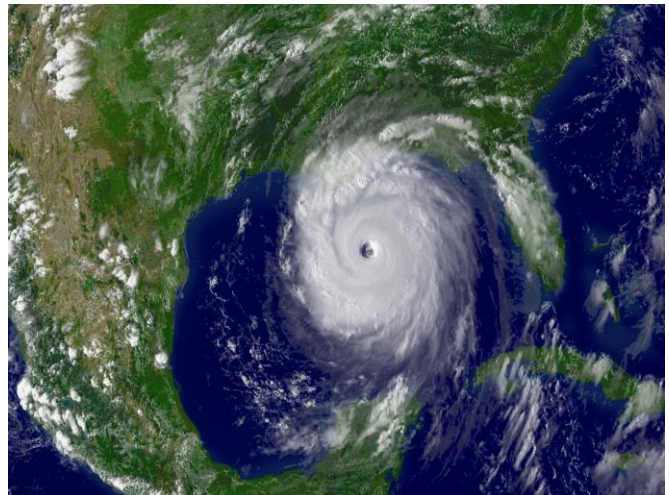


2022 WATER UTILITY CLIMATE ALLIANCE ANNUAL REPORT

SUMMARY OF ACTIVITIES:

This report documents the Water Utility Climate Alliance's 2022 Work Plan progress and accomplishments.



MESSAGE FROM THE STAFF CHAIR & VICE CHAIR

October 24, 2022

WUCA General Managers,



We are pleased to present you with the 2022 WUCA Annual Report, which highlights the leading-edge, on-the-ground climate adaptation work of the WUCA coalition. Like so many recent years, 2022 has again proven to be a year where we are observing and experiencing the disruptions of climate change to our water systems and our communities.

At the end of 2021, WUCA launched its new collection of Greenhouse Gas Mitigation case studies and continued to distribute these case studies with the sector throughout 2022. In February WUCA supported a sea level rise practitioner workshop with funds from the 2022 Emerging Opportunities budget. In April, WUCA utilized a large portion of the 2022 Emerging Opportunities budget to initiate the first year of a new equity project with US Water Alliance, which aims to develop a roadmap to “incorporate consideration of equity into all WUCA’s work,” a unanimous priority established by General Manager approval in the [WUCA 2022-2026 Strategic Plan](#). In April, WUCA staff also met in Las Vegas in-person for the first time since 2019 to initiate the equity partnership with the US Water Alliance and also share lessons learned on climate adaptation among our utilities. In July, WUCA conducted a virtual Climate Resilience Training with federal and other science partners in the Colorado River Basin to help participants enhance their understanding of how to use climate science in water resource planning.

In October, WUCA published [Beyond Barriers to Implementation: A Water Sector Perspective on Sea Level Rise Adaptation](#), the culmination of two years of work from the WUCA Sea Level Rise Committee and consultant EcoAdapt. This report and interactive web tool provide tangible, replicable examples to help drinking, stormwater, and wastewater agencies implement adaptation strategies for flooding, storm surge, and sea level rise. Furthermore, this year WUCA is completing its partnership with [Pathways Climate Institute](#) to better understand how utilities can scale the applications of climate science for stormwater and wastewater planning and decision-making.

Throughout 2022, WUCA also presented to the Association of State Drinking Water Administrators (ASDWA), NOAA’s Regional Integrated Science and Assessments Program Executive Committee, and the Water Sector Services Association of Australia, and identified opportunities for further collaboration with these partners.

Please find a summary of our key 2022 work activities included below.

Kavita Heyn

Chair, WUCA
Climate Resiliency Planning Manager
Portland Water Bureau

Alan Cohn

Vice-Chair, WUCA
Managing Director, Integrated Water Management
New York City Department of Environmental
Protection

INTRODUCTION

Each year the Water Utility Climate Alliance (WUCA) develops a list of projects that will help meet priorities outlined in its current strategic plan. A project scope, description, and budget are developed, and projects are ranked by WUCA staff and leadership based on how well they address: (1) the Alliance’s current strategic priorities; (2) value added to individual WUCA utilities; and (3) staff time available to execute the project. This forms the annual work plan and budget presented to WUCA executives each year at the General Managers’ Business Meeting. A committee made up of three or more WUCA staff contributors, including one staff member taking the lead to manage the project, implements and executes each project. This report documents WUCA’s 2022 accomplishments and the next steps for key projects.

2022 ACCOMPLISHMENTS

Leading Practices in Climate Adaptation

Committee: Kavita Heyn, WUCA Staff Chair (Portland Water Bureau) – Project Manager, with support from Julie Vano, Aspen Global Change Institute

This year WUCA staff continued to promote and distribute our 2022 Leading Practices report and web resources within the water sector and broader climate adaptation community, in collaboration with Julie Vano from the Aspen Global Change Institute. Staff presented the Leading Practices work in several different forums, including to the Association of State Drinking Water Administrators, the American Water Works Association’s Climate Change Committee, the WUCA Network, and the Water Services Association of Australia. The feedback from peers and partners has continued to be overwhelmingly positive. The applied examples of climate adaptation practices that are the vital component of this work have resonated strongly among WUCA members, and with other water utilities who are looking for scalable, replicable practices. Ultimately this work continues to promote learning from the experiences of doing climate adaptation work, and WUCA continues to be at the forefront of much of these efforts in the water sector.

Advancing Water Equity and Climate Resilience

Committee: Alan Cohn (New York City Department of Environmental Protection) – Project Manager, Ann Grodnik-Nagle, Kavita Heyn, Erich Pacheco, Julia Rockwell, Allison Lau, Heather Dalrymple, Marisa Flores Gonzalez, Denise McGlown, Jenny McCarthy, Carlos Carrillo

WUCA’s [2022-2026 Strategic Plan](#) set a new goal to “incorporate consideration of equity into all WUCA’s work”. In 2021 General Managers authorized \$100,000 of funds for an Emerging Opportunities budget with the intent of spending this on high priority, emerging issues during the budget year that aligned with WUCA’s new Strategic Plan. After receiving this direction from General Managers, WUCA explored opportunities for strategic partnerships on emerging issues, and staff ultimately prioritized an effort to work on equity given the Alliance had never engaged on this issue previously and this was a new priority component of the Strategic Plan. The goal was to hire external expertise from a national leader on water and climate equity that could help WUCA develop a roadmap to meet its Strategic Plan equity goal.

WUCA therefore teamed up with the US Water Alliance, leveraging the Alliance’s national Water Equity Network and Climate Action Cohort program to assess opportunities and develop a set of recommended strategies to help incorporate equity into WUCA’s work, and support this work with its members. The partnership was scoped as a 24 month, 3-Phase project, with Phase 1 of funding coming from the 2022 Emerging Opportunities fund, and Phases 2 and 3 to be contingent on funding and budget approval by General Managers.

In April 2022, WUCA kicked off the partnership at the annual Staff Meeting with an introduction to the US Water Alliance’s [Pillars of Water Equity](#) and discussion of what role WUCA members currently play in water equity. In Summer 2022, US Water Alliance conducted a survey of member utilities to develop a baseline understanding of WUCA utility equity work. The results of the survey have been incorporated into a State of Equity memo prepared by the US Water Alliance (*this is an internal facing document only*), which will be used to help WUCA assess and prioritize opportunities and key areas of interest for advancement. US Water Alliance will then continue to work with WUCA to develop an Equity Framework and Roadmap that will leverage the results of the survey, peer dialogues, learning exchanges and case studies to define WUCA’s role in the water equity and climate space and outline multi-year tasks and objectives to meet the goal of the five-year Strategic Plan to “incorporate equity into all WUCA’s work”

Greenhouse Gas Mitigation Case Studies

Committee: Taylor Winchell (Denver Water) – Project Manager, Kavita Heyn, Keely Brooks, Heather Dalrymple, Alan Cohn, Lurna Kaatz, (also former WUCA staff Goldamer Herbon)

WUCA’s work in GHG mitigation came from a recognition of the importance of GHG mitigation as a core climate adaptation strategy and an issue of climate leadership in the water sector. Water utilities have a role to play in mitigating GHGs, both due to the high energy usage of the industry as well as the leading example that it sets for other business communities. Ultimately, lower future GHG emissions will mean less future climate adaptation costs for water utilities.

Early in 2022, the greenhouse gas mitigation project team released a set of greenhouse gas (GHG) mitigation [case studies](#) that demonstrate projects at water utilities and include lessons learned during implementation. This project is the first step in implementing the GHG mitigation objectives in [WUCA's 2022-2026 Strategic Plan](#). The project reflected WUCA utilities desire to assess GHG mitigation projects that other utilities have implemented and share this information with a broad network of water utilities. While not an exhaustive list, the case study selection represents a wide swath of project types and provides a strong starting point for utilities to learn from each other. Although the case studies focused on water supply utilities, many of the projects also can apply to wastewater and stormwater utilities. WUCA developed the case studies in partnership with its peers and will continue its work in 2023 by creating a water utility community of practice to discuss and share GHG mitigation practices.

PROJECT DESCRIPTION
Lake County Special District (LCSO) in California manages a water system serving approximately 3,000 residential and 100 commercial connections, a wastewater treatment plant with 10.2 MGD service connections, and 8 lighting districts within its county. In 2017/2018, LCSO installed a 25.1 MW floating solar facility in a polishing pond of one of its treatment plants, which was designed to provide 100% of the electricity needs for the treatment plant. The pond is brought into service on a seasonal basis and sometimes the pond is dry, but the solar remains active during dry times because the system is designed with sensors that allow the floating array to go up and down with the water level. The floating solar option proved viable for this site because there was not a lot of ground area for a ground-based solar array. The solar array was designed as a 25.1 MW system and has consistently performed at or above that performance level. The project has seen an energy output of 346,000 kWh in 2020 and 404,200 kWh in 2020.

FINANCES
The total cost of the project— including the initial cost, area municipal lease interest costs— is \$254,214,000. To finance the initial costs of \$767,700,000, LCSO utilized a 10-year, low interest rate (3.75% APR) municipal lease financing option that provided ownership of the facility to LCSO at the completion of construction. Annual payments on the financing are made utilizing the savings in O&M costs (electric utility payments) with the long-term goal to have reduced electric utility payments and no financing payments after the 10-year period. Over the system's expected 25-year lifespan, LCSO anticipates total electric utility cost savings of \$4,203,200 with a total increased cost of \$444,100, for a net benefit of \$2,116,900.

Before choosing the 25.1 MW array, LCSO analyzed the anticipated savings for a 100 MW array vs. the 25.1 MW array. The 100 MW system anticipated a net benefit of \$2,629,700, which is about \$500,000 dollar greater than the net benefit of the 25.1 MW system. However, LCSO ultimately chose the 25.1 MW design because it was the more environmentally sensitive option, as it would provide 100% of the energy needs of the treatment plant.

MAKING THE PROJECT HAPPEN
LCSO has a long history of being geographically minded and has been investing in green energy projects since the '80s. This history and mindset made it easy to move forward with the project, which was proposed by management and supported by both staff and the Board of Directors. The huge catch-up from the project were also a driver in moving it forward.

WUCA

Sea Level Rise Community of Practice Workshop

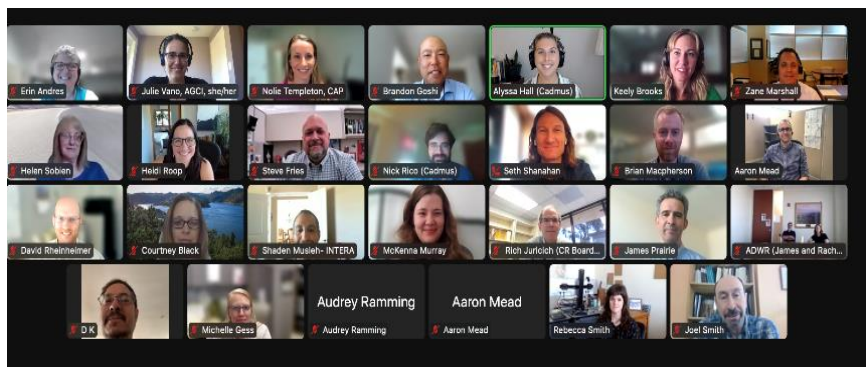
Committee: David Behar (San Francisco Public Utilities Commission) – Project Manager, Tirusew Asefa

WUCA contributed a portion of its 2022 Emerging Opportunities funds to a sea level rise community of practice workshop. David Behar, along with Dr. Daniella Hirschfeld, Assistant Professor at Utah State University, convened an international Organizing Committee comprised of leading scientists and practitioners working in sea level rise adaptation to design a workshop for, and by, the climate adaptation practitioner community. Three principles guided the workshop design: 1) inclusive, 2) value-adding, and 3) externally relevant. Through a group synthesis activity, five science recommendations and five planning recommendations emerged (see attached Workshop Executive Summary). These workshops built connections between practitioner communities using a capacity-building approach. In 2023, the sea level rise community of practice committee hopes to continue to utilize WUCA’s expertise to facilitate further global engagement on sea level rise and bring those lessons home to WUCA utilities, given the global nature of the challenge and adaptation solutions.

Climate Resilience Training

Committee: Keely Brooks (Southern Nevada Water Authority) – Project Manager, Nolie Templeton

In July, WUCA hosted a free virtual training, which was attended predominantly by water resource professionals from the Colorado River basin. Participants enhanced their understanding of the capabilities and limitations of climate models, learned best practices for using models in long-term water resource planning, and reviewed planning frameworks that address deep uncertainty. They also explored different communication tools and heard from experts about the challenges of picking specific climate models and downscaling methods to project future hydrology.



Attendees reviewed how user choices in model inputs affect results, in that predicted hydrologic scenarios vary based on the input selection of climate model ensembles and downscaling methods. The training also addressed questions such as, “What climate information should I select?” and “Should I select climate information?” Participants learned about different planning methods that address these questions, including Decision Making Under Deep Uncertainty (DMDU) methods. DMDU methods move away from traditional risk analyses, which quantify the number of simulations resulting in a defined risky category, and instead evaluates vulnerability metrics, such as critical reservoir levels, under different operating conditions or policies. DMDU approaches enable users to identify policies or operating conditions that are robust to a wide range of future conditions, including those more dire than observations. Using this approach allows users to

avoid planning for one specific climate future scenario and instead allows users to analyze whether a policy or strategy is robust or vulnerable in a range of future scenarios.

After reviewing different DMDU methods, participants heard from a panel of water managers who have previously explained climate science and DMDU methods to elected officials and general audiences. During the panel, presenters discussed a common practice of inviting climate scientists to be part of their long-range planning processes. Presenters also noted that climate impacts are coming faster and at a greater magnitude than previously anticipated, requiring water planners and water resource managers to be nimble and adaptive.

Finally, participants explored opportunities to build resilience to changing climate conditions, such as funding under the Infrastructure Investment and Jobs Act. To date, this program is the most significant federal commitment to clean energy and climate.

In polls taken during and at the end of the training, all participants either “agreed” or “strongly agreed” that the training content met their expectations and would be useful. Polls taken during and at the end of the training indicated that all participants either “agreed” or “strongly agreed” that the training content met their expectations and would be useful and applicable to their work.

Sea Level Rise Guidebook

Committee: Abby Sullivan (City of Philadelphia, previously Philadelphia Water Department) – Project Manager, Julia Rockwell, Allison Lau, Alan Cohn, Miranda Cashman, David Behar, Ann Grodnic-Nagle, Miles Mayhew (also former WUCA staff Ivana Kajtezovic, Kshitij Parajuli, Goldamer Hebron)

Since 2020, the WUCA Sea Level Rise Committee has worked with EcoAdapt to develop a guide highlighting leading practices for sea level rise adaptation in the water sector. This guide, [**Beyond Barriers to Implementation: A Water Sector Perspective on Sea Level Rise Adaptation**](#), took a focused look at the barriers utilities face when trying to move beyond the vulnerability and risk assessment phase to implementing policies, programs, and projects that build resilience. Leading practices to overcome those barriers were compiled from various sources, including a comprehensive review of scientific and gray literature (white papers, agency reports, and plans), 16 semi-structured interviews with water utilities from both coasts, a practitioner’s forum with over 60 resiliency leaders from around the United States, and the lived experience of members of the WUCA Sea Level Rise Committee. Information in this guide will help practitioners find creative solutions and real-world examples of success to help them break down barriers and take action to build resilience to sea level rise.

The guide and on-the-ground examples can be viewed in an interactive format on the WUCA website. A PDF of the guide can also be downloaded from the website link above.

Water Demand Forecasting

WUCA conducted an informal water demand assessment in 2022 to learn more about how its member agencies address and model projected climate change impacts on future water demands. Climate impacts considered include higher evapotranspiration rates, increased evaporation demand for cooling, longer growing seasons, increased conservation program implementation and population shifts.

WUCA met with member agency demand forecasting staff as part of an information-gathering process and issued a survey. Participating agencies shared information on how their utility models long-term demands (10-50 years) and incorporates climate change impacts into water demand projections.

Key findings of the survey indicate that 67% of WUCA agencies are either modeling climate change or updating their demand model to do so and many utilities develop demand scenarios and plan water supply options that support a range of future conditions. See attached summary of Water Demand Forecasting work.

Stormwater and Wastewater

Committee: Alan Cohn (New York City Department of Environmental Protection) and Julia Rockwell (Philadelphia Water Department) – Project Co-Managers, Tsega Anbessie, Ann Grodnik-Nagle, Miles Mayhew, Anna Roche, Joe Smith, (also former WUCA staff Goldamer Hebron)

The WUCA Stormwater and Wastewater (SW/WW) Committee collaborates on issues related to actionable climate change science and tools for flooding, water quality, and other challenges affecting resiliency and level of service goals. In November 2021, the Committee initiated a project with [Pathways Climate Institute](#) to develop a roadmap of established and emerging practices that can help SW/WW utilities gain a better understanding of how precipitation observations and projections can be scaled and applied to planning, design, and decision-making. This work builds on the recommendations of the 2019 workshop, Climate-Resilient Planning for Urban Stormwater and Wastewater Utilities, which WUCA organized in collaboration with the Water Research Foundation.

The project, which proceeded in four phases (literature review, national survey, case study interviews, and development of a final report), outlines the state of science and application, including best available methods and tools being used to analyze and apply climate data. Key themes emerged regarding outdated statistical data and the need for higher resolution precipitation projections, policy and guidance needs for application to planning, sustainable funding, and the crucial connection between research studies and practical application. The final report, which will be completed by the end of 2022, will provide science and policy-based recommendations and next steps for SW/WW utilities and climate service providers to improve the applicability and use of climate information to planning and design.

Ecosystem Services

Committee: Rolf Gersonde (Seattle Public Utilities) – Project Manager, David Behar, Heather Dalrymple, Dani Purnell, Marisa Flores Gonzalez, Taylor Winchell, Keely Brooks, Alan Cohn

In 2022, the Ecosystem Services committee conducted Phase 2 of the Ecosystem Services project. This was focused on compiling a list of case studies from around the country on climate adaptation strategies that consider ecosystem services. The case study identification built upon a survey conducted by the committee and Earth Economics in the previous year that summarized ecosystem services member utilities rely upon, expected climate impacts, and existing and anticipated adaptation measures to mitigate climate change impacts.

Case studies were developed with EcoAdapt in early 2022 in a 53 page report entitled ***Managing ecosystem services of water resources under climate change: case studies for the Water Utility Climate Alliance***. These

case studies included Climate Risk Informed Decision Analysis Applications in California, green infrastructure strategies in the Great Lakes Region, forests to faucet in Denver, Iowa River flood management, stormwater adaptation in the Mississippi River basin, harmful algal blooms in New York state, and other examples. This report is being used as an internal learning document for WUCA and is not intended for publication. However, EcoAdapt will share some of these examples in its Climate Adaptation Knowledge Exchange online platform.

WUCA was not able to fulfill the organizing of workshop in 2022 for this project due to lack of interest from partners, and limited case studies that met the intent of the workshop. WUCA will try and organizing a learning webinar on one of the case studies at the end of 2022 to share lessons learned. Funds for the workshop were not spent and are in the “Unspent” budget items in the 2023 project budget.

Learning From Each Other

Committee: Miranda Cashman (formerly New York City Department of Environmental Protection) – Project Manager, Kavita Heyn, Alan Cohn Tirusew Asefa, Taylor Winchell, with support from Jessica Evans and Erica Brown (Association of Metropolitan Water Agencies)

WUCA continued its virtual climate learning exchanges with experts and partners in 2022. This year speakers presented on a range of topics including applying different frameworks for adaptation at water utilities, hydro forecasting tools, forging community partnerships to advance environmental justice alongside climate change work, and climate modelling applications.

The first of these case studies came from Alexis DuFour, who was at the time a water resources engineer at San Francisco Public Utilities Commission (SFPUC), and Dr. Casey Brown. The speakers presented a webinar covering the long-term vulnerability assessment of SFPUC’s Regional Water System. The research provided a detailed case study of a decision scaling methodology and highlighted a systematic approach for addressing climate change concerns while also incorporating non-climate considerations.

In another webinar, John Matthews of the Alliance for Global Water Adaptation, Paul Fleming of Water Value LLC, and Kim Grubert of WSP, discussed the Water Resiliency Assessment Framework (WRAF), a framework released in 2021 that aims to inform water resilient decision-making to build long-term resilient water systems. The framework aligns with commonly used methods for water accounting, risk assessment, and other approaches, and outlines steps an organization can take to improve overall resilience. Speakers described the WRAF and showed how the framework could be used in tandem with WUCA’s Business Function Mapping Framework to mainstream climate resilience.

The WUCA network heard from Wayne Miles from the City of Raleigh, North Carolina, stormwater program and Reverend Jemonde Taylor from St. Ambrose Episcopal Church, who spoke about their community-city partnership from initiation to long-term continued engagement. This presentation provided a brief history of Raleigh’s inequitable practices, loss of trust of certain community members, and discussed actions the city’s stormwater program team is taking to become more equitable in program implementation and rebuild community trust.

Many speakers presented different climate modeling applications to the WUCA network. Dr. Cheikh Mbengue provided an overview of modeling in a changing climate using the Climate Modelling Alliance,

better known as CLiMA, earth system model, which uses modern software practices and various sources of up-to-date information.

Marshall Moutenot and Laura Read of Upstream Tech discussed advanced streamflow forecasting with their product Hydroforecast, a modelling application that uses innovative technology to provide accurate insights, far into the future. The speakers discussed how their technology combines the best of statistical and conceptual models, presented case studies from a recent forecasting competition held in part by the Bureau of Reclamation, and spoke about how better forecasts will help water utilities in the future.

Dr. Michael Cohen, Dr. Jeffrey Arnold, and Dr. James Thompson of MITRE presented on MITRE's water-power capacity planning modeling and decision tools that perform long-term regional drought mitigation planning and analysis. The speakers also discussed MITRE's capabilities that utilize disparate data sources to generate and evaluate potential climate resilience solutions for critical infrastructure.

WUCA will host another webinar in December 2022 featuring Penny Joseph, Head of Resilience and Climate Change Adaptation at Sydney Water in Australia. The discussion will focus on Sydney Water's climate change adaptation position, specifically Sydney Water's decision to plan for the most plausible climate change future and design by adapting to the Representative Concentration Pathway (RCP) 4.5 as a standard requirement.

WUCA Network

Committee: Kavita Heyn, WUCA Staff Chair (Portland Water Bureau) – Project Manager

The WUCA Network includes staff at peer utilities interested in learning from WUCA's work. WUCA continued its engagement with the WUCA Network in 2022 by sharing quarterly WUCA newsletters, invitations to attend quarterly WUCA Learning From Each Other webinars, and organizing a couple of one-on-one sessions where staff heard from the hydrological modeling efforts of the California Department of Water Resources (part of the WUCA Network). GMs are invited to recommend potential water utility peers and partners for the WUCA Network.

WUCA Website

Committee: Keely Brooks & Ashleigh Thompson (Southern Nevada Water Authority), Kavita Heyn. All WUCA members provide content and SNWA PIO website team implements.

SNWA continues to provide stellar web support services to WUCA. To keep the website fresh, WUCA staff provide content and text that SNWA updates throughout the year. This includes updates to the WUCA landing page to better describe the full range of WUCA's work, updates on the new WUCA Chair and Vice Chair contacts at the beginning of the year, rotating updates on the Climate Resilience Trainings, Leading Practices webinars, and GHG Mitigation Case Studies, and monthly member spotlights. SNWA also uploaded the latest version of WUCA's Strategic Plan that was approved by General Managers in Fall 2021. Most recently WUCA has uploaded the new [*Beyond Barriers to Implementation: A Water Sector Perspective on Sea Rise Adaptation*](#) under the Adaptation in Practice part of the website. The website continues to be a vital communication tool for WUCA to share reports, resources, and case studies with the broader water sector and climate adaptation community.

CONCLUSION

In 2023, WUCA will expand on the progress of this year's projects, identify new opportunities that align with the updated Strategic Plan, and remain responsive to emerging trends. WUCA's projects will support the priorities of its membership, and the water sector, by producing and sharing research and products of actionable value. Like many organizations, WUCA has experienced turnover and added new staff members during 2022. The staff hopes to continue in-person meetings in 2023 and to enhance WUCA's effectiveness as it continues implementing its strategic plan. See attached 2023 Workplan for a description of next year's work efforts.