

2022 ANNUAL REPORT

Utah Water Research Laboratory

UTAH STATE UNIVERSITY®



David Tarboton
UWRL Director

ways to meet their water needs with less and less water available to them.

Managing water in a semi-arid state such as Utah will always include a combination of monitoring, conservation, and innovation. Much of the research at the Utah Water Research Laboratory over the past year reflects those needs. In this report, we highlight a few of our ongoing research projects.

It has been exciting for UWRL researchers to participate in the Great Salt Lake strike team, a unique collaboration developed to evaluate research-based solutions for the shrinking Great Salt Lake. This work has been enabled by considerable past and ongoing research on the lake and its sensitivity to changes in input, salinity, and flows through the causeway dividing it into north and south arms, and those past research investments are still paying dividends.

Two of the projects highlighted here are using innovative water metering technology to help individuals and communities

The ongoing drought in the West has taken a toll on Utah water. The Great Salt Lake has continued to decline, reaching its lowest levels in history two years running. Utah reservoir levels ended the water year at below 50% capacity overall. Communities across the state are looking for

recognize where they might be overusing water and what they can do to be better water stewards. UWRL faculty member Jeff Horsburgh led the development of a custom “smart” meter that can track water in real time and connects to a standard water meter to identify individual water uses based on flow rate and duration. This information lets consumers and cities see where to target conservation efforts and can also identify water leaks. The other project worked with USU’s Extension Water Check program to collect high-resolution outdoor water use data.

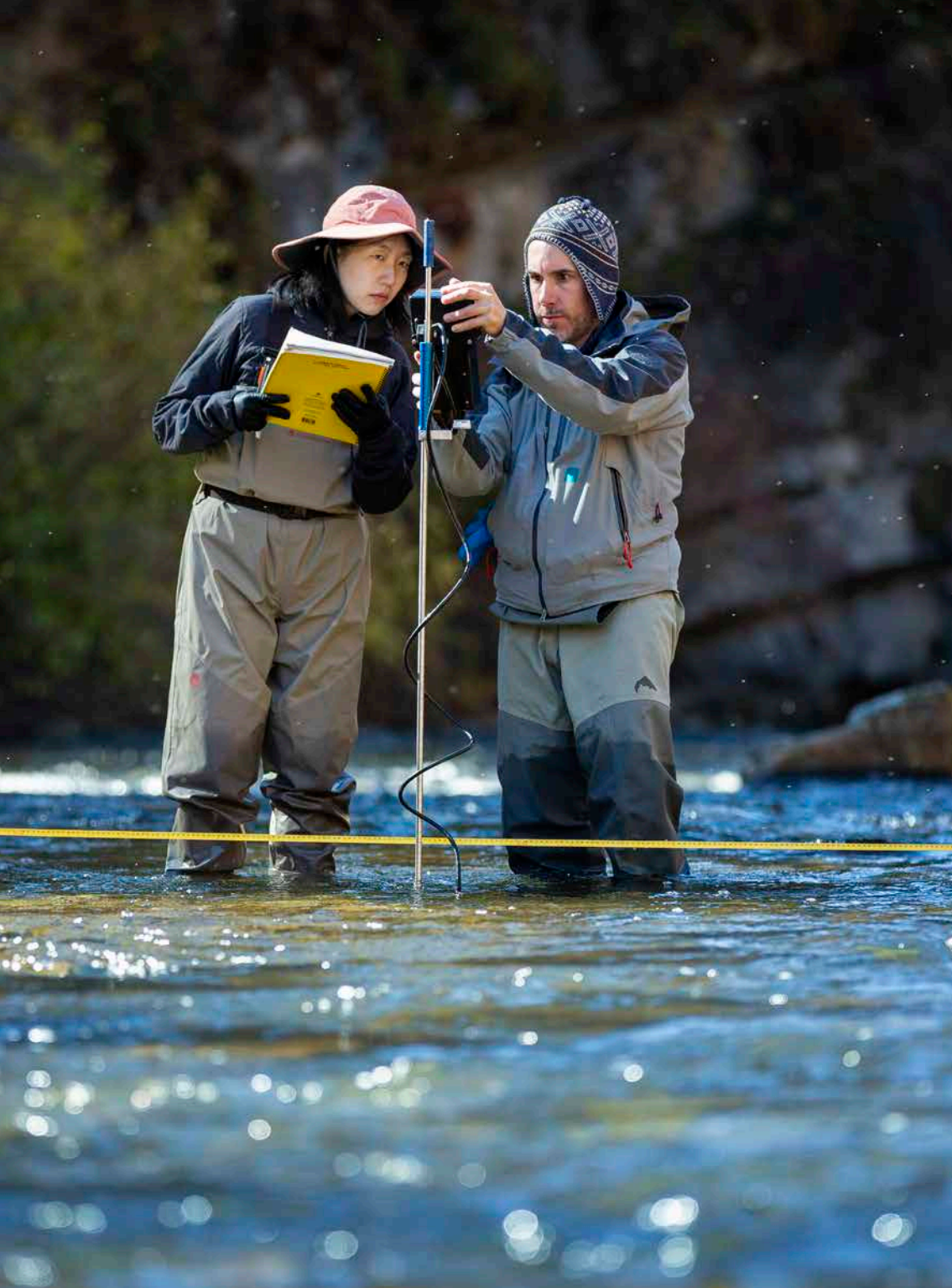
Agriculture is a major water consumer and can also be a major source of contaminants in water. A project led by UWRL faculty member Yiming Su is using nanotechnology to optimize fertilizer and pesticide use, reduce overapplication, and make agriculture more sustainable. While not yet ready for widespread application, this is an example of research investment that could also pay significant dividends in the future.

Polyfluorinated alkyl substances, or PFAS, are chemicals found increasingly to occur as contaminants in air, water, soils, fish, and human bodies. UWRL faculty member Ryan Dupont is leading an effort to better understand potential risks of exposure to PFAS from reclaimed secondary water, leachate from landfills, and contaminated biosolids applied to soils and plants.

It is gratifying to see the projects highlighted in this report addressing both immediate and longer term water challenges, with both leading towards future solutions. ■

For more information, please visit our website:

<http://uwrl.usu.edu/>



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Focus on **UTAH:**



Research-Based Solutions for the Shrinking Great Salt Lake

Population growth, agriculture and persistent arid conditions have brought Utah's Great Salt Lake to the brink. With recorded lake levels lower than ever before, salinity is increasing, and the ecosystem is under threat. Beyond that, as a terminal lake, evaporation is the only way water can get out, meaning any toxins and pollutants that might flow into the lake are left behind. Healing the Great Salt Lake has thus become a high priority for Utah leaders, and the Utah Water Research Laboratory has been at the forefront of this challenge.

Throughout 2022, the UWRL has been involved in multiple projects that aim to protect the Great Salt Lake and mitigate the harm thus far.

Great Salt Lake Strike Team

Two UWRL faculty members, David Tarboton and Bethany Neilson, participate on the Great Salt Lake Strike Team, a new type of partnership formed to get answers to policy makers faster. The Strike Team is not a typical academic research collaboration. Having begun its work in August 2022, the

team's primary goal is to synthesize data and evaluate policy options under consideration by the Utah Legislature during the 2023 General Legislative Session in January and February. The dimension of urgency in the group prompted the "strike team" moniker.

The Strike Team had the opportunity to present initial ideas and data at the second annual Great Salt Lake Summit hosted by Speaker of the Utah House of Representatives, Brad Wilson. The Strike Team spent the preceding weeks and months preparing their report for the event on October 13, 2022, which featured lawmakers, managers, and researchers from throughout the state of Utah discussing ideas for restoring the Great Salt Lake. Much of the report focused on trends affecting lake levels, flows into the lake, climate in northern Utah, and depletions of steamflow through consumptive use from human activities.

The Strike Team is drawing significantly upon prior research published by Tarboton and fellow USU researcher Sarah Null. Tarboton and a graduate student used modeling to quantify

the sensitivity of lake level changes associated with changes in streamflow and precipitation inputs, as well as temperatures, which affect evaporation. This information has helped the Strike Team quantify the effectiveness of conservation alternatives being evaluated. The strike team Policy Assessment, released on February 8, 2023, evaluates science-based scenarios for refilling the lake to target levels. Recommendations focus on investing in conservation to increase inflows or decrease withdrawals from the lake, leveraging wet flow years, setting a lake elevation range goal based on benefits from the lake, investing in water monitoring and modeling to ensure that conservation efforts are effective and conserved water reaches the lake, holistic long-term planning, and in-depth analysis of policy options.

Read more about the Strike Team and its work: <https://gardner.utah.edu/great-salt-lake-strike-team/>

Getting Water to the Lake

Neilson's contributions involve water monitoring and management. She directs the Logan River Observatory (LRO), an interdisciplinary project monitoring the Logan River watershed through permanent sensors and regular field work. It collects thorough data on a major tributary to the Bear River, which, in turn, is the largest contributor to the Great Salt Lake. LRO research serves as a model for how to monitor and invest in water intelligence to ensure that water conserved can be

committed and shepherded past intervening users to the Great Salt Lake.

See more about water shepherding: <http://bit.ly/3lqAKzv>

Read more about LRO efforts: <https://uwrl.usu.edu/lro/>

Managing Salinity

One measure involves the West Crack Breach, a break along the causeway, with an adjustable-level berm that separates the northern and southern arms of the lake. With all rivers flowing into the southern arm, the northern arm has higher salinity levels. Protecting the lower salinity levels in the southern arm is of great interest to the mineral extraction and brine shrimp industries. The Utah Department of Natural Resources asked two USU researchers to investigate how modifications to the West Crack Breach could protect the southern arm.

One of these researchers was UWRL faculty member Brian Crookston, who worked with USU Assistant Professor of Mechanical and Aerospace Engineering Som Dutta to study how different modifications to the West Crack Breach might affect flows through it. Using computational fluid dynamics models, Crookston and Dutta tested scenarios that involved 2-, 4-, and 6-foot increases in berm height.

After considering the various scenarios, Utah DNR chose to increase the berm in the breach by about 4 feet with construction completed in July 2022. The

modified berm now limits the amount of high-saline water that can pour into the southern arm. Early indications suggest this increase in berm height is significantly reducing the flows of high salinity water through the channel. With the lake having dropped even lower since early 2022, the state has, as an emergency action, decided to raise the berm further to prevent south to north flow and protect the levels and salinity in the southern arm important for brine shrimp. Graduate student Diana Dunn is now collecting data in other locations to help with salt-mass-balance modeling efforts.

Read more about GSL salinity:
Rasmussen, M, S Dutta, BT Neilson, BM Crookston (2021) Model of the Density-Driven Bidirectional Flows through the West Crack Breach in the Great Salt Lake Causeway, Water, 13(17):2423.
<https://doi.org/10.3390/w13172423>

Protecting Lake and Lives

As noted previously, the Great Salt Lake is a terminal lake in that it has no outlet other than evaporation. Any toxins that flow into the lake stay there forever.

In an effort to better understand terminal lakes generally, and how to better care for them, UWRL faculty member David Rosenberg joined an international team of researchers studying the similarities between the Great Salt Lake and Lake Urmia, a terminal lake in Iran that has been experiencing significant desiccation for decades. Rosenberg and his colleagues came to an important conclusion in their

research. No single target lake level will reverse all the problems. Lake levels fluctuate naturally and no one level will “fix” the lake. Focusing on the inflows, rather than lake levels, then, is a better indicator of a lake’s general health.

Both Lake Urmia and the Great Salt Lake are also closely tied with agriculture, and a great deal of the water that would otherwise flow into each lake is diverted for agriculture, meaning that leaders in both regions need to determine how to encourage and incentivize conservation within agriculture. While it may be a daunting task, it also is in the best interest of growers to protect these neighboring lakes. The diminished air quality resulting from a desiccated lake threatens the wellbeing and economy of the entire region.

See more about Rosenberg’s GSL research: What USU researchers can learn about the Great Salt Lake by looking at Lake Urmia in Iran, Utah State Today (Dec 2022). <http://bit.ly/3wXZVTh>

Identifying Risks

Another project at the UWRL will increase understanding of the toxic elements present in the lakebed that are exposed to the open air when the lake recedes. These elements have accumulated in the lake from industrial operations, mining, and agriculture, and their presence in the drying lake bed means they become part of the dust that is then blown into the densely

populated Wasatch Front. Since the 1950s, the input of these toxins into the lake has substantially decreased due to the implementation of environmental regulations. Thus, the present shoreline has lower concentrations of many elements compared to previous shorelines. Still, certain elements, like arsenic, lead, and selenium, are present at higher concentrations along the present shoreline.

UWRL researchers are studying how soil moisture and pH levels at the shoreline affect the mobilization of these particular toxins in the water and sediment. Because seasonal changes affect the soil moisture and pH along the shoreline, they are collecting samples across multiple seasons. UWRL faculty members Sierra Young and Joan McLean are leading these efforts to collect samples across the wetting and drying cycles of the Great Salt Lake to study the mobility of toxins stored in the sediment. Their objective is to understand how the rewetting and drying of the lakebed affect the mobilization of toxins.

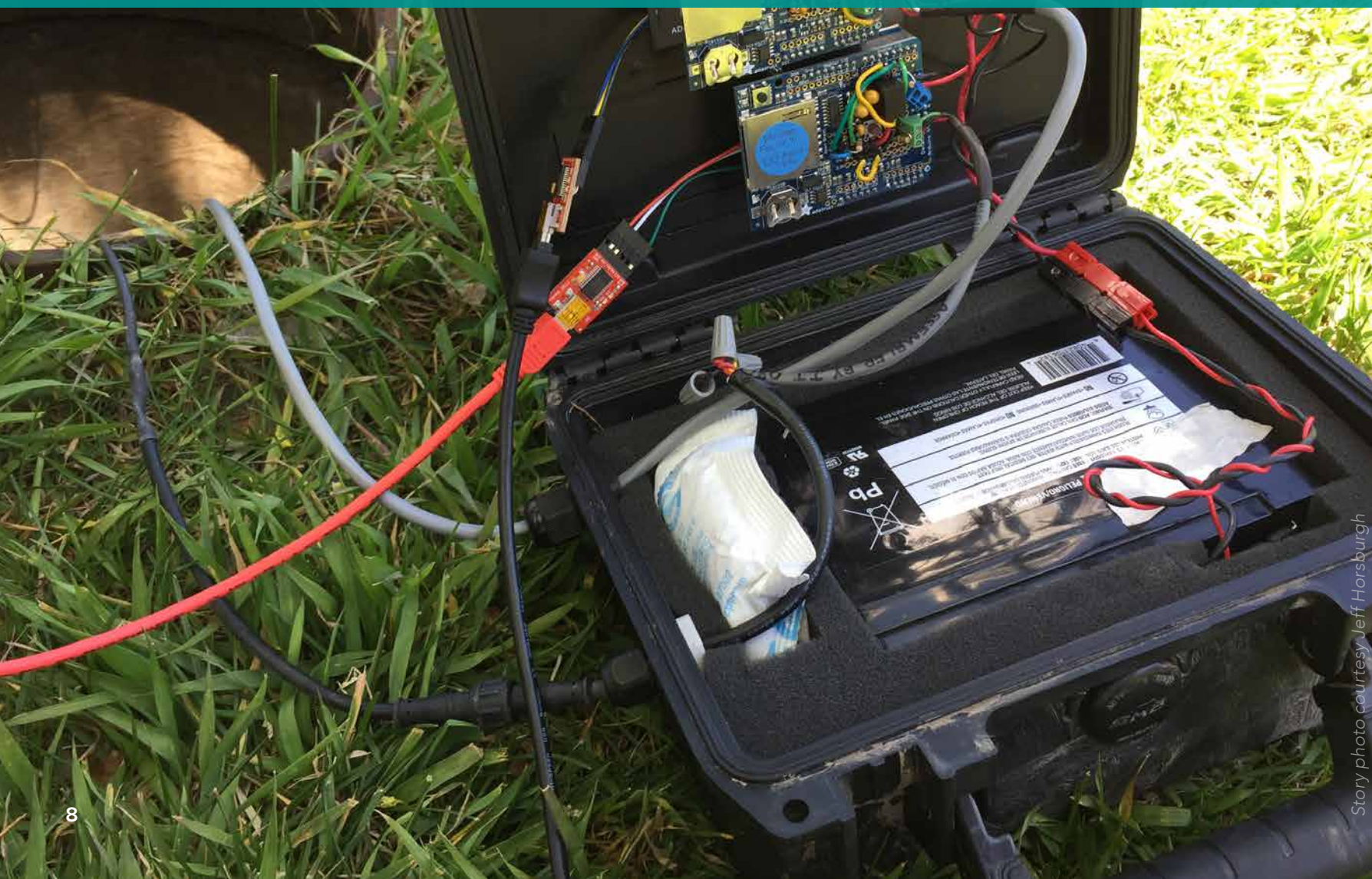
The drying Great Salt Lake is certainly one of Utah’s most pressing water problems today, and the Utah Water Research Laboratory will continue to invest time and resources to advance innovative solutions and promote scientifically informed policy and management decisions that will benefit the State of Utah. ■

Sediment and water sampling at the Great Salt Lake/Antelope Island to understand how wetting and drying cycles affect the mobility of toxins stored in the sediment.

Photo courtesy Sierra Young



Smarter Metering, Better Data



As communities look to conserve water, researchers at the Utah Water Research Laboratory (UWRL) are developing better ways to track water use for municipal and industrial users. Knowing how and when each drop of water is used can help home and business owners conserve. It can also identify which appliances use more water than necessary and identify leaks.

Most homes or businesses already have a meter that tracks consumption for billing purposes. However, these meters are typically read only once per month, and sometimes even less often. Thus, the only data point for water consumption is a measure of total volume consumed in a month.

Making Meters Smarter

UWRL faculty member Jeff Horsburgh is leading a team of researchers that is developing and using new data collection devices to enable existing water meters to collect data at a higher frequency. This finer scale data gives water managers and water users a better idea of how much water their appliances and irrigation system are using. That knowledge can, in turn, help them recognize opportunities for water conservation within their homes and businesses.

Most water meters are designed with an internal measurement element that is mechanically actuated when water flows through the meter. For example, some use a rotating disk inside the meter that

spins as water flows from the water main in the street through the meter and into the home or business. Each “rotation” of the disk is equal to a set volume of water, and the number of rotations corresponds to the total amount of water is being used within a given timeframe. A magnet inside the meter is connected to the disk and spins at the same rate. Its rotations are counted by a register on top of the meter that resembles a car’s odometer. That “count” is then translated into the volume of water that has flowed through the meter.

These common meters are highly accurate over long time periods, but, by themselves, they do not provide detailed measurements of water use over short timeframes, nor do they provide any insight into how the water flowing through them is being used. Newer “smart” meters that can collect higher resolution data are commercially available, but most of these are still not capable of collecting data at high enough resolution to identify individual water use events (e.g., faucets, showers, toilets, etc.), and replacing existing meters is expensive and disruptive.

Looking to address these challenges, Horsburgh, along with graduate student Nour Atallah, UWRL postdoctoral researcher Camilo Bastidas, and undergraduate students Josh Tracy and AJ Beckwith, created a datalogger that attaches to an existing meter and records the rotations of the magnet inside the meter in real time.

With this information, the datalogger calculates a continuous flowrate. These dataloggers can be attached to almost any mechanically driven water meter currently in use, turning an analog meter into a “smart” meter capable of providing the high-resolution data collection needed to identify end uses.

Water use events from different appliances within a home or business have different flowrates, durations, and volumes. For example, a toilet uses a similar volume of water with each flush; a showerhead operates at a similar flow rate each time it is used; faucets run at lower rates and shorter durations than other indoor uses, and sprinkler systems operate at much higher flow rates and use significantly larger volumes than any indoor water use. When a datalogger records the flow through a meter with high enough resolution, it can calculate characteristics of each water use event and determine which appliance is being used. Individual events can then be examined to determine fixture performance and aggregated to generate a summary profile of water use for a home.

To test their new dataloggers, Horsburgh and his team solicited volunteers and installed the devices on meters in the cities of Logan and Providence, Utah, as well as certain student housing units on the USU Logan campus. These installations provided them with sufficient data to test their dataloggers and better understand residential water use.

A Flood of Data

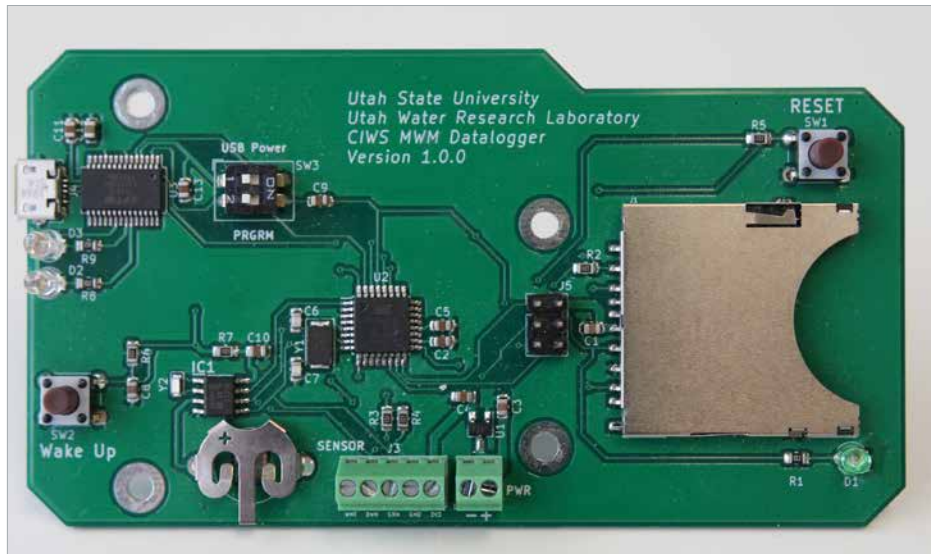
When individual users can see not only how much water they are using but also where and how they are using that water, they may be more apt to modify their behavior. When scaled up to a larger set of users, such data can also provide crucial information for water managers. For example, the data may show which appliances in a given area are using more water than necessary, which may be due to older and inefficient appliances still in use. Smart metering data can provide policy makers and managers with vital information needed to develop targeted plans and efforts to affect water savings, such as government incentive programs to replace outdated appliances.

Smarter water meters also have the potential to revolutionize the way municipal water use data is collected and utilized. However, the amount of data produced by smart meters can also present challenges. Horsburgh's team has also worked to create data management and analysis tools to help tackle the large volume of data produced. These studies have allowed them to test their cyberinfrastructure in a real-world environment, demonstrating successful management of the large volume of data produced by the field data collection activities. Together, these new data collection and analysis capabilities can enable water users and managers to understand and value every drop. ■

Further Reading:

Bastidas Pacheco, CJ, Horsburgh, JS, Bechkwith Jr., AS (2022). *Impact of data temporal resolution on quantifying residential end uses of water*, *Water*, 14(16):2457. <https://bit.ly/3JhJys7>

Bastidas Pacheco, CJ, Horsburgh, JS, Attallah, NA (2023). *Variability in consumption and end uses of water for residential users in Logan and Providence, Utah, USA*, *Journal of Water Resources, Planning and Management*. <https://bit.ly/3Y68p6D>



Horsburgh's custom datalogger (left), and the datalogger housed within the blue box and attached to a standard water meter (right). The connection to the meter is shown within the yellow rectangle.

Enhancing Residential Landscape Water Conservation with 5-Second Metering

Since 1999, USU Extension's Water Check program has visited thousands of households across Utah, measuring landscape features, testing irrigation system performance, and recommending efficiency improvements and irrigation schedules to reduce landscape water use. In 2014, the Utah legislature funded development of a tablet-based app and database to collect and store Water Check program data.

Recently, a new study led by UWRL researcher David Rosenberg began helping the USU Extension Water Check program to become even more effective.

The study recruited 102 Water Check participants from Hyde Park and Logan City, Utah, along with a handful of volunteers in other cities who were not part of the official study, to have a Flume, Inc. Smart Home Water Monitor device installed on their water meters to provide information on outdoor water use efficiency.

By attaching the monitoring device to a residential water meter, the team, including Jeff Horsburgh, Belize Lane, Kelly Kopp, Mahmud Aveek, and Camillo Bastidas, was able to collect outdoor water use data at high resolution (every 5 seconds).

The higher resolution data allows researchers to identify individual

irrigation events, leaks in the system, and potential opportunities for conservation. Over time, the data can help them to identify trends and behavior changes relative to factors such as climate and conservation effort. It could even help water managers target conservation messages to specific end-use behaviors and household motivations.

The study is also seeking to identify:

- ▶ Which Water Check recommendations participants implement.

- ▶ Why participants implement some recommendations and not others.
- ▶ How to make recommendations more actionable to enhance water conservation.

Outdoor water use is the largest component of Utah residential water use and offers the largest opportunity for conservation. The results of this project have the potential to help Utah residents achieve statewide and regional conservation goals. ■





Nanotechnology for Sustainable Agriculture

New research from the Utah Water Research Laboratory is showing that nanotechnology can reduce the environmental impact of agriculture and may soon provide significant economic benefits.

Traditional fertilizer and pesticides have long been associated with high levels of greenhouse gas emission and severe environmental pollution, such as widespread eutrophication. This has brought scrutiny to agriculture and prompted scientists to consider alternatives or innovations that might mitigate this problem. One such innovation is the use of nanotechnology in developing efficient fertilizers and pesticides.

A large portion of traditional agrochemicals failed to reach the plant or pest/pathogen, leading to significant waste and a greater risk of pollution. Nano-enabled fertilizers and pesticides, however, work by transforming traditional agrochemicals into a nano formula that delivers nutrients/pesticides in a more targeted fashion.

UWRL researcher Yiming Su led a team of international scientists investigating whether nanotechnology innovation in fertilizers and pesticides can reduce greenhouse gasses and be economically viable. The team published a paper in Nature Food describing the positive effects of nanofertilizers and nanopesticides as well as the need

to optimize the new technology for further adoption. While nanotechnology does have the ability to reduce costs for growers on a smaller scale, it is not yet ready for widespread use.

“Despite many groundbreaking findings, it was unknown whether and how the innovation of these nano-enabled agrochemicals contributes to the sustainable development of agriculture,” Su said. This question led to a cost-benefit analysis to determine whether nanofertilizers and nanopesticides can be both environmentally friendly and worth the cost to farmers.

Despite the up-front costs associated with the nanotechnology in agriculture, Su and his team hope to show how these costs can be offset with the low dosage of nanofertilizers and/or nanopesticides, and more efficient delivery of high-efficiency nanonutrients and nanopesticides to the proper places within a plant or onto a pest/pathogen. This would limit overapplication and lower the environmental impact.

A combination of further research and investment in nanotechnology will likely prove critical to its widespread implementation. However, Su’s research provides strong evidence that innovations in nano-enabled agrochemicals represent a significant step forward in the pursuit of sustainable agriculture and food production.

This project and other environmental engineering research ongoing at the UWRL are advancing understanding of the challenges and possibilities of nanoparticle use for irrigated agriculture. Su and his team are developing nanotechnology to remove contaminants from irrigation and drinking water, while a UWRL colleague, Joan McLean, and her team are advancing understanding of the effects of copper oxide nanoparticles on crops and their associated soil microbes. ■

Further Reading:

Cost-benefit analysis of nanofertilizers and nanopesticides emphasizes the need to improve the efficiency of nanoformulations for widescale adoption, (Nature Food): <https://go.nature.com/3XWhZbV>

Farming in the future: Utah State University lab develops nanotech fertilizer (KSL.com): bit.ly/3Hu6q6q

USU developing nano-fertilizers for agriculture (Cache Valley Daily): <http://bit.ly/3Htlm3J>

Nanotechnology could improve fertilizer, study from Utah Water Research Laboratory finds (Utah State Today): <http://bit.ly/3R3yYHj>

Focus on UTAH:

PFAS in Northern Utah Waters

A class of commonly used chemical compounds is making its way into Utah waters, and that has water managers and UWRL researchers concerned.

Polyfluorinated alkyl substances, also known as PFAS, are widely used in consumer products, building construction and infrastructure. They are often used in grease-resistant food packaging like the inside of pizza boxes, microwave popcorn bags, and candy wrappers. Cosmetics, water resistant clothing, firefighting foams, and carpeting are other sources. However, PFAS are considered “forever” chemicals because they are persistent in the environment and in the human body. They are also difficult to detect and have known negative human health impacts.

PFAS has been associated with increased cholesterol levels, low infant birth weights, cancer, and adverse effects on the immune system and thyroid hormone production, among others. While the presence of PFAS in most water sources remains quite low, their human health effects can occur even at these low levels, and these chemical compounds are extremely difficult to remove in an affordable and efficient manner. So, despite their current low levels, concerns are growing that PFAS and their negative health effects will only increase with time.

If managers, engineers, and policymakers are to begin mitigating the threat of PFAS,

Photo courtesy Brittanie Carter

they first must fully understand where they are coming from, where their levels are highest, and how they travel through Utah's water systems. UWRL faculty members Ryan Dupont, Joan McLean, and Randal Martin, along with graduate students Victoria Krull and Simon Kozik and Egyptian visiting scholar Mai Badr, are engaged in a project aiming to do just that.

The goal of their project is to generate PFAS concentration data for various potential exposure routes in northern Utah. Exposure might include routes such as municipal wastewater treatment plant effluent used for secondary irrigation, municipal biosolids, municipal landfill leachate, and wet deposition from atmospheric sources.

The project is also evaluating potential human risks from various routes such as:

- ▶ direct exposure to reclaimed secondary water.

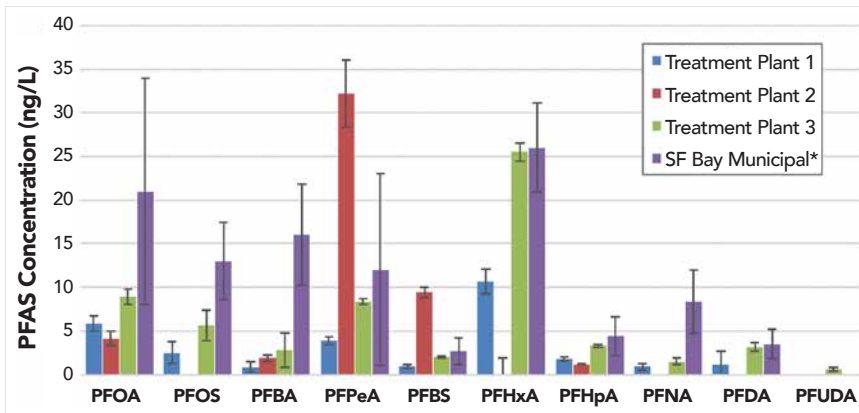
- ▶ exposure from recreational settings impacted by precipitation and landfill leachate influences.
- ▶ consumption of produce from urban gardens irrigated with treated wastewater or contaminated rainwater or grown in contaminated biosolids.

Dupont and his colleagues have developed sample processing, extraction, and analysis methods at the UWRL Environmental Quality Laboratory to test for 24 different PFAS compounds. The team has identified a range of PFAS compounds in both wastewater influent and treated effluent samples, as well as in vegetables irrigated with secondary water, in municipal biosolids and forage crops grown in biosolids-amended fields, in some rainwater samples, and in landfill leachate and leachate pond sediment samples collected from throughout Cache Valley, Utah.

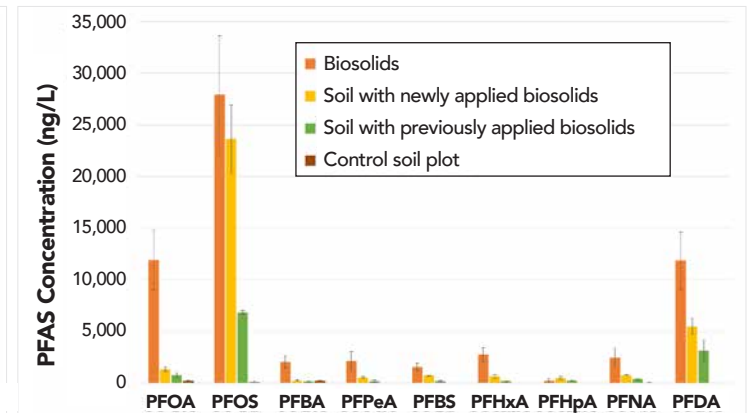
The project will continue to sample wastewater reuse systems to include biosolids from wastewater treatment plants, as well as various biosolids application sites, associated pore water, and biosolids composting systems to assess PFAS fate and transformation during common wastewater and biosolids stabilization steps.

This study represents the first data from northern Utah describing the fate and transport of PFAS in wastewater treatment plants and lagoons as well as the potential risks associated with beneficial wastewater and biosolids reuse.

Project results, along with treatment and reuse options identified in the study where potential PFAS risks exist will provide essential information for communities as policy makers consider development of water and biosolids reuse projects in the future. ■



Concentration of ten commonly detected PFAS isomers in local rural to peri-urban wastewater effluent samples compared to a San Francisco Bay municipal wastewater treatment plant serving a much larger urban population. The figure shows comparable wastewater PFAS concentrations in both, indicating that risks of exposure by this route are universal.



Concentrations of PFAS compounds in biosolids, biosolids amended soils, and a control plot. Results show significant levels of some PFAS compounds in soils amended with biosolids, with concentrations decreasing over time for all PFAS compounds quantified.

New UWRL Faculty



Joanna (Liyuan) Hou
Assistant Professor

PhD, U of Missouri; Post-doctoral fellowships, SUNY-ESF and U of Wisconsin-Madison

Expertise: Applied environmental microbiology to monitor, minimize, or valorize contaminants and wastes

Joanna's research focuses on functional microbial communities for promoting water quality and resource recovery in engineered and natural systems. She applies genome sequencing, metabolic engineering, and metabolite analysis to understand how contaminants interact with microbes to better remove or valorize contaminants. Recent research explores interactions between antibiotic resistance genes and microplastics in wastewater. ■



Pin Shuai
Assistant Professor

PhD, Texas A&M U; Post-doctoral associate and staff scientist, Pacific Northwest National Lab

Expertise: Groundwater hydrology with focus on groundwater and surface water interactions

Pin's research includes groundwater-surface water interactions, nutrient and contaminant transport, watershed biogeochemistry using machine learning and data-intensive integrated hydrologic modeling. Recent research is modeling hydrological and biogeochemical processes from bedrock to canopy top in watersheds under human activities and disturbances. ■



Yiming Su
Assistant Professor

PhD, Tongji University, Shanghai, China; Post doctoral fellowships, Tongji University, and U of California-Los Angeles

Expertise: Environmental applications and implications of engineered nanomaterials

Yiming's research interests broadly cover nano-bioremediation, conductive membrane development for water purification and resource recovery and development of nano-agents for crop growth and disease control. Recent research topics address the fate of microplastics in drinking water and the mechanisms that block entry of nanoplastics into plants. ■



Awards and Achievements*

New Grant Awards

The following represent some of the major projects and grants awarded to UWRL faculty in FY 21–22:

- ▶ Modernized standards and tools for sharing and integrating real-time hydrologic observations data (*CIROH, NOAA, U of AL; Horsburgh*)
- ▶ Development of a customizable fleet of autonomous co-robots for advancing aquaculture production. (*USDA-NIFA; Young*)
- ▶ RD1000 pumping plant model study (*Barfuss*)
- ▶ Water Main Break rate study (*Barfuss*)
- ▶ Separating the climate and weather of river channels: characterizing dynamics of coarse-grained river channel response to perturbations across scales (*NSF; Phillips*)
- ▶ Wesley E. Seale Dam Dewatering System physical model study (*Sharp*)
- ▶ Building pandemic resilience in Native American communities (*NCSU; Coopmans*)

Faculty Awards

Two UWRL faculty members were honored to be awarded newly established endowed professorships in USU's College of Engineering:



David Tarboton, director of the Utah Water Research Laboratory and professor in Civil and Environmental Engineering, was named the Sant Endowed Professorship of Water Resources Engineering.



Ron Sims, director of the Huntsman Environmental Research Center and professor in biological engineering, was named the Huntsman Endowed Professor of Biosystems and Environmental Engineering.

Thanks to the support of generous donors for these newly established endowed professorships that help to strengthen the university's role as a research leader.

Other News

Visiting Scholars: The UWRL welcomed eight Egyptian scholars during fall semester through the Center of Excellence for Water, based in Cairo, Egypt. UWRL faculty members David Stevens, Ryan Dupont, and Randy Martin are collaborators in the Center, which facilitates exchange programs for Egyptian students and researchers to study in the United States with a mission to improve water management and research in Egypt.

Nashwa Shaaban from the U. of Alexandria worked with UWRL faculty members and taught a seminar, while seven students from the participating Egyptian universities studied at USU throughout fall semester. Sixteen new students and three new researchers are participating in the same program during spring semester.

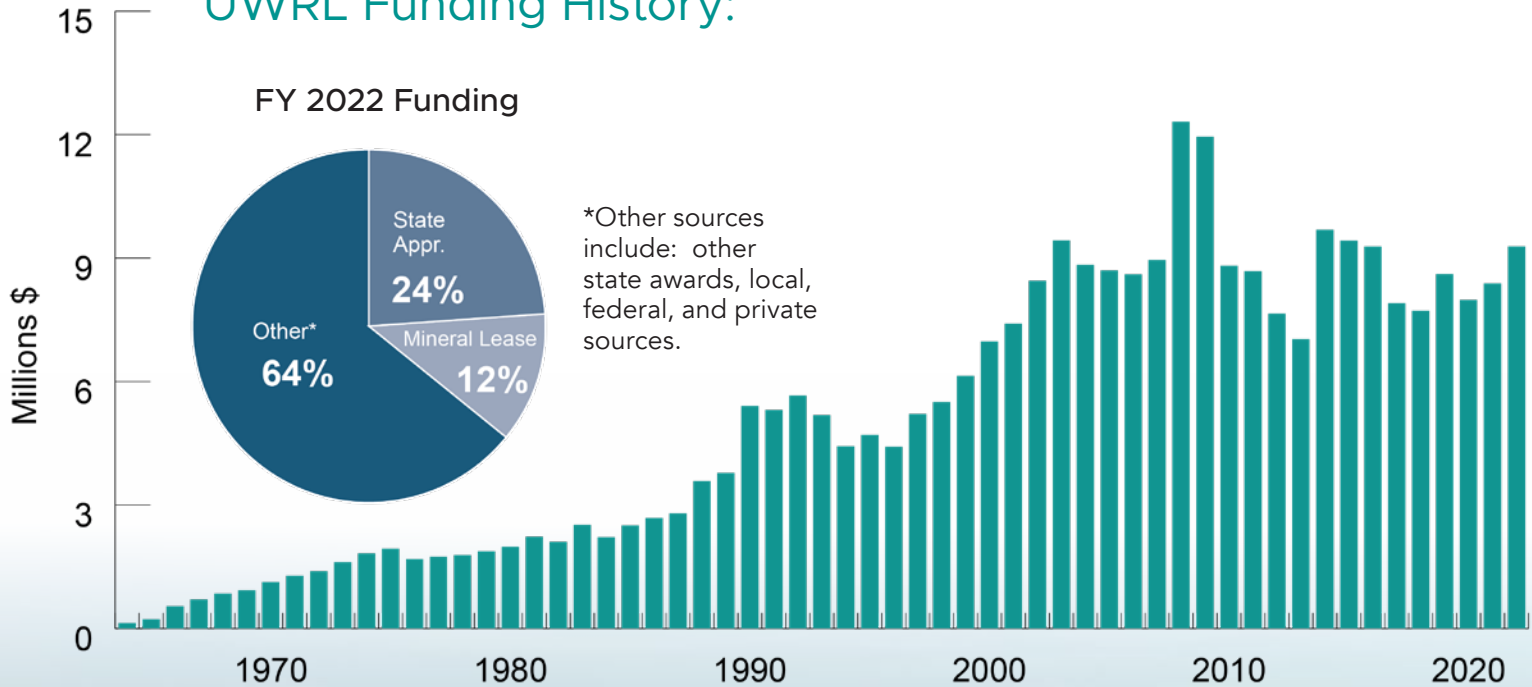


Cathi Allen has joined the UWRL community as Business Services Manager to oversee Business Services Office functions and handle financial reporting and grant management. ■

*These are just a few of the many achievements at the UWRL in FY 2022

FY 2022 Financial/Academic Summary

UWRL Funding History:



\$9,279,383

Total Annual Expenditures FY 2022

Research and Training Products:

158

Active projects

72

Scholarly publications in
peer-reviewed journals

31

Short courses peer
& trainings

Student Outcomes:

48

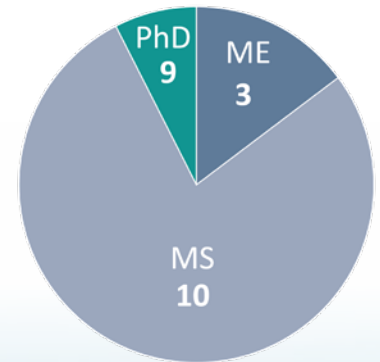
Graduate research
assistantships funded

63

Undergraduate students
supported

22

Graduate degrees
granted



The Utah Water Research Laboratory

conducts collaborative water
and environmental research
in Utah and throughout the world
to advance innovative solutions,
promote scientifically informed
policy and management decisions,
and train tomorrow's leaders



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Great Salt Lake photos courtesy Brian Crookston

Writer, publication editor, Carri Richards; writer, Micah Safsten

