

# **THINKING LIKE A RIVER BASIN:**

## **Leaders' Perspectives on Options and Opportunities in Colorado River Management**



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*A report from the*  
**Center for Natural Resources & Environmental Policy**  
**The University of Montana**

**In cooperation with Carpe Diem West**

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## **THINKING LIKE A RIVER BASIN: Leaders' Perspectives on Options and Opportunities in Colorado River Management**

### **Executive Summary** **April 2011**

This report provides a snapshot of Colorado River Basin leaders' perspectives on the policy decisions and challenges facing the basin. Its findings are based on confidential interviews conducted with 29 decision makers and other experts, including current and former employees of local, state, interstate, tribal, and U.S. and Mexican federal entities; urban and rural water agencies; conservation groups; and universities and related research institutes.

The concept for this report emerged from discussions over the past year among Carpe Diem West network members, who saw the need to develop a picture of the possible range of solutions for better managing water in the Colorado Basin in a time of increased water scarcity and growing demand.

Several common themes emerged in these conversations:

- There is widely shared concern that the Colorado River Basin's water supply and demand are in a precarious balance, and that conditions are likely to get less certain rather than more secure in the near term.
- Although many people foresee the likelihood of increased conflict as a result of these conditions, there is a widely held and consistently expressed shared value for resolving conflicts through discussion and negotiation, and an equally strong aversion to Compact-related litigation.
- There is widespread acknowledgement that a broader range of stakeholders desires to be involved in river management decisions than is currently allowed, although opinions vary about whether a broadly inclusive model of participation would be feasible or desirable.

The report summarizes the leaders' perspectives in response to the two broad questions that provided the starting point for each conversation:

**First Interview Question:**

**If the Colorado River continues to be managed pursuant to current laws, including the Interim Guidelines [contained in the 2007 Record of Decision], what conditions do you foresee in 15 years in terms of water shortages, water security, and interstate conflicts?**

**Hydrologic Conditions: *“The sky is not falling . . . yet”***

- Although all do not agree that climate change is the cause, there is general agreement that water supplies will be more stressed and conditions less certain in the future.
- The Colorado River is near capacity in meeting the demands of current uses.
- A shortage as defined in the Interim Guidelines is likely to be declared much sooner than was anticipated in 2007.

**Political Conditions: *Unstable footing ahead***

- The consequences of a shortage would vary a great deal among the seven basin states.
- A variety of unresolved legal issues make discussion of solutions difficult; some of these will have to be resolved to move forward productively.
- There is a real possibility of compact-based litigation in the next 15 years, although most parties share a strong commitment to resolve conflicts outside of the courtroom.
- Many feel strongly that the Law of the River provides important protection for states’ interests and does not require major changes.
- Recent initiatives offer encouragement for the promise of collaborative solutions, assuming the parties have an incentive to negotiate.
- Many see an unmet need for leadership that is willing to look beyond the interest of their own constituencies and promote a basinwide vision.

**Second Interview Question:**

**What might be necessary to achieve a more satisfactory outcome in this time period and beyond? We’re interested in your thoughts about how to improve decision-making processes, certainty, meaningful participation by stakeholders, and political/financial support for innovative management solutions.**

**The Law of the River: *The key is flexibility***

- There is widespread support for preserving the 1922 Colorado River Compact, though many favor additional agreements and interpretations of the Law of the River to address identified concerns.

- There is some interest in forming or engaging a new entity to facilitate basinwide conversations and provide a more regular process for stakeholder input.
- There are mixed opinions about the appropriate role for the Secretary of the Interior.
- Many expect the Interim Guidelines to require updating sooner than was anticipated in 2007.

**River Management: *More information and better practices***

- The Basin Study could provide important information about future scenarios and management options, but not everyone expects this outcome.
- There is a great deal of interest in options for augmenting the basin's limited water supplies to meet anticipated demands.
- Conservation and efficiency are viewed as important tools for stretching limited Colorado River water supplies.
- Some favor a broader approach to water transfers, ranging from local markets to interstate transactions involving cooperative storage agreements.
- Environmental protection and restoration initiatives remain a high priority, but some feel they should be evaluated and prioritized for maximum effectiveness.
- Many believe that additional and more diverse financial support will be necessary to address the basin's issues.

The many thoughtful ideas reflected here offer numerous starting points for productive, forward-looking conversations. Our experience suggests that the conditions may be ripe in the Colorado River Basin to explore some options for complementary processes to involve a wider range of interests to inform future management decisions. A broader dialogue could engage people more effectively in understanding and addressing the tough choices ahead in the basin.

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# I. Introduction

Competition for scarce Colorado River water resources is a longstanding reality in the arid Southwest. These conflicts prompted the seven basin states (Arizona, California, Colorado, Nevada, New Mexico, Utah, and Wyoming) to negotiate the 1922 Colorado River Compact, which today forms the core of the “Law of the River” that guides river water allocation and management decisions.<sup>1</sup>

In response to the dual challenges of increasing demand and sustained drought, the seven Colorado River Basin states crafted a set of interim guidelines for allocating Colorado River water in the event of shortages. These guidelines, approved by the Secretary of the Interior in a Record of Decision<sup>2</sup> in December of 2007, expire in 2026.

The Interim Guidelines represent an important advance in Colorado River management, suggesting that the many interests dependent on the basin’s resources can work together to address shared risks, concerns, and needs. And, although recent studies suggest that the terms of the 2007 agreement will not address the many challenges facing the basin in the next 15 years,<sup>3</sup> the Interim Guidelines bought valuable time for the basin states, federal resource managers, Indian nations, the Mexican government, and a wide variety of stakeholders to evaluate options for more comprehensive long-term solutions.

## A. Report Objectives

The idea for conducting this report emerged from conversations among diverse experts on western water policy joined through Carpe Diem West’s leadership network. These experts felt that Carpe Diem West could contribute to ongoing policy development by sparking forward-looking conversations about options and opportunities. This report is a first step toward identifying fruitful areas where such options and opportunities might be found. It is intended to inform and complement ongoing discussions among the basin states, federal managers, and others.

The goal of this report is to identify, through conversations with Colorado River Basin leaders, areas of shared concern and possible next steps to respond to the challenges facing the basin in the next 15 years and beyond. In other words, this is essentially a snapshot of leaders’ perspectives at a

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<sup>1</sup> For a brief overview of the Law of the River, see section II below. See also <http://www.usbr.gov/lc/region/g1000/lawofrvr.html>.

<sup>2</sup> U.S. Bureau of Reclamation, Colorado River Interim Guidelines for Lower Basin Shortages and Coordinated Operations for Lake Powell and Lake Mead (2007), available at <http://www.usbr.gov/lc/region/programs/strategies.html><http://www.usbr.gov/lc/region/programs/strategies.html>

<sup>3</sup> See, e.g., B. Rajagopalan, et al. *Water Supply Risk on the Colorado River: Can Management Mitigate* (Water Resources Research, Rapid Communication, 2009); John Berggren, et al., *Stressors and Threats to the Water Budget of the Colorado River Basin* (Natural Resources Law Center, 2010).

critical time in Colorado River management. This report is not a consensus document, poll, or statement of recommended policy changes. It may, however, offer insights to inform and encourage dialogue throughout the basin and beyond in the coming years.

## **B. Report Process**

The Center for Natural Resources and Environmental Policy at The University of Montana conducted this report in cooperation with Carpe Diem West. Senior staff at both organizations conducted confidential telephone interviews with 29 decision makers and other experts in the Colorado River Basin, identified in consultation with Carpe Diem West's leadership network. (See the full list of people interviewed in Appendix A and the introductory letter to participants in Appendix B.) Interviewees included current and former employees of local, state, interstate, tribal, and U.S. and Mexican federal entities; urban and rural water agencies; conservation groups; and universities and related research institutes.

The interview questions were simple and open-ended, in order to elicit thoughtful responses on big-picture issues:

- 1. If the Colorado River continues to be managed pursuant to current laws, including the Interim Guidelines [contained in the 2007 Record of Decision], what conditions do you foresee in 15 years in terms of water shortages, water security, and interstate conflicts?*
- 2. What might be necessary to achieve a more satisfactory outcome in this time period and beyond? We're interested in your thoughts about how to improve decision-making processes, certainty, meaningful participation by stakeholders, and political/financial support for innovative management solutions.*

These conversations took place between November 2010 and February 2011. Each took approximately 30 minutes, and none was taped or recorded other than in the researcher's notes. Individual responses to the interview questions are confidential, and no comments in this report are attributed to any individual. All participants were cooperative, generous with their time, and remarkably candid in their remarks. We appreciate their participation, and hope the information compiled here proves helpful to their good work.

## **C. Analyzing the Results**

Sections III and IV below summarize what we heard in response to the two broad questions, organized in themes we identified in reviewing our interview notes. These include leaders' predictions about hydrological conditions and the political forces shaping Colorado River management in the coming 15 years, and their thoughts on how to respond.



We were struck by several common themes that emerged in these conversations:

- There is widely shared concern that the Colorado River Basin's water supply and demand are in a precarious balance, and that conditions are likely to get less certain rather than more secure in the near term.
- Although many people foresee the likelihood of increased conflict as a result of these conditions, there is a widely held and consistently expressed shared value for resolving conflicts through discussion and negotiation, and an equally strong aversion to Compact-related litigation.
- There is widespread acknowledgement that a broader range of stakeholders desires to be involved in river management decisions than is currently allowed, although opinions vary about whether a broadly inclusive model of participation would be feasible or desirable.

A reader searching for clear recommendations may be frustrated, but the many thoughtful ideas reflected here offer numerous starting points for productive, forward-looking conversations. Our impression from speaking with these leaders is that they are ready for and interested in engaging in such discussions.

## II. Orientation: The Colorado River Basin and its Management

In conducting this report, we tapped into the thinking of 29 experienced and thoughtful individuals—taking the pulse of some of the key leaders who will shape the future of the Colorado River Basin. Most of these people have been participants in the milestones of basin management in recent decades, including the negotiations that led to the 2007 Interim Guidelines. The people we interviewed, and many who will read this report, are experts on Colorado River hydrology, the Law of the River, and the river’s many and diverse management challenges.

For the sake of those less familiar with the basin and the complex collection of laws, regulations, policies, and practices that govern its management, we provide here a brief orientation to the physical and legal framework within which Colorado River management decisions occur.

### A. The Colorado River Reaches Beyond its Basin

The Colorado River flows approximately 1,450 miles from the high country of the Rocky Mountains to the Gulf of California, providing critical water supplies for cities, crop irrigation, hydroelectric power generation, recreation, and flows necessary for fish and wildlife habitat. Dependent on snow deposited in Pacific storms on the Rocky Mountains, Colorado River streamflows are temperamental, with a fivefold difference between runoff in the wettest and driest years. Dams help even out the variable flows by providing storage capacity four times greater than the river’s annual flow. The river draws water from seven western states and traverses a small corner of Mexico, forming a 246,000 square-mile river basin.

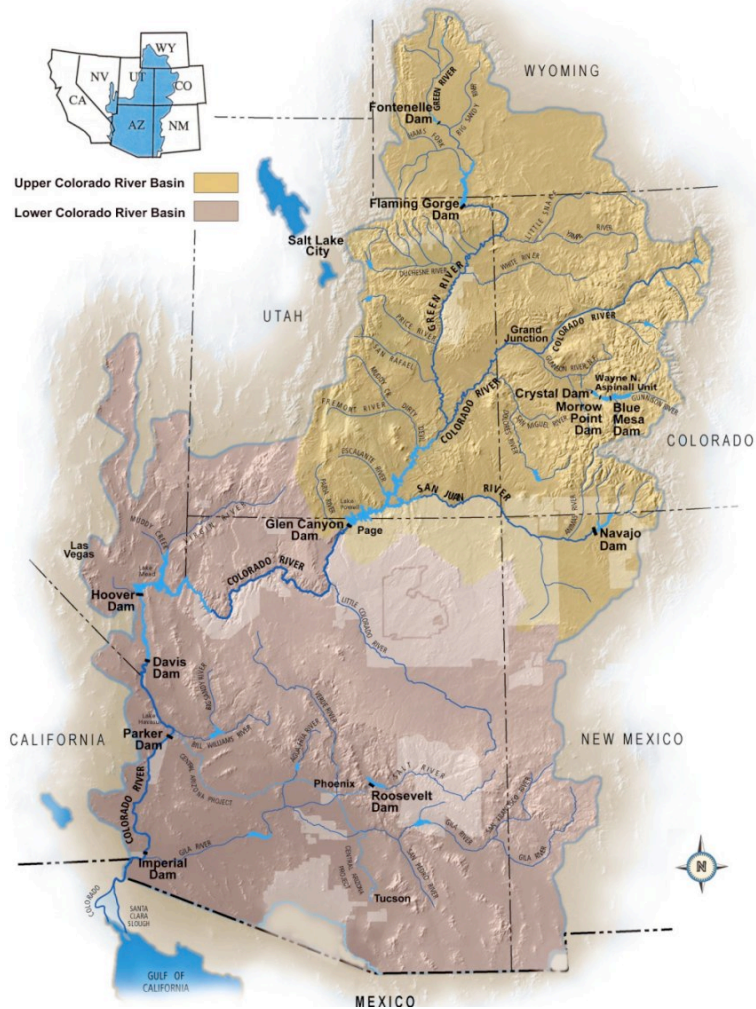
Importantly, the river basin model is insufficient to describe the hydrology of the Colorado River, because numerous diversions move river water out of the basin to people living in Colorado’s Front Range, Southern California’s farmlands and cities, and elsewhere.<sup>4</sup> Gary Weatherford argued that such transbasin diversions “cause hydrologic basins to be reshaped, breached and bonded by hydraulics resulting in hybrid basins.”<sup>5</sup> He termed these “hydrocommons,” which necessarily broaden the table of those who are affected by and must be involved in river management decisions.

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<sup>4</sup> Major transbasin projects in Colorado include the Colorado Big-Thompson Project (213,000 AF/yr), Denver Water Collection System (257,304 AF of total capacity), and the Fryingpan-Arkansas Project (69,200 AF/year). The San Juan Chama Project in New Mexico diverts 110,000 AF/year out of the Colorado River Basin. In Utah, the Central Utah Project, Bonneville Unit delivers 219,160 AF/year to out-of-basin users. In the Lower Basin, nearly all of California’s 4.4 MAF apportionment is used outside of the Colorado River Basin. The Metropolitan Water District of Southern California delivers between 550,000 AF and 1.293 MAF per year from the Colorado River to users in San Diego and Los Angeles. The Imperial Irrigation District diverts 3.1 MAF of Colorado River water per year out of the basin. John Berggren, et al., *Stressors and Threats to the Water Budget of the Colorado River Basin* (Natural Resources Law Center, 2010).

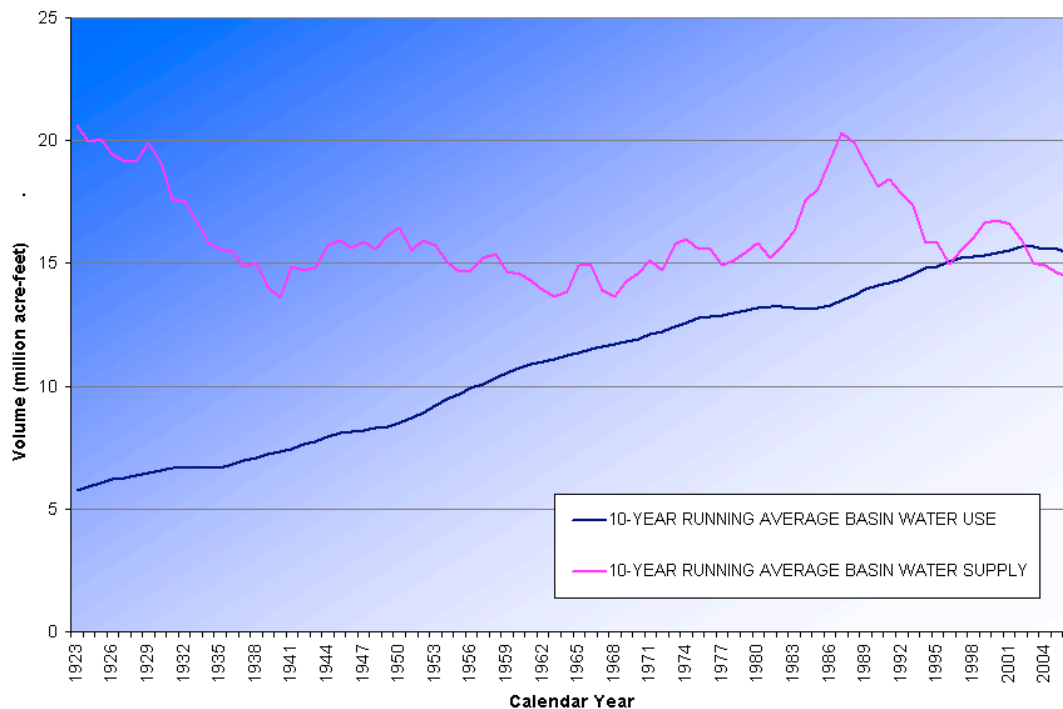
<sup>5</sup> Gary D. Weatherford, *From Basin to “Hydrocommons”: Integrated Water Management Without Regional Governance* (Natural Resources Law Center Western Water Policy Discussion Paper No. 5, 1990), available at [http://www.rlch.org/WWPP/archives/publications/1990/90\\_RR\\_Weatherford%20\(hydrocommons\).pdf](http://www.rlch.org/WWPP/archives/publications/1990/90_RR_Weatherford%20(hydrocommons).pdf)

## Colorado River Basin



The Colorado River serves more than 30 million people throughout and well beyond the basin.<sup>6</sup> It is virtually stretched to the limit of its ability to meet a wide variety of human and environmental demands, and current data (see graph) suggest that demands already exceed available water supply. Today's water managers face challenges beyond those contemplated a century ago—rapid population growth in Southwestern cities, growing demand for water-consumptive energy sources, development of long-held Indian reserved water rights, mandates to restore and protect aquatic ecosystems, and highly variable climatic conditions.

<sup>6</sup> By contrast, the mighty Columbia River, with average annual flows ten times that of the Colorado River, serves about a third as many people with electric power, crop irrigation, fisheries, industrial water, recreation, and everyday drinking water.



*This graph, provided by the U.S. Bureau of Reclamation, suggests that average annual water demands have already overtaken average annual water supplies in the Colorado River Basin.*

## B. The Law of the River: An Evolving Rulebook

Colorado River water allocation is governed by a collection of interstate compacts, treaties (with Mexico and Indian nations), federal legislation, and court decisions—which, collectively, comprise the “Law of the River.”<sup>7</sup> The seminal document is the Colorado River Compact, signed in 1922, which sets the basic quantitative apportionments among the seven basin states.<sup>8</sup>

The parties who negotiated the Compact aimed at dividing the river’s flow between the states of the Upper Basin (Colorado, New Mexico, Utah, and Wyoming) and Lower Basin (Arizona, California, and Nevada); resolving and preventing interstate disputes; and promoting orderly river development and management. Its key provisions include:

- Article III(a), which allocates 7.5 million acre-feet (MAF)/year of “beneficial consumptive use” to each basin, while Article III(b) reserves an additional 1 MAF/year for the Lower Basin

<sup>7</sup> The U.S. Bureau of Reclamation periodically publishes a reference book that collects many documents related to Colorado River water allocation and management. See *Colorado River Documents 2008* (hardbound book and DVD, released in 2010), <http://bookstore.gpo.gov/collections/colorado-river.jsp>

<sup>8</sup> See full text at <http://www.usbr.gov/lc/region/g1000/pdfiles/crcompct.pdf>

- Article III(c), which provides for administration of any later apportionment to Mexico (similarly, Article VII anticipates, but does not otherwise address, future apportionments to Indian tribes)
- Article III(d), which prohibits the Upper Basin states from causing average flows for any 10-year period to fall below 75 MAF at Lees Ferry (the dividing point between the two basins)
- Article VIII, which describes water rights already being exercised (so-called Present Perfected Rights) as being “unimpaired” by the Compact apportionment

Congress ratified the Colorado River Compact as part of the Boulder Canyon Project Act of 1928,<sup>9</sup> which also authorized the construction of the Boulder (now Hoover) Dam and the All-American Canal, as well as providing the three-state division of the Lower Basin apportionment. As the U.S. Supreme Court later confirmed in *Arizona v. California*,<sup>10</sup> the apportionment annually provides 4.4 MAF to California, 2.8 MAF to Arizona, and 0.3 MAF to Nevada. Deliveries in excess of such amounts are apportioned 46% to Arizona, 50% to California, and 4% to Nevada.

A 1944 Treaty with Mexico<sup>11</sup> provides the downstream nation with a minimum apportionment of 1.5 MAF annually. The 1948 Upper Colorado River Basin Compact<sup>12</sup> allocates the Upper Basin apportionment by percentages: 51.75% for Colorado, 23% for Utah, 11.25% for New Mexico, and 14% for Wyoming.<sup>13</sup>

The Law of the River also includes federal statutes relating to water project authorization and operation, including: the Colorado River Storage Project Act,<sup>14</sup> which provided an Upper Basin development plan and authorized the construction of Glen Canyon Dam; and the Colorado River Basin Project Act,<sup>15</sup> which authorized several projects, including the Central Arizona Project, or CAP. Soil salinity problems prompted to the enactment of the Colorado River Basin Salinity Control Act<sup>16</sup> and Minute 242 (1973), amending the treaty between the United States and Mexico.

As mandated by the Colorado River Basin Project Act and further defined in 1970 legislation, the Secretary of the Interior is required to prepare both long-range and annual plans for operations of the two major federally operated reservoirs on the Colorado River—Lake Mead, behind Hoover Dam, and Lake Powell, formed by Glen Canyon Dam.

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<sup>9</sup> P.L. 642, 45 Stat. 1057 (1928).

<sup>10</sup> 373 U.S. 546 (1963).

<sup>11</sup> T.S. No. 994, 59 Stat. 1219 (effective Nov. 8, 1945).

<sup>12</sup> 63 Stat. 31 (1949).

<sup>13</sup> Additionally, users in northeastern Arizona received the rights to 50,000 acre-feet.

<sup>14</sup> 70 Stat. 105 (1956).

<sup>15</sup> P.L. 90-537 (1968).

<sup>16</sup> P.L. 93-320 (1974).

Various national and region-specific environmental laws also influence water management and dam operation on the Colorado River. For example:

- The Endangered Species Act requires federal agencies to consult with the U.S. Fish & Wildlife Service before taking action that might jeopardize a listed species, and to take steps to recover and protect threatened and endangered species. In some cases, mitigating for potential impacts or recovering a species requires changes in streamflow patterns to more closely match natural river conditions. Accordingly, federal agencies work in partnership with state water managers and others to implement the terms of the Upper Colorado River Endangered Fish Recovery Program, which launched in 1988 with a cooperative agreement that calls for restoring and managing stream flows and habitat, boosting wild populations with hatchery-raised endangered fish, and reducing negative interactions with certain nonnative fish species. The goal of recovery is to achieve natural, self-sustaining populations of the endangered fish so they no longer require protection under the federal Endangered Species Act.<sup>17</sup>
- The Grand Canyon Protection Act of 1992 directs the Secretary of the Interior to operate Glen Canyon Dam “in such a manner as to protect, mitigate adverse impacts to, and improve the values for which Grand Canyon National Park and Glen Canyon National Recreation Area were established, including, but not limited to natural and cultural resources and visitor use.”<sup>18</sup> The Department of the Interior is implementing this mandate, in part, through its Glen Canyon Adaptive Management Program.<sup>19</sup>

### C. Recent Developments

The Law of the River is not a static rulebook, but instead changes over time in response to new conditions and information. In recent years, pressures from growing demands, drought, and climate change forced a hard look at the Compact’s erroneous assumption that the Colorado River’s annual flow would average at least 16 MAF.<sup>20</sup> Tree-ring data and models suggest an annual flow closer to 13.5 MAF, with erratic patterns ranging from 4.4 to over 22 MAF in past years. As the authors of a recent study put it, “In effect, water that was not likely to be in the river on a consistent basis was divided among the basin states.”<sup>21</sup> This information complicates Compact implementation, since the Lower Basin states interpret the agreement to guarantee substantial minimum deliveries from the

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<sup>17</sup> See <http://coloradoriverrecovery.org/general-information/about.html>

<sup>18</sup> Title XVIII of Pub. L. 102-575 (1992).

<sup>19</sup> See <http://www.gcdamp.gov/aboutamp/index.html>

<sup>20</sup> The error is understandable based on the contemporary hydrograph. According to subsequent research, the period in which the Compact was negotiated coincided with the highest sustained flows in 500 years. Connie A. Woodhouse, et al., “Updated Streamflow Reconstructions for the Upper Colorado River Basin” *Water Resources Research*, Vol. 42, W05415 (2006).

<sup>21</sup> *Id.*



Upper Basin. This interpretation would leave far less water available for Upper Basin use than the parties assumed was available in 1922.

In a 2007 report, the National Research Council described the future as “sobering” for elected officials and water managers, who face “increasing population growth and urban water demand in a hydroclimatic setting of limited—and likely decreasing—water supplies.” The NRC report recommends that “the realities of Colorado River water demand and supply will have to be addressed openly and candidly,” and concludes that “future events may necessitate a new level of federal and interstate collaboration on Colorado River water management.”<sup>22</sup>

And, in fact, there are some encouraging signs of collaboration among the basin states and the federal agencies, prompted by alarming drops in reservoir storage and predictions of more variable conditions in the future. In 2000, the Secretary of the Interior adopted interim surplus guidelines<sup>23</sup> for utilization in the Lower Basin, based in large part on a proposal from the states’ representatives. When drought conditions compelled further action, the Department of the Interior requested that the states negotiate to propose rules for operation in a shortage regime. Negotiations extended over two years, and culminated in several decision documents referred to here as the 2007 Interim Guidelines.

In their proposal, the seven Colorado River Basin states recommended interim operations (expiring in operating year 2026) aimed at minimizing shortages in the Lower Basin and avoiding the risk of curtailing Upper Basin water use through conservation, more efficient and coordinated reservoir operations, and water augmentation. Most relevant to this discussion, the states recommended the following steps in case of shortages:

- In years when the projected level of Lake Mead on January 1 is between 1,050-1,075 feet in elevation, deliveries to the Lower Basin and Mexico would be reduced by 400,000 acre-feet.
- In years when this level is projected to be 1,025-1,050 feet, deliveries would be reduced by 500,000 acre-feet.
- If Lake Mead’s projected level drops below 1,025 feet, the Secretary would consult with the states to determine what further measures would be necessary.

The states proposed enacting these curtailments in stages that primarily target water delivered by the Central Arizona Project, which is junior to the California apportionment and to other Arizona uses of mainstem water. They also proposed an “Intentionally Created Surplus” program, which allows water conserved in the Lower Basin through “extraordinary” measures—such as land fallowing, canal lining, desalination, and terminal reservoir construction—to be stored in Lake Mead for later use. The states proposed a formula for reducing deliveries to Mexico in times of shortage, but the

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<sup>22</sup> National Research Council, *Colorado River Basin Water Management: Evaluation and Adjusting to Hydroclimatic Variability* 153-154 (2007).

<sup>23</sup> 65 Fed. Reg. 48,531 (2000).

Secretary of the Interior did not include this provision in the December 2007 Record of Decision adopting the Interim Guidelines.<sup>24</sup>

In further response to these challenges, the basin states and the U.S. Bureau of Reclamation in 2009 jointly developed and funded a “Colorado River Basin Water Supply and Demand Study.” Conducted between 2010-2012, the study will “define current and future imbalances in water supply and demand in the Colorado River Basin and the adjacent areas of the basin States that receive Colorado River water for approximately the next 50 years, and to develop and analyze adaptation and mitigation strategies to resolve those imbalances.”<sup>25</sup>

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<sup>24</sup> The Secretary’s Record of Decision and related documents are available at <http://www.usbr.gov/lc/region/programs/strategies.html>.

<sup>25</sup> U.S. Bureau of Reclamation, Colorado River Basin Water Supply and Demand Study Plan of Study (undated), available at <http://www.usbr.gov/lc/region/programs/crbstudy.html>



### III. Leaders' Perspectives on the Near-Term Future

#### **First Interview Question:**

**If the Colorado River continues to be managed pursuant to current laws, including the Interim Guidelines [contained in the 2007 Record of Decision], what conditions do you foresee in 15 years in terms of water shortages, water security, and interstate conflicts?**

#### **A. Hydrologic Conditions: “The sky is not falling . . . yet”**

*“We need to plan for a drier future, or at least continuation of the [drought] conditions that have existed in the past ten years.”*  
- Colorado Basin leader

Without exception, every person we spoke with expressed concern about the Colorado River’s ability to meet growing demands in the future. There was a diversity of opinion on the urgency of the problem, with some expecting shortages in the next few years and others expressing confidence that such conditions are not likely to occur soon or that the existing institutions would adjust to deal with them effectively. All agreed that conditions are likely to be less predictable in the future.

- 1. Although all do not agree that climate change is the cause, there is general agreement that water supplies will be more stressed and conditions less certain in the future.**

We heard near-universal concern about hydrologic conditions in the near future, all in terms of tighter supplies and less certainty in the future:

- *“Mother Nature will stress the system in the next 15 years.”*
- *“We need to plan for a drier future, or at least continuation of the [drought] conditions that have existed in the past ten years. We need to manage risks to provide for these conditions.”*
- *“We will have to make very difficult water allocation decisions under urgent conditions in the midst of crisis.”*

Although a minority of the people we talked to explicitly pinned this concern to climate change, those that did emphasized the significant potential impacts in this region: “Climate change is the fundamental driving force for change in the basin . . . a game-changer.” One person cited predictions that climate change might reduce river flows by as much as 40%, the impacts of which—if combined with continued growth in demand for Colorado River water—“will range from bad to catastrophic.”

Several people expressed uncertainty about whether the recent years of drought indicate a major shift in the Colorado River’s hydrologic conditions or just a dry spell, noting that the hydrograph could swing either way, and that the recent years of drought might give way to relief in the near term: “Water supply eliminates a lot of conflict.” Another person predicted that a wet cycle now

might provide a 5-10 year window before problems arise. Several people noted that the region's warming temperatures might increase precipitation in parts of the Colorado River Basin, reducing rather than exacerbating drought conditions (although rising temperatures will bring increased evaporation as well).

Overall, we heard a consistent message that all parties need to be prepared for continued increases in demand and tighter supplies. All those involved in water supply planning said that they are currently taking this into account.

We heard different predictions about the system's capacity to withstand long-term drought. Some observed that the storage structures constructed to even out the river's variable flows may not prove much help in the case of chronic shortage conditions—that they will seldom fill to the point of delivering water to meet Compact obligations. Others expressed confidence that these reservoirs provide essential storage that will help the region enjoy continued water deliveries during dry periods: “The Colorado River will never dry up.”

There was also a wide divergence of opinions about whether the Upper Basin would be able to develop any additional water to satisfy its Compact allotment. Some said that the river's flows are simply inadequate to support any further development; others expressed confidence that new projects would remain viable in the long term (“We are fortunate to have water to develop over the next 15 years”). As one person put it, “Developing new storage projects and delivery systems is a tough investment to make in the face of uncertain water supplies.” Another remarked that the Upper Basin states are so focused on development options that they have failed to recognize the risk that even their current diversions may be curtailed in the near future. One person simply described Upper Basin development plans as “both unwise and unlikely,” and another cautioned that current models underestimate seepage and evaporation in mainstem reservoirs, meaning that substantially less water might be available for Upper Basin development than those states have assumed. One concluded that “the system will be challenged to meet the increased consumptive uses of existing projects, given climate change,” precluding all but the most “strategic new projects.”

## **2. The Colorado River is near capacity in meeting the demands of current uses.**

Several people remarked that growth has proceeded without regard for limitations. The recession and subsequent slow recovery period reduced the rate of growth in the region and thus dampened demand for urban supplies, at least temporarily. Some see this as an opportunity to look ahead:

- *“That bought time to continue the conversations.”*
- *“The economic downturn may provide the cities with some breathing space to catch up on their long-term planning.”*

One person remarked that the region “is in drought, but it's not because of reduced precipitation; it is because of overdraft . . . we're simply using more than we're putting in.” Another estimated the annual shortfall of flows replenishing Lake Mead as approximately 1.2 MAF under current practices.

Some see the balance of supply and demand at a precarious equilibrium: “The river is at capacity, meaning that long-term demand is essentially at the level of long-term supply, and any new demands on the river will have to come out of existing supplies being used by someone else.” A few raised concerns about the possible sources of water for large-scale oil shale development and other new energy and water supply projects.

In response to tightening supplies, water users in some areas have turned to groundwater pumping. Several people expressed concern that this finite source of water might prove an unreliable substitute for Colorado River water, and suggested that regulatory attention would be necessary to address this trend. Others noted that groundwater storage can be a useful mechanism to buffer shortages, and described current practices to “bank” unused portions of states’ allotments for use in case of curtailment.

A few people described the situation in terms of limits:

- *“We have to recognize that our ability to grow in this basin is not infinite, and we need to make significant adjustments to respond to physical realities of the basin.”*
- *“We are beginning to see the limits of the resource. We’ve been operating with surpluses, but that’s coming to an end, perhaps accelerated by climate change.”*

**3. A shortage as defined in the Interim Guidelines is likely to be declared much sooner than was anticipated in 2007.**

*“The magnitude of the shortages...contemplated [in the Interim Guidelines] may not be wholly adequate.”  
- Colorado Basin leader*

Many people characterized the Interim Guidelines as well-intentioned but insufficient to address conditions likely to develop in the coming decade or two: “The magnitude of the shortages they contemplated may not be wholly adequate.” Several people agreed with the remark that, “We may have only another year or two [until Lake Mead’s elevation reaches 1,075 feet to trigger the first round of shortage sharing criteria], not until 2026, as we thought we’d have in 2007.”

Several people predicted the conditions in the next 15 years in terms of scenarios—from relatively wet to extremely dry. In each case, the “dry” scenario included conditions that would exceed the anticipated shortfall in the Interim Guidelines, possibly for multiple years in a row, causing “substantial political and legal ramifications.” One person said simply, “The one certainty in all of this is that there will be a water shortage.” Another predicted “chaos on the river in 10-12 years” if the parties don’t work together to set up a new framework for resolving conflicts.

Given the possibility that Lake Mead’s elevation may drop below the initial threshold level for a shortage declaration as early as 2012, it was not surprising to hear that basin states are already engaged in discussions about how this might play out.

## B. Political Conditions: Unstable footing ahead

Most of the people we spoke with described the political landscape as uncertain and somewhat unstable, with many predicting conflict in the next 15 years. There was, at the same time, a strong consensus that the Colorado River Basin states share a strong commitment to working through disagreements outside of litigation. One person described looming supply/demand challenges as a “political black hole.”

### 1. The consequences of a shortage would vary a great deal among the seven basin states.

*“We are beginning to see the limits of the resource. We’ve been operating with surpluses, but that’s coming to an end, perhaps accelerated by climate change.”*  
- Colorado Basin leader

A century ago, Southern California’s rapid growth and the Upper Basin states’ desire to secure water for future development, motivated the seven Colorado Basin states to negotiate the terms of the Colorado River Compact—in effect, striking a compromise that would accommodate the needs of states with widely divergent conditions. The resulting formula for water allocation exposes the parties to different levels of risk, as shortages do not fall equally. As one person summarized, “The Upper Basin states feel like they got the short end of the deal in 1922.” Others described the situation as “basinwide misallocation,” “gross inequities,” and “a battle between the haves and the have-nots.”

For example, as several people pointed out, California’s senior priority means that it can receive its full allotment even if the Central Arizona Project receives no water. The Denver metropolitan area—which receives approximately half of its water from the Colorado River—is also vulnerable to “being dried up in a serious way,” according to one person. Some remarked that this sort of disparity is likely to provoke litigation unless the parties can negotiate a different way to deal with shortages.

One source of instability is that individual water users in the basin rely on the security of water rights that in turn depend on states receiving their full share of Colorado River water. If a shortage forces delivery curtailments, this impact will cascade through the water user chain, but impacts will not be spread evenly due to different users’ priorities.

### 2. A variety of unresolved legal issues make discussion of solutions difficult; some of these will have to be resolved to move forward productively.

The Law of the River provides a framework for addressing many issues arising in Colorado River management, but some legal questions remain unresolved. One is represented by the different interpretation of the Upper Basin’s delivery obligation. Stated in simple terms, the Upper Basin sees this as an obligation not to deplete the river’s flow beyond its 7.5 MAF share, while the Lower Basin views the Compact as requiring the Upper Basin to deliver 7.5 MAF annually (over a ten-year rolling average). Additionally, the Upper Basin has argued that the Compact terms represent a

mutual mistake, as the parties based the agreed-upon allocation on a mistaken belief that average annual flows would be 16 MAF.

Other legal issues that people mentioned as requiring resolution before long-term solutions are possible include:

- How to treat tributary waters in the Lower Basin
- Whether and how deliveries to Mexico may be limited in times of shortage, and how the delivery obligation to Mexico is shared between the Upper and Lower Basins
- What happens if Lake Mead drops below elevation 1,025 feet,<sup>26</sup> the lowest contemplated level in the Interim Criteria (one person remarked that the Interim Criteria are “political, not hydrological”)
- Resolution of the Navajo Nation’s reserved rights claim on the mainstem river and its tributaries

**3. There is a real possibility of compact-based litigation in the next 15 years, although most parties share a strong commitment to resolve conflicts outside of the courtroom.**

If shortages continue and worsen, the parties will first need to address the limitations of the Interim Guidelines. That agreement contemplates consultation between the basin states and the Secretary of the Interior if Lake Mead drops below 1,025 feet elevation. “If this happens,” one person predicted, “tensions within the basin will skyrocket.” Several people emphasized that this consultation process is consistent with the way they do business in the basin already: “Our intent is to manage the public resources responsibly.”

Some of the people we spoke with predicted a Compact call within the next 15 years. This would be an unprecedented step, in which the Lower Basin states would demand curtailment of sufficient post-1922 water diversions<sup>27</sup> to ensure delivery of the 7.5 MAF on a ten-year rolling average from the Upper Basin. In this case, litigation would be almost certain.

Because the fundamental legal positions among the basin states are set forth in an interstate compact, litigation involving its implementation would be filed directly with the U.S. Supreme Court, which has original jurisdiction in such disputes. The Justices addressed Lower Basin water allocation and other legal issues in the 1963 *Arizona v. California* decision, which addressed conflicts that first came to the high court more than three decades earlier.

No one we spoke with viewed the prospect of a new lawsuit in the Supreme Court as an attractive option for resolving outstanding legal issues, but many remarked that this is a real possibility. Everyone who mentioned this possibility linked it with the likelihood of an intensified conflict over how the Upper and Lower Basins share the delivery obligation to Mexico.

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<sup>26</sup> The elevation was 1,089 feet on January 21, 2011, having risen from a low of 1,081 feet in November, 2010.

<sup>27</sup> The Compact grandfathered all water rights established prior to 1922, so these “preexisting rights” are protected from a Compact call.

Many people cited the Interim Guidelines as a positive and encouraging example of the states' willingness to set aside their differences and resolve issues without litigation. There was a general agreement that litigation is always an option, often discussed, and universally viewed as the least productive way forward. Several people described an informal but shared agreement to consult with one another before taking steps toward litigation.

Many view this shared value as the foundation for successful cooperation in the basin:

- *"So far the system has worked, but that's largely because people have worked consistently toward agreement."*
- *"As supplies get tighter, people get frightened and retreat to strict legal positions . . . but no one wants litigation."*
- *"We all sincerely want to get to solutions. We don't have anything without a reliable water supply."*
- *"Upper and Lower Basin states' relations have improved, partly because issues are more pressing and immediate; if they aren't resolved, then we go to litigation."*
- *"Litigation puts everything up in the air."*
- *"We argue and throw darts at one another, but we're always able to pull together and focus on the bottom line. We battle on the margins."*

**4. Many feel strongly that the Law of the River provides important protection for states' interests and does not require major changes.**

***"We all sincerely want to get solutions. We don't have anything without a reliable water supply."  
- Colorado Basin leader***

Proposals for change are contentious in the Colorado River Basin. As one person put it succinctly, "the Law of the River protects legal entitlements." Many but not all the people we spoke with shared the opinion that the existing legal regime provides a sufficient balance of certainty and flexibility to adapt to new challenges. This was the dominant but not universal opinion among the people we interviewed. Some expressed concerns that the system's vulnerabilities are greater than is generally acknowledged. As one said, "The public should be outraged . . . Someone should shake us and urge a new order."

**5. Recent initiatives offer encouragement for the promise of collaborative solutions, assuming the parties have an incentive to negotiate.**

Over the past 20 years, various interests in the Colorado River Basin have collaborated to respond to environmental and other challenges. In many cases, the federal government provided the leverage for this work, through mandates in congressional legislation, regulatory programs, financial incentives, and resolution of (or efforts to head off) litigation. People we spoke with expressed cautious optimism that such initiatives demonstrate the ability of basin interests to work productively across jurisdictional lines.



One example mentioned by several people is the Upper Colorado River Endangered Fish Recovery Program, which was established in 1988 through a cooperative agreement between the Governors of Colorado, Utah, and Wyoming; the Secretary of the Interior; and the Administrator of Western Area Power Administration.<sup>28</sup> The Upper Colorado Endangered Fish Recovery Program was described earlier in this report.

Other efforts received mixed reviews, including the Glen Canyon Adaptive Management Working Group, which includes states, Indian nations, environmental groups, and resource managers from federal agencies. Because many of the issues regarding implementation of this group's work remain contentious, not everyone holds this up as a model for future collaborative efforts, but some mentioned it as an example of a movement toward more inclusive and "rational" approaches to addressing basin challenges.

**6. Many see an unmet need for leadership that is willing to look beyond the interest of their own constituencies and promote a basinwide vision.**

***"This crisis could be the catalyst that forces the states to move beyond their internal interests to compromise and do the right thing for the good of the Basin."  
- Colorado Basin leader***

Some see an unmet need for leadership in the basin, defined generally as political leaders willing to step beyond the interest of their own constituencies and promote a basinwide vision. One person suggested that it would take three states to step forward and launch such a conversation, predicting that early leaders might include Nevada, California, and Colorado.

We heard mixed messages about the role of the Secretary of the Interior. Importantly, the Secretary's authority differs between the Lower Basin (where the Secretary serves as water master) and the

Upper Basin (where the Department of the Interior operates several facilities but does not have authority to control deliveries to states). The Secretary is also responsible for carrying out diverse mandates throughout the basin, including species recovery, public land management, and hydroelectric power generation. "With additional objectives," observed one person, "come additional stakeholders, more complexity, more conflict, and a greater need for more responsive decision making and conflict resolution mechanisms."

Several people noted that the Secretary played a critical role in sparking the discussions that led to the Interim Guidelines by threatening to address shortages through federal regulations. Some suggested that this intervention might be necessary in the near term to update and revise those provisions. As one person commented, "Everyone has to be at risk of losing something to want to come to the table," noting that this was the case in 2007. Others cautioned that the Secretary's authority is too limited to play a significant role: "There isn't much of a hammer to force states to cooperate."

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<sup>28</sup> See <http://coloradoriverrecovery.org/>

One person called on the Secretary to step up and “be the parent in the room,” and criticized federal authorities for not having done enough to “shake us and urge a new order.” Another stated the opposite perspective, noting “some paranoia” among basin states about federal authority: “The feds help implement solutions; they don’t dictate them.”

### **C. An Upside of Crisis?**

Some people characterized the current situation as a potential turning point for Colorado River management:

- *“If conditions keep getting worse, this can either be an opportunity to work together or a serious obstacle that would create more tension.”*
- *“This is an opportunity for productive change, which requires both crisis and leadership.”*
- *“Everyone wants more certainty in water supply. This desire for security will drive negotiations.”*
- *“Fear is a wonderful motivator.”*
- *“This crisis could be the catalyst that forces the states to move beyond their internal interests to compromise and doing the right thing for the good of the basin.”*

One person observed that the Colorado River Basin will provide important lessons for the rest of the nation in how to deal with water shortages and related challenges, as this is the first U.S. river basin to experience large-scale impacts of climate change.



## IV. Leaders' Perspectives on Management Options and Opportunities

### Second Interview Question:

**What might be necessary to achieve a more satisfactory outcome in this time period and beyond? We're interested in your thoughts about how to improve decision-making processes, certainty, meaningful participation by stakeholders, and political/financial support for innovative management solutions.**

#### A. The Law of the River: The key is flexibility

1. There is widespread support for preserving the 1922 Colorado River Compact, though some favor additional agreements and interpretations of the Law of the River to address identified concerns.

***“Within the framework of the Law of the River, there’s an ability to reach agreement to meet critical demands as they occur.”***  
**- Colorado Basin leader**

The majority of people agreed with the fundamental value of the Law of the River as it currently exists. In particular, there was near-universal opposition to the idea of renegotiating the 1922 Compact, which is seen as the foundational document of the Law of the River. On the other hand, there was widespread support for the idea of negotiating changes that would update and improve implementation of the Law of the River:

- *“We can be creative within the framework of the Compact.”*
- *“Within the framework of the Law of the River, there’s an ability to reach agreement to meet critical demands as they occur.”*
- *“The system works pretty well; when it doesn’t, there’s a good process between states, feds, and NGOs to define the problem and come up with solutions.”*
- *“It’s not perfect, but wholesale changes are not feasible or attractive.”*
- *“There is fear in the Upper Basin about what would happen to our allocation if the Compact is opened.”*
- *“The Law of the River is cumbersome, but there is a concern that pitching this . . . will get us something worse.”*

Consistent with these statements, one person predicted no major changes to the Law of the River in the next 15 years because: (1) it provides certainty and definition of existing rights; and (2) the costs of renegotiating are prohibitively high in terms of time, effort, and money.

A number of people cited the Interim Guidelines as an example of how the Law of the River provides sufficient flexibility to meet critical water supply demands in the face of changing

conditions. Some suggested using this flexibility to take additional steps to improve the rules governing river management:

- *“It’s not politically feasible to change the Law of the River, and renegotiating the Compact won’t create any new water, but we can bend the hell out of it to make sure water flows to meet economic needs.”*
- *“The challenge is to move beyond the letter of the law and to embrace the spirit of the law—to share water in a common river basin and to share the benefits and costs of using the water for multiple objectives.”*

Some predicted the need for larger changes, possibly rethinking the terms of the Compact:

- *“In the short term, we have the capacity to work cooperatively . . . but in the long run we have not shown the willingness to address very difficult issues for the seven states . . . No one will come out of this unscathed.”*
- *“We need to change gears in a very big way—think way out of the box.”*
- *“If flows drop 40%, the numbers in the Compact are no longer viable.”*

**2. There is some interest in forming or engaging a new entity to facilitate basinwide conversations and provide a more regular process for stakeholder input.**

***“It is a fair criticism that states have left others out of the decisions until the end.”***  
***- Colorado Basin leader***

Many people noted the importance of a broader and more sustained conversation among basin interests. One person noted that, “it is a fair criticism that states have left others out of the decisions until the end.” Another described the system as “shuttle diplomacy,” because environmentalists and others are left out of direct negotiations but manage to provide input by informal means of consultation and input—a sort of guerrilla consultation process.

Several initiatives described earlier in this report (such as the multi-party endangered species recovery efforts) have successfully engaged a broader group of stakeholders and sovereign entities, including conservation groups, Indian nations, and Mexico, but most important planning and decision processes are limited to the seven basin states in cooperation with the federal government.

Some believe that broader participation is possible within existing institutions, pointing to the U.S. Bureau of Reclamation’s outreach efforts related to the Interim Guidelines as a positive example of how this might be done. One person concluded that, “We water buffaloes . . . see the need to address new values. We need to explain why we do what we do; we can’t just hide underground and supply water.”

As it now stands, there are many gatherings involving discussion of Colorado River water management, but they are not linked together. One person estimated that there is a meeting virtually every week on the Colorado River that merits attendance, “but the reality is that we have serious resource constraints that limit our ability to participate.”

A number of people we spoke with suggested creation of new basinwide forum or entity to help coordinate planning, management, and/or dispute resolution. Different people preferred different models, including:

- A new organization with decision making powers, such as a river basin authority
- A body that plays more of a coordinating and advisory role, such as a river basin council or a basinwide compact commission
- A nested collection of local bodies that feed information into a larger basinwide coordinating council
- An ongoing forum for sustained dialogue and problem solving

Some felt that such a change would provide the opportunity to involve broader interests in Colorado River Basin management. One person suggested that a basinwide forum could “broaden the circle of cooperation” among basin interests (including Mexico and Indian nations), and help integrate various resource management efforts. Other suggested benefits of a new entity include:

- Prioritize subbasin projects and individual actions
- Address operations of the river as a whole, relative to Upper Basin releases and Lower Basin demands
- Unify and coordinate management decisions
- Provide an “ongoing forum for genuine communication, understanding, and agreement”

Others expressed equally strong opinions that such a broad conversation would not accomplish much and would not be consistent with the states’ primary role as implementers of the Law of the River. Several people predicted gridlock if decision-making authority were extended beyond the current players: “When you’re trying to avoid crisis, you have to limit the number of participants.”

Taking such concerns into account, one person suggested that, “We need some way to balance or blend the value of inclusive participation . . . and making efficient decisions.” Another offered that a new entity might be divided into two parts, including: (1) a broad group that represents all stakeholders to help define overall management objectives; and (2) a smaller group responsible for implementation. That person acknowledged that any new entity would likely spark controversy among Compact parties, “but if we don’t try and start somewhere we will never improve governance of the system.”

Remarking on the political environment within which any new basin form might be formed, one person offered that the basin states would be unlikely to move in this direction “simply because it’s the right thing to do.” Rather, this person suggested, the states would only agree to broaden the table if essentially forced to do so, for example: (1) as a result of an order or threatened order of the Secretary of the Interior; or (2) if this ended up being the least-cost response to Endangered Species Act litigation on a very large scale, such as that seen in the Columbia River Basin.

### 3. There are mixed opinions about the appropriate role for the Secretary of the Interior.

As described in the previous discussion of a perceived leadership void, some believe that the Secretary of the Interior could play a more active role in coordinating and directing basinwide discussions. Opinions are decidedly mixed on this question, however, with many expressing the opinion that the federal government most appropriately supports but does not control state leadership in the basin.

Among the identified roles for the Secretary of the Interior:

- Pressure parties to negotiate through threatened exercise of allocation/operation authority
- Pressure the Upper Basin to prepare for the possibility of a Compact call
- Implement federal environmental mandates and support multi-party restoration initiatives
- Ensure meaningful representation of public interests and other parties not otherwise represented in existing decision processes
- Access financial resources and technical support (including modeling)
- Promote the national significance of the Colorado River Basin (along the lines of the Everglades and Great Lakes) to garner political support and resources for action

### 4. Many expect the Interim Guidelines to require updating sooner than was anticipated in 2007.

*“We need some way to balance or blend the value of inclusive participation... and making efficient decisions.”*

*- Colorado Basin leader*

As described in the previous section on people’s predictions of conditions in the next 15 years, there appears to be general agreement that the shortage conditions specified in the Interim Guidelines are likely to be experienced far sooner than the states anticipated when negotiating these provisions in 2007. Many expect to revisit the agreement sooner than its expiration in 2026. According to some, these conversations are already beginning.

Some suggested specific changes that might be considered, including revising elevations that trigger a shortage declaration and addressing concerns about power generation capacity in light of reservoir levels. One person suggested that the criteria should be more explicitly linked to climate change impacts, and that additional decision-making processes and management actions be triggered when projected impacts occur. Another urged a simpler method for calculating triggers, characterizing the current agreement as “overmodeled . . . mak[ing] management uncertain and confusing.”

As described above, some believe shortages may become severe enough to warrant Compact enforcement, sparking litigation and conflict. Several people suggested that the Upper Basin states should craft a new agreement among themselves to guide their response to a Compact call. Several others mentioned that preliminary discussions among Upper Basin states toward this end are already underway.

## **B. River Management: More information and better practices**

### **1. The Basin Study could provide important information about future scenarios and management options, but not everyone expects this outcome.**

Many people mentioned the work currently underway on the Colorado River Basin Water Supply and Demand Study. Some see it as a promising opportunity to develop scenarios for a range of hydrologic and growth conditions, but several expressed skepticism about the likely product. One person described the process so far as “dominated by positional negotiations rather than factual analysis.” Another characterized it as “way underfunded.”

Among the hopes expressed for Basin Study elements or outcomes:

- Link the study to larger landscape-level planning initiatives currently underway, emphasizing the importance of moving beyond a strict focus on water
- Provide accurate measurements of current consumptive uses: “You can’t manage what you can’t measure”
- Clarify how different demand curves will increase over time and how they will compare with projected water supplies
- Examine what happens to current institutions if there is a sustained 10-20% reduction in Colorado River flows
- Identify options that address demand exceeding supply, with specific actions to dealing with that deficit
- Identify opportunities to re-plumb the system, including dam reoperations, constructing upstream catchment structures, augmentation, and new infrastructure
- Evaluate the realistic opportunities for the Upper Basin to develop its full allotment
- Frame options around the fundamental goal of sustainability

One person suggested that the Basin Study’s approach could be complemented by use of the Delphi Method<sup>29</sup> to solicit water managers’ views about the likelihood and timing of a potential Compact call. This would reveal just how serious a threat this may be and provide an informed prediction of timing. It might provide a useful complement to the modeling work underway, and would give a sense of the variation in opinions among the Upper and Lower Basin leaders.

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<sup>29</sup> The Delphi Method is a structured communication technique, a systematic and interactive forecasting method that depends on a panel of experts who respond to questions in a series of surveys, with each new round informed by a summary of answers (and the respondents’ reasoning) to the previous round. Thus, experts revise their answers based on what they’ve heard from one another and—it is believed—the range of answers is refined and narrowed to reflect the best-informed “correct” outcome.

**2. There is a great deal of interest in options for augmenting the basin's limited water supplies to meet anticipated demands.**

A number of people believe that the only way to meet growing demands is to enhance the basin's natural water supplies. Among the options mentioned:

- Weather modification
- Desalination of ocean water
- Brackish water treatment
- Urban runoff capture and reuse
- Imported supplies from outside the basin, such as a pipeline to the Mississippi River

Several people expressed expectations that augmentation would be a primary focus of the options identified in the Basin Study. A menu of twelve augmentation strategies were described and evaluated in the Colorado River Augmentation Study.<sup>30</sup>

**3. Conservation and efficiency are viewed as important tools for stretching limited Colorado River water supplies.**

Several people we spoke with emphasized more aggressive conservation/efficiency measures such as irrigation improvements, lining canals, dry-year leasing from irrigators, eliminating invasive species. One person mentioned the Prairie Water Program<sup>31</sup> in Aurora, Colorado, as a promising example of water reuse and cooperative agreements between urban water suppliers and farmers.

**4. Some favor a broader approach to water transfers, ranging from local markets to interstate transactions involving cooperative storage agreements.**

A number of people predicted an increase in voluntary transfers from agricultural to urban water users throughout the basin, with a few noting that the quantities of water available from irrigated agriculture are more than sufficient to meet projected urban needs. Such transfers raise issues of impacts on other irrigators and the environment, which several people noted as requiring attention and mitigation.

Some argued in favor of cross-boundary water exchanges, including interstate water banks. Several suggested economic arrangements in which water users and states pay others to forgo water use and allow water to flow to more economically valuable uses.<sup>32</sup> Those favoring this sort of exchange expressed confidence that it would be permitted under the Law of the River. Others are concerned

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<sup>30</sup> See [http://www.snwa.com/html/wr\\_colrvr\\_augmentation.html](http://www.snwa.com/html/wr_colrvr_augmentation.html)

<sup>31</sup> This project captures return flows that otherwise would be discharged to the South Platte River and treats the water for reuse, boosting the city's supplies by as much as 20%. See <http://www.prairiewaters.org/>

<sup>32</sup> For example, one person suggested that California could agree to share shortage calls in exchange for access to marketable water that is not currently available to it, such as water currently supplied to irrigated agriculture in Arizona.

that this would threaten state allotments, and cautioned that any such proposals would fail in the face of political or possibly legal opposition.

Several people mentioned arrangements already in place for cooperative water storage, for example the Southern Nevada Water Authority storing water for the Metropolitan Water Agency of Southern California. Lower Basin water entities have negotiated more of these arrangements than their Upper Basin counterparts, but Wyoming currently manages water in North Platte River reservoirs using a similar sort of flexible system of ownership accounts, so this is not an unfamiliar concept in the Upper Basin. Those who receive water from the Colorado Big Thompson Project in Colorado receive shares that vary in quantity annually depending on supplies.

**5. Environmental protection and restoration initiatives remain a high priority, but some feel they should be evaluated and prioritized for maximum effectiveness.**

Many people mentioned the ongoing importance of addressing environmental issues on the Colorado River:

- Restoration of the Colorado River Delta ecosystem (which is designated for protection under the Ramsar Convention<sup>33</sup>)
- Addressing impacts of desalting on a large scale
- Protecting the intact tributaries of the White, Yampa, and Green rivers in the Upper Basin
- Protecting and recovering endangered species throughout the basin

Several people noted that habitat restoration is an experimental process, and much remains to be learned about how to measure success. Others noted that environmental flows need to be part of every modeling process, but generally are not. Another argued for a basinwide evaluation of the investments in ecological mitigation and restoration relative to the results they've achieved, suggesting that money could most likely be better spent strategically on portions of the river and tributaries where full restoration is an actual possibility. And one person suggested that such an evaluation should not be limited to environmental flows, but should extend to all uses of Colorado River water.

Some mentioned that habitat and flow restoration initiatives provide broad public benefits, but this is at a cost to water and power interests. We heard suggestions that the public beneficiaries of environmental protection measures should compensate those who bear the burden of altered flows or other measures. Others felt that restoration is among the highest priorities for future management.

One person cautioned that the primary goal of Colorado River management is to meet economic and social needs: "Environmental considerations take a back seat out of necessity." Another noted that

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<sup>33</sup> The Convention on Wetlands of International Importance, called the Ramsar Convention, is an intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. The treaty was adopted in the Iranian city of Ramsar in 1971; the United States and Mexico are both parties to the convention.



the river's hydrological changes are permanent, and we ought to recognize that restoring some species is unlikely and perhaps undesirable. Similarly, one person expressed doubt that people will be willing to give up significant amounts of water and energy to save species such as the humpback chub when pressures get intense.

**6. Many believe that additional and more diverse financial support will be necessary to address the basin's issues.**

Some suggested that the looming pressures on Colorado River management will require contributions from water users, states, conservationists, and others. One person suggested a small fee on water users' bills to go into a basinwide fund to pay for conservation improvements and other measures to stretch resources as far as possible.

Several mentioned the importance of continued and expanded support for projects funded by the Title XVI Water Reclamation and Reuse Program,<sup>34</sup> described as an incentive for water providers to adapt infrastructure to climate change and encourage water conservation. One person urged expansion of this program to include the practice of treating and injecting water into aquifers to be used for municipal supplies.

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<sup>34</sup> Authorized by the Reclamation, Wastewater and Groundwater Study and Facilities Act of 1992 (P.L. 102-575), this program provides funds for the reclamation and reuse of wastewater and naturally impaired ground and surface waters through projects constructed and owned by non-federal sponsors in partnership with states and local water managers. Projects aim at: improving water use efficiency; supplementing water supplies; increasing drought resistance in existing water supplies; and reduced reliance on inter-basin water transfers. U.S. Bureau of Reclamation, Title XVI Fact Sheet (2009).



## V. Conclusion

The literature on Colorado River management is vast—and growing by the day with new reports and papers predicting dire water shortages and other stresses for a region that has already experienced epic challenges and conflicts.

We hope that this report contributes something new by providing a snapshot of leaders' perspectives on issues of concern and options for action. It does not purport to be a consensus document, poll, or statement of recommended policy reforms, but this synthesis of Colorado River Basin leaders' perspectives could provide insights to inform and encourage dialogue throughout the Basin and beyond in the coming years.

We heard the following broad themes in this report, expressed through diverse perspectives of the people with whom we spoke:

- There is widely shared concern that the Colorado River Basin's water supply and demand are in a precarious balance, and that conditions are likely to get less certain rather than more secure in the near term.
- Although many people foresee the likelihood of increased conflict as a result of these conditions, there is a widely held and consistently expressed shared value for resolving conflicts through discussion and negotiation, and an equally strong aversion to Compact-related litigation.
- There is widespread acknowledgement that a broader range of stakeholders desires to be involved in river management decisions than is currently allowed, although opinions vary about whether a broadly inclusive model of participation would be feasible or desirable.

### **Identifying Opportunities for Action - Some Observations Based on the Interviews**

A reader searching for clear recommendations may be frustrated, but the many thoughtful ideas reflected here offer numerous starting points for developing proposals for reform. Our impression from speaking with these leaders is that they are ready for and interested in engaging in such discussions. Based on our conversations, we offer the following observations about opportunities for action:

- It would be productive to explore how to improve public engagement in the basin, both within and alongside official decision processes. Our experience with regional collaboration in many parts of the country<sup>35</sup> suggests that the conditions may be ripe in the Colorado River Basin to explore options for complementary processes to involve a wider range of interests to address these issues and inform future management decisions. Several people we spoke with expressed strong interest in some type a basinwide forum. The Secretary of the Interior could play an important role in encouraging and supporting such a broader dialogue, but success would be more likely if this were not solely a federal initiative.
- Given the broad agreement that conditions are likely to be less certain in the future (with many believing this to mean less water availability), it makes sense to step up efforts to agree about a range of long-term river flow scenarios. Ideally, hydrological models need to encompass a wide enough range of possible conditions to inform a discussion of the choices this future uncertainty implies. As described in this report, a number of people expressed a belief that a sense of crisis can provide an opportunity to drive parties to the table to discuss options that otherwise might not be politically acceptable. The current Basin Study process is one platform for this scenario development, but should be reconciled with others under development.
- Beyond the questions of supply, which are the focus of various hydrological models, the demand side of the equation deserves equal attention. Although many of the people we spoke with expressed a desire to maintain the protected status of all existing uses, others suggested that it is time for thoughtful evaluation of all uses—human and environmental—as part of envisioning a sustainable future for the Colorado River Basin. This suggests the value of an honest and integrated analysis of the possibilities for and impacts of augmentation, conservation and efficiency, market-based transfers, and environmental mitigation and restoration. The current deficit between annual supply and demand in the basin suggests that future shortage risks be minimized by offsetting any new consumptive uses with reductions in existing demands. Voluntary reallocation of water from lower- to higher-valued uses is likely to play an increasingly important role in meeting anticipated human environmental demands in the basin.
- Although some of the water management challenges facing the Colorado River Basin are physical, many are political. The division of the basin into two halves at Lee Ferry, and the allocation of entitlements based on that division, offers both a firm anchor for enforcing responsibilities and an arbitrary separation of a single river basin. At least some of today's conflicts could be alleviated by a basinwide approach to water management, optimizing use of the basin's extensive storage facilities to meet an overall water budget rather than focusing on water deliveries at Lee Ferry, and considering additional agreements similar to the Interim Guidelines to address shortages.

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<sup>35</sup> See Matthew J. McKinney and Shawn Johnson, *Working Across Boundaries: People, Nature, and Regions* (Lincoln Institute of Land Policy, 2009).

- We observed that it is common for people to speak of the Colorado River Compact and the Law of the River interchangeably, although the Compact is just one element (albeit the foundational document) of the broader Law of the River. To be clear, a minority of people we spoke with suggested actions that would require revisiting the Compact; the majority would prefer to leave this document alone. A far greater number of people observed that the Law of the River is dynamic—as evidenced by the 2007 Interim Guidelines—and predicted that it will continue to change to reflect new realities and values in the basin. We also observed that public conversations about options and opportunities often are derailed by the conflation of these references, resulting in misunderstanding that a policy proposal is taking aim at the Compact when in fact it would effect further evolution of the Law of the River. Additional clarity may encourage more constructive dialogue and an honest exchange of ideas to address identified challenges.

## **APPENDIX A**

### **List of Interviewees<sup>36</sup>**

**Robert Adler**, James I. Farr Chair in Law, University of Utah College of Law  
**Anne Castle**, Assistant Secretary for Water and Science, U.S. Department of Interior  
**Michael Connor**, Commissioner, U.S. Bureau of Reclamation  
**John Enstminger**, Assistant General Manager, Southern Nevada Water Authority  
**David Getches**, Dean and Raphael J. Moses Professor of Natural Resources Law, University of Colorado Law School  
**Jennifer Gimbel**, Director, Colorado Water Conservation Board  
**Herb Guenther**, Director, Arizona Department of Water Resources  
**Taylor Hawes**, Director, Colorado River Program, The Nature Conservancy  
**Robert Johnson**, Former Commissioner, U.S. Bureau of Reclamation  
**Jeff Kightlinger**, General Manager/CEO, Metropolitan Water District of Southern California  
**Eric Kuhn**, General Manager, Colorado River Water Conservation District  
**John Leeper**, Branch Manager, Water Management, Department of Water Resources, Division of Natural Resources, Navajo Nation  
**John Leshy**, Harry D. Sunderland Distinguished Professor of Real Property Law, University of California Hastings College of the Law  
**Jim Lochhead**, CEO/Manager, Denver Water  
**Estevan Lopez**, Director, Interstate Stream Commission, New Mexico  
**Mario Lopez Perez**, Engineering and Technical Standards Manager, National Water Commission of Mexico  
**David Modeer**, General Manager, Central Arizona Project  
**Barry Nelson**, Director, Western Water Project, Natural Resources Defense Council  
**Jennifer Pitt**, Senior Analyst, Environmental Defense Fund  
**Mike Purcell**, Director, Wyoming Water Development Commission  
**Jack Schmidt**, Professor of Watershed Sciences, Utah State University  
**Dennis Strong**, Director, Division of Water Resources, State of Utah  
**Tanya Trujillo**, Counsel, Energy and Natural Resources Committee, U.S. Senate  
**Pat Tyrrell**, State Engineer, Wyoming  
**Brad Udall**, Director, Western Water Assessment  
**David Wegner**, Staff Director, Subcommittee on Water and Power, Committee on Natural Resources, U.S. House of Representatives  
**Eric Wilkinson**, General Manager, Northern Colorado Water Conservancy District  
**Tony Willardson**, Executive Director, Western States Water Council  
**Jerry Zimmerman**, Executive Director, Colorado River Board of California

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<sup>36</sup> Affiliations and titles current as of the date of the interview.

## APPENDIX B

### Introduction Letter to Interviewees



32 Campus Drive  
University Hall  
Missoula, MT 59812  
[www.cnrep.org](http://www.cnrep.org)

November, 2010

We are contacting you to invite your participation in a study to assess options for optimizing the Interim Guidelines and other institutions related to Colorado River management. You are one of approximately 30 key leaders in the Colorado River Basin whose views and insights we're seeking in order to inform current river basin assessments and policy development.

This letter describes the purpose of the study, the process by which we're seeking information, and the uses to which it will be put. We are happy to answer your questions about the work, and **we will contact you within the next week to determine your availability to participate.** Our contact information is listed below.

#### Purpose of the Study

Competition for scarce Colorado River water resources is nothing new, but the conflicts that prompted the seven basin states to negotiate the 1922 Colorado River Compact have grown considerably fiercer and more complex in recent decades. Responding to the challenges of increasing demand and sustained drought, the seven states and a number of other affected interests agreed to a set of interim guidelines for allocating Colorado River water in the event of shortages. The Interim Guidelines, approved by the Secretary of the Interior in a Record of Decision in December of 2007, expire in 2026.

The 2007 Record of Decision represents an important evolution in the governance of the Colorado River, suggesting that the many interests in the basin can work together to address shared risks, concerns, and needs. Yet, numerous recent studies suggest that the Interim Guidelines alone may not address the many challenges facing the basin in the coming decades.

The goal of this study is to identify, based on a survey of diverse parties' concerns and interests, some possible next steps toward further optimizing the 2007 Record of Decision. The study is being conducted on behalf of Carpe Diem West, a non-profit organization dedicated to finding cooperative solutions for addressing Western water conflicts (<http://www.carpediemproject.org>). The research work will be completed by senior staff at the Center for Natural Resources and Environmental Policy at The University of Montana (<http://cnrep.org>). Importantly, this study will be an assessment of diverse parties' concerns and interests, **not** a consensus document, poll, or a statement of recommended changes. It may, however, suggest a universe of possible options to address such shared concerns and interests, and thus may provide some useful input to the ongoing Bureau of Reclamation studies and evaluation processes.

#### Interview Procedures and Confidentiality

If you agree to participate in this study, we will schedule a 30-minute telephone conversation at a mutually convenient time. Our conversation will not be recorded, but we will take notes and prepare a compilation of responses. **Pursuant to University guidelines for research subject confidentiality, your individual responses to the questions will be confidential, and you will not be quoted in the study write-up.** Only the person interviewing you will have access to the original notes. We are sharing the list of interviewees (the list of people we are inviting is enclosed).

Telephone interviews will be conducted by Sarah Bates or Matt McKinney of the Center for Natural Resources and Environmental Policy at the University of Montana, and/or Matt Clifford, Policy Director for Carpe Diem West. We will complete the interviews in the fall and early winter of 2010 and circulate the draft write-up early in 2011.

The interview questions are simple and open-ended, as our intention is to have a conversation with you to elicit the most thoughtful responses:

1. If the Colorado River continues to be managed pursuant to current laws, including the Interim Guidelines, what conditions do you foresee in 15 years in terms of water shortages, water security, and interstate conflicts?
2. What might be necessary to achieve a more satisfactory outcome in this time period and beyond? We're interested in your thoughts about how to improve decision-making processes, certainty, meaningful participation by stakeholders, and political/financial support for innovative management solutions.

#### Study Contact:

Sarah Bates  
Center for Natural Resources & Environmental Policy  
The University of Montana  
[sarah@cnrep.org](mailto:sarah@cnrep.org)  
406-207-9071

ENCL: Interview Invitation List



The **Center for Natural Resources and Environmental Policy** is an applied research and education center at The University of Montana. The Center is impartial and non-partisan, and is not an advocate for any particular interest or outcome. The Center's goal is to shape policy for people and places, including urban, rural, working, and wild landscapes. The Center operates on the principle that the best way to do this is through public processes that are well informed and provide meaningful opportunities for all interested citizens, stakeholders, and decision makers to participate.

Center staff and Senior Fellows are recognized experts in facilitation, mediation, collaboration, and conflict resolution. They are also well known for their work in public lands policy, water law and policy, land-use planning, and trans-boundary resource management.

The Center:

- Informs and invigorates policy discussions by providing timely, decision-relevant research and analysis;
- Facilitates and mediates complex, multi-party dialogues on land and water issues;
- Builds and shares knowledge to push the horizons of natural resources and environmental policy and governance; and
- Trains future leaders through The University of Montana's Natural Resources Conflict Resolution Program.

[[www.cnrep.org](http://www.cnrep.org)]



**Carpe Diem West** is a non-profit 501(c)(3) organization that engages a broad-based network of experts, advocates, decision makers and scientists to address the unprecedented impacts the growing climate crisis is having on water in the American West.

Carpe Diem West's mission focuses on water security—ensuring adequate water of sufficient quality and timing to support all uses—for our communities, the food we grow, our economy, and our environment. We provide a convening and communications framework where stakeholders and leaders with differing backgrounds and interests together forge pragmatic, science-based responses to the dilemmas presented by the growing climate crisis. This process has produced the wide-ranging stakeholder network that informs and guides all of Carpe Diem West's work.

[[www.carpediemwest.org](http://www.carpediemwest.org)]

This report was made possible by the many foundations, corporations, agencies, and individuals who support Carpe Diem West's work, with additional funding from the Natural Resources Defense Council and the Sonoran Institute.

