Executive Summary

Photo Credit: Brad Udall

Conditions on the Colorado River are, to put it bluntly, dire. The reservoirs that, when full, provide Colorado River water users with roughly 4 years of annual flows are now more than two-thirds empty. Additionally, the tradition of collaborative crisis management among the seven basin states may have reached its breaking point, as the ongoing EIS process for developing post-2026 rules has made it increasingly clear that finding truly sustainable solutions is both an exceptionally difficult challenge and is one that can no longer be kicked down the road. Both the water supply and institutional systems are failing; many of the environmental systems failed years ago, with others just hanging on desperately. Another year or two of low inflows and we will completely blow through the cushions provided by reservoir storage and the 20-year truce known as the Interim Guidelines, entering a world where physically moving water downstream becomes limited both by hydrology and engineering, and where the Compact "tripwire" of 10-year annual releases are potentially violated. As our report's sub-title suggests, we have now entered a new era: *Dancing with Deadpool*.

This inaugural *Colorado River Insights* touches on several of these issues in a variety of ways by eleven Colorado River Research Group members joined by eight guest contributors. It's far from a postmortem. The reality is that most of the problems in the basin are, and continue to be, to some degree self-inflicted, and that viable paths forward are available. Unlike many other corners of the world dealing with water stress, the Colorado River basin presumably has the resources and expertise needed to understand and address the multitude of challenges. This has been true for decades, but action has been postponed again and again, largely because the reality of the modern Colorado River does not match the river most States, Tribes, and NGOs felt they were promised. As we've all witnessed in recent years and months, that is a difficult starting point for negotiating solutions.

Given the open-ended nature of the Individual Submissions that comprise this volume, they don't fit together precisely in concept or structure like they would in a more deliberately structured multi-author book. Thus, the organization of the chapters is a "best fit" approach that generally pulls the reader from a discussion of physical conditions to human impacts, and simultaneously, from problem descriptions to more solution-oriented ideas. Again, this is an imperfect typology, as some contributions attempt to do all these things whereas others are much more narrowly focused.

The volume begins in **Chapter 1** with a detailed summary of the reservoir conditions that have inspired the disconcerting sub-title of this report, authored by authored by Jack Schmidt, Anne Castle, John Fleck, Eric Kuhn, Kathryn Sorensen, and Katherine Tara. As they note, the focus on crafting new long-term (post-2026) rules is a needed but dangerous distraction from the short-term crisis and the need to take action

immediately to further reduce consumptive water use across the basin. If winter 2025-2026 continues to be relatively dry and inflow to Lake Powell and other Upper Basin reservoirs is similar to that of 2024-2025, it is likely that less than 4 million acre feet in Lake Powell and Lake Mead would be *realistically available*—given infrastructure and hydropower production constraints limiting consumption of some active storage—for use during the nine months between late summer 2026 and the onset of snowmelt runoff in 2027. If winter 2026-2027 continues to be dry, water supply would be further constrained. The present reservoir operating rules that remain in place through 2026 are insufficient to avert this potential water supply crisis.

The sharp disparity between the river of today versus the river of the past (and the future) is a theme explored further in Chapter 2 by Jonathan Overpeck and Brad Udall fleshing out the contribution of climate change to the current problem and, more importantly, future conditions. Building on earlier research showing how warming temperatures reduce runoff by affecting local hydrologic processes (such as evapotranspiration), new research further suggests that climate change also negatively influences precipitation patterns—and thus runoff—in the basin by modifying water and air temperatures in the Pacific Ocean. It is a perfect storm of bad news, with the caveat that the underlying cause—greenhouse gas emissions—is a problem that can be managed through human intervention.

In Chapter 3, Doug Kenney continues a focus on risk and risk management, noting that the declining reservoirs are not the only "safety nets" that are buckling under the stress of climate change and a broken water budget. The most familiar of those other hydrologic safety nets is groundwater, which according to some of the latest research, is being mined at a pace far exceeding the more visible losses in surface water. Compounding these problems, the federal agencies, programs, and people that exist to understand and address these problems—as well as the underlying problem of climate change—are now being rapidly dismantled. Loss of staffing and financial resources are likely to limit the ability of the "federal partner" to assist the basin states that, increasingly, seem unable to dig out from the policies that threaten regional water supplies. Litigation, once a third rail issue for the states, is now clearly on the table of options, and is increasingly viewed by some as the best (and perhaps only) road forward. Virtually every trend is increasing risks to economic, environmental, and social systems.

The topic of water equity—an issue bubbling just below the surface in virtually all the discussions herein—takes center stage in Chapter 4. Bonnie Colby and Zoey Reed-Spitzer's detailed review of all areas receiving Colorado River water illuminates a troubling reality: limited access to clean water (for households and green spaces) and exposure to water pollutants is closely linked to ethnicity, with Hispanic, Black, and Native American populations disproportionately burdened. This topic is largely absent from many of the discussions over the Colorado River's future. Admittedly, this is a difficult problem derivative of policies originating at multiple levels of government and in many substantive areas. Nonetheless, this more nuanced picture of water equity deserves to be part of the policy dialogue on matters of water access, infrastructure spending, and water quality protection.

It's hard to imagine a more flexible and adaptive way to manage risk (and improve equity) on the river at a macro scale than to base allocations on a percentage system, rather than the fixed apportionments that currently characterize the

Law of the River. As reviewed by Eric Kuhn in Chapter 5, that approach has now been seriously considered in 3 instances: first in the 1922 Colorado River Compact negotiations, then revisited for the 1948 Upper Basin Compact, and most recently in post-2026 negotiations occurring over the summer and fall of 2025. In only the 1948 Upper Basin Compact negotiations did this approach prevail. The recent effort in 2025 has been derailed—at least to this point—by two intractable questions: what percentage would each basin receive, and how would this be enforced? Rather than tackle those questions, the sub-basins seem increasingly willing to stick to their own, mutually incompatible, legal interpretations of how shortages should be parsed among sub-basins, even if this inevitably steers the parties to interstate litigation. The only realistic path to a percentage-based apportionment, therefore, may be as a negotiated settlement to litigation, or perhaps the serious threat of litigation.

Chapter 6 offers one potential road forward that looks at the root water management problem: overuse of water. Kathryn Sorensen and Sarah Porter begin by acknowledging the many notable and creative arrangements major water users have crafted in recent years to reduce risks and implement incentivized conservation, but notes that a real solution requires more significant and lasting net reductions in water consumption. Much of the basin's current water use has been promoted and facilitated through federal actions, suggesting an obligation for federal leadership in efforts to permanently reduce use. One approach would be to establish a program of purchase and retirement of some agricultural lands, focused largely on those featuring high water use and low economic productivity. Given the potential socioeconomic impacts of such a program, great care would be needed in the selection of lands and the structure of the program, but it is one of few options available to achieve the scale of water saving needed to balance the regional water budget.

Chapter 7 continues the focus on the agricultural sector, and specifically, the challenge of reducing water use on Upper Basin farms and ranches. Kristiana Hansen, Daniel Mooney, Mahdi Asgari, and Christopher Bastian base their analysis on the notion that water availability for these users will almost certainly decline in the future, regardless of how ongoing interstate negotiations play out. The challenge, thus, is to choose proactive adaptation rather than unmanaged decline in these operations so vital to supporting rural economies. A variety of operational strategies have already been demonstrated—and many others remain to be explored—to achieve the needed reductions in use, pending the development of policy and market mechanisms that make these practices feasible for producers.

The volume concludes in Chapter 8, somewhat ironically, with a discussion of where the laws and policies for the river originate: the governance arrangements. Here, Matthew McKinney, Jason Robison, John Berggren, and Doug Kenney lament the governance deficiencies in the basin in three intertwined areas: inclusivity, transparency, and framing. After doing so, they cast eyes towards a solution: convening a basin-wide conversation about the merits and possible construction of a basinwide entity where current and future issues in the basin can be addressed by sovereigns, technical experts, and concerned citizens and river advocates. This is common practice in much of the world, and is not a new proposal for the Colorado River. Given the disappointing state of river management, both in terms of process and substance, the time has never been better to seriously explore this pathway. •