



## OCTOBER 2011 NEWSLETTER

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### VIEWPOINT: FIRE AND WATER

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Back in 2008 the Flagstaff Chapter put on a highly successful field trip to the Inner Basin to look at Flagstaff's mountaintop well field. We drove up the pipeline road, almost a century old, surrounded by the lush greenery of a dense forest crowding the steep slopes of the mountain. Cool winds accompanied our ascent and stirred the aspens.

On September 18 we again ascended the pipeline road on the Schulz Fire Burn Area field trip. But it was a much different trip. We walked this time, as the road is no longer passable to vehicles. Deep gullies cut the road in multiple spots. A short way up one gully we saw a recent debris flow composed in part of huge boulders. The old

pipeline itself was smashed, as evidenced by the many ceramic bits of pipe. A newer line was exposed in the deeper gullies. The A and B soil horizons had been stripped away, exposing bare rock. And only blackened skeletons of pine and spruce remained on the slopes. This watershed was nothing like it had been.

Then we went down to the alluvial fan at the base of Schulz Pass to the Timberline Estates subdivision. We saw trees with bark shredded by water-borne debris up to three feet above the ground. Scoured channels and damaged rip-rap marked the passage of severe floods. Sandbags and concrete barriers had been erected by homeowners against the flood they had never anticipated.

The wind-driven Schulz Fire unleashed the monster that had lurked unnoticed for a hundred years. Water which had been formerly taken up by the forest floor now swept down the slopes unimpeded, eroding quickly, picking up debris and deepening gullies. The entire watershed then emptied out onto land now occupied by homes, and water went a lot farther than anyone had expected. The alteration of the watershed by fire produced a profound hydrologic change that had a major adverse impact miles away.

This field trip, successful itself for different reasons than in 2008, demonstrated once again the massive power of surface water. Hydrology isn't just about water supply or quality; there are other effects that demand our investigation into the causes and mechanics. What we saw will not be soon forgotten.

Alan Dulaney,

AHS Corporate Board President, 2011

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## **GOVERNMENT GOINGS-ON**

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A variety of water reports has landed with a huge thud amongst us, and not just the Water Resources Development Commission report. Amazing how these things all flock together. All appear timely in a period when uncertainty hovers above Arizona's water future, and we should pay attention to their commonalities.

At the AHS Annual Symposium, we heard Grady Gammage present the Morrison Institute take on the future of water resources in the megapolitan area of Maricopa, Pinal, and Pima Counties that he calls the "Sun Corridor." In this paper Grady asks many questions, in an effort to get us to ask them too. He sees considerable growth ahead, straining water resources as currently understood, but with little chance of importing additional supplies from somewhere else. Behavioral change will be needed—way beyond "conservation" as we understand the term now. Go to <http://morrisoninstitute.asu.edu/publications-reports/2011-watering-the-sun-corridor-managing-choices-in-arizonas-megapolitan-area> for the report.

Just a few days earlier, Karen Smith of the Grand Canyon Institute released her study of water sustainability in Arizona. Like the Morrison Institute, she envisioned no new outside sources of water to be imported. She recommended five legislative proposals: 1) maximizing use of reclaimed water, 2) pricing wasteful uses of water such that waste is discouraged, 3) investigating ways to change surface water laws to allow environmental uses, 4) market-based mechanisms for water allocation, and 5) funding mechanisms for a state-wide augmentation authority. I cannot see how these proposals will make any serious headway against established interests right now, but in ten years they could seem more acceptable. Go to

[http://grandcanyoninstitute.org/sites/grandcanyoninstitute.org/files/GCI\\_Background\\_Report\\_Water\\_Policy\\_0.pdf](http://grandcanyoninstitute.org/sites/grandcanyoninstitute.org/files/GCI_Background_Report_Water_Policy_0.pdf) for the report.

Fred Tillman (AHS member), Jeff Cordova, Stan Leake, Balkemore Thomas and James Callegary of the US Geological Survey recently put out USGS Scientific Investigation Report 2011-5071. Go to <http://pubs.usgs.gov/sir/2011/5071>. This presents information on groundwater resources for the alluvial basins of Arizona, an updated water budget, and a regional groundwater flow model. From the water budget, an overall storage loss of 74.5 million acre-feet was estimated—a figure certain to be used elsewhere. This study should dovetail with the report to be issued by the WRDC, since many of the same data sources were utilized for both. This is a technical report, and in it is a warning for high-growth rural counties like Mohave and Yavapai and Cochise.

Along with the WRDC report, that's a lot of reading.

Alan Dulaney,

AHS Corporate Board President, 2011

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## **2011 AHS SYMPOSIUM WRAP-UP**

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September 18-20, 2011  
Flagstaff, Arizona

Arizona Hydrological Society  
24th Annual Symposium

Watersheds Near and Far: Response to Changes in Climate and Landscape

**ARIZONA HYDROLOGICAL SOCIETY 24<sup>TH</sup> ANNUAL SYMPOSIUM, HIGH  
COUNTRY CONFERENCE CENTER, FLAGSTAFF, ARIZONA**

We'd like to thank everyone who attended and supported the 2011 AHS Symposium. The High Country Conference Center is an outstanding venue and a great time was had by all! We'd also like to give our sponsors one more cheer and thank everyone for supporting AHS, our scholarships, and our common goals!

And big **THANK YOU** to our **SPONSORS!**



Inner Basin:



Lake Mary:



Woody Mountain: :

Dinner: [Southwest Ground-water](#)

Ice Breaker: [WDC Exploration](#), [Southwest Ground-water](#)

Lunch: [HydroSystems, Inc.](#), [Central Arizona Project](#), [CH2MHILL](#)

Field Trip: [City of Flagstaff](#), [NAU College of Engineering, Forestry, and Natural Sciences](#)

Breakfast/Break: [Roscoe Moss Company](#), [The Nature Conservancy](#), [The Wright Group](#), [Wells Fargo Advisors](#), [Archaeological Consulting Services](#), [GeoSystems Analysis](#), [Groundwater & Environmental Services, Inc. \(GES\)](#)

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**OUR EXHIBITORS**

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[WDC Exploration](#)

[Electronic Data Solutions](#)

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[Boart Longyear](#)

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[Groundwater & Environmental Services, Inc. \(GES\)](#)

## 2012 AHS SYMPOSIUM: CONFLUENCES – 25 YEARS BRINGING WATER, PEOPLE, AND IDEAS TOGETHER

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Now that the 2011 event is past us (and it was a great event!), it's time to start thinking 2012 in Phoenix in earnest. We have dates – September 18-20, a venue – Desert Willow Conference Center, along with a theme, a couple plenary speakers, and a website – <http://www.azhydrosoc.org/2012Symposium.html> . But there's still much to do.

Our first meeting will be **October 11, 2011 at SunUp Brewery on Camelback at 4 pm**, just prior to the regular Phoenix Chapter Board meeting. Be prepared to brainstorm about advertising, field trips, workshops, another plenary speaker or two, entertainment, etc.

If you have questions or want to get involved please contact Ted Lehman at [ted@jefuller.com](mailto:ted@jefuller.com) or 480-222-5709. Looking forward to putting together another successful symposium. This will be the 25<sup>th</sup>!

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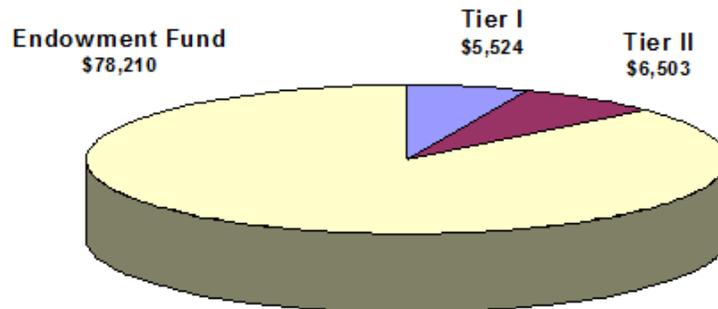
## AHS FOUNDATION NEWS

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*Submitted by Marvin Glotfelty and Howard Grahn*

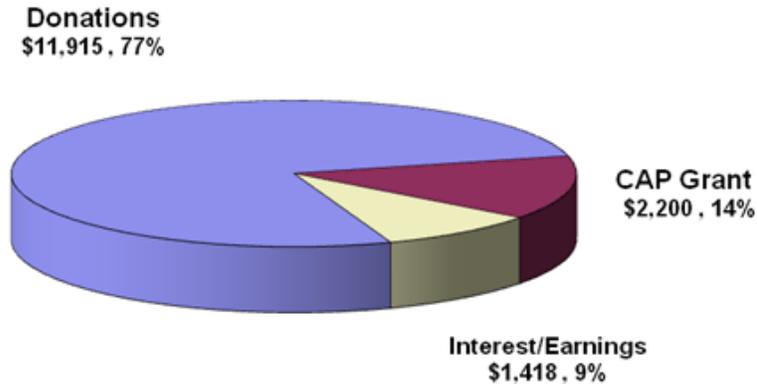
The Arizona Hydrological Society Foundation Board of Directors (consisting of the Ted Lehman, Chuck Graf, Gail Cordy, Gary Small, Howard Grahn, Mike Hulst, Errol Montgomery, Mike Pearce, and Marvin Glotfelty) reported assets of \$5,524 in "Tier I" (the checking account for working capital); \$6,503 in "Tier II" (the certificate of deposit account) and \$78,210 in the Endowment Fund.

**AHS FOUNDATION ASSETS**  
September 2011



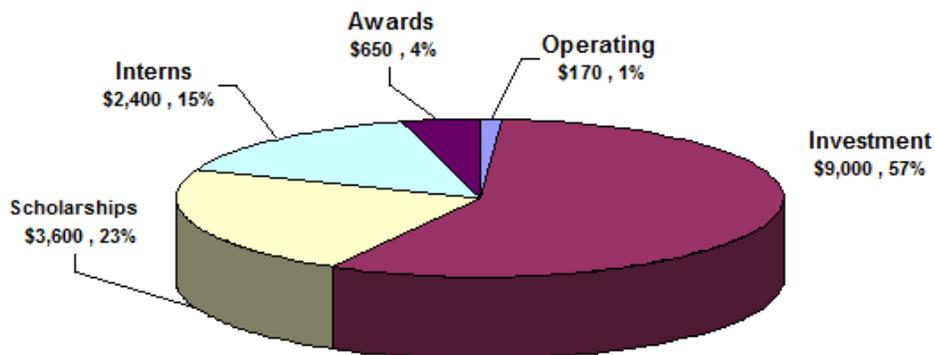
Contributions of revenue to AHSF during 2011 can be divided into 9% (\$1,418) from interest & earnings; 14% (\$2,200) from a grant provided by the Central Arizona Project; and 77% (\$11,915) from other donations. The donations to AHSF are the cornerstone of our revenue, and we greatly appreciate and extend sincere *Thank You* to our donors. In addition to the generous contribution from the [Central Arizona Project](#), significant donors during 2011 included [Montgomery & Associates](#) and [Dr. Herman Bouwer](#). Many others contributed to AHSF during the past year, and we thank you all. ***The Arizona Hydrological Society Foundation is a non-profit 501(c)(3) organization that enables contributions to be fully tax deductible.***

## AHS Foundation 2011 Revenue



The expenses of AHSF during 2011 consisted mostly of investment into the Endowment Fund (57%, or about \$9,000); followed by scholarships (23%, or about \$3,600); internships (15%, or about \$2,400) and awards (4%, or about \$650). Only about 1% or the AHSF expenditures (about \$150) went to operating costs, so contributions to this organization are efficiently directed to the funding mechanisms and endowment accounts for which they were intended.

## AHS Foundation 2011 Expenses



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## PHOENIX CHAPTER NEWS

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The next Phoenix chapter dinner meeting will be held **on Tuesday, October 11, 2011**, at SunUp Brewing Co., in midtown Phoenix (on the north side of Camelback Road, just east of Central Avenue). Please join us for a beverage, to share business cards, and talk water!

**Location:** [SunUp Brewery](#)  
322 E. Camelback Road  
Phoenix, AZ 85012

**Event:** *Power For Water: The Importance of the Navajo  
Generating Station to the Central Arizona Project*  
Marie Pearthree, Central Arizona Project

**Chapter Board Meeting:** 4:30 PM – 5:30 PM

**Happy Hour & Dinner:** 5:30 PM – 7:00 PM

**Program:** 7:00 PM – 8:00 PM  
**Cost:** \$15 member, \$20 non-member, \$5 student

RSVP with Kirk Creswick at [kcreswick@eecphx.com](mailto:kcreswick@eecphx.com) or 602-248-7702.

Hope to see you there!

**At the June Phoenix Chapter meeting, Marie Pearthree, Central Arizona Project Assistant General Manager in Business Planning and Governmental Programs, will give a presentation on “Power For Water: The Importance of the Navajo Generating Station to the Central Arizona Project”.**



Marie S. Pearthree, P.E., is a Professional Engineer with 30 years of experience in the water industry. She recently joined the Central Arizona Project as Assistant General Manager in Business Planning and Governmental Programs, focusing on legislative and regulatory affairs, inter-governmental relations, strategic planning, and climate adaptation. Prior to joining the CAP, Marie was a Principal Project Manager with CH2M Hill and also spent 10 years as Deputy Director of the Tucson Water Department where she oversaw water quality treatment, business services, customer service, and planning and engineering. Marie has a Master's Degree in Geosciences from the University of Arizona and a Bachelor's Degree in Geology from Oberlin

College.

### Abstract

The issues of water and power are intertwined, and that conjunction is nowhere better illustrated than Central Arizona Project's relationship with the coal-fired Navajo Generating Station. This power plant provides 95% of the energy CAP requires to bring renewable water from the Colorado River to the cities, industries, Native American nations and farms of central and southern Arizona. Potential new EPA air quality regulations now threaten the viability of the Navajo Station. This presentation will provide an overview of the issue, its implications for water users and how CAP and others are proactively addressing the situation.

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### **Future Event Calendar (see also calendar on [www.azhydrosoc.org](http://www.azhydrosoc.org))**

- November or December, 2011 – Marnie Greenbie, ADEQ, AZPDES.
- January 2012 – Planning meeting

### **2011 HERMAN BOUWER INTERN SCHOLARSHIP EXPERIENCE**

*By: Timur Galimzyanov*

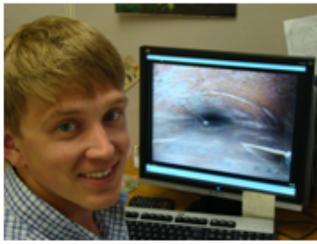
I, Timur Galimzyanov, a graduate student at Arizona State University in the field of Hydrosystems Engineering was selected as the 2011 recipient for the Herman Bouwer Intern Scholarship by the Arizona Hydrological Society (AHS). During the program, I had the opportunity to complete 40 hours of OSHA training, intern with Jacobs Engineering and the Arizona Department of Water Resources.

On April 24, 2011, I received word from Steve Acquafredda that I was invited to take part in the Herman Bouwer Intern Scholarship program. Such recognition by a prominent organization that deals with hydrology and environmental issues was very exciting for me. The internship offered me a great opportunity to meet professionals from local industries and regulatory agencies. It also provided the chance to gain hands-on work experience and insight into the professional career of hydrology. At the same time, I was selected for a 12-week summer internship at the Sanitation Districts of Los Angeles County, California (LACSD). Both of the programs offered great learning experiences and while it was difficult to juggle I benefited from two internships during the summer of 2011.

Soon after I graduated from ASU, I started the program by taking the 40-hour HazWOPER training where I learned the nature of hazardous substances and their associated risks. I learned how to recognize hazardous materials and how to respond if uncontrolled hazardous waste is encountered. Some other subjects I explored included the use of personal protective equipment, containment, and control procedures with materials as well as decontamination procedures. The central lesson I learned is the fact that most accidents with hazardous materials are preventable.

From the start of my first day with Jacobs Engineering, I knew I would enjoy my time working for the company. From the small (yet extremely friendly) staff, to the unique environment, there was no doubt this internship was the one I needed. Steve Acquafredda, a project engineer, who was also my mentor for Herman Bouwer program, had created a long list of tasks and assignments I would complete. These included plate settler testing and monitoring, the basis of design for new sewer line for Chaparral Water Treatment Plant and many more. During this time I reviewed some reports and specifications.

There were other projects as well, such as setting basic mass balances, writing memos and testing protocols. Jeanne Jensen and staff from Chaparral WTP gave me a tour of the plant and explained how it was different from a conventional plant. In addition, I visited the 23rd Ave. Waste Water Treatment Plant, one of the oldest treatment plants in Phoenix. Both of the tours were very informative and helpful in bridging a gap between the theoretical studies I had completed and the real work environment.



**During CCTV inspection at LACSD**

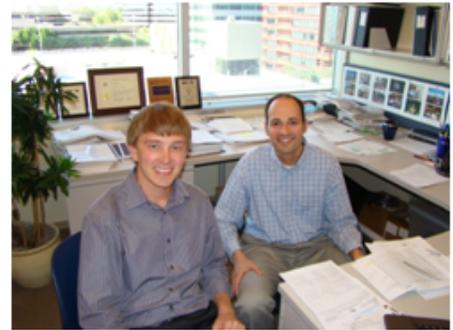
After 2 weeks interning at Jacobs I had to postpone my Herman Bower program and start an internship at the LACSD. The Sanitation Districts provide wastewater and solid waste management services to Los Angeles County. They manage a wastewater system that includes approximately 1,400 miles of main trunk sewers and 11 wastewater treatment plants that transport and treat about half the wastewater in Los Angeles County. In addition they manage the operation of three sanitary landfills, four landfill energy recovery facilities, three materials recovery/transfer facilities, and two refuse-to-energy facilities. There I worked with the department of wastewater and collection systems where I was involved in numerous tasks related

to operation and maintenance. As part of my duties I performed CCTV inspections, analyzed flows in sewer lines, and wrote specifications for different projects. Overall, it was an excellent experience.

Once the 12 weeks internship with the LACSD was over, I resumed my Herman Bower program with ADWR. There my host, Dave Christiana, explained the role of ADWR and introduced me to the staff. I explored numerous aspects of water resources management: groundwater permitting, groundwater modeling of the AMAs, well applications and impact studies, Assured Water Supply requirements, the National Flood Insurance Program, Dam Safety and Inspections, and international water issues. I was able to participate in fieldwork with Brian Conway and Paul Ivanich, installing and calibrating remote transducers. I observed land subsidence and fissures. During my time with the ground water modeling department, Wes Hipke explained how groundwater flow modeling can be used to simulate the past, present, and future impacts of water uses on aquifers. Dale Mason let me analyze data for the Tucson Active Management Area. During my time at ADWR I learned about the different regulations in place to secure long-term dependable water supplies for Arizona communities.

My summer experience was unique in the fact that it let me challenge myself and explore beyond my usual boundaries. I was able to apply the knowledge I gained in classes to real life projects. After completing the internship I find that I understand concepts taught in class much more easily. I was given the chance to interact with others in a professional way. Both of the internships provided me an opportunity to meet and talk to many professionals in the field of hydrology. It also showed me the importance of building and maintaining close relationships with the organizations we come into contact with. I learned the importance of time management, discipline, and effective communication skills. Now I feel more prepared to speak knowledgeably about the field I am entering.

I would like to thank everyone who made this program a success. Special thanks to Steve Acquafredda for his assistance and mentorship. Thanks to Jeanne Jensen, Abel Ramarui, Herb Durbin, Jason Boyles, Dusan Stanisic, Damon S. Williams, and the entire staff at Jacobs for being extremely welcoming and helpful, especially in giving career advice. Thanks to Dave Christiana, Wes Hipke, Brian Conway, Paul Ivanich, Tito Comparan, Lou Bota, Scott Miller, Maureen Towne, Joel Klein, Michael Johnson, Michael Lacey, Dale Mason and the entire ADWR crew for this unique experience. Thanks also to the Arizona Hydrological Society for the commitment to advancing hydrology and water resources in Arizona and supporting dedicated students despite this challenging economy. I truly appreciate the confidence the AHS committee showed in me by offering me this unique, prestigious internship. This internship has definitely increased my interest in pursuing a career in water resources and environmental engineering.



**Steve and Timur at Jacobs Engineering**



**Fissure near freeway 202 & I-60**

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## **TUCSON CHAPTER NEWS**

Please join us for the next Tucson Chapter meeting, Tuesday, October 11, at 6PM.

Location:

Montgomery and Associates  
1550 East Prince Road  
Tucson, AZ

Social half hour: 6:00 PM

Program: 6:30 PM

***Central Arizona Project's Artificial Recharge Program with Emphasis on the Tonopah Desert, Superstition Mountains, and Pima Mine Road Recharge Projects***

**Tim Gorey  
October 11, 2011**

The Central Arizona Project (CAP) has been tasked with siting, constructing, and operating the State Demonstration Recharge Projects. The projects were mostly funded by an ad valorem tax collected in Maricopa and Pima Counties from 1991-1996. The State Demonstration Projects purpose is to store Colorado River water for future use to "protect the general economy and welfare of this state and its citizens" (ARS 45-891.01). CAP has built seven recharge projects and currently operates six (Avra Valley Recharge Project was recently sold to the Metropolitan Domestic Water Improvement District). All the projects are surface spreading recharge facilities.

There are three projects in Maricopa County, one in Pinal County and three in Pima County (including AVRP). The projects are:

| Project:                      | Year Recharge Began: | Volume Stored Through June 2011: |
|-------------------------------|----------------------|----------------------------------|
| <b>Maricopa County:</b>       |                      |                                  |
| Tonopah Desert (TDRP)         | 2006                 | 694,300 AF                       |
| Hieroglyphic Mountains (HMRP) | 2003                 | 237,279 AF                       |
| Agua Fria (AFRP)              | 2001                 | 273,052 AF                       |
| <b>Pinal County:</b>          |                      |                                  |
| Superstition Mountains (SMRP) | 2011                 | N/A                              |
| <b>Pima County:</b>           |                      |                                  |
| Lower Santa Cruz (LSCRCP)     | 2000                 | 386,250 AF                       |
| Avra Valley (AVRP)            | 1996                 | 80,850 AF (through 2010)         |
| Pima Mine Road (PMRRP)        | 1998                 | 236,526 AF                       |
| <b>Total:</b>                 |                      | <b>1,908,257 AF</b>              |

Each project has unique features and operational requirements. The first projects were designed to operate manually and are relatively basic. As the program grew, it became apparent that the staffing requirements were becoming difficult for CAP to manage. A change in philosophy began with TDRP, it and SMRP are designed to operate remotely from CAP Headquarters. In addition, PMRRP has been retrofitted to operate from CAP Headquarters.

TDRP has 19 basins totaling 207 acres and is capable of receiving 310 cfs deliveries. In 2010, 150,789 acre-feet were stored at the project. TDRP was the first CAP recharge project that was designed to be operated remotely. A Modicon PLC is programmed to allow the CAP operators at headquarters to open and close gates and valves, monitor flow into individual basins, monitor water levels in the basins, and track water levels in the monitor wells and piezometers.

SMRP is CAP's newest recharge project and will become operational in September 2011. The project consists of two 20 acres basins capable of receiving 75 cfs each. The unique feature of this design is the six bridge mounted 250 hp pumps with variable frequency drives (VFD). The pumps are manifolded into a 54 inch pipe that will allow for future expansion of the site. The project is also controlled by an Allen Bradley PLC for remote operations. The CAP Operators will be able to control the pumps, backflow the pumps to clean the intake, monitor the flow and water levels in each basin, and track the water levels in the monitor well and piezometers.

PMRRP began operations in 1998 and is permitted with ADWR for 30,000 acre feet per year. Historically the project has stored between 20,000 and 23,000 each year. One main problem was the Ross pressure reducing valves that controlled flow into the basins. The raw CAP water has clam shells that would quickly clog the valves during operating cycles. This would require CAP maintenance crews to frequently pull the valves and clean them. In 2009 a project was started to redesign the inlet structures and modify the project for remote operations. In March of 2011 the construction began. The Ross valves were replaced with Hilton jet flow gate valves that will allow the clam shells to pass through. Also an Allen Bradley PLC was added to allow the project to be operated remotely.

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### Upcoming meetings:

- **November** - Dale Mason – ADWR Tucson AMA model updates
- **December** - Richard Greenberg – Water Potential on Europa, Click [here](#) for more information on Dr. Greenberg's new book, "Unmasking Europa."

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## FLAGSTAFF CHAPTER NEWS

For details on the next Flagstaff Chapter Meeting please contact [Brad Hill](#) or [Dana Downs-Heimes](#).

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### SPECIAL PRESENTATION – PREVIEW OF THE 2012 MCELLHINEY LECTURE

On Tuesday, November 8 at 3:45 in Room 103 of the Geology building at NAU, Marvin Glotfelty will be giving us an advance presentation on his **2012 McElhiney Lecture**. His year-long lecture tour doesn't officially start till after the NGWA Expo, but we will receive an early preview.

***2012 McElhiney Lecture: Life-Cycle Economic Analysis of Water Wells — Considerations for Design and Construction, Marvin Glotfelty, RG, Clear Creek Associates***

Following is more information from the NGWA website.

<http://www.ngwa.org/Foundation/mcellhiney/Pages/Future-McElhiney-Lecturer.aspx>

By attending the 2012 McElhiney Lecture presentation, you will be shown how seemingly more expensive initial water well costs may actually pay for themselves in the early life of the well, in addition to providing ongoing dividends in value and economics for many subsequent years.

You will learn how:

- The total cost of the well can significantly increase by using the least expensive "low-bid" approach to well construction in some cases
- Some well construction materials or methods that appear to be beneficial and cost-efficient may have "hidden" costs that can actually increase O&M costs or reduce the useful life of a well
- Analytical methods and techniques can maximize water production and water quality in both new and existing wells.

Several elements of well design/construction that impact the total (life cycle) cost of water wells including screen type, construction material, well development method, and frequency of well cleaning will be discussed.

An example life-cycle economic analysis comparing low-carbon steel vs. stainless steel well screen will be presented. The analysis includes consideration of the actual construction cost of more than 70 municipal wells

installed between 1993 and 2010. This analysis was independently performed in 2003, 2008, and 2010, with essentially identical results. Economic elements include:

- Initial capital cost
- Energy requirements for water pumping
- Operations and maintenance costs
- Probable well longevity
- Replacement schedules

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## **JOINT AZ RIPARIAN COUNCIL / ARIZONA HYDROLOGICAL SOCIETY FALL FIELD TRIP AT SHIELD RANCH!**

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### **Arizona Riparian Council Fall Campout Meeting with the Arizona Hydrological Society's Flagstaff Chapter at**



### **The Nature Conservancy's Shield Ranch near Camp Verde October 22-23, 2011 – Saturday & Sunday**

Please join us for this year's Arizona Riparian Council's Fall Meeting that will be jointly held with the Arizona Hydrological Society's Flagstaff Chapter. This year's meeting will be at The Nature Conservancy's Shield Ranch, located about 3 miles south of Camp Verde (see map link below). Plan on coming and meeting some new friends!

The Nature Conservancy acquired the 306-acre Shield Ranch in 2010. The property was acquired for its riparian values which include portions of West Clear Creek and the Verde River. To see some photos of the Ranch go to this [Picassa Web Album](#).

On Saturday afternoon, we will hear from three speakers. Chip Norton, Friends of the Verde River Greenway, will talk about the Verde River invasive management plan. Arizona Game and Fish will talk about native fish plans, and Brenda Smith, Assistant Field Supervisor, U.S. Fish and Wildlife Service, will speak on the Strategic Habitat Conservation in the Verde River Watershed Focus Area Plan.

We will have some free time to explore the area after the speakers. You can explore on your own or join Kim Schoenek, Heather Reading, and Jeanmarie Haney as they lead a walk to the top of the white cliff and talk about The Nature Conservancy Verde River activities.

Registration for the campout includes the cost of dinner, which will be a BBQ dinner catered by Babe's, a local restaurant; snacks on Saturday; and beverages Saturday evening. Please provide your own lunches (Sat and Sun) and breakfast Sunday morning. On Sunday, we will pack up and drive to West Clear Creek campground where Kim will lead us on a hike along West Clear Creek. During the hike she will discuss how she is working with the local ditch associations to conserve water flows in the Verde which will benefit habitat.

Please indicate on the [registration form](#) if you want a vegetarian meal. A \$20/adult and \$15/child fee (children under 10 are free) if you pay by check. Please make your check payable to the **Arizona Riparian Council** and mail to Cindy Zisner. You may also pay online through [Paypal](#) at a cost of \$25/adult and \$15/child (which includes additional handling fees). Kids are definitely invited; however, there is a **NO PETS** policy so you will have to leave your four-footed kids at home. In order to finalize our plans, please register and pay by Friday, October 7, 2011.

*So that everyone has a good experience we need to limit the number of people to 40. Those 40 will be the first registered and first paid. We will keep a waiting list.*

Please submit all registration forms electronically ([Cindy.Zisner@asu.edu](mailto:Cindy.Zisner@asu.edu)) and indicate on the form if you paid through Paypal. If you are paying by check please send the check to:

Cindy D. Zisner

Arizona Riparian Council,  
Global Institute of Sustainability  
Arizona State University  
PO Box 875402  
Tempe, AZ 85287-5402

Phone for questions (480) 965-2490 or email [Cindy.Zisner@asu.edu](mailto:Cindy.Zisner@asu.edu).

**Time to Meet:** 1:00 pm at on Saturday at Shield Ranch. [Map to Shield Ranch](#).

**What to Bring:** Camping gear (tent, sleeping bag), folding chair, river shoes (if you wade into the river), and water to drink. Bring food for lunch on Saturday and breakfast and lunch on Sunday. Water is available at the Ranch. The temperatures may be potentially cool at night so pack accordingly. Feel free to bring your kayak but you are on your own with logistics.

**ARC will Provide:** Snacks, drinks and dinner Saturday night. Port-a-potties will be available near the camp site.

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## HYDRO-NEWS

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### ARIZONA GEOLOGICAL SOCIETY MEETING

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*On the origin of kerogen, oil, and everything else, or how to make an oil field by throwing hot water on a peridotite*

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**Stanley B. Keith**  
Magma Cham Exploration Inc.

**Sheraton Four Points Hotel Wildcat Room**  
1900 East Speedway (SE corner of Campbell and Speedway)  
Tucson

**Lecture at 8:00 PM**  
Tuesday, October 4, 2011

[Reservations are required for the dinner](#). Admission to the talk only is free. Please also note that although there is limited surface parking around the hotel, there is ample parking in the garage beneath the hotel.

**Special Meal Deal for Students! Dinner is *FREE* for students who make a reservation online at the website below. Please bring a student ID with you.**

**SCHEDULE: CASH BAR @ 6:00 PM, DINNER @ 7.00 PM, TALK @ 8:00 PM. WITH RESERVATION: MEMBER = \$24.00, GUEST = \$27.00.** If you do not have a reservation, an extra \$3.00 will be charged. Also, without reservations you may not get dinner. To make dinner reservations please call the AGS answering machine at (520) 663-5295 or reserve online at <http://www.arizonageologicalsoc.org/meeting-information/dinner-reservations> by 5:00 P.M. on the Friday before the meeting. Leave name, number of attendees, and whether a vegetarian or low-salt meal is required. This number can also be used for field-trip reservations and leaving messages for Society officers. Please cancel your reservation via the answering machine if you find that you will be unable to attend.

## Abstract

Based on an extensive literature review and our own data, a new model is proposed for the origin of oil that is consistent with a well-known earth-scale process known as serpentinization. It is suggested that most kerogen (which is universally accepted as the starting material for oil formation) originally formed by hydrothermal metamorphism and hydrolysis of peridotite parents under greenschist facies conditions (Figure 1).

A relatively hydrogen-poor aromatic kerogen type is initially formed by polymerization and chelation of aromatic hydrocarbons around nickel porphyrin nuclei under highly reductive, non-ionic supercritical conditions that attend serpentinization (Figure 1) in 'kitchens' where the temperature ranges between about 300 and 550° C. A buoyant coexisting kerogen and brine product is propelled upwards by expansional force associated with about a 40 percent volume increase during serpentinization. During migration, the kerogen is continuously hydrogenated by hydrogen donated from the co-migrating hydrothermal water component to the point where aliphatic hydrocarbon chains are cleaved off as alkane-rich liquid state hydrothermal oil in accord with abundant hydrothermal experimental data (equation 1). At cooler temperatures and pressures, more aromatic and condensed oils are produced in what are now cooler, ionic, and denser subcritical conditions for the coexisting water component. They also may be fractionated from the alkane-rich oil precursors.



Serpentine hydrothermal residual oil carbonate  
 Kerogen plume water refractory kerogen brine

Only about 20% of the original kerogen is reacted to hydrothermal oil; the remainder is carried as a refractory residuum in hydrothermal brines to surface seep sites where it is expelled as a chemical flocculate that mechanically accumulates in black shale chemically dominated sediments along with dolomite, calcite, alkali salts, and minor metal sulfides brought by the chemical brine component. The hydrocarbon petroleum and gas seepages are associated with extensive chemical and mud volcanism that is co-deposited in basin settings or mud volcanic edifices.

In addition to the surface exhalations, extensive hydrocarbons and brines are coevally deposited in more familiar reservoir settings such as porous sandstones during low temperature hydrothermal diagenesis. In such cases, the more buoyant oil component pushes the brine component to the sides where it precipitates its anomalous element component marginal to and above the petroleum reservoir. Clay, carbonate, and or anhydrite cement deposition above or lateral to the petroleum accumulation characteristically results in a self-sealing effect. Extensive deposits of hydrothermal dolomite typically form in more proximal higher temperature settings more proximal to the hydrocarbon deposit – especially the more alkane dominant, lower density (high gravity) hydrocarbon chemical facies. The entire process has much in common with Mississippi Valley Pb-Zn or Tennessee Valley Zn deposits.

**Serpentinite Reaction and Photograph of Serpentinite Hand Specimen**

**SIMPLIFIED SERPENTINIZATION REACTION WITH CARBON**

|                  |   |          |  |
|------------------|---|----------|--|
| <b>REACTANTS</b> | $6(\text{Mg}_{1.5}\text{Fe}_{0.5})\text{SiO}_4 + .04\text{C} + 8(\text{H}_2\text{O}) + .24\text{HCO}_3$   | ➔        |  |
|                  | OLIVINE      IN OLIVINE      IN SEAWATER  |          |  |
| <b>PRODUCTS</b>  | $3\text{Mg}_3\text{Si}_2\text{O}_5(\text{OH})_4 + \text{Fe}_3\text{O}_4 + .01\text{HC} + .455\text{H}_2 + .04\text{HC} + .09\text{CH}_4 + .04\text{CHOO} + 0.1\text{CO}_2 + 1.44\text{H}_2\text{O} + \text{HEAT}$ |          |  |
|                  | SERPENTINE      MAGNETITE      KEROGEN      KEROGEN      METHANE      FORMATE   |          |  |
|                  | IN ROCK   | IN BRINE |  |
|                  | HYDROCARBONS      LIFE      CLIMATE      CLIMATE  |          |  |



➔



Lizardite Serpentine  
Snarum, Norway

Figure 1: Hydrolysis reaction between unaltered peridotite and carbon-bearing hydrothermal water to produce magnetite and kerogen bearing serpentinite and a formate-carbonate bearing brine with abiogenic methane and a kerogen flocculate.

Stan can be reached at [mcheme@aol.com](mailto:mcheme@aol.com)

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**AEG AND THE ARIZONA LAND SUBSIDENCE GROUP'S 2011 SHLEMON SPECIALTY CONFERENCE**

**2011 Shlemon Specialty Conference**

**Opportunities for Alternative Energy Development in Arizona and the Southwest– Geologic/Hydrologic Considerations**

**Tempe, Arizona**

October 27 - 28, 2011

Sponsored by: Association of Environmental and Engineering Geologists (AEG) and The Arizona Land Subsidence Group

Be sure to make your hotel reservations: [Embassy Suites](#) ~ 480-897-4444

Identify yourself as an attendee of the *Shlemon Specialty Conference*

Deadline for hotel conference rates ~ October 20, 2011! Room rate is \$129.00 per night

[Conference Brochure](#)

[Register online here](#)

[Download and print registration form](#)

[Sponsorship Form](#)

[Exhibitors Application](#)

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## 14TH WORLD LAKE CONFERENCE: LAKES, RIVERS, GROUNDWATER, AND COASTAL AREAS - UNDERSTANDING LINKAGES

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31 October - 4 November, 2011

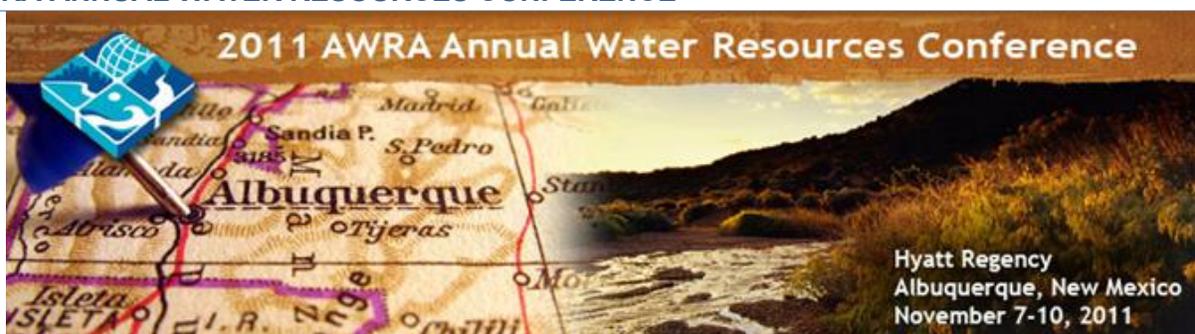
Austin, Texas USA

The International Lake Environment Committee (ILEC) and the River Systems Institute–Texas State University will co-sponsor the [14th World Lake Conference](#), to be held in Austin, Texas, USA, 31 October - 4 November, 2011. The conference provides an interactive international forum for the exchange of knowledge and experiences on important lake and reservoir science, management and governance issues. The conference is a biennial event with previous conferences having been convened in Argentina, China, Denmark, Hungary, India, Italy, Japan, Kenya, and the USA. The anticipated conference participants include international, national, and state agencies, non-governmental organizations, academic organizations, representatives of the private sector, and other water stakeholders from both developed and developing countries.

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## 2011 AWRA ANNUAL WATER RESOURCES CONFERENCE

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## 47th Annual Water Resources Conference

November 7-10, 2011 ~ Albuquerque, NM

The Conference Planning Committee has been hard at work on the [Preliminary Program](#). We had an overwhelming response to our call for abstracts, with over 350 submissions! More than half of all abstracts were submitted to Special Sessions, which were proposed and organized by water-resources professionals spanning a broad spectrum of organizations and interests. We're excited about the Special Session concept because it allowed our members and conference participants to directly inform the conference planning process by proposing the topics that are most important for discussion right now. Topics addressed by Special Sessions at this year's conference will include: climate change, remote sensing, instream flows, surface-water quality modeling, groundwater vulnerability, resource interdependencies, green infrastructure, water resources management, water marketing, and many more.

The Conference Planning Committee includes Laura Bexfield (U.S. Geological Survey), Claudia Borchert (City of Santa Fe), Michelle Henrie (Land and Water Law), Kelly Isaacson (Daniel B. Stephens & Associates), Jesse Roach (Sandia National

Laboratories), and Mark Stone (University of New Mexico). Thanks to their efforts, we've assembled a strong Conference Program, which includes:

- High-quality Technical Program, with close to 300 individual oral presentations, nine panel discussions, and a poster session
- Presenters representing 41 states, 11 nations, and 5 continents
- Keynote address by Cynthia Barnett, author of *Blue Revolution: Unmaking America's Water Crisis*
- Awards Luncheon keynote address by Charles Fishman, author of *The Big Thirst: The Secret Life and Turbulent Future of Water*
- Pre-Conference (November 6) Field Trip exploring the surface water and groundwater resources of the City of Santa Fe
- Two pre-conference workshops: one on the USGS-developed SPARROW Decision Support System and another on Integrated Water Resources Modeling
- A Student Career Night that will provide students the opportunity to hear from professionals with a variety of backgrounds
- Three book sales and signing events by Cynthia Barnett, author of *Blue Revolution: Unmaking America's Water Crisis*; Charles Fishman, author of *The Big Thirst: The Secret Life and Turbulent Future of Water*; and David Zetland, author of *The End of Abundance: Economic Solutions to Water Scarcity*.

The Conference will be held at the Hyatt Regency in downtown Albuquerque, conveniently located within walking distance of local restaurants and with easy access to major transportation corridors including the Rail Runner train to Santa Fe and the Rapid Ride bus to the University area.

Have a look at the [Preliminary Program](#) and make your travel plans to join us for the Annual Conference in Albuquerque!

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## NWRA 2012 LAKE MEAD SYMPOSIUM

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**Nevada Water Resources Association (NWRA)  
2012 Lake Mead Symposium Information is  
now Available!**

The 2012 Lake Mead Symposium - in conjunction with the 2012 NWRA Annual Conference - will be held at the Tuscany Suites & Casino in Las Vegas, Nevada on March 5-6, 2012.

### Call for Abstracts

**Don't wait; deadline is November 11, 2011!**

This is a perfect opportunity to exchange information, update our industry on projects, and collaborate with your colleagues on new ideas. NWRA will accept abstracts for either oral or poster presentations from both professionals and students! Please [click here](#) for more details on submitting your abstract.

Please watch for additional information about the 2012 Lake Mead Symposium on our website at [www.nvwra.org](http://www.nvwra.org). We look forward for seeing you at the Symposium!

### Attendee Registration

Please download registration [form here](#) and send with your payment to:

NWRA, c/o Tina Triplett, P.O. Box 8064, Reno, NV 89507

You can also register online at this [link](#).

### Sponsorship Opportunities:

Please download the sponsorship [form here](#) or visit this link for opportunities for your firm to receive recognition for your support of the 2012 Lake Mead Symposium either as an exhibitor or as a sponsor.

Please feel free to contact Tina Triplett, NWRA Executive Director, at 775-473-5473 or [creativerno@charter.net](mailto:creativerno@charter.net) for more information.

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## ARIZONA TO HELP TOMBSTONE WITH WATER REPAIRS

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*by Cale Ottens - Aug. 17, 2011 07:09 PM  
The Arizona Republic-12 News Breaking News Team*

Gov. Jan Brewer has declared Tombstone to be in a state of emergency after the town's water system was severely damaged by monsoon storms over the summer.

The town, located near Sierra Vista in southeastern Arizona, is currently relying on neighboring areas for its water supply, Brewer spokesman Matthew Benson said.

The damage stemmed from floods that hit the area between June 12 and July 26, after the town had already been affected by the Monument Fire.

The monsoon storms led to flooding, erosion and mudslides and caused significant damage to the city's primary water source, Benson said.

Tombstone draws 50 to 80 percent of its water supply from springs within the burn area, Benson said. The post-fire floods caused erosion and debris flows that damaged the water transmission system.

Read more: <http://www.azcentral.com/news/articles/2011/08/17/20110817tombstone-arizona-state-of-emergency-0817-abrk.html#ixzz1ZJAbNe2h>

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## EXPERTS: NEW 'SUPER-EARTH' MAY HOLD WATER

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*by Brian Vastag - Sept. 13, 2011 12:00 AM  
Washington Post*

Astronomers on Monday announced the discovery of 50 new planets circling stars beyond the sun, including one "super-Earth" that is the right distance from its star to possibly have water.

"If we are really, really lucky, this planet could be a habitat" like Earth, said Lisa Kaltenegger of the Max Planck Institute for Astronomy in Heidelberg, Germany.

The planet, dubbed HD85512b, circles an orange star somewhat smaller and cooler than our sun about 36 light-years away. The star, HD85512, is visible in the southern sky in the constellation Vela.

The newly found planet circles this star every 59 days, putting it at the edge of the "habitable zone" where water could exist if conditions were right.

In a teleconference, Kaltenegger said that the planet is at the warm edge of its star's habitable zone, as if "standing next to a bonfire." That means the planet would require a lot of cloud cover - which reflects starlight - to keep the surface cool enough to prevent any water from boiling, she said.

Astronomers have not determined whether the new super-Earth is rocky like the Earth or gassy like Jupiter, let alone whether it has an atmosphere. The new super-Earth is 3.5 times the mass of Earth.

Read more: <http://www.azcentral.com/news/articles/2011/09/13/20110913super-earth-may-hold-water.html#ixzz1ZJFSScdG>

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## ARIZONA DROUGHT CONDITIONS COULD DEEPEN

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*by Shaun McKinnon - Sept. 25, 2011 12:00 AM  
The Arizona Republic*

A dry winter and a weak monsoon fueled record wildfires, record heat and a succession of dust storms that played like a broken record, pushing Arizona deeper into a drought that has persisted since 1999.

Now, forecasters say La Niña, the ocean force responsible for the scant snowfall in Arizona's high country last year, has

returned for an encore and could set the stage for even drier conditions next year.

The latest weekly survey by the National Drought Mitigation Center in Lincoln, Neb., shows all of Arizona in some degree of drought, from abnormally dry conditions in the state's western third to pockets of extreme drought on the Navajo Reservation and extreme and exceptional drought in the southeastern corner of the state.

A winter forecast, meanwhile, by the Climate Prediction Center suggests little will change on the survey's drought map in the coming months. The odds favor drier, warmer weather over most of Arizona through December.



**San Carlos Lake near Coolidge is almost empty as drought grips Arizona.**

Dry conditions have forced some ranchers to continue reducing livestock herds already decimated by more than a decade of poor range conditions. Brittle forests contributed to a record wildfire season this year that has charred more than 1 million acres and lingered into September. San Carlos Lake near Coolidge is nearly empty, leaving less water for farmers in Pinal and Gila counties.

In Phoenix, the immediate effects of the drought are less apparent. The lack of cooling rain pushed August temperatures to record levels and fed an unusual number of later- season dust storms. But water supplies remain unaffected, insulated by in-state reservoirs that filled in 2010 and runoff from above-average snowfall this year on the upper reaches of the Colorado River, raising water levels in reservoirs that provide water for most Valley cities.

Read more: <http://www.azcentral.com/community/pinal/articles/2011/09/25/20110925arizona-water-drought-may-deepen.html#ixzz1ZJBbAMLc>

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## ARIZONA NEEDS A WATER MARKET

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*Robert Robb is a columnist for The Arizona Republic.  
Wednesday, September 28, 2011 at 07:57 AM*

A recent report by the Morrison Institute (“Watering the Sun Corridor”) is in part reassuring: We’re not in danger of running out of water anytime soon, even with reasonably robust growth.

That said, the report also indirectly underscores a defect in Arizona’s approach to allocating water as we move forward.

The report’s principal author was Grady Gammage, one of the state’s most astute urbanologists. It provides an excellent overview of the current water situation, somewhat clumsily rendered because of its adoption of a useless abstraction promoted by some national demographers.

The abstraction is that the country is coalescing into regional “megapolitan” areas that transcend and supersede the conventional metropolitan boundaries pedestrian analysts employ.

The uselessness of this abstraction is best illustrated by Southern California, which has already grown together. Yet Los Angeles County, Orange County and San Diego County are all distinct economic regions.

The Morrison water report treats Maricopa, Pinal and Pima counties as one megapolitan area, the “Sun Corridor.” Yet, in terms of water, they are very distinct, with different sources of supply and different issues. Phoenix still uses a third more water per capita than Tucson. Agriculture is still the primary water user in Pinal. Tucson has an allergy to the direct use of Central Arizona Project water.

Setting aside this crotchet, the report inventories likely supplies and demand for water and finds them in balance for several more decades.

Read more: <http://www.azcentral.com/members/Blog/RobertRobb/143550>

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## WATERBLOGGED BY SHAUN MCKINNON, ARIZONA REPUBLIC

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[\*\*\*August in Phoenix: It's a night heat\*\*\*](#)

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So there it is, August 2011, the hottest August on record and, with July 2009, the hottest month on record in **Phoenix**, and while the calendar says September, it's not over yet.

Read about some of the records [here](#), in a good [story](#) by the **Republic's John Faherty**, and dive into [this wonky chart](#) produced by the **National Weather Service**. The chart lists the 14 -- that's 14 -- heat-related records, including seven for daytime highs and seven for nighttime lows (and we use the term 'low' here with irony).



Some other notes from the summary:

- The high temperature reached 110 degrees or more 13 times in August. Add those to June and July and one day so far in September and the gauge at **Sky Harbor International Airport** has registered 110 degrees or more 32 times this year, which ties the record, a record that almost certainly will be broken Friday and piled on more well into next week.
- The [rain gauge](#) at the airport recorded 0.17 of an inch. The average for the month is 1 inch. The monsoon seems to have withered in the heat or decamped for parts not as hot. The last measurable rain at the airport was Aug. 3.
- In **Yuma**, there was just one day with a high temperature below 105 degrees. That's happened three times since 1878. (The last two were 1950 and 1962.)

Read more: <http://www.azcentral.com/members/Blog/ShawnMcKinnon/140042>

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For associated links and other timely water and environmental blogs on Shaun McKinnon's Arizona Republic site – **Waterblogged** visit <http://www.azcentral.com/members/Blog/ShawnMcKinnon>.

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## HYDRO JOBS

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### [Hydrologist III – Arizona Department of Water Resources](#)

Description:

This position is part of a team, supporting senior hydrologists/project managers with groundwater modeling projects. The successful candidate will be mentored in doing projects related to groundwater flow models. Responsibilities for this position include; organizing, collecting, and analyzing geologic, hydrologic, and water planning data using a variety of computer software and databases. This position assists hydrologic analysis for special projects as required.

Knowledge, Skills and abilities:

A general understanding of hydrology and geology with experience working with scientific data is required. Knowledge of databases, GIS, and a proficiency using computers is highly desirable. Experience in presenting results of work and analysis, orally and written, are valued qualifications. A desire to learn groundwater flow modeling is very important.

For a more detailed description and to apply for this position please visit the State of Arizona job site: <https://secure.azstatejobs.gov/pljb/azgovjobs//mainjb/applicant/jobClick.jsp?count=1&id=41535>

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## ADDITIONAL INFORMATION

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*For more information about the Arizona Hydrological Society, or to view current job listings and announcements, please visit our regularly updated web site at:*

<http://www.azhydrosoc.org/>

*Membership may be renewed by credit card through the AHS website or by mailing a check to the Arizona Hydrological Society, P.O. Box 1882, Higley, AZ 85236. Dues remain at \$45.00 year for regular membership and \$15.00 for students. Please remember that your 2011 membership was included in the 2010 Symposium registration fee!*

