



2020

ANNUAL REPORT

**GREATER DEPTH,
BROADER PERSPECTIVE
FOR A CLEAR
WATER FUTURE**



COLLEGE OF AGRICULTURE & LIFE SCIENCES
COOPERATIVE EXTENSION

**WATER RESOURCES
RESEARCH CENTER**

wrrc.arizona.edu



2020 ANNUAL REPORT: FINDING OPPORTUNITIES IN CHALLENGES

As 2020 began, the Water Resources Research Center (WRRC), acting on the 2018 periodic review recommendations, was working to strengthen our engagement and outreach with key audiences throughout Arizona. In mid-March the University of Arizona sent home all non-essential personnel, closed offices, and prohibited in-person gatherings in response to the COVID-19 pandemic. Fortunately, the WRRC was able to adapt quickly to the requirements of a virtual environment. We were able not only to maintain our programs, but also to realize the potential of virtual platforms to extend our reach, engaging a broader and growing audience. This report describes how the WRRC made lemonade out of an unexpected supply of lemons.

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Appendices are available at: <https://wrrc.arizona.edu/about#annual-reports>

2020 Highlights

[A two-page summary](#)



MESSAGE FROM THE DIRECTOR

I take great pleasure in presenting this overview of Water Resources Research Center activities during the challenging calendar year that started normally and ended with a surge in COVID-19 cases in Arizona and throughout the United States. Despite the unprecedented disruptions of the pandemic, we continued to focus on programs and projects that align with our mission to “tackle key water policy and management issues, empower informed decision-making, and enrich understanding through engagement, education, and applied research.” We also were able to add to our portfolio of real-world research projects that engage a spectrum of water stakeholders, as well as expand our outreach, educate students, and inform the public using online resources. We have extended and reinforced community partnerships, including with our External Advisory Committee and our colleagues in the Cooperative Extension System. As this report illustrates, our collaborative approach has yielded impactful work.

About the Director

WRRC Director Sharon B. Megdal oversees Center programs and operations and conducts applied research, engaging with multiple partners on water resources and management projects. The year started with travel to Singapore, Mexico City, and Israel as Dr. Megdal began a semester-long sabbatical. The spread of COVID-19, however, necessitated a transition to virtual lectures. Throughout 2020, Dr. Megdal contributed professionally through many publications, presentations, and interviews. Additionally, she worked closely with several graduate students. Two of her Ph.D. students are making great progress on their dissertations. A third, who took her comprehensive examinations in the Spring 2021 semester, is distinguishing herself in many ways. A fourth Ph.D. student, in Arid Lands Resource Sciences, is building upon her knowledge of her home country, Jamaica, to research matters related to groundwater governance and management in a changing climate. Dr. Megdal continued to advise her one master’s student, who completed his project for the Master’s in Water, Society, and Policy and graduated in May 2021. Dr. Megdal served as President of the Board for the International Arid Lands Consortium and as a board member for the American Water Resources Association. In December 2020, Dr. Megdal ended 12 years of service as an elected board member of the Central Arizona Water Conservation District, better known as the Central Arizona Project.



Sharon B. Megdal

A member of the faculty in the Department of Environmental Science (ENVS), Dr. Megdal is the C.W. & Modene Neely Endowed Professor for Excellence in Agriculture and Life Sciences and University Distinguished Outreach Professor, and she holds numerous courtesy appointments in departments and colleges across campus.

PARTNERSHIPS

External Advisory Committee

The WRRC's External Advisory Committee met virtually on December 8, 2020. The members of the EAC and their affiliations as of December 2020 are listed below.

- Tom Buschatzke, *Arizona Department of Water Resources*
- Cynthia S. Campbell, *City of Phoenix*
- Guy Carpenter, *Stanley Consultants*
- Ted Cooke, *Central Arizona Project*
- Maria Dadgar, *Inter Tribal Council of Arizona*
- Tom Davis, *Yuma County Water Users' Association*
- Scott Deeny, *The Nature Conservancy*
- Alan Forrest, *AF Engineering Inc.*
- Andy Groseta, *Groseta Ranches*
- Joe Gysel, *EPCOR, Water USA, Inc.*
- Jason Hauter, *Akin Gump Strauss Hauter & Feld LLP and Attorney for the Gila River Indian Community*
- Michael Lacey, *Freeport-McMoRan Copper and Gold*
- James (Jim) Leenhouts, *U.S. Geological Survey, Arizona Water Science Center*
- Melodee Loyer, *Farmers Water Co.*
- Randy Matas, *Arizona Department of Environmental Quality*
- Juliet McKenna, *Montgomery & Associates*
- Leslie Meyers, *U.S. Bureau of Reclamation*
- Richard Morrison, *Morrison Institute for Public Policy, Arizona State University*
- Joe Olsen, *Metropolitan Water District*
- Sarah Porter, *Morrison Institute for Public Policy, Arizona State University*
- Philip Richards, *Arizona Public Service*
- Dave Roberts, *Salt River Project*
- Fred Schneider, *Arizona Water Company*
- John Shepard, *Sonoran Institute*
- David Snider, *Retired (Pinal County Board of Supervisors)*
- Warren Tenney, *Arizona Municipal Water Users Association*
- Timothy (Tim) Thomure, *Tucson Water, City of Tucson*
- Chris Udall, *Agribusiness & Water Council of Arizona*
- Christopher (Kip) Volpe, *The Estes Company*
- Dave Wegner, *Woolpert Engineering Inc., National Academy of Sciences, Water Science Technology Board*
- Sid Wilson, *Retired (Central Arizona Project)*
- Brian Wong, *BKW Farms*



David Snider Remembered

Well-known as a civic leader and long-serving public official, David Snider contributed his time and energy to a long list of community organization efforts in Pinal County. For decades, his deep interest in water manifested itself in service and leadership on the Pinal AMA Groundwater Users Advisory Council, the Pinal County Local Drought Impact Group, the Pinal County Water Augmentation Authority, and the WRRC's External Advisory Committee. His impact was felt far beyond Pinal County, and his many friends in the water community. David Snider passed away on January 22, 2021

ORGANIZATION

The University of Arizona Water Resources Research Center is Arizona's federally authorizing water institute pursuant to the Water Resources Research Act, as administered by the US Geological Survey.

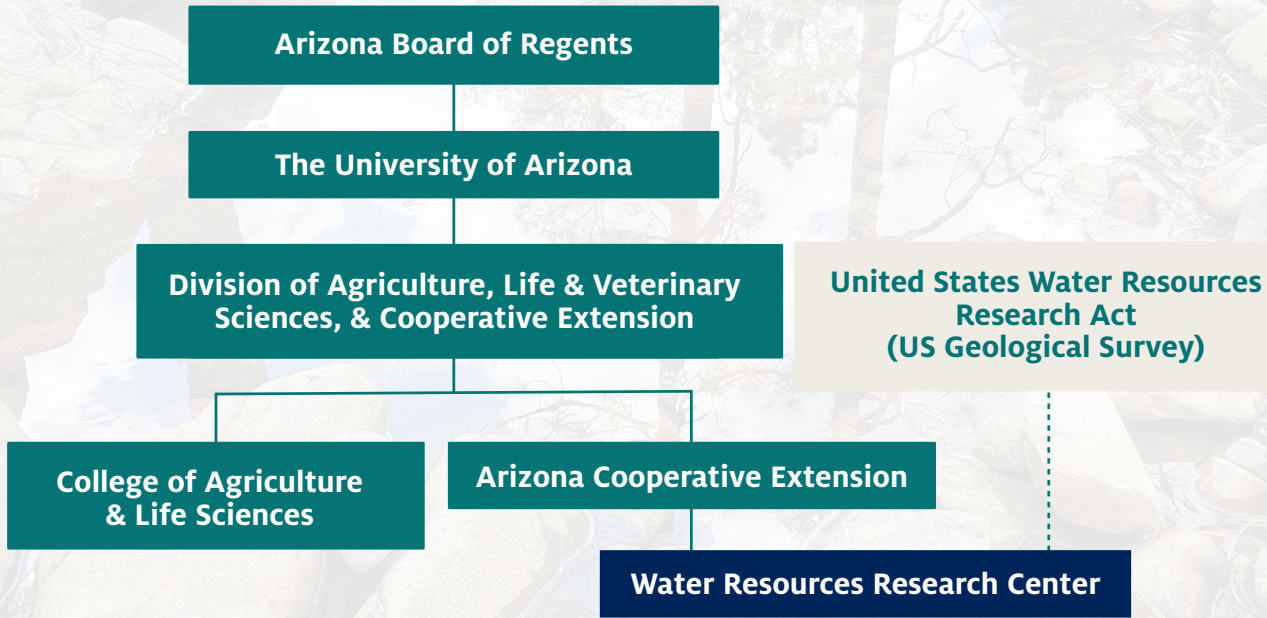


Photo: Mark Apel - Reflecting Pool - Turkey Creek, 2020, WRRR Photo Contest

HELPING COMMUNITIES

The WRRRC conducted several projects in 2020, engaging with communities across the state and accessing their knowledge to help them develop water awareness and understand local water resources issues.

Water Planning Assistance

Watershed Planning and Partner Commitment Going Strong in Southern Gila County

In 2020, the WRRRC's Water Research and Planning Innovations for Dryland Systems (RAPIDS) program team, led by Flinn-Brown Fellow Ashley Hullinger, worked through the third phase of an ongoing collaborative watershed planning effort in the Globe-Miami area and surrounding communities. In partnership with the US Bureau of Reclamation and Gila County Cooperative Extension, efforts focused on evaluating the role of ecosystem services in providing clean and reliable water supplies to this rural part of the state. In early spring, the team received Internal Review Board approval from the University of Arizona to conduct key stakeholder interviews designed to identify ecosystem services of value to local and regional communities and explore impacts from drought and fires. With the start of the COVID-19 pandemic in mid-March, in-person engagement was put on hold, requiring that all meetings and other outreach efforts be moved online, including interviews. Despite the challenge of redesigning engagement efforts for virtual platforms, the RAPIDS team succeeded in consistently bringing together partners through varied outreach strategies. Foremost among these was leveraging the strong collaborative relationship with the new Cobre Valley Watershed Partnership (CVWP). WRRRC personnel convened a Science Coordination Team as a subcommittee of the CVWP to advise, inform, and direct the watershed planning research. Another important aspect of the project's engagement effort involved convening a public forum to hear from local and regional experts and receive input from citizens. Held virtually in November, the Third Annual Cobre Valley Water Forum: Healthy Forests, Healthy Watershed brought together 60 stakeholders for panels, presentations, and facilitated breakout sessions.



Ashley Hullinger is Program Director, Water RAPIDS.



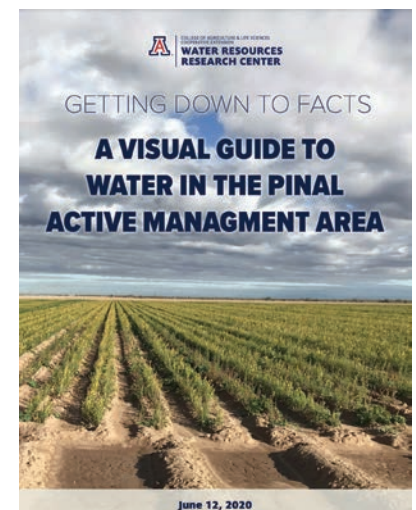
Michael Seronde is a program manager engaged in a wide variety of WRRRC programs.

Working with Stakeholders

Addressing Emerging Water Challenges in Pinal County

Based on feedback from dozens of local government representatives and stakeholder groups, the WRRRC and Pinal County Cooperative Extension, in partnership with the Lincoln Institute of Land Policy's Babbitt Center for Land and Water Policy, developed the report, [**Getting Down to Facts: A Visual Guide to Water in Pinal Active Management Area**](#), as an introduction to the major water issues in the region. Released in June 2020, the report emphasizes maps and data visualizations as context to understand the interconnections of water demands and supplies, jurisdictional boundaries, hydrologic settings, resource availability, current institutional framework, and the roles of various governmental and non-governmental entities. Amid concerns about water availability in the Pinal Active Management Area (AMA), the report serves as a visual overview and resource for interested residents, decision makers, and other stakeholders seeking to gain a basic understanding of water issues in the Pinal AMA.

The WRRRC continues its partnership with the Babbitt Center in collaboration with the Sonoran Institute. Water RAPIDS staff will assist Florence in an assessment of potential policies to inform the water element for the town's 2030 General Plan Update and future water management strategy development. The WRRRC also began supporting Superior in its goals to restore perennial flow to Queen Creek in 2020, facilitating and coordinating the town's Water Working Group, with plans to establish a formal project in 2021.



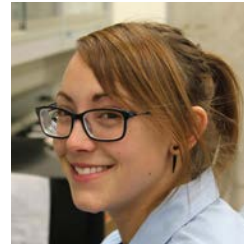
Cover of the visual guide

Water Quality Research

In 2020, Dr. Jean McLain continued her position as a research scientist in the Department of Environmental Science and at the WRRC, where she assists in developing research and outreach projects. She collaborated with Arizona Project WET on a USDA-funded project focused on providing experiential learning for biotechnology teachers throughout the state. Though the teacher training was challenging given COVID-19 restrictions, the initial learning was a success and a laboratory training component is planned for 2021. Other research projects examined the quality of harvested rainwater in Arizona and the potential for sewage overflows in Mexico to affect public health. Dr. McLain continues to teach a very popular course, *Scientific Writing for the Environmental, Agricultural, and Life Sciences* to undergraduate and graduate students each semester. Due to her expanding role of the College of Agriculture and Life Sciences (CALs) Assistant Dean for Faculty Advancement, Dr. McLain's research activities will be reduced in 2021 and beyond.



Jean McLain is assistant dean for faculty advancement in the College of Agriculture and Life Sciences and a research scientist in the Department of Environmental Science.



Victoria Obergh managed the McLain Laboratory until July 2020, when she transitioned to the School of Animal and Comparative Biomedical Sciences.

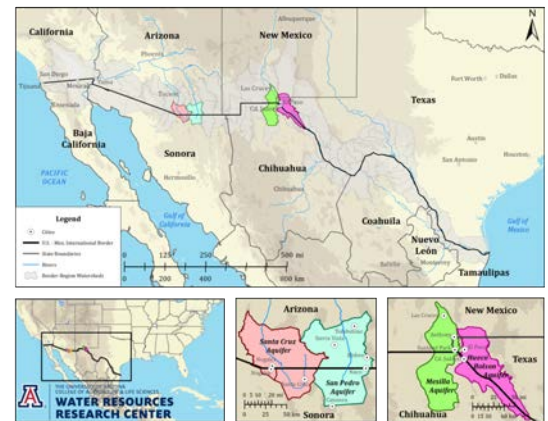
COLLABORATING INTERNATIONALLY

The WRRC recognized opportunities to share experiences and expertise beyond the US national borders. Ongoing research and engagement with Mexico and the Middle East continued through 2020.

Working Across Borders

Transboundary Aquifer Assessment Program (TAAP)

In 2020, the TAAP team, led by Sharon B. Megdal, was involved in several activities, including: working toward completion of the *Binational Study of the Transboundary Santa Cruz Aquifer*; collaborating with the USGS, the International Boundary and Water Commission (IBWC), Universidad de Sonora, and the Mexican National Water Commission (CONAGUA), on the overall implementation of TAAP; performing reconnaissance on other transboundary aquifers along the Arizona-Sonora border; and assessing the impacts of uncertain climate variability on surface and groundwater flows within the Santa Cruz River Aquifer in Mexico. The TAAP team published articles and gave presentations at regional, national, and international conferences. The WRRC held meetings to update TAAP partners in Mexico on water use and climate uncertainties in the Transboundary Santa Cruz Aquifer, exchange information regarding border modeling work, and engage in discussion. Additionally, the team met with Arizona Department of Water Resources staff to discuss the WRRC's past, current, and future efforts on the Transboundary Santa Cruz and San Pedro aquifers, mutual interests, and potential collaboration. This regional effort also involves New Mexico State University and Texas A&M University. An additional year of Federal funding was awarded in September 2020.



Transboundary Aquifer Assessment Program
Aquifers of Focus.

Water in the Middle East

Arizona, Jordan, Israel, and the Palestinian Territories are arid/semi-arid lands that face similar water challenges. For many years Director Megdal has bridged our region with these areas of the Middle East by facilitating communication and exchange of information related to water management and policy. This work continued in 2020 with a visit in early March to speak at the conference, *Climate Stress and Regional Risks: The Jordan River Basin*, which was held in Tel Aviv, Israel. Although her March visit was shortened due to COVID-19, Dr. Megdal continued to share information and endeavored to strengthen partnerships through many speaking engagements

and other activities. She spoke about the deployment of desalination in Israel at a southern California water forum, connected experts across the regions, and laid the groundwork for the May 2021 International Arid Lands Consortium virtual conference involving experts from the United States, Jordan, and Israel. Additional activities bridging the regions included a guest lecture on Israeli water management for an Arizona State University water management course and a webinar for Tel Aviv University on Wicked Water Problems of the Colorado River Basin. Dr. Megdal continued to serve as one of two University of Arizona representatives on the board of the Jewish National Fund (JNF) Joint Institute for Global Food, Water, and Energy Security, through which the university and entities in the Arava Region of Israel are collaborating.

Water Resources Research Act Programs

The WRRC is the Water Resources Research Institute for Arizona, federally authorized under the Water Resources Research Act (WRRRA). The WRRRA Annual Base Grant (104b) funding supports a portion of our information transfer activities and a small competitive research grants program, which is open to students and their faculty advisors at all three of Arizona's state universities. The two student research projects funded for the 2020-2021 grant year are nearing completion:

- Removal of Microplastics by Soil Aquifer Treatment of Reclaimed Wastewater: Charles Gerba, Co-Principal Investigator: Ian Pepper, Student Co-Principal Investigator: Sarah Abney, University of Arizona
- Flow Discharge Measurements Using Small Unmanned Aerial Systems: Jennifer Duan, Student Co-Principal Investigator: Ammon Cadogan, University of Arizona

Based on the success of the past four years, we again called for student research proposals in fall 2020, receiving only one submission: "Distribution of Groundwater Ages to Constrain Paleo-to Modern Recharge," from Dr. Jennifer McIntosh of the University of Arizona. There is no apparent reason for the low submission rate, but it may be due to the uncertainty caused by the COVID-19 pandemic. The 2021-2022 grant year begins September 1, 2021, contingent on federal appropriations.

In addition to the 104(b) program, the WRRC also administers the WRRRA Section 104(g) National Competitive Grant Program. In 2020, the WRRC forwarded for consideration three proposals. One, Dr. David Quanrud's proposal, entitled "In-stream Contaminant Attenuation by Sunlight: Benefits for Water Reuse," was awarded funding.



WRRC Research Program Manager Susanna Eden contributes to multiple activities, including research, outreach, and publications.



Photo: Hamdhani Hamdhani, Research on the Santa Cruz River, WRRC Photo Contest

CONNECTING TO A DIVERSE PUBLIC

The WRRC engages with partners, stakeholders, and the public throughout Arizona and beyond through multiple media platforms. A committee of WRRC personnel meets weekly to coordinate work on outreach activities and products. WRRC staff routinely respond to requests for information and media interviews. Additionally, a variety of external news and information outlets featured WRRC personnel and programs in 2020.



Claire Zucker served as WRRC associate director and WEES program (pg. 10) director until July 2020, when she became Director of Pima County Cooperative Extension.

Cooperative Extension Engagement

The WRRC has been developing a program of collaboration with Cooperative Extension offices in counties throughout Arizona. On January 30, 2020, the WRRC participated in the second of a three-event series, *Arizona Runs on Water: A Cooperative Extension Education Series for Maricopa County*, organized with and hosted by Maricopa County Cooperative Extension and focused on the county's agricultural water uses. The third installment in the series was cancelled due to COVID-19. In August 2020, Claire Tritz, a graduate student, began investigating sources of specific county-relevant data. She also helped produce a poster and slide on the potential for future collaborations, which were shown to Extension personnel at the Arizona Cooperative Extension Virtual Conference 2020: Everything Is Possible in October.

Engagement and Outreach in the Virtual Environment

Annual Conference

The 2020 conference, *Water at the Crossroads: The Next 40 Years*, was originally scheduled to take place in Phoenix on March 27. Due to the COVID-19 pandemic, the conference was postponed to June 18-19 and was completely transformed for the virtual platform. The greatly reduced registration price and convenience of a virtual conference allowed our registration and attendance to expand to 612 and 471, respectively, up from an average of 341 attendees over the previous six years. In addition to panels and speakers, including US Bureau of Reclamation Commissioner Brenda Burman and Bruce Babbitt, former Arizona Governor and former US Department of the Interior Secretary, the event featured audience polling and interactive "Happy Hour" breakout sessions hosted by conference sponsors. Generally regarded a success despite a few minor technical glitches, our approach became a model for other organizations pivoting to an online environment.



2020 conference speakers and panelists

In January and February, leading up to the originally scheduled March 2020 conference, the WRRC extended our reach and added context and depth to the planned conference agenda through a three-part *Get Ready Webinar Series*, featuring discussions on topics relating to the 2020 conference theme. The *Get Ready Webinar* experience helped us successfully pivot to deliver our virtual conference and set the stage for the in-depth conference presentations and discussions.

<https://wrrc.arizona.edu/conferences/2020>

Brown Bag Seminar Series

The WRRC's Brown Bag Seminar Series continued to attract diverse audiences to presentations on a range of water topics. Due to COVID-19 restrictions, Brown Bag seminars since mid-March were held virtually. In 2020, the WRRC held 15 Brown Bag webinars featuring state, national, and international experts. As a result of transitioning to a fully online platform, Brown Bag webinar attendance, on average, more than doubled over that of previous years, extending our reach to engage with a much wider and more diverse audience. The WRRC website hosts webinar recordings and copies of the slide presentations for each Brown Bag.

<https://wrrc.arizona.edu/brown-bag-seminars>

Other Public Events, Presentations, and Posters

WRRC faculty, staff, and students made many oral and poster presentations to academic, professional, civic, and community groups, locally, nationally, and internationally throughout the year. The WRRC also co-sponsored presentations by distinguished speakers when interests aligned and the topic had broad appeal. One such collaboration included the virtual panel, *Climate and Arizona's Future: A Conversation About the Nexus Between Environment, Economy, and Innovation*, which attracted over 275 attendees. For the panel, Sharon B. Megdal was joined by Southern Arizona Leadership Council President and CEO Ted Maxwell, and University of Arizona Global Environmental Futures Vice President and Biosphere 2 Director Joaquin Ruiz. Tucson Mayor Regina Romero provided opening remarks.

<https://wrrc.arizona.edu/events>

In Print

Arroyo Annual Publication

The *Arroyo*, WRRC's annual publication on a single topic of timely interest to Arizona, was sent in February 2020 to both email and print subscribers. Each year, the *Arroyo* content is linked to the previous year's conference and the 2020 *Arroyo* reflected themes from the 2019 conference, Arizona Runs on Water: Scarcity, Challenges, and Community-based Solutions. The Southern Arizona Water Users Association and the Walton Family Foundation provided support through their 2019 conference sponsorships. Taking inspiration from the 2020 Annual Conference, the 2021 *Arroyo*, "Arizona Groundwater Management – Past, Present, and Future," covers the history of the 1980 Groundwater Management Act and subsequent legislation that created today's regulatory and management structure for addressing groundwater management issues and crafting solutions to current and developing problems. Brian McGreal, WRRC's 2020 summer intern, worked remotely through the summer to complete the first draft. The Arizona Municipal Water Users Association and Southern Arizona Water Users Association supported the intern and publication costs through their 2020 conference sponsorships.



2020 Arroyo cover

<https://wrrc.arizona.edu/publications/arroyo>

Using Electronic Media

Weekly Wave e-News Digest

In 2020, the WRRC published 39 editions of the *Weekly Wave* and four editions of the bimonthly *Summer Wave*. Each edition included updated WRRC and water community news, events, publications, and announcements. Through the *Weekly/Summer Wave*, nine *Reflections* essays by WRRC Director Sharon B. Megdal were published. The *Weekly Wave* had nearly 3,000 subscribers at the close of the year. The *Weekly Wave* had an open rate (percentage of contacts who opened the email compared to how many received the email) of 34 percent, a top-tier score.

<https://wrrc.arizona.edu/publications/weekly-wave>

WRRC Website and Communications

In 2020 the WRRC maintained three websites. The main site continues to feature news, events, publications, and other resources, such as Brown Bag webinar recordings and links to the Arizona Project WET (APW) site. In addition, the WRRC maintains a listing of available [jobs and other opportunities](#) relating to water. In 2020, the WRRC website received 135,168 page views by 65,701 users. Both page views and individual users were up from 2019. The WRRC also maintained [Conserve2Enhance](#) and until July 2020, [UArizona Water Network](#).



John Polle manages the WRRC website and is responsible for design of external communications.

The WRRC's efforts in 2020 to employ social media, specifically [Facebook](#), Twitter ([@AZWRRC](#)), and Instagram ([@uazwrrc](#)), have resulted in modest gains as measured by increased shares, views, retweets, follows, and likes. The WRRC Facebook page had 895 followers as of December, 2020, a moderate increase from 2019. The Center had 935 Twitter followers, and 178 followers on Instagram.

Annual WRRC Photo Contest

Each year, the WRRC sponsors a contest for the best photographs of Arizona water on specific themes. In February 2020, the annual Chocolate Fest showcased the 2019 contest winners. [The 2020 Photo Contest](#) attracted entries from throughout the state, and a new category opened the contest to submissions depicting water in arid regions worldwide. Winning photographs are posted on the WRRC website and used for social media postings and WRRC publications.

<https://wrrc.arizona.edu/photo>

AFFILIATED PROGRAMS

Arizona Project WET Water and STEM Education

After 20 years, Arizona Project WET is streamlining and going University of Arizona blue with a new logo. With the new look comes new opportunities to activate learning through virtual engagement.

<https://arizonawet.arizona.edu/>

Arizona Project WET Water Education Program

The new Arizona Water Festival (AWF) Program website went live in 2020: <https://awf.projectwet.arizona.edu/>. The AWF program instills a deeper understanding of water in the Earth system and Arizona's water resources, and now APW is fully equipped to meet that goal virtually. The curriculum unit, comprising 10 lessons that fully cover two of the eleven 4th grade science standards, is the backbone of the program and is found through the Teacher Resources tab. This is a password-protected site for AWF-participating teachers to access all lesson resources and online activation components for the curriculum. The Festival Modules tab links to the online activation of the Groundwater, Watersheds, the Water Cycle, and Water Conservation Technology lessons (<https://awf.projectwet.arizona.edu/student-modules>). For the thousands of professionals and community members who have helped deliver festival learning, the Volunteers tab has new features, including a registration form, festival map locator, and other resources for volunteers. The Sponsors tab highlights sponsors with scrolling logos and links to their websites.

Water Scene Investigations (WSI) Program

Living in the desert requires an environmentally conscious approach to how we manage our water. That is why APW prioritized the WSI website development: <https://wsi.projectwet.arizona.edu/>. WSIs include home and school bathroom faucet audits, an athletic field irrigation audit, and leak quantification investigations. These investigations are now available in forms for teachers to use in a classroom, for direct student engagement, and for families at home. The bathroom faucet audit has participants installing water-efficient aerators, quantifying the annual water savings, and reporting the savings online to compare with others across their classroom, school, or county (<https://wsi.projectwet.arizona.edu/report>). In the athletic field irrigation audit, students evaluate irrigation water distribution uniformity using math and data collection methods. The *Make Every Drop Count* video series demonstrates how much water can be wasted from a leaky faucet and uses math to make meaningful conclusions about the significance of water waste (<https://wsi.projectwet.arizona.edu/community-action/additional-resources/make-every-drop-count>).



Kerry Schwartz, is an extension specialist with Arizona Cooperative Extension and director of Arizona Project WET.



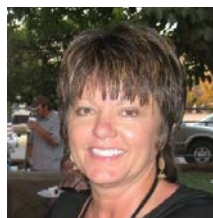
Betsy Wilkening is the education coordinator for the APW Tucson Program and started an Underwater Robotics & Engineering Design Academy.



Holly Thomas-Hilburn is coordinator of applied programs for APW, working with the AquaSTEM Program and Tucson APW.



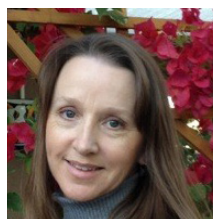
Miriam Aleman-Crouch is the senior instructional specialist for Arizona Project WET's Tucson Program.



Pam Justice, is the senior education coordinator at the Maricopa County Cooperative Extension office.



Sandra Hurlbut is the Community coordinator leading the Aqua STEM program in Maricopa County.



Julie Hasty is a senior instructional specialist with Arizona Water Festivals.



Pearl Lam was a senior instructional specialist with APW until April, 2021.

Coping with COVID

The entire APW team, currently composed of nine education specialists and seven AmeriCorps members, worked hard to keep all programs viable and effective since mid-March 2020. By spring's end, the team was helping teachers and parents engage their students and children using interactive learning modules focused on the groundwater system, watersheds and water supply, water conservation technology, and the water cycle. Over the summer, the team moved all teacher professional development online using Zoom for live sessions and Canvas as the learning management system. APW continues to modify direct student learning to facilitate engagement in an online, interactive format, whether students are in the classroom or learning from home.

Water, Environment, and Energy Solutions Initiative

The WRRRC continued to work in coordination with the University of Arizona Office of Research, Innovation & Impact to manage the Water, Environmental, and Energy Solutions initiative until June of 2020. WEES enables research that brings innovative solutions to pressing environmental, energy, and water challenges of importance to Arizonans. The WEES initiative is funded through the voter-approved Technology Research Initiative Fund (TRIF). In 2020, WEES invested approximately \$2.6M in water-related grants and startup support for new hires. These hires worked on a wide array of research topics, including membrane processes for water reuse, the dynamic behavior of managed hydrologic systems, and off-grid water treatment. Research and equipment grants funded by WEES supported research efforts to evaluate water quality, food safety, and environmental flows, and to advance membrane technologies. In addition, WEES funds supported University of Arizona institutes and centers that interface directly with Arizona stakeholders, promote private-public partnerships, and conduct applied research with tangible benefits. WEES continued to disseminate information through the Water Network listserv and promoted connection to water-related research and activities at University of Arizona through the Water Network website.

PERSONNEL AND FACILITIES

Department of Environmental Science (ENVS) faculty members Sharon B. Megdal, Jean McLain, and Kerry Schwartz are each responsible for developing and managing their individual research, Extension, and education programs. As WRRRC director, Dr. Megdal supervised support and programmatic staff. Programmatic staff Susanna Eden, Ashley Hullinger, Michael Seronde, and Claire Zucker, carried out research, Extension, and education projects designed to enhance the capacity of stakeholders and communities to tackle water resource issues. Ms. Schwartz supervised educational staff at the WRRRC (Miriam Aleman, Holly Thomas-Hilburn, Pearl Lam, and Betsy Wilkening) and six other APW staff members located in two county Extension offices. John Polle continued to be responsible for designing, maintaining, and updating three websites and, provided expertise in graphic design.

In 2020, Rose Veneklasen, Kayla Catacutan, and Leslie Bonilla assisted in administrative and financial matters. Ms. Bonilla and Ms. Catacutan's administrative home is ENVS, which has shared a business center with the WRRRC since January 2018. A team responsible for the implementation of core outreach and engagement programs met weekly to coordinate communications and related activities. The third member of the administrative team, Lynette Featherston, assisted in a wide variety of administrative duties.

A cadre of outstanding students supported the WRRRC's work in important ways. A list of WRRRC students can be found in Appendix B: Supplemental Information. To learn about our staff and outstanding graduate students, please visit the WRRRC Personnel Directory.

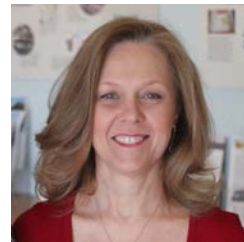
The WRRRC facility, including reception area with water-related informational materials and the Sol Resnick Conference Room was closed in March due to the COVID-19 pandemic and remained closed for the rest of 2020.



Leslie Bonilla is the WRRRC's accountant with responsibility for account transactions and reconciliation.



Rose Veneklasen is the WRRRC's administrative associate, she provides administrative support to the Director and carries out a wide range of administrative duties.

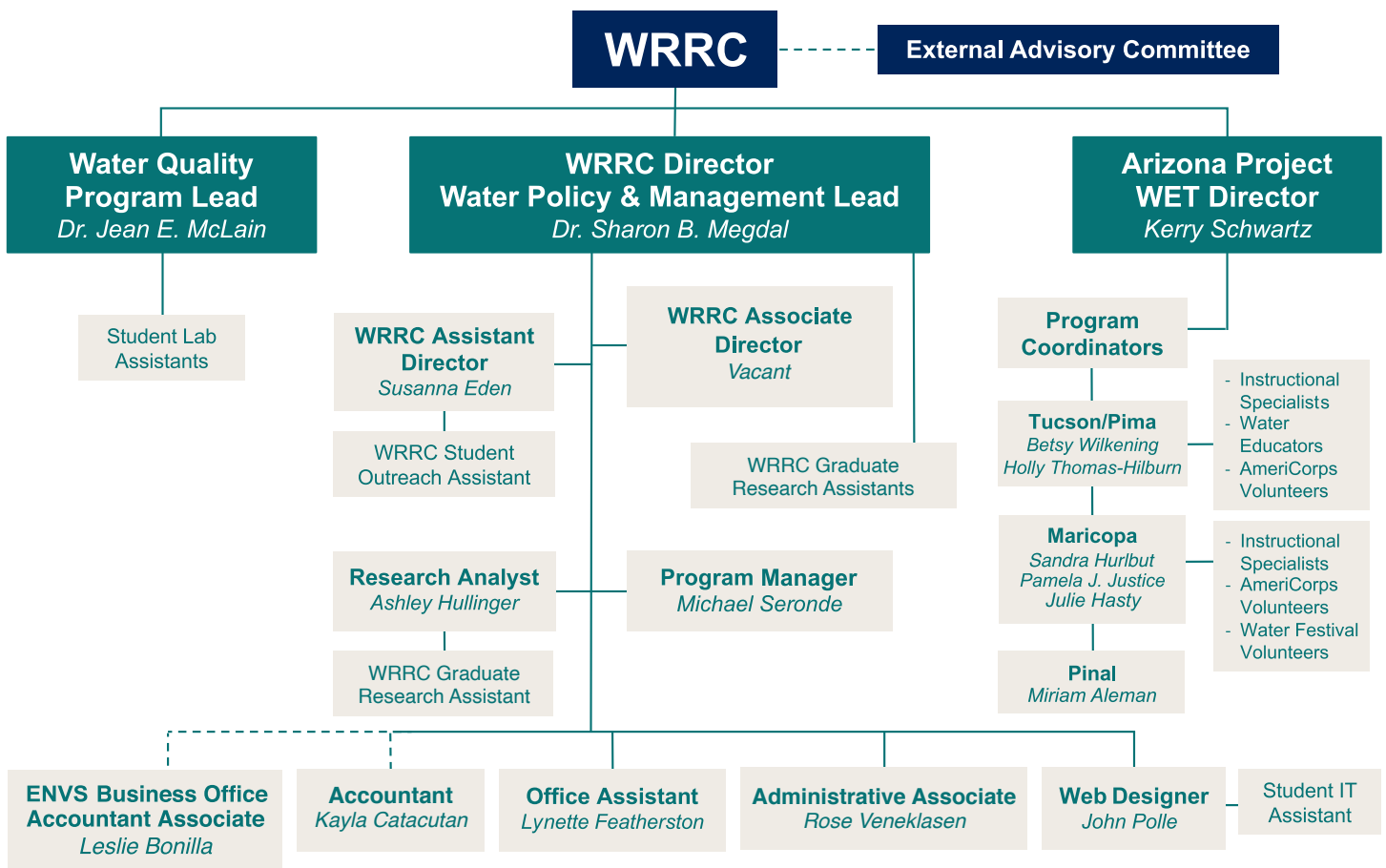


Lynette Featherston is the WRRRC's office assistant, receptionist, and database administrator.



Kayla Catacutan is the WRRRC's accounting assistant.

Organization as of December 2020



Changes

This year saw several significant personnel changes at the WRRC. With the awarding of her Ph.D. in Arid Lands Resource Sciences, Elia Tapia returned to Hermosillo, Sonora Mexico where she continues to collaborate on the Transboundary Aquifer Assessment Program. In July, Claire Zucker, associate director and WEES program director, left the WRRC to become director of Pima County Cooperative Extension. In August, Rose Veneklasen joined the WRRC staff as Administrative Associate. The Center's accountant, Leslie Bonilla, was promoted to a new position at the Business Center that the WRRC shares with ENVIS. Accounting Assistant Kayla Catacutan joined the team on November 30, 2020, the same day that Michael Seronde was promoted to program manager. Additionally, Assistant Director Susanna Eden phased down her time commitment in preparation for her retirement in January 2021. In April 2020, we mourned the passing of our volunteer social media coordinator, Ralph Churchill.

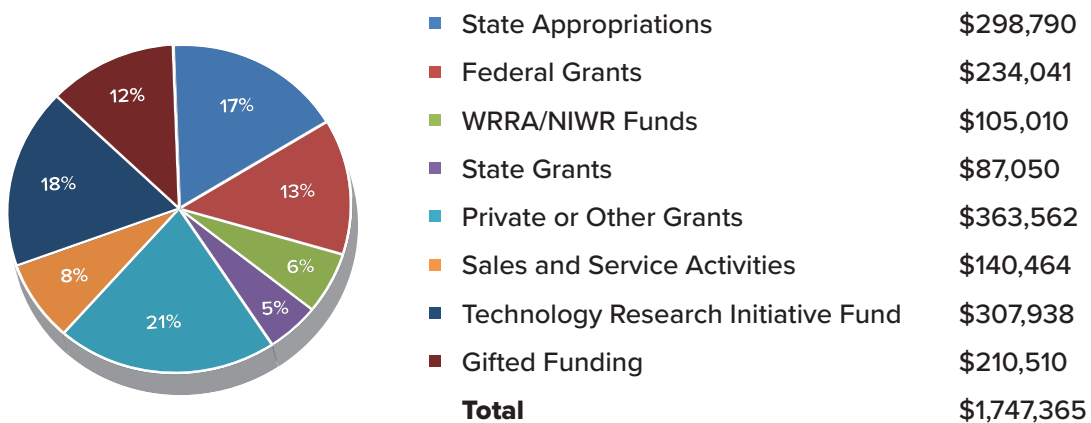
REFLECTIONS ON 2020'S CHALLENGES

In 2020, the COVID-19 pandemic presented many challenges, not only to education, research, and outreach, but to maintaining and expanding the relationships and collaborative engagement central to WRRC programs. As this report illustrates, the WRRC met the challenges head on, learning to adapt our programs. Despite the pandemic, reductions in staffing, and reduced revenue, the WRRC maintained or expanded its programs in 2020. The metrics in Appendix B of this report demonstrate the resilience of our programming and highlight the need for our continued focus on strengthening existing and building new relationships with our communities and partners.

2020 FINANCIAL OVERVIEW

In addition to state funding, financial support for the WRRC continues to come from grants, sales, service activities, and gifts. Of the Center's total 2020 revenue, 41 percent came from government awards. The Center also received 12 percent of its funding from private gifts. The support of staff and appointed personnel accounted for 61 percent of total expenses, while the remainder of expenses were for WRRC operations and programs. In 2020, revenue decreased as a result of TRIF funding reductions, lower conference registration fees, and some APW sponsorship changes. Expenses also decreased as a result of COVID-19 restrictions on travel, in-person trainings, and events; reduced conference costs resulting from the virtual format; and staffing changes.

Operating Support & Revenue



Operating & Program Expense



Notes

Operating Support & Revenue

State Appropriations: State General Fund and tuition collections appropriated to CALS by the State of Arizona.

Federal Grants: Monies received for awarded competitive national federal grants and federally funded cooperative agreements awarded to the WRRC.

WRRRA/NIWR Funds: U.S. Geological Survey 104(b) 5-year Cooperative Agreement funded annually in March. The WRRC receives this federal funding as Arizona's State Water Resources Research Institute.

State Grants: Revenue provided by the State of Arizona through competitive grants awarded to the WRRC by departments of the State of Arizona.

Private or Other Grants: Revenues received by the WRRC through the University and the University of Arizona Foundation from local governmental agencies and non-governmental organizations.

Sales and Service Activities: Revenue from one-time transactions accrued over time by the WRRC from publication sales, annual conferences, and miscellaneous services.

Technology and Research Initiative Fund: Revenue from TRIF, a state sales tax-derived fund supporting a range of educational programs. TRIF funding is allocated to the University of Arizona Water, Environmental, and Energy Solutions Initiative, which provides direct support to the WRRC.

Gifted Funding: One-time gifts from individuals and companies and revenue generated by endowment interest-bearing accounts.

Operating and Program Expense

Salaries and Wages: Includes salaries, wages, and supplemental compensation paid to WRRC faculty, appointed personnel, classified staff, graduate assistants, and student hourly employees.

Fringe Benefits: Includes costs of employee fringe benefits (ERE) for insurance, medical, and retirement benefits.

Operating Expense: Includes University of Arizona revenue and expense service fees; facilities and administration (indirect costs); UIITS network funding fees (access to University communication systems for staff); background checks; membership dues; subscriptions; building and equipment maintenance and upgrades; employee training; Brown Bag seminar series; Arroyo Annual publication; and conference.

Program Expense: Includes University and lecturer's fees, participant support and temporary labor; sub-contracted research agreements for 104(b) grants at Northern Arizona University; printing and publications; communications; office, research, educational, and general supplies; employee travel; conference registration fees; facility and vehicle rental; and meetings and workshops.



Photo: Adriana Greisman, On a Clear Day, Prescott, 2019, WRRC Photo Contest

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WEEKLY WAVE

The Weekly Wave e-news digest is distributed on Fridays and contains WRRRC news, events, and much more.

ARROYO

The *Arroyo* is published each year and summarizes knowledge on a single water topic.



Arizona Water Map Poster

The Arizona Water Map Poster is available exclusively from the WRRRC for \$12.00 (plus tax and shipping).
<https://wrrc.arizona.edu/map>



Photo: Sandy Shiloh, Whitewater Draw, WRRRC Photo Contest (Cover Image)



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