

## APRIL 2010 NEWSLETTER

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### VIEWPOINT: BARBARIANS AT THE GATE

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Rarely have I been so totally appalled by the degree of stupidity of the Arizona State Legislature as I am now.

Right now there are people working to dismantle every protection for water that has been developed by Arizona over the last 30 years. They want to cripple the agencies that protect our water supply and its quality and repeal through back-door methods the underlying laws that created the Arizona Departments of Water Resources and Environmental Quality. The Groundwater Management Act and the Environmental Quality Act, along with agency rules, provide us with a stable regulatory framework in which change is non-precipitous and usually only accomplished with stakeholder input. While the burden of compliance with ADWR and ADEQ can often seem onerous, consulting firms labor diligently to ensure their clients do not run afoul of the relevant laws. We are all better off for having these agencies.

You all should know by now how badly the two agencies (plus many others) fared in the budget battles. The only thing left to both agencies is to raise money through increased fees for applications. In the current budget reconciliation process, an emergency rule-making authority was granted to both agencies for one year to raise fees. Now in special session, there is an attempt to amend that emergency rule-making authority to two years, but—and here is the kicker—after two years every statutory authority to collect money and carry out those programs would be automatically repealed. Each agency would also have to justify its programs and existence. That amounts to a sunset review. And maybe the Legislature would vote to restore the agencies' authority to raise money via fees and carry out their programs. And maybe not.

An automatic repeal of agency authority to charge fees and carry out programs for the protection of water would in effect totally gut both the Groundwater Management Act and the Environmental Quality Act. There are those who are gleeful at the prospect of ADWR and ADEQ withering away, and they are striking now while state government is at its weakest. And some legislators are listening. Hopefully sanity will prevail, and this proposal will go down in flames.

AHS is not a lobbying organization. But individual members who care about survival of the Groundwater Management Act and the Environmental Quality Act can watch their senators and representatives in the Arizona Legislature to make sure they do no damage to the laws that have successfully protected our water resources for so many years.

I know I will.

Alan Dulaney,

AHS Corporate Board President, 2010

## GOVERNMENT GOINGS-ON

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Splat! That was the sound of ADWR hitting the wall.

In the General Fund appropriation for Fiscal Year 2011, ADWR only got \$7 million, plus they got temporary rule-making authority to set fees to raise another \$5.6 million, assuming anyone actually submits an application for anything. But just a few years ago, it took \$24 million to fully staff the agency, and even after serious cutbacks, this year's budget was \$18 million.

Drastic changes must occur. ADWR has already or is planning to close all the outlying Active Management Area offices in Tucson, Nogales, Prescott, and Casa Grande. The Phoenix AMA will be closed, and all AMA work will be handled at the main office by—who? We don't know yet. Overall layoffs will take ADWR down to about 60-70 employees, maybe less. The entire agency is being consolidated onto two floors at their current address. There is serious talk of giving ADWR some space in the ADEQ building to save money, even though rent at any building managed by ADOA would be much more expensive.

But that probably won't be enough. Unlike ADEQ with its various pots of Federal money, ADWR is mostly based on General Fund appropriations—now cut back to \$7 million. The only independent sources of money are fees for NOIs and Assured Water Supply applications. Now ADWR upper management is scrambling to set up a fee structure for

all applications that would make the agency partially self-funding. But the agency's survival will depend on a steady cash flow from applications, and that is unlikely to happen right away, and the \$7 million from the General Fund won't be enough to bridge the gap. They are looking at operating on only \$9 million for FY 2011.

I think ADWR needs to restructure everything. In 1980 separate Hydrology, Legal, and other divisions made sense for the agency. However, thirty years have passed, and rigid division of responsibility between functionally discrete divisions no longer makes sense. ADWR should move towards an organizational structure centered on program teams, in which multiple functions are assumed by fewer employees. ADWR should fundamentally restructure how its employees accomplish the various missions of ADWR, with the goal of eliminating lower priority non-core tasks. Layers of management should be considerably flattened and reduced in order to shift resources to the work that actually needs to be done. So far ADWR has laid off lower-paid staff; greater savings can be achieved by lopping off higher-paid managers and lawyers. This would leave mostly hydrologists, who should be managing core programs instead of maintaining a false isolation from the real work of processing applications. So I think, from the outside and looking back.

I don't know what is happening at ADEQ yet, but when I find out, it will appear in your Newsletter.

Alan Dulaney,  
AHS Corporate Board President, 2010

## PHOENIX CHAPTER NEWS

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### April Dinner Meeting

Please join us Tuesday, April 13th at the SunUp Brewery near downtown Phoenix to have a beverage, share business cards, and talk water.

- Location:** [SunUp Brewery](#)  
322 E. Camelback Road  
Phoenix, AZ 85012
- Event:** Evaluation and Rehabilitation of Water Wells presented by Marvin Glotfelty, [Clear Creek Associates](#) principal
- Chapter Board Meeting:** 4:30 PM – 5:30 PM
- Happy Hour & Dinner:** 5:30 PM – 7:00 PM
- Presentation:** 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!

Marvin Glotfelty's presentation on ***Evaluation and Rehabilitation of Water Wells***, will cover the following topics:

- Aquifer hydraulics
- Video survey analysis
- Flow profile analysis techniques (both spinner log and dye tracer methods)
- Structural modification of wells
- Case studies
- Post-rehabilitation analysis

Marvin F. Glotfelty R.G., has over 20 years of experience unmatched in Arizona and co-founded [Clear Creek Associates](#) in September, 1999. His expertise is in conducting studies of groundwater systems for water purveyors and other entities having particular groundwater-related problem where he brings a complete understanding of the problem to be solved and a strong sense of the hydrogeological sciences that must be used to resolve the problem. He specializes in the design, assessment, and rehabilitation of water wells, and in unveiling the mysteries of groundwater systems and relating that information to well design.

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### **March Dinner Meeting Summary**

The Phoenix Chapter thanks the ASU GeoClub for hosting and sponsoring a very successful Student/Professional Informal Meet and Greet, where students were able to ask Hydrology and Geoscience professionals questions on a wide range of topics. More than 20 professionals from all areas of geoscience and environmental consulting and engineering mingled with students and gave personal insights into their work experiences and answered questions.

Special thanks go to Vicki Mills, GeoClub president and the event coordinator - It was a fun evening!

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### **2012 Symposium Planning Underway**

Ted Lehman, Christie O'Day, and Mike Hulst have been scoping out possible venues for the 2012 AHS Symposium and hope to have a decision made by April. If you are interested in helping them with the early stages of the planning for 2012, please contact 2012 symposium planning chair, Ted Lehman, at [ted@jefuller.com](mailto:ted@jefuller.com) or 480-222-5709.

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

- April 6<sup>th</sup> – AEG-AHS Student Night, ASU Memorial Union
- April 17<sup>th</sup> – Earth Fissure Tour sponsored and hosted by the ASU GeoClub, with members from AEG and ADWR leading the tour. Contact [Vicki Mills](#), GeoClub president, for more information.

- May 11<sup>th</sup> – Dinner meeting, “SRPs reservoirs and Salt River releases,” Charlie Ester, Salt River Project
- June-Dec Dinner meetings – How ‘bout you? Contact [Keith Ross](#) if you’re interested in speaking!

## ARIZONA SCIENCE AND ENGINEERING FAIR WATER PROJECT AWARDS

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The Phoenix Chapter with the support of the Central Arizona Project once again judged and gave awards at the Arizona Science and Engineering Fair (AzSEF). Based on our review of the projects at this year’s AzSEF, the AHS and CAP were pleased to confer the following awards to students whose projects demonstrate excellence in hydrology or environmental science:

### Senior Division:

\$200 1st Place to **Kelsey Waite**, for her project: S-EV-10 AzSEF-455: Determining the Location and Spreading of the Salt Water-Fresh water Interface in Wells Using Simple Resistance Measurements

\$50 for 2nd Place to **Jenna Wild**, for her project: S-MI-10-AzSEF-460: Ampicillin Resistant Bacteria in Wastewater Effluent

\$50 for 2nd Place to **Jonah Rucker**, for his project: S-EA-10-AzSEF-1029: Is It Possible to Predict Catastrophic Earthquakes by Using Short-Term Observation and Fractal Mathematics?

### Junior High Division:

\$50 1st Place to **Catrina Letterman**, for her project: J-EA-10-AzSEF-848: The Earth’s Miracle Water – The Water Cycle

Honorable mention to **Alexis O’Neil**, for her project: J-EV-10-AzSEF-818: Rocky Secrets

Honorable mention to **Adrianna Nicolay**, for her project: J-EA-10-AzSEF-939: Diatreme or Volcanic Plug?

### Elementary Division:

\$50 for 1st Place to **Dylan Shamy**, for his project: E-EV-10-AzSEF-506: Pumping Power – “Oil Cleanup”

\$50 for 1st Place to **Logan Oliver**, for his project: E-EV-10-AzSEF-654: Geothermal Heating and Cooling – Does it Work?

Honorable Mention to **Cooper Payne**, for his project: E-EA-10-AzSEF-1122: Oceans Conveyor Belt

Honorable Mention to **Christie Shepard and Angelica Moreno**, for their project: E-EV-10-AzSEF-1068: Lead Alert

Honorable Mention to **Marief Letterman**, for her project: E-EV-10-AzSEF-1068: The Earth’s Miracle Water – The Water Cycle

Special thanks go to Paul Plato for his continued commitment to the AzSEF and coordinating the judges and awards. We'd also like to thank DeAnne Rietz of SWCA and Matt Frailey of Clear Creek Associates for their help in judging this year's competition. Generally, the projects this year were better than last year, with more choices and some very outstanding students.

## HERMAN BOUWER INTERN SCHOLARSHIP

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This year marks the 11th year the Phoenix Chapter will solicit applications for the Herman Bouwer Internship Program! The Herman Bouwer Intern Scholarship gives students enrolled in a hydrology-related discipline at any Arizona college or university the opportunity to gain practical experience in the multidisciplinary field of hydrology and water resources. This scholarship acknowledges the extensive contributions of Dr. Bouwer to the science of hydrology and to the AHS.

We are still accepting Organizations interested in hosting the intern scholarship recipient. Please email Steve Acquafredda at [acqua@dswa.net](mailto:acqua@dswa.net) by April 23, 2010.

Check out the [AHS website](#) if you would like more information about the Herman Bouwer Intern Scholarship Program and to download forms.

## TUCSON CHAPTER NEWS

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### April Meeting Announcement

The next Tucson chapter meeting will be held on Tuesday, April 13th.

**Location:** Offices of Montgomery & Associates

1550 E Prince Rd

Tucson, AZ 85719

**Event:** **Building a Global Data Network in the Geosciences** presented by Lee Allison, State Geologist and Director of the Arizona Geological Survey

**Date:** Tuesday, April 11, 2010, 6:00 pm

**Time:** Social half-hour begins at 6:00 pm; Talk begins at 6:30

Food and beverages provided

**Lee Allison** was appointed State Geologist and Director of the [Arizona Geological Survey](#) in December, 2005. Previously, he served as State Geologist in Utah (1989-1999) and Kansas (1999-2004). During 2004-2005, he was Policy Advisor for Science and Energy to Gov. Kathleen Sebelius of Kansas. He holds BA (University of California, Riverside), MS (San Diego State University), and PhD (University of Massachusetts, Amherst) degrees in geology. He blogs at "Arizona Geology," [www.arizonageology.blogspot.com](http://www.arizonageology.blogspot.com).

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## March 2010 Meeting Summary

- Shane T Clark, Tucson Chapter Secretary (2010): U.A Watershed Hydrology

### Some Recent Advances in Hydrologic Scaling Theory and Methodology

On March 10th, the Tucson Chapter hosted a special guest lecturer on the campus of the University of Arizona's Hydrology Department. This talk was abundantly attended by 35 people. The meeting presenter was Dr. Shlomo Neuman who is a Regents' Professor of Hydrology and Water Resources at the University of Arizona. Dr. Neuman is one of the world's leading groundwater hydrologists. He has received numerous honors and distinctions for his contributions in the area of subsurface water flow and contaminant transport

Here is a brief summary of his lecture for those AHS members unable to attend.

Space-time fluctuations in hydrologic variables generally depend on scale. There has been a growing tendency to treat such variables as samples from self-affine (monofractal) or multifractal random fields (or processes) with spatial (or temporal) increments having exceedance probability tails that decay as powers of  $\delta^{-945}$ ; where, in most reported cases,  $1 < \delta < 2$ . The literature considers self-affine and multifractal modes of scaling to be fundamentally different, the first arising from additive and the second from multiplicative phenomena.

Among recent advances is a theoretical demonstration that samples from additive fractional Brownian motion (fBm,  $\delta = 2$ ) yield square (or absolute) increments which behave as if the field was multifractal when in fact it is monofractal. Samples from additive fractional Lévy motions (fLm,  $1 < \delta < 2$ ) tend to exhibit spurious multifractality. Deviations from apparent multifractal behavior at small and large lags are due to nonzero data support and finite domain size, unrelated to noise or undersampling (causes cited for such behavior in the literature).

These findings are based on an earlier advance, the formal decomposition of anisotropic fLm (fBm when  $\delta = 2$ ) into a continuous hierarchy of statistically independent and homogeneous random fields, or modes, which captures the above behavior in terms of only  $E + 3$  parameters where  $E$  is Euclidean dimension. The decomposition has precise spectral and wavelet analogues. It has been used successfully to elucidate the reason why apparent autocorrelation scales of many variables increase with domain size; explain why apparent longitudinal dispersivities of subsurface tracer plumes increase with mean travel distance or time; provide a reason as to why the rate of this increase diminishes with increased resolution of plume details; derive expressions for scale-dependent effective permeability's of self-affine geologic media; recognize and quantify the uncertain nature of such effective parameters; develop multiscale relationships between length scales, apertures, densities and permeability's of natural rock fractures; derive ensemble analogues of Horton's scaling laws for river networks; relate statistical moments of river network attributes to arbitrary lower and upper cutoff scales that may (but need not) be taken to represent data support and maximum watershed size; provide a theoretical basis for the previously unexplained observation that transverse fluctuations of basin boundaries and main channels, having a common Hurst scaling exponent, are larger in the former than in the latter; upscale and downscale statistics of data collected on disparate support scales; provide a way to condition these statistics on data measured at specific space-time locations; and create a blueprint for the propagation of corresponding data and parameter uncertainties through hydrologic models.

These broad interpretive and analytical powers of the approach are sure to expand in the

future!

The AHS Tucson Chapter extends a very warm thanks to Dr. Shlomo Neuman for his informative presentation!

## 2010 SYMPOSIUM PLANNING COMMITTEE

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The AHS Symposium Planning Committee met on March 3, 2010 at the USGS Arizona Water Science. Items discussed included:

- Abstracts due **April 2, 2010**
- Sponsorship or exhibitors materials available on web page
- Technical sessions: Talked about the format of how to organize
  - List of potential speakers
  - Technical Program and Speaker suggestions welcome from AHS members
- Charles Hutchinson has been booked as a plenary speaker
- Need additional volunteers and field trip ideas

A planning meeting also occurred on March 24, 2010. Please contact [Shane Clark](#) or [Al Wynant](#) for details.

The next AHS Symposium Planning Committee meeting will be held on **Wednesday April 14, 2010 at 6:00 pm** at the USGS Arizona Water Science Center located on the U of A campus, 520 North Park Avenue, Tucson, AZ. Please contact [Shane Clark](#) or [Al Wynant](#) for details.

## SOUTHERN ARIZONA REGIONAL SCIENCE AND ENGINEERING FAIR WATER PROJECT AWARDS

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2010 Awards for the Tucson Chapter of the Arizona Hydrological Society at the Southern Arizona Regional Science and Engineering Fair (SARSEF):

Canyon View Elementary School: **Vishakk Rajendran, Jeremy Wang**: Are We Drinking Pure Water? And **Jeremy Wang, Vishakk Rajendran**: Which Liquid Has More Conductivity?

Sunrise Drive Elementary School: **Lara Alavi**: Can Well Water Make Witches?

International School Of Tucson: **Isaac Erickson**: What Kind Of Bridge Is The Strongest?

Tucson High Magnet School: **Kelsey Waite**: Determining The Location And Spreading Of The Salt Water- Fresh Water Interface In Wells Using Simple Resistivity Methods

Pistor Gate Middle School: **Kayley Manuel, Zari Hunter**: When Flash Floods Attack!

Billy Lane Lauffer Middle School: **Whole Class Project**: The Water Around Tucson

Fruchthendler Elementary School: **Andy Zhou**: Got Water? Do Water Plants Slow Water Water Loss?

Oetter Home School: **Nick Silveira, Tim Oetter**: Time To Cool Off

Twin Peaks Elementary School: **Hailey Simpson**: Plop, Plop, Fizz, Fizz - Oh What A Relief It Is!



Manzanita School: **Zoe Holtzman**: Water Vs. Water

Richard B. Wilson Jr School - Elem: **Lilyann Dean**: Thirsty Cactus

Sonoran Science Academy - Broadway: **Rudrakshi Dasika**: Solar Desalination

Many thanks to our judges Dick Thompson - Tucson Water, Gary Burchard – Metro Water, and especially Marla Odom – Montgomery & Associates for her ongoing commitment to SARSEF and coordination of judges and awards.

## **LEONARD HALPENNY INTERN SCHOLARSHIP – EXTENDED DEADLINE!**

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The deadline for Student Applications has been extended to **5:00 PM, April 9, 2010!**

### **Information for Interested Students**

The Leonard Halpenny Intern Scholarship is open to graduate and undergraduate students in the fields of hydrology, geology, civil, environmental and geologic engineering, renewable natural resources, wastewater management, soil and water science, and other hydrology-related studies. Students from the U of A, ASU, NAU, Pima College, and other Arizona colleges can apply to participate in the program. The scholarship provides an opportunity to gain practical experience at multiple hydrological work environments in Tucson. The scholar will be required to complete 200 hours of work in 2010. The scholarship carries a stipend in the amount of \$3,000. The student will be required to keep and submit a record of hours worked. Upon completion of the intern scholarship, the candidate will be required to submit an article summarizing his or her own experience that will be published in the AHS newsletter.

Those who wish to apply should obtain an application form from our web site: [http://www.azhydrosoc.org/internship\\_Halpenny.html](http://www.azhydrosoc.org/internship_Halpenny.html). Interviews are slated to occur the week of April 19<sup>th</sup>. Candidates must be willing to sign liability and confidentiality waivers for participating organizations prior to commencing their intern scholarship.

E-mail [modom@elmontgomery.com](mailto:modom@elmontgomery.com) for more information about the Leonard Halpenny Intern Scholarship Program.

### **Information for Interested Employers**

The Tucson Chapter is seeking employers from government, private industry, non-profit agencies and environmental consulting firms to host the Leonard Halpenny Intern Scholar and provide practical hydrological experience to a student pursuing a degree in hydrology, geology, environmental science, civil and environmental engineering, or other hydrology related fields. The Halpenny selection committee will interview qualified candidates the week of April 12<sup>th</sup>, 2010, and will announce the selection of the Intern Scholar by April 30, 2010. The Intern must complete 200 hours of service by December 31, 2010 with at least 40 hours service at each participating organization.

Interested organizations who wish to apply should obtain an application form from our web site: [www.azhydrosoc.org](http://www.azhydrosoc.org), and send it to the committee by April 12, 2010.

## Leonard Halpenny Intern Scholarship Committee

[Marla Odom \(modom@elmontgomery.com\)](mailto:modom@elmontgomery.com)

Montgomery & Associates

1550 E. Prince Road

Tucson, AZ 85711

Telephone: (520) 881-4912

Fax: (520) 881-1609

### WRRC BROWN BAG SEMINARS: APRIL 2010

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**WRRC Event:** Arizona v. California and the Colorado River Basin. A book signing will follow the seminar. *(Note: later start time for seminar)*

**Speaker:** Jack August, Executive Director, Barry Goldwater Center for the Southwest

**Location:** *Sol Resnick Conference Room*

*Water Resources Research Center*

*350 N. Campbell Ave.*

**Date:** April 8, 2010

**Time:** 4:15 to 5:30 PM

Many 20th Century court cases could be considered "the case of the century" from Fatty Arbuckle's murder trial in the 1920s to the Scopes Monkey Trial to Brown v. Board of Education. But these cases pale in comparison to Arizona v. California – the longest Supreme Court case in American history – a Herculean legal and political battle for an equitable share of the Colorado River and its tributaries. The interstate and international contentions stretched back over a century and the implications of Arizona v. California are being played out to this day.

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**WSP Event:** When Will the Reservoirs Run Dry: The looming water crisis in the Southwest *(Note: later start time and location)*

**Speaker:** Brad Udall, Director, CU-NOAA Western Water Assessment, NOAA Earth System Research Laboratory, and the University of Colorado at Boulder

**Location:** University of Arizona

Integrated Learning Center (ILC)

Room 140 (near main library)

**Date:** April 15, 2010

**Time:** 4:00 to 5:00 PM

Hosted by the Water Resources Research Center, School of Earth and Environment Sciences, and the Department of Geosciences *(Note: later start time and location for the seminar)*.

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**WRRC Event:** City/County Water Study Phase II Report & Implementation Status

**Speakers:** Melaney Seacat, Pima County Project Coordinator  
Nicole Ewing-Gavin, Assistant to the City Manager at City of Tucson – Tucson Pima Water Study

**Location:** *Sol Resnick Conference Room*  
*Water Resources Research Center*  
*350 N. Campbell Ave.*

**Date:** April 21, 2010

**Time:** 12:00 to 1:30 PM

The City of Tucson and Pima County have completed an intensive, two-year study of water and wastewater sustainability that involved hundreds of hours in public meetings and dozens of technical reports. This presentation will highlight the results of this effort focusing on the recommendations in the final Phase II Report and the status of their implementation.

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**WRRC Event:** Hot Topics in Water & Climate Policy

**Speakers:** Ben Grumbles, Director, Arizona Department of Environmental Quality (ADEQ)

**Location:** *Sol Resnick Conference Room*  
*Water Resources Research Center*  
*350 N. Campbell Ave.*

**Date:** April 28, 2010

**Time:** 12:00 to 1:30 PM

Among Arizona's most pressing environmental challenges today is finding innovative ways to address water sustainability and rising greenhouse gas emissions, a key driver affecting climate change. Communities and ecosystems depend on a sustainable supply of clean and safe water, and a current focus of ADEQ's mission is to explore and implement ways to reduce water waste, encourage its reuse, and restore critical watersheds. We also recognize the nexus between water and energy – connecting the drops with the watts! Advancing clean, renewable energy is crucial to resolving other critical environmental concerns, from clean air to climate change.

Together with Arizona businesses and communities, ADEQ is striving for pragmatic, proactive approaches to climate change mitigation and adaptation by advancing clean renewable energy, smart growth, fuel efficient transportation and energy efficiency policies and practices that make sense for Arizona. I look forward to telling you about our efforts and hearing your views on these important and timely topics.

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Information for additional seminars can be found on the WRRC web site:  
[www.cals.arizona.edu/azwater](http://www.cals.arizona.edu/azwater)

## FLAGSTAFF CHAPTER NEWS

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### April Chapter Meeting Announcement:

**Location:** [Casa Bonita](#)

1551 South Milton Road

Flagstaff, AZ 86001

**Date:** Wednesday, March 24, 2010

**Time:** 6:00 PM

Food and beverages provided

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### March 2010 Meeting Summary- Flagstaff

- Dana Downs Hienes, CH2M Hill

The Flagstaff Chapter would like to thank Charlie Ester from the Salt River Project for a providing an interesting and compelling talk at the March 24 chapter meeting. The following is an overview of his presentation.

The SRP delivers water to nearly 250,000 acres in the Phoenix area using a combination of groundwater and surface water supplies. Many of the groundwater wells were originally constructed for agriculture. However, as urban/residential development has progressed throughout Phoenix, many of these wells have become unable to contribute to their overall supply. Those which could be discharged to nearby canals for wheeling to areas of demand are of increasing importance..

Charlie presented several plans and studies SRP is utilizing to forecast and manage water supplies along the Verde and Salt River systems in light of the recent drought which significantly impacted reservoir storage. A Reservoir Operation Plan was developed which contains many components, including the impacts of weather and drought. Looking at the historic record, SRP has used information regarding the drought from 1898-1904 to develop storage operation planning. The most recent weather data indicate the recent drought was similar to the 1950s drought. Tree-ring data also suggest at least 8 other droughts were as severe or more severe, and that longer droughts have occurred. Two significant droughts were noted; the mega drought which occurred in 1575-1585 and the SRP Planning Drought of Record, which occurred 1898-1904.

However, tree ring studies completed by U of A indicate there have not been individual drought years going back to 1300 AD that were as severe as the 1996 and 2002. The possibility of a longer and more severe drought provided incentive for SRP to model combined storage and groundwater pumping scenarios to determine a point at which the SRP reservoir system is unable to meet any demand. SRP is exploring options to augment the storage supply before storage reaches a critical level, which allows the supply to be sustained for a longer period of time to preclude the complete loss of storage. Also, this approach of developing a more robust operations model will be applicable should a shift to a warmer, drier Arizona occur, as global warming/climate change predictions suggest. SRPs current operations management uses the 1575-1585 tree ring drought as the new Planning Drought of Record and a conservative 950,000 acre feet demand. If needed, reservoir shortages could be addressed through increased groundwater pumping, reduced allocation to customers, agreements with Central Arizona

Project, lease options with Indian and non-Indian agriculture, recovery of long term underground storage credits, conservation, watershed management and increased water-use efficiency.

Additionally, Charlie presented 2009-2010 El Nino winter precipitation summaries and statistics. Lakes along the Salt River have reached capacity, and are releasing water, while lakes along the Verde are very near capacity (much of the snowmelt from the northwestern portion of Verde watershed has just begun). Data from SNOTEL sites located in the SRP watershed indicate snowpack levels are much greater than what has been received in recent history. The SNOTEL information is being used to estimate future SRP reservoir inflow. While precipitation from the 2009-2010 winter will not resolve the long term regional drought, storage reservoirs have rebounded, and forests/watersheds have received some much needed moisture and relief.

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## **FLAGSTAFF CHAPTER 2010 INTERN SCHOLARSHIP – INFO FOR EMPLOYERS**

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Could your northern Arizona based company or agency use an intern this summer? This is your opportunity to influence a college student and introduce them to the profession of hydrology! The student will choose three companies or agencies with which they will spend at least 40 hours. The student is paid by AHS. The one page Employer Interest Survey Form for companies and agencies must be filled out and submitted by April 21. For more information please visit the [Flagstaff Intern Scholarship page](#) from the main AHS Website. Feel free to contact Erin Young at [eyoung@flusol.com](mailto:eyoung@flusol.com) for information or for the [Employer Survey Form](#).

### **AHS Flagstaff Intern Scholarship Program**

Erin Young

Phone: (928) 606-8422

E-mail: [eyoung@flusol.com](mailto:eyoung@flusol.com)

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## **HYDRO-NEWS**

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### **GURGLING CREEKS MAY BE SAYING OUR SHORT-TERM DROUGHT IS OVER**

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**We can thank Jan., Feb. rains, but long-term dry spell persists**

by **Tony Davis** – February 27, 2010  
*Arizona Daily Star*

The Tucson region got so much rain in January and February - about two-thirds more than normal - that National Weather Service officials are close to saying the area's short-term drought is over.

[http://azstarnet.com/news/science/environment/article\\_c9e6c5ad-b2ef-554e-a853-a994a7930347.html](http://azstarnet.com/news/science/environment/article_c9e6c5ad-b2ef-554e-a853-a994a7930347.html)

## **YOU CAN NOMINATE GREEN LOCATIONS IN OLD PUEBLO FOR MAP**

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by **Phil Villarreal** – March 16, 2010  
*Arizona Daily Star*

Makers of a map that spots Tucson's green locations need your help to complete the project by the end of the month.

To nominate a place for inclusion on the Green Pueblo Map, go to [www.greenpueblomap.org](http://www.greenpueblomap.org). The deadline is April 1 for inclusion in the printed map.

[http://azstarnet.com/news/local/govt-and-politics/elections/article\\_bf51804e-0243-5971-b281-3ed14e6f90f0.html](http://azstarnet.com/news/local/govt-and-politics/elections/article_bf51804e-0243-5971-b281-3ed14e6f90f0.html)

## **FOR PARCHED STATE, WET WINTER MEANS QUENCHED THIRST**

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by **Shaun McKinnon** – March 17, 2010  
*The Arizona Republic*

Winter storms plastered Arizona's high country with snow and soaked the lower deserts with rain until the ground was almost sloshing, but that was just the first half of an increasingly wet story.

As temperatures rise this week, the snow will start to melt, gushing down streams and rivers into reservoirs that, in many cases, are already full. The overflow on the Salt and Verde rivers alone could exceed a year's supply of water for Valley residents.

The runoff will ease drought conditions across much of the state, rejuvenating parched forests and rangelands and replenishing groundwater aquifers. Whether the winter has ended the drought, now more than a decade old, probably won't be known for another year or more. It's already clear that drought conditions will persist on the Colorado River.

<http://www.azcentral.com/arizonarepublic/news/articles/2010/03/16/20100316water-winter0317.html>

## **FORMER INTERIOR SECRETARY UDALL DEAD AT 90**

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Associated Press – March 20, 2010  
*The Arizona Republic*

SANTA FE, N.M. - Stewart Udall, a former Arizona congressman who sowed the seeds of the modern environmental movement as secretary of the interior during the 1960s and later became a crusader for victims of radiation exposure from the government's Cold War nuclear programs, died Saturday. He was 90.

A statement from Udall's family, released through the office of his son, Sen. Tom Udall, D-N.M., said he died of natural causes at his home in Santa Fe, surrounded by his children and their families.

Udall, brother of the late 15-term congressman Morris Udall, served six years in Congress as a Democrat from Arizona, and then headed the Interior Department for eight years under Presidents Kennedy and Johnson. His son Tom and nephew Mark also became congressmen, then both were elected to the Senate in 2008.

<http://www.azcentral.com/news/articles/2010/03/20/20100320stewart-udall-dies-ON.html>

## WATERBLOGGED

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by **Shaun McKinnon** – March 3, 2010  
*The Arizona Republic*

Are we ruining our own weekends? With rain in the forecast for a third consecutive Saturday and Sunday, some folks are starting to grumble about the snide turn nature seems to have taken in lining up storms on the cosmic playlist.

A few soggy pals, watching the weeds sprout after rainy weekends, have muttered some not so nice words about Whoever is in Charge Around Here, casting evil eyes in this direction, as if we at Waterblogged World Headquarters could control the weather -- which we can't, as far as you know.

Or can we?

Find the rest of the story, associated links, and other timely water blogs on Shaun McKinnon's Arizona Republic site – **Waterblogged** –  
<http://www.azcentral.com/members/Blog/ShawnMcKinnon>

## 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 web site at:*

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

*Your membership may be renewed for 2010 by credit card through the AHS website or by mailing a check to the Arizona Hydrological Society, c/o Christie O'Day, 3317 S. Higley Road, Suite #114, Box 120, Gilbert, Arizona 85297. Dues remain at \$45.00 year for regular membership and \$15.00 for students. Looking forward to a great 2010 with your continuing support. For those who attended the 2009 Water Symposium, be reminded that membership dues for 2010 were included in the registration fee.*