Written Testimony of Reagan Waskom
Colorado Water Institute

Submitted to: Senate Committee on Energy and Natural Resources
Water and Power Subcommittee

Hearing on Bureau of Reclamation's
Colorado River Basin Water Supply and Demand Study
July 16, 2013

Colorado Water Institute
Colorado State University
Fort Collins, CO 80523-1033
(970) 491-6308
reagan.waskom@colostate.edu
http://www.cwi.colostate.edu

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The Honorable Brian Schatz
Chairman
Senate Water and Power Subcommittee
304 Dirksen Senate Office Building
Washington, D.C. 20510

The Honorable Mike Lee
Ranking Member
Senate Water and Power Committee
304 Dirksen Senate Office Building
Washington, D.C. 20510

Dear Chairman Schatz, Ranking Member Lee and Members of the Committee:

My name is Reagan Waskom and I serve as the director of the Colorado Water Institute at Colorado State University. The Colorado Water Institute is one of the 54 state water resources research institutes funded through the US Geological Survey and organized under the National Institutes for Water Resources (NIWR), the organization that collectively represents the state water resources research institutes. Our Institute has been working on agricultural water management and Colorado River issues, among many other pressing water problems, since 1965. Currently, we are deeply engaged in dealing with drought and its associated problems such as fire and crop failure in the state of Colorado. For the record, this year I'm serving as the president of the National Institute for Water Resources and as the president of the Colorado Water Congress, but I am providing comments today solely in my role as a Co-Chair of the Colorado River Water Supply and Demand Basin Study Agricultural Conservation and Transfers Workgroup. My testimony will focus on the importance of the Colorado River for sustaining agriculture in the Southwest, the direction of our workgroup and the many challenges inherent in conserving agricultural water for transfer to other uses.

Importance of the Colorado River to the Southwest USA

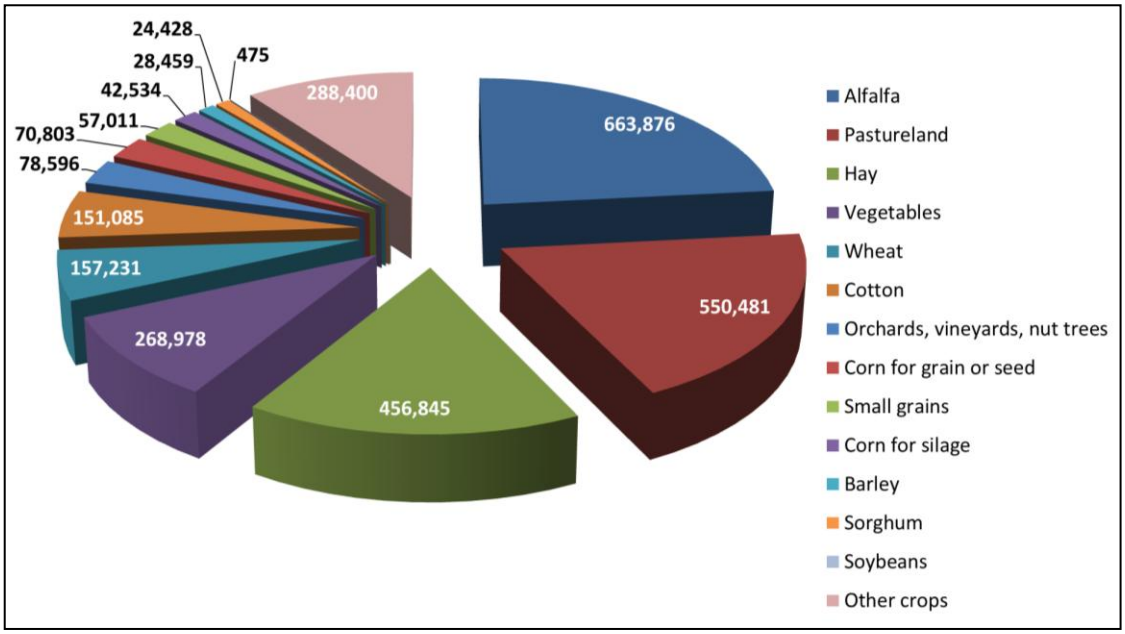
The Colorado River is one of the most important resources in the Southwestern U.S. and it is a critical water resource for the State of Colorado. The Colorado River spans parts of the seven states of Arizona, California, Colorado, New Mexico, Nevada, Utah, and Wyoming (Basin States), and it provides: 1) the municipal water supply for more than 30 million people; 2) the irrigation supply for nearly 4 million acres of land; and, 3) hydropower to generate more than 4,200 MW.

Water supply and demand imbalances already exist in some geographic areas in the Basin and these imbalances are projected to increase in both magnitude and spatial extent in the future. The Colorado River system has storage capacity that is greater than 60 million acre-feet, which is approximately four times the average inflow (14.9 maf), and this storage has allowed most demands in the lower Colorado River Basin to be met, even over periods of sustained drought. In the upper Colorado River Basin shortages exist somewhere in the upper basin in most years, due to variability of snowpack and rainfall. However, studies indicate that droughts of greater severity have occurred in the far past and climate experts and scientists suggest that such droughts are likely to occur in the future.

Nature of Colorado River Basin Agricultural Water Use

Agriculture in the Colorado River Basin is driven by irrigation, with about two million acres of land irrigated in the Upper Basin (including tributaries and transbasin lands) and another two million in the Lower Basin, representing about 15 percent of all crop receipts and 13 percent of all livestock in the U.S. A wide variety of crops are grown in the basin, including corn, sorghum, wheat, barley, cotton, peanuts, sugarbeets, soybeans, potatoes, lettuce, onions, chilies, alfalfa hay, grass hay, cauliflower, broccoli, carrots, honeydews, cantaloupes, watermelons, grapefruit, oranges, lemons, tangerines, grapes, tomatoes, apples, cherries, apricots, and peaches. Production of sheep, goat, dairy and beef cattle are large contributors to the basin's agricultural output.

California has the greatest number of irrigated acres of the seven states, with its largest user the Imperial Valley, which irrigates almost 500,000 acres. In Colorado, there are approximately 600,000 acres of agricultural lands in the Basin plus another 900,000 acres outside the basin that are partially irrigated with transbasin diversions. The San Juan River (the Colorado River's largest tributary) irrigates nearly 100,000 acres in New Mexico. Nevada does not directly use water from the Colorado River for agriculture; however, in Utah and Wyoming, the Colorado River and its tributaries provide irrigation water for over 500,000 acres.



Acreage of irrigated crops in the Colorado River Basin. Source: USDA Census of Agriculture, NASS (2009).

Previous research indicates that strong support exists among those who live in the western states for keeping land and water in agriculture and limiting water transfers that create adverse impacts on rural communities (Western Governors' Association and Western States Water Council, 2012). Local food and fiber production, protecting open space and wildlife habitat, maintaining agricultural jobs and businesses, and preserving western heritage are among the reasons for ensuring there are adequate land and water resources for agriculture production.

The Colorado Water Institute is currently working with the Water Research Institutes from the six basin states to survey and interview farmers and ranchers who use Colorado River water to determine their preferences for meeting future water shortages. They indicated a strong preference for water conservation and efficiency (77 percent); working towards public policy that supports keeping land and water in agriculture was ranked second highest at 75 percent. Findings from in-depth telephone interviews we conducted in late 2012 with agricultural water users and managers in all seven states suggest that agricultural irrigation efficiency and conservation are major concerns for farmers and ranchers. Yet significant technical, institutional, legal, economic, and social barriers to conservation are seen to exist across the Basin. Some water managers spoke of the technical complexities of efficiency and conservation, wherein the type of crop cultivated and irrigation technology employed shape how much water can be produced by conservation. For many farmers, conserving agricultural water is perceived as potentially harmful to their interests and to their future. Many fear, correctly or not, that under their state's water law, conservation may reduce their water rights and even subject them to legal abandonment.

Background on the Basin Study

Recently, the Colorado River Basin States ("Basin States") and the Bureau of Reclamation completed the Colorado River Basin Study ("the Basin Study"), to assess future water supply and demand imbalances over the next 50 years and develop and evaluate opportunities for resolving imbalances. The study has been under development for nearly three years by the U.S. Bureau of Reclamation (Reclamation) and the Basin States, in collaboration with stakeholders throughout the Basin. Reclamation officials have emphasized that this is a planning study; it will not result in any decisions, but will provide the technical foundation for future activities. In addition, the Study explored various options that could be used to reduce the anticipated supply/demand imbalances. A scenario planning approach was used for this study to examine the full range of possible water supply/water demand projections. The Study, a compilation of seven technical reports and two overview documents, is available in its entirety at http://www.usbr.gov/lc/region/programs/crbstudy/finalreport/index.html.

The Basin Study's four different supply scenarios and six different demand scenarios present a broad range of possible imbalances. However, when comparing the median of the six demand scenarios combined with the median of four different water supply scenarios, a Basin-wide imbalance of approximately 3.2 million acre-feet per year by 2060 is plausible. Moreover, the greatest increases in demand are projected to occur in the Lower Basin. The Basin Study also illustrates that because of the magnitude and distribution of the imbalances, no single solution will be adequate to meet all future water demand and supply imbalances.

The Study confirms that without future actions, the Basin faces a range of potential future imbalances between supply and demand. A wide range of future imbalances is plausible and each of those imbalances results in the decline in the performance of Basin resources including water deliveries, hydropower, water quality, ecological, and recreational resources.

The Study also demonstrates the implementation of a broad range of options that can reduce Basin resource vulnerability and improve the Colorado River system's resiliency to low and

variable hydrologic conditions. The Study identifies a series of next steps that should be taken to begin to discuss what actions should be pursued to ensure the sustainability of the system. One of the options that the Bureau of Reclamation and the Basin States explored within the Study was pursuing additional agricultural conservation and water transfers. This is not surprising or a new concept in the western United States. Many thousands of acres of agricultural lands have already been dried up within Colorado and throughout the West to meet growing municipal and industrial demands. This trend of transferring agricultural consumptive uses to growing municipal and industrial uses has real and far-reaching implications and effects. In Colorado alone, the trend has prompted policy makers to fund studies that explore and potentially provide alternatives to agricultural transfers. Tools like interruptible supply agreements, temporary fallowing arrangements, deficit irrigation techniques, water banks, improved infrastructure, and other tools are being developed and used throughout Colorado and the other western states.

Next Steps

While the Colorado River Basin Study provides new tools and answers a number of critical questions about the future of the Colorado River, it has raised new and different questions. The Bureau of Reclamation and the Basin States recognized that with the completion of the Colorado River Basin Study, their work was not done, but rather it was just beginning.

The Bureau of Reclamation and the Basin States agree that there are three key areas where additional work is immediately necessary: 1) municipal conservation; 2) agricultural conservation and transfers; and, 3) recreational and environmental flows. Thus, the Bureau of Reclamation and the Basin States formed three workgroups to tackle specific scopes of work associated with each of these subject matters.

The Basin Study estimated that one million acre-feet of water can be conserved from agriculture by the year 2060 to fill the estimated gap that will exist between water supply and demand. Agricultural water conservation has been proposed to reduce the overall water demand in areas currently relying upon water supply from the Colorado River system. The concepts received were first organized into six agricultural water conservation measures reflecting different types of activities that could generate water savings in the agricultural sector. The six agricultural water conservation measures consist of:

- Advanced irrigation scheduling
- Deficit irrigation
- On-farm irrigation system improvements
- Controlled environment agriculture
- Conveyance system efficiency improvements
- Fallowing of irrigated lands

In order to encourage adoption of the targeted water conservation measures, two possible implementation approaches were considered: (1) *Basin-wide agricultural water conservation* through a federal or state incentive-based program to encourage agricultural water use efficiency without specific legal transfer of water or water rights, and (2) *Basin-wide agricultural water conservation with water transfers* between a willing transferor and willing transferee that

promotes water conservation and/or short-term or permanent fallowing of irrigated lands to transfer conserved water to the transferee for a similar or different use.

The six agricultural water conservation measures have been conceptualized into two implementation approaches: 1) incentive-based programs to reduce agricultural demands and 2) water transfers to augment supplies. Because the conservation measures could produce different amounts of savings depending on the location in the Basin, implementation approach, and combination of conservation measures, the total quantities were estimated as an aggregate for each implementation approach rather than a summation of individual conservation measures. Up to 1 million acre feet of potential savings by 2060 was considered for both approaches combined with potential of roughly 500,000 acre feet under each approach category. By comparison, the summation of potential water savings for each conservation measure totals 2.44 million acre feet per year when accounting for non-consumptive use savings outside the Basin and ignoring return flow impacts, and is reduced to 833,000 acre feet per year when only consumptive use savings are considered under each approach category.

Agriculture Conservation and Transfers Workgroup

The "post-Basin Study" workgroups are being set up to dig deeper into the details. A "coordinating committee" will oversee and coordinate the activities of these three work groups. The result will be a draft report that is scheduled to be released later this year.

I will be co-chairing the Agriculture Conservation and Transfers Workgroup, along with the Bureau of Reclamation's Ken Nowak and Tina Shields, of the Imperial Irrigation District.

The Agricultural Conservation and Water Transfers Workgroup is intending to collect information and prepare a report that: quantifies agricultural conservation and transfers of Colorado River water (both in and outside of the Basin) that have occurred to date, documents programs that have been successful to date, documents impacts and tradeoffs, lists any existing future plans for these types of activities, and estimates what potential savings could come from these existing plans. From this baseline information, this workgroup will also propose Phase 2 activities to be conducted in 2014 to the Coordination Team.

Members of the Workgroup include:

Co-Chairs
- Ken Nowak, Reclamation
- Tina Shields, Imperial Irrigation District
- Reagan Waskom, Colorado State University

Members
- Doug Bonamici, Colorado River Indian Tribes
- Astor Boozer, Natural Resources Conservation Service
- Grant Buma, Colorado River Indian Tribes
- Aaron Citron, Environmental Defense Fund
- Chuck Cullom, Central Arizona Project
- Aaron Derwingson, The Nature Conservancy
- Anisa Divine, Imperial Irrigation District

Eslton Grubaugh, Welton-Mohawk Irrigation District
Jeff Johnson, Southern Nevada Water Authority
Mark Johnson, Coachella Valley Water District
Janine Jones, California Department of Water Resources
Dave Kanzer, Colorado River District
Dan Keppen, Family Farm Alliance
Randy Kirkpatrick, San Juan Water Commission
Eric Klotz, Utah Division of Water Resources
John Longworth, New Mexico Office of the State Engineer
Jan Matusak, Metropolitan Water District of Southern California
Lee Miller, Southeastern Colorado Water Conservancy District
Don Ostler, Upper Colorado River Commission
Pat O'Toole, Family Farm Alliance
Halla Razak, San Diego County Water Authority
Russ Schnitzer, Trout Unlimited
John Shields, Wyoming State Engineer's Office
Ed Smith, Palo Verde Irrigation District
TBD, Western Governors' Association/Western States Water Council
Tanya Trujillo, Colorado River Board of California
Warren Turkett, Colorado River Commission of Nevada
Grant Ward, Maricopa-Stanfield Irrigation and Drainage District
Erin Wilson, Colorado Water Users
Brad Wind, Northern Colorado Water Conservancy District
Ed Yava, Colorado River Indian Tribes

Concerns of Basin Agricultural Interests

Agricultural interests throughout the Basin, from headwater areas in my state to the fruit and vegetable producers in the Imperial Valley and Yuma, are concerned with the future scenaros identified in the Basin Supply. I believe that Basin irrigation districts appreciate Reclamation and the Basin states for their collaborative effort that led to the completion of this important study. A key overall benefit of this study is that, from now on, all Colorado Basin parties can work from the same technical foundation. However, I also know that many agricultural interests are concerned that virtually every scenario assessed by the Basin Study shows a loss of Colorado River Basin irrigated acreage by the year 2060.

The Basin Study assumes that irrigated acreage in the Colorado River Basin will decrease by 300,000 to 900,000 acres during the time period 2015 to 2060. Policy makers and Colorado River stakeholders must understand the critical implications of taking existing irrigated agriculture out of production. We are already behind the curve when it comes to meeting the future food needs of the world. Every single acre of land that is taken out of production reduces our capacity to meet that demand.

Irrigated agriculture is one of the largest economic engines in the Western U.S., according to the 2012 Family Farm Alliance report, "*The Economic Importance of Western Irrigated Agriculture*". For a region that spans the 17 Western states, the total household income impacts derived from the "Irrigated Agriculture Industry", made up of direct irrigated crop production,

agricultural services, and the food processing and packaging sectors, is estimated to be about $128 billion annually.

There are concerns about how the quantity of agricultural water that can be conserved was developed in the Basin Study. Once we have a firmer hold on that number, I'm hoping we can spend our time focusing on incentives and solutions to actually fill the gap. Some of that will certainly come from improvements and expansions in infrastructure and some will come from temporary, voluntary transfer methods like the water bank concept included in the Study.

We need to ensure that in-basin agriculture has the tools to remain resilient and profitable in the face of reduced supplies and increased pressure from cities to buy up agricultural land and water. Those tools can be directed to provide healthy flows benefits without permanently taking land out of production. Diversion and infrastructure improvements that can improve flows without drying up land are a good example. Healthy irrigated agriculture in the Basin provides value for water in place and gives environmental interests a partner to work with on conservation projects.

Past History Can Predict Future Actions

Several of the entities who are represented on the Ag Workgroup participated in the Colorado River Ag/Urban/Enviro Water Sharing forum a few years ago. Water used for agriculture in the Colorado River Basin and the western United States is increasingly seen as a potential supply for growing urban and environmental needs. In 2008, the Western Governors' Association, working through their water arm, the Western States Water Council (WSWC), issued *Water Needs and Strategies for a Sustainable Future: Next Steps*. One of the next steps identified in the report was that"...states, working with interested stakeholders, should identify innovative ways to allow water transfers from agriculture to urban use while avoiding or mitigating damages to agricultural economies and environmental values." In direct and independent response to the WGA's call to action, a diverse Water Sharing Work Group of highly knowledgeable and influential water leaders representing the sectors of agriculture, urban interests, and the environment, set aside parochial positions to collaboratively take on the governors' challenge.

One of the first issues the group resolved focused on the very nature of water transfers. Some in the group did not want to participate in any process that would somehow encourage additional water to be transferred out of agriculture. An essential first step in building the collaborative process was to come to the decision that the group would focus on ways to improve sharing of water between multiple sectors, and would not seek to find more ways to unilaterally transfer water out of agriculture.

This group also recognized that there was a need for additional dialogue on the role of storage. Faced with mounting demands to provide water for urban growth and other beneficial uses, including agriculture, some members of the group identify themselves as pro-storage. Others remain leery of the potential adverse impacts and costs associated with some storage projects. However, the group generally accepted the concept that there may be benefits to properly sized and located storage in certain circumstances, especially when such projects are part of a larger, multiple-benefit strategy. The group also generally agreed that when projects have the support of multiple entities, including agriculture, environmental, and urban players, the regulatory process

for approval of such projects should be better integrated, more conducive to moving forward, and less embroiled in redundant action by multiple agencies.

I helped facilitate the Ag/Urban/Enviro effort, and based on that experience, I think I have a good sense of the issues that we will tackle in the Workgroup I will be co-chairing. Colorado Basin agricultural interest will advocate that States and local governments consider the impacts of continued growth that relies on water transfers from agriculture and rural areas and to identify feasible alternatives to those transfers. Also, I'm certain the topic of aging infrastructure will come up. Aging Federal water infrastructure in the West must be addressed, as failure to reinvest in critical facilities will negate economic gains of past generations and create a failed legacy for future generations. It is imperative that we find creative ways to provide for the operation, maintenance, and modernization of existing water supply infrastructure. And, Colorado River Basin farmers and ranchers have long advocated for new water and power supplies, which they see as necessary to satisfy recreational and environmental needs, allow for population growth, and protect the economic vitality of the West. They would like the federal government to adopt a policy of supporting new efforts to enhance water supplies and management flexibility, while encouraging state and local interests to take the lead in the formulation of those efforts.

Irrigated crop production has a long history of innovation and adapting to changing conditions. New technologies and more efficient use of water are constantly being developed and voluntarily implemented throughout the irrigation belt of the West. The recent drought has certainly accelerated new technology and these advances in irrigated agriculture are most often first introduced to producers through the USDA Farm Bill programs. EQIP and the other programs target proven conservation practices and provide technical and financial assistance to farmers and ranchers as they continue to voluntarily reduce water use and improve irrigation efficiencies. Farmers need conservation programs such as EQIP and the CREP to assist, not subsidize, them as they face extremely difficult water conservation challenges caused by both drought and growth.

Conclusion

I am pleased that Reclamation and the Basin States are committed to the continued refinement of scenario planning as part of a robust long-term planning framework for the Basin. Policy makers and elected officials must clearly understand the importance of Western irrigated agriculture and the implications associated with transferring the water currently producing food in the Colorado River Basin and elsewhere.

At the appropriate time, federal authorizations or appropriations may be recommended or suggested as a result of the deliberations by the Workgroups and the States. We look forward to working with the Congress as we address these future challenges.

Thank you for this opportunity to present testimony to you.