

2016 Upper Colorado River Basin Water Forum
**Complex Systems in Flux:
Changing Relationships between Water, People & the Environment**
PROGRAM with ABSTRACTS & BIOGRAPHIES

November 2

7:30 Registration/ Breakfast

8:15 Welcome

8:30 Morning Keynote: Competing objectives for the Colorado River – water supply, hydropower, and river rehabilitation -- Can we have it all?

Jack Schmidt, Professor of Watershed Sciences, Utah State University

9:25 Integrated Water Planning: addressing environmental needs along with consumptive needs

Moderator: Corey Beough, CO Division of Water Resources

- Crystal River Stream Management Plan
Seth Mason, Lotic Hydrological
- Addressing environmental and consumptive needs together in Wyoming
Cory Toye, Trout Unlimited
- Stream Management Planning Discussions on the North Fork of the Gunnison
Luke Gingerich, J-U-B Engineers

10:25 Break

10:45 Emerging challenges in the Upper Colorado River Endangered Fish Recovery Program

Moderator: Tom Chart, Upper Colorado River Endangered Fish Recovery Program

- Program-wide overview
Tom Chart, Upper Colorado River Endangered Fish Recovery Program
- Colorado perspective
Harry Crockett, Colorado Parks and Wildlife
- Utah perspective
Matt Breen, Utah Department of Natural Resources
- Wyoming perspective
Pete Cavalli, Wyoming Game and Fish Commission

12:15 Lunch/ Poster Session

Posters

- National Water Resources Monitoring and Outlook: Meeting water managers' needs for timely water intelligence
Michelle Stokes, NOAA Colorado Basin River Forecast Center
- Grand Valley Salinity Loading to the Colorado River
Rondelle Whittle, Colorado Mesa University

1:45 River Restoration in the context of other uses

Moderator: Bruce Smith, Western Water and Land

- Conservation Planning for the Colorado River in Utah
Christine G. Rasmussen, EcoMainstream Contracting
- Combining stream restoration and mine reclamation techniques to increase water quality in Colorado
Bill Coughlin, Western Stream Works
- Addressing cultural and environmental needs together: Paonia River Park
Alyssa Clarida, OSMRE/VISTA, Western Slope Conservation Center

2:50 Forecasting Streamflow & reservoir conditions

Moderator: Aldis Strautins, National Weather Service

- Incorporation of a Stochastic Weather Generator to Further Inform Ensemble Streamflow Prediction in the Colorado River Basin
William Paul Miller, NOAA Colorado Basin River Forecast Center
- Monitoring and forecasting reservoir sedimentation in Paonia Reservoir
Cory A. Williams, Colorado Water Science Center, U.S. Geological Survey
- Advancing Drought Early Warning Capability in the Intermountain West: Bringing Arizona and New Mexico in the Fold
Alicia Marrs, NOAA National Integrated Drought Information System

4:00 Reception

Presentation: #Your Dolores Photo Series – *Cody Perry, Rig to Flip*

Complimentary beverages provided by the Palisade Brewing Company

November 3

7:30 Breakfast

8:00 Morning Keynote: Lower Basin Drought Contingency Planning

Tom Buschatzke, Director, Arizona Department of Water Resources

8:55 Balancing full development of Colorado River compact entitlements with system conservation

Moderator: John McClow, Upper Gunnison River Water Conservancy District

- *Eric Millis, Utah Division of Water Resources*
- *Steve Wolff, Wyoming Interstate Streams Division*
- *James Eklund, Colorado Water Conservation Board*

9:55 Break

10:15 Assessing and Addressing the Potential for Overdevelopment in the Upper Basin

Moderator: Eric Kuhn, Colorado River District

- West Slope Roundtable Colorado Risk Study
John Carron, Hydros Consulting
- System Conservation Pilot Program in the Upper Basin
Shanti Rosset, Assistant Attorney General for Colorado
- Water Banking Work Group
Aaron Derwingson, The Nature Conservancy

11:20 Demand Management in Agriculture: Potential and limitations of alternative transfer methods

Moderator: MaryLou Smith, Colorado Water Institute, Colorado State University

- Study of alternatives to buy & dry
Brad Udall, Colorado Water Institute, Colorado State University
- Farmer perspective on alternatives to buy & dry
Paul Kehmeier, Eckert, CO.
- Financial Analysis of alternative transfer methods on the Colorado Front Range
Brett Bovee, Westwater Research

12:20 Lunch

1:20 Demand Management in Cities: Can we conserve our way out of crisis?

Moderator: Larry Clever, Ute Water

- The Decoupling of Population Growth and Water Use Growth, *Brett Walton, Circle of Blue*
- Respondents:
 - o *Greg Fisher, Denver Water*
 - o *Scott Winter, Colorado Springs Utilities*

2:25 Ethical and Cultural Considerations for Water Allocation

Moderator: Jeff Sellen, Western State Colorado University

- Utilizing Sustainability and Equity Criteria to Evaluate River Basin Decision-Making: A Case Study from the Colorado River Basin
John Berggren, University of Colorado – Boulder
- Engaging Sacrificial Landscapes: Remembering a Forgotten Western River
Jonathan Bowler, University of Wyoming, Living Rivers
- The Moral Algebra of 21st Century Water Development
George Sibley, Gunnison Author

3:25 Closing Remarks/ Adjourn

Biographies and Abstracts (in order of appearance)

November 2: Morning Keynote

Competing objectives for the Colorado River – water supply, hydropower, and river rehabilitation -- Can we have it all?

Jack Schmidt, Professor of Watershed Sciences, Utah State University

Abstract

Management of the Colorado River must address three significant mandates, two of which concern utilitarian use of water and its harnessed energy and one of which concerns attributes of the river ecosystem. The primary objective of water supply management is the routing of water supply downstream to the Lower Basin in compliance with the Colorado River Compact and bi-national treaties and minutes. The primary objective of hydropower production is to maximize load-following production of renewable energy. The primary objective of river ecosystem rehabilitation is the recovery of endangered native species; a secondary objective specific to the Grand Canyon is the enhancement of a broad suite of ecosystem attributes defined by stakeholders. To date, the efficient production of hydropower has been compromised to meet ecosystem objectives, but the strategy to meet water supply mandates has changed little since construction of the Colorado River Storage Project. This mandate limits opportunities for rehabilitation of native river ecosystems, because reservoir releases are timed to meet water supply needs rather than optimum conditions most favorable to river rehabilitation. For example, success of the High Flow Experiment Protocol at Glen Canyon Dam is compromised by implementation of the Interim Shortage Guidelines that concern maintenance of approximately equal storage contents in Lake Mead and Lake Powell reservoirs. Alternative strategies for meeting water supply mandates, including alternative strategies of how water is stored in these two reservoirs, are needed.

Biography

Jack Schmidt is Professor of Watershed Sciences and heads the Center for Colorado River Studies at Utah State University where he has been a member of the faculty since 1991. Between 2011 and 2014, he served as Chief of the USGS Grand Canyon Monitoring and Research Center in Flagstaff. He has received awards from the National Park Service, US Geological Survey, and Department of the Interior for his applied research work that informs river management and river rehabilitation throughout the western United States.

November 2, 9:25am

Integrated Water Planning: addressing environmental flow needs along with consumptive needs

Moderator: Corey Beough, CO Division of Water Resources

Biography

Corey has been a Water Commissioner with the Division of Water Resources for almost 6 years, and is responsible for operations of some Grand Mesa reservoirs, administration of water rights in the Roan Creek watershed, and measuring the large Colorado River diversions in the Grand Valley. He has a Master's Degree in Rangeland Ecology and Watershed Management from the University of Wyoming, where he researched fluctuating E. coli levels in the streambed and water column in the Greybull River. He has previously been employed as a Hydrologist with the Arizona Department of Water Resources monitoring groundwater levels. Corey enjoys living in the high desert of Western Colorado and all the unique year-round recreational opportunities available, coaching youth basketball, and spending time with his wife and two boys.

**Integrated water use planning on the Crystal River:
a framework to help optimize water resource use and management**

Seth Mason, Lotic Hydrological

Abstract

The Crystal River Management Plan aims to identify, prioritize and guide management actions that honor local agricultural production, preserve existing water uses, and enhance the ecological integrity of the river. This planning effort responds to calls in the Colorado Water Plan for decision support tools and planning processes that help stakeholders and resource managers better understand the interplay between hydrology, hydraulics, channel form, alternative water use/management strategies, and measures of ecological function. The assessment framework utilized on the Crystal River quantitatively evaluated the ecological benefits realized by future alternative actions that develop off channel storage, reduce consumptive water use, improve water efficiencies or modify the structure of the stream channel. Discussions with local water users and stakeholders helped characterize the feasibility of specific management approaches. Primary planning recommendations focused on 1) developing and implementing market-based diversion reduction agreements during moderate and severe droughts and, 2) implementing raw water conservation measures and improving the efficiency of conveyance infrastructure in the Town of Carbondale.

Biography

Seth Mason is the Principal Hydrologist at Lotic Hydrological, a consulting firm based in Carbondale, CO. He specializes in hydrological modeling; stream characterization; deployment and operation of data collection and management systems; and development and coordination of water quality monitoring and assessment activities. Seth works extensively with city and county governments, federal agencies, and 501(c)3 organizations on a variety of watershed, land use, water quality, and water quantity issues.

Addressing environmental and consumptive needs together in Wyoming

Cory Toye, Trout Unlimited

Abstract

For the last 10 years, TU has worked across Wyoming to reconnect, restore and protect coldwater fisheries through pragmatic partnerships with landowners, ranchers and agencies. To date, TU implemented over 100 projects to reconnect and restore over 1500 miles of streams for wild and native

trout throughout Wyoming. Landowners who partner with TU have enjoyed the installation of maintenance free irrigation diversion structures, irrigation efficiency upgrades, riparian fencing, river channel restoration and new road crossing infrastructure. Success on the ground is also creating new opportunities for water use and policy. Building trust through projects has led to innovative water management on private lands to bolster streamflows and improve ranch operations.

Biography

Cory Toye is the Director of the Wyoming Water and Habitat Program for Trout Unlimited. He and his wife, Morgan and two boys, Joe and Ike, live near Pavillion, WY. Team Toye enjoys everything big, wonderful Wyoming offers, especially Wind River country and the Absaroka Mountain Range. Cory has a Juris Doctorate from the University of Wyoming College of Law and a B.S. in Economics with a minor in Environment and Natural Resources also from UW. Cory has worked for TU since 2006.

Stream Management Planning Discussions on the North Fork of the Gunnison

Luke Gingerich, J-U-B Engineers

Abstract

The North Fork Water Conservancy District, along with partners, has hired J-U-B Engineers to develop an irrigator lead Stream Management Plan. The goals of the plan are to increase knowledge and collaboration amongst the major diverters from the North Fork of the Gunnison river. Increasing resiliency to dry periods and managing the river for increased benefit to agriculture are among the goals of the project.

Biography

Luke Gingerich has been working as a water resource engineer on the western slope since 2009. Luke is currently the area manager for the Western Colorado office of J-U-B engineers located in Palisade, CO. Luke's career has focused on agricultural water use. He is a licensed engineer in CO, UT and NM. He lives in Palisade, CO with his wife Annie and their 3 kids Rye (7), Oren (5) and Iris (2).

November 2, 10:45

Emerging challenges in the Upper Colorado River Endangered Fish Recovery Program (panel)

Moderator: Tom Chart, Director, Upper Colorado River Endangered Fish Recovery Program

Panel Abstract

The Upper Colorado River Endangered Fish Recovery Program is working to recover four endangered fish species in the upper Colorado River basin while water use continues in compliance with state water law and interstate water compacts. Established in 1988, the Recovery Program is a multi-agency partnership of states, federal agencies, water users, power customers, and environmental groups. The Program is managing flows, restoring habitat, stocking two of the four fish species, and managing detrimental nonnative fish species, but significant challenges remain. As the endangered fish populations stabilize and Program partners look to downlisting and eventual delisting of these endangered fish, state conservation plans will be developed to provide long-term habitat and species management. This session will provide a brief overview / status report on the Recovery Program and then focus on state (Colorado, Utah, and Wyoming) perspectives on nonnative fish management and long-term water protection.

Overview

Tom Chart, Director, Upper Colorado River Endangered Fish Recovery Program

Biography

Tom is an East Coast native that fled for the West immediately following high school. He received undergraduate and graduate degrees in Fishery Biology from Colorado State University in the 1980's. His graduate studies exposed him to the native fishes and water related issues of the Colorado River system when he studied the initial effects of mainstem impoundment on the fish community of the White River in northwestern Colorado. He has worked for a variety of State and Federal agencies throughout his career, most recently accepting the position of Director of the Upper Colorado River Endangered Fish Recovery Program in 2009.

Colorado Perspective

Harry Crockett, Colorado Parks and Wildlife

Biography

Harry Crockett received his M.S. in Aquatic Ecology from Colorado State University in 2004. He joined Colorado Parks and Wildlife in 2005, serving as an Area Aquatic Biologist and subsequently an Aquatic Researcher, before assuming his current statewide role as Native Aquatic Species Coordinator in 2011. In this capacity he represents Colorado on the Upper Colorado and San Juan Endangered Fish Recovery Programs, Greenback and Colorado River Cutthroat Recovery Teams, Boreal Toad Recovery Team and others. He also coordinates Colorado's conservation efforts for native fish and amphibians statewide. A native of North Carolina, Harry has made Colorado his home for the past 23 years. Before receiving his M.S. he worked for a number of seasons as a river guide, and continues to fish, canoe, raft, and otherwise enjoy Colorado's outstanding aquatic resources.

Utah Perspective

Matt Breen, Utah Department of Natural Resources

Biography

Matthew J. Breen received his M.S. in Biology (Aquatic Emphasis) in 2008 (Thesis: *Movement, habitat use, and foraging behavior of mottled sculpins in a coldwater stream*) from Grand Valley State University in Allendale, MI. Just prior to graduation, Matt began working for the Utah Division of Wildlife Resources as a Native Aquatics Biologist II, mainly focusing on conservation of state listed fishes such as bluehead sucker, flannelmouth sucker, and roundtail chub. Since 2010, Matt has worked in UDWR's northeastern region as the Native Aquatics Project Leader, where he oversees Upper Colorado River Endangered Fish Recovery Program projects, including recovery efforts for endangered Colorado pikeminnow, razorback sucker, bonytail, and humpback chub. Additionally, his program focuses on conservation measures for state listed sensitive species to preclude federal listing. An American Fisheries Society Certified Fisheries Professional, Matt has received numerous awards for his dedication to native fish conservation and recovery, including the Award of Merit from the Utah Chapter of AFS in 2012 and the Upper Colorado River Endangered Fish Recovery Program's Researcher of the Year Award for 2015. Originally from Michigan where water resources are plentiful, Matt has learned a great deal about water allocation issues in western states of the Colorado River basin, and their centrality to the recovery of this globally unique native fish assemblage.

Wyoming Perspective

Pete Cavalli, Wyoming Game and Fish Commission

Biography

Pete Cavalli received a B.S. degree in Wildlife Management (Fisheries Option) from the University of Wyoming, and a M.S. degree in Fisheries Science from Utah State University. He studied endangered fishes in the Colorado River basin as part of his duties while working as a biologist for the Utah Division of Wildlife Resources. He is currently a fisheries biologist employed by the Wyoming Game and Fish Department, and serves as the Chairman for the Biology Committee of the Upper Colorado River Endangered Fish Recovery Program.

November 2, 12:15

Lunch/ Poster Session

National Water Resources Monitoring and Outlook: Meeting water managers' needs for timely water intelligence

Michelle Stokes, NOAA Colorado Basin River Forecast Center

Abstract

Water resources managers have been using National Weather Service (NWS) River Forecast Centers (RFCs) water supply forecasts and information for decades. With growing population and demand, and water supply affected by extended and extreme droughts, these forecasts have become increasingly important.

To meet requirements of stakeholders, the RFCs in the West have evolved their forecast services from being issued on a monthly basis, for a given time period, and only during winter and spring, to being issued on a daily basis for a wider range of time periods. The strength of these products is that they are generated from real-time hydrologic modeling systems that incorporate hydrometeorological data and the latest weather and climate forecasts. Operating in an ensemble mode, RFCs provide key water resources information in a probabilistic format that informs and supports effective management decisions. These water (supply) resources forecasts are used every year, to make multi-million dollar water management decisions.

Currently, RFCs involved in water resources forecasting have a variety of graphical and tabular display formats. While all are useful, they make it difficult for users who are interested in areas that cross RFC boundaries or individuals who are interested in getting a very high level view of how water availability may be varying across the country.

This poster will describe efforts of the western RFCs, along with partners such as the National Drought Information System (NIDIS), the Office of Atmospheric Research (OAR), and the National Center for Environmental Information (NCEI), to take a major step towards meeting these needs, by prototyping a National Water Resources Monitor and Outlook (NWRMO) as a web product. The NWRMO vision is to provide a comprehensive view of the water resources that will meet local, regional, and eventually national interests. In addition to water resources monitoring and outlook products, the web product will eventually include sub-seasonal to seasonal climate outlooks for water resources. Stakeholder engagement is also planned, guided by social science, to refine the understanding of user needs and refine designs for effective tools.

The NWRMO will be a very data heavy application interface. RFCs will be providing large datasets on a daily basis that will require statistical analysis and storage for analysis on demand by interface users. Graphics (maps and plots) will be generated on the fly, specified through the selection of available user options, and provide a lot of flexibility for the users to pull the information they are looking for. An initial prototype of the NWRMO is planned for late 2016.

Biography

Michelle Stokes has been the Hydrologist in Charge at NOAA's Colorado Basin River Forecast Center located in Salt Lake City, Utah, since 2006. Her office provides daily streamflow forecasts for hundreds of locations throughout the Colorado and Eastern Great Basins, including water supply forecasts. These forecasts are used for flood warnings, recreational purposes, water management and to make highly valuable water resource decisions in a water scarce part of the country. Previously, Stokes served as Deputy Division Chief for the Hydrology and Climate Services Division of the Western Region Headquarters for NOAA's National Weather Service, where her responsibilities included setting annual operating goals, developing policy, and ensuring operational readiness of the climate and hydrology programs at field offices across the seven most western states. Stokes holds Bachelors Degrees in Mathematics and Atmospheric Sciences from the University of Arizona, and a Masters Degree in Civil Engineering in Water Resources from Arizona State University.

Grand Valley Salinity Loading to the Colorado River

Rondelle Whittle, Colorado Mesa University

Abstract

The groundwater system in many of the irrigated valleys in the Upper Colorado River basin is produced almost completely by deep percolation of inefficient irrigation systems. Irrigation inefficiencies include seepage from unlined ditches, and over-irrigation causing unnecessary runoff, increased infiltration, and increased return flow to the river. Irrigation efficiencies in the Grand Valley are less than 50%. This leads to increased levels of salinity in the Colorado River system as shallow groundwater passes through the Mancos Shale and saline soils. Dissolved salts picked up from irrigated saline soils contaminate freshwater and introduce an unnaturally high amount of ions into the local groundwater system and surface water flows. Irrigation related salinity accounts for 85% of all human-induced salt load in the Colorado River. My research goal was to examine the change in water quality caused by irrigation over time.

A study of this nature was conducted in 1994-1995 by Butler and Guerard, who presented data on for Colorado River Salinity in the Grand Valley. I examined the chemistry of present-day irrigation return water and compared these values with those obtained in the 1994 study. I did so by collecting samples from a total of 13 sites including local canals, natural streams, the Colorado River, and irrigation return-flow drainages. The water chemistries were analyzed on an Oakton PC2700 pH meter by comparing the pH, conductivity, water hardness (in the form of Ca^{2+} cations) and the sodium content levels at each site on October 3, 2015, January 23, 2016, and April 7, 2016.

Results show an unmistakable correlation between river discharge rates and conductivity levels as well as an alarming constituent “dump” into the River at the beginning of each irrigation season. I am not convinced that we have made much progress in the overall push to decrease salinity levels in the Colorado River according to my overall comparison of past and present data.

Biography

Rondelle is a senior Environmental Geology student interested in watershed science, environmental management and restoration. For the past year and a half, she has managed the advanced geology lab on CMU's campus, which has run geochemistry on the Mancos Shale, parts of the Green River Formation, and completed numerous research projects on the Grand Mesa basalts and clay mineralogy of other local stratigraphic units.

Rondelle and her husband have been Colorado residents for 11 years, but are originally from central Arizona. They have two children, ages 12 and 2. They enjoy camping, hunting and caring for their many animals at home.

November 2, 1:45

River Restoration in the context of other uses

Moderator: Bruce Smith, Western Water and Land

Biography

Bruce has 28 years of experience in the environmental industry as a professional hydrologist, and 5 years as a professional geologist. Mr. Smith's experience encompasses a broad range of environmental hydrological applications and investigations including those associated with energy development, surface water and groundwater hydrology, watershed studies, water rights applications, water supply and treatment, contaminant hydrology, river restoration, active mine operations, abandoned mine lands, and solid-waste management. Bruce has extensive working knowledge and experience in assessing water quality and chemistry, groundwater/surface water interactions, aquifer contaminant distributions, and surface water and groundwater numerical modeling. Bruce has designed several passive water treatment systems for mine water drainage (acidic and alkaline conditions) and evaluated options for disposal of waters generated during energy exploration and development.

Conservation Planning for the Colorado River in Utah

Christine G. Rasmussen, EcoMainstream Contracting

Abstract

Strategic planning is increasingly recognized as necessary for providing the greatest possible conservation benefits for restoration efforts. Rigorous, science-based resource assessment, combined with acknowledgement of broader basin trends, provides a solid foundation for determining effective projects. It is equally important that methods used to prioritize conservation investments are simple and practical enough that they can be implemented in a timely manner and by a variety of resource managers. With the help of local and regional natural resource professionals, we have developed a broad-scale, spatially-explicit assessment of 146 miles (~20,000 acres) of the Colorado River mainstem in Grand and San Juan Counties, Utah that will function as the basis for a systematic, practical approach to conservation planning and riparian restoration prioritization. For the assessment we have: 1) acquired, modified or created spatial datasets of Colorado River bottomland conditions; 2) synthesized those datasets into habitat suitability models and estimates of natural recovery potential, fire risk and relative cost; 3) investigated and described dominant ecosystem trends and human uses, and; 4) suggested project selection and prioritization approaches. Partner organizations (The Nature Conservancy, US Geological Survey, National Park Service, Bureau of Land Management and Utah Forestry Fire and State Lands) are using the assessment and datasets to identify and prioritize a suite of restoration actions to

increase ecosystem resilience and improve habitat for bottomland species. Primary datasets include maps of bottomland cover types, bottomland extent, maps of areas inundated during high and low flow events, as well as locations of campgrounds, roads, fires, invasive vegetation treatment areas and other features. The report, detailing ecosystem trends, methods, findings and recommendations, will soon be available through Colorado Mesa University, Hutchins Water Center. An on-line decision support tool (available soon at <https://sciencebase.usgs.gov/crcp>) offers these datasets for download, as well as thematic maps for use by land managers and practitioners in restoration planning.

Biography

Growing up with a creek in her back yard, Dr. Rasmussen has long been a fan of ‘all things river’. She has made a career out of studying rivers through the disciplines of botany/zoology (BS), range management (MS), and fluvial geomorphology (PhD), with extensive experience in GIS, fisheries, and habitat needs of sensitive species. As the owner of EcoMainstream Contracting in Durango, Colorado, she has worked with a variety of agencies, conservation organizations and researchers around the West, classifying and diagnosing river issues and working with community groups toward cooperative solutions. Her current endeavors are to bring people and rivers together with greater understanding and benefit to both.

Combining stream restoration and mine reclamation techniques to increase water quality in Colorado

Bill Coughlin, Western Stream Works

Abstract

Within the effort to mitigate stream erosion, it becomes apparent that the stream restoration field should apply techniques and increase the effectiveness of traditional stormwater management efforts. Also, the combination of stream restoration principals within mine reclamation efforts can be effective to improve water quality. WSW has combined stream restoration and stormwater management with mine reclamation on the Silverbell Mine Reclamation Project above Telluride for 17 years. (I have photos) Diverse fields of stream restoration, mine reclamation and stormwater management must share the successes of efforts to increase the effectiveness of each. WSW has also recently designed an ephemeral stream channel through uranium mine tailings for the CDPHE and DNR (have photos). We are presently completing a design-build stream restoration project in cooperation with Ouray Silver Mines and Uncompahgre Watershed Partnership to help keep streamflow away from historic tailings. The ability to balance ecological remediation projects with a variety of tools is essential to enhance water quality in Colorado streams.

Biography

Bill Coughlin is founder/President of Western Stream Works, a design-build ecological restoration company located in Western Colorado. WSW specializes in stream restoration, mine reclamation, storm water management, coastal erosion control, pond and wetland restoration projects.

Addressing cultural and environmental needs together: Paonia River Park

Alyssa Clarida, Western Slope Conservation Center

Abstract

The Paonia River Park is a 23-acre public park on the North Fork of the Gunnison River. The River Park provides valuable public access along a river that is bordered by 95% private land. Formerly an in-stream gravel mine, development of the park’s visitor infrastructure is the current focus following a series of reclamation and restoration projects in the river and riparian zone. Over the last 15 years, the Western Slope Conservation Center (WSCC) has built the Paonia River Park in partnership with the Town of

Paonia, community members and organizations, irrigation companies, philanthropic foundations, businesses, and state and federal agencies.

The Paonia River Park is located in a community that has been historically shaped by mining and farming, both of which have shaped the community's relationship to its watershed. Coal mining has been the dominant economic driver in recent decades. However, the North Fork Valley is currently facing mine closures and mass layoffs. As the valley's economy changes, so too must its relationship with the land and water. The Paonia River Park represents stewardship, recreation, education, and tourism possibilities in an area historically shaped by local extraction.

The industrial history of the park is obvious with a gravel yard still visible adjacent to the park property. In the building of the Paonia River Park, the community wanted to honor that industrial history by incorporating it into the aesthetic design of the park, with park installations - including an archway, observation platform, ADA Ramp, and bike ramp - all hand-built from steel. The installations include artistic features that celebrate the ecological richness of the park. The WSCC has been successful in restoring the river and surrounding riparian habitat. Throughout this process, WSCC has involved as many community members as possible to raise the profile of the importance of local river restoration, access, and recreation.

Today, the Paonia River Park serves as hub of community activity. During the early spring, many boaters use the boat ramp to float the North Fork of the Gunnison River. Once the river slows down a bit in June, the River Park becomes the local swimming hole; a place where parents let their kids play and roam freely knowing they are close to home. When the river loses even more water, the park serves as an ideal place to stroll through the cottonwoods and willows on a lunch break. Throughout the year, there are many recreational and educational events held at the park, bringing conservation awareness to the public.

The overwhelming public support in tandem with a stabilized streambed and fully revegetated river corridor proves that the Paonia River Park has been incredibly successful. The WSCC believes that the processes used and lessons learned in creating and managing the park can help guide other communities undergoing similar projects. Paonia now has a place of public recreational and educational access that serves the people of the North Fork Valley. We hope to share our experience with other professionals, community leaders, and policy makers.

Biography

Alyssa Clarida joined the Western Slope Conservation Center as the Paonia River Park Coordinator/OSMRE AmeriCorps VISTA in April of 2016. She has been responsible for the final capital improvement projects at the Paonia River Park, marking nearly a decade of community involvement and over a million dollars invested at one of the only public access points on the North Fork of the Gunnison River. Her responsibilities include facilitating projects at the River Park, developing and promoting community outreach, and organizing a grassroots mining reclamation workshop that will take place in Spring of 2017. Her professional and personal interests revolve around the confluence between science based management and community participation in planning processes.

November 2, 2:50
Forecasting streamflow & reservoir conditions

Moderator: Aldis Strautins, National Weather Service

Biography

Aldis Strautins is the Service Hydrologist at the National Weather Service office in Grand Junction, CO. As service hydrologist he provides leadership and management for the hydrologic program including: hydrologic forecast and warning operations, service coordination and interagency support for eastern Utah and western Colorado. Earlier this year he served as Regional Service Support Hydrologist at National Weather Service Central Region Headquarters. Aldis has been with the National Weather Service for 16 years serving in West Texas and New Mexico before returning to Colorado in 2007. Previous to the NWS he worked with a consortium of underground water districts in West Texas. Born and raised in Colorado, Aldis enjoys the many recreational opportunities water brings to the region.

**Incorporation of a Stochastic Weather Generator to Further Inform Ensemble Streamflow Prediction
in the Colorado River Basin**

William Paul Miller, NOAA Colorado Basin River Forecast Center

Abstract

The National Oceanic and Atmospheric Administration's (NOAA's) Colorado Basin River Forecast Center (CBRFC) provides forecasts of water supply conditions to resource managers throughout the Colorado River Basin and Eastern Great Basin regions using Ensemble Streamflow Prediction (ESP) methods that are largely driven by historical observations of temperature and precipitation. Currently, the CBRFC does not incorporate climatic information, such as teleconnections (e.g., the El Niño Southern Oscillation [ENSO]), into the development of its streamflow ensembles; further, as the impacts of climate change are realized, the past may no longer be representative of future conditions. To address these issues, the CBRFC is investigating the incorporation of a Stochastic Weather Generator (SWG) developed by the University of Colorado. Additionally, numerous agencies issue climate outlooks that describe the probability that a region will experience warmer, normal, or cooler conditions with regards to temperature and wetter, normal, or drier conditions with regards to precipitation. Research published by the University of Colorado has shown that a SWG weighted by probabilities related to the ENSO may improve forecast skill in the San Juan River Basin, as well as other regions outside of the Colorado River Basin. In this study, the SWG is applied within the Colorado River Basin and weighted using climate probabilities developed by the National Weather Service's Climate Prediction Center. The ensemble of streamflow events developed using the SWG is then compared to historical ensembles used in the forecast of water supply over the region.

Biography

Paul Miller currently works for the Colorado Basin River Forecast Center as the Service Coordination Hydrologist in Salt Lake City, Utah, and is also the Climate Focal Point for the office. Prior to joining the CBRFC in November 2012, Paul worked for the U.S. Bureau of Reclamation, Lower Colorado Region for about 7 years investigating the impacts of climate change to the Colorado River Basin. Paul received his B.S. in Environmental Hydrology and Water Resources from the University of Arizona in 2003, his M.S. in Environmental Engineering from the University of Notre Dame in 2005, and his Ph. D. in Civil and Environmental Engineering from the University of Nevada, Las Vegas in 2010. His dissertation was titled, "Assessment of Impacts to Hydroclimatology and River Operations due to Climate Change over the Colorado River Basin." He has also taught introductory hydrology and fluid mechanics courses at the University of Nevada Las Vegas.

Monitoring and forecasting reservoir sedimentation in Paonia Reservoir

Cory A. Williams, Colorado Water Science Center, U.S. Geological Survey

Abstract

Aging, water-storage infrastructure throughout the United States is a growing concern to resource managers. Sedimentation within reservoir systems results in water-storage loss and can effect reservoir operations. The U.S. Bureau of Reclamation (Reclamation) and local stakeholder groups are evaluating reservoir-management strategies within Paonia Reservoir. Paonia Reservoir provides agricultural water along the North Fork Valley. This small reservoir fills to capacity each spring and requires approximately half of the snowmelt-runoff volume from its sediment-laden source waters, Muddy Creek. Reductions in water-storage capacity in the reservoir through time from sedimentation are affecting reservoir operational procedures. Storage losses also limit the availability of late-summer irrigation water for downstream diversions, especially during dry years when precipitation and natural sources of water become most scarce.

Active sediment removal techniques, such as dredging, are costly; therefore, an assessment of alternate management strategies (including passive removal techniques) is being evaluated. Management strategies to mobilize sediments within the reservoir are in development along with an assessment of reservoir redesign; integral to this process is the need for sediment monitoring. The U.S. Geological Survey (USGS), Reclamation, and local stakeholder groups, including the North Fork Water Conservancy District and Fire Mountain Canal and Reservoir Company, are evaluating reservoir-management strategies with a goal of maintaining or increasing water-storage capacity within Paonia Reservoir. Sediment monitoring to characterize incoming and outgoing sediment flux during reservoir operations is needed to establish current rates of reservoir sedimentation, support Reclamation sediment transport and storage models, and assess the viability of water-storage recovery in Paonia Reservoir. The USGS is currently conducting high-resolution (15-minute data-recording interval) sediment monitoring to characterize incoming and outgoing sediment flux during reservoir operations utilizing acoustic and optical surrogates. Repeated bathymetric surveying of the reservoir is being done by Reclamation and provides opportunities to assess depositional patterns within the reservoir and to redefine the water-storage capacity of the reservoir.

Biography

Cory Williams is a Grand Junction Native and has worked for the U.S. Geological Survey Colorado Water Science Center since 2001. He received his Bachelor of Science in Geology from Colorado Mesa University and his Master of Science in Geosciences from Colorado State University. As the senior Hydrologist in the Western Colorado Field Office, he has been a technical lead for multiple projects ranging in topical areas from surface water quantity and water quality assessment, to geomorphic response.

He is the Sediment Specialist for the USGS Colorado Water Science Center and serves on several State and National technical committees. He is currently serving as a Charter Member of the USGS Sediment Acoustics Leadership Team, the USGS Colorado Plateau Strike Team, and the USGS All-Hazards Wildland Fire Pilot Project. He was a technical advisor on the Upper Colorado River Endangered Fish Recovery Program Geomorphology Workgroup, the State of Colorado Long-Term Stream Recovery Steering Committee, and the State of Colorado Sediment 303d Workgroup.

**Advancing Drought Early Warning Capability in the Intermountain West:
Bringing Arizona and New Mexico in the Fold**

Alicia Marrs, NOAA National Integrated Drought Information System

Abstract

The National Oceanic and Atmospheric Administration's (NOAA) [National Integrated Drought Information System \(NIDIS\)](#) program was authorized by Congress in 2006 with an interagency mandate to coordinate and integrate drought research, building upon existing federal, tribal, state and local partnerships in support of creating a national drought early warning information system. In order to create this national system, NIDIS initiated the process by establishing smaller regional drought early warning systems (DEWS) with the ultimate goal of creating a national network of information systems to make climate and drought science readily available, easily understandable and usable for decision makers. These regional DEWS utilize new and existing partner networks to optimize the expertise of a wide range of federal, tribal, state, local and academic partners to improve the capacity of stakeholders to better monitor, forecast, plan for and cope with the impacts of drought.

In 2008, NIDIS and its partners launched the Upper Colorado River Basin Drought Early Warning System (UCRB DEWS) as the first DEWS in the nation. The UCRB DEWS was made up of the states of Colorado, Utah and Wyoming with the goal of fostering interstate coordination to cope with future droughts and growing water demands, and supporting increased communication and collaboration between scientific and water management communities. UCRB DEWS activities have included but are not limited to the following:

- [Colorado Climate Center's regular Upper Colorado River Basin Drought Assessments](#)
- Western Water Assessment's [Snowpack Monitoring for Streamflow Forecasting and Drought Planning Workshops](#)
- [Colorado Drought Tournament \(2012\)](#)

As NIDIS continues to develop its network of DEWS throughout the country, the UCRB DEWS is being expanded to include Arizona and western New Mexico to form the new Intermountain West Drought Early Warning System (IMW DEWS). NIDIS and its partners are working with stakeholders throughout the region (AZ, CO, NM, UT and WY) to identify priorities and needs as part of the process of developing a new strategic plan for the IMW DEWS. This strategic plan will provide a framework of priority actions to further develop and implement the IMW DEWS over the next two years.

One of the planned IMW DEWS activities is the continued development and proposed transition to operations of the Water Resources Monitor and Outlook (WRMO) being developed through a partnership between NOAA's Western River Forecast Centers, NIDIS, the Earth Sciences Research Laboratory/Physical Sciences Division (ESRL/PSD) and the National Centers for Environmental Information (NCEI). In order to address the expressed needs of western water management stakeholders for an integrated source for water resource-related data and predictive information, the WRMO will provide ensemble forecasts, data analysis for both observed and forecast data and verification tools to improve both hydrologic forecast model output as well as hydrologic and climate forecast application.

This presentation will provide an overview of activities and lessons learned from the UCRB DEWS, a preview of anticipated IMW DEWS activities, and ways interested stakeholders can get more involved in its development and implementation.

Biography

As Regional Drought Information Coordinator for the National Oceanic & Atmospheric Administration's (NOAA) National Integrated Drought Information System (NIDIS) Alicia coordinates the three western Drought Early Warning Systems (DEWS) which include the California-Nevada DEWS, the Intermountain West DEWS, and the new Pacific Northwest DEWS which she launched in February 2016. In this role, Alicia works with a wide range of federal, tribal, state and local partners to help make climate and drought science more readily available, easily digestible and usable for decision makers at every level of government with the ultimate goal of mitigating the impacts of drought.

Prior to joining NIDIS she spent a majority of her seven years with the U.S. Environmental Protection Agency's (EPA) working for EPA's WaterSense® Program where she helped manage a national network of partners from the public, private and non-profit sectors to promote the ethic of water conservation and encourage the transformation of the market for water-efficient products, homes and services. During her time at EPA she also served as national coordinator of EPA's Clean Water Indian Set-Aside grant program and worked for EPA's Office of Environmental Justice and with EPA Region 8's Drinking Water Programs. Alicia holds a B.A. in Environmental Planning and Policy from Western Washington University's Huxley College of the Environment, and an M.A. in Global Environmental Policy from American University in Washington, D.C.

November, 4:00 Reception

Presentation: Your Dolores Photo Series

Cody Perry, Rig to Flip

Abstract

The #YourDolores photo series is the culmination of filming across the Dolores River Basin for over two years, amassing thousands of photographs that tell unique aspects of this river's story, its people and place. As a storyteller, I've arranged these images to share the most compelling moments from following and learning about the complex story to share with the public and help bring greater visibility to this remarkable story of our place and people.

Biography

Cody M. Perry is a filmmaker that specializes in telling stories about the Colorado River Basin's land, water and people. Cody has worked with non-profits, federal land agencies, outdoor brands and many voices from our diverse western communities to create films and images that inspire awareness and engagement in the future health of our land, water and people. Cody comes from a ranching family in southern Arizona. He's worked as an outdoor educator, a ski patroller and writer. His passion is telling stories about the West.

November 3: Morning Keynote

Lower Basin Drought Contingency Planning

Tom Buschatzke, Director, Arizona Department of Water Resources

Biography

Tom Buschatzke was appointed Director of the Arizona Department of Water Resources in January 2015. Prior to this appointment he served as the Assistant Director of the Department's Water Planning Division, overseeing the Colorado River Management, Active Management Areas, Planning and Data Management, Assured and Adequate Water Supply and Recharge Permitting, and Statewide Planning programs and Tribal Liaison. He is responsible for multiple planning and policy, regulatory and permitting programs for the management of the state's water supplies.

Mr. Buschatzke serves as Arizona's principal negotiator on matters relating to the Colorado River, is the Chairman of the Arizona Water Banking Authority and Co-Chair of the Drought Inter-Agency Coordinating Council and represents the State in Indian water right negotiations.

Mr. Buschatzke possesses over thirty years of experience in water management and has been a member of several statewide long-term water planning initiatives including serving as Co-Chair of the Statewide Water Resources Development Commission, the Governor's Blue Ribbon Panel on Water Sustainability where he served as Co-Chair of the Regulatory and Permitting Group and was an active participant in the Statewide Water Advisory Group and Governor's Drought Task Force.

During his twenty-four year tenure with the City of Phoenix, he served as the Water Resources Management Advisor and was responsible for policy development for management of the City's water resources and worked directly with the City's executive staff, the City Manager, the Mayor, and with members of the City Council on a variety of water issues.

Mr. Buschatzke's career in Arizona water resources began with a 1982 Arizona Department of Water Resources internship in the Phoenix Active Management Area and he ultimately became a Program Manager in the Adjudications Division. He holds a Bachelor of Science in Geology from the State University of New York at Cortland.

November 3, 8:55

Balancing full development of Colorado River compact entitlements with system conservation

Moderator: John McClow, Upper Gunnison Water Conservancy District

Biography

John H. McClow is a graduate of the University of Colorado and Colorado Law. He has practiced law in Colorado since 1973. He has represented the Upper Gunnison River Water Conservancy District since 1991, becoming full-time General Counsel in 2006. John is a Colorado Bar Fellow, a member of the Board of Directors of the Gunnison Ranchland Conservation Legacy, and is past Chair of the Seventh Judicial District Commission on Judicial Performance. He is a member of the Board of Directors and is past President (2014) of the Colorado Water Congress, and is Vice-Chair of its State Affairs Committee. He is the Legislative Representative to the Gunnison Basin Roundtable and the Gunnison-Uncompahgre Basin Director on the Colorado Water Conservation Board. He represents Colorado in the Glen Canyon Dam Adaptive Management Work Group. He served 2013-2014 as Colorado's Commissioner on the Upper Colorado River Commission, and Colorado's representative to negotiations among the seven

Colorado River Basin states, the United States, and Mexico. He is currently Colorado's Alternate Commissioner.

Eric Millis, Utah Division of Water Resources

Biography

Eric Millis is the director of the Utah Division of Water Resources and Utah's interstate streams commissioner since November 2013. Eric has worked for the Division for 28 years and served as the Division's development director, planning director, River Basin Planning Section chief and as an engineer in the Division's Investigation Section assisting applicants to the Board of Water Resources build water development projects. He is a graduate of Brigham Young University and a registered professional engineer.

Steve Wolff, Wyoming Interstate Streams Division

Biography

Steve Wolff is the Administrator of the Interstate Streams Division in the Wyoming State Engineer's Office. The Division is responsible for overseeing Wyoming's rights and responsibilities relative to the seven interstate water compacts and three interstate water decrees the State is party to. Prior to assuming the role of administrator, Steve oversaw the Colorado River Program in the Division. Steve also currently serves as Wyoming's representative on a number of western water councils and interstate water management committees.

James Eklund, Colorado Water Conservation Board

Abstract

Faced with increasing water stress, leaders in the Upper Basin of the Colorado River are proactively immersed (*pun intended*) in contingency planning. Should conditions remain dry, the states must have a plan to activate in the face of falling reservoir elevations at Lake Powell and models showing both good news and bad news: The bad news is that the last 16-year period of dry hydrology must be treated as the "new normal" with air temperatures set to increase; the good news is that we can influence the situation with a package of reservoir operations, voluntary reduction in demands, and continued management practices (*e.g.* weather modification and phreatophyte removal). In the midst of all this, the states are working together better than ever before. Lower Basin leaders have agreed that we need to address the system's dynamic of consuming more water than the system can sustain on an annual basis and are currently making progress on a Lower Basin contingency plan that defines how shortages would be taken. In essence, leaders in both basins are trying to make the Colorado River healthier and more resilient for people and the environment.

Biography

James Eklund is the director of the Colorado Water Conservation Board (CWCB) where he was the architect of Colorado's Water Plan – the largest civic engagement process in state history. He also serves as Colorado's interstate representative on the Colorado River.

As a lawyer and a government official, Eklund is already a disappointment to much of his family on the Western Slope. He is redeemed in their eyes, however, because he drinks whiskey and fights over water (but never at the same time). As the Director of the CWCB, Eklund leads the state's water policy, financing, and planning efforts. Prior to leading CWCB, Eklund was Senior Deputy Legal Counsel to Colorado Governor John Hickenlooper, where he focused on legislative and legal matters key to Colorado.

Eklund is a graduate of Stanford University and the University of Denver College of Law (neither of which, his father is quick to note, made him any better at cleaning ditches or irrigating pasture). The Upper Colorado River endangered fish he most identifies with is the Razorback Sucker because he thinks of himself as sharp but also somewhat gullible.

10:15 Assessing and Addressing the Potential for Overdevelopment in the Upper Basin

Moderator: Eric Kuhn, Colorado River District

Biography

Eric is the General Manager of the Colorado River District, a position he has held since 1996. He earned his Bachelor's Degree in Engineering from the University of New Mexico and a Master's Degree in Business Administration from Pepperdine University in California.

Prior to working for the Colorado River District, he served as an engineer officer aboard nuclear submarines in the U.S. Navy and worked as start-up engineer for Bechtel Power Corp.

Eric started employment with the Colorado River District in 1981 as Assistant Secretary-Engineer. He has served on the Engineering Advisory Committee of the Upper Colorado River Compact Commission since 1981.

From 1994-2001, he served on the Colorado Water Conservation Board representing the Colorado River mainstem. In 2006, Eric was appointed by Governor Owens as an at-large representative on the Colorado Interbasin Compact Committee, a position he continues to hold.

West Slope Roundtable Colorado Risk Study

John Carron, Hydros Consulting

Abstract

We will provide an introduction to the Colorado River Risk Study being funded jointly by the Colorado River District, Southwestern WCD, and the CWCB (via the four BRTs). The Study is intended to address in-State and in-basin issues related to the ongoing drought in the Colorado Basin, and how Contingency Planning in both the Upper and Lower Basins can mitigate against the risk of reaching critically low elevations at Lakes Powell and Mead. Implications for Lake Powell and the Upper Basin States include potential loss of hydropower and non-compliance with the 2007 Interim Guidelines. The study will quantify the risk of water shortfalls at Lake Powell under a variety of assumed future conditions, and help identify trade-offs in different approaches to mitigating those risks.

Biography

John has over 20 years of experience in water resources engineering and consulting, include modeling and management of river basins, reservoirs, and water supply systems; reliability and risk analysis; climate change studies; and water rights engineering. His recent work includes development and analysis of a drought Contingency Plan for the Upper Colorado River Commission member states, technical support for the state of New Mexico in litigation over the Rio Grande compact, feasibility and operational studies for new storage facilities in the Lower Colorado River Basin (Texas), planning studies for the nine Nile River Basin nations, and development of operational decision support tools for the Bureau of Reclamation in the lower Colorado River. He is an expert in the management of the Colorado River and the "Law of the River", and has extensive expertise in the development of RiverWare models and their applications to complex water management problems.

System Conservation Pilot Program in the Upper Basin

Shanti Rosset, Assistant Attorney General for Colorado

Biography

Shanti Rosset is an Assistant Attorney General who represents the State of Colorado in Colorado River related matters. Before Shanti joined the Colorado Attorney General's Office, she worked on water rights and property matters in private practice in Colorado, and also served as an Assistant Attorney General in the Arizona Attorney General's Office where she represented various states agencies, including the State Land Department, in their water rights matters. Shanti first started her work in natural resource policy matters while serving as committee staff at the Arizona State Senate. Shanti Rosset received her B.A. from the University of Arizona and her J.D. from Arizona State University College of Law.

Water Banking Work Group

Aaron Derwingson, The Nature Conservancy

Abstract

The Water Bank Work Group (WBWG) is a representative group of stakeholders that is exploring the use of a voluntary and compensated market approach to temporarily reduce consumptive uses in the Colorado River Basin in Colorado in order to address the risks of ongoing drought and potential water shortages. Since forming in 2009, the WBWG has focused on developing a long term program that minimizes the risk of shortage for all water Colorado River users, avoids long-term agricultural dry up, and protects or improves the health of our rivers and streams. Today's discussion will cover the Work Group's efforts to understand how a water bank can work for agricultural water users, including lessons learned from current field studies and pilot projects. We will also look at current efforts to scale up the water bank work, including how a program could be structured, administered, and financed over the long term.

Biography

Aaron Derwingson is the Agricultural Coordinator for The Nature Conservancy's Colorado River Program where he works in partnership with agricultural water users on pragmatic, solution-oriented approaches to protecting river flows while meeting the needs of people. Aaron works with agricultural producers and water managers to understand issues and opportunities with adopting new water management and irrigation practices.

Aaron holds a Bachelor's degree in Biology from the University of Colorado and a Master's in Community and Regional Planning from the University of Oregon. Before joining The Nature Conservancy, Aaron worked at the Rio Grande Headwaters Land Trust helping protect important working lands, wildlife habitat, and water resources in Colorado's San Luis Valley.

November 3, 11:20

Demand Management in Agriculture: Potential and limitations of alternative transfer methods

Moderator: MaryLou Smith, Colorado Water Institute, Colorado State University

Biography

After 35 years as vice president and co-founder of Aqua Engineering, Inc., MaryLou joined the Colorado Water Institute at Colorado State University to continue providing water policy collaboration services.

Her work revolves around group process design and facilitation for various stakeholder groups including roundtables and work groups of the Colorado Interbasin Compact process; water conservancy districts; ditch companies; and agricultural and environmental organizations. Agricultural/urban/environmental water sharing strategies and the integration of land use planning with water supply planning is of prime interest.

MaryLou grew up on cotton and alfalfa farm irrigated by wells in eastern New Mexico. She earned a master's degree in educational psychology from New Mexico State University and received facilitation and mediation training from CDR Associates. She served twelve years on the Fort Collins Water Board, and currently serves on CSU's Water Archives Advisory Board and the Fundraising Committee of Colorado Foundation for Water Education.

Study of alternatives to buy & dry

Brad Udall, Colorado Water Institute, Colorado State University

Abstract

This presentation discusses a peer-reviewed synopsis of the current state of knowledge about the best known and promising agricultural water conservation and transfer methods that are alternatives to permanent fallowing. The goal is to provide support for efforts that are focused on keeping Colorado River Basin agriculture economically healthy while finding agricultural water for non-agricultural purposes.

Biography

Brad Udall serves as senior water and climate research scientist at the Colorado Water Institute to provide additional expertise in the field of water resources and climate change. He has extensive experience in water and climate policy issues, most recently as the director of the Getches-Wilkinson Center for Natural Resources, Energy and the Environment and the Western Water Assessment at the University of Colorado, Boulder. He has authored numerous peer-reviewed publications on water management and climate change which have been published by the federal government and major journals. He has researched water problems on all major Southwestern US rivers including the Rio Grande, Colorado, Sacramento-San Joaquin and Klamath, and has spent six months in Australia studying their recent water reforms.

Farmer perspective on alternatives to buy & dry

Paul Kehmeier, Eckert, CO

Abstract

Paul's long history of farming and participation in several research studies on deficit irrigation, as well as in numerous discussions of alternative agricultural transfer methods, leave him well-positioned to provide insights into how agricultural water users view such strategies.

Biography

Paul Kehmeier farms on his family farm near Eckert, Colorado. His main crops are alfalfa and grass hay. He has been participating with CSU for several years in the study of deficit irrigation of alfalfa. Mr. Kehmeier holds a Masters of Science degree in Range Ecology. He is active on a variety of agricultural boards in his area.

Financial Analysis of alternative transfer methods on the Colorado Front Range

Brett Bovee, Westwater Research

Abstract

Much of the focus on ATMs has been on policy and water law changes that would allow greater trading among farmers and municipalities. The goal has been to make Colorado water law more flexible to respond to municipal demands under leasing arrangements. But a fundamental question surrounding ATMs is: *why should municipalities seek to acquire ATM supplies instead of permanent supplies?* A study was completed looking at the financial costs of different water supply alternatives for two Front Range municipalities as case studies, including both traditional and ATM water supplies. The results help to inform the discussion on ATMs and what factors will drive their implementation.

Biography

Brett Bovee is a Regional Director at WestWater Research, located in Fort Collins, CO. WestWater is a water resources consulting firm, specializing in water valuation and water markets in the Western US. Brett has been working on water rights in the Western states for over 12 years, and has managed a range of engineering, economic, and planning projects in the water sector.

November 3, 1:20

Demand Management in Cities: Can we conserve our way out of crisis?

Moderator: Larry Clever, Ute Water

Biography

Larry Clever is the General Manager of Ute Water Conservancy District. Prior to his tenure (21 years) at Ute Water, Mr. Clever was the Town Administrator for the Town of Palisade.

The Decoupling of Population Growth and Water Use Growth

Brett Walton, Circle of Blue

Abstract

Cities in the American West are often using less water than they did decades ago, even as they add more people. For a dry region, conservation and efficient plumbing have become important planning tools and sources of water – if the water is available to begin with. Yet conservation also opens a box of related challenges for water utilities, notably revenue, budget, and infrastructure considerations. The shift toward conservation is forcing both customers and utilities to adapt and to consider new values for water.

Biography

Brett writes for Circle of Blue, a news agency reporting on fresh water and all its connections. He covers agriculture, energy, infrastructure, and the politics and economics of water in the United States. He also writes the Federal Water Tap, a weekly digest of U.S. government water news. He is the winner of two Society of Environmental Journalists reporting awards, one of the top honors in American environmental journalism: first place for explanatory reporting for a series on septic system pollution in the United States (2016) and third place for beat reporting in a small market (2014). Brett lives in Seattle.

Denver Water Perspective

Greg Fisher, Denver Water

Biography

Greg Fisher is manager of demand planning for Denver Water

Colorado Springs Perspective

Scott Winter, Colorado Springs Utilities

Biography

Scott is a Project Manager in water conservation with Colorado Springs Utilities, where he has worked for 12 years. He is responsible for water efficiency and demand management planning and reporting, including demand modeling, water use benchmarking, efficiency program rate impact and benefit-cost analysis, and measurements of program influence. Scott also assists efficiency program managers with program design, implementation and management. He is keenly interested in understanding the many factors that shape how people use water in the urban environment and finding ways to maximize the beneficial and efficient use of water to improve the livability of our cities and resiliency of our water resources. Scott has a degree in Agriculture from Kansas State University and a Master's in Geography from the University of Colorado, Colorado Springs. He spends his free time enjoying a wide variety of adventures – usually with his wife and two young daughters.

November 3, 2:25

Ethical and Cultural Considerations for Water Allocation

Moderator: Jeff Sellen, Western State Colorado University

Biography

Jeff Sellen is an Associate Professor and the Director of the Environment and Sustainability program at Western State Colorado University, where he teaches and researches the politics and policy associated with environmental issues.

Utilizing Sustainability and Equity Criteria to Evaluate River Basin Decision-Making: A Case Study from the Colorado River Basin

John Berggren, University of Colorado – Boulder

Abstract

Prolonged drought, increasing and shifting demands, climate change, and over-allocation pose tremendous challenges for the sustainable and equitable management of both domestic and global water resources (Overpeck and Udall 2010). Recent theoretical work has suggested that adaptive capacity (the ability to cope with or respond to changes in the environment) is highly dependent on whether or not governance structures are flexible (Kenney et al. 2011), collaborative (Ananda and Proctor 2013), can take into account new scientific information (Reed and Kasprzyk 2009), and can effectively adjudicate among competing needs in an equitable and sustainable manner (Weik and Larson 2012). As research around the need for adaptive capacity in water management has grown, so too has research suggesting the inherent inflexibility, conservatism, and rigidity of existing water institutions (Heinmiller 2009). While extensive research has been conducted on the need for increased adaptive capacity given growing uncertainty, and the seemingly inflexibility of existing water institutions, there has been little

attention to empirically examining the necessary bridge between sustainable or equitable water policy and adaptive water institutions (Hedelin 2007; Weik and Larson 2012). *Thus, a critical gap exists in our empirical understanding of how water managers could successfully identify, analyze, and implement equitable and sustainable water policies.* This research project will attempt to address this gap. It seeks to understand how criteria for equitable and sustainable water policy might improve our understanding of decision-making processes in complex river basin systems. The proposed presentation at the 2016 Upper Colorado River Basin Water Forum will present the preliminary results of a case study utilizing the Colorado River Basin to understand not only how sustainable and equitable criteria are institutionalized (or not) in the governing policies and decisions, but also how these criteria might inform future decisionmaking processes. Research methods include a comprehensive literature review, document analysis, surveys, and semi-structured interviews. Document analysis will be used to systematically code the Colorado River Compact and all major decision documents (n=12) in the Basin—collectively known as the “Law of the River”—by systematically coding the documents using a comprehensive set of metrics and criteria for identifying sustainability and equity. A survey (n=900) and semi-structured interviews (n=30) will then be employed to help contextualize, ground-truth, and ultimately help adapt the results of previous work to a framework of criteria for examining decision-making processes. The panel for the survey will be members of the Colorado River Water Users Association, which has a diverse membership of over 900 Colorado River Basin stakeholders. This includes a significant variety of water managers, government officials (at multiple levels of government), NGO representatives, Tribal leaders, academics, and concerned citizens. The semi-structured interviews will be conducted with a select sample of Colorado River Basin managers and decision-makers. This includes state and federal employees (e.g., State Engineers, Bureau of Reclamation), water district managers, municipal utility managers, consultants, Tribal leaders, and NGO representatives. Results from this research will hopefully help contribute to the discussion on transitioning to sustainable and equitable water policy in the Western US and elsewhere.

Biography

John Berggren is a doctoral candidate in the Environmental Studies Program at the University of Colorado Boulder. His research focuses on issues of sustainability and equity as they relate to water policy, utilizing the Colorado River Basin as a case study. He is also conducting research on municipal drivers of climate change adaptation, the co-production and usability of climate and hydrologic science, and understanding changes in wildfire mitigation and policy. John holds a B.A. in Public Health Studies from the Johns Hopkins University and an M.H.S. in Environmental Health Sciences from the Johns Hopkins Bloomberg School of Public Health.

Engaging Sacrificial Landscapes: Remembering a Forgotten Western River

Jonathan Bowler, University of Wyoming, Living Rivers

Abstract

Where the Green River flows past the Split Mountain Boat Ramp in Dinosaur National Park, the socio – ecological relationship between humans and their environment changes as quickly as Split Mountain dives into the river. A “wilderness”, filled to acceptable capacity by over 10,000 river users per year gives way to a “multiple use” area, where less than 100 visitors travel the river through a sacrificial landscape. The Green River as it flows through the Uinta Basin of Utah is a microcosm of the cultural, historical, and ecological complexities that define the management of the Colorado River System. The forgotten rivers

of the West exemplify the fragmented ecological knowledge applied to the Colorado River Basin, which today exists largely within political rhetoric, conceptual theory, and multi-agency management plans.

The Colorado River, and its main tributaries, the Grand, Green, and San Juan Rivers have been systematically dismantled into basins, managed segments, planning areas, pipelines, and diversions. In turning a wild, natural river system into a complexity of numbers, policies, and legal frameworks entire generations of Westerners have lost connection to the resource that has sustained life for millions of years and have formed a relationship based on a fragmented ecological understanding. The loss of connection to regional natural resources results in the loss of a sense of place and the increase of human created homogenous habitats. The current cultural and socioecological perceptions that stem from this disconnect are founded in the persistence of age-old myths, ineffective objectives for posterity, and ecologically degrading resource manipulation strategies. The manipulation forced on the Colorado River system has not aged well; forecasts and trends show increasing demands and decreasing supply – an inherently unsustainable situation further strained by uncertain hydrologic and climatic futures, a loss of systematic resiliency, continued development and population growth.

The forgotten rivers of the West show the inevitable result of replacing bold and innovative ideas with quick and cost-effective ideas. The contemporary relationships between water, people, and the environment have shifted dramatically from those held prior to the tamed hydrograph. For all the benefit reaped from the Colorado River system's waters, the socio-ecological connection has never been more removed. The idealized perception of the modern Colorado River system is dying and this is good news. There is time to restore resiliency by boldly admitting defeat and quickly propagating a baseline shift in cultural and socio-ecological perceptions of life-sustaining natural resources. A new relationship between water, people, and the environment is needed; one that honors unique culture over homogeneity, integration over segmentation, and engagement over conquest.

Biography

Jonathan Bowler has spent the past decade travelling the West as an educator, scientist, and proud public lands owner. Years spent on the Grand, Green, San Juan, and Colorado Rivers have led to a life devoted to western water resources. Jonathan's graduate research at the University of Wyoming assessed social perceptions of recreation opportunities within the Green River's Uinta Basin. This work is being continued at the University of Wyoming in a PhD program in Ecology focused on socio-ecological dimensions of the relationship between water resource management strategies and cultural connections to place. Although Jonathan is most at home on the rivers of the Colorado River Basin, he enjoys spending time in the headwaters state of Wyoming.

The Moral Algebra of 21st Century Water Development

George Sibley, Gunnison Author

Abstract

It is too easy to start thinking of water in "zero-sum" terms – that moving water from one group of users to another group of users means less water for the first group, and who would willingly go along with that?

But this misses a fundamental point about water development: no developed use for water involves just water; every developed use – even a basic irrigation ditch – involves a mix of *water, ideas and investment (money, labor, tools, etc.)*. Thus if one group of users is to receive less water in a water transfer to another use, then *ideas* for more efficient, different or otherwise more fitting use of the remaining water, and the *investment* necessary to implement the ideas, could, maybe should, be "moved" to that group from the group gaining the water to use, thus enabling the first group to

continue using its remaining water in an economically or ecologically viable way. This is, in a way, basic algebra which is the language of equations: changes in one variable require changes in other variables to maintain "equation" around unvarying constants.

It needs to be noted immediately that this would be a "moral algebra" on the part of the second group, which has legally acquired use of the water, and under the appropriations doctrine has no obligation to users in the first group beyond addressing any demonstrable injury to individual users. Yet the disappearance of water from a watershed affects future development for the entire watershed. And the history of large-scale complex water development in Colorado and the West shows a spectrum of attitudes on whether changes of use and place of use impose a moral obligation on the changing party to compensate for future losses from those changes.

This goes back to the 1922 Colorado River Compact negotiations, when chairman Herbert Hoover tried to articulate an elusive "principle of equation" that the negotiators wanted to establish to avoid a zero-sum race for rights "between the upper basin and lower basin." It was next evident in the Colorado-Big Thompson negotiations, in which South Platte farmers acknowledged an obligation (under the Bureau's insistence) to compensate through storage for the loss of water to West Slope farmers.

The Front Range municipal utilities, on the other hand, acknowledged no such obligation in their major transmountain diversions (Moffat, Roberts, and Homestake), until around 1990 when Denver Water had to begin considering Denver's impacts on the Colorado River headwaters; since then, the Wolford Reservoir and Moffat Firming projects have set high standards for "the moral algebra." My suggestion would be to introduce the concept of "a moral algebra for equation in water development," followed by analyzing the "algebraic" manipulation of the water-idea-investment variables of some past and current projects and discussing how the moral algebra might be applied in future situations like ag transfers or high-conservation municipal programs.

Biography

George Sibley was born in Western Pennsylvania, but was conceived in Colorado, by Colorado natives, and thus considers himself to be a native Coloradan. He returned to Colorado after graduating from the University of Pittsburgh in 1964, and has lived "mostly in the mountains" ever since. Most of that time has been spent in the Upper Gunnison River valley, west of the Continental Divide - first in Crested Butte, Colorado, where he ascended, more or less overnight, from ski bum to editor of the town newspaper, and more recently 30 miles downvalley in Gunnison where he worked for many years at Western State College of Colorado.

He left the Crested Butte newspaper in 1971 for an envisioned career as a freelance writer, which became a career as "freelance oddjobber," with occasional writing jobs, for publications ranging from the local newspapers to Harper's Magazine. One book was published in that period: ***Part of a Winter*** (Crown, 1977). For the rest of a living and life, he worked as a ski patrolman, bartender, construction worker, occasional contractor, sawmill operator, winter caretaker for a remote biological field station, forest-fire fighter, librarian, and other seasonal and part-time occupations.

In 1988, he landed a position at the college in Gunnison, teaching halftime and developing a series of regional conferences at the college the rest of the time – exploring the issues of sustainability, community and "intelligent life on earth" that also infuse his writing. In 2007, he retired from the college to go back to freelancing and to participate more effectively in some community work.