



COLLEGE OF AGRICULTURE & LIFE SCIENCES  
COOPERATIVE EXTENSION

# WATER RESOURCES RESEARCH CENTER

## ANNUAL REPORT 2015



[wrrc.arizona.edu](http://wrrc.arizona.edu)



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COOPERATIVE EXTENSION

# **WATER RESOURCES RESEARCH CENTER**

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

We tackle key water policy and management issues, empower informed decision-making, and enrich understanding through engagement, education, and applied research.

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**Appendices are available online at [wrrc.arizona.edu/annual-report-2015](http://wrrc.arizona.edu/annual-report-2015)**

**Appendix A: 2015 Metrics Report**

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**Cover photo:** Pima Canyon - Brian Powell

**Posted:** June 17, 2016

# A COMMUNITY HUB FOSTERING INFORMED DISCUSSION AND DECISIONS ON WATER RESOURCES

The University of Arizona Water Resources Research Center (WRRC) has been a primary source for independent and objective water resource information for more than 50 years. As a research and extension unit of the College of Agriculture and Life Sciences (CALs) and Arizona Cooperative Extension, the WRRC serves as a hub for the examination of vital water resource issues. It pursues its mission of research, education, outreach, and engagement through programs and projects focusing on real-world challenges. In 2015, the WRRC reinforced and expanded its partnerships within the university and across the water community with the goal of amplifying its impacts. As described in this report, effective partnerships contributed to the successes of WRRC new initiatives, on-going activities, and special events.

In the second half of 2015, we engaged in a series of strategic planning exercises to update WRRC messaging. These activities include development of a new mission statement, website organization, and prospectus. The aim was to focus attention on core capabilities and aspirations in terms of real world impacts. This process was carried out in parallel with the normal annual reporting of WRRC accomplishments in accordance with the 2012 Strategic Plan as amended in 2013. Those accomplishments are described in this report, which concludes with our Annual Financial Report. Metrics of progress toward strategic goals, including fostering partnerships, can be found in Appendix A. Appendix B contains supplemental information on WRRC achievements.

# WRRC DIRECTOR



WRRC Director Sharon B. Megdal, Ph.D., continued to fulfill her multiple responsibilities at the University of Arizona (UA), where she is the C.W. and Modene Neely Endowed Professor for Excellence in Agriculture and Life Sciences and Professor in the UA Department of Soil, Water and Environmental Science. She has many additional appointments, which include the UA School of Government and Public Policy, the School of Geography and Development, the College of Architecture, Planning and Landscape Architecture, the Mel and Enid Zuckerman College of Public Health, the James E. Rogers College of Law, and the Arizona Center for Judaic Studies. In addition, she directs the Water Sustainability Program (WSP) and is co-director of the Water, Environmental, and Energy Solutions (WEES) Initiative, of which WSP is a part.

Her commitment to the M.S. program in Water, Society and Policy remains strong. That commitment combined with her membership on the Executive Committee for the UA interdisciplinary Ph.D. Program in Arid Lands Resource Sciences and the Arizona Water Policy class, which she teaches each spring semester, makes her a unique resource for students interested in water resources.

Beyond participating, often as lead principal investigator, in several of the projects this report describes, she was active in numerous additional efforts. For example, her team received a grant from the Ground Water Research and Education Foundation for a 15-month project to develop and implement an in-depth survey on groundwater governance and management. During 2015 she made more than 30 presentations to audiences of many different types. She was a featured speaker at a reception hosted by UA President Ann Weaver Hart for UA Colorado alumni in Denver and at the Renewable Natural Resources Foundation's Congress on Sustaining Western Water in Washington, DC. She gave two presentations while in Israel for the WATEC 2015 conference and arranged for filmmaker Cody Sheehy to film documentary footage in Israel for the Beyond the Mirage project, an innovation in water awareness raising. She also spoke at the 2015 Workshop for State Officials held by the American Water Resources Association's National Leadership Institute. In November, she spoke during the opening breakfast panel at the Arizona Town Hall. In May 2015, she talked with Will Stone from KJZZ radio about looming Colorado River shortages and in November was interviewed for KCXI radio's first episode of their Fathoming Water series. In its May issue, Green Living AZ magazine featured Director Megdal among the strong and inspirational women celebrated for doing amazing things to advance sustainability.

Her journal articles included a paper in the *Journal of the American Water Works Association* on Tucson Water's approach to water management and an article in the journal *Groundwater* on groundwater governance. Two columns in the *Arizona Republic* and a case study on Arizona water banking for the Western Governors' Association were also published and/or posted. A special issue of the journal *Water*, entitled "Policy and economics of managed aquifer recharge and water banking," which she co-guest edited, was published as a book in 2015. Appendix B contains listings of her many presentations and publications.

As of September 30, 2015, Director Megdal ended her term as President of the National Institutes of Water Resources (NIWR), the organization of 54 water institutes funded through the Water Resources Research Act. As NIWR President, she testified before the U.S. House of Representatives Committee on Appropriations, Subcommittee on Interior, Environment, and Related Agencies, highlighting the recent achievements of the NIWR institutes and their role in addressing the Nation's water resources issues. As Immediate Past President, she became responsible for the development of NIWR's Executive Summary of activities during the past year for Congress and others. In 2015 she also served on the Board of the Universities Council on Water Resources and on the Board of Directors for the Western Regional Development Center. She served on the boards of several other professional organizations and on several committees and advisory boards, including the Kyl Center for Water Policy. She also is serving her second six-year term as an elected member the board of the Central Arizona Project.

# WRRC EXTERNAL ADVISORY COMMITTEE

The WRRC's External Advisory Committee (EAC) is made up of leaders from the Arizona water community, who provide advice on WRRC programs and plans. The WRRC depends on the valuable input from the EAC on many of our programs and plans. The EAC meets at least once annually, and in 2015 they met on December 8th at the Arizona Department of Water Resources in Phoenix. The 2015 members of the EAC in December are listed below with their affiliations as of that month.

Chris Avery, *Tucson Water*

Tom Buschatzke, *Arizona Department of Water Resources*

Guy Carpenter, *Carollo Engineers*

Ted Cooke, *Central Arizona Project*

Mark Cross, *Montgomery & Associates*

Kathleen (Kathy) Ferris, *Arizona Municipal Water Users Association*

Alan Forrest, *CH2MHill*

William Garfield, *Arizona Water Company*

Patrick Graham, *The Nature Conservancy*

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*

Bob Johnson, *National Water Resources Association*

Bob Lotts, *Arizona Public Service*

Francis McAllister, *Freeport-McMoRan Copper and Gold*

Richard Morrison, *Morrison Institute for Public Policy, Arizona State University*

Leslie Meyers, *U.S. Bureau of Reclamation*

Cliff Neal, *City of Phoenix*

Joe Olsen, *Metro Water*

Sarah Porter, *Kyl Center for Water Policy, Morrison Institute for Public Policy, Arizona State University*

Dave Roberts, *Salt River Project*

John Shepard, *Sonoran Institute*

Joe Sigg, *Arizona Farm Bureau Federation*

David Snider, *Retired (Pinal County Board of Supervisors)*

Kathryn Sorensen, *City of Phoenix*

Graham Symmonds, *FATHOM, Global Water*

Chris Udall, *Agribusiness & Water Council of Arizona*

Nan Walden, *Farmers Investment Company*

Sid Wilson, *Retired (Central Arizona Project)*

Brian Wong, *BKW Farms*

# RESEARCH APPLIED TO REAL-WORLD CHALLENGES

## Research Funding through Water Resources Research Act Programs

➤ [wrrc.arizona.edu/wrra-104-grants](http://wrrc.arizona.edu/wrra-104-grants)

The WRRC is the water resources research institute for Arizona, federally authorized under the Water Resources Research Act (WRRRA). WRRRA base (104b) funding supports a small competitive grants program, which is open to investigators at all three state universities. WRRRA funding flows through the U.S. Geological Survey (USGS) budget. This funding also supports a robust information transfer program. Except in FY 2013, the WRRC has received \$92,335 annually for each of the past five years. From this amount three or four research grants have been awarded, averaging \$10,000. For the 2015-16 grant cycle, the WRRC selected three research projects for funding from the eight proposals received:

- Water Sources over Time for a Semi-Arid River – Implications for Water Resources and Groundwater Modeling, Principal Investigator: Thomas Meixner, University of Arizona;
- Impact of Upgraded Wastewater Reclamation Facilities on Chemicals of Emerging Concern in the Effluent-dependent Lower Santa Cruz River, Principal Investigator: David M. Quanrud, University of Arizona;
- Characterization of Uranium and Arsenic in Unregulated Water Sources on the Navajo and Hopi Reservations, Principal Investigator: Jani Ingram, Northern Arizona University.

The WRRC issued its call for proposals in September for the 2016-2017 cycle (March 1, 2016-February 28, 2017). The Technical Review Committee met on December 18th to evaluate the five proposals received and two projects were recommended for funding:

- Sunlight-driven reactive oxygen species production for natural attenuation of wastewater trace organic compounds, Principal Investigator: Robert Arnold, University of Arizona;
- Recycled water use for agriculture: on-farm demonstration and evaluation research, Principal Investigator: Channah Rock, University of Arizona.

The WRRRA also funds a nationally competitive grants program, the 104g program. Funded projects in Arizona are administered by the WRRC, which is responsible for submitting the proposals on behalf of principal investigators from Arizona. No Arizona projects were funded in 2015.

## Laboratory Water Quality Research



An active research program, led by WRRC Associate Director Jean McLain, is examining the microbiology of water and irrigated soils. The water quality laboratory hosts students from CALS, the College of Science, and the School of Public Health, all conducting research related to recycled water irrigation, food safety, and biological impacts of emerging contaminants. In 2015 two grants from the Arizona Department of Agriculture were awarded for the study of novel methods to maintain water quality within irrigation water distribution systems.

In November, work on a project funded by the USDA-Agriculture and Food Research Initiative concluded with “Antibiotics in

Agroecosystems: State of the Science,” a symposium at the International Agronomy Societies featuring presentations from world-renowned experts. Five review papers to be published in April 2016 in a special issue of the Journal of Environmental Quality resulted from this effort.



**Jean E. McLain**, WRRC Associate Director and Associate Professor/ Research Scientist in Soil Water and Environmental Science, focused her efforts from January to June 2015 organizing the WRRC Annual Conference, with assistance from her organizational

partner Dr. Karletta Chief (SWES) and WRRC staff and students. As in past years, McLain also assisted in management of staff and development of outreach materials, and leads the WRRC annual reporting of metrics and updating of the WRRC Strategic Plan.

McLain devotes time to mentoring undergraduate and graduate students in laboratory and field microbiological sciences. In 2015 her first graduate students, Valerisa Joe and Victoria Obergh, graduated with Masters Degrees in Environmental Science. Joe is continuing her Ph.D. work in the McLain lab on a cutting-edge study to establish best practices for identifying microbial organisms in irrigation water systems.

In 2015, McLain actively represented the WRRC at local and national meetings, and in May she presented “Antibiotic Resistance in Treated Wastewater Reservoirs in Arizona” at the European Cooperation in the Field of Scientific and Technical Research meeting in Barcelona, Spain. In June, she traveled to Myanmar, as part of a University of Arizona team aiding research faculty at Yangon University in developing a food safety laboratory. While in Myanmar, she presented four talks focused on microbiological seafood safety at local universities, trained students and faculty in molecular methods of seafood analysis, and provided an interview to local television. Work in Myanmar will continue in 2016, with the ultimate goal of aiding this country in developing a sustainable seafood exporting industry.

In 2015, McLain continued her work on advisory panels for the WaterReuse Research Foundation, the Cities of

Tucson and Flagstaff, the US Department of Agriculture, and the Environmental Protection Agency, and also remained active in professional associations including Arizona WaterReuse, the Soil Science Society of America, and the American Society for Microbiology.



**Rachael Willis** was a Research Assistant in McLain’s Water Quality Research Laboratory until July 2015. Much of her work in 2015 focused on an NSF-funded antibiotic resistance project to compare antibiotic resistance levels of bacteria in drinking water

and recycled water systems in different areas around the United States. She was also involved in a project funded by the Arizona Department of Agriculture examining the effectiveness of quaternary ammonium compounds for sterilization of harvesting tools used in the produce industry. Willis was cross-trained on the projects of McLain lab graduate students, assisting on all research projects.



**Victoria Obergh** became a research and laboratory assistant in the McLain lab in October. She took over many of Rachael Willis’s duties, and has become a valuable team member with strengths in laboratory organization. She also assumed the role of

managing a project, funded by the Water Environment Research Foundation, examining the development of antibiotic resistance through wastewater treatment processes.

## RESEARCH AND ENGAGEMENT THROUGH THE WATER RAPIDS PROGRAM

➤ [wrrc.arizona.edu/waterrapids](http://wrrc.arizona.edu/waterrapids)

The WRRC’s Water Research and Planning Innovations for Dryland Systems (Water RAPIDS) Program fosters new approaches to water resource management with the goal of integrating traditional planning for natural resources with land use planning. The team works at regional, state, watershed, and local scales to develop tools for and capacity within communities to balance residential, commercial, industrial, and agricultural needs for water security with water needs of natural areas. In 2015, the team convened or participated in more than 40 presentations, workshops, or lectures across Arizona on subjects ranging from scenario planning to water for



natural areas. More than 1,300 people were reached by these efforts. In October 2015, the Water RAPIDS program received an Award of Merit in the environmental education and communication category at Arizona Forward's Environmental Excellence Awards.

## In 2015, the Water RAPIDS program included four projects: Conserve2Enhance (C2E)

➤ [conserve2enhance.org](http://conserve2enhance.org)

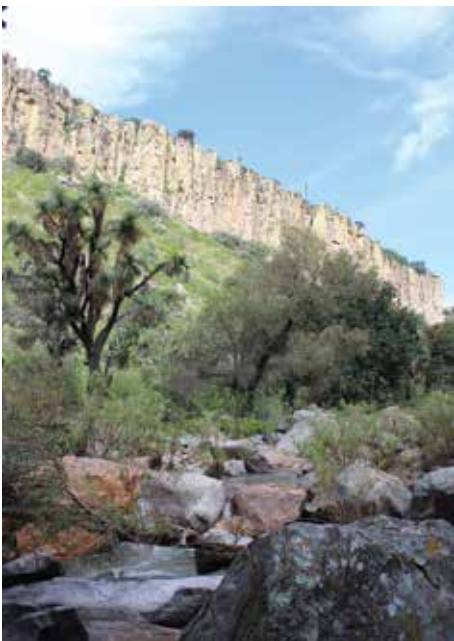


Since 2010, Conserve2Enhance (C2E), a trademarked program of the WRRC, has connected voluntary water conservation to environmental enhancement by funding local projects through participant donations based on their water savings. Participating homes and businesses can create accounts on the C2E Water Use Dashboard ([www.conserve2enhance.org](http://www.conserve2enhance.org)) to track their water use, learn conservation tips, and donate to a local C2E program. With the launch of two new programs in 2015, C2E has developed four programs: Tucson, Arizona Audubon, Arizona Water Sentinels, and Yavapai C2E. Work with the City of Flagstaff has resulted in plans for an additional program there. Through a signed MOA in July of 2015, Bonnevill Environmental Foundation (BEF) has agreed to support C2E's efforts to conserve water in the Colorado Basin by

placing the C2E logo on their website and promoting the conservation tools and online dashboard.

In total, C2E participants have conserved over 7.4 million gallons of water and invested over \$70,000 in community-identified project sites that enhance local washes, reduce flooding, and increase wildlife habitat. Most of this investment has been in neighborhood-scale projects in Tucson, involving hundreds of volunteers. Results include improvement to communities and increased water awareness across diverse groups. Community-wide water conservation will get a boost from increasing use of the C2E Water Use Dashboard. Developed by the WRRC, this tool is available at no cost to participants and interested communities. The Dashboard offers features, such as graphical water use reports, donation summaries, and customized conservation tips. It provides a convenient way for the public to engage with their water use and visualize the impact of their conservation actions over time. They can also make donations to local projects through a linked Paypal account. As of November 2015, there are five live program pages and 224 participants. The majority of these participants are in the Tucson program.

## Understanding Environmental Flow Needs in Water Scarce Regions



In 2015, the WRRC, in partnership with Northern Arizona University (NAU), created a geospatial database of environmental flow needs and responses for the deserts of the U.S. and Mexico. The goals of this project were, first, to understand the critical data gaps in flow need and flow response data in the deserts of the U.S. and Mexico. The second goal was to develop a user-friendly, one-stop-shop on existing data on flow needs and responses in the Desert Landscape Conservation Cooperative (LCC) region for natural resource managers and researchers. The Desert LCC is a bi-national, non-regulatory regional partnership of federal resource management entities and interested public and private entities in the Mojave, Sonoran, and Chihuahuan Desert regions of the southwestern United States and northern Mexico. This work expanded the 2013 Arizona only environmental flows database. The database, which contains information from over 400 studies, is available at [wrcc.arizona.edu/desertflowsdata](http://wrcc.arizona.edu/desertflowsdata).



**Kelly Mott Lacroix** completed her Ph.D. in Arid Lands Resource Sciences in January 2015 and was promoted to Senior Research Analyst. She leads the Water RAPIDS team in their work on local, watershed, and state levels to improve water

management through the use of Geographic Information Systems (GIS), data collection and management, and engagement with stakeholders. Her activities in 2015 included: creation of a database of environmental flow needs and flow responses for the desert rivers of the United States and Mexico, a stakeholder driven water supply and demand study for the Upper Gila Watershed, raising water awareness in the Globe-Miami community through a Water 101 series, evaluation of Conserve2Enhance™, and 25 presentations in Arizona and beyond on Water RAPIDS research.

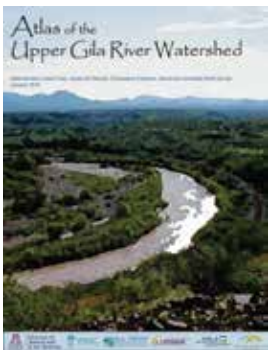


**Ashley Hullinger** transitioned from a Graduate Research Assistant to full-time WRRRC staff as the Research Coordinator for the Water RAPIDS program in October 2015. Ashley's main activities at the WRRRC included: organizing and facilitating stakeholder

meetings and workshops; coordinating C2E programs and evaluation; and providing support and research for the various programs. Ashley also assisted with WRRRC-wide outreach and events through organizing the Brown Bag Seminar Series and serving as part of the WRRRC communications team. Ashley holds a M.S. in Urban Planning, with a concentration in Water Resources, from the University of Arizona and B.A. degrees in History and Geography from the University of Kansas.

## Watershed Planning in the Upper Gila Watershed

➤ [wrrc.arizona.edu/Gila-Watershed-Assessment](http://wrrc.arizona.edu/Gila-Watershed-Assessment)



The Water RAPIDS team has been working in the Upper Gila Watershed since 2012. In 2015, a new project was funded through a cooperative agreement with the U.S. Bureau of Reclamation. The project is a collaborative effort involving the WRRRC, Arizona Cooperative Extension, and the Gila Watershed Partnership. The project team has been working with the community to understand water supply and demand in order to use this knowledge to develop alternatives that ensure a resilient community now and in the future. They also have been exploring effective mechanisms of stakeholder engagement for water resource management in rural Arizona.

In the past year, this project has convened two large workshops to discuss water management issues and solutions, along with five smaller “working group” meetings to estimate water demand and discuss how best to determine water supply availability. Team members have also presented the results of previous work in scenario planning for the future of the Upper Gila Watershed. Presentations were made to all of the region’s town councils (5) and boards of supervisors (2). An Arizona Cooperative Extension publication on the project’s method for developing scenarios, *Using Scenario Planning to Prepare for Uncertainty in Rural Watersheds*, was published by Arizona Cooperative Extension in December 2015.

## Community Conversations on Water – Globe/Miami

In July 2015, the Water RAPIDS program, together with Gila County Cooperative Extension, received a grant from the Freeport McMoRan Foundation to support the Gila County Master Watershed Steward program and conduct a series of workshops on water resources in the Globe/Miami area. The three fall community conversations, “Good to the Last Drop? Water in the Cobre Valley”, were designed to learn about citizen concerns around water and develop educational materials for the region on their water resources. Three additional community conversations were planned.

# WATER EDUCATION EMBRACING PEOPLE OF ALL AGES

## Arizona Project WET

➤ [arizonawet.arizona.edu](http://arizonawet.arizona.edu)



It is obvious from the literature and news that the Southwest's future will depend on developing the next generation of water and natural resources leaders. Less obvious is how to reach these youth. With the trust and investment of more than 36 sponsors and an annual budget of \$548,000, Arizona Project WET (APW), ([arizonawet.arizona.edu/](http://arizonawet.arizona.edu/)), a program of the WRRC and Arizona Cooperative Extension, develops water stewardship and STEM literacy through three pathways: 1) teacher professional development that evolves instructional practices and deepens content knowledge, 2) direct student outreach that delivers or extends classroom learning, and 3) community engagement that offers effective involvement in K-12 education.

Deeply rooted in the STEM educational approach, our programs integrate the four disciplines of Science, Technology, Engineering, and Math into rigorous, real-world learning experiences for students. In 2015, the APW team engaged in the Thinking 101 online course and webinar sessions with the Cabrera research team. As a partner of Cabrera Research Labs (<https://www.crlab.us/#home>) the APW team planned, designed, delivered, and evaluated all program components in iterative stages. APW's work focused specifically on giving thinking a structure and language, by making distinctions, identifying parts and wholes, making relationships, and taking perspectives. Revamping curriculum components with this structure ensured that thinking was the primary focus. This approach provides more time for reflection, a key for students to learn to reason and develop their own arguments about complex and multidimensional water resource issues. Learning to think through issues using a common structure ultimately leads to transference, the ability to make cognitive connections between fields and disciplines.

A cornerstone of all APW programs is professional development delivered over multiple days in our Teacher Academies ([arizonawet.arizona.edu/programs/teacher\\_academies](http://arizonawet.arizona.edu/programs/teacher_academies)). After 36 hours of professional development, participating teachers reported a 36 percent improvement in their own thinking skills, and a 67 percent gain on using distinctions, part/whole identities, and relationships to help students construct their own thinking.

Watershed systems, from the regional Salt/Verde River Watersheds to the massive Colorado River Watershed, are a focus of the first unit of APW's Water Investigations Program (WIP) curriculum ([arizonawet.arizona.edu/programs/water\\_investigations\\_program](http://arizonawet.arizona.edu/programs/water_investigations_program)). Many people in the Phoenix metropolitan area, like most Americans, don't know where their water comes from and are therefore not connected to their own rivers or watersheds. Yet, 66 percent of WIP's graduates know that the Colorado River is part of their water supply and 44 percent know that the Verde River is a part of their water supply. Prior to the WIP, 30 percent of students thought that their water supply came from the ocean; subsequent to the WIP only one percent thought this.

In Tucson, where foundational knowledge of the groundwater system is critical, APW revamped the in-classroom groundwater presentation, which is part of the curriculum for 4,004 third grade students. The new presentation activates kinesthetic learning with a hands-on model for every two students. It relates the kinesthetic learning to visual and auditory learning modes through the use of a diagram with magnetic parts that can be manipulated. After improving the groundwater lesson, third graders' knowledge of the groundwater system increased by an average by 22 to 41 percent on all concepts, including groundwater's connection with surface water and its inclusion in the water cycle.

APW's School Water Audit Program ([arizonawet.arizona.edu/programs/school\\_water\\_audit](http://arizonawet.arizona.edu/programs/school_water_audit)) is a STEM unit that incentivizes school and community water conservation through student-driven inquiry and students' installation of water saving technology. In seven faucet audits, 84 aerators were replaced for a projected water savings of 0.9



**Kerry Schwartz** is Director of the APW water education program and Associate Specialist with Arizona Cooperative Extension at UA. She is responsible for programs that teach science and STEM literacy and systems thinking skills to educators, K-12

students, and community members. She works statewide, supervising 10 personnel located in three extension offices. During her tenure at the UA, she has raised over 3.5 million dollars to support APW programming and has sustained partnerships with corporations, foundations, and governmental agencies. She and the APW team work to develop and evaluate STEM focused education programs and teacher professional development that incorporate real world science and engineering practices and foster critical and creative thinking. She worked cooperatively with the APW team to achieve the reported impacts.



**Betsy Wilkening** is the Education Coordinator for the Tucson Program. Utilizing her background in engineering, she led a team in the development of STEM curriculum units and lessons focused on the engineering design process. These include the Rainwater Harvesting

instructional unit for teachers and the Pump it Up Central Arizona Project design challenge lesson. In 2015, she also led the effort to revamp the third grade groundwater lesson. Implementing the School Water Audit Program (SWAP) in Tucson, her team led the student driven effort to audit components of their schools and install water saving devices that will save a projected 41,509 gallons each year. She also worked with Wilson K-8 School to coordinate presentations by students of all ages to Tucson Water and district personnel. Students from the inaugural SWAP program at Wilson, who are now high school seniors, returned to their school to present alongside fourth and eighth grade students. Fourth graders audited drinking fountains, quantified water waste, recommended acquiring bottle fill fountains, and began to raise money to do so. Eighth graders audited bathroom faucets and quantified a projected water savings of 1,687,500 gallons per year.

**Jessica Ahlstrom**, Senior Instructional Specialist for the Tucson Program, manages 12 UA student water



educators and coordinates direct student outreach programs. In addition, in 2015 she worked with the Director to extend the reach of APW's Discovery Program by developing and implementing it at Sweetwater Wetlands. This program challenges

students to think through the scientific process while exploring the natural environment. Beginning at the main kiosk, students choose to engage as biologists, hydrologists, botanists, or ornithologists. Using a smart device, students scan the first QR code, which prompts an "I wonder..." question. Students explore the wetlands - thinking systematically in order to come up with a scientific conclusion to their "I wonder..." question.



**Holly Thomas-Hilburn** is Coordinator of Applied Programs for the Water Investigations Program (WIP). She has been involved with WIP assessment and evaluation since its 2010-11 school-year pilot and for that past 3 years has been responsible for supervision

of the community coordinators, curriculum development, teacher professional development, and program assessment. She holds a Master's degree in Teaching and Teacher Education with an emphasis in environmental learning. In 2015, the WIP team launched on a journey that led to clarification of objectives, a rethinking and reformatting of curricular components and lessons, and a complete change in how water education programs are delivered. Employing new methods, meta-mapping, and models that make thinking tangible, will better accomplishing the ultimate STEM goal – the ability to think.



**Chuck Dugan**, Pinal County Program Coordinator, has taken over the Arizona Water Festival programs in Pinal County and formed strong partnerships. He led fundraising efforts that included raising \$14,000 from the Department of Corrections, Eyman Complex,

and \$7,000 from Nissan to add to existing Pinal County funding. With Abbott Nutrition, the program's founding

sponsor, he works to promote a community water conservation ethic through a multi-pronged approach to reach people of all ages. A Spray Head Replacement Program in the county continues to offer water savings to restaurants across Pinal County. Savings through 2015 was projected to be 328,000 gallons annually at 11 restaurants.



**Mary Ann Stoll** is an Education and Technology Coordinator with Arizona Cooperative Extension at the UA, working with the APW water education program. Stoll develops and delivers curriculum and professional development in STEM literacy and is a team

leader in the integration of best instructional practices for teachers and educators. She also designs, develops, and maintains APW's website, which provides an online connection to the community and ready resources for participants in APW programs.



**Tara Oakes**, Instructional Specialist with the Water Investigations Program, conducts direct student outreach programs in Maricopa County classrooms and field days. Tara worked with 35 teachers and 2,667 students in the 2014-15 school year and

20 teachers and 1,585 students in the 2015-16 school year. She delivered program components including: Hassayampa River Preserve Field Days, Rio Salado Field Days, Phoenix College STEM Symposia, Groundwater Flow Model Presentations, Water Efficiency Technology Presentations, indoor water audits, outdoor water audits, and Rainwater Harvesting lessons. She led the APW team in design, development, and implementation of monarch butterfly habitat expansion at Rio Salado Habitat Restoration Area in Phoenix.



**Pam Justice**, Senior Education Coordinator, has represented Arizona Project WET at the Maricopa County Cooperative Extension office since 2003. She coordinates educational and outreach programs that improve the understanding of both youth and adults regarding

water issues. In 2015, Justice engaged 827 sixth grade

students in 32 classes in the Water Scene Investigations (<https://arizonawet.arizona.edu/programs/wsi>) home water audit within the Gilbert and Higley School districts. Seventy percent of the students were able to leave new water efficient aerators on and some students audited more than one faucet. A total of 921 aerators were changed, producing a total projected annual water savings of 2,785,844 gallons.



**Julie Hasty** is a half-time Community Coordinator with the WIP. She has been with the program since September 2014 and has a Bachelor of Science degree in biology. As a Community Coordinator she supported the WIP teachers within

13 of the 32 participating schools in the 2014-15 school year and 6 of the 16 participating schools in the 2015-16 school year, with approximately 1,361 students. She made groundwater and water conservation presentations within each classroom and conducted water audits with schools to install high efficiency faucet aerators. In the spring of 2015, she facilitated students in the field doing science investigations and assisted in the expansion of the butterfly habitat at the Rio Salado Habitat Restoration site. In fall of 2015, she facilitated rainwater harvesting lessons at WIP participating schools.



**Sean Sederstrom**, Water Festival Program Coordinator, participated in the delivery of 14 Arizona Water Festivals (AWF) [arizonawet.arizona.edu/programs/arizona\\_water\\_festival](https://arizonawet.arizona.edu/programs/arizona_water_festival) in 2015 reaching 6,865 students and 266 teachers. He led

five of those festivals in 2015, delivering professional development workshops for teachers; coordinating logistics and evaluation with teachers; recruiting and training volunteers; organizing festivals for up to 1,000 students at a time; and developing partnerships for program sustainability. Under Sederstrom's leadership, fourth grade students' knowledge gains due to the AWF programs delivered in the first half of 2015 were 28 percent in understanding of a watershed, 22 percent in understanding of the groundwater system, 18 percent in understanding of the water cycle, and 8 percent in understanding of water conservation. He also led the effort to re-focus the conservation lesson on water efficient technology.

million gallons per year. Students demonstrated a 27 percent gain in their understanding of how to audit a water faucet and calculate annual use. Pre- to post-audit data showed a 26 percent knowledge gain in understanding how to save water through behaviors and a 64 percent knowledge gain on the subject of saving water using technology. Students applied their water auditing knowledge at home too, installing water efficient aerators. In 2015, a total projected 2,785,844 gallons of water per year was saved due the actions of 827 students.

A new Rainwater Harvesting lesson required students to measure the amount of water collected from a model roof with various roofing materials and slopes. This lesson focused on engineering design practices, the E in STEM.

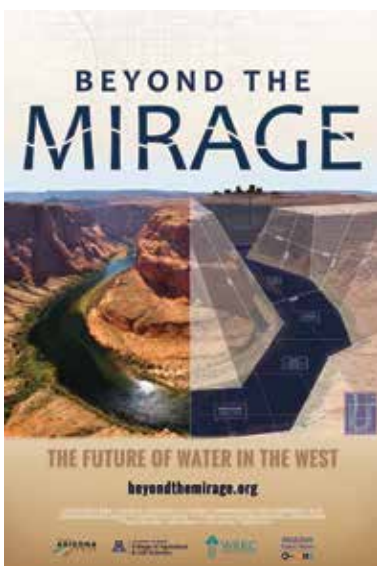
In facilitated sessions focused on riparian systems, students visiting a riparian area became scientists observing, measuring, collecting, checking, and recording. A total of 2,236 students and 337 parents engaged in 31 field days. Students reported improved confidence in scientific practice skills. In rating themselves on 12 different skills important to scientific practice, students showed an average 20 percent increase in confidence across all areas.

At the end of the school year, middle school students reflect on their learning and deliver 10-minute presentations at a STEM Symposium held at a local college and modeled after a professional conference. In 2015, 968 middle school students shared their ideas, work, and recommendations with each other, 24 teachers, and 54 other adult observers. APW staff, along with 16 volunteers, judged student presentations using a set rubric and at the end of the day awarded the “Academy Awards”. Student evaluations in each break-out room also chose the “Peoples’ Choice Awards”. One hundred percent of participating teachers’ reported the symposium experience as being important or very important to their students.

Some students involved in APW programs applied their learning for the betterment of their community. Fifty Liberty Traditional students audited the Maryvale Ballpark in 2015 and a projected 147,340 gallons of water was saved over the year through their actions. Working with a team of 10 National Civilian Community Corps members at Rio Salado Habitat Restoration Area, students planted 45 trees and 180 other plants, laid 1,000 feet of drip irrigation lines, and installed 200 feet of fencing to protect new vegetation as part of the APW’s National Fish Wildlife Foundation-funded Restoration Project.

## Beyond the Mirage Video-based Water Awareness Program

➤ [beyondthemirage.org](http://beyondthemirage.org)



The WRRC is working with Cody Sheehy and a team from CALS on a multi-faceted project to raise awareness and knowledge about water issues in Arizona and the Southwest. Its core is an interactive, guided but self-directed learning experience drawing on hundreds of video clips. Clips are presented in smart web environment and users can chose among them according to their interests. Users are then able to create their own documentaries, which can easily be shared on social media. The program also includes a feature length documentary for airing on public media stations and an education component for bringing the content into the classroom in new and engaging ways.

The New Arizona Prize cash award, won by Beyond the Mirage in April, and funding through the WRRC from the University of Arizona Technology and Research Initiative Fund have supported project development. Sheehy completed filming video footage all over the state and region, as well as footage shot in China in April and Israel in October (funded separately). The team completed about 80 percent of clip editing for the website and building the web infrastructure. More than 240 clips, or about 95 percent of the total, were completed in 2015. Each clip has been vetted by the WRRC team, which had approved 168 clips by the end of December.

The existing video clips have been transcribed and meta-data has been generated for each clip. This information is used in the smart web interface. Website development was nearly completed during 2015 with beta testing scheduled for January 2016.

A social media campaign was designed to reach the widest possible audience, drawing on the expertise of Phoenix-based marketing consultant Jessica Hall. A Social Media Plan and Distribution Plan were developed and

implementation was begun in October with outreach to business/corporate influencers. A 2.5-minute video trailer was created to drive traffic to the website and advertise the project. In addition a narrated “about-this-website” demonstration video explaining the website was developed.

Arizona Public Media is an integral part of the team for the documentary and its distribution. The documentary production process was roughly 90 percent complete by the end of 2015.

Arizona Project WET has plans to engage teachers and schools in using the Beyond the Mirage video content and website as a teaching tool for water education. PBS Learning Media, the premier web resource for curriculum across the country, is hosting selected clips and related curriculum specially designed for the purpose by APW. The clips for posting to PBS Learning Media have been selected and questions developed to accompany the clips and guide their use for educational purposes. As a statewide education program with a large presence in Phoenix, APW is uniquely positioned to spread word about this project at community events.

Multiple presentations have been made across the state by team members. Sheehy presented Beyond the Mirage to the Arizona Town Hall, the University of Arizona’s Institute of the Environment’s Art and Environment lecture series, and the Arizona Forward Board. These presentations raised interest in the website roll-out, documentary airings, and classroom implementation all taking place in the spring of 2016.

## CONNECTING UA’S COMMUNITY OF WATER EXPERTS TO SPUR INNOVATION

Technology and Research Initiative Funds advance water research and engagement at UA through the Water Sustainability Program (WSP).

### Water Sustainability Program (WSP)

➤ [wsp.arizona.edu](http://wsp.arizona.edu)



WSP strategically directs UA resources to stimulate innovative research, engage industry, develop a high-tech work force, and connect UA water experts to Arizona’s water issues. WSP is part of a larger collaborative involving the Institute of the Environment (IE) and the Renewable Energy Network (REN) through Water, Environmental, and Energy Solutions (WEES). WEES programs, including WSP, positively impact Arizona and reflect the priorities of its funding source, the Technology and Research Initiative Fund (TRIF), which is a voter-approved fund administered by the Arizona Board of Regents. The WRRC serves as one of the management hubs for WEES and is the center for water engagement and public water education at UA.

WEES funds are used to support interdisciplinary and cross-sector research concerning scientific, technological, and policy-related solutions. WEES joint funding initiatives in FY2015 included seed funding for equipment purchases, five new faculty hires, and funding for events and workshops. WSP supported two additional equipment purchases that directly supported water quality and agricultural water use research in Arizona.

In 2015, WSP invested significant funding into research and activities related to environmentally sustainable mining, water management and policy, biological effects of trace contaminants, water treatment / reuse technologies, and eco-hydrology. Notably, UA expertise and leadership in water treatment and reuse led to the establishment of the WSP-supported Water and Energy Sustainable Technology (WEST) center, located at the Agua Nueva Pima County Water Reclamation Campus. WSP investments also bolstered the Arizona Laboratory



**Claire Zucker** is the Program Director for the Water Sustainability Program (WSP) and as such co-administers the Water Environmental Energy Solutions (WEES) initiative. The WSP and WEES programs manage Technology and Research Initiative Funds (TRIF) to strengthen research, education, and outreach and to support interdisciplinary collaborations. TRIF resources are strategically invested to bring high-value return on investment to the university and to benefit Arizona. As Program Director, Zucker is responsible for overall management including program development, delivery, and reporting. She organizes the WSP Distinguished Speaker Series and provides support to the WRRRC by serving on the its conference planning committee, leading its on-going strategic planning process, and contributing to the planning and organization of Brown Bag seminars and other events. This year, she worked to develop and release the unique cross-campus UA Water Network website, launched in December 2015, which profiles the cross-discipline nature of water research and education at UA. She also connects students to regional water issues by providing guest lectures in a variety of classes and facilitates cross-campus communication and information sharing through the WSP listserv. Zucker serves as a senior advisor on a National Science Foundation Urban Water Innovation Network (UWIN) project entitled: Finding Pathways to Integration for Urban Water Management, Urban Planning and Design, and as part of that project she participates on the engagement panel for its Arizona urban water sustainability hub. She also serves on several community advisory committees and Boards of Directors, helping to connect the WRRRC to stakeholders in the region.

for Emerging Contaminants, and the Center for Environmentally Sustainable Mining. Both of these units foster private-public partnerships and provide industrial partners an interface with UA scientific knowledge and technology.

This year, WSP created and launched a new web platform to comprise and present the broad ranging efforts relating to water research and education at UA. The UA Water Network, [www.water.arizona.edu](http://www.water.arizona.edu), showcases the more than 280 faculty and researchers in 48 departments and programs who specialize in topics related to water. The site also provides a unified water events calendar for all campus programs, a robust searchable expertise directory, and a student resources section that includes timely notification about jobs and internship opportunities.

The Water Sustainability Distinguished Speaker Series is central to the WSP education and outreach mission. In March 2015, WSP co-sponsored a Water Policy Forum, Arizona Solutions to Colorado River Supply Challenges, hosted and convened by Senator Jeff Flake. This high profile event attracted water professional, civic leaders, and a wide range of public attendees. In April 2015, WSP sponsored a presentation by Brian Richter, Chief Scientist of Water Markets for The Nature Conservancy and author of the newly released book, *Chasing Water: A Guide for Moving from Scarcity to Sustainability*.

WSP enhances research opportunities and workforce development by supporting outstanding UA graduate students as well as K-12 education. WSP also continued investment in K-12 water education by supporting Arizona Project WET activities in Maricopa County.

In 2015, WSP and WEES leaders have been engaged in planning for the last cycle of TRIF funding, FY2017 to FY2021.

## ENGAGING, INFORMING, AND INSPIRING A DIVERSE PUBLIC

The WRRRC engages with the university and non-university communities in many ways. Funding from the federal WRRR 104(b) base grant provides an essential foundation for these activities. Selected highlights of WRRRC information transfer activities appear below. For up-to-date information on WRRRC news, events and activities, subscribe to our newsletters at [wrrc.arizona.edu/subscribe](http://wrrc.arizona.edu/subscribe).



## Weekly Wave

➤ [wrrc.arizona.edu/weekly-wave-archive](http://wrrc.arizona.edu/weekly-wave-archive)



Inaugurated in 2014, the Weekly Wave e-news digest was sent to subscribers regularly throughout 2015. Thirty-two editions of the Weekly Wave and seven editions of the bi-monthly Summer Wave were sent. Each edition included updated WRRC and water community events, news, media appearances, announcements, and social media interaction opportunities.

The distribution lists grew by nearly 265 recipients to more than 2,000, resulting in increased website traffic, event attendance, and dissemination of WRRC news through other outlets. The Weekly Wave was redesigned for better mobile compatibility in time for the first Weekly Wave of 2016.

## Arizona Water Resource

➤ [wrrc.arizona.edu/publications/awr](http://wrrc.arizona.edu/publications/awr)



The WRRC's quarterly newsletter, Arizona Water Resource (AWR), appeared in January, April, July, and October, 2015. In addition to electronic distribution, print copies are mailed to approximately 1,800 subscribers. The Winter 2015 issue contained a 4-page fact sheet from the WaterRAPIDS program, Roadmap for Considering Water for Arizona's Natural Areas.

A spring insert described a NOAA funded project, Groundwater, Climate and Stakeholder Engagement (GCASE), and the summer insert was 2014 At-a-Glance, an infographic showing highlights from the WRRC's 2014 Annual Report. Several WRRC students contributed substantive articles to the AWR in 2015. In addition, the AWR provided an opportunity to shine a spotlight on some of the WRRC's exceptional students. Guest Views were provided by Chuck Graf, Senior Hydrologist at the Arizona Department of Environmental Quality, and Joseph Olsen, General Manager of the Metro Water District. Following up the WRRC's Annual

Conference, Indigenous Perspectives on Sustainable Water Practices, the AWR dedicated its fall 2015 issue to views of the conference and fostering continued dialogue. The Agnese Nelms Haury Program in Environment and Social Justice funded the printing of this 16-page newsletter, and printed copies were distributed to all participants at the November 2015 Arizona Town Hall on water. Electronic copies were sent to all the Annual Conference attendees.

## Arroyo

➤ [wrrc.arizona.edu/publications/arroyo](http://wrrc.arizona.edu/publications/arroyo)



The topic for the Arroyo, WRRC's annual newsletter on a single topic of timely interest to Arizona, is selected each year with EAC guidance. In 2015, the topic selected was "Closing the Water Demand-Supply Gap in Arizona". Publication was delayed until early in August 2015 because of the need for multiple reviews of this complex topic. External reviews were provided by individuals from many EAC member organizations, including Tom Buschatzke and Michelle Moreno (Arizona Department of Water Resources), Chuck Cullom (Central Arizona Project), Rebecca Davidson (Salt River Project), Ron Doba (Northern Arizona Municipal Water Users Association), Kathy Ferris (Arizona Municipal Water Users Association), Carly Jerla (U.S. Bureau of Reclamation), Juliet McKenna (Montgomery & Associates), and Bill Plummer (Agribusiness and Water Council of Arizona).

Nejlah Hummer, an MS student in Planning, was selected from a highly talented applicant pool as the Montgomery & Associates Summer Intern at the WRRC to work on the 2016 Arroyo on potable reuse of water, its potential and challenges. She produced a first draft over the summer, which has undergone revisions and will be sent out for review in February 2016. Printing and mailing of the 2016 Arroyo will be funded by a donation from Carollo Engineers. The intern is supported by an annual donation from Montgomery & Associates, water resource consultants

## Brown Bags

➤ [wrrc.arizona.edu/events/brownbag](http://wrrc.arizona.edu/events/brownbag)



The WRRC's Brown Bag seminar series has continued to draw diverse audiences to hear a range of speakers on water-related topics of interest. In 2015, the WRRC held 17 Brown Bag seminars. Speakers included state, national, and international experts. Average attendance was 20 people (in person), approximately 55 percent from UA and 45 percent from the broader community. Seminars that drew large audiences included Robert Glennon, Regents' Professor/Morris K. Udall Professor of Law and Public Policy in the Rogers College of Law at UA, who spoke on "Shopping for Water: How the Market Can Mitigate Water Shortages in the American West"; Gary C. Woodard, Senior Water Policy and Economics Consultant, Montgomery and Associates, speaking on "The Surprising Slide in Domestic Demand: Be careful what you wish for"; and Mike Crimmins, Associate Professor, Department of Soil, Water and Environmental Sciences and Associate Extension Specialist, UA, speaking on "El Niño 2015-16: Godzilla or Mothra?"

Access to the WRRC's Brown Bag series now routinely includes offsite listeners through live webcasts via Go-to-Webinar and in-house video coverage. Offsite attendance continues to grow and in 2015, 160 participants attended Brown Bag seminars as webinars. Recorded Go-To-Webinar can be viewed on the WRRC website. The slide presentations of most seminars are also available for viewing on the website.

## Annual Conference

➤ [wrrc.arizona.edu/conference](http://wrrc.arizona.edu/conference)



Each year the WRRC organizes a major conference on an important water resource topic. A program of experts is assembled with the aim of engaging and informing a broad audience. We are grateful every year to our roster of sponsors who make it possible to keep registration fees attractively low to everyone.

The 2015 Conference, Indigenous Perspectives on Sustainable Water Practices, was held June 9-10 at the Wild Horse Pass Hotel and Casino in Chandler, AZ in partnership with the Gila River Indian Community. The conference attracted more than 330 participants from six states, 49 cities, and 13 tribal nations. Thirty-three speakers with ties to Native American communities across Arizona presented diverse perspectives. The agenda was developed through the efforts of conference co-chairs WRRC Associate Director Jean McLain and Dr. Karletta Chief, Department of Soil Water and Environmental Science,

with guidance from a conference advisory committee made up of individuals with links to Arizona's tribal nations. In addition, conference sponsors enabled us to reach a broad-based set of participants. Truly a group effort, the conference was supported logistically by Administrative Associate Jane Cripps until her retirement in May 2015, when Marie-Blanche Roudaut was employed temporarily to take over these responsibilities.

The 2016 Annual Conference is titled, #AZwaterfuture: Tech, Talk, and Tradeoffs. Scheduled for March 21st at the UA Student Memorial Union in Tucson, the conference focus is on innovative ideas and approaches in the realms of technology, communication, and policy. Planning began in mid-2015, and Anne Castle, former Assistant Secretary for Water and Science, agreed to give a keynote.

## Other Public Events

The WRRC has sponsored, co-sponsored, and hosted a number of events for a broad range of interests. Our annual February Chocolate Fest provided an opportunity for our friends in the water community to meet informally. Co-sponsored speakers included Lester Snow, Executive Director, California Water Foundation, who spoke on "Drought and Sustainable Water Management in California: Behind the Scenes". The WRRC and Water Sustainability Program (WSP) sponsored a Water Policy Forum: Arizona Solutions to Colorado River Supply Challenges, convened by Senator Jeff Flake on March 10, 2015, at the UA Center for Creative Photography. WRRC Director Sharon B. Megdal



**Susanna Eden, PhD,** WRRRC Assistant Director, participates in research, outreach, and engagement activities and manages the federal WRRRA section 104 Program. In 2015, she contributed to writing and editing of the background report for the 107th Arizona

Town Hall and compiled the WRRRC's 2014 Annual Report. She is a co-editor with the WRRRC Director of a special issue of the online journal *Water*, which will appear in 2016. She is a member of the team developing the "Beyond the Mirage" project, which is implementing an innovative concept for providing accurate and objective information on water issues to the layperson through hundreds of short video clips that can be sequenced by the viewer and shared on social media. Along with other team members, Kerry Schwartz, Brittany Xui, and Ashley Hullinger,

she advised on content development, contributed to the winning application for the New Arizona Prize Water Consciousness Challenge, vetted video clips, and participated in planning and implementation of publicity and fund raising campaigns for the project. She was responsible for the Montgomery & Associates Summer Writing Internship at the WRRRC and oversaw development of the annual *Arroyo* publication. She bears primary responsibility for the *Arroyo* and *Arizona Water Resource (AWR)* newsletters, for which she writes and edits. She also participate is producing the *Weekly Wave*. In addition, she contributed to planning and implementation of the annual conference and other sponsored and co-sponsored events, responded to inquiries on water related subjects from the public, and made presentations on research projects and other water resources topics. She also serves on the UA Appointed Professionals Advisory Council and its policy committee.

spoke and moderated a panel featuring: Tom Buschatzke, Director, ADWR; Marie Pearthree, Deputy General Manager, CAP; and Alan Forrest, then Director, Tucson Water. On April 14th a film showing and panel discussion, *Restoration of the Colorado River Delta: One Year After*, was co-sponsored with WSP in the Gallagher Theater, UA Student Union Memorial Center. Director Megdal moderated the panel that included Yamilett Carrillo, Executive Director, Delta Water Trust; Karl Flessa, Professor, UA Department of Geosciences and Co-chief Scientist for the Colorado River Delta Monitoring Program; and Francisco Zamora Arroyo, Director, Colorado River Delta Legacy Program, Sonoran Institute. On November 6th the WRRRC, in collaboration with CAP, hosted a community forum to engage citizens of southern Arizona in discussion of regional water issues. Lisa Atkins, President of the CAP Board, opened the forum and the keynote was given by Tom Buschatzke. Megdal moderated a panel of experts and community leaders who provided their perspectives and answered questions from the audience. The WRRRC also co-sponsored the *Native Eyes Showcase*, on November 8th, which consisted of multiple events including a resource fair and film screening at the Loft Cinema in Tucson.

## WRRRC Communications and Website

➤ [wrrc.arizona.edu](http://wrrc.arizona.edu)

Communications efforts at the WRRRC continued to expand in 2015. Communications staff regularly submitted WRRRC news, events, and accolades to University channels. Externally, the WRRRC has been featured over 21` times across a variety of news and media outlets. Efforts continued throughout the year to expand the WRRRC's social media visibility on Facebook, Twitter and YouTube, resulting in increased shares, views, retweets, follows, and likes. Twitter followers of the WRRRC grew to 217, adding one new follower a day in the last three months of the year, and the WRRRC Facebook page surpassed 280 likes. The Center also created an infographic for each of its programs to be used in presentations, publications, and social media posts. These infographics were added to the WRRRC website and used in print and presentations to publicize the impacts and accomplishments of programs and activities.



**John Polle** creates, develops, and manages content for the WRRC website, as well as keeping up with the ongoing maintenance of the site. He designs printed and digital outreach materials for the WRRC and the various programs associated with the Center. He also manages and provides support for the audio and visual needs of the WRRC and when necessary, provides IT support. In 2015, he completed the development of the UA Water Network website and worked closely with students to create content for this site. He created marketing pieces for WRRC programs and engagement activities. He worked with the Conserve2Enhance program, both maintaining their website and creating print and digital materials to be used by participants and students. He also began the process of working with the College of Agriculture web development team and a WRRC

committee on the redesign of the WRRC website.

The WRRC website continues to feature news, events, and programs, as well as publications and other resources. Video recordings of select Brown Bag Seminars were made readily available directly through the WRRC website via a searchable video gallery ([wrrc.arizona.edu/video-gallery](http://wrrc.arizona.edu/video-gallery)). The website also made available audio recordings from the November 6, 2015 community forum and a PDF of the background report for the 107th Arizona Town Hall, created with WRRC participation. A major redesign and update of the website in collaboration with the UA College of Agriculture and Life Sciences information technology team was planned to debut in 2016.

Digitized archival copies of 384 past WRRC publications were made available through the University of Arizona Libraries' Campus Repository.

## Presentations and Posters

The WRRC is called upon frequently to inform audiences about Arizona water and our water management practices and policies. On May 29th the WRRC provided a 90-minute briefing to U.S. Representative Martha McSally on Arizona water issues. Throughout the year, WRRC faculty, staff and students make many presentations, both oral and poster format, locally, nationally, and internationally. A list of WRRC presentations can be found in Appendix B.

## A WINNING TEAM: FACULTY, STAFF, AND STUDENTS

The WRRC depends on the team efforts of our personnel, including undergraduate and graduate students. Day-to-day operations, overseen by Director Megdal, are supported by the significant contributions of the administrative staff, who also aid with the special needs of individual programs.



**Brittany Xiu**



**Jackie Moxley**



**Jane Cripps**

There have been a few departures and additions to the WRRC team in 2015. Jane Cripps, retired in May and in September, Georgine Speranzo stepped into the Administrative Associate position. In June the WRRC said goodbye to retiring Jackie Moxley, Program Director for the TRIF-WEES Water Sustainability Program and long-time WRRC employee. Her position was filled by Claire Zucker, who brings 23 years of experience with regional water and environmental issues with her from the Pima Association of Governments. Outreach Coordinator, Brittany Xiu left a gap with her departure in September. Picking up some of Xiu's responsibilities, Ashley Hullinger became Research Coordinator in October after working for two years in the Water RAPIDS program as a graduate research assistant. A directory of our staff can be found at [wrrc.arizona.edu/personnel-directory](http://wrrc.arizona.edu/personnel-directory).



**LaVonne Walton**, Business Manager, provides a high level of service to all members of the WRRRC community. As Fiscal Officer for the WRRRC and Arizona Project WET, she has responsibility for the Center’s financial and human resource operations, grant submissions and management.



**Georgine Speranzo**, Administrative Associate, worked at the WRRRC from September 2015 to February 2016, replacing Jane Cripps after her retirement. She assumed administrative duties and operational functions necessary to accomplishment of WRRRC

objectives, including maintaining the Director’s calendar providing her administrative support, contributing to the organization of the Annual Conference, Brown Bag Seminars, and distribution of the WRRRC’s publications.



**Lynette Featherston**, Office Assistant, is a valuable team member, fielding inquiries from the public and overseeing preparation of WRRRC facilities for events. She assists the Administrative Associate and Business Manager and handles exceptional tasks as they arise.

## Students

Students are an important part of our workforce, and we provide them with meaningful learning opportunities through our many projects. The WRRRC employed 43 students in 2015. Those students are listed below.

Aleman, Miriam

Amaro-Silva, Joaquin

Barker-Perez, Emma

Batts, Iesha

Bernat, Rebecca

Bonfield, Jana

Brill-Duisberg, Emilie

Bui, Nicole

Callaway, Kristen

Capehart, Mary Ann

Clinkenbeard, Dixie

Currie, Jordan

Delano, Nathaniel

DeMoulin, Jade

DeWalt, Emily

Diaz, Krystalle

Farah, Amina

Fullerton, Christopher

Gebremariam, Reshet

Gray, Erin

Gudvangen, Emily

Hancock, Scott

Huang, Ling-Yee

Hullinger, Ashley

Hummer, Nejliah

Joe, Valerisa

Kennett, Bailey

Kleiman, Beth

Miller, Hennessy

Nelson, Craig

O'Neill, Brian

Posegate, Ann

Prescott, Alexander

Riccio, Joshua

Richard, Danielle

Roudaut, Marie-Blanche

Serwon, Daniel

Tapia, Elia

Trimble, McKenzie

Vimont, Ethan

White, Alissa

Wilkening, Patrick

Zimmermann, Nicholas

## Awards and Recognitions

Jean E. McLain serves on the editorial boards of two peer-reviewed journals and in January 2016 begins a 3-year appointment as Technical Editor for Agronomy Journal.

In September 2015, the Water RAPIDS program received an Award of Merit for work on environmental education and communication at the Arizona Forward Environmental Excellence Awards.

The Beyond the Mirage project won the first-ever New Arizona Prize Water Consciousness Challenge, which carried an award of \$100,000.

# ANNUAL FINANCIAL REPORT

WRRC Annual Financial Report, 2015 (ending December 31, 2015)		
SOURCES	2014	2015
State Appropriations	\$557,640	\$546,885
Federal Grants	\$106,209	\$246,936
WRRRA / NIWR Funds	\$138,990	\$127,867
State Grants	\$40,569	\$161,062
Private or Other Grants	\$100,158	\$411,252
Sales and Services Activities	\$250,118	\$303,025
Technology and Research Initiative Fund (TRIF)	\$388,395	\$392,146
Gifted Funding	\$564,249	\$233,249
	\$2,146,328	\$2,422,422
USES		
Salaries and Wages	\$1,083,871	\$1,191,217
Fringe Benefits	\$340,340	\$391,965
Operational Costs	\$524,267	\$697,617
Capital Equipment	\$13,472	\$0
	\$1,961,950	\$2,280,799
<b>REVENUE AVAILABLE – December 31, 2015</b>	<b>\$184,378</b>	<b>\$141,623</b>

## SOURCES

**State Appropriations:** State General Fund and tuition collections appropriated to the College of Agriculture and Life Sciences by the State of Arizona. Partial funding is provided for administrative salaries, operations and travel. These monies are distributed to administrative accounts and Sharon B. Megdal and Jean E. McLain’s Hatch Project.

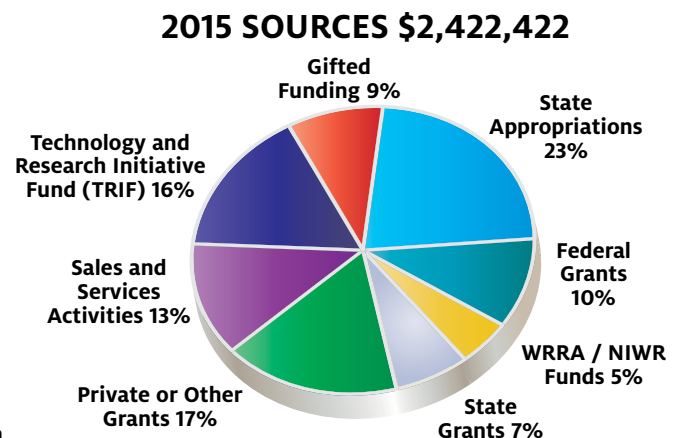
**Federal Grants:** Monies received for awarded competitive national federal grants, and federally-funded cooperative agreements awarded to the WRRC.

**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. In 2015 the WRRC received an annual allocation of \$92,335 which funded two research grants [see Section II, Part I (a)]. The remaining monies were used to support administration of the 104(b) program and personnel and activities dedicated to Information Transfer. The grant period is March 1st, 2015 through February 29th, 2016.

**State Grants:** Revenue provided by the State of Arizona through competitive grants awarded to the WRRC. In 2015 the Arizona Department of Water Resources, and the Arizona Department of Agriculture provided new and continued funding for multi-year grants.

**Private or Other Grants:** Revenues received by the WRRC through the University and the UA Foundation from local, county and state governmental agencies (non-competitive), and NGO’s. In 2015, the WRRC received funding from Central Arizona Project (CAP), City of Tucson, the Abbott Fund, Freeport McMoran Copper and Gold, and the Arizona Community Foundation, among others.

**Sales and Service Activities:** Revenue from one-time transactions accrued over time by the WRRC from publication



sales, annual conferences, and miscellaneous services. These monies include fees charged by Arizona Project WET to hold Water Festivals in cities across the state.

Technology and Research Initiative Fund (TRIF): Revenue from the Technology and Research Initiative Fund (TRIF), a state sales tax- derived funds supporting a range of programs at the Arizona’s three state universities. TRIF funding is allocated to the UA Water, Environmental and Energy Solutions (WEES) initiative, which provides direct support to WRRC and also funds the Water Sustainability Program (WSP) housed at the WRRC. Only WEES funds awarded to WRRC and WSP funds managed by the WRRC are included in this report.

Gifted Funding: One-time gifts from individuals and companies and revenue generated by endowment interest bearing accounts. These funds are used to support WRRC programs, including Arizona Project WET.

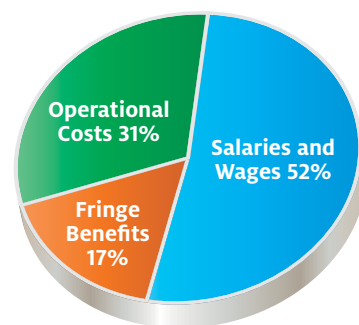
## USES

Salaries and Wages: Expenses include salaries, wages and supplemental compensation paid to WRRC faculty, appointed personnel, classified staff, graduate assistants, and student hourly employees. WRRC funding provided salary support to employee groups as follows: faculty-15%; appointed personnel-45%; classified staff-17%; graduate students-5%; student hourly and undergraduate wages-18%.

Fringe Benefits: Costs of employee fringe benefits (ERE), background checks, and required employee training.

Operational Costs: Expenses include: administrative service charges, Indirect Costs, stipends, lecturer’s fees, participant support and temporary labor; sub-contractual research agreements for 104(b) grants at Arizona State University (ASU) and Northern Arizona University (NAU); printing and publications; communications; office, research, educational, and general supply; employee travel; conference registration fees; membership dues; facility and vehicle rental; business meetings; UITS FTE network funding (Access to University communication systems for staff) ;building maintenance and upgrades.

**2015 USES \$2,280,799**



## REVENUE AVAILABLE – December 31, 2015

Balance available reflects monies in WRRC accounts as of December 31, 2015. Balance includes State Appropriations and TRIF accounts that are budgeted on a fiscal year basis (7/1 to 6/30); Sales and Service Activities revenue from one-time transactions accrued over time by the WRRC. Monies also include; Federal, State, Private or Other Grants, and Gifted Funding that are provided on varying annual schedules.



**wrrc.arizona.edu**

350 N. Campbell Ave. • Tucson, AZ 85719 • (520) 621-9591