

# 2015 Tennessee Water Resources Symposium

Presented by the TNAWRA including a Pre-Symposium Seminar:  
**Nutrient Trading: The Good, the Bad, and the Ugly**

April 1-3, 2015  
Montgomery Bell State Park  
Burns, TN

## Registration and Preliminary Agenda

(ATTN Engineers: Opportunity for PDHs/CEUs)

### KEYNOTE SPEAKER:

[Michelle Perez](#)

World Resources Institute

*"Nutrient Trading & Targeted Watershed Projects: Potential for Improving Water Quality Locally and in the Gulf of Mexico"*



Photo courtesy of Alan Cressler, USGS

### LUNCHEON SPEAKER:

[Dr. David L. Feldman](#)

University of California, Irvine  
School of Social Ecology

*"Water Pollutant Trading - Local Challenges, Global Perspectives, Adaptive Solutions"*



Montgomery Bell State Park  
Burns, Tennessee  
April 1-3, 2015



### Hosted by

Tennessee Section of the American Water Resources Association

### Planning Committee

- Tom Allen, Neel-Schaffer, Inc.
- Ken Barry, S&ME, Inc.
- Paul Davis, P.E.
- David Duhl, TDEC, Division of Water Resources
- Scott Gain, U.S. Geological Survey
- George Garden, Barge, Waggoner, Sumner & Cannon, Inc.
- Don Green, City of Chattanooga
- Michael Hunt, Nashville Metro Water Services
- Alfred Kalyanapu, Tennessee Tech University
- Deedee Kathman, Civil & Environmental Consultants, Inc.
- Marion Keith, Ragan Smith & Associates, Inc.
- Rodney Knight, U.S. Geological Survey
- Tom Lawrence, Water Quality Matters!
- Andrea Ludwig, University of Tennessee
- Patrick Massey, LDA Engineering
- Patrick McMahon, S&ME, Inc.
- Shannon O'Quinn, Tennessee Valley Authority
- Daniel Saint, Tennessee Valley Authority
- Scott Schoefnacker, Ground Water Institute, University of Memphis
- Forbes Walker, University of Tennessee, Biosystems Engineering & Soil Sciences
- Sherry Wang, TDEC, Division of Water Resources
- Adrian Ward, Barge, Waggoner, Sumner & Cannon, Inc.
- Lori Weir, U.S. Geological Survey

### Symposium Chair

Forbes Walker

UT, Biosystems Engineering & Soil Science

Email: frwalker@utk.edu

Tel: (865) 974-7266

# 2015 Tennessee Water Resources Symposium



## **Symposium Dates:**

April 1-3, 2015

## **Pre-registration for Symposium:**

Before March 30, 2015

## **Symposium Location and Accommodations:**

Montgomery Bell State Park  
1000 Hotel Avenue  
Burns, TN 37029

A block of rooms at the Montgomery Bell Inn has been reserved. Inn rooms are \$83 plus tax. When making your reservations, please specify group code #7031. For reservations call (615) 797-3101 or (800) 250-8613.

**Please reserve lodging by FEBRUARY 20, 2015, to ensure availability and rate.**

## **Directions to Montgomery Bell State Park:**

For detailed directions to the park, please visit:  
[http://tnawra.er.usgs.gov/2015/map\\_dir.html](http://tnawra.er.usgs.gov/2015/map_dir.html)

## **Sponsors & Exhibitors**

Opportunities are still available for your organization to be a sponsor.

<http://tnawra.er.usgs.gov/2015/exhibitor.html>

### ***Both Sponsoring and Exhibiting***

- Amec Foster Wheeler Environment & Infrastructure, Inc.
- Hach Hydromet
- Stevens Water Monitoring Systems, Inc.
- Trutta Consulting
- UT, Tennessee Water Resources Research Center and Institute for a Secure and Sustainable Environment

### ***Exhibitors***

- HydroLogics
- In-Situ, Inc.
- S&ME, Inc.
- Suntree Technologies, Inc.
- Sutron Corporation
- Water Quality Matters!
- YSI

### ***Sponsors***

- ARCADIS U.S., Inc.
- Barge Waggoner Sumner & Cannon, Inc.
- Center for the Management, Utilization & Protection of Water Resources, TTU
- Civil & Environmental Consultants, Inc.
- Ground Water Institute, The University of Memphis
- Neel-Schaffer, Inc.
- Tennessee American Society of Civil Engineers /Environmental & Water Resources Institute



<b>Apr 1</b>				<b>AGENDA</b>			
<b>8:30 a.m.</b>		<b>Education Outreach: The Water Cycle-Group Camp 1</b>		9am <b>Mountain Bike Ride</b> <i>sponsored by Trutta Consulting</i>		9:30am <b>Golf Tournament at Montgomery Bell Golf Course</b>	
<b>7:30 a.m.</b>				<b>Coffee Break in the Exhibit Room</b>			
		<b>Room A</b>		<b>Room B</b>		<b>Room C</b>	
<b>9:00 a.m.</b>		<b>Seminar: Nutrient Trading: The Good, the Bad, and the Ugly</b> <i>funded by TVA</i>				<b>ASCE EWRI Track</b>	
<b>12:00 p.m.</b>		<b>Lunch with Keynote Speaker: Michelle Perez, World Resources Institute-"Nutrient Trading &amp; Targeted Watershed Projects: Potential for Improving Water Quality Locally and in the Gulf of Mexico"</b>					
		<b>Headwaters</b>		<b>Hydraulics</b>		<b>ASCE EWRI Track</b>	
		Moderator: Andrea Ludwig, UT		Moderator: Tom Lawrence, Water Quality Matters!		Moderator: Alfred Kalyanapu, TTU	
<b>1:30 p.m.</b>		Chattanooga WPA Ditch Program. P. Dobbs		Continuous Flow Simulation for Ungauged Watershed to Calculate Stream Power for Cohesive Soil Erosion Studies. B. Mahalder		Automated Identification of Sediment Sources and Sinks in Channel Networks. J. Cartwright	
<b>2:00 p.m.</b>		The Redevelopment of Pond Creek. A. Ward		Operating Dams for Downstream Water Temperature Change and Water Quality Management: Two Case Studies (Elk and Cumberland Rivers). C. Montgomery		Comparative Flood Consequence Assessment for different Digital Elevation data over Cumberland River near Nashville. N. Bhuyian	
<b>2:30 p.m.</b>		A Hole in Our Bucket: How and Why Tennessee Needs to Improve Headwater Protection. P. Davis		Reelfoot Lake Hydrologic Controls and Spillway Operation: Then and Now. B. Cobb		Applying GIS Techniques and Terrain Analysis to Develop a Dataset of Karst Features for Tennessee. D. Ladd	
<b>3:00 p.m.</b>				<b>Coffee Break in the Exhibit Room</b>			
		<b>Freshwater Ecology</b>		<b>TVA Flood Systems</b>		<b>ASCE EWRI Track</b>	
		Moderator: Deedee Kathman, CEC, Inc.		Moderator: Patrick Massey, LDA Engineering		Moderator: John Schwartz, UTK	
<b>3:30 p.m.</b>		Ecological Limit Functions and Hydrologic Accounting: An OASIS on the Cumberland Plateau. R. Knight		Flood Control Operations Overview at TVA. G. Mueller		Evaluating the Impacts on Runoff of Landscape-based BMPs in Intensively Managed Landscapes. J. Schwartz	
<b>4:00 p.m.</b>		Determining the Chronic Toxicity of Boron to the Freshwater Mussel ( <i>Lampsilis siliquoidea</i> ) and the Aquatic Worm ( <i>Lumbriculus variegatus</i> ) in Whole-Sediment Exposures. S. Hall		2013 Flood Event in the Tennessee Valley: Results and Impacts. D. Saint		Characteristics of Fine Sediment Transport along Hillslope Concentrated Flow Pathways Caused by Cattle Traffic. Z. Seiden	
<b>4:30 p.m.</b>		Sediment Quality and Freshwater Mussels-One Piece of the Puzzle. G. Johnson		TVA's New Rainfall-Runoff Model: Development and Use of the Sacramento Soil Moisture Accounting Model. C. Jawdy		Suspended-sediment Concentrations at Six Highway-Construction Outfalls. T. Diehl	
<b>5-6 p.m.</b>		<b>Vendor Equipment Demonstration Session at the dock behind the hotel restaurant</b>					
<b>6-8 p.m.</b>		<b>Dinner and Live Music in Rooms A&amp;B-Drinks</b> <i>sponsored by Stevens Water Monitoring &amp; Hach Hydromet</i>					
<b>Apr 2</b>							
<b>7:00 a.m.</b>		<b>Fun Run</b> <i>sponsored by Barge Waggoner Sumner &amp; Cannon, Inc.</i>					
<b>7:30 a.m.</b>				<b>Coffee and Biscuits in Exhibit Room</b> <i>sponsored by Amec Foster Wheeler Environment &amp; Infrastructure, Inc.</i>			
		<b>Nutrients</b>		<b>Modeling-1</b>		<b>ASCE EWRI Track</b>	
		Moderator: George Garden, BWSC		Moderator: Patrick McMahon, S&ME, Inc.		Moderator: Jennifer Watson, TN Stormwater Assoc.	
<b>8:30 a.m.</b>		Development of the Algae Trophic Index: a New Tool to Evaluate the Impacts of Aquatic Nutrient Pollution. J. Lebkuecher		Evaluating the Impact of Wetlands on Targeting and Integrating Conservation Practices in Watershed Systems. H. Momm		A Collaborative Effort towards Real-time Water Quality Equipment Demo. at Falling Water River. A. Kalyanapu	
<b>9:00 am.</b>		Nitrogen and Phosphorus Removal Using Existing Wastewater Treatment Equipment. G. Weaver		Modeling Karst Hydrology. D. Solomon		Evaluation of Trace Metal Monitoring Results Near Landfill Contamination Plumes in Tennessee. R. Curtis	
<b>9:30 a.m.</b>		The Sulfur Cycle in the Great Smoky Mountains National Park. A. Gonzalez		Reservoir Modeling for Development of TVA Emergency Action Plan Maps. P. Massey		Conceptual Models of ARD Formation at Road Cuts in Tennessee. M. Bradley	
<b>10:00 a.m.</b>				<b>Coffee Break in Exhibit Room</b> <i>sponsored by Civil &amp; Environmental Consultants, Inc.</i>			
<b>10a-12p</b>				<b>Poster Session in the Mezzanine-students and professionals will be available for questions</b>			
		<b>MS4</b>		<b>Modeling-2</b>		<b>ASCE EWRI Track</b>	
		Moderator: Paul Davis, P.E.		Moderator: Shawn Hawkins, UTK		Moderator: Daniel Saint, TVA	
<b>10:30 a.m.</b>		Water Quality Volume Trading. M. Minkara		A Risk and Reliability Analysis Approach to Investigate the Impact of Reservoir Inflow Change on Dam Overtopping. E. Ahmadsaraf		Collaborative Watershed Stewardship in the Cumberland River Basin. J. Grubbs	
<b>11:00 a.m.</b>		Going Digital: The Visual Stream Assessment for Unincorporated Shelby County, Tennessee. E. Goddard		Updating Probable Maximum Precipitation and Precipitation Frequency Estimates in the Tennessee River Watershed. K. Neff		How Many Drops of Water Fit on a Penny? L. Reynolds	
<b>11:30 a.m.</b>		Three Tasks, One Tablet: Condition Assessments Go Mobile in Chattanooga. R. Berger		Predictions of Saturated Hydraulic Conductivity Dynamics in Intensively Managed Watersheds. C. Wilson		ArcGIS Online to Teach Middle and High School Teachers and Students about Water Resource Issue. R. Hanahan	

Noon	<b>Lunch with Luncheon Speaker in Rooms A&amp;B:</b> David Feldman, University of California, Irvine-"Water Pollutant Trading - Local Challenges, Global Perspectives, Adaptive Solutions"		
	<b>Stormwater Control Measures</b> Moderator: Michael Hunt, Metro Water Services	<b>Modeling-3</b> Moderator: Adrian Ward, BWSC	<b>ASCE EWRI Track</b> <b>Agriculture</b> Moderator: Don Green, LEED AP
1:30 p.m.	Predictive Performance Scaling of Hydrodynamic Separators Using the Peclet Number. M. Miller	Modeling Climate Change Impacts on Bioretention Performance. J. Hathaway	BMP Evaluation in the MS Delta: Preliminary Findings. J. Murphy
2:00 p.m.	Estimating Load Reduction Costs for Assessing Stormwater Best Management Practice (BMP) Feasibility. R. Turpin	Comparing Modeled Runoff Water Quality from Bioenergy Crop Land Conversions of Switchgrass and Short-Rotation Wood Crop in the Southeastern USA. Z. Seiden	Impact of cropland manure application on water quality at the UT Little River Dairy Farm. L. McKay
2:30 p.m.	Lessons Learned from Metro Nashville's Stormwater Control Measure (SCM) Oversight Program. A. TerryNelson	Implementing Delft-FEWS at the Tennessee Valley Authority: The Evolution from a Unique, Model-Centric System to an Industry-Standard, Data-Centric System. N. Barber	Alternate Tile Intake Design for Intensively Managed Ecosystems. C. Wilson
3:00 p.m.	<b>Coffee Break in the Exhibit Room sponsored by The University of Memphis</b>		
3-3:30p.m.	<b>Poster Session in the Mezzanine-students and professionals will be available for questions</b>		
	<b>Water Resources</b> Moderator: Tom Allen, Neel-Schaffer, Inc.	<b>The Tennessee Permanent Stormwater Management Program</b> Moderator: Jon Hathaway, UTK	<b>ASCE EWRI Track</b> <b>Memphis Aquifer</b> Moderator: Rodney Knight, USGS
3:30 p.m.	Effects of Roadway Construction on Benthic Invertebrates in Middle Tennessee. D. Kathman	Tennessee Permanent Stormwater Management: Requirements and Guidance. R. Karesh	Groundwater Geochemistry and Age Along two Flow Paths in the Memphis Aquifer in West Tennessee. J. Kingsbury
4:00 p.m.	Stormwater Turbidity Sampling on TDOT Projects. J. Wolf	The Tennessee Runoff Reduction Assessment Tool (TNRRAT): A Tool for Permanent Stormwater Management System Design. A. Ludwig	For Better or for Worse: The State of the Former Shelby County Landfill. S. Schoefernacker
4:30 p.m.	A Comparison of Three Thermoelectric Water-use Data Sets in the Southeast. M. Harris	Tennessee Permanent Stormwater Management Design Training Overview. A. Ludwig	Fifteen years of Age-dating Groundwater from Production Wells in Shelby County, TN: Summary of Results. D. Larsen
6-8pm	<b>Dinner and Live Music followed by TN AWRA Business Meeting in Rooms A&amp;B-Drinks sponsored by ARCADIS U.S., Inc.</b>		
9:00 p.m.	<b>Movie: Dam Nation in Rooms A&amp;B</b>		
<b>Apr 3</b>			
7:30 a.m.	<b>Coffee and Biscuits in Exhibit Room sponsored by UT, Water Resources Research Center &amp; ISSE</b>		
	<b>LID</b> Moderator: Jason Scott, Town of Farragut	<b>Stream Restoration-1</b> Moderator: Ken Barry, S&ME, Inc.	<b>ASCE EWRI Track</b> <b>Environmental Microbiology-1</b> Moderator: Jennifer Cartwright, USGS
8:30 a.m.	Maintenance and Cleaning of Pervious Concrete Systems. A. Sparkman	Divining the Pitfalls of Urban Stream Restoration Design. P. McMahon	Sublethal Concentrations of Antibiotics Stimulate Bacteria from Mammoth Cave. T. Byl
9:00 a.m.	LID Design Competition. D. Green	Application of the High Definition Stream Survey on the Paint Rock Creek and Bear Creek Watersheds. B. Connell	An Approach Towards Linking Diversity of Polyphosphate Accumulating Organisms to Improved Functional Stability of the Enhanced Biological Phosphorus Removal Process. G. McClellan
9:30 a.m.	Nashville's Voluntary Post Development LID Stormwater Treatment Program – Trial Period Results & Lessons Learned. R. Dohn	Assessing Spatial Relationships of Distributed Urban Land Cover Composition and In-stream Flow Regime in Knoxville, TN. T. Epps	Effectiveness of Wastewater Treatment Processes in the Removal of Pathogenic Microorganisms. S. Chen
10:00 a.m.	<b>Coffee Break in Exhibit Room</b>		
	<b>TDEC/EPA</b> Moderator: Jennifer Dodd, TDEC	<b>Stream Restoration-2</b> Moderator: Patrick McMahon, S&ME, Inc.	<b>ASCE EWRI Track</b> <b>Environmental Microbiology-2</b> Moderator: Tanya Datta, TTU
10:30 a.m.	New TMDL Vision. A. Feingold	Urban Stream Restoration: A Monitoring and Assessment Framework. J. Schwartz	Patterns of Microbial Indicators in Stormwater Runoff as Revealed by Cultivation-Independent High-Throughput Sequencing. K. Wyckoff
11:00 a.m.	The New Recovery Potential Screening Tool. R. McGahen	The May Prairie Stream Restoration Project: Functional Improvement at a Valuable State Natural Area. A. Spiller	Sediment-Microbial Source Tracking (MST) for Oostanula Creek Watershed. Y. Huangfu
11:30 a.m.	Using EPA Region 4's 5R Approach as Alternatives to TMDLs. D. Duhl	The Removal of a Lowhead Dam at McCabe Golf Course on Richland Creek in Nashville, TN. G. Mryncza	Effects of Seasonal and Abiotic Factors on E. coli and Bacteroides Species at a Watershed Scale in Central Tennessee. M. Stallard
<b>Adjourn</b>			

# 2015 Tennessee Water Resources Symposium Pre-Registration Form

(Online registration is available at: <http://tnawra.er.usgs.gov/Submit/TWRS-Reg.html>)

Title \_\_\_\_\_  
 Name \_\_\_\_\_  
 What do you prefer to be called \_\_\_\_\_  
 Title \_\_\_\_\_  
 Organization \_\_\_\_\_  
 Address \_\_\_\_\_  
 City, State, Zip \_\_\_\_\_  
 Daytime Phone \_\_\_\_\_  
 Email Address \_\_\_\_\_

Additional registrants if at the same address. If addresses differ or if more space is needed, please use a separate piece of paper.

2. Name: \_\_\_\_\_  
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Type of Registration	Cost per person	Number of registrants	Subtotal
Regular Registration	\$100**		
Speaker	\$100**		
Professional Poster Presenter	\$100**		
Moderator	\$100**		
Sub Total			
Discount 10% (if more than 10 \$100 registrations)			
Student Registration*	\$30**		
Student Poster Registration*	\$30**		
Extra Meals for spouses	\$15		
Grand Total			

Send Registrations to:  
 TN AWRA  
 c/o U.S. Geological Survey  
 640 Grassmere Park, #100  
 Nashville, TN 37211  
 ATTN: Lori R. Weir  
 Phone: (615) 837-4720  
 FAX: (615) 837-4783  
 Email: [lrweir@usgs.gov](mailto:lrweir@usgs.gov)

\*Student sponsorships for registration fees are available again this year. If you are a student and would like to be considered for sponsorship, please write "Student Sponsorship" on this form by your name.

Please circle one:    Visa    Mastercard    American Express    Discover  
 Credit Card # \_\_\_\_\_ Exp. \_\_\_\_\_  
 CVV Number (last 3 digits on back V/MC; 4 digits on front of AmEx) \_\_\_\_\_  
 Signature \_\_\_\_\_ Billing address zip code of credit card statement \_\_\_\_\_  
 Please print name on card (if different from above): \_\_\_\_\_

\*\*Pre-registration fee is \$100 until March 30, 2015; onsite registration fee is \$120. Student registration is \$30. A 10% discount applies if 10 or more people register from one organization (student registrations are already discounted). Make check payable to "Tennessee AWRA" or "TNAWRA." Visa, Mastercard, American Express, and Discover are also accepted. The registration fee covers the costs for attendance to all sessions, and the costs for both lunches, both dinners, coffee breaks, and 2015-16 membership fees. Additional meals may be purchased for spouses for \$15 each.



## Social Events



**Golf Tournament.** The tournament is scheduled for 9:30 am, April 1. To sign up or for more information, please call Randy Kerr at (615) 736-5633 or email him at [randall.z.kerr@usace.army.mil](mailto:randall.z.kerr@usace.army.mil)

**Fun Run sponsored by BWSC.** A morning jog is scheduled for April 2 at 7am. If you are interested, please sign up at the Registration Desk.

**Mountain Bike Ride sponsored by Trutta Consulting.** A bike ride is scheduled for April 1 at 9am. If you are interested, please sign up at the Registration Desk. Contact Brett Connell, [baconnell@gmail.com](mailto:baconnell@gmail.com), (419) 215-7897, if you have any questions.

**Movie: Dam Nation** April 2 at 9pm.



**Live Entertainment at both dinners**



## Attn: ASCE Members

The ASCE EWRI Tennessee Chapter is again a sponsor of the TN AWRA Water Resources Symposium. This year's agenda identifies an "ASCE EWRI Track" that might be of particular interest to many civil engineers. Earn up to 16 Professional Development Hours by participating in these activities:

- Nutrient Trading: The Good, the Bad, and the Ugly
- Keynote luncheon address by Michelle Perez, World Resources Institute, and Luncheon Speaker David Feldman, University of California-Irvine.
- Break-out sessions with presentations on flood issues, storm water quality, water supply, low impact development (LID), treatment technologies, stream restoration, water modeling, GIS techniques, and engineering applications.

Of course, with your \$100 registration you can attend any of the sessions offered and come and go as you need. Take a look. We hope you can join us and keep yourself at the forefront of water resource issues in Tennessee.

## Education Outreach: The Water Cycle

Where: Group Camp 1

When: April 1, 8:30-11:30am

Students from the 4<sup>th</sup>-6<sup>th</sup> grade will learn about the water cycle and other fun facts about water from over 10 stations from different universities and organizations:

<http://tnawra.er.usgs.gov/2015/EducationOutreach.html>

Please contact Scott Schoeferacker for more information: (901) 678-4315 or

[sschfrnc@memphis.edu](mailto:sschfrnc@memphis.edu).



## Nutrient Trading: The Good, the Bad and the Ugly

April 1, 2015, 9:00 a.m. Room A

Michelle Perez, Ph.D. (World Resources Institute): [Building a Water Quality Trading Program – Options and Considerations: A Product of the National Network on Water Quality Trading](#)

[Bill Meinert, P.E. \(O'Brien and Gere\): "Three Decades of the Chesapeake Bay Program, Its Impacts, and the Point Source's Perspective"](#)

Peter Tennant, P.E. (Executive Director, ORSANCO): [ORSANCO's Trading Experience](#)

William Park, Ph.D. (UT Department of Agriculture and Resource Economics): [A Geographical and Institutional Perspective on the Potential for Watershed Level Nutrient Trading in Tennessee](#)

Jeffrey Fore, Ph. D. (The Nature Conservancy): [Feasibility of Establishing a Water Quality Trading Program in West Tennessee](#)  
(This session funded by TVA)

## Vendor Equipment Demo Session

Where: At the boat dock behind the hotel restaurant

When: April 1, 5-6 p.m.

Vendors are signing up to demonstrate their equipment in the field. Check the following website for vendor information:

<http://tnawra.er.usgs.gov/2015/equipment.html>

Please contact Don Green for more information: (615) 308-1014 or [biogreen1@comcast.net](mailto:biogreen1@comcast.net)

## Poster Session

The Poster Session will be in the Mezzanine on Thursday afternoon. The Poster Judges will be judging the Student Posters from 10a-12p and from 3:00-3:30p. The general Poster Session will follow at 5:30p. Please be sure to attend.

To encourage student participation, TN Section AWRA will present awards for the best student posters.

If you are not affiliated with a university or a student poster presenter and would like to be a judge, please send email to either:

Regan McGahen [regan.mcgahen@tn.gov](mailto:regan.mcgahen@tn.gov) Daniel Saint [dpsaint@tn.gov](mailto:dpsaint@tn.gov)

For a listing of this year's poster presenters, please visit: <http://tnawra.er.usgs.gov/2015/posters.html>