

# High Stakes Games in the South Platte

*Proceedings of the 21<sup>st</sup> Annual South Platte Forum  
October 20-21, 2010  
Longmont, Colorado*

Jennifer Brown, Editor

October 2010

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# High stakes games in the south PLatte

**Proceedings of the 21<sup>st</sup> Annual South Platte Forum**  
October 20-21, 2010—Radisson Conference Center—Longmont, Colorado

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**Colorado Water Institute, Reagan Waskom, Director**  
Colorado State University, Fort Collins, CO 80523-1033

# High stakes games in the south Platte

Wednesday, Oct. 20

## Registration & Continental Breakfast (7:45)

### To Tell the Truth: A Basin Overview (8:15)

- *South Platte Background and Transbasin Diversion Update*.....4  
Jim Hall, Former Division Engineer
- *Water Quality of the South Platte Basin*.....4  
Marcella Hutchinson, U.S. EPA Region 8
- *Ground Water from the Headwaters to the Plains*.....5  
Suzanne Paschke, U.S. Geological Survey
- *Fishery Management in the South Platte from 30,000 Feet*.....6  
Ken Kehmeier, Colorado Division of Wildlife

## Break (10:10 - 10:40)

### Jeopardy: Water Resources Planning (10:40)

- *Interbasin Compact Committee*.....8  
Alexandra L. Davis, Colorado Dept. of Natural Resources
- *Meeting Colorado's Future Water Needs*.....9  
Eric Hecox, Colorado Water Conservation Board
- *Nights of the South Platte Roundtable: An Update*.....9  
Jim Yahn, South Platte Roundtable

### South Platte Pictionary—Keynote Luncheon (12:00)

*Sponsored by Deere & Ault Consultants, Inc.*

- *Friends of the South Platte Award Presentation*.....10  
Presented to Les Williams
- *A Virtual Tour of Water Projects in the South Platte Basin*.....10  
Dick Stenzel, Applegate Group

### Deal or No Deal: Project Updates (1:40)

- *The Chatfield Reallocation Project: A Status Update*.....12  
Rick McCloud, Centennial Water and Sanitation District
- *Flaming Gorge Pipeline*.....12  
Aaron Million, Million Conservation Resource Group, Inc.
- *404 Evaluations: Where's the Permit?*.....13  
Chandler J. Peter, Corps of Engineers

## Break (2:45—3:15)

### Win, Lose or Draw: Forest Health (3:15)

- *A Look at Forest Health through Different Lenses*.....14  
Jessica Clement, Colorado Forest Restoration Institute
- *Headwaters*.....14  
Glen Casamassa, U.S. Forest Service
- *Protecting Critical Watersheds in Colorado from Wildfire*.....16  
Brad Piehl, JW Associates

# High stakes games in the south Platte

Thursday, Oct. 21

## Registration & Continental Breakfast (7:45)

### Concentration: Nutrient Water Quality Standards (8:30)

- *Overview of Colorado's Proposed Nutrient Criteria*..... 17  
Richard Parachini, Water Quality Control Division
- *Nutrient Sources and Transport in the Missouri River Basin*..... 17  
Lori Sprague, U.S. Geological Survey
- *Water Quality Monitoring and Assessment Perspective*..... 18  
Karl A. Hermann, U.S. EPA Region 8 Water Quality Unit
- *EPA's National Perspective*..... 19  
Bert Garcia, U.S. EPA Region 8 Water Quality Unit

## Break (10:10 - 10:40)

### Family Feud: Nutrient Perspectives (10:45)

- *Nutrient Management Trends in Agriculture*..... 20  
Mark Sponsler, Colorado Corn
- *Potential Directions for Urban Dweller Nutrients Standards*..... 21  
Tad S. Foster, Attorney
- *Nutrient Criteria in Colorado: An Ecological Perspective*..... 22  
Jamie Anthony, Colorado Division of Wildlife

### Funny You Should Ask — Keynote Luncheon (12:00)

*Sponsored by Parker Water and Sanitation District*

- *Downstream from Denver*..... 23  
Ann S. Bleed, Former Director, Nebraska Department of Natural Resources

### Price is Right: Alternatives to Ag Transfer (1:25)

- *Public Attitudes About Western Water*..... 23  
Troy Bauder, Colorado State University Extension
- *The Market Impact of Leasing Permanent Water Rights*..... 24  
Christopher Goemans, Colorado State University
- *Tools for Alternative Transfers: Ducks and Corn*..... 25  
Matt Lindburg, P.E., Brown and Caldwell
- *The Tipping Point*..... 26  
Jay Winner, Lower Arkansas Valley Water Conservancy District

## Forum Ends (2:50)

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Wednesday, October 20, 8:15 a.m.

## **To Tell the Truth: An Overview of South Platte Basin**

**Moderator: Reagan Waskom, Ph.D.**

*Director, Colorado Water Institute, Colorado State University, 1033 Campus Delivery, Fort Collins, CO 80523-1033, 970-491-6308, Reagan.Waskom@ColoState.EDU*

*Reagan Waskom is the director of the Colorado Water Institute and Colorado State University Water Center. Reagan has a joint appointment in the Department of Soil and Crop Sciences and the Department of Civil and Environmental Engineering at CSU. He has worked on various water-related research and outreach programs in Colorado for the past 24 years.*

### **The South Platte Basin: A Background and an Overview of Transbasin Diversions**

**Jim Hall**

*Former Division Engineer, Colorado Division of Water Resources; Water Resources Manager, City of Greeley, 1100 10<sup>th</sup> St., Ste. 300, Greeley, CO 80631, 970-336-4039, jim.hall@greeleygov.com*

Nearly two-thirds of the increased municipal and industrial demand over the next several decades will occur in the South Platte Basin. With the increased demand and limited supply, competition for the water resources and opportunities for cooperation in the basin will continue. To make reasonable analyses and decisions, it is important to have an overall understanding of South Platte Basin hydrology, transbasin diversions, and water rights administration. It is also important to recognize the impact, if any, of non-water right issues such as Federal mandates on water supply availability.

*Jim Hall was born and raised in Colorado. After high school, Jim attended Colorado State University where he earned a bachelor's degree in civil engineering. Jim then started work for the Division of Water Resources first as a hydrographer and then as an engineer associated with litigation and water supply plans for new developments. Jim was also the water resources manager for Thornton. In 1992, Jim took a job as assistant division engineer in Water Division 1. Jim was appointed Division Engineer December, 2002. In this role, he managed approximately 50 staff members responsible for water administration, dam safety, and hydrography in the South Platte, Republican and Laramie River Basins. In June 2010, Jim was hired as the water resources manager for the City of Greeley. In this position, he is responsible to oversee the operation, defense, and planning of Greeley's raw water supplies. Jim is a registered Professional Engineer in the State of Colorado.*

### **Water Quality of the South Platte Basin**

**Marcella Hutchinson**

*Colorado Watershed Coordinator, U.S. EPA Region 8, 1595 Wynkoop St., Denver, CO 80202, 303-312-6753, hutchinson.marcella@epa.gov*

The South Platte River rises in the Central Rockies of Colorado. It is joined by several tributaries from both the mountains and the plains on its approximately 450 mile journey to its confluence with the North Platte in Nebraska. Roughly 19,000 square miles of the basin's approximately 24,000 square miles lie within Colorado, including Colorado's most populous areas. It is a river of many uses, providing habitat for aquatic life and supporting much upland wildlife and many human uses including recreation, drinking water, agriculture, and industry. Rivers and streams are the lifeblood of a watershed. While water quality attains standards throughout much of the basin, it is also a basin with many water quality impacts, and these vary with both geography and human activity. This presentation will explore current water quality impacts and how they vary through the basin.

*Marcella Hutchinson is an environmental scientist with the Office of Ecosystems Protection and Remediation at the U. S. Environmental Protection Agency Region 8 office in Denver. She is responsible for Watershed and Non Point Source programs for the State of Colorado. She has a Bachelor of Arts and a Master of Science, both in geology, from the University of Colorado at Boulder. Ms. Hutchinson has worked in EPA's water programs since 1996.*

**Speaker PowerPoint Presentations are available at  
[www.southplatteforum.org](http://www.southplatteforum.org)**



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## **Groundwater from the Headwaters to the Plains in the South Platte River Basin**

**Suzanne S. Paschke, Ph.D.**

*Associate Director for Hydrologic Studies, U.S. Geological Survey, Colorado Water Science Center, Denver Federal Center, MS 415, PO Box 20546, Lakewood, CO 80225, 303-236-6904, [spaschke@usgs.gov](mailto:spaschke@usgs.gov)*

Groundwater from fractured-rock aquifers, the South Platte alluvial aquifer, and Denver Basin sandstone aquifers are important sources of water for ecosystem, agricultural, municipal, industrial, and domestic uses in the South Platte River Basin. Water-availability and water-quality issues related to these three primary aquifers are affected by climatic, geologic, and land-use factors. In mountainous parts of the South Platte headwaters, groundwater derived from snowmelt runoff occurs in fractured-rock aquifers, supplies base flow to mountain streams, and supports domestic wells for rural residences.

Because mountainous areas receive more precipitation than the plains, fractured-rock aquifers generally receive more precipitation recharge than either the South Platte alluvial aquifer or the Denver Basin bedrock aquifers. However, fractured-rock aquifers can be less porous and less conductive than aquifers underlying the plains, such that well yields in mountainous areas are typically low and water availability can be limited. Fractured-rock aquifers also are vulnerable to the effects from overlying land use. For example, the effect of septic systems on water quality in fractured-rock aquifers is an issue of concern in the headwaters of the South Platte Basin.

In the plains region of the South Platte Basin, unconsolidated alluvial sand and gravel deposits that primarily occur along present-day stream channels of the river and its tributaries form an extensive and productive alluvial aquifer. Irrigated agriculture is the primary use of groundwater in the South Platte alluvial aquifer, although alluvial groundwater also supports municipal, industrial, and domestic water supplies in the lower South Platte Basin. The South Platte alluvial aquifer is relatively porous and permeable compared to fractured-rock or sandstone aquifers in the basin, contains a shallow water table with no overlying confining unit, and, in areas of irrigated agriculture, rates of irrigation return-flow exceed natural precipitation recharge rates.

Water availability in the South Platte alluvial aquifer has increased compared to predevelopment conditions (pre-1880) because of the importation of surface water to the basin, making the alluvial aquifer a readily available source of water where water rights are available. However, the hydrologic characteristics that provide ready access to the productive alluvial aquifer also make the aquifer vulnerable to the effects of overlying land use, and water quality in the South Platte alluvial aquifer is frequently degraded with elevated concentrations of total dissolved solids, nutrients, trace elements, and anthropogenic contaminants such as pesticides and herbicides.

The Denver Basin bedrock aquifers, composed primarily of confined sandstone aquifers interbedded with claystone confining units, underlie the South Platte alluvial aquifer in the plains region of the basin. The Denver Basin bedrock aquifers contain water of excellent quality, so from a water-quality perspective, they are considered ideal sources of drinking water for municipal and domestic purposes. However, extensive development of the bedrock aquifers for water supply has lowered hydraulic heads, increased downward gradients, and caused mixing in the system, which has reduced water availability and increased the vulnerability of Denver Basin bedrock groundwater to the effects of overlying land use.

*Suzanne Paschke is a groundwater hydrologist with more than 25 years of hydrologic experience primarily in Colorado. Dr. Paschke is presently the associate director of hydrologic studies for the U.S. Geological Survey Colorado Water Science Center. Dr. Paschke has a bachelor's degree in geology from the University of Wyoming and master's and doctorate degrees in geological engineering from the Colorado School of Mines.*

### **Notes:**



## **Fishery Management in the South Platte Basin from 30,000 Feet**

**Ken Kehmeier**

Senior Aquatic Biologist, Platte River Basin, Colorado Division of Wildlife, 317 W. Prospect, Fort Collins, CO 80526, 970-472-4350, 970-472-4458, ken.kehmeier@state.co.us, www.wildlife.state.co.us

Waters in the Platte River Basin are managed for a wide variety of fishery purposes, ranging from native fish conservation and protection to recreational fishing supported by the stocking of catchable trout. In order to quantify and describe how waters are currently managed, the Colorado Division of Wildlife classifies and categorizes all waters managed to support fisheries by classifying each water into one of four large classifications: Native Fish Species Conservation Management, Wild Trout Management in Recreational Waters, Sportfish Management – Stocked Waters and Non-managed Intermittent, and Private Water. Within each classification, individual waters are categorized based on water type, water size, and stocking approach. For example, within the Sportfish Management - Stocked Waters, lakes and streams are further refined based on the fish stocking approach as Intensive Management, using catchable rainbow trout, or Optimum Management, where a put-and-grow approach to stocking allows the stocked fish to benefit from the water's productivity. This approach allows fish managers across the state to compare waters that are managed in a similar fashion, and with the addition of creel census, biologists can predict recreation-day production for each category, each classification, and ultimately for the basin. This approach also allows the flexibility of managing waters for a diversity of angling opportunities within smaller geographic areas, allowing the angling public to select the type of angling experience they want to enjoy.

*Ken Kehmeier is a fourth generation Colorado native, having grown-up on the Western Slope family farm and ranch. Ken has bachelor's and master's degrees in fishery and wildlife biology from Colorado State University. After college he worked as a fisheries specialist for the Colorado State Extension Service concentrating on farm pond management. Since 1986 Ken has been employed by the Colorado Division of Wildlife as an aquatic biologist in Gunnison and Fort Collins. He is currently the senior aquatic biologist for the Platte River Basins in Colorado.*

### **Notes:**

## About the South Platte Forum

The South Platte Forum was initiated in 1989 to provide an avenue for a timely, multi-disciplinary exchange of information and ideas important to resource management in the South Platte River Basin. Its stated mandates are:

- to enhance the effective management of natural resources in the South Platte River Basin by promoting coordination between state, federal and local resource managers, and private enterprise, and
- to promote the interchange of ideas among disciplines to increase awareness and understanding of South Platte River Basin issues and public values.

*The expressed opinions and information at the Forum and in this program are not necessarily endorsed by the South Platte Forum or any of its sponsoring agencies.*

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Wednesday, October 20, 10:40 a.m.

## **Jeopardy: Water Resources Planning**

### **Moderator: Brian Werner**

Public Information Officer, Northern Water, 220 Water Ave., Berthoud, CO 80513, 970-622-2229, [bwerner@ncwcd.org](mailto:bwerner@ncwcd.org)

Brian Werner is the public information officer for Northern Water in Berthoud. He also serves as the public affairs coordinator for the Northern Integrated Supply Project, a water storage project currently going through the environmental permitting process. Brian oversees public affairs for Northern Water, including media relations, youth and public education, facility tours, and informational publications. He has coordinated more than 50 children's water festivals, produced a video on the Colorado-Big Thompson Project, and given numerous tours and presentations on the Colorado-Big Thompson, Windy Gap, and other projects the District has built or is considering building.

### **Interbasin Compact Committee**

#### **Alexandra L. Davis**

Director, Interbasin Compact Committee; Assistant Director - Water, Colorado Department of Natural Resources, 1313 Sherman St., Denver, CO 80203, 303-866-3311, [alex.davis@state.co.us](mailto:alex.davis@state.co.us), [www.dnr.state.co.us](http://www.dnr.state.co.us)

Alexandra will discuss the recent IBCC efforts to address creating a statewide vision for Colorado's Water Supply Future.

Alexandra Davis, assistant director for the Colorado Department of Natural Resources, works with the Colorado Division of Water Resources, the Colorado Water Conservation Board, the Division of Wildlife, and other state agencies regarding interstate river compacts, state water rights issues, and federal reserved water rights.

Prior to joining the Natural Resources Department, Alex was the first Assistant Attorney General in Colorado. In her previous role she supervised the attorneys working in the attorney general's water unit. She served as an assistant attorney general, litigating water rights cases for the State Engineer's Office, the Colorado Water Conservation Board and the Division of Wildlife for more than 11 years. She spent one year in Billings, Montana, as a Special Assistant U.S. Attorney representing the Department of Interior Agencies in the Montana general water rights adjudication. She is a graduate of Pitzer College in California and the University of Colorado School of Law.

### **Notes:**



## **Meeting Colorado's Future Water Supply Needs**

**Eric Hecox**

Water Supply Planning Section Chief, Colorado Water Conservation Board, 1580 Logan St., Ste. 200, Denver, CO, 80220, 303-866-3441 x3217, [eric.hecox@state.co.us](mailto:eric.hecox@state.co.us), [www.cwcb.state.co.us](http://www.cwcb.state.co.us)

This presentation will provide an overview of Colorado's water supply planning process and discuss current efforts to identify portfolios of solutions for meeting our state's 2050 water demands. Colorado's water supply planning process has concluded that meeting our state's water supply needs will require a mix of successful implementation of local projects and plans, additional conservation and reuse, agricultural transfers, and new water supply development. There is no "silver bullet" solution for our future water needs, and relying solely on any one strategy will not have a favorable result. The CWCB is working with the IBCC and Basin Roundtables to develop "portfolios," or combinations of strategies for meeting Colorado's water supply needs. This presentation will discuss the development of these portfolios and their associated trade-offs.

*Eric Hecox is the section chief for CWCB's Water Supply Planning Section. The Section manages the Interbasin Compact Process and associated Basin Roundtables and analyzes Colorado's current and future consumptive and non-consumptive water needs and potential projects or methods to meet those needs. It also administers the Water Supply Reserve Account and the Alternative Agricultural Transfers grant program and provides public education and outreach on Colorado's water supply future.*

*Prior to joining the State, Eric served as a natural resource specialist to the Bureau of Land Management's National Science and Technology Center under a Presidential Management Fellowship. Eric received his bachelor's degree in biology from Lawrence University and prior to graduate school was a Fulbright Scholar at the University of Zimbabwe. He earned his master's degree in environmental science in water resources and a Master's of Public Affairs from Indiana University.*

## **Nights of the South Platte Roundtable: An Update**

**Jim Yahn**

Chair, South Platte Roundtable; Manager, North Sterling and Prewitt Reservoirs, North Sterling Irrigation District, PO Box 103, Sterling, CO 80751, 970-522-2025, [jim@northsterling.org](mailto:jim@northsterling.org), [www.northsterling.org](http://www.northsterling.org)

As the Colorado Water for the 21<sup>st</sup> Century Act enters its sixth year of existence, the roundtable process continues to move forward. The members of the South Platte Basin Roundtable have spent many evenings over the past five years attempting to grasp the future water needs of the South Platte Basin and the entire State of Colorado. We have worked to distribute roundtable funds responsibly, to give guidance to our Interbasin Compact Committee representatives, to educate ourselves and the public within our basin, and to fully understand our future needs. If we are going to make this collaborative effort a success there are many nights to come.

*Jim Yahn is the manager of the North Sterling and Prewitt Reservoirs, a position that he has held for 18 years. He is responsible for overseeing the diversion and distribution of water to more than 350 farmers. Together the reservoirs are a source of irrigation water for approximately 70,000 acres. The North Sterling, on average, diverts 125,000 acre-feet of water annually from the South Platte River, while the Prewitt, on average, diverts 40,000 acre-feet.*

*Jim is a registered professional engineer. He received a Bachelor of Science in agricultural engineering from Colorado State University. Prior to his employment with North Sterling and Prewitt he worked as a private consulting engineer in Fort Collins for five years. He is a native of Colorado - Jim grew up on a family ranch that used water from the North Sterling Reservoir System.*

*Jim served as a member of the Senate Bill 73 Committee in 2003, and he was a member of the Governor's South Platte Basin Task Force in 2007. Currently, Jim serves as the chairman of the South Platte Roundtable. In addition to his work-related committees, Jim is President of the Northeastern Junior College Advisory Council. In his spare time Jim farms and ranches with his wife Tracy and two children, preaches part time for Cowboy Up Ministries, and enjoys singing with a contemporary Christian band.*

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Wednesday, October 20, 12:00 p.m.

## **South Platte Pictionary: Keynote Luncheon**

### **Friends of the South Platte Award Presentation to Les Williams**

Award presented by Dennis Yanchunas, President, St. Vrain and Left Hand Water Conservancy District

#### **Les Williams**

President, Municipal Subdistrict; Former Executive Director, St Vrain and Left Hand Water Conservancy District; Retired President, District 6 Water Users Association; 8876 Rogers Rd., Longmont, CO 80503, 303-776-7527, coljwilliams@gmail.com

Les Williams was born in Denver and raised in Longmont. After graduating from Longmont High School, he graduated from Colorado State University. He then earned a graduate degree in dentistry from Northwestern University. After graduation he served two years in the Army Dental Corps and then returned to Longmont and practiced Dentistry with his father for eleven years.

In 1984 Les left dentistry and had his first water experience, serving on the advisory committee for the St. Vrain Basin Reconnaissance Study. Les became the executive director of St. Vrain and Left Hand Water Conservancy District in 1986. He also became a director on the District 6 Water Users Association at that time. In 1989 Les was appointed to the Board of the Northern Water Conservancy District and has been a board member since.

Some of the issues Les has worked include the North St. Vrain Wild and Scenic River Proposal, the Forest Service Federal Reserve Water Rights Claims, the St. Vrain Basin Augmentation Plan and Water Rights Acquisition, the South Platte Basin Round Table, and the St. Vrain Basin Corridor Committee.

Les and his lovely wife Martha have two children, Kristin and Todd, and three grandsons.

### **A Virtual Tour of the Water Projects in the South Platte River Basin**

#### **Dick Stenzel**

Senior Water Engineer, Applegate Group, Inc., 1499 W. 120<sup>th</sup> Ave., Ste. 200, Denver, CO 80234, 303-452-6611, dickstenzel@applegategroup.com

The presentation will take you on a photographic journey of the historic water development throughout the South Platte River Basin looking at water diversion structures, reservoirs, and water supply systems. You will have an opportunity to see structures that you may have heard about many times but have never actually seen.

Dick Stenzel retired from the State Engineers office in 2002 after 25 years of service and was the Division 1 Engineer for the Colorado Division of Water Resources when he retired. For the last eight years he has worked part time as a senior water resource engineer with the Applegate Group. The balance of his time is spent in travel, photography, writing short articles, and making presentations regarding Colorado's water history and water rights administration. His photographs of water projects have been used in the calendar produced by the Applegate Group called Colorado's Historical Water Projects, which has been printed annually since 2005.

### **Notes:**

# Friends of the South Platte

This award program was initiated in 2004 to recognize individuals and organizations who, through diligence and dedication, have made exceptional contributions in the South Platte River Basin.

## Hall of Fame

**Chuck GrandPre, “founder” of the South Platte Forum**

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2009 Friend of the South Platte

**Nominations:** To nominate an individual or organization for the Friends of the South Platte award, visit [www.southplatteforum.org](http://www.southplatteforum.org). Honorees are selected by the organizing committee.

*Special thanks to John Fielder for his generous donation of the picture “South Platte Sunset” and his support of the Friends of the South Platte Award. “South Platte River Sunset” can be found with John’s other fine art prints at John Fielder’s Colorado, his art gallery in the Cherry Creek mall. You can also view his work, learn about workshops and order books at [www.johnfielder.com](http://www.johnfielder.com).*

## Mark Your Calendar!

**October  
2011**

**Wed**

**19**

**Thu**

**20**

**The 22nd Annual  
South Platte Forum**



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Wednesday, October 20, 1:40 p.m.

## **Deal or No Deal: Project Updates**

**Moderator: Rich Vidmar**

Senior Water Resources Engineer, Aurora Water, 15151 E. Alameda Pkwy., Aurora, CO 80012, 303-739-7326, rvidmar@ci.aurora.co.us

*Richard Vidmar is a water resources engineer for Aurora Water specializing in water rights acquisitions, appropriations, and protection in the South Platte Basin. Rich holds a bachelor's degree in civil engineering from Colorado State University. Prior to earning his degree, Rich worked for the U.S. Bureau of Reclamation for six years at the Mt. Elbert power plant's water operations and maintenance division. Rich has been employed at Aurora Water for more than five years, working on many different projects including the Prairie Waters Project. Rich grew up in Buena Vista, CO where his father, Tom, is the superintendent of the Homestake Water Project. Rich also completed the Colorado Foundation for Water Education Water Leaders program.*

## **The Chatfield Reallocation Project: A Status Update**

**William R. (Rick) McLoud**

Water Resources Manager, Centennial Water and Sanitation District, 62 W. Plaza Dr., Highlands Ranch, CO 80129, 303-791-0430, rmcloud@highlandsranch.org

## **Flaming Gorge Pipeline**

**Aaron P. Million**

Managing Partner, Million Conservation Resource Group, Inc., Fort Collins, CO, million\_1@hotmail.com

*Aaron Million is the managing partner and principal of Million Conservation Resource Group, Inc., headquartered in Fort Collins, Colorado. The company was formed in 2005 to plan, permit, engineer, and build the Regional Watershed Supply Project. The project will transport a new water supply of approximately 200,000 acre-feet from the Flaming Gorge Reservoir/Green River system for the benefit of agricultural producers, environmental interests, and municipal and industrial water supply entities located throughout Southern Wyoming and Colorado. The water supply idea was developed by Mr. Million through graduate work studies in resource economics at Colorado State University with a focus on environmental issues.*

*Raised on a ranch in Green River, Utah, Mr. Million's professional background and expertise has centered on the balanced management of agricultural lands and natural resources throughout the Western United States. His water supply planning expertise goes back four family generations to the Green River basin starting in the early 1900s.*

*Mr. Million has been focused on environmental issues related to private sector involvement and assistance in meeting public policy objectives related to conservation, regional land use planning, and mitigation of environmental and agricultural impacts. Mr. Million has future policy and political interests.*

*Million Conservation Resource Group's determined collaboration and public/private business model will help in solving some of the region's water and natural resource challenges. The company is moving to pioneer creative, environmentally responsible partnerships to address water needs for the current and future citizens of the region and to use pragmatic alternatives to best protect our natural resources.*

## **Notes:**



#### 404 Evaluations of Water Supply Proposals – Where's the Permit?

Chandler J. Peter

NEPA EIS/404b1 Coordinator, Corps of Engineers, Omaha District, Denver Regulatory Office, 9307 S. Wadsworth Blvd., Littleton, Colorado 80128, 303-979-4120, [chandler.j.peter@usace.army.mil](mailto:chandler.j.peter@usace.army.mil), [www.nwo.usace.army.mil/html/od-tl/tri-lakes.html](http://www.nwo.usace.army.mil/html/od-tl/tri-lakes.html)

The Corps of Engineers, Omaha District Regulatory Branch, is currently directing the development of four Environmental Impact Statements (EIS) involving five major water supply proposals to serve the South Platte River basin portion of the Colorado Front Range. These EISs have been ongoing for extensive periods of time with the expenditure of millions of applicant dollars with none of the actions receiving authorization to date. The presentation will focus on the status of the permit review process for four of the projects and highlight some common themes that have developed in associated with water supply permit actions.

*Chandler Peter is the National Environmental Policy Act (NEPA) EIS/404b1 coordinator for the Corps of Engineers, Omaha District Regulatory Branch, as well as the Northwest Division NEPA subject matter expert for the regulatory program. He has more than 20 years experience in aquatic resource regulation and analysis with the Corps, the state of New Jersey, and the U.S. Fish and Wildlife Service. His primary responsibility is to lead third party contractor teams in the formulation of Environmental Impact Statements for the largest, most complex, and controversial permit actions in the District as well as providing technical support to all Corps Districts in the Northwest United States relative to NEPA and 404b1 compliance issues.*

#### **Notes:**



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Wednesday, October 20, 3:15 p.m.

## **Win, Lose or Draw: Forest Health**

**Moderator: Don Kennedy, Denver Water**

Environmental Scientist, Denver Water, 1600 West 12th Avenue, Denver, CO 80254, 303-628-6528,  
Don.Kennedy@denverwater.org

*Don Kennedy has worked for Denver Water as an environmental scientist for 24 years. His job duties are diverse. Currently, Don's main focus is watershed wildfire protection within Denver Water's water collection system. Other projects he works on are stream improvement, land reclamation, and relicensing of facilities and projects requiring compliance with governmental acts such as National Environmental Policy Act (NEPA), the Clean Water Act and the Endangered Species Act. Prior to working with Denver Water, Don worked for a consulting firm, the U.S. Forest Service, and the U.S. Park Service. He has a bachelor's degree in forestry and a master's degree in biology.*

### **A Look at Forest Health through Different Lenses**

**Jessica Clement**

Co-Director, Colorado Forest Restoration Institute, Colorado State University, 133 Forestry Bldg, Campus Mail 1472,  
Fort Collins, CO 80523-1472, 970-491-2104, jessica.clement@colostate.edu, www.cfri.colostate.edu

*Jessica Clement, who was born in the Netherlands, has studied, researched, and taught at Colorado State University and Colorado Mountain College in ecology, natural resource management, and human dimensions in natural resources for the last twenty years. Before that she worked in several countries in journalism and other media-related subjects and has served as assistant dean at Colorado Mountain College. As research associate and now co-director in the Colorado Forest Restoration Institute at Colorado State University, she is in charge of the administration of the Institute and leads all programs related to ecological and social capacity monitoring, support for place-based collaboration, and science-policy discourses. Jessica also advises and works with national forests, wildlife refuges and wildlife agencies in Colorado, Wyoming, and Montana, and is exploring the intersections between landscape restoration and resilience, rural community economic capacity, and climate change.*

### **Headwaters**

**Glenn Casamassa**

Forest Supervisor, Arapaho & Roosevelt National Forests, Pawnee National Grassland, U.S. Forest Service, ARP,  
2150 Centre Ave., Bldg. E, Fort Collins, CO 80526, 970-295-6603, gcasamassa@fs.fed.us

*Glenn Casamassa graduated from Utah State University in 1980 with a degree in forest ecology. He began his Forest Service career in 1982 working on the Tongass National Forest, Prince of Wales Island in Southeast Alaska. In 1983 he attended Oregon State University, completing advanced studies in forest engineering. After serving in several National Forests in Utah as a timber forester and recreation forester, he became the regional environmental coordinator for the Intermountain Region in Ogden, Utah in 1992.*

*In 1996 Glenn became the district ranger overseeing the Moab and Monticello Ranger Districts of the Manti-La Sal National Forest, Utah and served as the acting area ranger for the Sawtooth National Recreation Area in central Idaho in 2002.*

*In 2003, Glenn served as a legislative affairs specialist in the agency's Washington Office where he worked with Congressional staff, Department of Agriculture officials, and the Office of Management and Budget on Forest Service issues related to legislation, program oversight, and budget formulation.*

*Glenn has served as the forest supervisor for the Arapaho & Roosevelt National Forests and Pawnee National Grassland since December 2006. He said, "I am truly humbled by the duties entrusted to me as the Forest Supervisor of the Arapaho and Roosevelt National Forests and Pawnee National Grasslands. I enjoy working with the employees of the Forest, the communities, and all those interested in the management of such a special place."*

### **Notes:**



**Northern Treatment Plant Vision Statement:**

*The Metro Wastewater Reclamation District is committed to providing advanced, cost-effective facilities for our communities while extending our history of environmental stewardship.*



Conceptual Rendering at Build-Out

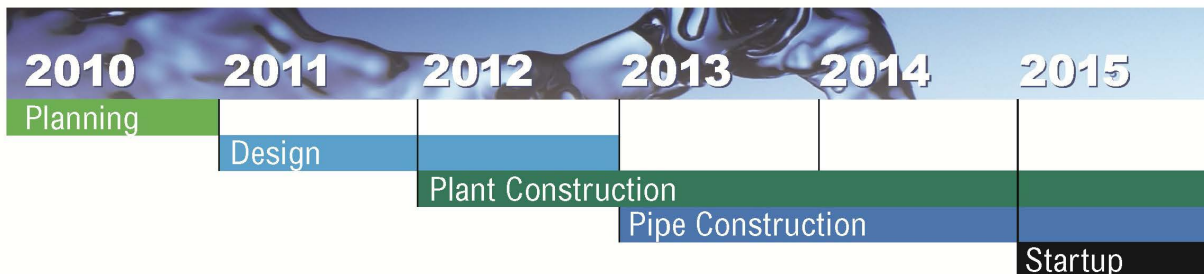
**Northern Treatment Plant  
Facts:**

- Part of the region's plans for more than four decades
- Supported by local governments, businesses, and regulators
- Most cost-effective solution for the region
- Online in 2015
- 90-acre site; located on the northwest corner of Highway 85 and 168<sup>th</sup> Avenue
- 24-million gallons per day during Phase 1
- 60-million gallons per day at build-out
- 300,000 residents served in 5 cities during Phase 1

**Through the Northern Treatment Plant, the Metro District will:**

- Meet the needs of economic development and growth
- Build advanced facilities using proven technology and practices
- Provide safe, reliable, and cost-effective treatment and transmission services
- Extend environmental stewardship

**Northern Treatment Plant Timeline:**



**Thanks for coming to the South Platte Forum...**

**...Don't forget to fill out your evaluation!!**



## **Protecting Critical Watersheds in Colorado from Wildfire: A Technical Approach to Watershed Assessment and Prioritization**

**Brad Piehl**

Partner/Forest Hydrologist, JW Associates, PO Box 3759, Breckenridge, CO 80424, 970-406-0085,  
bpiehl@jw-associates.org, www.jw-associates.org

The Upper South Platte watershed experienced major impacts on municipal water supplies as a result of flooding, erosion, and sediment deposition after the 1996 Buffalo Creek Fire and 2002 Hayman and Schoonover fires. The Front Range Watershed Wildfire Protection Working Group has created an approach to watershed assessments that prioritized subwatersheds based on the hazard caused by high-severity fire and the potential effects on drinking water supplies. This approach - Protecting Critical Watersheds in Colorado from Wildfire: A Technical Approach to Watershed Assessment and Prioritization - has been applied to several watersheds in Colorado including the Upper South Platte and South Platte Headwaters. The results of those assessments will be presented.

*Brad Piehl is a forest hydrologist that facilitated the Front Range Watershed Protection Data Refinement Work Group in their work in creating the procedure titled Protecting Critical Watersheds in Colorado from Wildfire: A Technical Approach to Watershed Assessment and Prioritization. This work is the guiding document for the watershed assessments that have been completed in Colorado. He has been the lead in all the watersheds assessments of this type in Colorado to date. Brad has also been involved in several groups focused on finding solutions to both the high wildfire risk in the ponderosa pine forests and the risk created by the mountain pine beetle in the lodgepole pine forests of Colorado. He is part of the Colorado Bark Beetle Cooperative and the Summit County-based Forest Health Task Force.*

### **Notes:**

***Thank you for attending the South Platte Forum.***

We'll start again Thursday morning promptly at 8:30 a.m.

A continental breakfast will be available at 8 a.m.

***See you then!!***



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Thursday, October 21, 8:30 a.m.

## **Concentration: Nutrient Water Quality Standards**

Moderator: Suzanne Paschke, U.S. Geological Survey

### **Overview of Colorado's Proposed Nutrient Criteria**

**Richard Parachini**

Watershed Program Manager, Water Quality Control Division, 4300 Cherry Creek Dr. South, Denver, CO 80246,  
303-692-3609, [sarah.johnson@state.co.us](mailto:sarah.johnson@state.co.us)

The Water Quality Control Division will propose nutrient criteria for Colorado's surface waters for consideration by the Water Quality Control Commission in June 2011. This is the result of a ten-year criteria development effort. The presentation will provide an overview of the criteria development work, the criteria, and the implementation considerations that the Division will propose.

### **Nutrient Sources and Transport in the Missouri River Basin: a Regional View of the South Platte**

**Lori Sprague**

**with Julianne Brown and Jean Dupree, U.S. Geological Survey**

Hydrologist, U.S. Geological Survey, National Water Quality Assessment Program, Denver Federal Center, PO Box 25046,  
MS 415, Lakewood, CO 80225, 303-236-4882 x262, [lsprague@usgs.gov](mailto:lsprague@usgs.gov), [co.water.usgs.gov](http://co.water.usgs.gov), [water.usgs.gov/nawqa/](http://water.usgs.gov/nawqa/)

SPATIally Referenced Regression On Watershed attributes (SPARROW) modeling was used to identify the major nutrient sources and terrestrial and aquatic delivery factors affecting nitrogen and phosphorus loads in streams throughout the Missouri River basin during 2002 conditions. Preliminary model results indicate that the largest sources of nitrogen and phosphorus in the Missouri River at its confluence with the Mississippi River were manure and farm fertilizer. Point sources were estimated to contribute about 8% of the nitrogen and 11% of the phosphorus in the Missouri River, whereas developed land contributed about 12% of both nitrogen and phosphorus.

In the South Platte River at its confluence with the North Platte River, point sources were estimated to be a larger source of both nitrogen and phosphorus than in the Missouri River. Among the terrestrial delivery factors considered in the model, nitrogen delivery from the land surface to streams was found to vary with precipitation, air temperature, irrigation, and surficial geology; phosphorus delivery to streams was found to vary with precipitation, permeability, and basin slope. Nitrogen was attenuated in reservoirs and small streams, whereas phosphorus was primarily attenuated in reservoirs but on average, not in streams—channels of large streams were estimated to be a source rather than a sink of phosphorus.

Results from SPARROW models are being used to address a variety of local, regional, and national management issues. Using the model, nutrient concentrations and loads in unmonitored stream reaches can be predicted, allowing for identification of specific locations where regulatory standards or criteria are not likely to be met. Nutrients in a given stream reach, reservoir, or other receiving water body can be traced to individual sources and locations in the upstream watershed, allowing for targeted management of nutrient sources and contributing areas. Model source inputs can be altered, allowing for simulation of hypothetical conditions, such as changes in nutrient sources associated with future nutrient control strategies.

*Lori Sprague is a hydrologist with the Water Resources Discipline of the U.S. Geological Survey in Denver. She currently conducts national nutrient studies for the National Water-Quality Assessment Program of the USGS, which collects information on water chemistry, stream habitat, and aquatic life to provide science-based insights on surface and ground water issues throughout the United States. Prior to her work with the NAWQA program, she researched nutrient transport in the Chesapeake Bay watershed, drought effects on water quality in Colorado, and the fate of endocrine-disrupting chemicals downstream from municipal wastewater treatment facilities.*

### **Notes:**



## Nutrients: Water Quality Monitoring and Assessment Perspective

**Karl A. Hermann**

Monitoring and Assessment Coordinator, U.S. EPA Region 8 Water Quality Unit, 1595 Wynkoop St., Mail Code 8EPR-EP, Denver, CO 80202, 303-312-6628, [hermann.karl@epa.gov](mailto:hermann.karl@epa.gov), <http://www.epa.gov/region8>

Given water quality standards, a state's assessment methodology serves as a critical tool in the monitoring and assessment for pollutants. The methodology describes the data required for an assessment and provides methods for determining attainment or non attainment of water quality standards. Like other pollutants, nutrients have sampling considerations in order to obtain quality and representative samples. Likewise, laboratory analyses need to ensure quality results. For Clean Water Act Sections 305(b) and 303(d), assessments of attainment and non attainment for pollutants are performed for classified waterbody segments. Ensuring a representative assessment for a segment must consider spatial and temporal monitoring factors. For waterbody segments that are identified as impaired for a pollutant, monitoring and assessing for pollutant sources becomes the first step of the total maximum daily load calculation process.

*Karl Hermann is the water quality monitoring and assessment coordinator for the U.S. Environmental Protection Agency Region 8 in Denver. He has oversight responsibilities for Clean Water Act Sections 305(b) and 303(d) in the State of Colorado. Karl has been with EPA Region 8 since 1996. Prior to his move to Denver, Karl was at the University of Tennessee working for the National Biological Service and in North Carolina as a contractor to EPA in Research Triangle Park and as a State of North Carolina employee with the Department of Natural Resources. Karl has a master's degree from Colorado State University and did doctorate studies in forestry at North Carolina State University. He was also a Peace Corps volunteer in Africa.*

## Notes:



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## Excess Nutrients in Surface and Groundwater: EPA's National Perspective

**Bert Garcia**

Director, Ecosystems Protection Program, U.S. EPA Region 8, 1595 Wynkoop St., Mail Code 8EPR-SR, Denver, CO 80202-1129, 303-312-6670, [garcia.bert@epa.gov](mailto:garcia.bert@epa.gov)

Addressing pollution caused by excess nitrogen and phosphorus (nutrients) in surface waters and aquifers has become a priority for the Environmental Protection Agency's Office of Water. Nutrient-related degradation of waters results in harmful algal blooms, reduced spawning grounds and nursery habitats, fish kills, oxygen-starved "dead" zones, public health concerns related to impaired drinking water sources, and drinking water treatment pollutants and costs. Important ecosystems in the United States have been altered due to excess nutrients; Chesapeake Bay and the Gulf of Mexico are prime examples, but this problem is found throughout the nation. Nutrient problems are in the top three reasons lakes and estuaries are listed by states as impaired.

For more than 10 years, EPA has encouraged states to develop water quality standards for nutrients so that water programs are more effective. However, EPA was criticized in 2009 in a report by the Office of the Inspector General for not having accelerated progress in establishing state nutrient standards. EPA has been petitioned to establish nutrient standards for the Mississippi River. EPA has also been sued and received notices of intent to sue for not having promulgated nutrient standards in three different states. Supporting states to develop assessments of nutrient-related water quality conditions and nutrients standards is a key strategic activity in EPA Region 8.

*Bert Garcia is director of EPA Region 8's Ecosystems Protection Program, working with states and tribes to implement EPA's water quality programs. He's been with EPA since 1990 and spent much of that time working in the CERCLA hazardous waste cleanup program. Prior to joining EPA he was a banker. He graduated from Texas A&M University with a bachelor's degree in nuclear engineering and a master's degree in business administration.*

### **Notes:**



## AURORA WATER Prairie Waters Project

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Prairie Waters uses natural cleansing processes that enhance and preserve open space.
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*The Peter D. Binney Water Purification Facility, the final component of the Prairie Waters Project, uses state-of-the-art technology such as Advanced UV Oxidation and Granular Activated Carbon filtration to ensure the water meets or exceeds all current and future standards. Slated for completion later this year, this facility can treat up to 50 million gallons of drinking water per day.*

**Prairie Waters is an innovative project that uses a sustainable water supply by recapturing river water to provide drought insurance and as a cornerstone of a water supply plan that will help meet Aurora's needs for decades. Prairie Waters uses both natural cleansing processes and state-of-the-art purification technology to deliver an additional 3.3 billion gallons of water per year. For more information, visit [PrairieWaters.org](http://PrairieWaters.org).**



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Thursday, October 21, 10:45 a.m.

## **Family Feud: Nutrient Perspectives**

**Moderator: Amy L. Woodis**

Governmental/Legislative Liaison, Metro Wastewater Reclamation District, 6450 York St., Denver, CO 80229, 303-286-3240, awoodis@mwrd.dst.co.us

*Amy Woodis has been at the Metro Wastewater Reclamation District in the Environmental Services Department since 2000. On behalf of Metro, she participates in a number of water quality standards development workgroups through the Colorado Water Quality Forum. She also coordinates legislative and regulatory activities on behalf of the District.*

*Ms. Woodis received her bachelor's degree from Smith College, her master's degree in business administration from Santa Clara University, and her law degree from George Mason University School of Law. She is a member of the Florida and Colorado bars and is an adjunct lecturer at the Regis University College for Professional Studies in the Public Administration program. She also is a member of the Board of Directors of the Colorado Wastewater Utility Council, an association of 41 agencies, municipalities, and special districts, whose mission is to promote professional and responsible environmental protection by supporting legislation and regulations that achieve well-defined benefits while promoting local flexibility.*

## **Nutrient Management Trends in Agriculture – Precision and Progress**

**Mark Sponsler**

Executive Director, Colorado Corn, 127 22nd St., Greeley, CO 80631, 970-351-8201, sponsler@coloradocorn.com, www.coloradocorn.com

Mark's presentation will address trends in nutrient management over recent decades with an emphasis on irrigated crop systems within Colorado. Nutrient use rates, efficiencies, common practices, challenges, and adoption of recognized best management practices will be part of the discussion as they relate to corn production in Colorado.

*Mark Sponsler was hired as executive director for Colorado Corn in 2006 after serving as their agronomic services director for three years.*

*Mark has an extensive background in Colorado irrigated agriculture spanning 28 years. He worked with hundreds of farmers and their operations across much of Colorado from the San Luis Valley and the Uncampahgre to the Lower South Platte and Republican basins. He worked nine years as an agronomist for Coors Brewing Company and 13 years as a fertilizer specialist and project manager for Centennial Ag Supply. He is a former chairman of both the Colorado Ag Water Alliance and Colorado Ag Council, and he currently serves on the National Ag Industry Council. Mark is a graduate of Iowa State University and is a Certified Crop Advisor.*

*As executive director, Mark works to advance the interests and issues of corn producers throughout the state. Among other duties, he currently manages the Corn Growers' interests in several research projects related to water use. Projects include the development of alternatives to buy and dry methods of water procurement by municipalities in the South Platte Basin and a Rooting Architecture and Water Use Efficiency Study at the Irrigation Research Foundation near Yuma, Colorado.*

## **Notes:**



## **Potential Directions for Nutrients Standards for Urban Dwellers, their Cumulative Costs, and Frozen Futures!**

**Tad S. Foster**

Attorney, Law Office of Tad S. Foster, 20 Boulder Crescent, Colorado Springs, CO 80903, 719- 632-5240,  
tadfoster@tsfosterlaw.com

Regardless of whether EPA's total nitrogen and total phosphorus (nutrients) proposed water quality criteria or the Colorado Water Quality Control Division's proposed less stringent criteria are adopted, they are so low that point sources, stormwater flows, agricultural return flows, atmospheric deposition, and water management flows will likely need to be controlled to extreme levels of removal to attain the standards. These standards are at or even below natural background conditions. There is little or no assimilative capacity for current loading from any source. Yet such standards and the resulting treatment controls may have no effect in avoiding excessive algae and its impact on aquatic life, recreational uses, or drinking water quality. Many variables may prevent the formation of excessive algae at higher concentrations, but the proposed standards make no allowance for these variables. The low standards proposed by Colorado risk many streams, lakes, and reservoirs being listed as impaired under Clean Water Act Section 303(d). Each listing results in a long study process leading to nutrient loading reductions allocated among all sources on the segment or far upstream segments. This is called a Total Maximum Daily Load (TMDL). Pending completion of the TMDL and sufficient implementation to discern new assimilative capacity, no new sources of nutrients are allowed under 40 CFR 122.4(i) according to one major case from Arizona. In light of this freeze on new sources such as wastewater plants, new urban areas draining to the streams and rivers, water diversions returning flows to the rivers and streams, new growth is frozen. It is not clear that the new Discharger Specific Variance process of the Water Quality Regulations will thaw the freeze. In any case, existing sources will seek to set site specific standards, but years of data should have or will have to be obtained. In the interim, advanced wastewater treatment likely will be required. The costs of such treatment are being assessed. If reverse osmosis treatment is necessary to meet the low total nitrogen standards, the capital and operational costs will be significant. Thus, it is critical to determine the appropriate standards to truly justify the likely significant costs and related residential sewer fees.

*Tad S. Foster has been practicing environmental law since 1974 with a significant focus on water quality law. This includes being on the Colorado Water Quality Control Commission from 1981 to 1987. During that time the commission set the initial water quality standards for all of the river basins in the state. In the mid 1980s nutrient water quality standards for phosphorus and nitrogen were set for Dillon, Chatfield, and Cherry Creek Reservoirs. Those standards continue to undergo significant analysis and revisions. From 2005 to 2008, Mr. Foster defended a \$300 million civil lawsuit for breach of contract in California. This case arose because California's nutrient standards were so stringent, two wastewater plants were unable to discharge to their adjacent stream and were forced to pump their effluent to another watershed, and frustrated their contract to provide water imported from the Colorado River to downstream diverters, who sought damages. The case is a symbol of the future as stringent nutrient standards are being considered for adoption throughout Colorado and the nation.*

### **Notes:**

**Have you seen your evaluation?**

**It doesn't want to be blank forever.**



## Nutrient Criteria In Colorado: An Ecological Perspective

Jamie Anthony

Water Quality Program Coordinator, Colorado Division of Wildlife, 6060 Broadway, Denver, CO, 80216, 303-291-7128, jamie.anthony@state.co.us, www.wildlife.state.co.us

Nutrients are fundamental drivers of ecosystem productivity because they often limit rates of primary production. Although nutrients are essential to support biological productivity, human activities have dramatically influenced nutrient loading to aquatic ecosystems. With nutrients, as with most essential things, there can be too much of a good thing, and excessive nutrient loading can have a detrimental influence on aquatic life. While some effects of elevated nutrient loading can be relatively obvious (e.g., fish kills), others may be much more subtle (e.g., decreased biodiversity). Nutrient management becomes even more complicated with respect to recreational fisheries, which may be constrained by either low or high nutrient concentrations. The development of nutrient criteria forces us to grapple with potentially conflicting ideals. Can the needs of aquatic life and recreational fisheries be reconciled with the needs of other uses as well as public perceptions of water quality? Such questions will not be unique to nutrient criteria as we move into an era of difficult-to-treat emerging contaminants.

*Jamie Anthony is the water quality program coordinator for the Colorado Division of Wildlife. In this role, Jamie works to ensure that water quality standards are developed and implemented in a manner consistent with the protection of Colorado's wildlife resources. Before joining the CDOW, Jamie received his bachelor's and master's degrees from Iowa State University where he researched the internal loading of nutrients in lakes, the ecology of native freshwater mussels, and the management of commercial mussel fisheries. After working as an Ecological Society of America (ESA) biologist for the Washington State Department of Transportation, Jamie earned a Ph.D. from the University of Colorado, Boulder, conducting research on sediment-water nutrient exchanges in lakes and patterns of nutrient limitation in alpine lakes.*

### Notes:



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Thursday, October 21, 12:00 p.m.

## **Funny You Should Ask: Luncheon Keynote**

### **Downstream from Denver**

**Ann S. Bleed**

*Former Director, Nebraska Department of Natural Resources; Consultant, ABA, 1315 N. 37th St, Lincoln, NE 68503, 402-419-1796, [ableed@neb.rr.com](mailto:ableed@neb.rr.com)*

John Wesley Powell argued in the 19<sup>th</sup> century that state boundaries in the west should be drawn along watershed boundaries. He lost that argument. Now there are numerous rivers that cross state boundaries, including the North and South Platte Rivers. Compacts and decrees have been written to manage and allocate the waters of interstate streams. In many basins, including the Platte, the hydrologic regime, water uses, and changes in policy and the law have created problems not anticipated at the time the initial compacts and decrees were written. The states of Colorado, Wyoming, and Nebraska have all been involved in attempts to address such interstate stream issues. What lessons have we learned from this experience, and how can we do a better job to resolve interstate conflicts in the future?

*Ann Bleed, Ph.D., P.E., is currently a consultant providing consultation and facilitation services to people facing water resource issues. She also teaches graduate courses at the University of Nebraska in water and environmental law and policy and in integrated resources management. For more than 20 years, Ann worked at the State of Nebraska Department of Natural Resources, first as the state hydrologist, overseeing the more complex technical aspects of water administration and serving as the State's examiner in water rights hearings before the Department, and then as deputy director and finally director of the department. She served as a representative of the State of Nebraska on the negotiating teams that settled two interstate water allocation lawsuits, Nebraska v. Wyoming, and Kansas v. Nebraska, that were before the U. S. Supreme Court. She also helped develop the Platte River Recovery and Implementation Program and facilitate the Water Policy Task force that wrote a new comprehensive integrated surface water and ground water law for the State of Nebraska.*

Thursday, October 21, 1:25 p.m.

## **Price is Right: Alternatives to Ag Transfer**

**Moderator: Troy Bauder**

### **Public Attitudes about Ag Transfer**

**Troy Bauder**

*Extension Water Quality Specialist, Cooperative Extension Services, Dept. of Soil and Crop Sciences, Colorado State University, Fort Collins, CO 80523-1170, 970-491-4923, [tbaud@lamar.colostate.edu](mailto:tbaud@lamar.colostate.edu)*

*Troy Bauder is the state extension water quality specialist in the Department of Soil and Crop Sciences at CSU where he received his bachelor's degree in agronomy and his master's degree in soil science. Troy is responsible for conducting statewide educational and applied research programs on water quality especially related to protecting groundwater quality from impairment to agricultural chemicals as authorized under the Agricultural Chemicals and Groundwater Protection Act (SB90-126). His research and outreach activities include nitrogen management using high-nitrate irrigation water, aquifer vulnerability to contamination, and factors affecting adoption of Best Management Practices by Colorado producers.*

### **Notes:**



## The Impact of Leasing on Markets for Permanent Water Rights: A Laboratory Investigation

Christopher Goemans

Assistant Professor, Dept. of Ag and Resource Economics, Colorado State University, Clark B-312, Fort Collins, CO, 80526, 720-771-9443, cgoemans@colostate.edu, www.dare.colostate.edu

Academics, politicians, and planners have touted the importance of developing alternatives to permanent transfers for re-allocating water from agricultural to urban uses. While the details differ, these alternatives largely amount to developing opportunities for temporary leasing markets that would, in theory, allow for a more efficient allocation of water and lessen the negative impacts associated with permanent transfers (e.g., decrease in agricultural acreage, decimation of rural communities, etc.; Howe and Goemans, 2003). Efforts to promote these alternatives are largely directed at eliminating existing institutional barriers and/or high transaction costs, which many argue are the reason why active leasing markets do not currently exist. These efforts are often costly and have frequently not led to the desired outcome. Previous efforts have studied the dynamics of either water leasing markets or markets for permanent water rights; however, these studies have typically focused on stylized examples (e.g., market for CBT shares) and more importantly, have focused on these markets in isolation. Despite the widespread belief that active leasing markets are desirable, it is unclear what impact they would have both specifically on the market for permanent water rights (e.g., price, number of permanent transfers, etc.) and on the resulting allocation of water. The limitations of the existing literature are largely due to a lack of data: few active leasing markets exist and cities/farmers do often not report their water market activity. Using experimental economics techniques we ask: How would active water leasing markets in Colorado impact markets for permanent water rights and the resulting allocation of water? In our presentation we discuss the project, provide an overview of the experimental water leasing and water rights markets developed as part of the project, and report project findings.

*Christopher Goemans is an assistant professor in the Department of Agricultural and Resource Economics at Colorado State University. Dr. Goemans holds a Ph.D. in Economics from the University of Colorado. His past academic experience includes serving as a visiting scholar at Victoria University of Wellington, New Zealand and as an adjunct instructor for the University of Colorado at Denver. Dr. Goemans most recent work has focused on water markets, efficient water use, and residential water demand modeling. Dr. Goemans' non-academic experience includes a senior associate position with Harvey Economics where he provided expert testimony regarding the use of econometric and statistical techniques, collaborated in a cost-benefit analysis study of a major water pipeline project, evaluated the water demand forecasting techniques used by Denver Water, and conducted a water rights valuation for a large commercial water user.*

*Stephan Kroll is an environmental and experimental economist at Colorado State University with a Ph.D. in economics from the University of Wyoming. A native of Germany, he held positions at St. Lawrence University (New York), Sacramento State University (California) and the University of Innsbruck (Austria) before coming to Colorado in 2008. Dr. Kroll's research focuses on the institutional and behavioral components of decision-making with an emphasis on environmental, resource, and agricultural topics. His primary tool to analyze such decision-making is the use of laboratory experiments, in which human subjects face an incentive system that resembles the incentives from the "real world." Participants in these experiments earn money depending on their own decisions, on the decisions of other participants and, to a small extent, on luck.*

### Notes:

Did you save the date?

October 2011

Wed 19 Thu 20

22nd Annual South Platte Forum



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## **Tools for Alternative Transfers: Ducks and Corn**

**Matt Lindburg, P.E.**

*Principal Engineer, Brown and Caldwell, 1697 Cole Blvd., Ste. 200, Golden, CO 80401, 303-239-5400, [mlindburg@brwnncald.com](mailto:mlindburg@brwnncald.com), [www.brownandcaldwell.com](http://www.brownandcaldwell.com)*

The Colorado Corn Growers Association (CCGA), Ducks Unlimited (DU), and the City of Aurora (Aurora) were awarded a grant to develop tools to help agricultural producers understand the processes, economic implications, and the potential for conducting alternative agricultural water transfers such as rotational fallowing, interruptible supply agreements, and other transfer methods. Although the CCGA, DU, and Aurora are a diverse team, they are interested in a common goal – to develop win-win alternative transfers of water that can both meet growing urban and industrial demands and also maintain irrigated agriculture in Colorado. During the course of the project, the team joined forces with a group of water users and suppliers interested in forming a water cooperative in the lower South Platte River (Co-op). One of the Co-op group's interests is helping agricultural and other water users develop efficient means to retine and optimize excess water that is available from time to time in the lower South Platte for agricultural and other beneficiaries. The common goals and diverse viewpoints of the Co-op, CCGA, DU, and Aurora have resulted in productive collaboration and thinking. Assisting in the research for this project are the Colorado Water Institute (research engineers and economists from Colorado State University); Lind, Lawrence, and Ottenhoff, LLC (attorneys); Harvey Economics; and Brown and Caldwell (engineers).

As the above goal suggests, the primary focus of this project was to examine alternatives to traditional “buy and dry” that can maintain sustainable irrigated agriculture and provide water to other users. The Team accomplished this objective by investigating alternative transfer methods and developing tools to help facilitate alternative transfers. The tools can be used by agricultural producers, municipalities, industry, etc. to evaluate and implement alternative agricultural water transfers in the South Platte River basin and across Colorado. The tools consisted of a guidance manual for conducting transfers and spreadsheet-based and user friendly tool for evaluating the on-farm economic implications of conducting transfers.

The tools were tested in two demonstration projects in the South Platte Basin in which actual alternative transfers were explored in detail. The demonstration projects involved examination of necessary infrastructure to carry out the transfer, assessment of agreements that would need to be in place, investigation of accounting needs, etc.

A third demonstration project was developed that focused on the ability to exchange excess water that is periodically available and analyzing potential enhancements that would optimize exchange capabilities. The research shows that, while there are several points of diversions that act as “bottlenecks” for exchange, there does exist the potential to exchange water, especially in the area between Fort Morgan and the mouth of the Cache la Poudre River.

*Matt Lindburg is a professional engineer with Brown and Caldwell in Golden, Colorado. He has 16 years of experience managing and participating in water resources engineering projects. He has undergraduate and graduate degrees in agricultural engineering from the University of Nebraska. His professional experience includes water resources planning and engineering for irrigation facilities, serving as an expert witness, supporting interstate water rights litigation; hydrologic and hydraulic modeling; stormwater infrastructure engineering and design; and project management.*

## **Notes:**



## **Tipping Point Study**

### **Jay Winner**

*Executive Director, Lower Arkansas Valley Water Conservancy District, 801 Swink Ave., Rocky Ford, CO 81067, 719-254-5115, jwinner@centurytel.net, www.lavwcd.org*

Rural Community leaders have long been concerned about the impacts of “buy and dry” proposals that move irrigated water rights out of the region. Community impacts have not historically been conserved in negotiating water rights transfers. The Lower Arkansas Valley Water Conservation District understands the tension between water right holders faced with a chance to profit from water sales and the desire to maintain the integrity of agricultural communities. Together with the Colorado Water Conservation Board, the LAVWCD supported an economic study to look at the effects of reaching “tipping points” in the population required to support different types of local businesses. This workshop is an opportunity to learn about the results of the first phase of this study from the authors, and to offer feedback about the usefulness of the results and how they might be used to inform the policy debate around water transfers.

*Ralph “Jay” Winner, a native of South Dakota, has lived in Colorado most of his life. He obtained his Bachelor of Science and Bachelor of Arts degrees at the University of Southern Colorado-Pueblo. He was the director of the Public Works Department for Vail Ski Resorts for 14 years. For 11 of those years, he served as a director and in senior management positions. He has extensive knowledge of State and Local government codes and procedures. Jay and his wife Lori reside in Pueblo, Colorado. He came aboard as the executive director for Lower Arkansas Valley Water Conservancy District in October 21, 2004. When asked why he took this job with Lower Arkansas Valley Water Conservancy District he answered, “I wanted to make a difference.”*

*In addition, Jay belongs to the following committees: Interbasin Compact Committee – Arkansas Basin Roundtable, Master Planning on Fountain Creek, Fountain Creek Task Force, Conservation Task Force, Water Needs Assessment Committee, Arkansas Basin Roundtable Committee, Arkansas River Region’s Planning Group, Arkansas River Basin Advisory Committee, Conservation Easement Oversight Committee, Citizens Advisory Committee, Blue Mesa Marketable Pool Joint Sub-Committee.*

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## **Posters**

### **Platte River Recovery Implementation Program: A Basin-Wide Approach toward Recovery and ESA Compliance for Four Listed Species**

**Executive Director's Office, Platte River Recover Implementation Program**

**Beorn Courtney**

*Director of Water Resources, Headwaters Corporation, 2727 Bryant St, Suite 210, Denver, CO 80211, 720-524-6115, courtneyb@headwaterscorp.com, www.platteriverprogram.org*

Historically, spring flows were so large and full of sediment that it helped to remove vegetation from the Platte River and kept the river wide and shallow with bare stretches of sand. This provided a safe place for cranes and other birds to rest at night, allowing the birds to keep predators in sight. Terns and plovers also may have used the sandbars for nesting and raising their young. Over the past century, 70% of the water that was originally in the Platte has been removed or retimed by storing it in reservoirs. Without these flows and sediment load, sandbars and riverbanks have become overgrown with vegetation and channels confined and narrowed.

In July 1997, the governors of Colorado, Nebraska, and Wyoming and the Secretary of the Interior entered into a Cooperative Agreement to address the needs of four target species using the Platte River Basin: the endangered whooping crane, interior least tern, and pallid sturgeon and the threatened piping plover. The agreement proposed a framework for a long-term recovery implementation program. A Governance Committee was formed, consisting of representatives of the three basin states; the Bureau of Reclamation; the Fish and Wildlife Service; water users from each of the three states; and environmental groups. Negotiations regarding details of the program took place from 1997 to 2006 and the Platte River Recovery Implementation Program (Program) commenced in 2007. The Program has three main elements:

- Increasing stream flows in the central Platte River during relevant time periods;
- Enhancing, restoring and protecting habitat lands for the target bird species; and
- Accommodating new water related activities in a manner consistent with long-term Program goals.

The Program has three interrelated components: Adaptive Management, Land and Water. General information will be provided on each component, with a focus on the Water Plan.

## **Have YOUR poster on display at the next South Platte Forum**

**If you have a poster you would like to present at the 2011 South Platte Forum,  
Oct. 19-20, email a one-page abstract to Jennifer Brown,  
jennifer@jjbrown.com, by Aug. 1, 2011.**

**To be considered, your poster abstract must clearly include the title of the poster  
followed by the author's name, organization, address, phone number, and email address.**



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## **What, Me Worry? The Risk of Quagga and Zebra Mussel Infestations in Colorado**

**Philip Brandhuber PhD, Melissa Marts, Sarah Clark PE**

*HDR Engineering*

Since the 1990's the infestation of natural waters first by zebra mussels (*Dreissena polymorpha*) and later by quagga mussels (*Dreissena bugensis*) has caused significant costs and operational headaches for water uses in the eastern United States. Given the distances between major western water bodies and infested eastern water bodies, it was thought that the risks of infestation in the West were low. Events have turned out otherwise however, and important water sources in the western United States have been or may be infested. The explosive rate at which the quagga mussels have invaded Lakes Mead illustrates how rapidly infestations can develop.

Of immediate concern in Colorado is the discovery of quagga mussel larvae (veligers) in the reservoirs in the Upper Colorado and Arkansas River systems. In 2008, veligers were found in Lake Granby, near the headwaters of the Colorado River, and on the Arkansas River in Pueblo Reservoir. These discoveries may place the Upper Colorado and Arkansas River systems and their accompanying impoundments at risk of infestation. In addition, since over 200,000 acre-feet of Lake Granby water is transferred to the South Platte River Basin annually, the South Platte river system and its impoundments may be at risk as well. Evaluations of the water quality of several Front Range reservoirs indicate that conditions exist which could support a thriving mussel community, if that body were infested.

This poster will explore the likelihood and implications of mussel infestations in Colorado. The poster will also highlight a mussel response plan developed for a Colorado drinking water utility which is suitable for use by any Colorado water user. This plan consists of four parts:

- Source water vulnerability evaluation
- Source water protection program
- Mussel monitoring program
- Mussel treatability assessment

## **Low Head Hydro Potential in Colorado**

**Lindsay George, PhD, PE**

*Applegate Group, Inc., 118 West 6th St., Ste. 100, Glenwood Springs, CO 81601, 970-945-9686*

Applegate Group, Inc. in partnership with Colorado State University has been awarded a grant from the Colorado Department of Agriculture to study the potential that Colorado's irrigation canals hold to produce hydropower. Specifically, the study will investigate low head hydropower, with elevation drops of less than 30 feet. Emerging technologies are currently in development to make these low head sites economically viable. Innovative turbines that require very little change in elevation can be utilized by irrigation companies and ranchers to produce power in their canals and ditches and provide an additional revenue stream to the organization.

The study consists of three main goals: 1) to research the available technologies, 2) to match typical canal structures with the most appropriate turbine, and 3) to estimate a statewide potential. The study began in May of 2010 and to date we have put together a list of available technologies, and we have begun to match these technologies with the typical canal structures. We recently sent surveys out to all organizations that own ditches with a decreed capacity over 100 cfs. The results of the surveys will outline the possible locations that turbines could be installed in Colorado, and we will summarize a statewide potential. Two ditches will be chosen from all of the surveys for further investigation. These ditches will be visited and the structures considered in more detail for low head hydropower development.

The study will result in a quantification of the potential to produce low head hydropower in megawatts, as well as a guidance document that can be used by ditch owners to evaluate the potential of their canals. The poster that will be presented at the South Platte Forum will explain the goals of our study and display some of the more interesting turbines that we have discovered.



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## **Quantified Hydrogeological Framework Interpretations from Helicopter Electromagnetic Surveys**

**Jared D. Abraham**

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**Jared D. Abraham, Lyndsay B. Ball, Paul A. Bedrosian, Maria Deszcz-Pan, Burke J. Minsley, Bruce D. Smith**

*Geological Survey, Crustal Imaging and Characterization Team, Denver, CO*

**James C. Cannia, Steven M. Peterson**

*US Geological Survey, Nebraska Water Science Center, Lincoln, NE*

**Steven S. Sibray,**

*Conservation and Survey Division, School of Natural Resources, University of Nebraska Lincoln, Scottsbluff, NE*

Management of water resources within the state of Nebraska has created a demand for innovative approaches to data collection for development of hydrogeologic frameworks to be used for groundwater models. In 2008, the USGS in cooperation with the North Platte Natural Resources District, South Platte Natural Resources District and the University of Nebraska Conservation and Survey Division began using airborne geophysical surveys, in particular helicopter electromagnetic surveys (HEM), to map selected sections of the Nebraska panhandle. The surveys took place in selected sections of the North Platte River valley, South Platte River valley, Lodgepole Creek and portions of the adjacent tablelands. The objective is to map the aquifers of the area to improve understanding of the groundwater-surface water relationship and provide improved hydrogeologic frameworks to be used in the groundwater models of the area. For the HEM to have an impact in the groundwater model at the basin scale through improved hydrogeologic frameworks, physical properties and hydrostratigraphic units need to overlap and have detectable physical property contrasts. Where these contrasts exist within the study area and where they are detectable from an airborne platform, large volumes of data on the resistivity of the sediments in the subsurface can be collected. To make the geophysical signals useful to the groundwater model, numerical inversion is necessary to turn the raw signals into a depth dependent physical property map. These maps in themselves are not useful for the hydrogeologist. They need to be turned into maps of hydrostratigraphic units. In order to make quantified interpretations of the HEM data a process of numerical imaging inversion, sensitivity analysis, geological ground truth (boreholes), geological interpretation (picking), and aquifer characterization is completed. This provides a 3-D map of the hydrostratigraphic units with associated statistical confidence on the interpretations derived from the HEM data.





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