WRF Webinar Program: Multi-faceted Utility Climate Adaptation Strategies and Practices
June 20th, 2023

Webcast Description
As Earth's temperature rises at an unprecedented rate, the water sector will need to adjust to new norms in order to continue providing critical services. Climate change is already altering the patterns of our natural hydrologic cycle, forcing utilities to rethink practices that have traditionally been effective and seek solutions that will meet different, more unpredictable conditions. WRF is at the forefront of a new climate paradigm, offering sound science to help the water sector continue to meet water demand and quality standards, and plan for uncertain times.

As a clearer picture of climate change emerges, evidence suggests that impacts will vary widely by region; however, it is relatively certain that no area will be untouched. Implementing adaptation strategies will be critical as the water sector moves forward. This webcast will focus on four WRF climate adaptation projects that feature utility adaptation strategies and practices, with a focus on flooding, wildfire, drought, and risk mapping.

Presenter Biography Information
Eric Hersh, PhD, PE Senior Water Resources Engineer Stantec
Eric is a senior water resources engineer with specific expertise in water resources planning and management. His work focuses on water supply and availability analyses, studies of climate variability and climate impacts, risk assessment, environmental flow studies, and flood and drought assessment and planning for federal, state, municipal, and private clients. Prior to joining Stantec, Eric was a faculty member and researcher at the University of Texas at Austin.

Mac Gifford, PhD, PE Water Quality Engineer Portland Water Bureau
Mac Gifford is a Water Quality Engineer at Portland Water Bureau, a drinking water utility in Portland, Oregon serving more than 1 million customers. Mac solves water challenges using a unique background of academic research and public infrastructure design and operation. He has 12 years of water industry experience and a doctoral degree from Arizona State University in Civil/Environmental Engineering. He specializes in water treatment, water quality, resilient infrastructure, and sustainable technology.

Lynn Stephens, Northwest Drinking Water Leader, Brown and Caldwell
Lynn Stephens is the Northwest Drinking Water Leader at Brown and Caldwell. Lynn has expertise helping multiple communities prepare for climate change to understand how climate change can impact water supply, water quality and infrastructure. Lynn has also evaluated how source water quality challenges impact treatment through treatability/piloting efforts. Lynn is serving as the PI for WRF 5168 project to enhance water treatment resilience to wildfires and was the Co-PI for WRF 4637 that looked at climate change impacts to the Honolulu Board of Water Supply.

Keely Brooks, Climate Change Policy Analyst, Southern Nevada Water Authority
Keely Brooks is the Climate Change Policy Analyst for the Southern Nevada Water Authority (SNWA). She manages and coordinates the climate science, policy and adaptation efforts at the organization. Her expertise includes climate change, paleoclimatology, geology and climate adaptation in the Southwest U.S. Keely is the former Chair for the Water Utility Climate Alliance, an organization comprised of twelve of the nation's largest water providers, formed to provide leadership and to collaborate on climate change issues affecting the country's water agencies. She is a co-author of the Southwest Chapter of the 2018 U.S. National Climate Assessment Report

Harry Zhang, PhD, PE Research Program Manager, **The Water Research Foundation**
Dr. Harry Zhang, PE, serves as Research Program Manager on Integrated Water and Stormwater at The Water Research Foundation (WRF). He leads the Sustainable Integrated Water Management (SIWM) and stormwater research portfolios, and climate change topics. Harry is the subject matter editor on water sustainability for Encyclopedia of Sustainability Science and Technology (Second Edition) by Springer Nature. Harry holds a PhD in civil & environmental engineering (water resources) with a minor research field in systems engineering from the University of Virginia. Harry is a registered Professional Engineer.

Sydney Samples, Research Program Manager, The Water Research Foundation
Sydney Samples serves as an Innovation Program Manager at WRF where she manages projects on nitrogen reduction and energy efficiency. Sydney received a bachelor's degree in Environmental Studies and Spanish and a minor in Political Science from Simpson College and a master's degree from the Middlebury Institute of International Studies at Monterey in International Environmental Policy. Her specialization is in Natural Resources Policy and Management.

WRF Webinar Program: Sampling and Monitoring Strategies for Opportunistic Pathogens in Drinking Water Distribution Systems and Practices
August 17th, 2023

Webcast Description
Opportunistic pathogens (OPs)—notably, *Legionella pneumophila*, *Pseudomonas aeruginosa*, and nontuberculous mycobacteria (NTM)—have become a leading cause of waterborne disease in developed countries. Due to their complex ecological habitats and resistance to disinfectants, understanding and characterizing occurrence and dissemination of these OPs in drinking water distribution systems (DWDSs) has been difficult. Currently, there are no robust detection or monitoring tools available to track the presence of OPs, and monitoring OPs in a DWDS system is difficult. Where present, OPs may exist at low levels, requiring sensitive methods (large volume sampling) for their capture and identification (molecular detection/viability). As OPs are

distributed unevenly throughout distribution systems, the selection of sampling locations becomes a critical component of the monitoring strategy.

Project 4911, *Sampling and Monitoring Strategies for Opportunistic Pathogens in Drinking Water Distribution Systems*, developed a practical sampling and analytical approach for water utilities to quantify them in DWDSs such that actionable data can be gathered for future risk determination and mitigation. An innovative OPs vulnerability visualizer was also developed, leveraging historical water quality data to provide a practical approach for utilities to prioritize sampling locations for OP monitoring. In this webcast, Zia Bukhari, Senior Scientist at American Water, will present the findings and results of project 4911, which aimed to assist water utilities with sampling and monitoring strategies for OPs in DWDS.

Presenter Biography Information

Zia Bukhari, PhD Principal Scientist American Water
Zia Bukhari has over 20 years of research and industry experience focusing on defining and mitigating health impacts associated with physicochemical, microbial and emerging contaminants exposure through environmental routes especially drinking water, wastewater, reclaimed water and seawater desalination.