

October 12, 2015

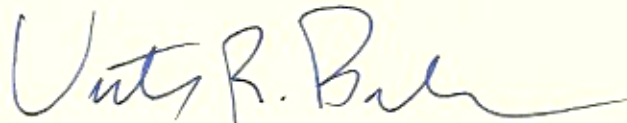
Honorable Sally Jewell
Secretary of Interior
U.S. Department of the Interior
1849 C Street, NW
Washington, DC 20240

Re: Letter requesting a National Academy of Sciences review of Colorado River programs pertaining to the 2009 SECURE Water Act, 2012 Colorado River Basin Water Supply and Demand Study and Moving Forward Effort

Dear Secretary Jewell:

Herein please find an open letter signed by 23 scholars requesting the Department of Interior to engage the National Academy of Sciences in a review of the activities so far undertaken by Interior, the Basin States and other stakeholders per the mandate of the 2009 SECURE Water Act, and as detailed in the 2012 Colorado River Basin Water Supply and Demand Study and 2015 Moving Forward Phase 1 Report.

Sincerely,



Victor R. Baker
Regents' Professor of
Hydrology and Water Resources



Honorable Sally Jewell
Secretary of Interior
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1849 C Street, NW
Washington, DC 20240

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Re: National Academy of Sciences review of Colorado River programs pertaining to the 2009 SECURE Water Act, 2012 Colorado River Basin Water Supply and Demand Study and Moving Forward Effort

Dear Secretary Jewell:

Congress provided an excellent opportunity via the 2009 SECURE Water Act¹ to help solve serious water problems on the Colorado River. As public intellectuals who have published extensively on the natural and human-induced changes to this river system, we applaud the efforts by the Department of Interior (DOI) to fulfill its mandate under this Act. The 2012 Colorado River Basin Water Supply and Demand Study (Basin Study), the resulting Next Steps Program, and the recently released Moving Forward Phase 1 Report have all fostered an improved understanding of some of the challenges facing people and wildlife that are reliant on water supplies from the Colorado River system. Moreover, this has been accomplished within an atmosphere of cooperation among stakeholders never before achieved. Nevertheless, some management options presently under consideration represent a departure from the baseline standards that have been provided in recent decades, and, on the whole, these options fail to provide a clear picture of how water security will be realized in the 21st century. As a result, despite the cooperative atmosphere among Basin States, the Tribes, Mexico, non-governmental organizations (NGOs) and other stakeholders, many of the conclusions reached by these partnerships may be insufficient to accommodate the full range of risks that lie ahead.

As the DOI now seeks input on its continued implementation of the programs set forth through the 2009 SECURE Water Act, we highlight below key concerns that so far have yet to be sufficiently addressed. Given their individual importance and collective scope, and that the process has already been underway for six years, we suggest that an independent, science-based review of this process by the National Academy of Sciences (NAS) would be both beneficial and timely.

1. Climate Change-Induced Streamflow Reduction Forecasts (SECURE Water Act, Sec. 9503 (1)): The Basin Study was overly focused on an average future runoff decline of 9% by 2060. Researchers have identified climate change-induced runoff reductions for the Colorado River to range from 6 to 45 percent by 2050. Twenty-first century Colorado River streamflows are currently 19% lower than those of the 20th Century. Uncertainty about the average decline for

¹Omnibus Public Land Management Act of 2009: Title IX—Bureau of Reclamation Authorizations, Subtitle F – Secure Water. PUBLIC LAW 111–11—MAR. 30, 2009: 123 STAT. 1329.

future runoff dictates that water managers should incorporate a suite of supply scenarios in their strategic planning.^{2 3}

2. Groundwater Impacts (SECURE Water Act, Sec. 9503(b)(2)(C)): Evaluations involving streamflow reductions and/or increased demand within the Colorado River watershed must also assess the stress that this may pose on groundwater reserves, both in terms of recharge and as a surrogate water supply. These relationships were not adequately addressed in the Basin Study. Some researchers have suggested that the Basin's groundwater reserves are being depleted, but a more comprehensive evaluation of the interactions between groundwater and surface water is clearly needed.⁴

3. Flood Management (SECURE Water Act, Sec. 9503(b)(2)(H)): While declining reservoir levels have focused public attention on water scarcity, major floods will occur within the Colorado River system. The established protocols for routing floodwater in the Colorado River system proved inadequate during the snowmelt of 1983. The relevant risks to flood protection for communities and critical infrastructure have not been adequately addressed, especially given the recent discoveries that revealed a 2,000-year flood history of higher magnitudes and frequencies. It remains unclear to what extent the water conveyance infrastructure can be safely managed to route the types of floods that Nature has historically visited upon this watershed.⁵

4. Water Demand Forecasts (SECURE Water Act, Sec. 9503(b)(2)(D)(i)): The Basin Study concluded that a supply shortfall could exist in 2060 of up to 6.8 million acre-feet (MAF) annually, with a median of 3.2 MAF. These findings, however, are based on outdated population projections and inattention to growing water conservation trends underway throughout the basin, resulting in inflated demand scenarios and inaccurate options' assessment. Moreover, the analysis undertaken tends to equate any desire to consume water that is unmet as a

² Julie A. Vano, Bradley Udall, Daniel R. Cayan, Jonathan T. Overpeck, Levi D. Brekke, Tapash Das, Holly C. Hartmann, Hugo G. Hidalgo, Martin Hoerling, Gregory J. McCabe, Kiyomi Morino, Robert S. Webb, Kevin Werner, and Dennis P. Lettenmaier, 2014: Understanding uncertainties in future Colorado River streamflow. *Bull. Amer. Meteor. Soc.*, **95**, 59–78. <http://journals.ametsoc.org/doi/pdf/10.1175/BAMS-D-12-00228.1>

³ Tim P. Barnett and David W. Pierce. Sustainable water deliveries from the Colorado River in a changing climate. *PNAS* 2009, [doi:10.1073/pnas.0812762106](https://doi.org/10.1073/pnas.0812762106)

⁴ Castle, S. L., B. F. Thomas, J. T. Reager, M. Rodell, S. C. Swenson, and J. S. Famiglietti (2014), Groundwater depletion during drought threatens future water security of the Colorado River Basin, *Geophys. Res. Lett.*, 41, 5904–5911, [doi:10.1002/2014GL061055](https://doi.org/10.1002/2014GL061055)

⁵ Greenbaum, N., T. M. Harden, V. R. Baker, J. Weisheit, M. L. Cline, N. Porat, R. Halevi, and J. Dohrenwend (2014), A 2000 year natural record of magnitudes and frequencies for the largest Upper Colorado River floods near Moab, Utah, *Water Resour. Res.*, 50, 5249–5269, [doi: 10.1002/2013WR014835](https://doi.org/10.1002/2013WR014835).

shortage and does not include needs' assessments that offer demand scenarios that fit within available supply limits.⁶

5. Ecology (SECURE Water Act: Secs. 9503(b)(2)(D),(E),(G)): Native Colorado River fishes are well-adapted to annual and seasonal changes in natural habitat. Unfortunately, the Colorado River has experienced massive changes that have endangered four of its big river fishes, and threatened others. For example, a top predator in the larger river channels, the Colorado pikeminnow (a large migratory fish), has lost about 80% of its historic habitat due to construction and operation of dams, diversions and reservoirs. A legacy of stocking aggressive non-native 'sport' fishes and bait fishes, mostly by state and federal agencies, has further stressed native fish. While some attention is now being given to ecological flows through the Moving Forward Effort, what remain unclear are the long-term prognosis for habitat recovery and the challenges and trade-offs needed to achieve it across the entire ranges of critical habitat within the Colorado River watershed.⁷

6. Water Quality (SECURE Water Act, Sec 9503(b)(3)(F)): While the Basin Study modeling included several salinity metrics, it did not adequately consider the broader scope of salinity concerns given the potential for more intense climate change-induced streamflow reductions. Moreover, the SECURE Water Act's Water Quality requirement was not strictly limited to salinity considerations, but it also included water quality issues more generally as they impact ecological habitat, human health and the economy. With decreasing annual flows in the Colorado River basin, the mitigating effects of diluting return flows will become more challenging and expensive over time. Not only salts, but also pesticides, heavy metals (such as selenium, mercury, and arsenic), groundwater plumes of hexavalent chromium and perchlorate rocket fuel, and endocrine disruptors from pharmaceuticals may all become more problematic. The impacts from increased hydraulic fracturing practices within the basin can also affect surface water quality, as well as the thousands of defunct mines and drilling installations within the basin that are still awaiting remediation.⁸

7. Vulnerability (SECURE Water Act, Sec. 9501(3)): As prerequisite to fulfilling its climate change adaptation responsibilities under the Act, DOI should first undertake a comprehensive climate change vulnerability assessment of this complex, coupled human-environmental system. The 2014 National Climate Assessment reiterates the importance of such baseline

⁶ Cohen, Michael (Pacific Institute), Beckwith, Drew (Western Resources Advocates), Letter to Colorado River Basin Study Project Team, May 25, 2012

⁷ Adler, Robert W., An Ecosystem Perspective on Collaboration for the Colorado River (August 20, 2008). UNLV William S. Boyd School of Law Legal Studies Research Paper No. 08-13; UNLV William S. Boyd School of Law Legal Studies Research Paper No. 08-13. Available at SSRN: <http://ssrn.com/abstract=1241483>

⁸ Walters, D. M., Rosi-Marshall, E., Kennedy, T. A., Cross, W. F. and Baxter, C. V. (2015), Mercury and selenium accumulation in the Colorado River food web, Grand Canyon, USA. *Environmental Toxicology and Chemistry*. doi: [10.1002/etc.3077](https://doi.org/10.1002/etc.3077)

analysis for formulating climate change response strategies.⁹ Nonetheless, it remains unclear how DOI or the Moving Forward Effort intends to undertake a climate change vulnerability assessment for the Colorado River that will include the society and ecosystems that depend upon it.

Congress, when it approved the 2009 SECURE Water Act and appropriated funds for DOI to initiate the Basin Study, recognized the need to assist stakeholders in developing a management plan that will adapt to the changing hydrology of the Colorado River. This process will not be successful if the components listed above are not examined thoroughly. The need to synthesize climate change impacts, groundwater impacts, flood management criteria, water demand forecasts, recovery of the river's ecology and water quality impacts were specifically asked for in the Act, and so it is reasonable to request that DOI seek an impartial review of the Basin Study process to ensure that the program is indeed on track. Such independence and expertise can more objectively confront the difficult issues that might otherwise continue to escape through the cracks amidst the challenges of maintaining this stakeholder-driven process.

At the same time, significant challenges persist impeding integration of scientific findings into Colorado River management. The proposed review should examine the institutional barriers and capacity limitations constraining the use of science's best articulation of the complex variables at play in our quest to realize more resiliency, robustness and flexibility in our management of this vital natural resource. The review should therefore consult practitioners at federal, state and tribal levels to the extent appropriate in order to identify pathways that will ensure valuable scientific research better informs decision-making.

The National Academy of Sciences, through its National Research Council, has assisted DOI in the past on several important Colorado River management issues. As scientists we appreciate the peer-review methods of the NAS. Because the development of management criteria in the Colorado River basin is often volatile, the NAS would maintain confidentiality and quality control in their review process. The NAS typically publishes their work in two years or less. Additionally, the cost will not be a burden to the DOI budget and would prove to be an investment well spent.

In summary the DOI, in cooperation with the Basin States, Tribes, Mexico and NGOs, has accomplished valuable work in the Colorado River basin as requested by Congress. Nevertheless, the process has not sufficiently engaged academic and scientific assets. Without a broad examination of the important physical and social issues listed above, the management decisions now under consideration will likely lead to increasing system vulnerabilities and expenses. Clearly DOI should seek the best available science for the management of this critical natural resource while taking a comprehensive look at the processes by which this important information will best be integrated into Colorado River management. It is our hope that DOI will seriously consider our request for an independent peer-review of the Basin Study, with the goal of developing successful and robust strategies to secure water supplies and recover endangered species in a timely and affordable manner. We are available to consult with you and your staff immediately for more details about our requests.

⁹ US Global Change Research Program, *2014 National Climate Assessment*, <http://nca2014.globalchange.gov/report/response-strategies/research-needs>

Sincerely (listed alphabetically),

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Bradley H. Udall; Colorado Water Institute; Colorado State University, Fort Collins

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Cc:

The Honorable Joseph R. Biden Jr.
President of the Senate

The Honorable John Boehner
Speaker of the House of Representatives

The Honorable Doug Ducey
Governor of Arizona

The Honorable Susana Martinez
Governor of New Mexico

The Honorable Jerry Brown
Governor of California

The Honorable Brian Sandoval
Governor of Nevada

The Honorable John Hickenlooper
Governor of Colorado

The Honorable Gary Herbert
Governor of Utah

The Honorable Matt Mead
Governor of Wyoming

The Honorable Tom Vilsack
Secretary of Agriculture

Ms. Gina McCarthy
Environmental Protection Agency

Ms. Christy Goldfuss
Council on Environmental Quality

Colonel Kimberly M. Colloton
U.S. Army Corps of Engineers

Mr. Mark Gabriel
Western Area Power Administration

Mr. Edward Drusina
International Boundary and Water and
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Colorado River Commission of Nevada

Ms. Tanya M. Trujillo
Colorado River Board of California

Mr. Michael Lacey
Arizona Department of Water Resources

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