

Water Supply Systems and Wildfires

Water Science and Technology Board Spring 2025 Meeting



Briefing Book

May 14th, 2025

Water Supply Systems and Wildfires

May 14, 2025



WEDNESDAY, MAY 14, 2025

TIMES IN PT/ET

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Meeting Objective

This event will convene Water Science and Technology Board Members and experts to discuss the impacts of wildfires on water supply systems and waterways. The discussions will cover contamination of drinking water treatment and distribution systems by fires, stormwater threats to downstream communities following fires, and policies and programs for water supplies that can improve wildfire response and recovery.

10:00am/1:00pm

Welcome and Introductions

David Sedlak, WSTB Chair, University of California at Berkeley

10:10am/1:10pm

Keynote Speaker

Andrew Whelton, Purdue University

10:40am/1:40pm

Panel 1: Understanding the Damage Caused by Urban Wildfires

Moderator: Amy Pruden, WSTB Member, Virginia Tech

- **Brian Ebel**, U.S. Geological Survey
- **Kurt Kowar**, Director of Public Works and Utilities, City of Louisville, CO
- **Chris Olivares**, University of California at Irvine

11:25am/2:25pm

Panel 1 Discussion

11:40am/2:40pm

Break

11:55am/2:55pm

Panel 2: Water System Operations During Fires

Moderator: Camille Pannu, WSTB Member, Columbia University

- **Robert Sowby**, Brigham Young University
- **Ben Horenstein**, Marin Water
- **Greg Pierce**, University of California at Los Angeles

12:40pm/3:40pm

Panel 2 Discussion

12:55pm/3:55pm

Break

1:10pm/4:10pm

Panel 3: Future Proofing Municipal Water Systems

Moderator: Venkatamaran Lakshmi, WSTB Member, University of Virginia

- All previous panelists

1:45pm/4:45 pm

Synthesis Remarks

David Sedlak, WSTB Chair, University of California at Berkeley

2:00pm/5:00pm

ADJOURN

Pre-Reading For Open Session
Water Supply Systems and Wildfires:
Water Science and Technology Board Spring Meeting 2025

How better water systems can help a city survive the next firestorm

AP News – Brittany Peterson, February 19, 2025

Water Supply and Firefighting: Early Lessons from the 2023 Maui Fires

Robert B. Sowby and Braxton W. Porter, February 2024

Even though drinking water utilities are not meant to fight wildfires, they quickly become stakeholders, if not first responders, when their resources are needed for firefighting. The August 2023 wildfires on the island of Maui, Hawaii, USA, have highlighted weaknesses at this intersection. While attention has focused on the wildfire causes or water quality impacts afterward, few studies have analyzed the response. We review this extreme case to support disaster-response lessons for water utilities and to guide further research and policy. First, emergency water releases were not available in a timely manner. Second, fire and wind toppled power lines, causing power outages that inhibited pumping water. Third, many structures were a total loss despite water doused on them, consuming valuable water. Finally, water was lost through damaged premise plumbing in burned structures, further reducing system pressure. These conditions emphasize that water utilities need to access emergency water supplies quickly, establish reliable backup electricity, coordinate with firefighters on priority water uses, and shut valves in burned areas to preserve water. While further research will certainly follow, we present these early lessons as starting points.

Do Urban Water Supply Systems Put Out Wildfires?

UCLA Luskin Center for Innovation

Experts: Gregory Pierce, Faith Kearns, Silvia R. González, Lauren Dunlap

The January 2025 wildfires devastated Los Angeles, claiming lives, homes, jobs, and whole communities. As the fires raged, discussions erupted across social and mainstream media, questioning whether water supply systems could have been more prepared to fight the fires. This FAQ provides clear, accurate answers to the most common questions we heard from the public, media, and policymakers about fire hydrants, firefighting, water infrastructure, and more. Our goal is to offer a better understanding of how water systems work, address common concerns, and provide useful information that can help communities stay informed and prepared, and advocate for change. We seek to answer these questions in ongoing research, as they have not been well studied and explained in clear language.

Post-Wildfire Distribution System Water Quality Impacts and Potential Responses

As a result of climate change, the number and severity of wildfires in the western United States are increasing. Volatile organic compound (VOC) and semi-VOC contamination has been found in water distribution systems after wildfires in California. Preliminary research indicates that thermal degradation of plastic assets within distribution systems may be a potential source of this contamination.

This project furthered the understanding of the degree to which thermally damaged plastic assets contribute to the observed VOC and semi-VOC contamination, and presents response and recovery actions that impacted utilities can take. In addition to the final report, a CONOPS plan that can enable public water systems to obtain a clearer direction on how to rapidly respond and recover from wildfire disasters, and what steps need to be taken to be better prepared for future ones, was published as a separate project paper in 2024.

SPEAKER BIOGRAPHIES

Water Supply Systems and Wildfires: Water Science and Technology Board Spring Meeting 2025

BRIAN EBEL is a Research Hydrologist at the U.S. Geological Survey. His work focuses on landscape disturbance impacts (e.g., wildfire, forestry, legacy mining sites) on water availability and water-related hazards to human lives and infrastructure. He uses field measurements combined with numerical modeling to advance prediction and assessment for water resources through improved process representation. Dr. Ebel earned a B.A. in earth and planetary sciences from Washington University in St. Louis and a Ph.D. in hydrogeology from Stanford University.

BEN HORENSTEIN is the Municipal Water District General Manager at Marin Water. Prior to joining Marin Water, Horenstein was the director of Santa Rosa Water and, prior to that, the Director of Wastewater for the East Bay Municipal Utility District. He has extensive experience in wastewater operations and engineering and regulatory issues in California. He has authored numerous technical papers and served on several committees including the Tri-TAC, a statewide wastewater agency regulatory group, the California Association of Sanitation Agencies, and the National Association of Clean Water Agencies' Water Quality Committee. Mr. Horenstein earned a B.S. in Environmental Engineering from the University of Florida. He is a Registered Civil Engineer in California and a Grade V certified wastewater and water plant operator.

KURT KOWAR is the Director of Public Works and Utilities for the City of Louisville, Colorado. In addition to his expertise in public water distribution systems and the improvements needed to better fight urban fires, Mr. Kowar has authored papers and presented on the City's response to the Marshall Fire in December of 2021 in Boulder County, Colorado. Kowar has been instrumental in installing remote shutoff valves, helping to prevent firefighters from entering dangerous conditions to manually shut off residential water supplies where fires have damaged pipes. Mr. Kowar graduated from Ohio State University.

CHRISTOPHER OLIVARES is an Assistant Professor of Civil and Environmental Engineering at the University of California at Irvine, and he is also the Associate Director of UCI's Water-Energy Nexus Center. His research focuses on microbial-organic contaminant interactions to understand pollutant environmental fate and transport, biomarkers of biotransformation of highly fluorinated chemicals (PFAS) in sites contaminated with fire-fighting foams, and climate change disasters impacting water contaminants. Dr. Olivares obtained his Ph.D. in Environmental Engineering and M.A. in French at the University of Arizona.

GREGORY PIERCE is the Co-Director of the Luskin Center for Innovation (LCI) and serves as a Senior Researcher, leading LCI's Water, Environmental Equity and Transportation programs. He is also an Affiliate Faculty member at the Institute of the Environment and Sustainability at the University of California at Los Angeles and an Adjunct Assistant Professor in the Department of Urban Planning. His research is on basic resource/service provision and access for disadvantaged or marginalized populations, with a focus on water and transport. Dr. Pierce employs formal policy design techniques to

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evaluate and inform service provision strategies formulated by national sub-national agencies. He assesses programs and plans which allocate services to specific neighborhoods and households. Finally, Dr. Pierce's research utilizes rational choice and behavior models to analyze low-income urban and households strategies to secure access to and utilize basic services and programs. He earned a Ph.D. in Urban Planning in 2015 and an M.A. in Urban Planning in 2011, both from UCLA.

ROBERT SOWBY is an Assistant Professor of Civil and Construction Engineering at Brigham Young University. Sowby is a licensed professional engineer with particular expertise in the planning, design, construction, and operation of drinking water systems. He teaches and studies environmental engineering, urban water infrastructure, and sustainability. He was the 2020 recipient of ASCE's Daniel W. Mead Prize for Younger Members. Dr. Sowby received his Ph.D. in civil and environmental engineering from the University of Utah, his M.Eng. in civil and environmental engineering and environmental and water quality engineering from the Massachusetts Institute of Technology, and his B.S. in civil engineering and German studies from Brigham Young University.

ANDREW WHELTON is a Professor of Civil, Environmental, and Ecological Engineering at Purdue University. He leads the Healthy Plumbing Consortium and Center for Plumbing Safety, and several other initiatives with multiple university and industrial collaborators. His expertise is in environmental chemistry and engineering, disasters, polymer science and engineering, water quality, infrastructure, and public health. His research teams have responded to support communities devastated by wildfires. He has briefed state executives, the Oregon House of Representatives, the Indiana Senate, the National Academies of Sciences Public Health Wildfire Workshop, Standing Committee on Disaster Science, and the U.S. Chemical Safety and Hazard Investigation Board on fire threats to water supplies. Before joining Purdue, Dr. Whelton served on the faculty at the University of South Alabama, and he worked for the National Institute for Standards and Technology Building Fire Research Laboratory, Virginia Tech, the U.S. Army, and private engineering consulting firms. He earned a B.S. in civil engineering, M.S. in environmental engineering, and a Ph.D. in civil engineering from Virginia Tech.

**WATER SCIENCE AND TECHNOLOGY BOARD
MEMBER BIOGRAPHIES 2025**

Updated May 5, 2025

DAVID L. SEDLAK, NAE, Chair, is the Plato Malozemoff Professor in the Department of Civil & Environmental Engineering at the University of California, Berkeley where he is also the co-Director of the Berkeley Water Center and the Deputy Director of the National Science Foundation's Engineering Research Center on Reinventing the Nation's Urban Water Infrastructure (ReNUWIt). His areas of research include analytical methods for measuring organic compounds in water, fate of chemical contaminants in water recycling systems, environmental photochemistry, and ecological engineering. He has received several notable awards including the Fulbright Senior Scholar Award in 2003, Paul Busch Award for Innovation in Water Quality Engineering in 2003 and the NSF CAREER Award in 1997. Dr. Sedlak received a B.S. in environmental science from Cornell University and a Ph.D. in water chemistry from the University of Wisconsin, Madison.

PEDRO J.J. ALVAREZ, NAE, is the George R. Brown Professor of Civil and Environmental Engineering at Rice University, where he also serves as founding Director of the NSF Engineering Research Center on Nanotechnology-Enabled Water Treatment (NEWT). His research interests include environmental implications and applications of nanotechnology, bioremediation, fate and transport of toxic chemicals, water footprint of biofuels, water treatment and reuse, and antibiotic resistance control. He is the 2012 Clarke Prize laureate and also won the AAEE Grand Prize for Excellence in Environmental Engineering and Science. Past honors include President of the Association of Environmental Engineering and Science Professors (AEESP), the Perry McCarty AEESP Founders' Award for Outstanding Contributions to Environmental Engineering Education and Practice, the AEESP Frontiers in Research Award, the WEF McKee Medal for Groundwater Protection, the SERDP cleanup project of the year award, the Brown and Caldwell lifetime Achievement Award for Site Remediation, the ASCE Simon Freese Award, and various best paper awards with his students. He is an Associate Editor of Environmental Science and Technology and previously served on the scientific advisory board of the EPA and of the advisory committee of the NSF Engineering Directorate. Prof. Alvarez was elected to the National Academy of Engineering for outstanding contributions to the practice and pedagogy of bioremediation and environmental nanotechnology. Professor Alvarez received the B. Eng. Degree in Civil Engineering from McGill University and MS and Ph.D. degrees in Environmental Engineering from the University of Michigan.

MARTIN DOYLE is professor of water science and policy at Duke University; he was previously a professor at UNC-Chapel Hill. Beyond academic positions, he has served in the Office of the Assistant Secretary of the Army (Senior Advisor, Civil Works), Department of Interior (Senior Conservation Finance Fellow), and US Army Corps of Engineers (Frederick Clarke Scholar). His research is focused on the hydraulics and geomorphology of river systems, but also spans into infrastructure finance and federal

water policy. He is a Guggenheim Fellow, Walton Family Foundation Fellow, and was selected as a Kavli Fellow for the Frontiers of Science by the National Academy of Sciences. He has an MS in Engineering from University of Mississippi and a PhD from Purdue University.

JORDAN R. FISCHBACH is the director of planning and policy research at The Water Institute of the Gulf. Before joining the Water Institute, Fischbach was co-director of the RAND Climate Resilience Center, a senior policy researcher at the RAND Corporation, and an affiliate faculty member at the Pardee RAND Graduate School. Since 2010, Fischbach has led RAND research focused on climate adaptation, urban resilience, water resources management, coastal planning, and post-disaster recovery. For the past 10 years, Fischbach has been the principal investigator for the Coastal Louisiana Risk Assessment (CLARA) modeling effort, which provides next-level modeling capabilities for Louisiana Coastal Protection and Restoration Authority to efficiently estimate flood risk under a wide range of future environmental, operational, and growth uncertainties and with various proposed projects in place. Fischbach's other work includes serving as a co-investigator for the NOAA Mid-Atlantic Regional Integrated Sciences and Assessments (MARISA) center, which has the goal to support the effective utilization of climate science and the building of adaptive capacity and resilience to climate variability and change in the Mid-Atlantic region. Fischbach was previously principal investigator on a project to evaluate of the economic, social, and ecosystem benefits and costs of a range of green stormwater infrastructure proposals for Pittsburgh's Negley Run watershed. The project applied simulation modeling and Robust Decision Making to evaluate large-scale green infrastructure designs—developed by the U.S. Army Corps of Engineers Pittsburgh District—across a range of uncertain climate futures. He received his B.A. in history from Columbia University and his M.Phil. and Ph.D. in policy analysis from Pardee RAND Graduate School.

SHEMIN GE is a distinguished professor in the Department of Geological Sciences at the University of Colorado Boulder. She was the department Chair from 2015-2019 and served for two years as a program director for the Hydrologic Sciences Program at the National Science Foundation. Dr. Ge studies groundwater in Earth's crust. Her research expertise includes water resource dynamics under a changing climate and permafrost hydrology in cold regions. Dr. Ge also explores fluid induced earthquakes associated with geo-energy (geothermal and oil/gas) development. In recognition of her pioneering research and leadership in the field, the Hydrogeology Division of the Geological Society of America awarded Dr. Ge the 2018 Meinzer Award and named her as the 2016 Birdsall-Dreiss Lecturer for excellence in research and ability to communicate effectively. She is a fellow of American Geophysical Union and Geological Society of America. Dr. Ge received her Ph.D. in hydrogeology from Johns Hopkins University in 1990. She holds an M.S. from the University of British Columbia and a B.E. from the Wuhan University of Technology. She was a member of the Academies Committee on Catalyzing Opportunities for Research in the Earth Sciences (CORES): A Decadal Survey for NSF's Division of Earth Sciences.

ELLEN GILINSKY is president of Ellen Gilinsky, LLC, which she started in 2017 to work with government, industry, and the private sector on finding environmental solutions to water challenges. As part of the Obama Administration from 2011 through 2016, she was the associate deputy assistant administrator for water at the Environmental Protection Agency where she played a key role in water programs at the federal, state, and local levels working closely with diverse stakeholders in the water quality, quantity,

and agriculture sectors and serving as co-chair of the Mississippi River/Gulf of Mexico Hypoxia Task Force. Prior to this appointment, Dr. Gilinsky served as director of the Water Division at the Virginia Department of Environmental Quality, and in the early 1980s she was part of Virginia's Chesapeake Bay Program staff. In addition, she has 12 years of experience as an environmental consultant at several regional and national environmental engineering firms. She has been a past president of the Association of Clean Water Administrators and held a past gubernatorial appointment to the State Advisory Board of the Virginia Water Resources Research Center. She currently serves as a board member of River Network and the Soil and Water Conservation Society and holds a gubernatorial appointment to the Science and Technical Advisory Committee of the Chesapeake Bay Program. Dr. Gilinsky received her B.A. in biology from the University of Pennsylvania and her Ph.D. in zoology with a concentration in aquatic ecology from the University of North Carolina at Chapel Hill.

ROBERT M. HIRSCH is a research hydrologist emeritus at the U.S. Geological Survey (having retired in 2018). As a research hydrologist, the focus of his research is on the description and understanding of long-term variability and change in surface-water quality and streamflow. From 1994 through May 2008, he served as the Chief Hydrologist of the USGS. In this capacity, Dr. Hirsch was responsible for all USGS water science programs, which encompass research and monitoring of the nation's groundwater and surface water resources including issues of water quantity as well as quality. Dr. Hirsch has received numerous honors from the federal government and from non-governmental organizations, including the 2006 American Water Resources Association's William C. Ackermann Medal for Excellence in Water Management, selected to be the Walter Langbein Lecturer of the American Geophysical Union in 2017, and has twice been conferred the rank of Meritorious Senior Executive by the U.S. President. He is co-author of the textbook *Statistical Methods in Water Resources*. Dr. Hirsch has served on four Academies committees, including the Committee to Review the New York City Watershed Protection Program and The Committee on the Future of Water Quality in Coeur d'Alene Lake. Dr. Hirsch received a B.A. in geology from Earlham College, an M.S. in geology from University of Washington, and a Ph.D. in geography and environmental engineering from the Johns Hopkins University.

BRANKO KERKEZ is the Arthur F. Thurnau Associate Professor of Civil and Environmental Engineering at the University of Michigan, where he directs the Digital Water Lab. He is also the Chief Technical Officer of Hyfi, steering research and development of sensing and AI technologies for urban water management. His research interests include water, data, and sensors. His group is working to enable smart water systems, which autonomously adapt themselves to changing conditions using real-time data and controls. His research projects have spanned wireless sensing of large mountain basins, real-time flood response, robotics, and control algorithms for water systems. He is the founder of Open-Storm.org, an open-source consortium dedicated to freely sharing hardware, software, and case studies on smart water systems. He was recognized as a Gilbreth Lecturer by the US National Academy of Engineering in 2018 for his contributions to smart water systems. Other honors include the National Science Foundation's CAREER Award, Verizon Climate Resilience Prize, the Grand Prize for the WEF/WRF Intelligent Water Challenge, UM's 1938E Award, as well as numerous teaching and research paper awards. Dr. Kerkez holds a Ph.D. and M.S. in Civil and Environmental Engineering, as well as an M.S. in Electrical Engineering and Computer Science from UC Berkeley.

YUSUKE KUWAYAMA is an Associate Professor in the School of Public Policy at the University of Maryland, Baltimore County, and a Fellow at Resources for the Future (RFF) in Washington, DC. He studies the economics of water resource and ecosystem management, with a focus on federal and state regulation of ambient water pollution, water management to protect aquatic species habitats, and sustainable water use in agriculture. He is an at-large appointee to the Chesapeake Bay Program's Scientific and Technical Advisory Committee and serves on the steering committee of AquaWatch, a water quality initiative within the Group on Earth Observations. He previously served as Director of the Consortium for the Valuation of Applications Benefits Linked with Earth Science (VALUABLES), a cooperative agreement between RFF and the National Aeronautics and Space Administration. He received his Ph.D. in agricultural and applied economics and an M.S. in economics from the University of Illinois Urbana-Champaign and an A.B. in economics from Amherst College.

VENKATARAMAN LAKSHMI is the John L Newcomb Professor of Engineering in the Department of Engineering Systems and Environment at the University of Virginia. He served as the Cox Visiting Professor of Earth Sciences at Stanford University 2006-2007 and 2015-2016 and Program Director for Hydrologic Sciences at the National Science Foundation 2017-2019. His research interests are in the areas of land surface hydrology, hydrometeorology, hydro-climatology and land-atmospheric-ecological interactions studies using modeling and remote sensing. Between 1995 and 1999 he worked at the NASA Goddard Space Flight Center as a research scientist in the Laboratory for the Atmospheres. Dr. Lakshmi is a fellow of the American Society of Civil Engineers (ASCE), Fellow, Geological Society of America (GSA) and has around 150 peer-reviewed articles and 450 presentations. He has advised over 30 graduate students. He has served as editor for Eos, associate editor of Water Resources Research, Journal of Hydrologic Engineering, Journal of Hydrology and Journal of Geophysical Research and currently is serving as Editor of the Vadose Zone Journal. He is the founding editor-in-chief of the Remote Sensing in Earth System Science (a Springer publication). He has served on the board of directors of the Consortium of Universities for the Advancement of Hydrological Sciences, the AGU Hydrological Sciences Executive Council and the co-chair for the Program Committee of the Hydrology Section for the AGU Fall Meeting. He is currently serving on the Earth Science Advisory Committee for NASA. He recently served on the National Academies Panel for the Decadal Survey of Earth Observations from Space (NASA) (2016-2018) and as chair of the planning committee for Groundwater Recharge and Flow: Approaches and Challenges for Monitoring and Modeling Using remotely Sensed Data (NGA) (2018-2019). He received his Ph.D. in Civil and Environmental Engineering from Princeton University in 1996.

CAMILLE PANNU is director of the Just Transition Clinic and an associate clinical professor of law at Columbia Law School. Prior to joining Columbia Law, Pannu served as the inaugural director of the Aoki Water Justice Clinic at the University of California, Davis, School of Law where she combined transactional law, policy advocacy, and strategic research to ensure low-income communities receive clean, safe, and affordable drinking water. She additionally served as a visiting assistant clinical professor of law at the University of California, Irvine, School of Law's Community and Economic Development Clinic. Professor Pannu's legal services advocacy focuses on partnering with low-income communities of color to address poverty and racial and environmental inequality. Her research focuses on structural racism, poverty, and environmental inequality in low-income, rural, and unincorporated communities. Her work interrogates

how groups leverage power through corporate law and local government to assert control over shared environmental resources and essential infrastructure. Pannu received her B.A. in international political economy and J.D. with a certificate in environmental law from the University of California, Berkeley.

AMY PRUDEN is the W. Thomas Rice Professor and University Distinguished Professor in the Department of Civil and Environmental Engineering at Virginia Tech. Her research and teaching focus on bringing a microbial ecological perspective to advancing control of pathogens and antibiotic resistance in the design and management of water, wastewater, and recycled water systems. Pruden is widely known for her research on antibiotic resistance genes (ARGs) as environmental contaminants and is currently engaged in research aimed at advancing metagenomic approaches for surveillance of pathogens and antimicrobial resistance in sewage and affected aquatic environments. Pruden is a co-lead author of the 2023 Quadripartite spotlight report on the Environmental Dimensions of antimicrobial resistance. Pruden is the recipient of several awards, including the Presidential Early Career Award in Science and Engineering, the Paul L. Busch Award for innovation in water research, the Water Research Foundation Research Innovation Award, and the Recipharm International Environmental Award, and is a fellow of the International Water Association. She earned her B.S. in Biological Sciences and her PhD in Environmental Science, both at the University of Cincinnati. Pruden previously served on the National Academies' Committee on Management of Legionella in Building Water Systems, the Environmental Health Matters Initiative, and the NASEM One Health Action Collaborative.

JENNIFER TANK is the Galla Professor of Biological Sciences at the University of Notre Dame and director of the Notre Dame Environmental Change Initiative (ND-ECI). Dr. Tank is an aquatic ecologist and biogeochemist who studies how nutrients and particles move through streams and rivers with a focus on restoration and conservation efforts that improve the structure and function of flowing waters. Her research informs management and policy of freshwaters especially around water quality in agricultural landscapes. Her federally-funded research program includes grants from the U.S. Department of Agriculture, National Science Foundation, Department of Defense, and the Environmental Protection Agency. She has published >160 journal articles and this work has been cited >17,000 times. She also serves as an associate editor for two journals: Biogeochemistry and Limnology and Oceanography Letters. Dr. Tank is also committed to science leadership and translation, which grew out of her participation as a 2013 Leopold Leadership Fellow. She was the 2018-19 president of the Society for Freshwater Science and was recently elected a 2020 AAAS Fellow. For the National Academies of Sciences, Engineering, and Medicine, she served on the consensus study Future Water Priorities for the Nation: Directions for the U.S. Geological Survey Water Mission Area. She earned her Ph.D. in ecology from Virginia Polytechnic Institute and State University.

CRYSTAL TULLEY-CORDOVA is a Principal Hydrologist in the Navajo Nation Department of Water Resources – Water Management Branch. She was employed at Los Alamos National Laboratory, Lawrence Livermore National Laboratory, National Energy Technology Laboratory, and the Pacific Northwest National Laboratory. She has worked collaboratively with tribal partners on water-related research since 2013. In 2021, she received the American Indian Science and Engineering Society Professional of the Year Award and the University of Arizona Agnese Nelms Haury Tribal Resilience Leadership Award. She's received numerous awards, fellowships, and scholarships during her academic journey. She received a

Ph.D. in Geology and an Interdisciplinary Graduate Certificate in Sustainability from the University of Utah. She has received a Master of Water Resources in Hydrosience and a B.S. in Earth and Planetary Sciences from the University of New Mexico.