utah Lake, *ASLO Annual Meeting: Planet Water*, San Juan, PR, February 2019
- Short-term Forecasting and Decision Support Tool for Algal Blooms in a Multi-Lake System, *EWRI World Water Congress,* Minneapolis, MN, June 2018
- Integrated Modeling Framework for Improved Future Management of the Utah Lake-Jordan River Watershed, *Salt Lake County Watershed Symposium,* November 2017
- Sensitivity of Water System Vulnerability to Changing Snowpack from Dust Deposition and Climate Change, *EWRI World Water Congress,* Sacramento, CA, May 2017
- Identifying Contributing Factors to Utah Lake Algal Blooms, *Salt Lake County Watershed Symposium,* November 2016
- A Tale of Two Bays: Enhancing understanding of historical conditions and Evaluating Patterns of Water Quality In the Great Salt Lake, *EWRI World Water Congress,* West Palm Beach, FL, May 2016

- Google Earth Engine as a Platform for Making Remote Sensing of Water Resources a Reality for Monitoring Inland Waters, *EWRI World Water Congress,* Austin, Texas, May 2015
- Watershed GIS and Remote Sensing to Assess Regional Water Quality, *AWRA GIS Conference*, Snowbird, Utah, May 2014
- Regional Application of Sub-Seasonal Remote Sensing Chlorophyll Detection Models*, North American Lake Management Symposium*, San Diego, October 2013
- Developing Seasonal Models to Accurately Assess Algal Succession and Water Quality Using Remotely Sensed Data, *North American Lake Management Symposium*, Madison, Wisconsin, October 2012

OUTREACH, SERVICE, AND AWARDS

- Member of the Oral/Poster Presentation sub-committee for the Joint Aquatic Sciences Meeting (2022)
- Mentor for US DOE Science Undergraduate Laboratory Internships (SULI) Program; Summer 2021
- Community outreach through Oak Ridge National Laboratory
    - "Stump a Scientist" panel member with TN Freedom Schools
    - Engineering Week presentation https://www.ornl.gov/news/ornl-scientists-share-excitement-engineering-students-statewide
- Reviewer for technical papers in *Remote Sensing, Climatic Change, Nature—Scientific Data, Journal of Hydrologic Engineering, Lake and Reservoir Management*
- Served on NASA ROSES (2019) review panel for
- STEM Ambassador for the University of Utah – participated in a number of community educational outreach events to engage different audiences in University-level science activities; 2016
- Director of Online Communications and Outreach for Utah Women of Water; 2015-2018
    - Manage social media accounts and website, produce original content
    - Facilitate networking events for members
- First place, American Water Resources Association, Utah Chapter Paper Competition; 2012 & 2013
- American Water Works Association Scholarship Recipient; 2012
- BYU Global Engineering Outreach – Peru, a campus humanitarian engineering club – designed and implemented clean burning stoves and low-cost water filters; 2011-2012