



# WATER RESOURCES RESEARCH CENTER

Annual Report 2013



THE UNIVERSITY OF ARIZONA

College of Agriculture  
& Life Sciences

Cooperative Extension



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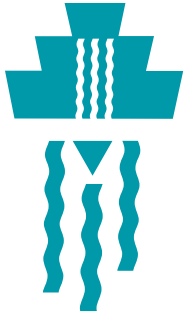
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Appendices are available online at [wrrc.arizona.edu/annual-report-2013](http://wrrc.arizona.edu/annual-report-2013)

**Appendix A:** 2013 Strategic Planning Metrics and Partnership Matrix

**Appendix B:** Supplemental Information

**Cover photo:** Watson Lake in Prescott, Arizona, by Frank Postillion



# Expanding Understanding of Water Resources Science and Policy in Arizona and Beyond

With a dual identity of research and extension, the Water Resources Research Center (WRRC) is a unit within the University of Arizona College of Agriculture and Life Sciences. WRRC programs and activities support its mission to promote understanding of critical state and regional water management issues through research, outreach and education. In accordance with the University's "Never Settle" strategic planning policy, the WRRC is implementing the vision described in its 2012 Strategic Plan by creating and exploiting opportunities for applied research, community engagement and educational impact, while sustaining a reputation for excellence. With local, regional, national and international projects, the WRRC is positioned to identify solutions across the spectrum of water resource challenges.

Strategic Plan revisions in 2013 focused attention on the many WRRC partnerships that expand the impact of projects and programs throughout the water community and beyond. A partnership matrix is included in Appendix A along with tabulations of metrics that demonstrate the WRRC's progress toward Strategic Plan goals.

# WRRC Director



**Sharon B. Megdal, Ph.D.**, has been Director of the WRRC since 2004, managing a budget of approximately \$2 million dollars from state, federal and private sources. In 2013, she oversaw the work of its 18 full- and part-time staff and 53 students on activities in support of the WRRC mission and conducted a full program of collaborative research. Her work has focused on water resources management and policy, on which she writes and frequently speaks.

Dr. Megdal is the C.W. and Modene Neely Endowed Professor for Excellence in Agriculture and Life Sciences; she also holds the title Distinguished Outreach Professor. She is Professor and Specialist in the UA Department of Soil, Water and Environmental Science, and Director of the Water Sustainability Program, a component of the Technology and Research Initiative funded Water, Environmental, and Energy Solutions Initiative, which she co-directs. She is involved in several of the projects described in this report, often as Principal Investigator. In 2013, she produced many publications and presentations (see Appendixes B-6 and B-7), including the Keynote at the Securing our Water Future: Challenges and Solutions, International Water Conference at Sias University in Zhengzhou, Henan Province, China. January 2013 saw the publication of an edited volume of papers on Arizona-Israeli-Palestinian water issues. She taught her graduate Arizona Water Policy class in the Spring 2013 semester to a full group of 15 students and provided her time to advise graduate students as committee chair or member. The director's page on the WRRC web site can be found at <http://wrrc.arizona.edu/sharon-b-megdal>. Along with her Curriculum Vitae, it links to many of her publications, including all of the public policy columns she has contributed to the Arizona Water Resource, the WRRC's quarterly newsletter.

At UA, Dr. Megdal is a member of the Arid Lands Resource Sciences Graduate Interdisciplinary Program and serves on its Executive Committee. Dr. Megdal also is a member of the Institute of the Environment and the Center for Middle Eastern Studies Advisory Board, and she remains deeply involved in the Masters in Water, Society and Policy program. She holds courtesy appointments with the UA School of Geography and Development, the Mel and Enid Zuckerman College of Public Health, the James E. Rogers College of Law and several other units on campus.

In addition, Dr. Megdal, holds several positions in the broader water community. She was elected to a six-year term on the Central Arizona Water Conservation District Board of Directors in 2008. A member of the National Institutes for Water Resources since 2004 and on its board since 2011, her term as President-Elect began October 1, 2013. As President-Elect, she spent time in 2013 organizing the February 2014 annual meeting. In 2013, Dr. Megdal was appointed to the Board of Directors for the Western Regional Development Center, for a term beginning in January 2014. She was also elected to the Board of Directors of the Universities Council on Water Resources (UCOWR), with her term beginning in June 2013. In addition, she was appointed to the national Water Resources Working Group for the Association of Public and Land-Grant Universities. International activities included involvement in programs related to transboundary aquifers, groundwater governance, and comparative policy analysis.

# External Advisory Committee

Leaders in the Arizona water community give their time to serve on the WRRRC External Advisory Committee (EAC), providing valuable advice on WRRRC programs and strategies. On December 6, 2013, the annual meeting of the EAC was held at the Nina Mason Pulliam Rio Salado Audubon Center in Phoenix, Arizona. The EAC members as of December 2013 are listed below with their affiliations as of that date.

**Maria Baier**, *Sonoran Institute*

**Ann Becker**, *Arizona Public Service*

**Guy Carpenter**, *Carollo Engineers*

**Randy Chandler**, *U.S. Bureau of Reclamation*

**Mark Cross**, *Montgomery & Associates*

**Henry Darwin**, *Arizona Department of Environmental Quality (ADEQ)*

**Sandra Fabritz-Whitney**, *Arizona Department of Water Resources (ADWR)*

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

**Alan Forrest**, *Tucson Water*

**William Garfield**, *Arizona Water Company*

**Patrick Graham**, *The Nature Conservancy*

**Andy Groseta**, *Groseta Ranches*

**Joe Gysel**, *EPCOR Water USA Inc.*

**Trevor Hill**, *Global Water*

**James Leenhouts**, *U.S. Geological Survey*

**John Lewis**, *Inter Tribal Council of Arizona, Inc.*

**David Modeer**, *Central Arizona Project*

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

**Cliff Neal**, *City of Phoenix*

**Sarah Porter**, *Audubon Arizona*

**Dave Roberts**, *Salt River Project*

**Joe Sigg**, *Arizona Farm Bureau Federation*

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

**Bob Strain**, *City of Sierra Vista (retired)*

**Mark Stratton**, *Metropolitan Domestic Water Improvement District*

**Chris Udall**, *Agri-Business and Water Council of Arizona*

**Nan Walden**, *Farmers Investment Company (FICO)*

**Sid Wilson**, *Central Arizona Project (retired)*

**Ron Wong**, *BKW Farms*

# Integrated Research and Outreach for Knowledge Creation and Relationship Building

The WRRRC is a leader in producing and communicating useful water resources science through stakeholder engagement. Projects and programs support real world solutions to water resource planning and management concerns. Projects are funded through grants from federal agencies, charitable foundations and the State of Arizona, including UA's Technology and Research Initiative Fund and the Arizona Department of Agriculture. A summary of projects and funding awards can be found in Appendix B-1.

## FEDERAL WATER RESOURCES RESEARCH ACT SECTION 104 PROGRAM

The WRRRC is the federally authorized water resources research institute for Arizona. The Water Resources Research Act (WRRRA) funding supports a competitive research grants program, open to researchers at all three Arizona universities, and a portion of the WRRRC information transfer activities and programs. For several years, the WRRRC has received \$92,335 annually and distributed research funds ranging from \$30,000 to \$55,000 for three to five grants, averaging \$10,000. The WRRRA also funds a nationally competitive 104(g) grants program. The WRRRA funding flows through the federal USGS budget and any WRRRA grants awarded for research at Arizona universities are administered by the WRRRC. Historically, the 104(g) program has been funded at \$900,000 to \$1,000,000 annually, but in 2013 the program was not funded.

Due to sequestration and other budget constraints, WRRRA water research institutes across the country suffered cuts in funding in 2013. The WRRRC received only \$55,525, resulting in a shortfall of \$36,810. The WRRRC absorbed the cutback in funding by using local revenues and some salary savings through grants. Despite the unexpected funding cut, the WRRRC was able to award grant monies to four research projects. A list of these projects can be found in Appendix B-2. The total amount of funding committed to these four projects was \$39,024. <http://wrrc.arizona.edu/wrra-104-grants>

## WATER QUALITY RESEARCH PROGRAM

WRRRC Associate Director Jean McLain continued her laboratory studies focused on establishing the environmental and public health safety of using recycled water for irrigation of food crops. Through 2013, multiple collaborative projects were housed in the McLain laboratory, including "Dredging Influences on Canal Water Quality". This ongoing project examines the potential for downstream adverse water quality impacts from re-suspension of contaminants that may occur during maintenance of irrigation canals. The analysis of data collected over two years will result in improved management practices for growers of fresh produce in Yuma, Arizona. Another project, "Assessing biological and chemical quality of harvested rainwater in Arizona: Can in-line carbon filters decrease health risks?", is a collaborative effort with the UA Laboratory for Emerging Contaminants, establishing the quality of rainwater harvested from Tucson rooftops. Two projects in the McLain laboratory focused on the development of antibiotic resistance in soil and water bacteria exposed to anthropogenic stressors. The Research Corporation for Scientific Advancement funded Tucson high school science teacher Kourtney Brown in the McLain laboratory for the summer of 2013, with funding continuing through the summer of 2014, for a project titled, "The critical challenge of antibiotic resistance: are wastewater treatment plants a concern?"



**Jean E. McLain, Ph.D.**, Associate Director of the WRRRC, also holds positions as Associate Research Scientist at the WRRRC and in the Department of Soil, Water and Environmental Science. She directs research projects focusing on the public health implications and environmental risks of using recycled municipal wastewater for irrigation. In 2013, heightened concern regarding the development of antibiotic resistance in soils irrigated with recycled water led to numerous speaking invitations for McLain, including a plenary talk at the Soil Science Society of America International Meeting in Tampa. McLain also received funding in 2013 from the USDA to host a workshop, “Antibiotics in Agroecosystems: State of the Science,” to bring renowned scientists from across the United States, Europe and the Middle East to discuss current methodologies for assessing antibiotic resistance in environmental samples. McLain continues to represent the WRRRC on

expert panels, including the City of Tucson’s Citizens’ Water Advisory Committee and the Flagstaff City Manager’s Advisory Panel on Contaminants of Emerging Concern, and is also active in professional societies, including the Soil Science Society of America, WaterReuse Research Association and Arizona Water Association. She also holds the position of Associate Editor for both the *Agronomy Journal* and the *International Journal of Water Science*.

Funding from the USGS 104b Grants Program supported undergraduate researchers addressing the question, “Do simple carbon additions induce resistance in environmental bacteria?”

In 2013, the 900-square foot McLain lab in the Marley Building provided training to three undergraduate students from the Department of Veterinary Science and Microbiology and the Department of Physiology. In that year the McLain lab also served as a training venue for nearly a dozen graduate students, with some students traveling from as far away as Penn State University for training in molecular and cultural techniques for analysis of microbial communities in soil and water samples.

## **GROUNDWATER, CLIMATE AND STAKEHOLDER ENGAGEMENT (GCASE)**

In 2013 the WRRRC completed the first year of a two-year NOAA funded project with titled, “Incorporating Climate Information and Stakeholder Engagement in Groundwater Resources Planning and Management.” This project uses an innovative modeling framework to account for climate variability and employs robust stakeholder engagement strategies to increase the capacity of water managers to understand the potential impacts of changes in precipitation patterns on groundwater resources. A four-person Project Advisory Committee, which includes representatives of USGS, ADWR, SRP, and the City of Nogales, has provided expert assistance throughout the project. The WRRRC is responsible for coordinating stakeholder engagement activities and contributing to the “translation” of the scientific data and model results, which include climate information, surface water and groundwater hydrology, and scenario analysis. Activities also include identifying and expanding the roster of engaged stakeholders, developing mechanisms for stakeholder communication, and planning project workshops to optimize stakeholder understanding. Three project workshops have been held since October 2012 and a series of future workshops was planned to explore the transferability of the scientific and stakeholder methodologies. <http://wrrc.arizona.edu/GCASE>

## **GROUNDWATER GOVERNANCE AND MANAGEMENT**

Multiple WRRRC-based research projects of national and international scope explore how groundwater is governed. Results of a national-scale survey of state water agency officials in the U.S., carried out in cooperation with the Udall Center for



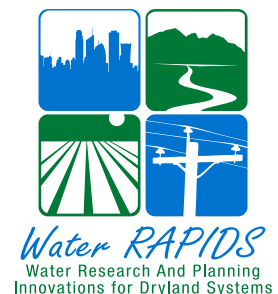
**Susanna Eden, Ph.D.**, is the WRRRC's Assistant Director and participates in multiple research and outreach activities. She also manages the federal WRRR section 104 program. In 2013 she was responsible for stakeholder engagement in the GCASE project and was Principal Investigator on the Desert Landscape Conservation Cooperative's Bureau of Reclamation WaterSmart project. Part of the Desert Water Harvesting Initiative, this project developed a toolbox of assessment tools for communities considering water harvesting as a strategy to achieve multiple benefits at multiple scales. She edited the quarterly newsletter, *Arizona Water Resource*, and compiled the *WRRRC's 2012 Annual Report*. She managed the Montgomery & Associates Summer Writing Internship at the WRRRC and oversaw development of the annual *Arroyo* publication. 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 results and other water resources topics. She also serves on the UA Appointed Professionals Advisory Council and its policy committee.

Studies in Public Policy, were reported in May 2013 and are posted on the WRRRC web site. Reports and articles by Sharon B. Megdal on groundwater governance and management are also posted on the program page. Internationally, Dr. Megdal continued to participate in a project that raises awareness of the importance of groundwater resources globally and promotes best practices in groundwater governance. The project is jointly supported by the Global Environment Facility (GEF) and implemented by the Food and Agriculture Organization of the United Nations (FAO), jointly with UNESCO's International Hydrological Programme (UNESCO-IHP), the International Association of Hydrologists (IAH) and the World Bank. <http://wrrc.arizona.edu/groundwater>

## Reaching into the Community to Foster Sustainable Water Uses

### WATER RESEARCH AND PLANNING INNOVATIONS FOR DRYLAND SYSTEMS (Water RAPIDS)

In Fall 2013, the Environmental Water Program changed its name to Water Research And Planning Innovations for Dryland Systems (Water RAPIDS). The Water RAPIDS program focuses on new approaches to water resource management that integrate traditional natural resources planning with land use planning. The program's goal is to help communities balance a secure water future for residential, commercial, industrial and agricultural sectors with the water demands of the natural environment. Planning for people and natural resources together can lead to a more sustainable future by strengthening local and regional economies and supporting the ecosystems that contribute to the high quality of life in the Southwest. <http://wrrc.arizona.edu/waterrapids>





## In 2013 the Water RAPIDS program included four projects:

### 1) Conserve to Enhance (C2E)

C2E is a unique, voluntary program that motivates water savings by linking water conservation efforts with community and regional environmental enhancement. Participants conserve water and then donate the value of the water saved to a C2E fund that supports enhancement projects. Community priorities determine the choice of projects, which range from green infrastructure to riparian restoration. In 2013, the C2E program expanded through creation of a C2E Program Design Guide and a new C2E Water-Use Dashboard ([conserve2enhance.org](http://conserve2enhance.org)). The open source Dashboard provides participating water users with information about their water use, tips on how to conserve and the opportunity to donate to local or regional C2E programs. Program managers can access a database-driven back-end to monitor participants' water savings and donations. The Dashboard is available to utilities, non-profits, and other interested users at no cost. <http://wrrc.arizona.edu/conserve2enhance.html>

### 2) Connecting the Environment to Arizona Water Planning (EnWaP)

The EnWaP project, funded by the Nina Mason Pulliam Charitable Trust, engages individuals and groups at the local, regional and state levels to explore what it means to consider the environment in water management and planning. This project is working to establish dialogue among water users about voluntary, stakeholder-driven options for considering water for the environment in the context of limited water supplies and existing water rights. The project provides information on environmental water needs and technical support to communities for water management and planning. In 2013 the project team worked to create a "Roadmap" for determining if and when environmental water demands should be considered in Arizona water planning and management. In addition EnWaP completed a spatial and tabular database of all information on environmental flow needs in Arizona. Since its release, the database has been downloaded by stakeholders ranging from the federal government to local non-governmental organizations. A webinar, requested by stakeholders, was presented in the fall.

An EnWaP Steering Committee, including representatives from the Agribusiness Council of Arizona, Arizona Farm Bureau, Freeport McMoran, U.S. Bureau of Reclamation, Metro Water, Salt River Project, Arizona Cooperative Extension, Western Resource Advocates, Arizona Game and Fish and Tribal interests, guided the Roadmap development process and served as a sounding board for project ideas. Roadmap development was launched March 4, 2013, at a roundtable led by the



**Kelly Mott Lacroix** has worked as a Research Analyst in the Water RAPIDS program since July 2012. As part of the Water RAPIDS team, she works at the local, watershed and statewide level to improve water management through the use of Geographic Information Systems (GIS), data collection and management and engagement with stakeholders. Her projects in 2013 included: creation of the *Atlas for the Upper Gila River Watershed*; convening of focus groups across the state to develop an understanding of perspectives on providing water for natural resources; conduct of research and community engagement in support of a water resources management program for the Town of Clarkdale; and completion of a spatial-tabular database that summarizes the state of the knowledge on environmental flow needs and responses in Arizona. She is also a Ph.D. candidate in Arid Lands Resource Sciences and won the prizes for best research presentation and best presentation linking science and society at the Fall 2013 Institute for the Environment Grad Blitz.



**Candice Rupprecht** worked at the WRRC for more than six years and led the Water RAPIDS team with Kelly Mott Lacroix and Brittany Xiu. Rupprecht's primary focus was the C2E program, for which she managed the Tucson C2E program, conducted outreach to communities throughout the Colorado River Basin and led the development of the C2E Water Use Dashboard — C2E's new online tracking and donation tool. She worked with Kelly Mott Lacroix on developing the Water Resources Management Program for the Town of Clarkdale, leading a public process and facilitating expert meetings for the town.



**Brittany Xiu** is the Outreach Coordinator for WRRC's Water RAPIDS team. Xiu divides her time primarily between the Conserve to Enhance (C2E) program and Connecting Environmental Water Needs to Arizona Water Planning (EnWaP) project. Working with Candice Rupprecht, she helped design and promote the online C2E Water Use Dashboard, expand C2E to include business partnerships and provide assistance to communities developing their own C2E programs. Xiu collaborated with Kelly Mott Lacroix to continue building the EnWaP Roadmap; throughout the year they hosted surveys, roundtable discussions and focus group interviews with Arizona stakeholders to advance discussions about considering water for natural areas in statewide water management and planning decisions.



In summer of 2013, **Aaron Lien** transitioned from his Research Analyst position at the WRRC to a new role as a Senior Researcher at the Udall Center for Studies in Public Policy. Prior to leaving the WRRC, Lien led two major projects: the Desert Landscape Conservation Cooperative (LCC) funded project to develop a watershed plan for the Upper Gila River Watershed and the development of a new website and interactive water conservation dashboard for the Conserve to Enhance program. Major accomplishments of these projects include the completion of a watershed atlas for the Upper Gila River Watershed and the C2E dashboard. Both projects are part of the larger WRRC Water RAPIDS program and are ongoing. Lien is also a Ph.D. student in the Arid Lands Resource Sciences Graduate Interdisciplinary Program.

WRRC and EnWaP Steering Committee, which focused on how, where and why the environment could be considered in water management and planning. To inform the roundtable, the WRRC wrote a white paper on the state of the policy and science for environmental water needs in Arizona. Between September and December 2013, the WRRC conducted more than 20 focus groups statewide. Designed to elicit natural resources values and opinions on the place of natural resources in water management, these focus groups gathered input from more than 200 different water users. <http://wrrc.arizona.edu/Water-for-the-Environment>

### 3) Participatory Watershed Assessment for the Upper Gila River Watershed

For the Participatory Watershed Assessment (Assessment) for the Upper Gila River, the WRRC has partnered with the Gila Watershed Partnership and Arizona Cooperative Extension on a project funded by the Desert Landscape Conservation Cooperative through the U.S. Bureau of Reclamation WaterSMART program. The Assessment is developing decision-making tools to support watershed planning for Arizona's portion of the Upper Gila River watershed. This two-year project is producing an evaluation of current watershed conditions and will analyze future scenarios generated through collaboration with stakeholders. In August 2013, the WRRC completed a database with 62 unique geospatial datasets



ranging from soil erodibility to instream flow right applications. The database was used to create an Atlas of the Upper Gila River Watershed, which contains more than 20 original maps. The Atlas, which includes the first Automated Geospatial Watershed Assessment model for the Upper Gila River Watershed, provided stakeholders with the necessary context for scenario planning in Phase II of the project. Also during 2013, the project team fostered extensive stakeholder engagement through regular meetings with the Watershed Assessment Advisory group and two unique events. The first was a science coordination workshop in Safford, Arizona, which brought together more than 40 scientists and land managers from across the watershed to share data and information, identify opportunities to coordinate on projects and contribute to the goals of this project. The second was a Shared History Timeline exercise in which everyone present for the exercise contributed to a timeline history of the Upper Gila River Watershed. <https://wrrc.arizona.edu/Gila-Watershed-Assessment>

#### 4) Town of Clarkdale Water Resources Management Program

Since January 2013, the WRRC has worked with the Town of Clarkdale, Arizona, to help develop a plan to balance the Town's water supply and demand. As the project facilitator, the WRRC is leading development of the Town's water management strategy, conducting research on best practices and tools for water resource management and helping organize public meetings. The WRRC reviewed more than 70 publications and water management plans to create a Clarkdale Water Resources Management Matrix, and in the summer of 2013, formed a 6-person advisory committee to help identify management strategy options for the Town. In addition, the WRRC hosted three public meetings in 2013. The first informed the citizens of Clarkdale about the general hydrology and water policy of the region, and the second displayed initial results of the groundwater model being developed for Clarkdale. The third meeting was a "Water Fair" attended by more than 40 citizens of Clarkdale to learn about options for a water resource management plan. Members of the advisory committee joined the project team at the Water Fair to provide additional expertise.



**Desert  
Water  
Harvesting  
Initiative**

#### DESERT WATER HARVESTING INITIATIVE (DWHI)

The WRRC established the Desert Water Harvesting Initiative (DWHI) to provide a forum for outreach and communication among utilities, practitioners of water harvesting, academics, and interested citizens. Created in 2010, the initiative has several components. The DWHI website serves as a clearinghouse providing access to research, activities and publications on water harvesting, low-impact development and green infrastructure. A Rainwater-

Stormwater Professionals Network (RSPN) meets semi-annually at the WRRRC through the auspices of the DWHI to keep members abreast of current and planned activities, resources, policy initiatives and data, through invited speakers and roundtable discussion. DWHI provides advice through an online directory of expertise on design, monitoring and research relating to water harvesting and green infrastructure. Through small grants from the UA student-run Green Fund, WRRRC installed water harvesting demonstration systems at its building, including two cisterns, a condensate collection system, and a weather station to provide data to correlate water harvesting potential with weather conditions. Water quality testing in 2013 included a monitoring study of the cistern water and sampling of the condensate for detection of pathogenic microorganisms. A two-year grant from the Desert Landscape Conservation Cooperative through the U.S. Bureau of Reclamation WaterSMART Program was near completion by December 2013. The project developed an assessment guide for communities to consider water harvesting as a method for realizing multiple benefits ranging from water supply conservation to water quality protection to urban heat island mitigation. The project benefited from the input of a Technical Advisory Committee composed of local experts and involved numerous presentations to local municipalities and water providers. The research product is a toolkit with an on-line interactive module, decision support worksheets and additional web-based resources targeted for use by communities in the desert Southwest. <http://wrrc.arizona.edu/DWHI>

## Innovative Educational Strategies for Water Resource Literacy

### ARIZONA PROJECT WET (WATER EDUCATION FOR TEACHERS)

Arizona Project WET (APW) sustains a number of programs that have contributed to water stewardship and STEM (Science, Technology, Engineering and Math) literacy through teacher professional development focused on 21st century skills and direct student outreach that delivers



**Kerry Schwartz** is an Associate Specialist with Arizona Cooperative Extension at UA and Director of the APW water education program. She is responsible for programs that teach science and STEM literacy and 21st Century learning skills to teachers, educators, K-12 students and community members. She works statewide, supervising 20 personnel located in three extension offices. Her geology and geohydrology education and experience enable her to deepen teachers' content knowledge about water resources through applied learning with real world examples and relevancy. During her tenure at the UA, she has raised over 3 million dollars to support APW programming and has sustained partnerships with corporations, foundations and governmental agencies. In 2013, she worked 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. Under her leadership APW won a 2013 Gold Award from the Association of Natural Resources Extension Professionals for its Water Scene Investigation educational publication and a Silver Award for excellence in leadership, planning, designing, delivering and evaluating a high impact Extension program. She was asked to serve on the Teacher Recruitment, Preparation, Retention, and Professional Development subcommittee of the UA STEM Center at the UA Flandrau Science Center and advises Arizona State University's Decision Center for a Desert City on the Water Sim Model.



**Mary Ann Stoll** is an Education and Technology Coordinator with Arizona Cooperative Extension at the University of Arizona, working with the APW water education program. Stoll develops and delivers curriculum and professional development in STEM literacy, 21st Century learning and 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. Her knowledge and extensive experience in engineering and education technology contribute to her insight into the challenges that teachers face and development of effective solutions to those challenges. Continued work with youth through the Phoenix Girls Chorus and FIRST Robotics help to maintain connections with today's youth.



**Betsy Wilkening** joined Arizona Project WET as the Tucson Water Education Coordinator in June 2013. She coordinated Tucson water education programs and developed lessons for use in the Tucson Academy centered on Tucson Water operations that utilize engineering concepts and technology. In August 2013, she traveled to the Arctic as one of 14 teachers chosen nationally for the Grosvenor Teacher Fellow Program. During this time she received media attention and created an educational blog. At the Arizona Science Teacher Association (ASTA) conference in October 2013, she co-presented a 3-hour workshop for teachers with the Champions for Change program to involve students in water-related service learning projects.

or extends classroom learning and community engagement. These programs include Teacher Academies, the Water Investigations Program, Arizona Water Festivals, School Water Audit Program and the Water Scene Investigations Program. Other APW programs that had a significant impact in 2013 include the Tucson Water Education Program and the Pinal County Water Education Program. In 2013, the APW team launched their new website: <https://arizonawet.arizona.edu/>. Through this informative and interactive site, sponsors, partners, teachers and future collaborators can explore the most up-to-date information and latest news about APW work, mission and goals.

## 1) Teacher Academies

In response to high demand, APW professional development workshops have been transformed into multi-day academies. Using water as an overarching theme, academies provide the support needed by 21st century teachers to adopt instructional practices that encourage students to apply their learning to develop ideas, design solutions and deliver positive change. APW staff invested 246 hours in the delivery of multi-day academies that assisted 139 teachers in evolving their instructional practices and curriculum units. Those teachers reported reaching 18,276 students annually.

## 2) Water Investigations Program

Through a partnership with The Nature Conservancy (TNC), APW developed the Water Investigations Program (WIP), which by the end of 2013 had engaged teachers, students, parents and volunteers in 13 cities across metro Phoenix





**Holly Thomas-Hilburn** is Coordinator of Applied Programs for the WIP. She has served as WIP coordinator since June 2012, and has been involved with WIP assessment and evaluation since the first pilot in the 2010-11 school year. She holds a Master's degree in Teaching and Teacher Education with an emphasis in environmental learning. Her work with the WIP includes supervision of the community coordinators, curriculum development, teacher professional development, and program assessment.



**Tara Oakes** began as a Community Coordinator with the WIP in January 2013 and quickly began attending field investigations at the Hassayampa River Preserve with the 20 participating schools. In October 2013, she moved from a half-time to a full-time position, supporting all 27 WIP teachers for the 2013-14 school year. This work encompassed 26 schools and approximately 2,600 students with whom she worked throughout the fall. She made groundwater and water conservation presentations in each classroom and conducted water audits with each school to install high efficiency faucet aerators that conserve water and money.

in understanding their connection to the Verde and Salt Rivers. Employing all components of APW programming, WIP students are transformed over the course of the school year by the opportunity to think creatively and critically about natural resources in their community, state and region. The School Water Audit Program (SWAP) and Water Scene Investigations (WSI) Program (home water audit) are part of the curriculum, engaging students in a meaningful, real-world STEM project. Over the last two years, students have saved an estimated 11.722 million gallons of water per year by installing water efficient technology. In 2013, WIP field investigation days at Hassayampa River Preserve engaged 1,363 students and 243 parents in 19 field days facilitated by 147 volunteers. In addition, more than 400 WIP students shared their work and ideas with each other, 50 adult observers and their 14 teachers at the end of year Symposium held at Phoenix College. The WIP students have been featured on Channel 12, Channel 3, Know99 Television and the Virtual Arizona Experience web site. WIP coordinators have been featured on Know 99 and the TNC's website.

### 3) Arizona Water Festival Program

Through 2013, Arizona Water Festivals (AWF), APW's longest running program, have engaged 66,957 fourth grade students and 2,470 teachers in learning about Arizona's unique water cycle, watersheds and groundwater systems. APW has also trained 2,188 community volunteers to deliver lessons in 26 communities. Ten water festivals were held in 2013 in Gilbert, Nogales, Flagstaff, Tucson, Verde Valley, Payson, Yuma, Florence, Chandler and Window Rock, serving 5,162 students, 197 teachers and 434 parents. The 470 specially trained volunteers provided 2,820 service hours in 2013.

### 4) Tucson Water Education Program

The Tucson Water Education Program has grown exponentially since its inception in 2005 and now delivers all APW programs through a long-term partnership with Tucson Water. Tucson Teacher Academies use the water distribution system to integrate real world engineering with math and science in the STEM curriculum. Tucson Water professionals



**Tina Sleeper**, APW Program Coordinator, joined the APW team in June of 2012. Working closely with APW team members, local coordinators, and Director Kerry Schwartz, Sleeper coordinates the statewide Arizona Water Festival program, which includes facilitating teacher professional development workshops, recruiting and training volunteers, and developing relationships with community organizations, businesses, and members. In 2013, she helped organize AWF programming in 10 communities located throughout the state, involving more than 5,100 students, 197 teachers, 434 parents, and 470 volunteers. In the summer and fall of 2013, Sleeper worked with the APW Director to expand the program with the help of additional sponsors and grants, laying the foundation for an anticipated 17 Arizona Water Festival communities in 2014.

assisted providing authentic experiences for the 25 academy participants. Twelve UA students and Americorps members were trained as learning facilitators to deliver direct student outreach in Tucson. The rarely understood but important component of the hydrologic cycle, groundwater, is taught using hands-on models in the classroom as part of the curriculum. Learning facilitators delivered 156 50-minute, in-classroom groundwater flow model presentations to 3,667 students. The Sweetwater Wetland Water Festival, also part of the program, engaged 3,393 students (144 classes) and 579 adult chaperons in two hours of hands-on learning. As part of the curriculum for third grade students, UA facilitators conducted interactive groundwater presentations in the classroom combined with a field trip to the local Sweetwater Wetlands. During the field trip students explored the water cycle, water conservation and the Tucson watershed and experienced the riparian area created as part of Tucson Water's reclamation process. At the middle school and high school classroom level, UA facilitators conducted a full exploration of the groundwater system using interactive models in 49 teachers' classrooms, instructing 1,178 students. Learning facilitators assisted three participating teachers in implementing the SWAP with 76 students. In the Canyon del Oro High School water audit, students installed 33 water efficient aerators, saving a projected 86,000 gallons of water per year.

### 5) Pinal County Water Education Program

Pinal County's Water Education Program utilizes many of APW's direct student outreach programs. In 2013, APW staff delivered 15 Field Days, 33 in-classroom groundwater flow model presentations, 6 Afterschool Programs, 2 Family Science Nights, 1 Water Festival, 1 WSI presentation and 1 SWAP audit. These programs engaged a total of 1,510 students and 19 community volunteers in age-appropriate water education in 2013. The WSI and SWAP combined achieved a projected water savings of 804,131 gallons per year through the installation of water efficient devices. In the absence of a Pinal County coordinator for most of 2013, the APW team kept the program productive and viable.

## Communicating Water Resource Information to Many Audiences

The WRRC engages with the university and non-university communities in many ways. Some of the key mechanisms are highlighted below.



**John Polle**, Web Manager, creates, develops, and manages content for the WRRC website, as well as keeping up with the ongoing maintenance of the site. He designs printed materials for the WRRC and the various programs associated with the Center. In 2013, he completed a redesign of the Arizona Water Resource newsletter and implemented a new video editing station, allowing the WRRC to create promotional videos and film in-house events. He also manages and provides support for the audio and visual needs of the WRRC and when necessary, provides IT support.



**Jessica Schlievert**, Information and Communications Specialist, joined the WRRC in January 2013. Collaborating with WRRC staff and students, she has worked to improve the WRRC's communications and publicity efforts on a number of platforms. In September, she launched the WRRC Weekly Wave e-news digest with graphics assistance from Web Manager John Polle. Schlievert has also worked to grow and enhance the WRRC's presence in the news media and maintain regular contact with the public through social media outlets on Facebook, Twitter, and YouTube. Her efforts have attracted more attendees to WRRC events, including Brown Bag seminars and the WRRC Annual Conference.

## WRRC COMMUNICATIONS AND WEBSITE

Communications efforts at the WRRC saw a number of changes in 2013. Notably, on September 20, distribution of WRRC news and events switched to a regular weekly e-news digest format – The WRRC *Weekly Wave*. The *Weekly Wave* is a visually appealing, easily navigable informational email sent each Friday, containing WRRC and water community events, news, announcements, media coverage, social media links, and much more. A *Summer Wave* appeared once every two weeks through the summer months. The WRRC *Weekly Wave/Summer Wave* Issues for 2013 are found in the Archive with live links at <http://archive.constantcontact.com/fs197/1109945124084/archive/1116345843957.html>. WRRC news and events also have regularly appeared in newsletters from the College of Agriculture and Life Sciences, UA Extension, Institute of the Environment, ASU Sustainability Digest and others. WRRC social media efforts continued to expand, with growing interest in the WRRC's Facebook presence ([facebook.com/AZWRRC](https://www.facebook.com/AZWRRC)) and a recent revival of the @AZWRRC Twitter handle. Most content on the WRRC website is now also easily shareable on Facebook with the addition of a “Share” button.

The WRRC website – [wrrc.arizona.edu](http://wrrc.arizona.edu) – also saw updates and changes in 2013. The WRRC expanded and enhanced its Annual Conference and Press pages, while maintaining a fresh portfolio of homepage feature news stories. Individual program pages have seen modifications throughout the year with the addition of several program sections, including those for the Water RAPIDS program, the DWHI and the GCASE program. The addition of an on-site WRRC weather app and an expansive UA Water Expertise Directory have also helped boost website traffic. The directory, produced by the WSP, contains more than 300 experts searchable by name, field and department. The WRRC staff directory can be found at <http://wrrc.arizona.edu/personnel-directory>. The Director's page (<http://wrrc.arizona.edu/sharon-b-megdal>) includes a drop-down menu of all of Sharon B. Megdal's public policy columns.

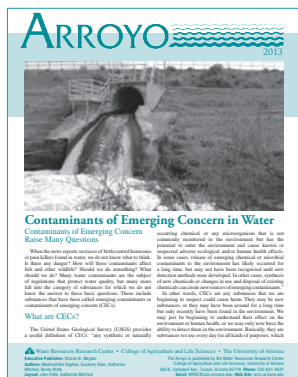
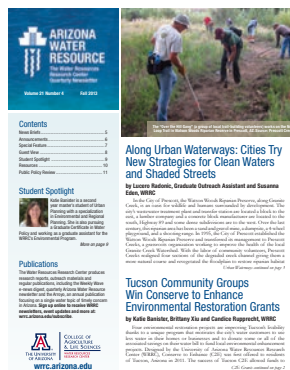
The WRRC furthered its efforts to consistently brand itself in 2013 by creating several printed pieces, including banners,



folders, bookmarks, rack cards, and the WRRC Annual Report. In addition, the WRRC, its programs, projects and personnel have appeared frequently in local, regional and national news media; a list of such appearances is in Appendix B-3.

## ARIZONA WATER RESOURCE QUARTERLY NEWSLETTER (AWR)

In 2013 the WRRC issued its quarterly newsletter, Arizona Water Resource (AWR), in January, April, July, and October. The AWR obtained additional support from the USGS and the UA Water Sustainability Program for publication of full-color, four-page inserts in the Winter and Summer issues. Several feature articles were written by Graduate Outreach Assistants Katharine Mitchell, who graduated in May with Master of Science in Planning degree, and Lucero Radonic, a Ph.D. student in the Department of Anthropology. The AWR also highlighted outcomes from the WRRC's Annual Conference and published Guest Views by Evan Canfield, Pima County Regional Flood Control District; Irene Ogata, City of Tucson; Summer Waters, Nick Pacini and Ayman Mostafa, UA Cooperative Extension, Maricopa County; Katosha Nakai, Esq., Central Arizona Project Manager, Tribal Relations & Policy Development; and Robert G. Varady and Christopher A. Scott, UA Udall Center for Studies in Public Policy. The AWR also provided an opportunity to showcase the students who work at the WRRC and to publish the winners of the WRRC photo contest, "Water: The Human Element." The final issue for 2013, which appeared in mid-October, inaugurated a new, full-color design.



## ARROYO

The Arroyo, WRRC's annual newsletter on a single topic of timely interest to Arizona, was published in the spring of 2013. Titled "Contaminants of Emerging Concern in Water," the Arroyo introduced the concept of emerging contaminants, explaining the various terms used and their overlapping meanings. It described the results of numerous studies on human and environmental exposure and potential effects and highlighted the need for additional research. As in past Arroyo newsletters, every attempt was made to present a balanced perspective. The draft was reviewed by a variety of experts before publication, including Guy Carpenter, Carollo Engineers; Chuck Graf, Arizona Department of Environmental Quality; Brad Hill, City of Flagstaff; John Kmiec, Town of Marana; Jean McLain, University of Arizona; David Quanrud, University of Arizona; Dan Quintanar, City of Tucson; and Channah Rock, University of Arizona.

The 2013 Arroyo was written by Madhumitha Raghav, the 2012 Montgomery & Associates Summer Writing Intern at the WRRC, with Susanna Eden and graduate students Katharine Mitchell and Becky Witte. Madhumitha Raghav, a Ph.D. student in Environmental Engineering at UA, received her degree in December 2012. The Montgomery & Associates Internship is a competitive award made possible with funding from Montgomery & Associates, Water Resource Consultants. The competition is open to any student enrolled in one of the three Arizona universities. The 2013 Summer Intern was Max Effrein, who was enrolled in a BA program in journalism and history at UA. His research for the 2014



Arroyo was on the value of water, including pricing and costs in various sectors, the value of water in the environment and the concept of virtual water.

## CONFERENCE

The 2013 Annual Conference, “Water Security, From the Ground Up,” was held March 5 at the UA Student Union Memorial Center. Organized in partnership with the United States Geological Survey (USGS), it featured prominent water experts who spoke on water sustainability, the environmental implications of stressed water supplies, policy options and aspects of water security from the local to the global scale. Anthony Cox, Head of the Climate, Biodiversity and Water Division in the Organisation for Economic Co-operation and Development (OECD) Environment Directorate, opened the Conference with a presentation on the global perspective of water security. Twenty-one posters were on display during the conference and at the lunchtime poster session. UA students Rachel Maxwell, Angela Knerl and Jeremy Cusimano each won poster prizes. Sponsors

included Aquasec, Agribusiness Council of Arizona, Arizona Public Service (APS), BKW Farms, Central Arizona Project (CAP), Metropolitan Pima Alliance, Montgomery & Associates, Salt River Project (SRP), USGS, Veolia Water and WSP. More than 300 people attended and the conference was featured on the UA PBS television station’s program, “Arizona Week” with Michael Chihak, who spoke with WRRC Director Sharon B. Megdal and several of the speakers. Participants included attendees from 37 communities in Arizona, six U.S. states and three countries.

The 2014 Conference, Closing the Gap Between Water Supply and Demand, was planned for Tuesday, April 8, 2014, at the UA Student Union Memorial Center. Organized in collaboration with the Arizona Department of Water Resources, the Conference program was designed to address challenges and options for balancing the water supply and demand scales. Registration for the 2014 Conference opened the first week of December 2013.

## BROWN BAGS AND OTHER EVENTS

The WRRC’s Brown Bag seminar series continues to draw a broad range of distinguished speakers who cover a wide spectrum of water expertise. In 2013, the WRRC held 16 Brown Bag seminars featuring experts from Arizona and the Southwest and several eminent authorities from Israel. Arizona State University faculty Benjamin Rudell and David White made presentations, as did individuals from UA, the University of Oregon and the University of Colorado. Representatives from Salt River Project, the Gila River Indian Community, Western States Water Council, Tucson Water, and the Forest Institute of Chile updated audiences on new programs and studies. In August and September, distinguished speakers from Ben Gurion University (Israel) spoke of water challenges in the Middle East. Average in-person attendance was 28 people, approximately 60 percent from UA and 40 percent from the broader community. Access to the WRRC’s Brown Bag series also recently expanded to include offsite stakeholders through live webcasts via Blackboard Collaborate and in-house video coverage. Thirty-five participants availed themselves of remote observation. The full list of 2013 Brown Bags can be found in Appendix B-4.



The WRRC hosted or co-sponsored a series of other events in the Sol Resnick Conference Room, across the UA campus and elsewhere. These included the traditional Chocolate Fest, February 15, which began with the book launch for *Shared Borders, Shared Waters: Israeli-Palestinian and Colorado River Basin Water Challenges*, co-sponsored by the Arizona Center for Judaic Studies, Center for Middle Eastern Studies, Udall Center for Studies in Public Policy, and Water

Sustainability Program. The event also provided a public opportunity to announce the WRRC's photo contest winners and display their photographs. Through funding from the UA International Arid Lands Consortium, the WRRC hosted a workshop in March 2013 on gray water research with scientists from the Royal Scientific Society of Jordan. Other co-sponsored events included a workshop organized by Audubon's Western Rivers Action Network promoting healthy rivers in the Colorado River Basin, a roundtable discussion with Dr. Alon Tal (Ben Gurion University, Israel), and a talk by David Livingstone (Director, Renewable Resources and Environment, Northwest Territories (retired)) titled, "Water Stewardship in the Northwest Territories, Canada: Partnerships, Knowledge and Governance." Co-sponsored events are listed in Appendix B-5.

## **OTHER OUTREACH**

WRRC personnel have continued to produce publications through various outlets and to give lectures and presentations to diverse audiences at conferences, seminars, public meetings, invited sessions, student groups, and more, statewide, nationally and internationally. Other WRRC outreach efforts in 2013 included participation on community and regional boards and commissions, state and local task forces and study committees and a diversity of meetings relevant to water resources, in addition to responding to inquiries from the public.

Appendix B-6 contains a listing of the 27 publications produced and Appendix B-7 lists the 95 presentations given by WRRC personnel. In addition, Appendix B-8 contains the many educational presentations, workshops and other events presented by APW personnel.

# University-Wide Collaborations Working Toward Water Sustainability

## **WATER SUSTAINABILITY PROGRAM (WSP) AND RELATED TECHNOLOGY AND RESEARCH INITIATIVE FUND (TRIF) PROGRAMS**

The Technology and Research Initiative Fund (TRIF) at UA, established in 2001, has enabled campus water leaders through the Water Sustainability Program (WSP) to make strategic investments in water research, education and outreach that has resulted in significant contributions to sustaining high quality water supplies for economic vitality and the health and wellbeing of all Arizonans. As part of the TRIF Water, Environmental and Energy Solutions (WEES) initiative, in partnership with the Institute of the Environment (IE) and the Renewable Energy Network, the WSP participates in joint funding decisions for interdisciplinary programs across campus. WSP also independently manages funding for a number of water related initiatives and activities.

Through the WSP, funding is allocated to strategic initiatives highly relevant to state water issues including: the development of the Water and Energy Sustainable Technology (WEST) facility, a state-of-the-art water quality assessment laboratory in Tucson that will focus on water treatment and reuse; water and energy use for sustainable high-tech manufacturing, particularly the semi-conductor industry; the Center for Environmentally Sustainable Mining (CESM), concerned with mining-related water use, dust and contaminant issues; water and environmental research at Biosphere



**Jackie Moxley**, Program Director for WEES and WSP, is responsible for the overall management of WEES and WSP programs, including funding programs and required reporting, as well as outreach activities and WEES/WSP-sponsored events. In 2013, she organized the WSP Distinguished Speaker Series that brought three renowned professionals in water resource management to the UA. She also supports WRRRC activities, including DWHI. She is a Co-PI on a U.S. Bureau of Reclamation grant project to develop water harvesting assessment tools for decision makers, to be completed in Spring 2014. She organizes the semi-annual meetings of the Rainwater-Stormwater Professionals Network (RSPN), which brings in special speakers to address the RSPN on topics related to rainwater and stormwater harvesting. Her other activities include serving on the WRRRC conference planning committee and contributing to the planning and organization of Brown Bag seminars and other events co-sponsored by WSP and WRRRC. She also represents Appointed Professionals on the UA President's Advisory Council on Environmental Sustainability and is an elected member of UA's Engaging Employees in Sustainability, Eco-Ops.

2, a world renowned and unique facility for large scale experimentation located in Oracle, Arizona; and water policy and management research that falls under the purview of the WRRRC. WSP continues to support outstanding UA undergraduate and graduate students studying water resources through year-long fellowships and other mechanisms for graduate student support with the objective of enhancing workforce development. (See Appendix B-9 for details).

The WRRRC serves as the management hub for the WSP and continues to play a pivotal role in implementing, developing and managing program components under the leadership of WRRRC and WSP director, Sharon B. Megdal. Through WSP funding, the WRRRC continues to expand its applied research programs in water policy and management and to provide high quality education and outreach products and publications. Training opportunities for graduate students have been a major benefit of this funding. WSP funds helped to support eight WRRRC graduate students during 2013. WSP-funded students worked on diverse projects, including water reuse for agriculture, regional water management cooperation, and environmental water needs. This investment facilitated production of papers and presentations delivered locally, regionally and nationally. [wsp.arizona.edu](http://wsp.arizona.edu).

## Coordination and Administration

Coordination and administrative functions are carried out by the WRRRC's able administrative staff, who ensure the efficiency and effectiveness of day-to-day operations. The staff are often the face of the WRRRC to the public and the first point of contact for visitors and partners. Their readiness to respond to needs as they arise and to handle their responsibilities in a professional manner provides invaluable support for accomplishing the WRRRC's mission.



**Jane Cripps**, Administrative Associate, is instrumental in the provision and oversight of WRRRC administrative duties and operational functions, including support of the organization of WRRRC meetings, the Annual Conference, Brown Bag Seminars, and distribution of the WRRRC's publications.



**Lynette Featherston**, Office Assistant, joined the center in July 2013. In the short time that she has been at the WRRRC, she has proven a valuable team member, fielding inquiries from the public, overseeing preparation of WRRRC facilities for events, handling exceptional tasks as they arise and assisting administrative staff.



**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. In 2013, the City of Tucson provided supplemental funding for her to assist Arizona Project WET with program management.

## Students

One of the WRRRC's primary strategic goals is to provide skills and knowledge for future generations of water professionals. The graduate and undergraduate students who work at the WRRRC gain real professional experience as they provide support for the WRRRC's many programs and projects. Talented students are regularly recruited for research support, outreach to targeted audiences and the public, and participation in APW's educational programs. Students come away from their experiences with increased knowledge and strengthened commitment to addressing water and related resource and environmental issues. The following students were employed at the WRRRC in calendar year 2013 (See also Appendix B-10.)

Armenta, Mariah  
Assimacopoulos, A. Katerina  
Banister, Kathryn L.  
Bedoya, Bianka  
Chan, David J.

Chase, Jessica  
Clark, Jennifer  
Cleveland, Jenna  
Cusimano, Jeremy  
Dehn, Michael

Delano, Nathaniel  
Dewalt, Emily  
Doung, Alanna  
Driscoll, Jessica  
Edwards, Leah

Fausel, Cassandra  
Fosnot, Spencer L.  
Fullerton, Christopher  
Garcia, Luisana  
Gonzales, Stephanie  
Gudvangen, Emily  
Hamilton, Jillian  
Hansen, Lisa  
Hapeman, Laura  
Huang, Ling-Yee  
Joe, Valerisa  
Jondall, Kelsea  
Jones, Nicholas

Khamsi, Tymon  
Knerl, Angela  
Malott, Elissa  
McClain, Grace  
McOmber, Todd  
Mitchell, Katharine L.  
Mott Lacroix, Kelly  
Obergh, Victoria L.  
Pena, Bridgette G.  
Picazzo, Martin A.  
Plesniak, Kelly M.  
Posegate, Ann  
Prescott, Alexander

Prietto, Jacob  
Radonic Lucero  
Reidy, Christian  
Reuter, Rochelle M.  
Richards, Hunter  
Schwerin, Kristen  
Sittig, Julia  
Smith, Sarah E.  
Sprouse, Jason  
Tuttle, Koiya  
Watanabe, Lisa A.  
Witte, Becky A.

# Special Recognition for WRRC Personnel and Programs

A listing of awards and other special recognition of personnel and programs can be found in Appendix B-11.

## Appendices

Appendices can be found on-line at [wrrc.arizona.edu/annual-report-2013](http://wrrc.arizona.edu/annual-report-2013).

Appendix A contains the 2013 Strategic Planning Objective Metrics Report and the Partnership Matrix.

Appendix B contains supplemental information, including lists of WRRC publications, presentations.

# WRRC Annual Financial Report, 2013

(ending December 31, 2013)

<b>SOURCES</b>	
State Appropriations	\$496,425
Federal Grants	\$260,131
NIWR Funds	\$26,661
State Grants	\$10,435
Private or Other Grants	\$773,792
Sales and Services Activities	\$43,545
Technology and Research Initiative Fund (TRIF)	\$274,715
Gifted Funding	\$69,038
	\$1,954,742
<b>USES</b>	
Salaries and Wages	\$1,076,900
Fringe Benefits	\$358,801
Operating Costs	\$665,064
Capital Equipment	\$6,951
	\$2,107,716
Revenue Available - December 31, 2013	(\$152,975)

Financial reporting process was updated in 2013 and differs from prior years in that it considers monies received instead of all monies awarded. This change in accounting method better reflects the changing world of federal, state and private grant funding.

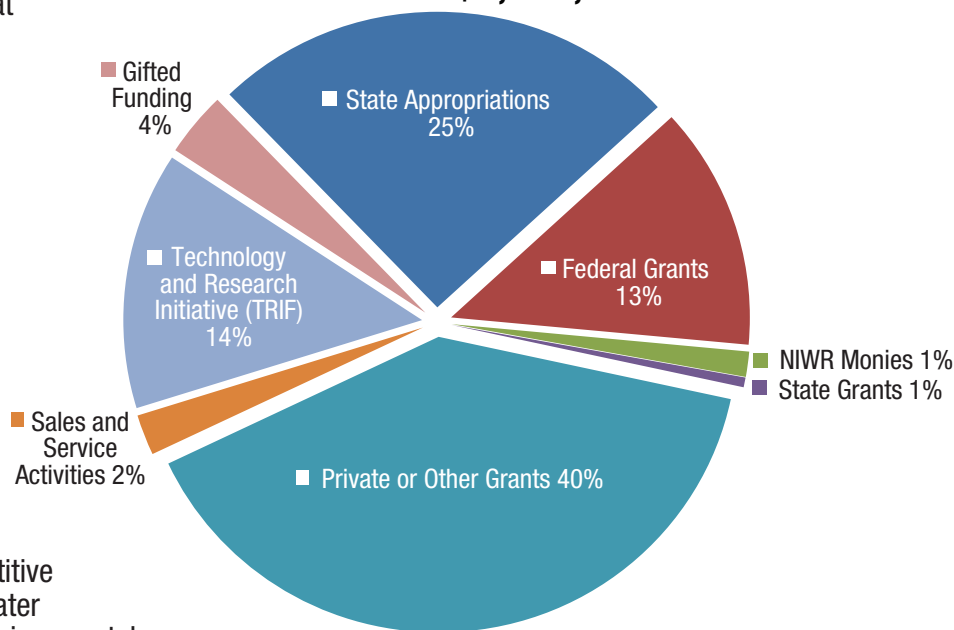
## SOURCES

**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's and Jean E. McLain's Hatch Project.

**Federal Grants:** This total includes 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. The WRRRA budget for 2013 was reduced by \$36,810 resulting in our annual budget being \$55,525 instead of \$92,335. Even though the

budget was reduced the WRRRC funded the three research grants and one sub-contract that had been included in the original 104(b) submission [see Section II, Part I (a)]. The remaining monies were used to support administration of the 104(b) program and Information Transfer personnel and activities. The grant period is March 1, 2013 through February 28, 2014, and funds were carried over from calendar year 2012. Also included in this section are all monies received for competitive national federal grants and cooperative agreements awarded to the WRRRC.

## 2013 Sources \$1,954,742



**State Grants:** Revenue provided by the State of Arizona through awarded competitive grants. In 2013 Arizona Department of Water Resources and Arizona Department of Environmental Quality continued funding for multi-year grants that had been received in 2012.

**Private or Other Grants:** Revenues received from local, county and state governmental agencies (non-competitive). In 2013, the WRRRC received funding from Central Arizona Project (CAP), City of Tucson and the Town of Clarkdale. Also included are competitive grant funds received from non-profit organizations and private individuals that are processed through the University. In 2013, the WRRRC received major grant awards from the Arizona-Sonora Desert Museum, The Nature Conservancy and the Abbott Fund. This section includes competitive charitable grants processed through the UA Foundation. In 2013, the WRRRC received major competitive charitable grant awards from The Nina Mason Pulliam Charitable Trust (a second award to the WRRRC for Arizona Project WET), The Walton Family Foundation and the Abbott Foundation.

**Sales and Service Activities:** Revenue from one-time transactions accrued over time by the WRRRC from publication sales, annual conferences and miscellaneous services. These monies include fees charged by Arizona Project WET to hold Water Festivals in various cities across the state.

**Technology and Research Initiative Fund (TRIF):** Revenue from the State Technology and Research Initiative Fund (TRIF), a state sales tax-derived fund supporting various programs at Arizona state universities. TRIF funding is allocated to the UA Water, Environmental and Energy Solutions (WEES) initiative, which provides some direct support to WRRRC and also



funds the Water Sustainability Program (WSP) housed at the WRRRC. Only WEES funds awarded to WRRRC and WSP funds managed by the WRRRC are included in this report.

Gifted Funding: Included are one-time gifts from individuals and companies and revenue generated by endowment interest bearing accounts over a period of time. These funds are used to support WRRRC programs, including Arizona Project Wet.

## USES

**Salaries and Wages:** Expenses include salaries, wages and supplemental compensation paid to WRRRC faculty, appointed personnel, classified staff, graduate assistants and student hourly employees. WRRRC funding provided salary support to employee groups as follows: faculty-17.34%; appointed personnel- 39.32%; classified staff-24.88%; graduate students-9.448%; student hourly/undergraduate wages-9.01%.

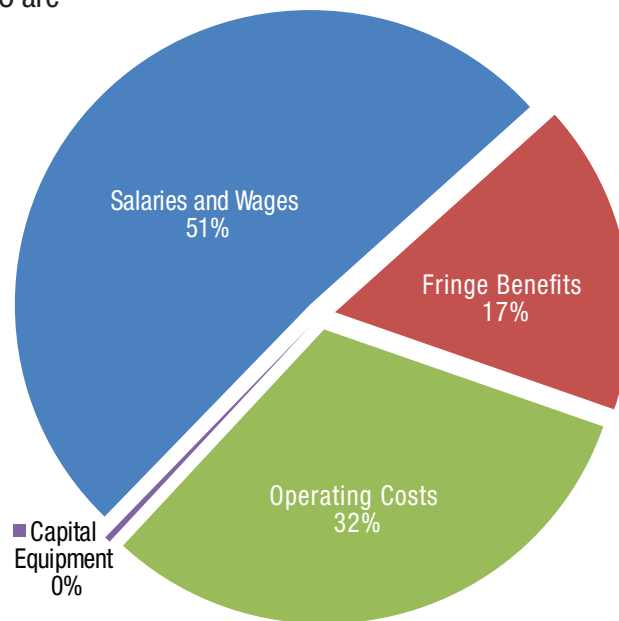
**Fringe Benefits:** Expenses include costs of employee fringe benefits (ERE), background checks and required employee training.

**Operational Costs:** Expenses include Administrative Service Charges and Indirect Costs; Stipends, Lecturer's Fees, Participant Support and Temporary Labor; Sub-Contractual Agreements 104(b) Grants at ASU and NAU; Printing and Publications; Communications; Educational Supply; Research Supply; Office and General Supply; Travel; Conference Registration Fees; Membership Dues; Building and Vehicle Rental; Business Meetings; UITS FTE Network Funding (Access, University Communication Systems); Building Maintenance and Upgrades.

**Capital Equipment:** Expenses include costs for purchase of capital laboratory research equipment, computer, data processing, and office equipment.

**Revenue Available:** Balance available reflects monies in WRRRC accounts as of December 31, 2013. Negative number is due to differential funding timelines on private sector grants and varying schedules for University of Arizona federal grant invoicing (draw-downs). Balance includes State Appropriations and TRIF accounts that are budgeted on a fiscal year basis (July 1 to June 30); Sales and Service Activities revenue from one-time transactions accrued over time by the WRRRC; Federal, State, Private or Other Grants and Gifted Funding that are on varying annual schedules.

## 2013 Uses \$2,107,716





**WRRC**

WATER RESOURCES RESEARCH CENTER

**wrrc.arizona.edu**

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