CONFERENCE SPONSORS AND EXHIBITORS

Mark Cochran
Associate Vice President
for Agriculture- Research
Fayetteville, AR

Evan Teague
Environmental Specialist
Little Rock, AR

Dave Procyk
Regional Manager
Austin, Texas

Ric Bertrand
Product Manager
Austin, Texas

Amy Wilson
Director of Public Affairs
Lowell, Arkansas

ARKANSAS WATER RESOURCES CENTER

2008 ANNUAL RESEARCH AND WATERSHED CONFERENCE

APRIL 22-23, 2008 · FAYETTEVILLE, ARKANSAS
UNIVERSITY OF ARKANSAS

PHOTO COURTESY OF TERRY BOYD PHOTOGRAPHY
CONFERENCE PARTICIPANTS

Daniel Smith  
Arkansas Department of Health  
daniel.smith.adh@arkansas.gov

Richard Smith  
US Geological Survey  
rsmith1@usgs.gov

Ken Steele  
University of Arkansas  
kkeele@uark.edu

Ryan Stoner  
UA Division of Agriculture  
rstoner@uark.edu

Rick Stubblefield  
Oklahoma Scenic River Commission  
grstub@hotmail.com

Rusty Tate  
Beaver Water District  
rtate@bwdh2o.org

Barry Tonning  
Tetra Tech  
barry.tonning@tetratech.com

Susan Thomas  
City of Fayetteville  
sthomas@ci.fayetteville.ar.us

Kent Thornton  
FTN & Associates  
kwt@ftn-assoc.com

Faron Usrey  
National Park Service  
faron_usrey@nps.gov

Tara Verkler  
UA Division of Agriculture  
tverkler@uark.edu

Brian Wagner  
AR Game and Fish Commission  
bkwagner@agfc.state.ar.us

Marvin Weeks  
USDA Forest Service

Amy Wilson  
Beaver Water District  
avilson@bwdh2o.org
CONFERENCE PARTICIPANTS

Marty Matlock  
UA Division of Agriculture  
mmatlock@uark.edu

David Procyk  
Hach Environmental  
dprocyk@hach.com

Tom McAlister  
Rogers Water Utilities  
super@rwu.org

Richard Rebich  
US Geological Service  
rarebich@usgs.gov

Ellen McNulty  
AR Dept. of Environmental Quality  
mcnulty@adeq.state.ar.us

Mike Rodgers  
US Army Corps of Engineers  
Michael.r.rogers@usace.army.mil

Roger Miller  
AR Dept. of Environmental Quality  
jmiller@adeq.state.ar.us

Rick Roeder  
UA Division of Agriculture  
vroeder@uark.edu

John Moore  
Upper White River Basin Found.  
jmoore@uwrb.org

Chris Rogers  
UA Division of Agriculture  
cwrogers@uark.edu

Bob Morgan  
Beaver Water District  
rmorgan@bwdh2o.org

Moye Rutledge  
UA Division of Agriculture  
erutledge@uark.edu

Naresh Pai  
UA Division of Agriculture  
npai@uark.edu

John Sampier  
NWA Conservation Authority  
johnsampier@hotmail.com

Jose Luis Pantoja  
UA Division of Agriculture  
jpantoja@uark.edu

Dharmendra Saraswat  
UA Division of Agriculture  
dsaraswat@uark.edu

John Pennington  
UA Division of Agriculture  
jhpennington@uaex.edu

Mary Savin  
UA Division of Agriculture  
masvin@uark.edu

Greg Phillips  
GMBc & Associates  
gphillips@gbmassoc.com

Thad Scott  
UA Division of Agriculture  
Jts004@uark.edu

Eric Pollock  
University of Arkansas  
epolloc@uark.edu

Andrew Sharpley  
UA Division of Agriculture  
sharpley@uark.edu

Jennie Popp  
UA Division of Agriculture  
jhpopp@uark.edu

Bob Singleton  
AR Dept. of Environmental Quality  
singleton@adeq.state.ar.us

ARKANSAS WATER RESOURCES CENTER

203 Engineering Hall  
University of Arkansas  
Fayetteville, AR 72701

Phone: (479) 575-4403  
Email: awrc@uark.edu

www.uark.edu/depts/awrc

BRIAN E. HAGGARD  
AWRC Interim Director  
Associate Professor  
Biological & Agricultural Engineering  
University of Arkansas  
203 Engineering Hall  
Fayetteville Arkansas, 72701  
479.575.2879  
haggard@uark.edu

LESLIE D. BARTSCH  
AWRC Conference Coordinator  
Program Associate  
Biological & Agricultural Engineering  
University of Arkansas  
203 Engineering Hall  
Fayetteville Arkansas, 72701  
479.575.2840  
lbarts@uark.edu

Picture courtesy of Terry Boyd Photography
In 1964, Congress passed the Water Resources Research Act, establishing water research institutions like Arkansas Water Resources Center at land grant universities throughout the United States. The State Water Resources Research Center Institutes were charged with arranging for competent research that addresses water problems and enhances our understanding, aiding the entry of new research scientists into water resources fields, helping to train future water scientists and engineers, and transferring results of sponsored research to water managers and the public.

This year, the Arkansas Water Resources Center funded three projects including:

- **Role of Fluvial Sediments in Modifying Phosphorus Exports from Northwest Arkansas Watersheds**, Andrew Sharpley, UA Division of Agriculture, $24,098.
- **Biogeochemical Controls and Interactions of Carbon and Nutrient Cycling in Karst Hydrologic Systems**, Erik Pollock, UA Stable Isotope Lab, $20,814.
- **Spatial and Historical Distribution of Geosmin and MIB Producers in Beaver Reservoir, Northwest Arkansas**, Sonja Hausmann, UA Division of Agriculture, $25,423.

This year, the National Institute of Water Resources highlighted one of the AWRC’s recently funded investigations; this study focused on the occurrence of antibiotic resistance in fauna of natural systems. For more information on this project please contact Mary Savin (msavin@uark.edu).
CONFERENCE PARTICIPANTS

Tatsuya Akiyama  
UA Division of Agriculture  
takiyam@uark.edu

Jane Anderson  
AR Game and Fish Commission  
jeanderson@uagfc.state.ar.us

Ray Avery  
Beaver Water District  
ravery@bwdh2o.org

Sreekala Bajwa  
UA Division of Agriculture  
sgbajwa@uark.edu

Leslie Bartsch  
UA Division of Agriculture  
lbartsch@uark.edu

Ric Bertrand  
Eureka Environmental  
rbertrand@eurekaenvironmental.com

Ruchi Bhattacharya  
University of Arkansas  
ruchi.bhattacharya@gmail.com

Robert Blanchard  
US Geological Survey  
rb Blanchard@usgs.gov

Susan Bolyard  
US Geological Survey  
sbolyard@usgs.gov

Van Brahana  
University of Arkansas  
brahana@uark.edu

Brian Breaker  
University of Arkansas  
bbreaker@uark.edu

Paul Burns  
Rogers Water Utilities  
paulburns@nwu.org

Sandra Chandler  
Arkansas Department of Health  
Sandra.chandler@arkansas.gov

Z Clayton-Niederma  
UA Division of Agriculture  
zclayton@uark.edu

Angela Coats  
angielee@hotmail.com

Michael Crump  
USDA Forest Service  
mcrump@fs.fed.us

Eric Cummings  
UA Division of Agriculture  
ecummin@uark.edu

Morgan David  
University of Arkansas  
mdavid@uark.edu

Ralph Davis  
University of Arkansas  
ralphd@uark.edu

Jeanne DeLanois  
US Geological Survey  
jdelanois@usgs.gov

Walter Delp  
USDA NRCS  
walter.delp@ar.usda.gov

Paul Easley  
City of Fort Smith  
reasley@fsark.com

Alice Enochs  
UA Division of Agriculture  
aenochs@uark.edu

Paul Etzkorn  
University of Arkansas-Fort Smith  
petzkko00@uafotysmith.edu

AWRC ANNUAL CONFERENCE PROGRAM AT A GLANCE

TUESDAY APRIL 22, 2008

7:30- 8:15  Coffee, Juice, Pastries
8:15- 9:45  Session 1: Nutrient Loads into the Gulf of Mexico
9:45-10:10  Coffee Break and Posters
11:30- 1:30  Lunch and Poster Session
12:30- 1:30  Rolling Slide Show of the Scenic Beauty of Arkansas
2:50- 3:15  Coffee Break and Posters
3:15- 4:35  Session 4: Aquatic Conservation and Implementation of the State Wildlife Grants Program
7:00- 9:00  Social at On the Rocks Bar & Grill

WEDNESDAY APRIL 23, 2008

7:30- 8:30  Coffee, Juice, Pastries
8:15- 9:45  Session 5: Water Research Activities and Stakeholder Assessment in the Upper White River and the Illinois River
9:45-10:05  Coffee Break
10:05-12:00  Session 6: Watershed Management and Municipal Nutrient Reduction Activities across Arkansas
12:00-12:30  Concluding Remarks and Thank You
Session 1: Nutrient Loads into the Gulf of Mexico
Moderator: Ralph Davis, Geosciences Department, University of Arkansas

8:15 Welcome and Introduction
8:20 Nutrient Loads into the Gulf of Mexico – New USGS SPARROW Modeling Results from the Mississippi River Basin, Richard Smith, US Geological Survey (rsmith1@usgs.gov)
9:20 Discussion and Questions

Session 2: Federal Agency Water Research Activities – Water Quality, Modeling and Biology
Moderator: Andrew Sharpley, Watershed Research and Education Center, UA Division of Agriculture

10:10 Water Quality Monitoring of Selected Springs at the Buffalo River, Faron Usrey, National Park Service (faron_usrey@nps.gov)
10:30 Water Quality Characteristics Resulting from a Mass Gathering on the Ozark – St Francis National Forests – The Largest Drum Circle on the Buffalo River, Michael Crump, US Forest Service (mcrump@fs.fed.us)
10:50 Interagency Collaboration at the Savoy Experimental Watershed- New Insights for Ground-Water Quality in Mantled Karst, Van Brahana, Department of Geosciences, University of Arkansas (brahana@uark.edu)
11:10 The Future: Data-Driven Lake and Reservoir Monitoring Using Real-Time 3-D Hydrodynamic and Water-Quality Simulations, Reed Green, US Geological Survey (wrgreen@usgs.gov)

Lunch, Posters and Rolling Slide Show

11:30-1:30 Lunch Break – Penguin Ed’s Barbeque and Poster Session (Foyer and Room 405)
12:30-1:30 Rolling Slide Show of the Scenic Beauty of Arkansas Waters (Room 405) Terry Boyd, Naturalist and Photographer, Russellville, Arkansas

General:
Solids:
- Dissolved 10.00
- Suspended 10.00
- Total 10.00
- Volatile 15.00
- Ash Free Dry Weight 15.00
- Sulfate, SO₄ 10.00
- Turbidity 7.00

Biological:
- Chlorophyll a, b, & c (spectrophotometric) 15.00

Microbiological:
- MMO-MUG (Colilert):
  - Total coliform+E. Coli (1 dilution) 20.00
  - Additional dilutions 10.00
*Must use 100 mL sterile containers and be next day mailed to the laboratory
*Not certified for drinking water

Metals:
- Aluminum, Al 10.00
- Barium, Ba 10.00
- Cadmium, Cd 10.00
- Calcium, Ca 10.00
- Cobalt, Co 10.00
- Copper, Cu 10.00
- Iron, Fe 10.00
- Lead, Pb (ICP) 10.00
- Magnesium, Mg 10.00
- Manganese, Mn 10.00
- Potassium, K 10.00
- Sodium, Na 10.00
- Vanadium 10.00
- Zinc, Zn 10.00

*Call before submitting metal samples

Discounts negotiable for multiple samples
**AWRC Fee Schedule for Water Testing**

The AWRC Water Lab offers the following basic packages:

<table>
<thead>
<tr>
<th>Package</th>
<th>Fee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic</td>
<td>$75</td>
</tr>
<tr>
<td>Irrigation-All crops</td>
<td>$75</td>
</tr>
<tr>
<td>Irrigation-Drip or Trickle</td>
<td>$80</td>
</tr>
<tr>
<td>Water Quality Assessment</td>
<td>$165</td>
</tr>
</tbody>
</table>

For more information about these packages visit: [www.uark.edu/depts/awrc/AWRCWaterQualityLab.htm](http://www.uark.edu/depts/awrc/AWRCWaterQualityLab.htm)

The AWRC Water Lab also offers individual tests as follows:

- **Sample Handling** (per sample) 5.00
- **General:**
  - Alkalinity 8.00
  - Anions (NO$_3$-N, F, SO$_4$, Cl) 20.00
  - Bromide, Br 10.00
  - Carbon:
    - Total Organic 20.00
    - Non-purgable 20.00
  - Chloride, Cl 10.00
  - Chemical Oxygen Demand (COD) 25.00
  - Fluoride 5.00
  - Hardness 10.00
  - Nitrogen:
    - Ammonia, NH$_3$-N 15.00
    - Nitrite, NO$_2$-N 10.00
    - Nitrate, NO$_3$-N 10.00
    - Nitrate+Nitrite 15.00
  - Total Nitrogen & Phosphorus 35.00
  - pH 4.00
  - Phosphorus:
    - Ortho-phosphate, PO$_4$-P 10.00
    - Total P 20.00
    - Total Nitrogen & Phosphorus 35.00
  - Silica, SiO$_3$ 10.00

Terry has dedicated the last seven years of his life to his work, living one roll of film at a time, doing his best to be at the right place at the right light. In late August 1998 when he was 23 and trying to figure out a way to make a living mountain biking or small mouth bass fishing, he made a random stop into a pawn shop and purchased a used Canon Rebel even though he knew absolutely nothing about photography. The first time he photographed a sunset from a bluff top above the Arkansas River the waters of his existence were no longer murky but instantly as clear as Richland Creek in the summertime. He told himself he had a lot of catching up to do and photographed with reckless abandon.

Highest quality archival prints are printed on Kodak Endura Metallic Paper, very high gloss with a unique pearslescent finish. Black and white images are printed on Kodak True Digital Black and White Paper.

For more information about Terry and his photography or to order additional prints visit him at: [http://www.terryboydphotography.com](http://www.terryboydphotography.com)
**List of Posters**

1. Patterns of Multi-Drug Resistance in Escherichia Coli Isolated from a Stream Receiving Treated Wastewater, Tatsuya Akiyama* and Mary Savin, Crop, Soil, and Environmental Sciences Department, University of Arkansas, tatkiyam@uark.edu.

2. Antibiotic Fate and Transport in Three Effluent-Dominated Ozark Streams, Leslie Bartsch*, Brian Haggard, Joel Galloway, and Reed Green, Biological and Agricultural Engineering Department, University of Arkansas, lbartsc@uark.edu.


4. Flood History of the Lower White River Correlated with Climatic Change, Ruchi Bhattacharya* and Sonja Hausmann, Arts and Sciences Department, University of Arkansas, rbhattac@uark.edu.

5. Study of Endocrine Disrupting Chemicals on the Lee Creek Tailwaters, Paul Etzkorn*, Paul R. Easley, and Roger Lightner, University of Arkansas at Fort Smith in Conjunction with the City of Fort Smith Department of Environmental Quality, petzko00@uafortsmith.edu.

---

**AWRC Water Quality Laboratory**

University of Arkansas
700 Research Boulevard
Fayetteville, AR 72701
Phone: (479)575-7317
Fax: (479) 575-6720

The AWRC Water Quality Laboratory provides a variety of analytical analyses for surface and drinking water. The AWRC lab is the only lab in the state accredited under the EPA NELAC standards. For more information about the lab’s analytical capability and equipment visit:

www.uark.edu/depts/awrc/AWRCWaterQualityLab.htm

**What’s New?**

Starting July 1, 2008, aquatic invertebrate identification and bioassessment services will be available through the AWRC Bug Lab in Engineering Hall 318 at the University of Arkansas. The Bug Lab will provide:

- Taxonomic identifications of aquatic invertebrates
- Archive of regional fauna using specimen cataloguing software
- Field sampling, laboratory processing and taxonomic identification—Let us do all the work for you!
- Outreach, extension and bioassessment technology transfer—We can be your information resource.

We are currently working on prices; please contact Brian Haggard, Interim AWRC Director, for more details.
**SESSION 5: WATER RESEARCH ACTIVITIES AND STAKEHOLDER ASSESSMENT IN THE UPPER WHITE RIVER AND THE ILLINOIS RIVER**
*MODERATOR: BOB MORGAN, BEAVER WATER DISTRICT*

8:15 Introduction
8:20 Developing Recommended Beaver Lake Water Quality Criteria, Kent Thornton, FTN and Associates (kwt@ftn-assoc.com)
8:40 Application of an Upper White River Watershed Scale Model for NPS Load Scenario Analysis, Marty Matlock, Biological and Agricultural Engineering Department, University of Arkansas (mmatlock@uark.edu)
9:00 Polluters, Payers and Policy: Stakeholder Opinions of Water Quality in Lincoln Lake Watershed, Jennie Popp, Agricultural Economics and Agribusiness, University of Arkansas (jhpopp@uark.edu)
9:20 Implementation of Holistic Watershed Water Monitoring Model for the Illinois River Watershed, Rick Stubblefield, Adair County Representative, Oklahoma Scenic Rivers Commission (grstubb@hotmail.com)

**SESSION 6: WATERSHED MANAGEMENT AND MUNICIPAL NUTRIENT REDUCTION ACTIVITIES ACROSS ARKANSAS**
*MODERATOR: MIKE MALONE, NORTHWEST ARKANSAS COUNCIL*

10:05 Introduction, Format and Panel Assembly
10:10 Nonpoint Source Nutrient Management in Fayetteville, Susan Thomas, City of Fayetteville, Arkansas (suthomas@ci.fayetteville.ar.us)
10:25 Lake Maumelle Watershed Management Plan and Now What? Martin Maner, Central Arkansas Water (martin.maner@caw.org)
10:40 Illinois River Watershed Management Plan: Preliminary Results and Scope, Delia Haak, Illinois River Watershed Partnership (delaahaak@irwp.org)
10:55 Comparisons and Contrasts: Driving Forces and Management Objectives for the Beaver Lake, Illinois River, and Lake Maumelle Watersheds, Barry Tonning, Tetra Tech (barry.tonning@tetratech-ffx.com)
11:10 Questions and Panel Discussion

**Panel Members:**
- Delia Haak (IRWP)
- Martin Maner (Central Arkansas Water)
- Susan Thomas (City of Fayetteville)
- Barry Tonning (Tetra Tech)

12:00 Concluding Remarks and Thank You – Rick Roeder, Associate Director of UA Agricultural Experiment Station

---

8. The Discovery of a Correlation between Fluorescent Whitening Agents and Macro-invertebrate Biodiversity in Streams, Kaleb Horlick, Fayetteville High School, k_horlick@fayar.net.
11. Modeling L’Anguille River Watershed using Soil and Water Assessment Tool (SWAT) Model, N. Pai*, D. Saraswat, and P. Tacker, Biological and Agricultural Engineering Department, University of Arkansas, npai@uark.edu.
13. Identifying Nutrient Thresholds that Alter Stream Microbial Community Function, Thad Scott*, Jeff Back, Jason Taylor, and Ryan King, Crop Soil and Environmental Sciences Department, University of Arkansas, jts004@uark.edu.
14. Preliminary Investigation of the Distribution of Trace Metals in Soil, Water and Poultry Litter in Northwest Arkansas, Ken Steele*, Kris Brye, Van Brahana, and Ralph Davis, Geosciences Department, University of Arkansas, ksteele@uark.edu.
15. Long-Term Variation in Sediment Phosphorus below a Rural Effluent Discharge, Ryan Stoner* and Brian Haggard, Crop, Soil, and Environmental Sciences Department, University of Arkansas, rstoner@uark.edu.
TUESDAY APRIL 22, 2008

SESSION 3: NEW WATER SCIENCE FACULTY RESEARCH AND PREVIOUS USGS 104B STATE WATER RESOURCES INSTITUTE PROJECTS
MODERATOR: BRIAN HAGGARD, ARKANSAS WATER RESOURCES CENTER
UA DIVISION OF AGRICULTURE

1:30 Watershed and Lacustrine Controls on Nitrogen Fixation in Reservoirs, Thad Scott, Crop, Soil and Environmental Sciences Department, University of Arkansas (jts004@uark.edu)

1:50 Biological Thresholds and Water Quality Criteria in Central Plains Streams, Michelle Evans-White, Biology Department, University of Arkansas (mevanswh@uark.edu)

2:10 Seasonal Limnological Changes of Beaver Reservoir, Sonja Hausmann, Geosciences Department, University of Arkansas (shausman@uark.edu)

2:30 Oxygen Isotope Ratios as a Tracer for Sources and Cycling of Phosphorus in the Illinois River in Arkansas and Oklahoma, Brian Breaker, Geosciences Department, University of Arkansas (bbreake@uark.edu)

SESSION 4: AQUATIC CONSERVATION AND IMPLEMENTATION OF THE STATE WILDLIFE GRANTS PROGRAM
MODERATOR: JANE ANDERSON, STATE WILDLIFE GRANTS PROGRAM
ARKANSAS GAME AND FISH COMMISSION

3:15 Overview of the State Wildlife Grants Program and Its Relevance to Water Resources, Jane Anderson, Arkansas Game and Fish Commission (jeanderson@agfc.state.ar.us)

3:35 Finding a Needle in a Channelized Haystack: Updated Distribution of an Endemic Water Beetle in the Ozark Highland and Boston Mountain Ecoregions, Scott Longing, Biological and Agricultural Engineering Department, University of Arkansas (slonging@uark.edu)

3:55 Influence of Land Use, Flow Regime and Ecoregion on Stream Habitat and Fish Assemblage Structure, Dan Magoullick, Arkansas Fish and Wildlife Cooperative Research Unit, University of Arkansas (danmag@uark.edu)

4:15 Status and Distribution of Williams’ Crayfish, Orconectes williamsi, in Arkansas, Brian Wagner, Arkansas Game and Fish Commission (bkwagner@agfc.state.ar.us)

ON THE ROCKS PATIO & GRILL SOCIAL
Sponsored by Hach Environmental
Tuesday, April 22 from 7:00-9:00 PM

On the Rocks Patio & Grill is located at 339 North West Avenue (north of Dickson Street)
~15 minute walk from the Cosmopolitan hotel

Hach Environmental manufactures Hydrolab water quality instruments and OTT water level/discharge instruments. Dave Procyk is a Factory Direct Manager and please contact him at 512-288-5831 or check us out at www.hachenvironmental.com.