LIVING RIVERS
COLORADO RIVERKEEPER®

March 13, 2013

Bureau of Reclamation
Attention: Ms. Pam Adams, LC-2721
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Dear Ms. Adams

The following represents the comments of Living Rivers/Colorado Riverkeeper and the Center for Biological Diversity on the Colorado River Basin Supply and Demand Study released December 12, 2012.

While the study represented an unprecedented effort on behalf of the Department of Interior and the seven basin states, it's selective and misguided analysis, and thus findings, fall far short of serving the public's interest at this increasingly critical time for Colorado River water supply management.

Lost in the extensive discussions about completely unrelated demand projections, and inappropriate supply options to address them, along with an array of climate change scenarios, was the squandering of an historic opportunity to finally begin addressing the decades-old problem of an over-allocated river.

The study fails to adequately articulate the immediate challenges facing Colorado River water users, and places the public at increased risk of being unprepared as Colorado River water supplies grow ever tighter. Likewise, the study wholly ignores critical non-consumptive uses such as cultural heritage and the environment, that must not be ignored when addressing future river management strategies.

The lack of leadership at this critical time by Reclamation and the team involved in crafting this study is a travesty. As we anxiously await the appointment of a new Interior Secretary, we hope that Reclamation will take it upon itself to remedy the study's shortcomings, and begin undertaking a water supply and demand analysis that is far more grounded in the immediate challenges facing both consumptive and non-consumptive uses of Colorado River water.

1) Colorado River Demand Constraints

The study's first major obfuscation is its approach to calculating water demand. Instead of focusing on the known fixed limits of demand for withdrawals from the Colorado River, as guided by the Law of the River, the study added upwards of 5.4 maf of projected new water demand that no one would ever assume could be provided by the Colorado River. The study's C1 scenario assumes Colorado River demand at 20.4 maf. However, in 1922 the Colorado River Compact, still in effect today, restricts United States diversions from the Colorado River to 15.0 maf. Although subsequent legislation and treaties have allowed for diversions above this amount under certain hydrologic conditions, it's pure fantasy to assume such excessive demand would ever be associated with Colorado River streamflow.

This supply/demand constraint has longtime been known to the basin's water planners. Accordingly, they've known to seek out on their own accord supplies beyond the Colorado River to satisfy the very demand Reclamation is forecasting. Given that the focus of this study is the Colorado River, and the supply constraints therein, it's completely inappropriate to introduce demand projections that exceed the river's known physical and legal supply constraints. Reclamation's role, and that of this study, must be to address the supply and demand challenges specific to Colorado River runoff. Reclamation must not use these known legal and hydrologic constraints to position itself to lead efforts in advancing additional supplies for projected demand that Colorado River runoff was never intended to serve.

Any demand figures beyond 15.0 maf have no bearing on anything relating to present or future management of Colorado River flows. Reclamation should therefore revise the study by appending all discussion of demand beyond this amount to a footnote pertaining to anticipated population increases and other factors stimulating future water demand. The Colorado River would never be asked to meet this demand, and it is not Reclamation's role to identify additional supply options. Reclamation's and the study's only focus, as regards to Colorado River water demand, should be on demand management within the River's existing and potential future water budget.

2) Directly Address Over-Allocation

The study's main impetus was the emergences of a multi-year drought in the watershed that began in 2000 along with growing concerns surrounding the likelihood of reduced future flows resulting from climate change. However, the potential for Colorado River water shortages due to over-allocation and hydrologic uncertainty has been known for decades. As the study states,

> *The challenges and complexities of ensuring a sustainable water supply and meeting future demand in an over-allocated and highly*

> *variable system such as the Colorado River have been recognized and documented in several studies conducted by the Bureau of Reclamation (Reclamation) and the Basin States over the past several decades.*
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> *Executive Summary, page 1*

The Colorado River Compact allocated 16.5 maf feet of water to the basin states and Mexico, but the average annual flow of the Colorado River over the last 50 years has been less than 15 maf at the Compact Point (Lee's Ferry, AZ). Moreover, recent consumptive use combined with treaty obligations have exceeded 16.5 million acre feet per year. Therefore, independently of potential climate change impacts, Colorado River water use has been operating at a significant deficit for years.

Although Reclamation concedes this problem, neither this study nor any of Reclamation's past initiatives have produced anything to encourage or require the Basin States to adjust their use to address this longstanding imbalance. Worse, the study actually masks this existing problem by focusing public attention on a convoluted future supply/demand imbalance that diverts attention from this immediate concern.

> *The average imbalance in future supply and demand is projected to be greater than 3.2 million acre-feet by 2060, according to the study. One acre-foot of water is approximately the amount of water used by a single household in a year. The study projects that the largest increase in demand will come from municipal and industrial users, owing to population growth. The Colorado River Basin currently provides water to some 40 million people, and the study estimates that this number could nearly double to approximately 76.5 million people by 2060, under a rapid growth scenario.*
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> *"There's no silver bullet to solve the imbalance between the demand for water and the supply in the Colorado River Basin over the next 50 years – rather, it's going to take diligent planning and collaboration from all stakeholders to identify and move forward with practical solutions," said Secretary Salazar. "Water is the lifeblood of our communities, and this study provides a solid platform to explore actions we can take toward a sustainable water future. Although not all of the proposals included in the study are feasible, they underscore the broad interest in finding a comprehensive set of solutions."*
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> *DOI Press Release: December 12, 2012*

Again, there's been a known imbalance for some time. It's not some distant problem that Reclamation presently has the foresight to address. Furthermore, as noted in item 1 above, Reclamation's future deficit is based on a completely

false interpretation of the Colorado River's supply side of the equation. The river was never expected to meet such demand projections. The only deficit relating to the river would be the difference between the 15.0 maf allocated by the Compact and what nature actually provides. The study must therefore be revised to specifically address this longstanding imbalance and strategies for the Basin States to remedy it.

3. The New Critical Period

As of March 11, the 24-Month Report forecasted 2013 Colorado River runoff into Lake Powell to be just 49% of average (average based on the period 1981-2010). As such, Reclamation projects 2013's unregulated inflow volume into Lake Powell will be 5.31 maf . By the end of September 2013 Lake Powell and Lake Mead are projected to be at 44% and 46% capacity respectively. Since 1999, when these reservoirs were nearly full, Colorado River flows have averaged only 84% of the annual flow since the beginning of the 21st century. Coincidentally, a similar average reduction occurred during what's been called the "Critical Period" from 1953 - 1964.

Two decades were required for Colorado River reservoirs to replenish themselves following this critical period of the mid-20th century. But during that time, consumptive use was not beyond the River's limit as it is now. During the period of "filling criteria" for Lake Powell (1963 - 1980), the Central Arizona Project was not then diverting 1.4 maf, and the upper basin states were diverting about 1.5 maf less than it does today. This 2.9 maf of surplus per year provided the opportunity for Lake Mead to recover and Lake Powell to eventually fill for the first time in 1980.

But this surplus water is not available now. This is why experts forecast that when and if this current critical period ends, Lake Powell and Lake Mead are unlikely to ever fill again (See: David Pierce and Tim Barnett. 2008. *When will Lake Mead go dry?* See also: Romano Foti et al. 2010. *Vulnerability of U.S. Water Supply to Shortage*).

As these earlier studies suggest, this current critical period could extend for some time, in effect these lower flows might represent the new normal. At minimum, given the low level of storage right now, rate of consumption, and some accepted level of climate change runoff reductions, it's impossible to argue that there does not exist at least some potential for shortages much sooner than suggested by the study. But this scenario, and responses to it, were not discussed.

Instead, the study's authors focused more on the abstract. They employed up-to-date modeling techniques to simulate climate impacts on Colorado River streamflow to generate a forecast for how much water the Colorado River will deliver over the next 50 years. Their answer: roughly 10% less water by 2060. While the approach to generate this finding fits with best practices, the report

failed to discuss how this finding fits with present reality, or the range of alternative scenarios Colorado River water users might also face, albeit with less likelihood according to their calculations.

Table 1
Comparison of Colorado River Low Flow Periods

1953-1964 +2 years	Natural Flow Lee's Ferry	2000 - 2013	Natural Flow Lee's Ferry	Notes
1953	11.2	2000	11.02	natural
1954	8.37	2001	11.1	natural
1955	9.8	2002	6.26	natural
1956	11.5	2003	10.47	natural
1957	20.16	2004	9.45	natural
1958	16.9	2005	16.85	natural
1959	9.23	2006	12.46	natural
1960	11.97	2007	12.17	natural
1961	9.25	2008	16.56	natural
1962	17.77	2009	15.28	provisional
1963	9.26	2010	13.27	provisional
1964	10.8	2011	21.33	provisional
1965	18.87	2012	9.45	provisional
1966	11.62	2013	10.35	provisional
Total average	12.6	Total average	12.6	provisional
Percent of 15 MAF	84%	Percent of 15 MAF	84%	provisional
Percent reduction	16%	Percent reduction	16%	provisional

Given that with each passing year climate change indicators from temperatures, reductions in continental ice, and various proxies of the paleo record continuing to exceed previous predictions, the future predictions employing climate modeling is a moving target. Therefore, this finding of a 10% average streamflow reduction by 2060 could prove to be very inaccurate. Prudent planning suggest that instead of concentrating so much on this average, that a wider range of scenarios are explored to better inform the public of both the high degree of uncertainty surrounding this average being realized, and the need to be prepared for wider range of possible futures, both good and bad.

For example, over the past 14 years Colorado River flows have averaged 16% below normal. What if this, or something close to it, is indeed the new normal? If this trend continues for another five years, what does that say about the usefulness of the current modeling? Again, the study's deficiency in this regard has little to do with its calculus and results. What's lacking is a comprehensive, qualitative analysis of what these finding may or may not mean given the real-world uncertainties surrounding them, especially placing them in the context of present day streamflow and stored water on hand.

4. An Environment and Conservation Ethic

The Colorado River is much more than a water pipe for farms, factories and families. The Colorado River is a living ecosystem that has been extensively damaged as a result unbalanced thinking and analysis perpetuated by studies like this that focus solely on human demand. The principal reason Reclamation and Colorado River water users have found themselves in this predicament is the lack of a conservation ethic inherent in their approaches since the Colorado River Compact was signed. Their emphasis has been human use and little more.

The study's extensive focus on new water supply options as opposed to aggressive demand side management strategies only decreases further the region's resilience to respond appropriately to the supply shortages that may lie ahead. The study's infrastructure options for groundwater mining, desalinization and inter-basin transfers add both to public debt and drive up prices for water consumers. More unfortunate, they reinforce a supply-side approach that is inconsistent with a growing global responsibility to pay more attention to regional and planetary resource boundaries. Put simply, Reclamation remains entrenched in looking for more water, as opposed to focusing on how to do more with the water it already has under management.

The Colorado's water supplies flow through national and state reserves where native species suffer as a result of the infrastructure and diversions that disrupt their habitat. A river that no longer flows freely has also affected sacred sites and cultural heritage. Stretches of the Colorado's native landscape have been dramatically altered by physical and biological interventions to foster and promote recreational activities inconsistent with the needs of the surrounding

habitat and at the expense of more complimentary and sustainable recreational opportunities. While the study may have assured certain instream flow parameters were maintained, it's focus was not how to enhance non-use values.

When looking at the future of the Colorado River, a study that emphasizes consumptive water use is valuable only insofar as it is a component feeding into a larger evaluation that is equally devoted to the Colorado River's other uses, values and management options, from which a more balanced set of scenarios can be generated for the River's long-term management.

5. Conclusion

The Basin Study represents a valuable technical achievement by Reclamation staff in applying contemporary modeling tools to generate predictions regarding future Colorado River flows. But these are just numbers, and they are wrought with uncertainty. Moreover, how these results were presented shielded the public from attaining an understanding of the real challenges that Colorado River water users may be facing far sooner than the study's findings predict. Therefore, Reclamation should task the authors to begin work on a revision that addresses the following:

1) Provide extensive qualitative analysis as to the significant real-world uncertainty associated with the future streamflow predictions.

2) Discuss in far more detail the range and probabilities in future streamflows beyond the 10% average reduction projected by 2060.

3) Specifically address the new critical period (2000-2013) and the likelihood that it will continue. Moreover, if these conditions do persist for several more years, at what point do the study's future streamflow findings lose relevance and Reclamation's modeling needs recalibrating?

4) Detail the history and present status of over-allocation in the Basin, and the strategies that might be pursued to address remedies.

5) Eliminate discussion of demand projections that are not directly connected to Colorado River withdrawals and/or Colorado River water delivery obligations with Mexico.

6) Restrict discussions of new water supply options to water saved through demand-side management and conservation, and only to the extent necessary to help balance the Colorado River's water supply budget.

7) Incorporate an analysis of the Colorado River's long-term needs and potential, relating to issues other than water diversion: critical habitat maintenance and restoration, appropriate recreation and cultural preservation, etc. Explore

opportunities for changes in how the river is managed and water is stored and delivered, given the changes in the hydrologic regime, the potential for water conservation, increased instream flows, and the decommissioning of unnecessary storage infrastructure.

This revised effort should be led by a team whose vision for the Colorado River extends beyond the dams and diversions put in place since the signing of the Colorado River Compact. There's more to the future of the Colorado River than how much and where its water can be diverted. Additionally, there's a need for full disclosure about the actual challenges water users may be facing in the near term, and creative discussions about solutions that address the real imbalance on the Colorado: excessive human intervention at the expense of the river's natural integrity. So despite the study's significant shortcomings, it can nonetheless serve as a valuable step in a continuing process that seeks real solution for the whole of the Colorado River, should the Interior Department, and Reclamation specifically, summon the leadership do so.

Sincerely yours,

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