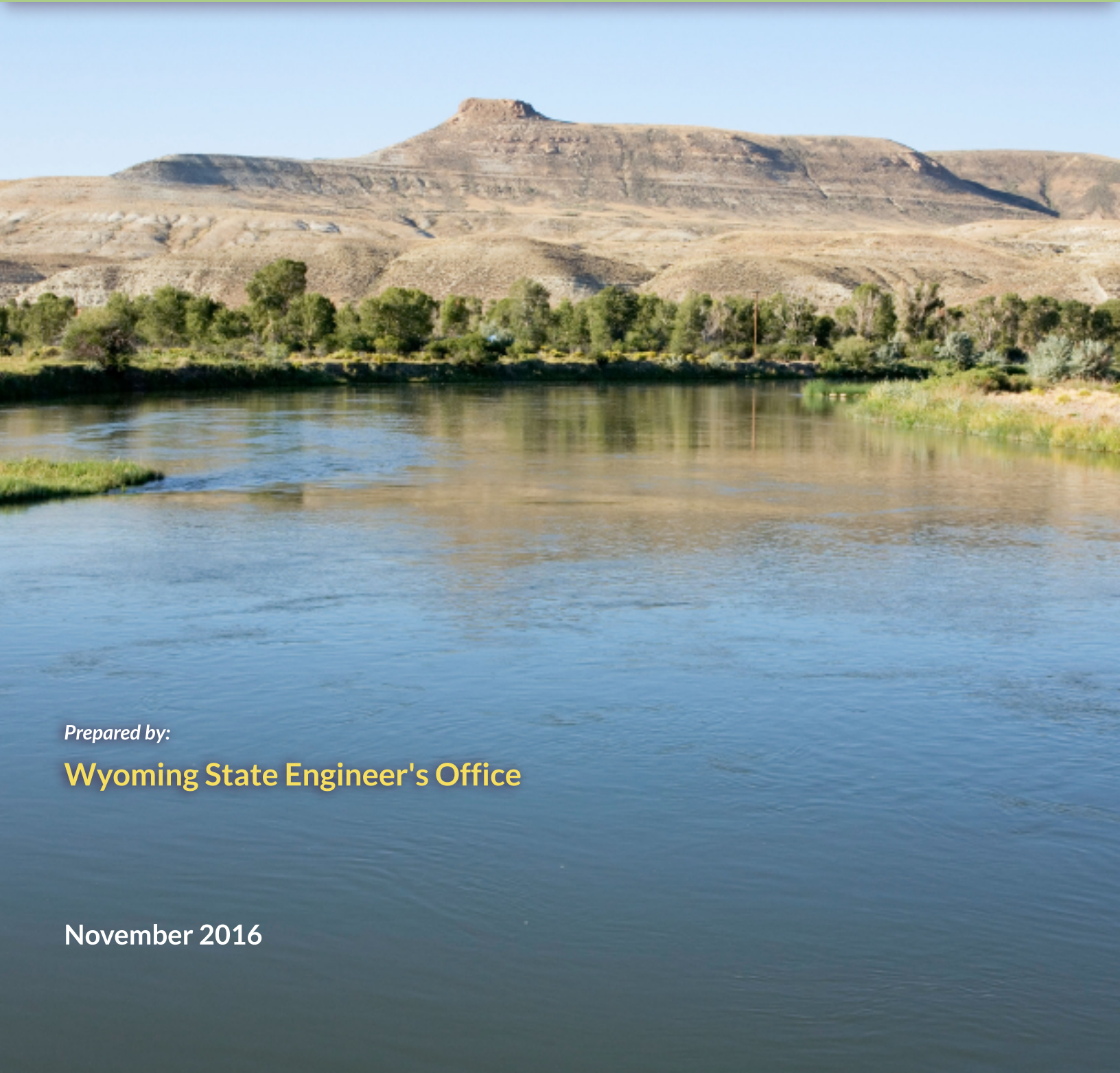




# WYOMING AND THE COLORADO RIVER: A REPORT



*Prepared by:*

**Wyoming State Engineer's Office**

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Seedskaadee National Wildlife Refuge, Wyoming. (Photo: U.S. Fish and Wildlife Service)

# INTRODUCTORY MESSAGE

**What is Wyoming's role as a Colorado River Basin State? What benefits does Wyoming enjoy from the river, and how does the Law of the River constrain those benefits?**

*By Patrick T. Tyrrell, Wyoming State Engineer*

The Colorado River ultimately flows through seven states and into the Republic of Mexico on its way to the Gulf of California. Along the way, the river and its tributary sources traverse federal, state and private property, and tribal trust lands. It is managed with the help of federal reservoirs large and small, and private and state projects as well. It carved the Grand Canyon, while a tributary, the Gunnison River in Colorado, carved the “Black Canyon of the Gunnison.” It dissolves salt from saline geology on the way, and, in two years of frenzy in the early 1900s, broke its banks in California at an early irrigation diversion to create the Salton Sea. It produces hydropower that puts economical green energy on the western grid while at the same time serving as the “soft start” provider should there be an outage on that grid.

It cools thermo-electric power plants. Many threatened or endangered species live in the waterways or the landscape around them. It provides water, our lifeblood, for 40 million people in the United States and Mexico. Its allure drew John Wesley Powell into the river trip of a lifetime in 1869. Is there any wonder that such a resource is among the most heavily studied, and indeed most heavily regulated, water courses in the world?

About 17,000 square miles in Wyoming (nearly 20 percent of the State), lie within the Colorado River Basin. Wyoming's Green and Little Snake Rivers are its primary watercourses draining to the larger Colorado River (the Little Snake River first entering the Yampa River in Colorado, its waters thence

delivered to the Green River within Dinosaur National Monument in Colorado). From Cora and Pinedale on the north to Green River and Rock Springs further south, and from Baggs and Dixon on the east to Lyman and Kemmerer on the west, many citizens, municipalities, industries, ranches and farms rely on waters draining to this famous and storied river. It provides outstanding recreational opportunities and excellent habitat for multiple species on its mainstem and many tributaries.

From Frank Emerson's presence at the negotiating table for the 1922 Compact, to L.C. Bishop's role in crafting the 1948 Compact, to his son Floyd Bishop's first Salinity Control Forum meeting in 1973, to Jeff Fassett advising Governor Sullivan to sign on to the Upper Colorado River

Endangered Fish Recovery Program in 1988, Wyoming State Engineers have been deeply involved with our state's influence on issues affecting our use of water in the Colorado River Basin. Even today, over half of the State Engineer's time on interstate topics is somehow related to the Colorado River. With capable in-house staff and experienced legal assistance through the Wyoming Attorney General's Office, Wyoming is well represented and situated to respond to the myriad issues that can and do arise.

When the Wyoming Water Development Commission and members of the Select Water Committee of the Wyoming Legislature raised questions related to our rights and abilities regarding the Colorado River in late 2015, it was

fitting that this office step up and offer to create the document you are holding. It is my sincere hope that having this Law of the River summary, and its Wyoming effects, distilled down to essential components and hopefully written for a wide audience, will be helpful as these and other groups and individuals forge Wyoming's future in the basin.

The intent of this Report is to inform its readers about the current issues on the river, Wyoming's uses of the river, and to describe the varied laws, compacts, decrees, operating plans,

and other instruments that have come to be as uses of the Colorado River Basin have matured and evolved since the early 1900s. It also discusses the effects of those instruments in and on Wyoming. What is our role as a Colorado River Basin State? What benefits do we get from the compacts on the river, and are we also constrained by them? Should we care about uses of water in Mexico? Should we care about the salinity of the water diverted at the All-American Canal in California? Might endangered fish in Utah affect water use in Wyoming?

Our hope is to delve into these important questions, and more, in a way that educates water managers, appropriators, our citizenry and governmental officials across the state. The Colorado is a complex river basin, often misunderstood and the subject of many an urban myth. In the coming pages we hope you'll learn more about this marvelous resource and Wyoming's place at the table.

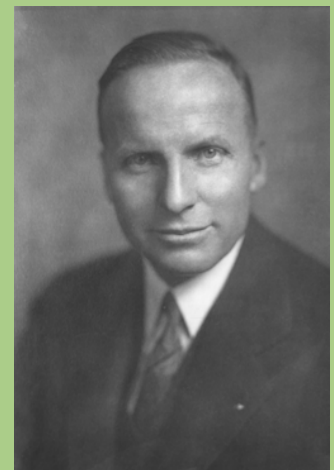


Elwood Mead

*(Photo: Wyoming State Archives)*

Elwood Mead (1858-1936) was an engineer who pioneered western water law and development and worked tirelessly for over fifty years to ensure that water went to its best use. Mead was raised on a farm in Indiana and majored in agricultural engineering at Purdue. In 1888, he was hired as Wyoming's first Territorial Engineer (the precursor to the State Engineer). While in Wyoming, Mead wrote Wyoming's water code, set up the administration for running it, and formulated the state's participation under the Carey Act. After leaving Wyoming in 1899, Mead worked for the Department of Agriculture, traveled to Australia for an eight year stay, and in 1924, became the Commissioner for the Bureau of Reclamation. As Commissioner, Mead oversaw the construction of Boulder Dam (now Hoover Dam) and the reservoir now carries his name.

The 1922 Compact was negotiated by men from each of the Colorado River Basin States. Wyoming's representative was State Engineer Frank C. Emerson. Emerson was born and raised in Michigan, received his degree in engineering from the University of Michigan in 1904, and then moved to Cora, Wyoming. Emerson served as the Wyoming State Engineer from 1919 until he was inaugurated as Wyoming's 15th Governor in 1927.



Frank C. Emerson

*(Photo: Wyoming State Archives)*



## ONE BASIN, SEVEN STATES, TWO COUNTRIES

The Colorado River Basin provides water to 40 million people, 5.5 million acres of lands and serves an area that has an economic value of approximately \$1.4 trillion annually.

### UPPER BASIN

The Upper Basin is a land of high deserts, canyons, plateaus and table mesas and the Rocky Mountains. Most of the River's flow originates in the numerous high mountain watersheds located above 9,000 feet in elevation.

### WYOMING'S SHARE

In Wyoming, the Colorado River Basin covers about 17,000 square miles, inclusive of the areas drained by the Green and Little Snake Rivers.

# HYDROGEOGRAPHY OF THE COLORADO RIVER BASIN

The Colorado River basin drains nearly 250,000 square miles of land from seven western states and the Republic of Mexico (Figure 1). In addition, water from the Colorado River serves significant areas outside of its physical drainage basin. Overall, the Colorado River

Basin provides water to 40 million people and 5.5 million acres of irrigated lands, and serves an area that has an economic value of approximately \$1.4 trillion annually.<sup>1</sup> In addition, there are seven National Wildlife Refuges, four National Recreation Areas, 11 National Parks and numerous state and local



Aerial view of Flaming Gorge Reservoir  
(Photo: David B. Gleason)

recreation areas within the basin.<sup>2</sup> Finally, the river system provides over 4,200 megawatts of hydropower capacity. The Colorado River Basin covers about 17,000 square miles of southwest Wyoming, which includes the Green and Little Snake River basins.



Figure 1: Map of the Colorado River Basin



# INTERSTATE COMPACT/DECREE LAW, GENERALLY

**The two primary instruments that govern interstate uses of rivers are interstate compacts and court decrees.**

Compacts are formed when two or more states voluntarily agree about how to divide the use of water equitably. Court decrees typically come about where no compact existed and are the result of litigation between the states. Contests of this nature are within the original jurisdiction of the Supreme Court of the United States. In some cases, states can disagree about the interpretation of a compact, resulting in litigation that lays a court decree on top of a compact. Compacts are signed initially by states' representatives, followed in order by ratification by the states' legislatures and finally by Congress. In this manner, they are a signed contract between the states and federal government, but are also state and federal law. They are usually constructed to last in perpetuity, or until some legal or administrative action results in their modification or termination. To our knowledge, no interstate river compact has ever been terminated outright.

River basins are not required to have compacts or decrees, although many do. In Wyoming, the Little Missouri River, Cheyenne River and the South Platte River are the only interstate river basins where no compacts or decrees exist.

## What a Compact Does

A compact typically apportions the consumptive uses (or divertible flows), and/or future storage amounts, of a river and its tributaries in an equitable fashion among the states it serves. They may also define an amount of water that must be delivered to the downstream state(s). Compacts also typically, in some manner, respect the rights to uses (if not overtly the amount of use represented) existing at the time the compact was entered, such that there is a distinction in how rights existing prior to (pre-compact) and after (post-compact) its effective date are treated (Table 1). Compacts usually affect pre-compact rights less than post-compact rights. In most compacts to which



North Platte River at the Wyoming/Nebraska state line

Wyoming is a party, some de minimis uses such as domestic and stock watering (including stock dams under 20 acre-feet (AF) in capacity) are exempted from compact compliance. This exemption allows the relatively unfettered development of water for man and beast although such uses must still meet the requirements of the water laws of the state within which they exist.

## Colorado River Compacts

Wyoming is party to two compacts that govern apportionments of the Colorado River. These compacts are described in additional detail in the Law of the River section of this Report, but both apportion the beneficial consumptive use of the river. The Colorado River Compact of 1922 essentially divided the river at Lee Ferry, Arizona, and defined, for its purposes, the "Upper Basin" and the "Lower Basin." Key operational provisions of this Compact are that the Upper Basin cannot deplete the flow at Lee Ferry below 75 million acre-feet (MAF) in any running 10-year period, not including water used by rights perfected prior to the Compact. Further, the Upper and Lower Basins must meet their demands from water available only to them under the Compact.

The second compact on the Colorado River is the Upper Colorado River Basin Compact of 1948. The 1948 Compact further divides the use of water available to the Upper Basin to the states therein. This compact created the Upper Colorado River Commission, and contains important but so far unused language relating to compact curtailment should the Upper Basin fail to meet its non-depletion obligation under the 1922 Compact.



**Table 1: Brief Comparison of Wyoming's Various Compacts and Court Decrees**

Compact/Decree	Date	Signatory States	Allocation or Administration Basis: Depletion or Diversion/storage	Stock Use exempt?
Colorado River Compact	1922	WY, AZ, CA, CO, NM, NV, UT	Depletion	Silent
Belle Fourche River Compact	1943	WY, SD	Diversion/storage	Yes & stock ponds < 20 AF
Upper Colorado River Basin Compact	1948	WY, CO, NM, UT, AZ <sup>1</sup>	Depletion	Silent
Yellowstone River Compact	1950	WY, MT, ND	Diversion/storage	Yes & stock ponds < 20 AF
Snake River Compact	1949	WY, ID	Diversion	Yes & stock ponds < 20 AF
Upper Niobrara River Compact	1962	WY, NE	Primarily Storage	Yes & stock ponds < 20 AF
Amended Bear River Compact	1958, amended 1978	WY, ID, UT	Both	Yes & stock ponds < 20 AF
Laramie River Decree	1922, amended 1957	Supreme Court of the United States, WY, CO	Diversion	Silent
North Platte Decree	1945, modified 2001	Supreme Court of the United States, WY, NE, CO	Both	Yes
Roxana Decree (Teton and South Leigh Creeks)	1941	United States District Court for the District of Wyoming, WY, ID	Diversion	Silent

<sup>1</sup> As an Upper Basin signatory, Arizona received a 50,000 AF apportionment. It is not a member of the Upper Colorado River Commission.

<sup>2</sup> All direct flow rights are subject to interstate priority regulation when a water emergency is declared. Under depletion limitations, protection is afforded to surface and groundwater rights prior to January 1, 1976.

<sup>3</sup> Of the total apportionment to Colorado, 19,875 AF/year is limited to transbasin diversions. If not diverted outside of the basin, the remaining amount may only be applied to specific lands described in the Decree.

<sup>4</sup> Colorado is limited to out-of-basin exports no greater than 60,000 AF over a ten year period.



Domestic Use exempt?	Pre-Compact/Decree Water Right Protection?	Expressly requires approval for out-of-basin diversion?	Miscellaneous Notes
Silent	Yes	No	First major river basin compact; defined Upper and Lower Basins
Yes	Yes	No	WY is allotted 10% of unallocated flow as of Compact date; SD gets 90%.
Silent	Yes, see 1922 Compact	No	WY's share is 14% of Upper Basin apportionment.
Yes, with 0.5 ac domestic irrigation limitation	Yes	Yes	MT sued WY in 2007 under the compact and the litigation is currently pending. Once concluded, this compact may operate under both the compact and a court decree.
Yes	Yes	Yes	WY allocated diversion or storage of 4% of the waters of the Snake River.
Yes	Yes, but implicit more than explicit	No	Only compact to recognize the need to investigate groundwater use for possible apportionment if found desirable.
Yes	Partial <sup>2</sup>	No	River managed as 3 Divisions; Upper, Central, and Lower.
Silent	Yes	N/A <sup>3</sup>	CO limited to divert 49,375 AF/year from the mainstem and tributaries; WY entitled to remaining portion.
Yes	Yes	No <sup>4</sup>	Decree recognizes hydrologic connectivity of groundwater wells.
Silent	Yes	No	All WY diversions ordered to install measuring devices.

Arizona has a very small amount of use (50,000 AF) provided for by the 1948 Compact, and is an “Upper Basin State.” However, Arizona is not one of the “States of the Upper Division” and has no responsibility to meet the non-depletion requirement at Lee Ferry. The 1922 and 1948 Compacts use the term Upper and Lower “Basin”, as well as the term Upper and Lower “Division.” The distinction between the terms is that “Basin” refers to the geographic divide while “Division” refers to the State divide. For example, the State of Arizona is part of the Upper “Basin” geographically, but it is not part of the Upper “Division.” Thus, Compact obligations and benefits placed upon the Upper “Division” are not shared by Arizona. Upper Division States are Colorado, New Mexico, Utah and Wyoming. Lower Division States are Arizona, California and Nevada. This Report uses the term “Basin” to include both terms for simplicity.

### Wyoming's Other Interstate Compacts<sup>3</sup>

To better understand the Colorado River Compacts, and Wyoming's role relative to those compacts, it helps to have a general knowledge of the other five interstate river compacts to which Wyoming is a party: The Belle Fourche River Compact (1943), Snake River Compact (1949), Yellowstone River Compact (1950), Upper Niobrara River Compact (1962), and the Amended Bear River Compact (1978). The State Engineer's Office administers Wyoming's rights and responsibilities under all of them. Table 1 compares some important characteristics of all seven compacts.

### Wyoming's Interstate Court Decrees

Also in Wyoming, three court decrees exist that provide an administrative overlay for the drainages in which they apply. These are the Laramie River Decree (1921), which was modified by stipulation in 1956, the Modified North Platte Decree and Final Settlement Stipulation (2001), and the Roxana Decree (1941), which was issued as between water users in Wyoming and Idaho by the United States

District Court, for the District of Wyoming.

In the Laramie River Decree, Wyoming prevailed after suing Colorado over injuries sustained by senior Wyoming rights due to junior Colorado diversions. The decree revealed that the United States Supreme Court viewed the priority system to operate in an interstate fashion when both states recognize a prior appropriation system. In other words, since Wyoming and Colorado were both prior appropriation states, the Laramie River cannot be developed with impunity in Colorado and ignore senior rights in Wyoming.

The 2001 Modified Decree on the North Platte River resulted from suit brought by Nebraska in 1986. While a 1945 United States Supreme Court decree already existed on the river, Nebraska sued over more recent issues such as Wyoming's lack of regulation on tributaries below Pathfinder Dam, development of groundwater resources along the river (particularly in the Torrington area) and Wyoming's proposed construction of the Deer Creek Dam near Glenrock. The Modified Decree imposed new compliance tasks on Wyoming, including a “consumptive use cap,” a revised annual irrigated acreage cap (which now included intentionally irrigated acres along tributaries and the mainstem below Pathfinder Dam), and the need to provide replacement water for depletions caused by wells in the Torrington area. This Modified Decree, and the Platte River Recovery Implementation Program, constrain water use in Wyoming's North Platte River Basin.

The Roxana Decree is unusual in that it was not issued by the United States Supreme Court but instead by a United States District Court. This is because the contestants were private parties, and not sovereign states, even though the resulting decree essentially divided water between two states. It apportions water between Wyoming and Idaho diversions along only two streams, Teton Creek and South Leigh Creek, on the west side of the Teton Mountain Range.



While “Lee Ferry” and “Lee's Ferry” are often used interchangeably, they are not precisely the same thing. Lee Ferry is the specific point on the Colorado River, referenced in both Colorado River Compacts, separating the Upper and Lower Basins. It is defined specifically as “...one mile below the mouth of the Paria River.”

Lee's Ferry is the historic river crossing location representing the only place within several hundred miles of canyon where the Colorado River could be accessed by wagon. On the ground, Lee's Ferry is just upstream of the Paria River and is the point where the USGS streamgage used for measuring flow of water to the Lower Basin is located. Lee's Ferry was named for a Mormon banished to that place by Brigham Young and ordered to carry travelers across the river. *(Photo: Upper Colorado River below Lee's Ferry, Grand Canyon)*



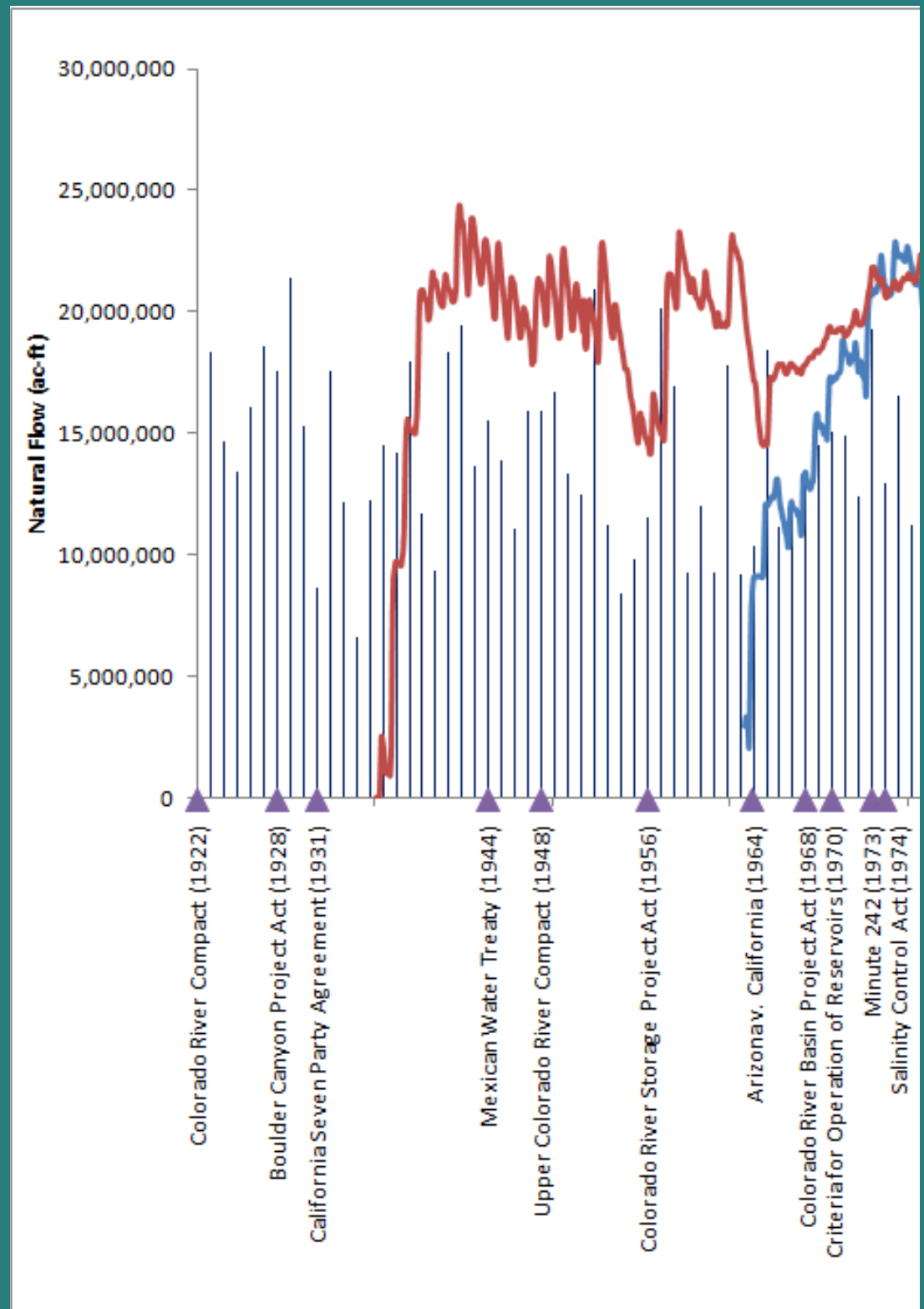
# THE LAW OF THE RIVER

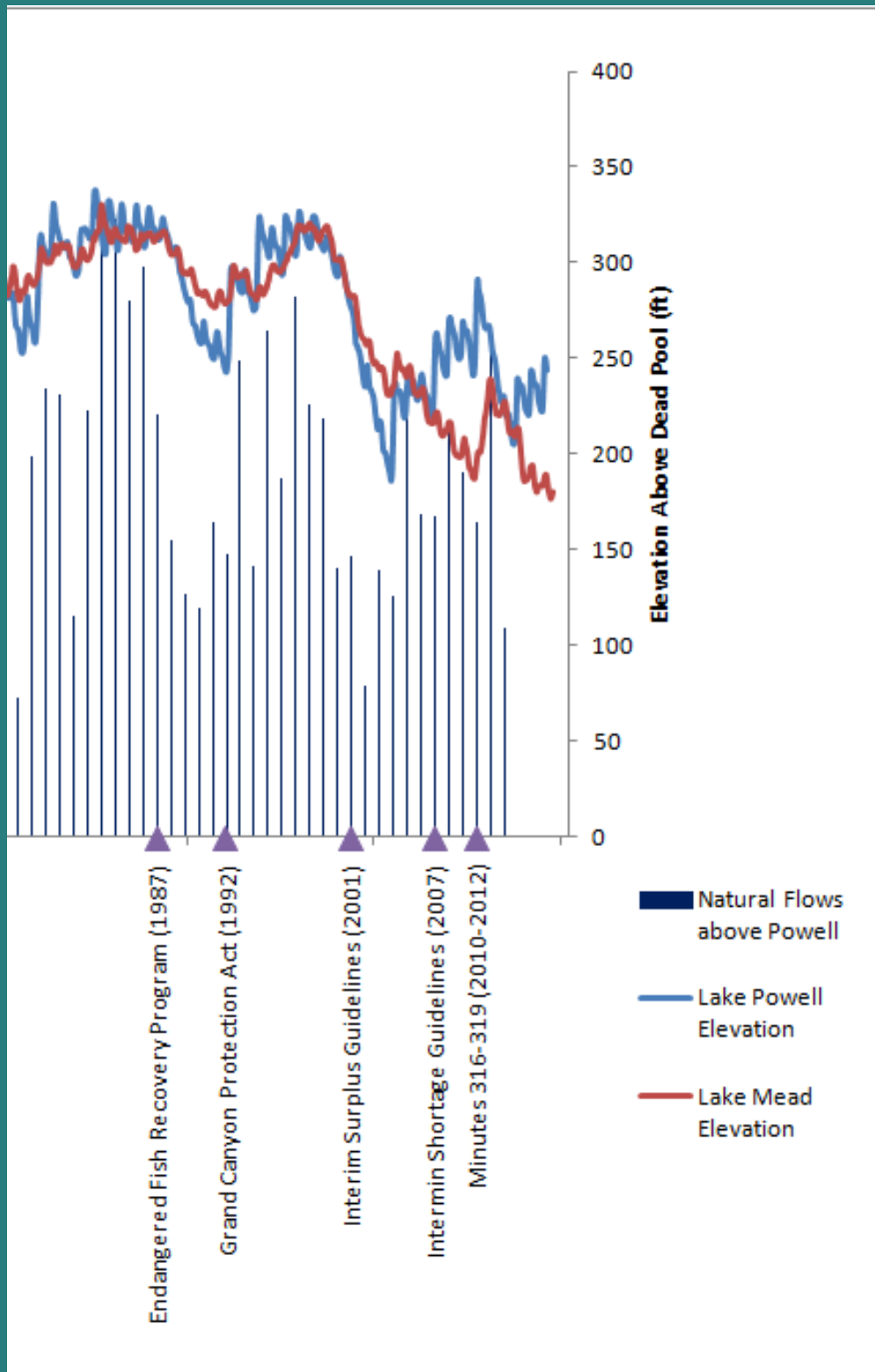
The Colorado River Compact was the first document in what has come to be called the Law of the River.<sup>4</sup> Scores of documents have followed. The Bureau of Reclamation (hereafter referred to as "Reclamation" or the "Bureau") compiled a list of documents that it refers to as the Law of the River which includes a series of documents through 2008 that can be found in *The Colorado River Documents 2008*.<sup>5</sup> Reclamation's 2008 compilation, along with previous Bureau compilations, provides the basis for much of this Law of the River summary. Included here is only a brief summary of the following major Law of the River components: (Figure 2)

- The Colorado River Compact (1922)
- The Boulder Canyon Project Act (1928)
- The California Seven Party Agreement (1931)
- The Mexican Water Treaty of 1944
- The Upper Colorado River Basin Compact (1948)
- The Colorado River Storage Project Act (1956)
- *Arizona v. California*, 373 U.S. 546 (1964)
- The Colorado River Basin Project Act (1968)
- The Criteria for Coordinated Long-Range Operation of Colorado River Reservoirs (1970)
- Minute 242 of the U.S.-Mexican International Boundary and Water Commission (1973)
- The Colorado River Basin Salinity Control Act (1974)
- The Upper Colorado River Endangered Fish Recovery Program (1987)
- The Grand Canyon Protection Act (1992)
- Interim Surplus Guidelines (2001)
- Interim Shortage Guidelines/Coordinated Reservoir Operations (2007)
- Recent Minutes of the 1944 Mexican Water Treaty; 316 - 319 (2010 - 2012)



Figure 2: Major Law of the River Components Compared to Natural Flows







Colorado River from Moab Rim (Photo: Matt Miller, United States Geological Survey)

## THE COLORADO RIVER COMPACT (1922)<sup>6</sup>

**“The Colorado River Compact offers a plan of basic principles which in effect will guarantee to Wyoming water supply sufficient for the development of all our possibilities to the limits that can be foreseen.” -- Wyoming State Engineer Frank C. Emerson**

The Colorado River Compact was born in the shadow of the U. S. Supreme Court case, *Wyoming v. Colorado*.<sup>7</sup> There the Court determined that the rule of first in time, first in right applied to diversions from the Laramie River without reference to the state line.

Delph Carpenter, a Greeley water lawyer, was aware of the case and its implications. California was developing rapidly. Agriculture in California’s Imperial Valley was using all of the Colorado River water that it could get. Carpenter was concerned that rapid development in California would give California water users the vested right to the Colorado’s flows, leaving the State of Colorado without water to support development. Arizona, Nevada, New Mexico, Utah and Wyoming shared his concern. Instead of being subjected to the doctrine of appropriation across state lines,

Carpenter’s idea was to create an interstate compact or treaty between the states to specify each state’s rights to Colorado River water.

California, as well as the other Lower Basin States, had additional motivation to reach an agreement. Flows in the Colorado River were very erratic resulting in both floods and very low flows. Storage was the answer to this problem, but support from the Upper Basin States was necessary. A dam would prevent the floods and meter the supply out over the year. But no state, and no coalition of irrigators, could afford to build the dam needed to tame the

Colorado River, so federal assistance was necessary. In 1921 the seven Colorado River Basin States appointed delegates to the Colorado River Commission, which negotiated the Compact during 1922 under the chairmanship of Herbert Hoover, who represented the United States.

Wyoming’s Commissioner was State Engineer Frank C. Emerson. Mr. Emerson knew that development in Wyoming would not be rapid and sought a way to protect future development as it became feasible: “Wyoming has therefore looked with much concern upon the proposed large developments on the lower Colorado River that would establish priorities to the use of water from the river that might well cause an embargo against future developments in this State.” “The Colorado River Compact offers a plan of basic principles which in effect will guarantee to Wyoming water supply sufficient for the development of all our possibilities to the limits that can be foreseen.”<sup>8</sup>

The Commission considered proposals to give specific amounts



and proportions of water to each of the states. Negotiations nearly foundered on how to divide the supply. Mr. Hoover proposed a compromise to divide the drainage into an upper and a lower basin and to allocate the consumptive use of water between the basins. This compromise left the states to later work out the specific state proportions within the two divisions, and left internal water administration to each division.

The Commission signed the Compact on November 24, 1922, after meeting twenty-seven times. The Compact divides the Colorado River into two basins, the Upper and the Lower, with the dividing line at Lee Ferry.<sup>9</sup> It apportions 7.5 MAF of beneficial use of water per year to each Basin from the Colorado River and all of its tributaries, which includes all water necessary to supply water rights perfected at the time. It also gives the Lower Basin the right to increase its consumptive use by 1 MAF per year.<sup>10</sup> So, between the two Basins, the Compact apportions 16 MAF per year. The Compact also recognizes Mexico's right to water, but that right was not quantified until 1944. Instead, the Compact states that surplus water will first satisfy the Mexico right, and, if surplus water is insufficient, each basin shall equally bear the deficiency.<sup>11</sup>

Article III, subsection (d) of the 1922 Compact is important to Wyoming and the Upper Basin. It states that the Upper Basin "will not cause the flow of the river at Lee Ferry to be depleted below an aggregate of 75,000,000 acre-feet for any period of ten consecutive years reckoned in continuing progressive series." Therefore, subsection (d) does not contain a water delivery requirement. Instead, it prohibits the Upper Basin from depleting the river at Lee Ferry below the 75 MAF in a 10-year total by exercising post-compact rights.

Article III, subsection (e) states that the Upper Basin will not withhold water and the Lower Basin will not "require the delivery of water, which cannot reasonably be applied to domestic and agricultural uses." This language reinforces a general Compact concept that it is the beneficial consumptive use which is apportioned, not the water itself.

Article VI provides for dispute



Upper Colorado River below Lee's Ferry, Grand Canyon, circa 1900-1930

resolution by commissioners appointed by the governors. The commissioners have the power to adjust the claim or controversy, subject to subsequent legislative ratification. Article VI specifically allows claims to be resolved "by any present method" or by direct legislative action, probably meaning another compact or compact amendment. The Compact does not describe what was meant by "any present method" of dispute resolution, but Article IX preserves each state's right to enforce the Compact in court.

Article VIII preserved the status quo of rights pre-dating the Compact. It states that "present perfected rights" are unimpaired. This treatment of present perfected rights can be important in at least two contexts. In Upper Basin States, those rights are exempt from regulation if the Upper Basin must curtail consumption in order to meet the 75 MAF in 10-year non-depletion obligation. In Lower Basin States, present perfected rights, those existing as of June 25, 1929,<sup>12</sup> would be satisfied first in the event of shortage. In the Upper Basin, there is some debate about whether the correct date to qualify as a present perfected right is November 24, 1922 when the Compact was signed, or December 21, 1928 when it was approved by Congress, or June 25, 1929 when the act passed by Congress became effective. Further, there can be some question regarding when a particular right became perfected, which may depend upon the laws of each individual state. The bulk of the irrigation water rights in the Green River Basin in Wyoming have a pre-1922 priority date.

Although the Compact was ratified fairly quickly by six states, it was not ratified quickly by Congress and Arizona. Arizona, primarily, opposed the construction of necessary storage works and the All-American Canal in the Lower Basin which would benefit California, and expressed concern regarding the status of the Gila River. The unwillingness to ratify the Compact was a stimulus for the Boulder Canyon Project Act.



# THE BOULDER CANYON PROJECT ACT (1928)

**After years of wrangling, Congress passed the Boulder Canyon Project Act of 1928.<sup>13</sup> The Act authorized the construction of Boulder Dam (now Hoover Dam) and the All-American Canal.**

The Boulder Canyon Project Act did not take effect until either all seven states ratified the 1922 Compact, or any six states including California ratified the Compact and California renounced the right to divert more than 4.4 million acre-feet (MAF) per year plus a share of any surplus. California agreed, and all states except Arizona had already ratified the Compact by 1928.

The Boulder Canyon Project Act authorized California, Arizona, and Nevada to enter into an agreement to divide the Lower Basin's share of the river. The Act granted approval in advance to an interstate compact allocating 300,000 AF per year to Nevada, 2.8 MAF to Arizona, and 4.4 MAF to California.<sup>14</sup> The United States Supreme Court later determined that this language was a congressional apportionment.<sup>15</sup>

The 1928 Act established priorities for the use of Hoover Dam and reservoir: "First, for river regulation, improvement of navigation, and flood control; second, for irrigation and domestic uses and satisfaction of present

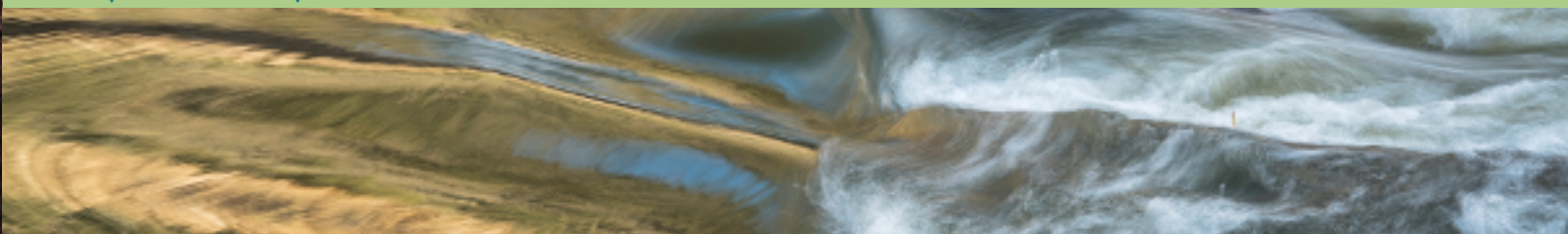
perfected rights in pursuance of Article VIII of said Colorado River compact; and third, for power."<sup>16</sup> Construction of Hoover Dam began, and by 1935 the dam was completed and the first water stored. The Boulder Canyon Project Act, the construction of Hoover Dam, and the administration of Lake Mead by the Bureau of Reclamation created a fundamental difference in how the river is administered between the Upper Basin and the Lower Basin.

In the Upper Basin, a water user obtains the right to use water through a permit system under state law, or through water court in the case of Colorado. There are federal reservoirs which have water contractors, but those reservoirs have storage priorities administered under state law and take their place in the priority system. Each state administers its own streams without federal help. In the Lower Basin, for all mainstream uses below Hoover Dam, the Secretary of the Interior is the river master. Water users in each Lower Basin State must have a direct contract with Reclamation, or receive water through a state agency which has a direct contract with Reclamation.



# THE CALIFORNIA SEVEN PARTY AGREEMENT (1931)<sup>17</sup>

Before Reclamation entered into water delivery contracts under the Boulder Canyon Project Act with users in California, it requested a listing of the relative priorities of rights among the major users of Colorado River water. The California Seven Party Agreement divides the California 4.4 MAF per year apportionment between the Palo Verde Irrigation District, Imperial Irrigation District, Coachella Valley County Water District, Metropolitan Water District of Southern California, City of Los Angeles, City of San Diego, and County of San Diego. The Agreement establishes priorities and quantities, with the senior priorities totaling 3.85 MAF apportioned to Palo Verde, Imperial, Coachella and the Yuma Project. If there is ever a shortage shared by California, this priority schedule would likely be vital.



## THE MEXICAN WATER TREATY OF 1944

In the early 1940s, the United States and Mexico negotiated a treaty for the Rio Grande, Colorado and Tijuana Rivers.<sup>18</sup> Article 10 of the treaty guarantees that the United States will deliver 1.5 MAF of Colorado River water annually to Mexico and allows for a delivery schedule. Recall that the 1922 Compact states that surplus water will first satisfy the Mexico right, and, if surplus water is insufficient, each basin shall equally bear the deficiency. Moreover, the treaty provides an opportunity for Mexico to schedule delivery of up to an additional 200,000 AF of water if and when the United States determines there is a surplus volume available over and above annual compact and treaty uses.

An unresolved issue relates to the Upper Basin's obligation to help satisfy Mexico's right under the Treaty. As stated above, the 1922 Compact first requires that Mexico be satisfied from surplus water before the Upper Basin has an obligation to satisfy half of any deficiency. However, there is not unanimity regarding when a deficiency in the system exists and how to quantify such a deficiency. On one hand, it can be argued that unless and until the Lower Basin can demonstrate it is only using its compact apportionment from the Colorado River mainstream and its tributaries, there can be no basis for asserting that the system lacks surplus water that would require the Upper

Basin to provide half the deficiency to Mexico. On the other hand, it may be that, at least since 1998, there has been no surplus and further, the Upper Basin States must cover transit losses from Lee Ferry to Mexico, about 100,000 AF per year. This issue becomes more relevant as water supplies become more scarce because the more water that is released from Lake Powell in excess of the Upper Basin's 7.5 MAF non-depletion obligation, the greater the risk the Upper Basin may be unable to meet that obligation in subsequent 10 year periods.

The treaty also anticipated that Mexico would have to share in water shortages: "In the event of extraordinary drought or serious accident to the irrigation system in the United States, thereby making it difficult for the United States to deliver the guaranteed quantity of 1,500,000 AF a year, the water allotted to Mexico under subparagraph (a) of [ ] Article [10] will be reduced in the same proportion as consumptive uses in the United States are reduced."<sup>19</sup> Unresolved issues exist regarding what constitutes an "extraordinary drought", how the "same proportion" should be measured, what number of states must experience shortage before Mexico must as well, and whether carried-over storage in the United States is protected or must be released to satisfy the treaty obligation.





Upper Fremont Lake, Wyoming (Photo: Wesley Gooch)

# THE UPPER COLORADO RIVER BASIN COMPACT (1948)

**Unlike the Lower Basin, the Upper Basin States were able to negotiate their own compact, which was ratified by Congress in 1949.<sup>20</sup> The Upper Colorado River Basin Compact provides for the equitable apportionment of the Upper Colorado River System waters (above Lee Ferry) between the signatory states of Arizona, Colorado, New Mexico, Utah, and Wyoming.**

The Compact is administered by a commission, with one representative from each state except Arizona, and one representative of the United States. This body, termed the Upper Colorado River Commission, has a paid staff with an Executive Director, General Counsel, and support personnel.

A unique aspect of both the 1922 and 1948 Compacts is that they define the Upper and Lower Basin States as “those parts of the States of [Upper or Lower Basin States] within and from which waters naturally drain into the Colorado River System above [or below] Lee Ferry, and also parts of said States located without the drainage area of the Colorado River System which are now or shall hereafter be beneficially served by waters diverted from the System above [or below] Lee Ferry.”<sup>21</sup> The

practical meaning of this language is that those parts of Wyoming, Colorado, Utah, and New Mexico which are served by trans-basin diversions of Colorado River water (such as Denver, the Central Utah Project, and Cheyenne’s Little Snake River diversions), are considered part of the Upper Basin. Similarly, places like Los Angeles are considered part of the Lower Basin because Colorado River water is conveyed and used there. All those areas are considered part of the “Basin” not because they lay geographically inside it, but because they use water physically diverted from it. And, such trans-basin diversions need no formal approval by the Upper Colorado River Commission or any other Basin State to be constructed within an individual state. For example, Wyoming needed no such outside approvals to build the Cheyenne

Stage I and Stage II projects, which divert water from the Little Snake River Basin to the North Platte River Basin. This is not true of all compacts to which Wyoming is a signatory.

Article III of the 1948 Compact divides the consumptive use of water apportioned to the Upper Basin under the 1922 Compact this way:

Arizona receives up to 50,000 AF per year. The other states divide the remainder:

Colorado	51.75%
New Mexico	11.25%
Utah	23.00%
Wyoming	14.00%.

Each state’s apportionment is based on the beneficial use of water, and

includes all water necessary to satisfy rights in existence at the time the 1922 Compact was signed. The Compact further provides the ability of each state to develop its compact apportionment in the other signatory states.<sup>22</sup>

Article IV describes what happens should curtailment become necessary to avoid depletion below the requirements of Article III of the 1922 Compact (75 MAF in any running 10-year total). Curtailment will be proportioned between the Upper Basin States based upon the previous year's consumptive use. There is provision for payback if a state has used more than its share in the previous ten years.

Article VIII(d) grants the Commission specific powers. Among

other things, the Commission is specifically empowered to make findings as to the quantity of water used in the Upper Basin and each state each year, the quantity of deliveries at Lee Ferry, the necessity for and extent of required curtailment, and findings concerning extraordinary drought affecting the Mexican treaty. The Commission's findings are not conclusive, but are prima facie evidence of the facts found.<sup>23</sup>

Article XI apportions the consumptive use of the Little Snake River between Colorado and Wyoming, and specifies administration of existing rights on the basis of an interstate priority schedule below the confluence of Savery Creek. It also provides for an equal use of water between the states by rights initiated after the Compact.

Article XII apportions the consumptive use of Henry's Fork and its tributaries between Utah and Wyoming also on the basis of an interstate priority schedule for existing rights, and an equal right to future development.

Article XVI is a reaffirmation of each state's right to delay development. According to that Article, any state's failure to use water apportioned to it is not a relinquishment of that water to the Lower Basin and is not a forfeiture or abandonment of the right to such use. Of course, like other compacts, this Compact and its provision recognizing the right to delayed development is federal law approved by Congress.



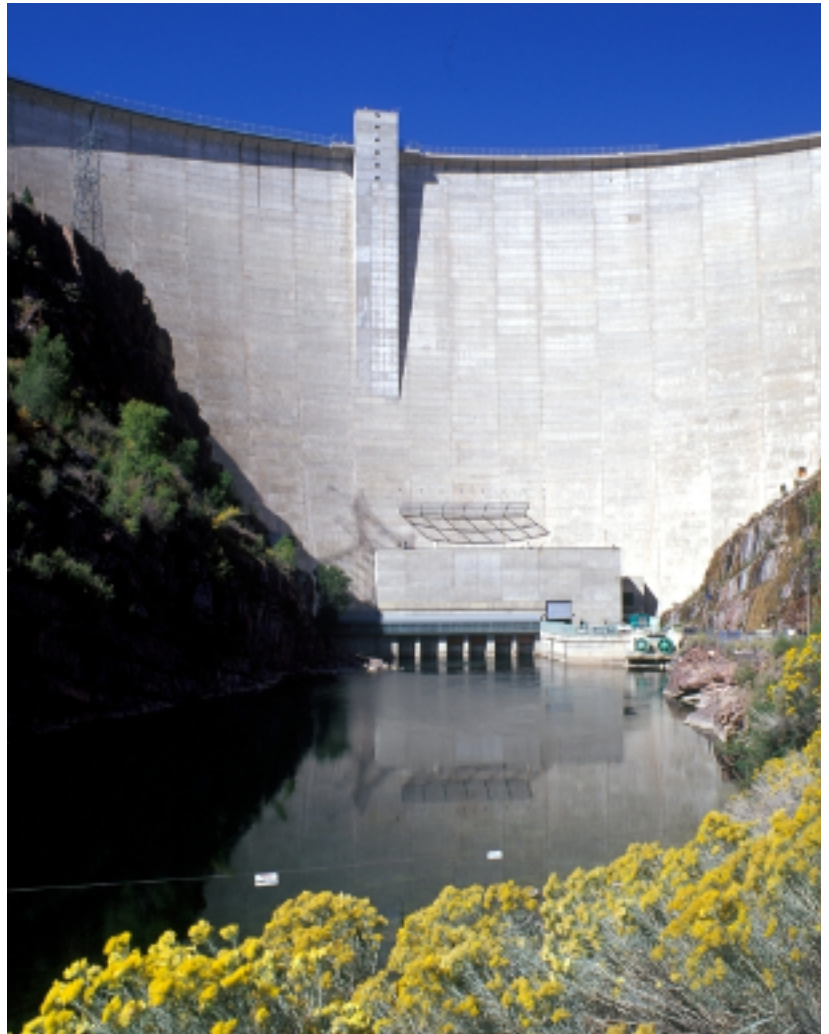
President Truman at his desk in the Oval Office, signing S. 790, an act granting the consent of the United States to the Upper Colorado River Basin Compact, as Interior Secretary Julius Krug and members of the congressional delegations of Wyoming, Utah, Colorado, New Mexico, and Arizona look on. Dated April 6, 1949. (Photo: National Archives and Records Administration)

# THE COLORADO RIVER STORAGE PROJECT ACT (1956)<sup>24</sup>

**After ratification of the 1948 Compact, the Upper Basin States sought the ability to develop water uses in the Upper Basin. As with many western rivers, the Colorado River fluctuates greatly in its flow thereby increasing the risk that the Upper Basin may fail to satisfy its obligation under the 1922 Compact. The construction of major reservoirs above Lee Ferry permits a relatively equalized annual flow at Lee Ferry and serves as at least a partial solution to that problem.**

The Colorado River Storage Project Act authorized the construction of several major Upper Basin reservoirs. The initial authorized units were Glen Canyon, Curecanti (now Aspinall) in Colorado, Flaming Gorge in Utah and Wyoming, and Navajo in New Mexico. The combined storage capacity of these four major projects is in excess of 30 MAF.

The Act also authorized the construction of participating projects in the Upper Basin as long as they were found feasible. In Wyoming, the participating projects, some authorized through subsequent



Flaming Gorge Dam, Utah (Photo: United States Bureau of Reclamation)

legislation, include La Barge, Lyman, Seedsdakee, Eden, and Savery-Pot Hook. Fontenelle Reservoir, for example, was authorized under the Seedsdakee Project. Several of these have never been built.

This Act also created the Upper Colorado River Basin Fund. The Basin Fund was established from apportioned power revenues generated by the authorized dams to assist repayment of participating projects. The allocation to the respective states is as follows: Colorado 46 percent; New Mexico 17 percent; Utah 21.5 percent, and; Wyoming 15.5 percent.<sup>25</sup> Under a Memorandum of Agreement signed in January, 2011, approximately \$11.5

million annually of Basin Fund revenue can be used to fund projects or activities within the Upper Basin which further the purposes of the Act. Projects are selected annually from those proposed by the Upper Basin States.

Section 14 of the Act directs the Secretary of the Interior to operate the authorized facilities in compliance with the 1922 and 1948 Compacts, the Boulder Canyon Project and Adjustment Acts, and the Mexican treaty. It further authorizes any Basin State to sue in the Supreme Court to enforce the provision and consents to the joinder of the United States as a party.



# ARIZONA V. CALIFORNIA,

## 373 U.S. 546 (1963)<sup>26</sup>

As described previously, the Lower Basin States failed to negotiate a compact allocating Colorado River water within the Lower Basin. Arizona finally ratified the 1922 Compact in 1944 and then sought congressional approval of the Central Arizona Project. However, approval stalled due to the uncertain nature of Arizona's claim to water. California opposed Arizona's effort since there was still no agreement among the Lower Basin States regarding how their apportioned water would be divided. Congress would not approve the project until the Lower Basin States' rights were determined either by litigation or voluntary agreement. To that end, in 1952 Arizona filed suit in the Supreme Court and requested adjudication between the states of Arizona and California as to each state's right to Colorado River water.

Among other things, California argued that it was entitled to 5.3 MAF annually from the Colorado River due to its established uses and application of the prior appropriation doctrine. On the other hand, Arizona initially argued that, through application of the Supreme Court's doctrine of equitable apportionment, it could prove a need for water even though it had no water conveyance system to its large population centers in the state. Later, Arizona argued that California was limited to 4.4 MAF annually due in part to the Boulder Canyon Project Act.

According to the Court, due to the states' inability to divide the water themselves, the Boulder Canyon Project Act established a congressionally-mandated equitable apportionment of the Lower Basin's share of the Colorado River. Thus, the Court found that the Lower Basin States were entitled to the amounts stated in the Act: 4.4 MAF to California, 2.8 MAF to Arizona, and 300,000 AF to Nevada, with proportionate sharing of any surplus. The Secretary of the Interior was left to make decisions regarding the application of shortages as opposed to a proportional sharing of shortages. Since this case, there are three possible ways to equitably apportion an interstate

stream: interstate compact, Supreme Court decree, and Congressional apportionment.

California also argued that 1 MAF of Arizona's apportionment should be satisfied through its uses of the Gila River. Arizona contended that the 1922 Compact apportioned only the waters of the mainstream, not the mainstream and the tributaries. This view seems untenable in light of the express 1922 Compact wording. Although the Supreme Court held that Arizona's apportionment did not include its Gila River uses, it did not interpret the 1922 Compact: "We need not reach that question, however, for we have concluded that whatever waters the Compact apportioned the Project Act itself dealt only with water of the mainstream."<sup>27</sup> Thus, the Court only interpreted the Boulder Canyon Project Act. The Upper Basin has consistently articulated the position that Article III of the 1922 Compact divides the waters of the whole Colorado River System, which the Compact defines to include all tributaries.

The Special Master in the case also recommended that consumptive use be measured at each point of diversion on the mainstream minus return flows. This calculation does not account for evaporation or conveyance losses to the points of diversion. As a result, it has helped to set the stage today for the problem known as the structural deficit where the demands on Lake Mead outstrip supply by about 1.2 MAF annually.

The Supreme Court issued a Decree in the case on March 9, 1964.<sup>28</sup> The terms of the Decree generally bind and guide the Department of the Interior with regard to the water deliveries it makes within the Lower Basin. Paragraph II(B)(3) of that Decree allows the Secretary of the Interior to determine the proper allocation of shortages once present perfected rights have been satisfied.



# THE COLORADO RIVER BASIN PROJECT ACT (1968)<sup>29</sup>

Section 603(a) states “Rights of the upper basin to the consumptive use of water available to that basin from the Colorado River system under the Colorado River Compact shall not be reduced or prejudiced by any use of such water in the lower basin.”

Following the Supreme Court’s decision in *Arizona v. California*, the Colorado River Basin Project Act authorized construction of the Central Arizona Project which conveys Colorado River water to the Phoenix and Tucson areas. However, it did not come about easily. The legislation could not pass without the support of the other Basin States. The resulting compromise softened the victory Arizona won in the litigation.

Section 301(a) of the Project Act limits the Granite Reef aqueduct (the primary conveyance canal for the Central Arizona Project’s apportionment from the Colorado River mainstream) to 2,500 cfs unless Lake Powell is full or is spilling or when releases are being made to equalize the active storage of Lake Powell with the active storage of Lake Mead. This provision was designed to limit the Project’s reliance on water allocated to but unused by

the Upper Basin. Even if the Project does use water allocated to but unused by the Upper Basin, Section 603(a) states “Rights of the upper basin to the consumptive use of water available to that basin from the Colorado River system under the Colorado River Compact shall not be reduced or prejudiced by any use of such water in the lower basin.”

Section 301(b) makes the Central Arizona Project the most junior priority in the Lower Basin. In any year in which the mainstream will not supply 7.5 MAF, the Central Arizona Project is limited to what is left after present perfected rights and the California and Nevada allocations under *Arizona v. California* are satisfied. Essentially, except for present perfected rights in Arizona, the brunt of any shortage in the Lower Basin is likely to be borne by Arizona.

Section 602 is one of the most important provisions of the Act from the Upper Basin perspective. It provides Congressional direction to the Secretary of the Interior on the operation of Glen Canyon and Hoover Dams. It also recognizes the importance of the Upper Basin reservoirs and a purpose they serve in providing 1922 Compact compliance insurance and the ability to develop water in the Upper Basin. Section 602(a) directs the Secretary of the Interior to propose criteria for the long-range operation of the Colorado River System reservoirs (known as LROC). Those criteria are to make provision for storage of water in Upper Basin reservoirs and releases from Lake Powell in the following order of priority: (1) releases to supply one-half the deficiency described in Article III(c) of the 1922 Compact (termed the Mexican obligation; a deficiency for which has never been documented or declared); (2) releases to comply with Article III(d) of the 1922 Compact (75 MAF in 10 year non-depletion obligation); (3) storage of water not required for releases under (1) and (2) to the extent that the Secretary finds such storage to be reasonably necessary to assure deliveries under (1) and (2) without impairing consumptive uses in the Upper Basin. It directs the Secretary not to release storage if active storage in Lake Powell is less than the active storage in Lake Mead, and also to maintain, “as nearly as practicable”, active storage in Lake Mead equal to the active storage in Lake Powell. Historically, under certain conditions when active storage in Lake Powell was higher than Lake Mead, releases from Glen Canyon Dam could be increased so that storage in the two reservoirs was made more equal. These criteria are written more specifically in the 2007 Interim Shortage Guidelines.

Section 602 recognizes that the more water the Upper Basin has in storage, the more insurance it has to comply with the 1922 Compact. However, recall that under Article III(e) of the 1922 Compact the Upper Basin cannot withhold water it cannot reasonably use from the Lower Basin. When setting the 602(a) levels of Upper Basin storage, the Secretary has to balance the Upper Basin’s need for insurance water against the Lower Basin’s rights under Article III(e).



# THE CRITERIA FOR COORDINATED LONG-RANGE OPERATION OF COLORADO RIVER RESERVOIRS (1970)<sup>30</sup>

Section 602 of the Colorado River Basin Project Act requires the Secretary of the Interior to propose criteria for the long-range operation of the Colorado River System reservoirs (LROC). The Secretary first did so in 1970. The criteria primarily restate portions of Section 602(a) of the 1968 Project Act and relevant portions of the *Arizona v. California* Decree. The criteria must also be administered in conformity with other parts of the Law of the River.

The criteria define a minimum objective release of 8.23 MAF per year. This minimum release is made if either the active storage in Upper Basin reservoirs is less than the 602(a) level or if Lake Powell active storage is less than Lake Mead active storage. The release criteria have been modified while the 2007 Interim Shortage Guidelines are in effect.

The LROC requires an annual plan of operation which is to include a determination of the 602(a) storage quantity as of September 30 of each year. The required 602(a) storage is to be calculated after considering the law and relevant factors such as historic stream flows, the most critical

period of record, probabilities of water supply, estimated future depletions in the Upper Basin including recurrence of critical periods of water supply, and sufficient storage of water for the Upper Basin to meet 602(a) needs.

If the Secretary declares a shortage under the LROC, then Article II(B)(3) of the *Arizona v. California* Decree controls. The Secretary apportions the river so that present perfected rights are satisfied in priority without regard to state lines, and California is limited to 4.4 MAF. Section 301(a) of the Colorado River Basin Project Act then controls releases whereby Arizona likely suffers the brunt of the shortage.

The provisions of the LROC are reviewed every 5 years, and through this review the criteria were amended in 2005. The amendments were: (1) to accommodate a specific change in Federal law applicable to the LROC (that is, the 1992 Grand Canyon Protection Act consultation requirements); (2) to address outdated language that had remained in the LROC since its adoption in 1970; and (3) to incorporate specific modifications to Article IV(b) of the LROC to better reflect operating experience.<sup>31</sup>

Aerial view of Glen Canyon Dam  
(Photo: United States Bureau of Reclamation)





# MINUTE 242 OF THE U.S.-MEXICAN INTERNATIONAL BOUNDARY AND WATER COMMISSION (1973)<sup>32</sup>



Morelos Dam on the border of Arizona and Mexico  
(Photo: United States Bureau of Reclamation)

Minutes to the 1944 Mexican Water Treaty reflect agreements of the International Boundary and Water Commission regarding Treaty implementation. Minute 242 provided that the United States take actions to reduce the salinity of water being delivered to Mexico at Morelos Dam (the Northern International Boundary). Primarily, the Minute provides as follows:

*“The United States shall adopt measures to assure that not earlier than January 1, 1974, and no later than July 1, 1974, the approximately 1,360,000 acre-feet (1,677,545,000 cubic meters) delivered to Mexico upstream of Morelos Dam, have an annual average salinity of no more than 115 p.p.m.  $\pm$  30 p.p.m. U.S. count (121 p.p.m.  $\pm$  30 p.p.m. Mexican count) over the annual average salinity of Colorado River waters which arrive at Imperial Dam, with the understanding that any waters that may be delivered to Mexico under the Treaty of 1944 by means of the All American Canal shall be considered as having been delivered upstream of Morelos Dam for the purpose of computing this salinity.”<sup>33</sup>*

A counterintuitive result of this salinity “differential” calculation is that the cleaner the water is as it arrives at Imperial Dam, the harder the differential is to satisfy. Still this requirement has never been violated. To make sure the Minute would be operational and implementable in the United States, it had to be supported by the passing of the Colorado River Basin Salinity Control Act of 1974.<sup>34</sup>

# THE COLORADO RIVER BASIN SALINITY CONTROL ACT (1974)

In 1974, Congress passed the state-supported Colorado River Basin Salinity Control Act. This Act provided a way to reduce the salinity of the river while the Upper Basin States proceeded with further development of their compact apportioned water. Congress passed the Act to address the problems created by the loading and concentration of salts in the Colorado River. Salts enter the river through both natural and manmade sources, with irrigation return flows being the primary source of manmade salt loading.

Title I of the Act focuses on measures downstream of the

Imperial Dam. Its objective is to bring about compliance with Minute 242 of the 1944 Mexican Water Treaty. Title II of the Act addresses measures upstream of the Imperial Dam. Its primary purpose is to reduce salinity levels on the Lower Colorado River within the United States, primarily by constructing salinity control measures in the Upper Basin.

The Act also authorized the Secretary of the Interior to construct the Yuma Desalting Plant. The idea was to treat 129 million gallons per day (395 AF) of drain water, returning 70 percent to the river with 90 percent of the total dissolved solids removed. That is, to take the runoff from the Wellton-Mohawk Irrigation District and reduce its salinity to a level where it was useful to blend back into the river to reduce overall salinity. The plant became operational in 1992 but only ran for a few months when flooding caused it to stop operations. The plant was operated briefly at partial capacity in 2007 and then again in 2010 and 2011 for a total of 328 days.<sup>35</sup>

The Act also created the Colorado River Basin Salinity Control Advisory Council. It is a federal advisory committee which provides recommendations to the Secretary of the Interior, the Secretary of Agriculture and the Administrator of the Environmental Protection Agency on the implementation of the salinity control program. The Governors of each state can appoint up to three members to the Advisory Council.

A states-only group, the Colorado River Basin Salinity Control Forum, exists in parallel with the Advisory Council. The Forum was created in 1973 as a states' effort to make sure the Salinity Control Act did not contain state line water quality standards. Its role is to provide state input and recommendations to the salinity control process, and it is not governed by Federal Advisory Committee Act rules. Wyoming has had a significant presence on both the Advisory Council and Forum over their entire histories.



*Dan S. Budd*

Dan S. Budd was a fixture for Wyoming at Colorado River meetings for over 40 years. He was appointed Interstate Stream Commissioner by Governor Clifford Hansen in 1967, joined the Salinity Control Forum in 1974, and served both the Forum, the Program's Advisory Council, and the Upper Colorado River Commission (as Alternate Commissioner for Wyoming) until he passed away in 2015. Dan was a well-known rancher from Big Piney, Wyoming.



Juvenile Humpback Chub (Photo: National Park Service)

## THE UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM (1988)

The Upper Colorado River Endangered Fish Recovery Program was established in 1988 to help bring four species of endangered fish back from the brink of extinction: the humpback chub, bonytail, Colorado pikeminnow, and razorback sucker.

The United States Fish and Wildlife Service had maintained since 1978 that a jeopardy situation existed because of habitat loss and other factors and because of the declining numbers of the endangered fish. It concluded that actions had to be taken to mitigate this situation. The Upper Basin States were concerned that protection of the endangered fish could negatively affect water use and development, and operation of federal projects.

The Recovery Program was initiated with the signing of a cooperative agreement by the Governors of Colorado, Utah, and Wyoming; the Secretary of the Interior; and the Administrator of Western Area Power Administration.<sup>36</sup> Governor Sullivan signed the cooperative agreement for Wyoming and the state has been an active participant throughout the program's history. The cooperative agreement implemented the Recovery Program as

described in a framework which took over three years of cooperative effort to develop.<sup>37</sup> The Recovery Program is a partnership of local, state, and federal agencies, water and power interests, and environmental groups working to recover endangered fish in the Upper Colorado River Basin while water development proceeds. The Program provides Endangered Species Act compliance for continued operation of federal water and power projects in accordance with project purposes.

Under the cooperative agreement, the Program has five principal elements: (1) habitat management through the provision of instream flows; (2) nonflow habitat development and maintenance; (3) native fish stocking; (4) management of nonnative species and sportfishing; and (5) research, data management, and monitoring.



# THE GRAND CANYON PROTECTION ACT (1992)<sup>38</sup>

By 1992, the effects of Glen Canyon Dam upon the Grand Canyon had caused some concern. With the exception of the sand delivered during flood events from the Paria River entering the Colorado River at Lee's Ferry, the sediment load of the Colorado is trapped behind Glen Canyon Dam, and its relatively steady-state releases do not duplicate the effects of natural flows. This resulted in reduced sediment deposits and colder water temperatures in the Grand Canyon which affected both native fish and recreationists. The Grand Canyon Protection Act adds additional operating criteria to Glen Canyon Dam. The intent of the Act is to mitigate adverse impacts and to protect and improve the values for which both Grand Canyon National Park and Glen Canyon National Recreation Area were established. However, the Act must be implemented in a manner fully consistent with and subject to the Compacts and other elements of the Law of the River.<sup>39</sup>

A result of the Act was the Glen Canyon Dam Adaptive Management Program which employs a process of "adaptive management" to monitor and assess the effects of dam operations on downstream resources. The Act also

directed the Secretary of the Interior to establish and implement long-term monitoring programs and activities that will ensure that Glen Canyon Dam is operated in a manner consistent with the Act. These programs include research and studies to determine the effect of management of the dam on the downstream natural, recreational, and cultural resources. The actions are undertaken in consultation with other federal agencies, the Basin States, Indian Tribes, the general public, environmental organizations, the recreation industry, and contractors for the purchase of power produced at Glen Canyon Dam. The consultation is accomplished by an advisory committee called the Adaptive Management Work Group.

The Act directs that these adaptive management actions be undertaken in a manner fully consistent with and subject to the primary elements of the Law of the River. Section 1806 of the Act states that nothing in the Act "is intended to affect in any way- (1) the allocations of water secured to the Colorado Basin States by any compact, law, or decree[.]"



# INTERIM SURPLUS GUIDELINES (2001)<sup>40</sup>

Water demand in the Lower Basin increased during the 1990s in part as a result of the Central Arizona Project completion. Arizona finally had a way to get its Colorado River apportionment to where it was needed. At the same time, the surplus water conditions of the 1980s lessened. The 1964 Decree in *Arizona v. California* provided guidance regarding the amount of water available to Lower Basin water users, but with increased demand and decreased supply, additional guidance was necessary.

Prior to the 1990s, California was annually using nearly 1.0 MAF more water than its 4.4 MAF apportionment. The Law of the River allowed this excess water use so long as another Lower Basin State was not using its full apportionment. But as Arizona and Nevada approached their full apportionments, less water was available for use in California. As such, California needed to reduce its reliance on the Colorado River and work toward limiting its withdrawals to 4.4 MAF.

The Secretary of the Interior signed the Record of Decision for the Interim Surplus Guidelines on January 16, 2001. The Guidelines were the result of a long debated and negotiated agreement among all seven Basin States. The Guidelines linked determinations of surplus availability to specific Lake Mead elevations and also to California's plan to reduce its annual consumptive use to 4.4 MAF. Essentially, the Guidelines answered the questions of when and how much surplus water was available for California's use. The Guidelines were not meant as a drought plan, but

were intended to give California a "soft landing" through a gradual reduction in its reliance on Colorado River water. But because the drought of the 2000s began soon after the Guidelines took effect, California has not been able to take advantage of them, and has had to live within its 4.4 MAF allocation much sooner than originally anticipated. The

Guidelines were to be in place until 2016.

A reduction of water available to California caused a heightened accounting of the water use within California. The three senior California priorities, totaling 3.85 MAF and reflected in the California Seven Party Agreement of 1931 discussed above, are for irrigation uses. However, those rights were only vaguely described as to each user, and municipal demands of California's growing population were increasing. To address this issue, key California water users entered into the 2003 Quantification Settlement Agreement<sup>41</sup> which enabled California to



Central Arizona Project as it passes through Scottsdale, Arizona  
(Photo: Dominic McDevitt-Parks)

implement major Colorado River water conservation and transfer programs to reduce the state's demand on the river. It also contains provisions regarding restoration of the environmentally sensitive Salton Sea. Using policies on payback, inadvertent overruns, forbearance, fallowing, and other techniques, the parties agreed to methods designed to allow California to live within its allocation.

# INTERIM SHORTAGE GUIDELINES/COORDINATED RESERVOIR OPERATIONS (2007)<sup>42</sup>



Lake Mead National Recreation Area (Photo: National Park Service)

The Record of Decision implementing these interim operational guidelines was signed December 13, 2007. The Guidelines specify the elevations in Lake Mead which dictate during the interim period when the Secretary of Interior (Secretary) will declare water use shortages in the Lower Basin and what the amount of those shortages will be. The Guidelines also specify new, coordinated operational parameters for Lakes Powell and Mead, which have as their intent to operate the reservoirs to avoid the risk of water curtailments in the Upper Basin and minimize shortages in the Lower Basin. The guidelines provide mechanisms for the creation and delivery of conserved system and non-system water in Lake Mead (Intentionally Created Surplus or ICS) to create additional water supply

flexibility in the Lower Basin, encourage water conservation in Lake Mead and limit the severity of potential future shortages. In addition, the Guidelines modified and extended the existing Interim Surplus Guidelines through 2026, the same termination date for the Shortage Guidelines.

The 2007 Interim Guidelines provide an objective methodology to determine the annual releases from Lake Powell and Lake Mead. Table 2 shows the Lake Powell Operational tiers as specified by the 2007 Interim Guidelines. Release volumes are described in narrative form in the Guidelines based on the elevation of Lakes Powell and Mead.



The signing of the 2007 Interim Guidelines. From left: Pat Tyrrell, Wyoming State Engineer; Dirk Kempthorne, Secretary of the Interior; Dennis Strong, Director, Utah Division of Water Resources; Estavan Lopez, Director, Interstate Stream Commission, State of New Mexico (currently Commissioner of the Bureau of Reclamation). (Photo credit: Andy Pernick, United States Bureau of Reclamation)



**Table 2: Lake Powell Operational Tiers from the 2007 Interim Shortage Guidelines**

<b>Lake Powell Operational Tiers</b>		
<b>(subject to April Adjustments or mid-year review modifications)</b>		
Lake Powell Elevation (feet)	Lake Powell Operational Tier	Lake Powell Active Storage (maf)
3,700	Equalization Tier - equalize, avoid spills or release 8.23 maf	24.32
3,636 – 3,666 (see table below)	Upper Elevation Balancing Tier - release 8.23 maf; - if Lake Mead < 1,075 feet, balance contents with a min/max release of 7.0 and 9.0 maf	15.54 – 19.29 (2008 – 2026)
3,575	Mid-Elevation Release Tier - release 7.48 maf - if Lake Mead < 1,025, release 8.23 maf	9.52
3,525	Lower Elevation Balancing Tier - balance contents with a min/max release of 7.0 and 9.5 maf	5.93
3,370		0

<b>Lake Powell Equalization Elevation Table (for use with above table)</b>	
Water Year	Elevation (feet)
2008	3,636
2009	3,639
2010	3,642
2011	3,643
2012	3,645
2013	3,646
2014	3,648
2015	3,649
2016	3,651
2017	3,652
2018	3,654
2019	3,655
2020	3,657
2021	3,659
2022	3,660
2023	3,662
2024	3,663
2025	3,664
2026	3,666



Satellite view of the Imperial and Mexicali Valleys and the Colorado River Delta, Mexico

(Photo: National Aeronautics and Space Administration)

# RECENT MINUTES OF THE 1944 MEXICAN WATER TREATY; 316 - 319 (2010 - 2012)

Since 2010, the International Boundary and Water Commission has entered multiple Minutes related to the Colorado River. Those Minutes are briefly summarized as follows:

1. **Minute 316:**<sup>43</sup> This Minute approved an agreement to allow use of the Wellton-Mohawk Bypass Drain and other necessary infrastructure in the United States for the conveyance of water by Mexico and other entities to the Santa Clara Wetland, also called the Cienega de Santa Clara, during the Yuma Desalting Plant Pilot Run.
2. **Minute 317:**<sup>44</sup> Primarily, this Minute affirmed that the International Boundary and Water Commission shall continue to seek joint cooperative projects that provide benefits to both countries and promote sustainable management of water in the Colorado River Basin.
3. **Minute 318:**<sup>45</sup> In April 2010, a severe earthquake caused significant damage to the irrigation system in Irrigation District 14 in the Mexicali Valley, Baja California, Mexico. The damage limited the amount of water the District could convey and use on its lands. This Minute allowed Mexico to defer delivery of up to 260,000 AF of water through 2013. The Minute also includes details on accounting for water storage and delivery of deferred water consistent with the 2007 Interim Shortage Guidelines.
4. **Minute 319:**<sup>46</sup> This Minute is described in-depth in the Current Issues on the River section of this Report. Generally, Minute 319 outlined several actions to proactively manage the Colorado River System to obtain binational benefits and mitigate risks associated with variable water supplies and growing demands, including the sharing of Colorado River water shortages and surpluses under specifically defined Lake Mead elevations.



Reactors at the Yuma Desalting Plant

(Photo: United States Bureau of Reclamation)



# WYOMING'S WATER USES IN THE COLORADO RIVER BASIN

An irrigated pasture near Boulder, Wyoming

## WYOMING'S CONSUMPTIVE USE PROGRAM

**Wyoming enjoys a perpetual water apportionment under the 1922 Compact, and the 1948 Compact further defines that apportionment. Should the day come where the Upper Basin must curtail water uses to comply with Article III of the 1922 Compact (75 MAF total in any running 10-years non-depletion obligation), Wyoming must have sufficient and reliable information with regard to its own uses in the Colorado River Basin. With this information, Wyoming can best protect its apportionment and its water users.**

In the early 2000s, drought hit the Upper Colorado River Basin helping cause Lake Powell storage to be drawn down to 33 percent of its capacity by 2005. This drop in Lake Powell elevation motivated the Upper Colorado River Commissioners to discuss the possibility of having to implement the curtailment provisions contained in Article IV of the 1948 Compact.

In response to these discussions, in the fall of 2004 the State Engineer commissioned a report to assist with a review of available administrative tools should compact curtailment ever become necessary. The resulting Colorado River Compact Administration Project,<sup>47</sup> completed in June of 2005, was intended to help formulate a plan whereby Wyoming water administrators could undertake necessary additional steps to ensure Compact compliance.

The Administration Project report recommended developing an annual comprehensive water use monitoring program addressing all categories of water use. It specifically recommended using the State of Colorado's River Decision Support System, or a similar computer-based system. Such a system would provide credible information on which to base informed decisions concerning management of water resources. While the Colorado River Decision Support System is a good model, it requires a significant amount of data to run and operate

accurately. Historical and real-time diversion records and climatic data are examples of required data. Thus, Wyoming needed to obtain the required baseline data before it could implement any program that comprehensively and regularly monitored its water use.

In 2006, the Wyoming Legislature approved a budget request from the Wyoming State Engineer's Office to begin a multiyear effort to improve the agency's water use data collection and analysis capabilities in the Green River Basin in Wyoming. This effort included hiring a Colorado River Coordinator to develop and implement the Colorado River Consumptive Use Plan (Plan).<sup>48</sup> Because the vast majority of consumptive use results from irrigated agriculture, the Plan recommended installation of five fully automated agricultural weather stations within the basin. Four of the stations were installed in 2010 and the last one in 2012. Also, the Plan included installing or updating 150 state-run, stream and diversion gaging stations in the Green River Basin. This effort coincided with the Statewide Stream Gaging Automation Plan also proposed by the State Engineer's Office and funded by the Wyoming Legislature.

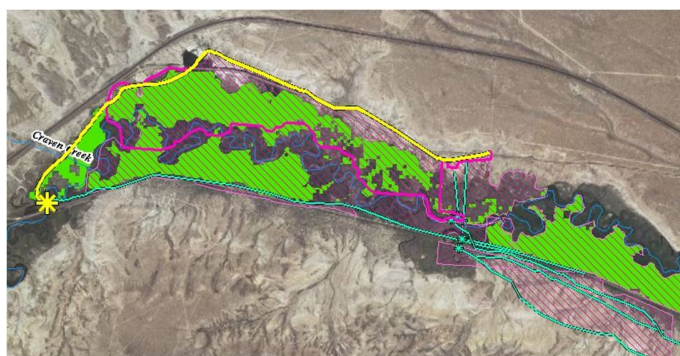
Another major part of the Plan involved water rights attribution, which assigns water right permit

characteristics (i.e. permit #, priority date, and owner) to mapped irrigated lands within a GIS system. The Green River Basin Plan completed by the Wyoming Water Development Commission in 2001 made an initial effort at mapping irrigated lands in the basin. Contiguous areas of irrigation were aggregated and attributed with the various water right permits associated with those irrigated lands. Unlike the North Platte or Big Horn Basins, the Green River Basin is dominated by small diversions serving individual users rather than larger irrigation districts. Thus, more detail was needed to assist in water right attribution. To that end, the State Engineer's Office, with

financial support from the Attorney General's Office, hired a consultant in 2007 to map the water rights in the basin and to develop the Wyoming Water Rights Attribution Geodatabase.

The State Engineer's Office completed the three different efforts of installing climate stations, installing stream gages and conducting water rights attribution mapping to help achieve the ultimate goal of the Consumptive Use Plan: to know Wyoming's water uses and have a clearly defined and defensible approach to implement and administer a Colorado River curtailment if it ever becomes necessary.

## WYOMING'S COLORADO RIVER WATER USES



Screenshot of irrigated lands mapping

The State Engineer's Office calculates Wyoming's total consumptive use within the Green and Little Snake River Basins and provides those calculations annually to the State Engineer and Upper Colorado River Commission. The Bureau of Reclamation also determines consumptive use in the Colorado River Basin for all four Upper Basin States,<sup>49</sup> but uses different methodologies.

By far, the largest use of water in the Green and Little Snake River Basins is irrigated agriculture. Other uses in the basins include municipal, industrial, and domestic. The State Engineer's Office also accounts for reservoir evaporation. Table 3 contains a five-year average from 2011 to 2015 of all the water use categories in the basins.<sup>50</sup>

### Irrigation

Irrigation is the largest consumptive use of water in the Green and Little Snake River Basins. Irrigation demand changes annually depending on the winter snowpack, summer rainfall and the amount of acreage that irrigators decide to put into production each year. Grass hay and alfalfa are the two main crops irrigated in the basins, with much smaller amounts of small grains or other cash crops. Average irrigation water use can be seen in Table 3.

### Municipal

There are three main municipal water users in the basins, and they are managed by the Sweetwater, Bridger Valley, and Kemmerer-Diamondville Joint Powers Boards. Towns like Baggs, Pinedale, Big Piney and others use water for municipal purposes, but on a smaller scale than those governed by the Joint Powers Boards. Municipal water use is reported annually to the State Engineer's Office by the different entities. Table 3 shows the average amount of water used by municipal water users.

### Industrial

The two largest industrial water consumers are the Jim Bridger and Naughton Power Plants. Other industrial users in the basin include Exxon and SF Phosphates. The 2010 Green River Basin Plan<sup>51</sup> anticipated that industrial water use would increase into the future as the power plants and other industries expanded. But, since 2010, those uses have been basically flat with small annual fluctuations. The power plants have not expanded due in part to slumping coal markets, so their water use is not growing. Table 3 shows the average amount of water used by industry.

### Other

Other water uses in the basin include domestic, recreational and losses to evaporation. There are very few individual diversions for domestic use in the Green and Little Snake River Basins as the majority of this type of use is met from groundwater resources. Recreation use is not a consumptive use, but is important because it supports tourism in this part of Wyoming. Wyoming's total consumptive use apportionment, according to the 1948 Compact, must include a share of Colorado River Storage Project Act reservoir annual evaporations, which is shown in Table 3 as Main Stem Evaporation. Wyoming also accounts for surface evaporation off of other federal and non-federal reservoirs, but not natural lakes, shown in Table 3 as In State Evaporation.



**Table 3: Average Consumptive Water Use in the Colorado River Basin in Wyoming from 2011-2015**

Sector of Use		Average Consumptive Use (Acre-Feet/Year)
<b>Agricultural</b>	<b>Sector Total</b>	<b>463,691</b>
Irrigation	Surface and Groundwater	456,836
Stock	Surface and Groundwater	6,855
<b>Municipal/Industrial</b>	<b>Sector Total</b>	<b>68,108</b>
Urban	Surface Water	10,599
Urban	Groundwater	817
Rural	Surface Water	0
Rural	Groundwater	3,042
Thermal Electric Power	Surface Water	27,394
Thermal Electric Power	Groundwater	6,054
Mineral Resources	Surface Water	18,248
Mineral Resources	Groundwater	1,954
<b>Exports</b>	<b>Sector Total</b>	<b>8,735</b>
City of Cheyenne		
Diversions	Surface Water	8,056
Broadbent Supply	Surface Water	679
Reservoir Evaporation	In-State Reservoirs	27,000
<b>Total</b>		<b>567,534</b>

# TRANS-BASIN DIVERSIONS FROM WYOMING'S COLORADO RIVER BASIN

There is only one significant trans-basin diversion moving water out of Wyoming's Colorado River Basin. This is the City of Cheyenne's Stage I & II project. The city conveys replacement or "make-up" water into the North Platte River Basin to replace out of priority diversions it makes from the North Platte River Basin. The fact that Wyoming's compact allocation can be used to meet the demands in other basins expands the future potential uses of the water.

There are currently two known proposals to withdraw water from the lower Green River and/or Flaming Gorge Reservoir in Wyoming and transport it to the front range of Colorado and possibly to central and/or southeast Wyoming. These two projects are commonly referred to as the "Million Pipeline" proposal and the "Colorado/Wyoming Cooperative Water Supply Project Coalition"<sup>52</sup> proposal. Both proposals are still being studied and have much work to be done prior to any actual construction. The Million Pipeline proposal has permit

applications on file with the State Engineer's Office. It should be noted that although these projects are designed to divert water in Wyoming, the majority of the water use would be in Colorado. Hence, should these projects be realized, the majority of the water use would be charged against Colorado's compact apportionment.

In addition to the two current proposals, there have been other proposals to take water from Wyoming's Colorado River Basin to other locations both inside and out of Wyoming,<sup>53</sup> as well as proposals to move water into the Basin from outside sources.<sup>54</sup> To date, none of these proposals have come to fruition. With regard to projects funded by the Wyoming Water Development Commission, it should be noted that "A project involving a transbasin diversion shall address the impact of the diversion and recommend measures to mitigate any adverse impact identified in the basin of origin."<sup>55</sup> This helps to ensure that there will be no harm to in-basin water users.



High Savery Dam and Reservoir

*(Photo and call-out text: Wyoming Water Development Office)*

High Savery Dam and Reservoir is located on Savery Creek. Savery Creek is a tributary to the Little Snake River and is located in the Green River drainage. The purpose of the storage project is to serve as an agricultural and municipal water supply, as well as recreation, environmental enhancement, and mitigation for the Stage I and II trans-basin diversion water supply projects for the city of Cheyenne.





# WATER MARKETING FROM THE UPPER BASIN TO THE LOWER BASIN

Over the years, multiple inquiries and efforts have arisen with regard to the marketing of water apportioned to the Upper Basin to uses in the Lower Basin. Generally, the Upper Basin States do not use the full amount of water apportioned to them by the 1922 Compact in any given year, while the Lower Basin States, particularly California, have found themselves in need of more water than the 1922 Compact apports to them. Proponents of water marketing plans would like to capitalize on this imbalance by providing for the transfer of unused Upper Basin apportionments, including transfer of existing Upper Basin uses, to Lower Basin users.

Many legal, practical and political considerations influence the trans-basin marketing question and answer. What follows is a very brief summary of a few Law of the River and other considerations which factor into the ability to transfer water apportioned to the Upper Basin to uses in the Lower Basin. Also included is a summary of historic efforts to market water from the Upper to the Lower Basin, all of which ultimately failed.



# LEGAL CONSIDERATIONS REGARDING TRANS-BASIN MARKETING<sup>56</sup>



## THE COLORADO RIVER COMPACT

Perhaps the strongest arguments against water transfers from the Upper to the Lower Basin are found in the language of the 1922 Compact itself. However, the 1922 Compact may not expressly require use within a particular Basin, and it does not expressly prohibit water exports.<sup>57</sup>

The basic structure of the 1922 Compact (Articles I & II) divides the River into two Basins, apportioning the right to use a specific quantity of water to each Basin. The only transfers contemplated are those to areas outside the Colorado River System drainage area, but within the states assigned to each Basin. Also, a fundamental purpose of the 1922 Compact was a territorial split intended to protect the Upper Basin's right to develop against the rapidly developing Lower Basin. Any use in one Basin of water apportioned to the other would therefore be contrary to the Compact's basic structure and fundamental purpose.

The language in Article III(a) that apportions, in perpetuity, 7.5 MAF of water for the "exclusive beneficial consumptive use" in each Basin appears to clearly prohibit trans-basin transfers. "Exclusive" means restricted or limited to the person, group, or area concerned. Also, the term "exclusive" rarely modifies the phrase "beneficial consumptive use" in western water law and therefore tends to show that the apportionments are for the sole use of the respective Basins.<sup>58</sup>

The rights conferred by Article III(a) are usufructuary rights, not ownership rights, and as such are accounted for at the place of use. A usufructuary water right does not confer ownership of the water itself, but rather a right to use and enjoy the water. In other words, the Upper Basin cannot market what it does not own. There is also no mechanism in the 1922 Compact to account for a use of Upper Basin water that occurs in the Lower Basin. The Compact drafters intended to create only usufructuary rights that the Compact counts against the apportionment of the Basin where use occurs. Further, Article III(e) explicitly prohibits the Upper Basin from withholding water it cannot put to beneficial use. The Upper Basin must ultimately let unused water flow downstream. Therefore, any attempt to sell the Upper Basin States' right to unused water appears impossible because Upper Basin States and users do not have any right to the water if it cannot reasonably be put to use.

Article VIII also tends to express a territorial use limitation by stating that "[a]ll other rights to beneficial use of waters of the Colorado River System shall be satisfied solely from the water apportioned to that Basin in which they are situate." Thus, those rights cannot be satisfied from water apportioned to the other Basin.

Finally, the Compact's status as federal law limits the ability to confer rights in excess of the Compact's limitations. The Compact does not explicitly—or implicitly—endorse trans-basin transfers of water apportioned by the Compact and any attempt to add to or modify its terms would require consent of Congress and the respective state legislatures.



# THE UPPER COLORADO RIVER BASIN COMPACT

The 1948 Compact also contains provisions which weigh against trans-basin transfers. With regard to unused Upper Basin apportionments, the 1948 Compact, like the 1922 Compact, only apportions to each State the right to use water, not ownership of the water itself.<sup>59</sup>

Additionally, Article III(b)(2) states that “[b]eneficial use is the basis, the measure and the limit of the right to use.” In other words, the Compact apportions to each Upper Basin State only a right to use a percentage of the available water, nothing else.

The 1948 Compact also contemplates excess water use by any Upper Basin State. Article III(b)(3) allows Upper Basin States to exceed their apportionment so long as that use does not deprive another State from its apportioned use. Article XV(b) also reserves the right of each State to regulate the use and control of water within its boundaries. Accordingly, unless deprived of its apportioned use, no one Upper Basin State has authority

to prevent the use of excess water by another Upper Basin State, nor the authority to require that unused water be shepherded through another state. It would therefore be difficult, if not impossible, for any Upper Basin State to guarantee delivery of a certain amount of water at Lee Ferry at a time when another Upper Basin State needs the excess water.

Further, Article IX of the 1948 Compact explicitly allows for the transfer of water from one Upper Basin State to another for consumptive use so long as the amount transferred is within the apportionment of the State to which the water is transferred. The Compact does not provide for similar transfers to Lower Basin States. It does require such use be counted toward the receiving (Upper Basin) State’s apportionment. The 1948 Compact contains a separate provision regarding similar transfers made to Upper Basin States for the purpose of complying with the 1922 Compact’s non-depletion obligation.

## ARIZONA V. CALIFORNIA



Parker Dam on the border of Arizona and California

*(Photo: United States Department of Interior)*

There is no Lower Basin Compact. Water deliveries below Lee Ferry must comply with the terms of the Arizona v. California Decree and must be acquired through a contract with the Secretary of the Interior. Once water passes Lee Ferry, it becomes “mainstream water,” which is controlled by the federal government. Article II(B)(4) of the Decree states that “[a]ny mainstream water consumptively used within a state shall be charged to its apportionment, regardless of the purpose for which it was released.” Further, Article III enjoins all Lower Basin water users from interfering with water releases authorized by the Decree. Thus, under the Decree, water purportedly delivered as a transfer from an Upper Basin State or user would be charged to the Lower Basin State’s apportionment where the water is ultimately used. This result would defeat the desired purpose of any such transfer, which is to avoid charging the water use to the receiving Lower Basin State.



# DORMANT COMMERCE CLAUSE

Some proponents of water transfers from the Upper to the Lower Basin have stated that any attempt to deny such a transfer would violate the dormant Commerce Clause. However, if Congress has consented to such a denial, it is not subject to dormant Commerce Clause scrutiny.

The Commerce Clause of the U.S. Constitution gives the federal government power over interstate commerce. But it is not just an affirmative power. The Commerce Clause also prohibits the States from enacting laws which interfere too much with interstate commerce. This prohibition is known as the dormant, or negative, Commerce Clause.

Dormant Commerce Clause issues can arise when a state interferes with the ability to export the right to use water outside of the state. In the case of *Sporhase v. Nebraska* decided in 1982, the U.S. Supreme Court held that a Nebraska water export statute violated the dormant Commerce Clause.<sup>61</sup> The export statute in *Sporhase* was unconstitutional because it impermissibly interfered with interstate commerce by prohibiting a Nebraska water right holder from using the water in Colorado. In essence, states can burden or interfere with interstate commerce such as interstate water transfers only in very limited circumstances.

Many states, including Wyoming, have a water export statute.<sup>62</sup> Under Wyoming's export statute, no water appropriator, or applicant to appropriate water, may transfer 1,000 AF of water or more for use outside of

Wyoming without prior approval of the Wyoming Legislature. The statute sets out numerous factors both the State Engineer and the Legislature must consider before approving, or denying, such a transfer. However, by its own terms, nothing in the export statute can be construed to interfere with Wyoming's interstate compact obligations. If the Legislature were to deny an export request made under this statute, proponents of the transfer may likely argue that the denial impermissibly interferes with interstate commerce and therefore violates the dormant Commerce Clause.

However, if Congress gives its consent to a denial of water exports, the action is immune from dormant Commerce Clause scrutiny.<sup>63</sup> Congress can provide its consent through federal law. Interstate compacts, like the 1922 and 1948 Compacts, are federal law because they are approved by Congress. Accordingly, if through those Compacts, or perhaps the many other federal laws affecting the Colorado River, Congress consented to a denial of transfers from the Upper to the Lower Basin, the denial is not subject to dormant Commerce Clause scrutiny. As describe above, both Compacts through their fundamental purpose and express language may prohibit such transfers thus reflecting Congress's consent to the export denial. With Congressional consent, the dormant Commerce Clause simply does not apply. The U.S. Supreme Court affirmed this very kind of result in a recent case related to the Red River Compact.<sup>64</sup>



# PRACTICAL CONSIDERATIONS REGARDING TRANS-BASIN MARKETING

The delivery of water from the Upper Basin to water users in the Lower Basin would raise a number of unique water delivery issues. Assuming delivery through the natural water course, the water would have to travel up to 1,400 miles and pass through multiple federal facilities which may include Flaming Gorge, Lake Powell, Lake Mead, Lake Havasu and Parker Dam. Some of the issues implicated by this kind of delivery include: (1) how the comingled water will be treated in accordance with the Law of the River, including state water rights and regulatory schemes in the Upper Basin; (2) how to compute anticipated delivery losses including evaporation; and (3) how the federal facilities with their complex authorities and constraints will be operated to handle the proposed delivery.

## POLITICAL CONSIDERATIONS REGARDING TRANS-BASIN MARKETING



There also are numerous political considerations which have historically warned against water marketing from the Upper to the Lower Basin. Among them are the fear of jeopardizing water rights in the Upper Basin or even compact apportionments, the inability of the states to control an unregulated market, and the drying of agricultural land in the Upper Basin producing negative economic and social impacts.

Perhaps as important among the various political considerations would be degraded comity between the Basin States. In 1984, in response to the Galloway Proposal described later in this Report, the Upper Colorado River Commission adopted a resolution which stated, in part, that “there are serious legal and institutional problems which do not appear to be amenable to resolution and which threaten comity among the States[.]”<sup>65</sup> Addressing the same proposal, Arizona Governor Bruce Babbitt informed the San Diego County Water Authority that moving forward with the proposal “would be immediately countered by a lawsuit by the State of Arizona.”<sup>66</sup> Arizona’s strong opposition to such a proposal was based, in part, on the fact that it has the opportunity to use any unused Upper Basin apportionment under the Law of the River. If that unused apportionment is instead transferred to a different Lower Basin user, Arizona would be precluded from that opportunity.

# HISTORIC EFFORTS TO MARKET WATER BETWEEN THE UPPER AND LOWER BASIN<sup>67</sup>

Over the last several decades, there have been multiple attempts to “market” water from Upper Basin allocations to the Lower Basin. None of these attempts have been successful, primarily because the Law of the River likely precludes such transfers, but also due to political and practical hurdles. Generally, past attempts proposed some method whereby users in the Lower Basin could make use of water apportioned to the Upper Basin without that use being counted against the Lower Basin’s apportionment. Below are brief descriptions of a few of the previous attempts.<sup>68</sup>

## Galloway Proposal

In 1984, a Colorado corporation called the Galloway Group entered into an option to lease 300,000 to 500,000 AF of water per year to the San Diego County Water Authority. Galloway planned to construct reservoirs on the White or Yampa rivers in Colorado and release stored water to deliver under the lease. The released water would then flow downstream from Colorado and through the various federal facilities along the way. Galloway also met

with the Governors of Colorado, Utah, and Wyoming and presented individualized option agreements which would give each State the right to enter into a lease agreement by which that state would lease 50,000 to 100,000 AF of water to Galloway. Galloway in turn would deliver the water to entities in the Lower Basin. The proposed lease payment to the states was \$10 per acre-foot of water, or a minimum of one million dollars per year. As far as compact accounting, use of water under the

proposed leases would not be charged to the Lower Basin water users, but to the states where the water originated.

The Galloway proposal experienced immense legal and political scrutiny and pushback. Ultimately, numerous Colorado River entities, as well as the Upper Colorado River Commission, expressed opposition to the Galloway proposal and it was never realized.





## Resource Conservation (RCG) Proposal

In 1989, RCG proposed to lease three classifications of “water” from the Upper Basin to the Lower Basin. “Type 1” water was water not being consumptively used in the Upper Basin but was still within each Upper Basin State’s compact apportionment. “Type 2” water was water that had been developed, but was not used on a regular basis. Type 2 water included water like that stored in Fontenelle Reservoir which was under contract to industrial users but was not being consumptively used. “Type 3” was water being consumed by water rights holders in the Upper Basin, primarily irrigators. Leases of Type 3 water would require Upper Basin water users to temporarily dry up irrigated acreage on a rotating basis. Type 3 water was also the principal focus of the proposal, with payments being made both to the water right holder for foregone use and to the Upper Basin State where the use occurred. Payments to the states were meant to fund future water development.

Like the Galloway Proposal, the RCG Proposal also met many legal and political barriers. With regard to the proposed Type 3 water leases, the RCG proposal also threatened to dry up Upper Basin farmland, adversely impact local economies and the environment, and create a bidding war for water use between the Upper and Lower Basin.

## California's Conceptual Water Bank

In 1991, California was using nearly 1 MAF per year more than its compact apportionment. Drought, coupled with the likelihood that California would have to pay back overages, caused California to entertain an invitation from Colorado to begin a process of reducing its water use. The result was a proposal described in a conceptual paper which contained three primary elements:

- Through agricultural water conservation measures, within a reasonable time California would stop using water above its basic apportionment, 4.4 MAF in normal years. The other Basin States would not object to California taking more than its basic apportionment during a twenty-year period. California could continue to use water in excess of its basic apportionment until then, and operating criteria for system reservoirs would be developed that would guarantee that California could satisfy its demands.
- If the Metropolitan Water District of Southern California caused water use to exceed the Lower Basin’s total apportionment, then Metropolitan

would pay money into an established escrow account for each acre-foot of overuse. That money would be paid to the other Basin States on a percentage basis, with Wyoming’s percentage proposed at 8.3%.

- The proposal would have established a state controlled interstate water bank through which Colorado River water that was being consumptively used could be transferred to users in other states. Each state would have control over participating uses in that state, and the seven Basin States would establish a uniform price.

The other Basin States were all in favor of California reducing its demand, and most were in favor of at least

None of these attempts have been successful, primarily because the Law of the River likely precludes such transfers, but also due to political and practical hurdles.

discussing the escrow account component. However, the water bank concept received much less support. The other states feared that making additional water available to California would not effectively address California’s overuse in the long term. Elements of California’s conceptual plan were advanced through other means, such as the 2001 Interim Surplus Guidelines, and a similar water bank component exists exclusively in the Lower Basin. But, the inter-basin water bank component did not move past preliminary negotiations between the states.

## Roan Creek Proposal

In 1993 Chevron and Getty oil companies advanced the Roan Creek Proposal. This proposal was similar to the Galloway Proposal in that it sought to construct a reservoir in Colorado and lease the stored water to Nevada for 30 to 50 years until it was needed for oil shale development in Colorado. Under the proposal, Nevada would have financed the project and the State of Colorado would have received \$50 per acre foot of water sold. The oil companies already owned decreed, Colorado water rights, and they asserted the right to lease the water, and argued that the project was feasible.

However, the Roan Creek Proposal suffered the same problems as the earlier Galloway Proposal, and was opposed by Colorado water officials. It was also opposed by the Southern Nevada Water Authority whose vision for future water supply did not match that of the Colorado River Board of Nevada who had entertained the proposal. Ultimately, the project did not move forward.

# EXAMPLES OF WATER MARKETING IN THE UPPER AND LOWER BASINS

## EXAMPLES OF WATER MARKETING IN THE UPPER BASIN



Denver Water workers digging a ditch in 1896.

*(Photo: Denver Water)*

The movement of water within and between states of the same Basin is not constrained like transfers from the Upper to the Lower Basin, and does occur at many levels. The most common form of such transfers in the Upper Basin, although maybe not technically water marketing, are the numerous intrastate trans-basin diversions that exist in each and every Upper Basin State. This occurs where water is moved from the Colorado River Basin to another basin for use within the same state. For example, in Colorado, approximately 500,000 AF is moved through trans-basin diversions each year. Most of those diversions move water from west to east, supplying water to the Front Range.<sup>69</sup> Water used through these diversions may have been obtained through a normal (original) water right process, or purchased and transferred from an existing in-basin water right

holder. Figure 3 illustrates Colorado River water use outside the physical Colorado River Basin.

There are also several examples where water is diverted in one state and used in another. This most commonly occurs along tributaries that traverse state borders. In these areas, it is not unusual to have an irrigation ditch that diverts water in the upstream state and serves lands in both the upstream and downstream states. The 1948 Compact addresses several of these situations, including within the Little Snake River (Article XI, Colorado and Wyoming) and the Henrys Fork (Article XII, Utah and Wyoming). In fact, the 1948 Compact authors foresaw the need for one Upper Basin State to build infrastructure in another state to allow and ensure the ability to fully develop each state's apportionment. This opportunity is covered in Article IX of the 1948 Compact. It is Article IX under which current efforts for the interstate transfer of water (e.g. The Million Pipeline proposal) are prepared.

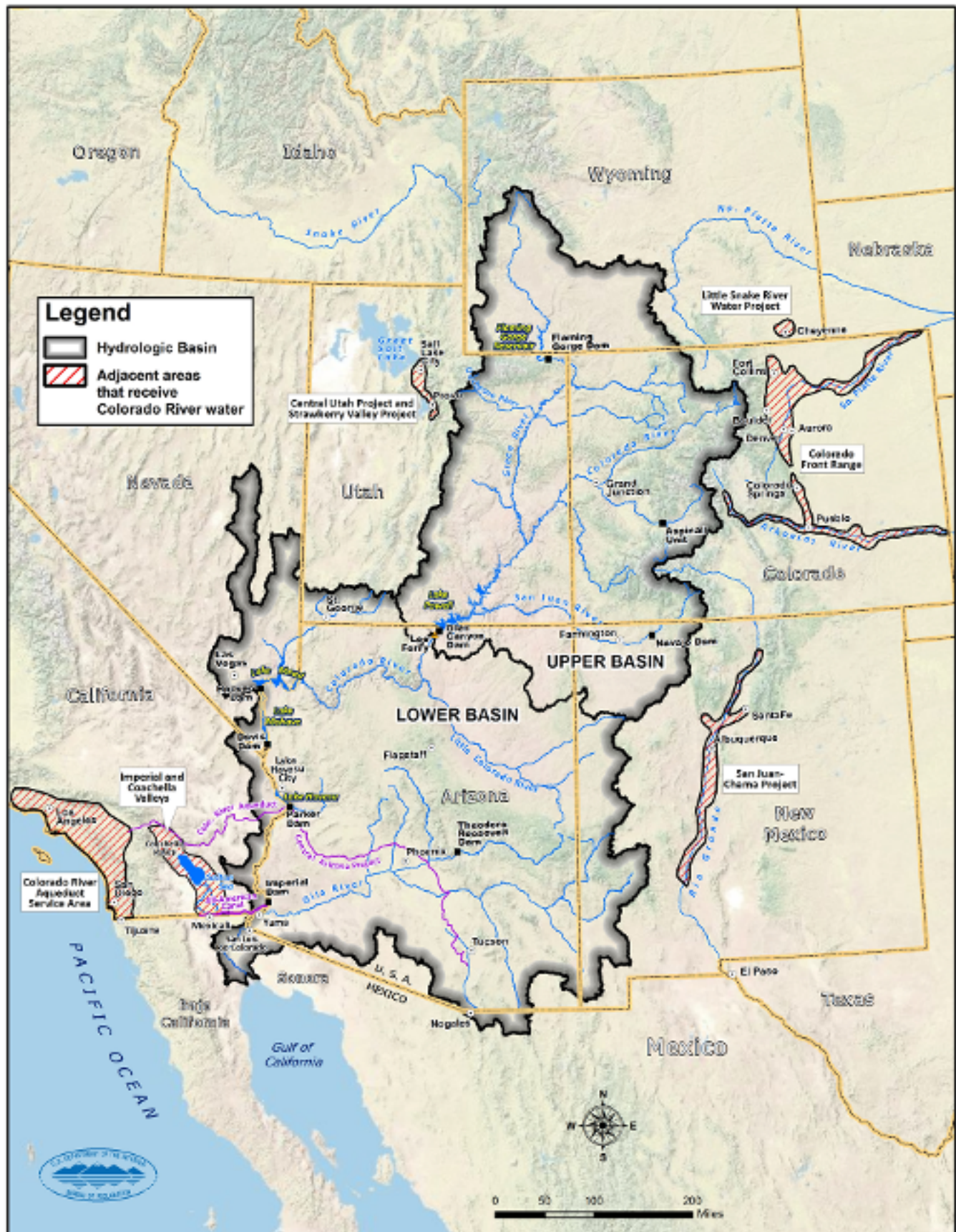
An example of a trans-basin diversion in New Mexico is the San Juan-Chama Project. It consists of diversion structures and tunnels for trans-basin movement of water from the San Juan River Basin to the Rio Grande Basin. It is a participating project of the Colorado River Storage Project Act, and provides an average annual diversion of about 110,000 AF of water from the upper tributaries of the San Juan River. Primary purposes of the San Juan-Chama Project are to furnish a water supply to the middle Rio Grande Valley in New Mexico for municipal, domestic, and industrial uses.<sup>70</sup>

Of recent note in Utah, the State Legislature passed the Lake Powell Pipeline Development Act in 2006. The legislation authorizes a pipeline to take water from Lake Powell, and transport it to Washington and Kane counties in western Utah. The proposed project consists of approximately 139 miles buried pipe from Lake Powell to Sand Hollow Reservoir near St. George, Utah. Hydroelectric generation facilities will be included to utilize the roughly 2,900 foot drop between the high point and the end of the pipeline. Power sales will be used to help offset pumping costs. At full development the pipeline is expected to annually deliver up to about 86,000 AF. The water will be a portion of Utah's 1948 Compact allocation. The state will build the project and the receiving water districts will repay the costs through water sales.<sup>71</sup>

In Wyoming, Temporary Water Use Agreements are available to achieve temporary water transfers.<sup>72</sup> These instruments are commonly used to allow one water right holder --typically one with a senior right -- to transfer the consumptive use portion of their water right to another water user for up to two years for temporary purposes.



Figure 3: Detailed Basin Map (Map: United States Bureau of Reclamation)



# EXAMPLES OF STATE OF WYOMING WATER MARKETING

**As part of its request for this Report, the Water Development Commission requested a description of examples in Wyoming where the State of Wyoming itself markets water. The following briefly describes Wyoming's interests in Fontenelle Reservoir, Palisades Reservoir, and the Wyoming Account in Pathfinder Reservoir.**



Fontenelle Dam and Reservoir

*(Photo: United States Bureau of Reclamation)*

Fontenelle Reservoir is a Bureau of Reclamation facility on the Green River in southwest Wyoming. Through 1962 and 1974 contracts with the Bureau of Reclamation, the State of Wyoming has the right to perpetually market 120,000 AF of the original 190,250 AF active capacity. Presently, the state has four active “ready to serve” contracts for Fontenelle storage water totaling 46,550 AF which contractors rely on as an emergency or back-up supply. Each contract requires an annual payment based on the contracted water amount regardless of whether water is released for diversion downstream. If a contractor requests water delivery, the contract payment amount increases. To date, no contractor has requested water delivery for use, and the Wyoming Legislature has not previously approved the use of this water outside of the state. Funds paid to the state under these contracts are used by the Water Development Commission to support Wyoming’s financial obligations to the Bureau of Reclamation for the annual operation and maintenance of Fontenelle Dam and Reservoir.





Palisades Reservoir

*(Photo: United States Bureau of Reclamation)*

Palisades Reservoir is a Bureau of Reclamation facility on the Snake River in Idaho and its dam sits about eleven miles west of the Idaho-Wyoming border. The State of Wyoming has a contractual right to 33,000 AF of storage space in Palisades Reservoir which satisfies Wyoming's obligations for supplemental storage under the Snake River Compact. Wyoming uses this storage capacity for these purposes and in this priority: (1) meeting the requirements of the Snake River Compact; (2) supplementing flows in the Snake River below Jackson Lake Dam or the water levels in Jackson Lake for fisheries; and (3) selling the water on a short term basis to users in Wyoming and Idaho. Wyoming has the option to exchange water stored in Palisades Reservoir upstream to Jackson Lake. Wyoming can then use this water to help maintain higher Jackson Lake levels or to release the water to satisfy fisheries requirements along the Snake River in Wyoming during low streamflow periods,

typically in the winter. If not otherwise needed, Wyoming can sell the stored water to irrigators in Idaho who need to replace water pumped from the Snake Plains aquifer which is done under Idaho law through the Upper Snake River Rental Pool.<sup>73</sup> The operation and accounting of Wyoming's storage space in Palisades Reservoir is detailed in the "Guidelines for Decision-Making in Operation of Wyoming's Contracted Space in Palisades Reservoir."<sup>74</sup> Wyoming currently has a contract to annually lease water to the Idaho Groundwater Appropriators. The yearly amount of water varies depending on the amount in Wyoming's storage account as well as negotiations with those users. Like payments received for Fontenelle storage water, Wyoming uses payments for Palisades water to help pay annual operation and maintenance charges to the Bureau of Reclamation. Even though the dam is not located in Wyoming, the Wyoming Legislature approved the sale of this water for use by Idaho users.<sup>75</sup>

Pathfinder Reservoir is a Bureau of Reclamation facility on the North Platte River in Wyoming. The 2001 Modified North Platte Decree envisioned the Pathfinder Modification Project which included the Wyoming Account with a capacity of 20,000 AF. Water stored in the Wyoming Account is first used as a supplemental supply for Wyoming municipalities during times of regulation. Second, it is used as a replacement water supply needed to meet certain Wyoming obligations under 2001 Modified North Platte Decree. Third, it is used as a replacement water supply needed to mitigate water use in excess of Wyoming's existing water-related baselines defined in Wyoming Depletions Plan under the Platte River Recovery Implementation Program. In 2009, the Wyoming Legislature approved the Wyoming Water Development Commission's application to transfer up to 9,600 AF of water per year from the Wyoming Account to the Platte River Recovery Implementation Program for use in Nebraska.<sup>76</sup> This sale and transfer out of state for use in Nebraska may occur only if the water is not needed for any of the other purposes.



Pathfinder Reservoir during its historic spill in 2011



# EXAMPLES OF WATER MARKETING IN THE LOWER BASIN

The use of water markets or other types of transfer arrangements is more common and well established in the Lower Basin than in the Upper Basin. Lower Basin transfers occur not only within states, but also between states and sometimes involve Indian reserved water rights. The specific characteristics of these transfers can be factually diverse and exceedingly complex. What follows are just a few examples of some Lower Basin transfer arrangements.

## Arizona Water Bank and the Southern Nevada Water Authority

Beginning in 1996, Arizona has stored nearly 4 MAF of Central Arizona Project water in underground aquifers for use in times of need. In addition to entities within Arizona obtaining credits to this stored water for future use, so has the Southern Nevada Water Authority. The costs to store and withdraw its water are paid by Nevada. As of 2013, Southern Nevada Water Authority had a right to about 601,000 AF, for which it paid at least \$122,738,945 to the Water Bank.<sup>77</sup> For Nevada to recover the stored water, Arizona will use Nevada's banked water and forgo use of the same amount of Colorado River water. Nevada will then divert the amount from Lake Mead up to 60,000 AF annually during a declared shortage.

## California Conservation and Transfer Efforts

Multiple examples of water transfers exist within California. Each of those examples is unique and complex, and difficult to fully describe in this Report. However, in 2012, in cooperation with the seven Basin States and other stakeholders, the Bureau of Reclamation published the Colorado River Supply and Demand Study. Since that time, Reclamation has led an effort to build on future considerations and next steps identified in the Study. In May of 2015, Reclamation published its Phase 1 Report regarding that effort.<sup>78</sup> An element of the Phase 1 Report describes water conservation, productivity, and water transfer case studies from within the Basin. Two California case study summaries from that Phase I Report, both of which include a water transfer element, are provided here verbatim as examples on the following page.



### Case Study 3: Imperial Irrigation District (IID) Quantification Settlement Agreement Conservation and Transfer Program

“IID, as part of the Quantification Settlement Agreement (QSA), agreed to a 45- to 75-year conservation and transfer program that was supported initially (2003–2017) by a fallowing program that transitions over time (2008–2026) to efficiency-based conservation programs at full implementation. During the 15-year fallowing period, landowners and/or lessees voluntarily fallow fields to help IID meet water acquisition and transfer obligations, in exchange for compensation. Additionally, a \$50 million community fund was set up and managed locally for mitigation of direct and indirect socioeconomic impacts caused by fallowing. For the on-farm conservation program, growers volunteer to implement field-level conservation measures they select, in exchange for compensation. Between December 2003 and June 2014, 1,242,283 acre-feet (AF) of Colorado River water were conserved as a result of fallowing, and 18,093 AF have been conserved through on-farm efficiency measures. An additional 125,213 AF have been conserved through system conservation measures.”

A fallow field in Imperial Valley, California (Photo: Imperial Irrigation District Fallowing Program Status Report, October 2016)



### Case Study 6: Palo Verde Irrigation District (PVID) and Metropolitan Water District (MWD) of Southern California Forbearance and Fallowing Program

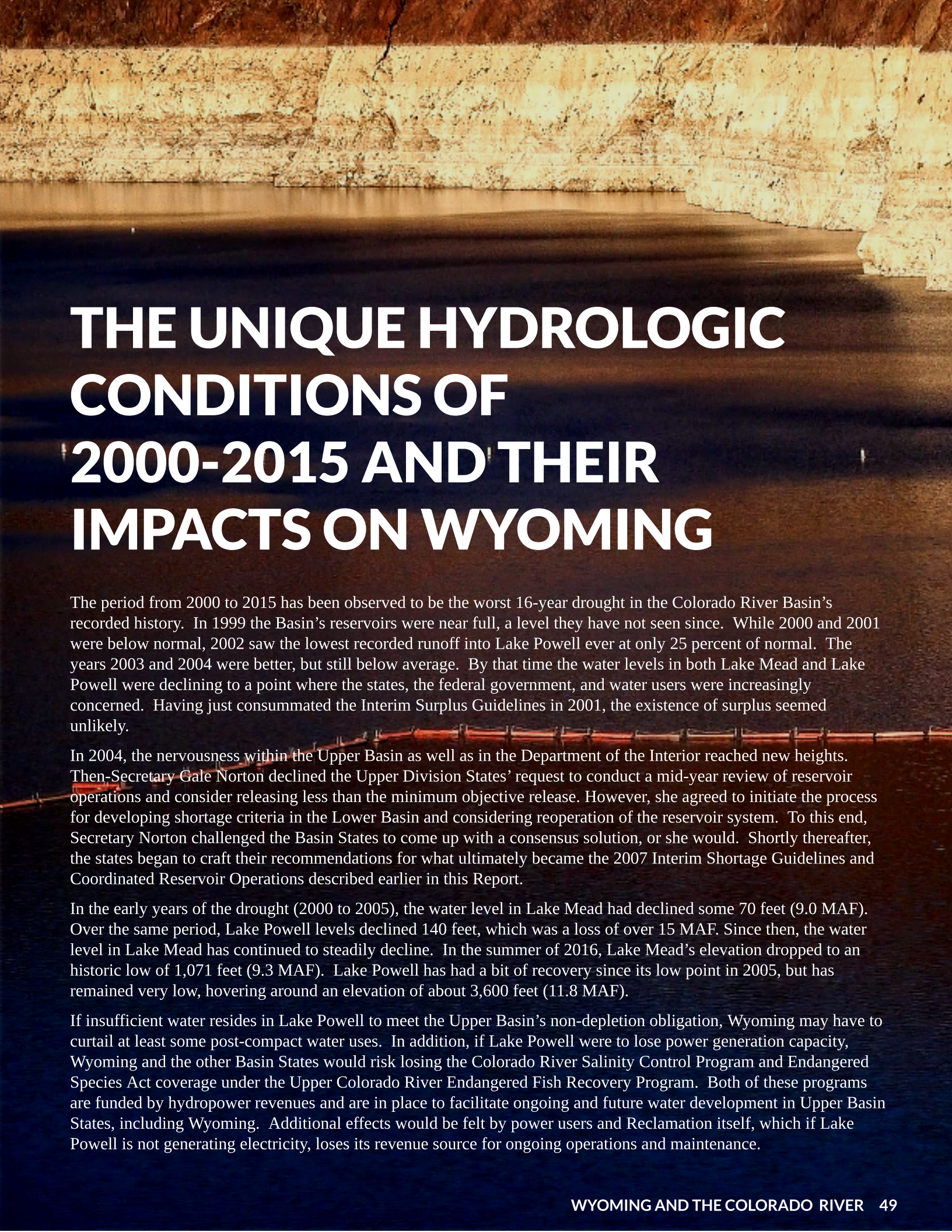
“On January 1, 2005, the PVID and MWD began a 35-year Forbearance and Fallowing Program with landowners within PVID. The key component of the program is land fallowing, where participants fallow land in exchange for payments. The volume of water that becomes available to MWD is governed by the QSA and the 2003 Colorado River Water Delivery Agreement. Under these agreements:

MWD must reduce its consumptive use of Colorado River water by that volume of consumptive use by PVID and holders of Priority 2 that is greater than 420,000 AF in a calendar year, or MWD may increase its consumptive use of Colorado River water by that volume of consumptive use by PVID and holders of Priority 2 that is less than 420,000 AF in a calendar year.

In both cases, each AF of reduced consumptive use by PVID is an additional AF that becomes available to MWD. A \$6 million fund for local community improvement programs was established to mitigate third-party economic impacts. Annually, water saved has varied from about 32,750 AFY to 122,220 AFY.

In March 2014, a report was prepared for MWD by the natural resource policy consultant M. Cubed to assess the regional economic impacts of the Program for program years 2005–2012. It was estimated that the net effect of the Fallowing Program and Community Improvement Fund grant and loan activity on regional employment for the period 2005 to 2012 was positive, with a net gain to the regional economy of approximately 357,000 labor hours between 2005 and 2012. Over the period 2005 to 2012, the report estimated that the Fallowing Program payments by MWD and Community Improvement Fund grants and loans resulted in a net gain of \$7.1 million in regional value added, due to a local expenditure of sign-up payments and Community Improvement Fund loans (Mitchell, 2014). Over the 35-year program, total water saved is estimated to be between 1.9 million AF and 3.7 million AF.”<sup>79</sup>





# THE UNIQUE HYDROLOGIC CONDITIONS OF 2000-2015 AND THEIR IMPACTS ON WYOMING

The period from 2000 to 2015 has been observed to be the worst 16-year drought in the Colorado River Basin's recorded history. In 1999 the Basin's reservoirs were near full, a level they have not seen since. While 2000 and 2001 were below normal, 2002 saw the lowest recorded runoff into Lake Powell ever at only 25 percent of normal. The years 2003 and 2004 were better, but still below average. By that time the water levels in both Lake Mead and Lake Powell were declining to a point where the states, the federal government, and water users were increasingly concerned. Having just consummated the Interim Surplus Guidelines in 2001, the existence of surplus seemed unlikely.

In 2004, the nervousness within the Upper Basin as well as in the Department of the Interior reached new heights. Then-Secretary Gale Norton declined the Upper Division States' request to conduct a mid-year review of reservoir operations and consider releasing less than the minimum objective release. However, she agreed to initiate the process for developing shortage criteria in the Lower Basin and considering reoperation of the reservoir system. To this end, Secretary Norton challenged the Basin States to come up with a consensus solution, or she would. Shortly thereafter, the states began to craft their recommendations for what ultimately became the 2007 Interim Shortage Guidelines and Coordinated Reservoir Operations described earlier in this Report.

In the early years of the drought (2000 to 2005), the water level in Lake Mead had declined some 70 feet (9.0 MAF). Over the same period, Lake Powell levels declined 140 feet, which was a loss of over 15 MAF. Since then, the water level in Lake Mead has continued to steadily decline. In the summer of 2016, Lake Mead's elevation dropped to an historic low of 1,071 feet (9.3 MAF). Lake Powell has had a bit of recovery since its low point in 2005, but has remained very low, hovering around an elevation of about 3,600 feet (11.8 MAF).

If insufficient water resides in Lake Powell to meet the Upper Basin's non-depletion obligation, Wyoming may have to curtail at least some post-compact water uses. In addition, if Lake Powell were to lose power generation capacity, Wyoming and the other Basin States would risk losing the Colorado River Salinity Control Program and Endangered Species Act coverage under the Upper Colorado River Endangered Fish Recovery Program. Both of these programs are funded by hydropower revenues and are in place to facilitate ongoing and future water development in Upper Basin States, including Wyoming. Additional effects would be felt by power users and Reclamation itself, which if Lake Powell is not generating electricity, loses its revenue source for ongoing operations and maintenance.



In light of these developments and their ramifications to the state, Wyoming benefits greatly from understanding and fully participating in the decision making that influences operations affecting water use and supply all along the Colorado River. Even Minutes to the Mexican Treaty need to be followed and understood, because water delivered to Mexico, if not closely monitored, can affect levels in Lake Mead, which can then affect levels in Lake Powell. Every water using activity in the basin can affect all users and all the Basin States.

As described above, basin-wide drought effects became pronounced in 2004. At that time, Wyoming had no comprehensive program for understanding its own uses of water in the Colorado River Basin. Only two staff in the State Engineer's Office, one being the State Engineer himself, participated in the multitude of meetings that were being held. Wyoming recognized a need to better understand its own water uses. As such, the State Engineer's Office sought and received funding from the 2006 legislature for a full-time position and contract dollars to shore up Wyoming's understanding of its water uses in the basin. The work started in 2006 has continued to this day. It has generated significant additional information regarding Wyoming's use. Today, Wyoming leads the Upper Basin in the use of remote sensing for quantifying water use, and has more state-funded climate stations to support that work in the Upper Basin than any other state.

In 2007, the work that began in 2004 at Secretary Norton's urging was finalized with a Record of Decision memorializing what is now known as the 2007 Interim Shortage Guidelines. This document tied the operation of Lakes Mead and Powell more closely together. For the first time it also defined Lower Basin shortage declarations that would occur if Lake Mead reached critically low levels. The Interim Shortage Guidelines are more protective of Lake Powell at low levels where the Upper Basin States need that protection, but are more protective of Lake Mead when Powell sees higher inflows and storage elevations. They further recognize that Mexico should also address the specter of shortage head-on, a concept memorialized further in Minute 319 to the Treaty, signed at the end of 2012.

All the while, during this period of drought, all seven Basin States, Reclamation and others wrestled with and achieved negotiated solutions regarding other aspects of the river – including protocols for High Flow Experiments and a new operational framework (LTEMP) from Glen Canyon Dam. Those solutions are remarkable not only in their subject matter but in the fact they were addressed at a time when drought had all parties deeply concerned. Issues such as these are further evidence that the Basin States, affected users and federal agencies can find solutions that are workable without upsetting the Law of the River, and without resorting to basin-wide litigation.

## The Current Drought

The recent, prolonged drought compelled Wyoming more than ever before to understand and fully participate in decision making that influences operations affecting water use and supply all along the Colorado River. Seeing the danger of falling elevations that were first of concern in 2004, Wyoming knew something needed to be done. Declining runoff affects Wyoming because, as an Upper Basin State, Wyoming's ability to develop its unused apportionment hinges on compliance with the 1922 Compact. In times of drought, the Upper Basin's ability to ensure compact compliance is based primarily on having enough water "saved" in Lake Powell to

## Wyoming's Use of Remote Sensed Data



Remote sensing imagery of irrigated acreage

Since the initiation of the Green River Consumptive Use Program in 2006, the Wyoming State Engineer's Office has been using remote sensed data (satellite imagery) to assess the consumptive use of water from irrigated lands. Wyoming was one of the first entities in the western United States to utilize this newly developed research tool on an on-going applied basis. The use of remote sensed data continues to expand and develop and Wyoming continues to use this tool.

# CURRENT ISSUES ON THE RIVER

**Previous sections of this Report have set the stage for a description of issues currently at play in the Colorado River Basin. To the extent discussion in this section repeats earlier information, it is only to tie what is currently happening back to those parts of the Law of the River, or the current hydrologic situation, which are relevant. It is also to illustrate how the older instruments still very much govern how the river is managed today.**

## DROUGHT CONTINGENCY PLANNING

In June of 2013, Secretary of the Interior Sally Jewell met with Upper and Lower Basin State officials to discuss the drought in the Colorado River Basin. Something additional needed to be done. The Basin States had been discussing ways to mitigate the effects of drought, whether it be shortages in the Lower Basin and Mexico, or curtailment of use in the Upper Basin. However, the message was clear, especially to the Lower Basin, that if the Basin States did not find and implement mitigation measures themselves, the Secretary, as watermaster of the Lower Basin, would do it for them. Upper Basin representatives remained concerned about the water supply health of the entire basin. The physical effects of drought could manifest themselves in the Upper Basin in damaging ways. Like previous efforts to solve problems through a concerted seven state approach, the Upper Basin States decided to be part of the solution even though the Department of Interior has less administrative presence above Lake Powell. At the most basic level, extreme low water levels in Lake Powell jeopardize the ability to get water out of the reservoir and increases dramatically the risk of non-compliance with the 1922 Compact's 75 MAF in 10 year non-depletion obligation. Compliance with the 1922 treaty is critical to the Upper Basin.

Seedskaadee National Wildlife Refuge, Wyoming  
(Photo: United States Fish and Wildlife Service)



# UPPER BASIN EFFORTS

## **Augmentation (Weather Modification)**

Colorado and Utah have been cloud-seeding for snowmaking for years, and Wyoming has completed a significant research project that generated favorable information on the positive effects of this technology. Continuing to seed clouds, and enhancing seeding where possible, was seen as one way to relatively inexpensively augment snowpack and increase system water. This effort became one of the Upper Basin's three focal points for drought contingency planning.

## **Reservoir Operations During Drought**

It is critically important to keep sufficient water in Lake Powell for hydropower, revenue generation, and compact compliance. Accordingly, the operations of all Colorado River Storage Project Act Initial Units were reviewed to evaluate how their operations could be modified to move additional amounts downstream during drought when the power pool at Lake Powell was threatened. This was an action that Reclamation would likely have to take during severe drought anyway. The Upper Basin States wanted to ensure their interests were protected. Therefore, influencing drought operations of the Initial Units above Lake Powell became the second focal point of the Upper Basin's Drought Contingency Plan. Lake Powell itself, Navajo Reservoir in New Mexico, the Aspinall Unit in Colorado, and Flaming Gorge in Utah and Wyoming were all evaluated, and continue to be evaluated. All of these Reclamation reservoirs operate under Records of Decision and Biological Opinions that describe their operational parameters. Of the three facilities upstream of Lake Powell, Flaming Gorge is the one with the most uncommitted storage. It is likely able to provide water to Lake Powell in an emergency. A defining characteristic of this action is that it be used only in the most critical drought conditions, and only after uniform consideration of all the initial units. Further, a specific component will focus on the most expeditious recovery of storage released for drought operations. Without this extra water, Lake Powell could otherwise lose its ability to generate power or release water for compact purposes. This contingency plan does not represent a change in normal operations.

## **Demand Management (System Conservation Pilot Program)**

A final way the Upper Basin identified to mitigate the effects of drought is the evaluation, and possible implementation, of demand management efforts. Essentially, this is meant to improve levels in Lake Powell by reducing depletions above it. Demand management is supply management by voluntary demand reduction. It is common in municipal water circles when cities and towns need to stretch a strained water supply. Demand management for additional system water at Lake Powell would need to be voluntary, incentivized, and pose no risk to established water rights. It is a previously untested concept in the Upper Basin States. None of them have clear statutory or rule-based authorities for doing so, and simply turning off a use at one point of diversion does not guarantee saved water in the system beyond non-participating, downstream diversions.

In 2014, a consortium of mostly municipal interests and the Bureau of Reclamation funded a demand management pilot, the "System Conservation Pilot Program." The funding partners included Southern Nevada Water Authority, Metropolitan Water District of Southern California, the Central Arizona Water Conservation District, and Denver Water, along with the Bureau of Reclamation. Initially, they contributed \$11 million to incentivize the reduction in all kinds of water use. The program provided up to \$8.25 million for Lower Basin efforts with the remaining funds (about \$2.75 million) available for Upper Basin projects. The program in the Upper Basin is administered by the Upper Colorado River Commission. Requests for proposals were prepared, and in 2015 five projects were awarded in Wyoming, three in Colorado, and none in Utah or New Mexico. For 2016, nine projects were funded in Wyoming, eight in Colorado, two in New Mexico, and one in Utah.

While the State of Wyoming provided no funding, the State Engineer's Office assisted the pilot program to see if system water could be generated in a voluntary, incentivized fashion. The protection of levels in Lake Powell approached this way was seen as preferable to mandatory reductions that could come with forced curtailment. In either case, uses are turned off. In one, appropriators retain some control. In the other, priority regulation occurs while individual control is lost.

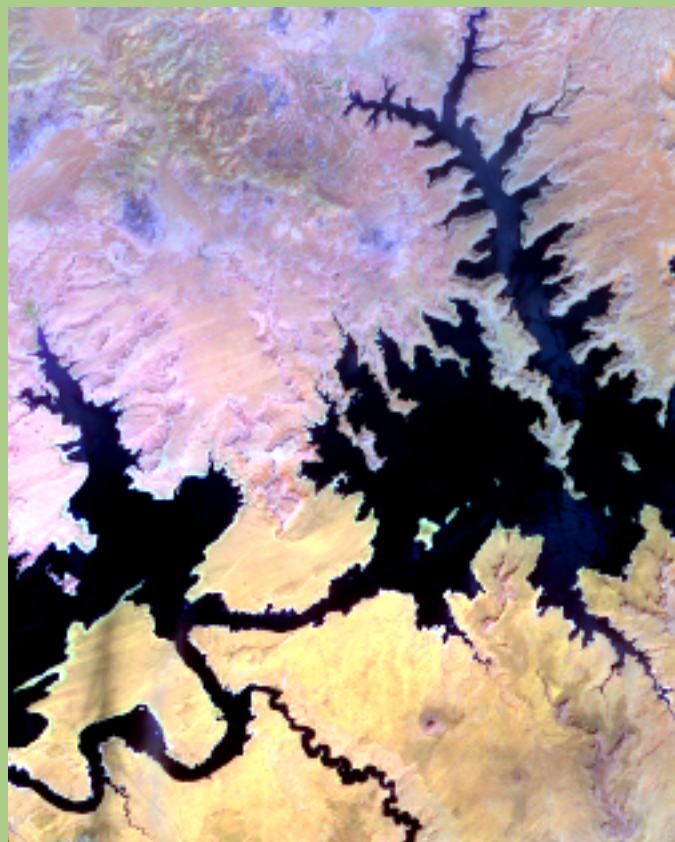
# LOWER BASIN EFFORTS

While the Lower Basin had access to more demand management dollars, and has more effective experience in demand reductions through fallowing projects, it needed to do more to conserve water. Its \$8.2 million for the System Conservation Pilot Program, while helpful, was not enough to dim the specter of shortage as early as 2017. In 2014, the Lower Basin water entities signed a Memorandum of Agreement memorializing the notion of “protection volumes” to be preserved through non-use in Lake Mead. In 2015 and 2016, while not yet final, the Lower Basin formulated additional plans to voluntarily forego up to 1.1 MAF of diversion from Lake Mead per year if water levels reach a critically low elevation (below 1,025 feet). An important component of this most recent plan is that at

very low levels (1,045 feet), California takes an agreed-to reduction in delivery despite devastating drought in that state. This is important because California holds a senior priority to the first 4.4 MAF in the Lower Basin, and would not be required to take a shortage in most instances. The total amount of 1.1 MAF in annual savings is in addition to 100,000 AF of additional savings the Department of Interior has pledged to create each year. At least some of the foregone use at these low levels can be recovered when Lake Mead recovers to an elevation of 1,110 feet. Conversely, water lost through a shortage declaration under the 2007 Interim Shortage Guidelines is unrecoverable.

## Importance of Glen Canyon Dam and Lake Powell to Wyoming

Glen Canyon Dam and Lake Powell are extremely important to the citizens of Wyoming, and consequently Wyoming follows its management closely. Water stored in Lake Powell is the water used to satisfy the Upper Basin’s compact obligations to the Lower Basin. The stored water acts as a “savings account” for the Upper Basin, ensuring the Upper Basin complies with the 1922 Compact. Second, the hydropower generated at the dam is distributed throughout much of the west, including many areas of Wyoming. Finally, revenue generated by selling the hydropower benefits Wyoming both directly and indirectly, and helps pay for the Salinity Control Program and the Upper Colorado River Endangered Fish Recovery Program, both of which are important to current and future Wyoming water use and development.



Aerial view of Lake Powell

*(Photo: National Aeronautics and Space Administration)*



# GLEN CANYON DAM ADAPTIVE MANAGEMENT PROGRAM



Glen Canyon Dam (Photo: United States Bureau of Reclamation)

In 1989, the Secretary of Interior directed an Environmental Impact Statement (EIS) be prepared on the operation of Glen Canyon Dam. The Final EIS was completed in March 1995. Findings from the EIS indicated that many uncertainties still existed regarding the downstream impact of water releases from Glen Canyon Dam.<sup>80</sup> In addition, the Grand Canyon Protection Act was passed in 1992 and proposed a process of adaptive management whereby the effects of dam operations on downstream resources would be monitored and assessed over time.

To comply with consultation requirements as well as the assortment of federal laws regarding the operation of Glen

Canyon Dam, the EIS recommended formation of a federal advisory committee. In January 1997, Interior Secretary Babbitt signed a Notice of Establishment of the Glen Canyon Adaptive Management Work Group (AMWG), a federal advisory committee. The AMWG chair is appointed by the Secretary of the Interior – typically the Assistant Secretary for Water and Power. Membership is appointed by the Secretary of Interior with representation from each of the cooperating agencies, Colorado River Basin States, environmental groups, recreation interests, and contractors for federal power from Glen Canyon Dam. The State of Wyoming holds one seat on this advisory committee.

# LONG-TERM EXPERIMENTAL AND MANAGEMENT PLAN EIS (LTEMP)

In 2011, the Department of Interior published a Notice of Intent to prepare a new EIS relative to the operation of Glen Canyon Dam. The Notice of Intent stated:

“The need for the LTEMP stems from the need to use scientific information developed since the 1996 ROD to better inform DOI decisions on dam operations and other management and experimental actions so that the Secretary may continue to meet statutory responsibilities for protecting downstream resources for future generations, conserving species listed under the Endangered Species Act, avoiding or mitigating impacts on National Register of Historic Places (NRHP)-eligible properties, and protecting the interests of American Indian Tribes, while meeting obligations for water delivery and the generation of hydroelectric power.”

From 2011 through mid-2016, all stakeholders with concerns relative to dam operation participated in the EIS process. This included representatives from the State of Wyoming and the other Basin States. The final Record of Decision for this EIS is expected to be signed by the end of 2016.

Wyoming’s primary focus regarding this EIS process was to ensure that the primary intended purpose of Glen Canyon Dam – water storage and the management of flows from the Upper Basin to the Lower Basin to satisfy provisions of the 1922 Compact – was preserved. Although the generation of hydropower is a secondary purpose of the facility, it is also very important to Wyoming and thus remained a high priority for this EIS process as well.

## HIGH FLOW EXPERIMENTS

Over the last two decades (1996 – 2015), the Bureau of Reclamation has proposed and implemented several high-flow experimental (HFE) releases from Glen Canyon Dam. The purpose of these events is to mobilize sand delivered from the Paria River and stored in the river channel and redeposit it to rebuild and maintain sandbars along the channel margins in the Grand Canyon. These sand features and associated backwater habitats are meant to provide key wildlife habitat, potentially reduce erosion of archaeological sites, enhance riparian vegetation, maintain or increase camping opportunities, and improve the wilderness experience along the Colorado River in Grand Canyon National Park.<sup>81</sup>

HFEs include flow events with peak releases from 31,500 to 45,000 cfs, lasting from one to several days. Events typically occur in October through November, but are also possible in March through April. To date, HFEs have occurred in 1996, 2004, 2008, 2012, 2013, and 2014. Although an HFE was planned for the fall of 2015, the discovery of green sunfish, which are potentially predatory on young humpback chub, below the Glen Canyon Dam in the summer of 2015 halted that HFE. Removal of green sunfish has now been completed, and an HFE is planned to begin on November 7, 2016. Looking forward, any additional HFEs are addressed as part of the LTEMP EIS.

Although the Upper Basin’s compact obligations are met when HFEs occur, states have been concerned about the loss of hydropower because HFEs require some water to bypass the turbines, which also results in the loss of associated revenues. They also potentially impact the population of humpback chub that resides in the Grand Canyon reach of the Colorado River.



Glen Canyon Dam: All four jet tubes releasing water for high flow experiment. (Photo: United States Bureau of Reclamation)



An underwater photograph showing several fish, likely bonytails, swimming over a rocky riverbed. The water is clear, and the rocks are light-colored and covered in some algae. The fish are silvery with a hint of blue on their sides. The title "UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM" is overlaid in white, sans-serif capital letters.

# UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

The Upper Colorado River Endangered Fish Recovery Program was initiated in 1988 with the signing of a cooperative agreement by the Governors of Colorado, Utah, and Wyoming; the Secretary of the Interior; and the Administrator of Western Area Power Administration. The Recovery Program was established to help recover populations of four species of endangered fish: the humpback chub, bonytail, Colorado pikeminnow and razorback sucker, while providing for water development to proceed in compliance with State law, interstate compacts and the Endangered Species Act.<sup>82</sup> The Recovery Program has developed into a successful partnership of local, state, and federal agencies, water and power interests, and environmental groups working to recover endangered fish in the Upper Colorado River Basin. The program's value to Wyoming is clear: without its Endangered Species Act coverage, water development would be greatly hindered if not precluded. Every proposed water development project would be subject to Section 7 consultation absent this program.

The most notable aspects of this effort are: (1) the four fish species are being recovered with a planned delisting date of 2023; (2) water development activities in the basin have moved forward unfettered because the existence of the program fulfills the need for Endangered Species Act compliance; and (3) there has been no litigation relative to this Endangered Species Act activity.

One important component of the program's recovery efforts is Flaming Gorge Dam and Reservoir. In 2005, an EIS was completed on revising the operations of Flaming Gorge Dam. The stated purpose and need of the new EIS was:

"... to operate Flaming Gorge Dam to protect and assist in recovery of the populations and designated critical habitat of the four endangered fishes, while maintaining all authorized purposes of the Flaming Gorge Unit of the CRSP, particularly those related to the development of water resources in accordance with the Colorado River Compact."

Since the Record of Decision for this EIS was signed in 2006, Flaming Gorge Dam has been operated almost entirely to address flow and temperature needs of downstream endangered fish. To date, this has not impacted contract water users since there are minimal federal contracts for water from Flaming Gorge Reservoir. The State of Utah does hold an approximately 450,000 AF water right associated with the Reservoir which, for the most part, is not currently used. The current operations also keep the reservoir relatively full, which is a benefit to reservoir recreation which is a significant economic driver for communities in southwest Wyoming and northeast Utah.



# SALINITY CONTROL PROGRAM

Established by the Governors of the seven Colorado River Basin States in 1973, the Salinity Control Forum works jointly with federal agencies and Congress to develop, fund and implement salinity reduction measures to meet national, international and state water quality objectives for the Colorado River system. The Salinity Program is a unique cooperative watershed effort resulting from EPA's interpretation that the Clean Water Act required water quality standards, including beneficial use designations, numeric salinity criteria, and a plan of implementation for the Colorado River.

Numeric criteria standards were subsequently established below Hoover Dam, below Parker Dam and at Imperial Dam by the Forum, but it put no state-by-state water quality standards in place. To date, the Program has controlled more than a million tons of salt discharge annually and has reduced the average salt concentration in the Lower Colorado River at Imperial Dam from 896 milligrams per liter in 1970 to 677 milligrams per liter in 2013.

A primary goal of the Program is the reduction of salts in the Lower Basin by implementing control measures in the Upper Basin. Project components in Wyoming, Utah, Colorado and New Mexico, primarily directed at reducing saline returns from irrigated agriculture, have resulted in estimated net direct benefits to the Colorado River Basin of nearly \$300 million annually.<sup>83</sup> Lower Basin benefits are largely to plumbing and agricultural systems that now see less impact and maintenance cost than they would with saltier water. Upper Basin benefits center around installation and operation of more-efficient irrigation systems but the Program is not entirely irrigation-focused.

The Paradox Project in west-central Colorado pumps shallow brine from a collapsed salt dome beneath the Dolores River. That brine would otherwise contribute a heavy salt load to the basin. The brine is collected from nine wells that range in depth from 40 to 70 feet deep. This brine has a salinity of around 250,000 ppm and is injected deep underground (around 16,000 feet) under high pressure. The Paradox Project removes an average of 110,000 tons of salt annually from the Colorado River system. This is the largest single salt control feature of the Program. While successful, this project is currently undergoing NEPA review assuming the useful life of the injection well will be reached in the near term. The Paradox Project will continue in some fashion, as either a

replacement well, evaporation ponds, or mechanical salt removal, all of which are being evaluated.

The 1996 amendments to the Colorado River Basin Salinity Control Act changed the Basin States' cost-share requirements from repayment to upfront cost share. At that time, there was a significant carryover in the salinity portion of the Lower Colorado River Basin Development Fund. Since that time, the carryover has been reduced such that at the end of Fiscal Year 2015, the salinity portion of the fund balance is between \$10 and \$11 million. The Forum has established a Program Finances Subcommittee to consider viable alternatives for solving the disparity between the present income and present cost-share obligations incurred in the Lower Colorado

River Basin Development Fund. The Wyoming State Engineer serves as the Co-Chair of this committee.

A primary goal of the Program is the reduction of salts in the Lower Basin by implementing control measures in the Upper Basin.

In addition, the Program continues its longstanding effort to reduce salt loading into the Green River's tributaries at the Big Sandy Unit of the Colorado River Salinity Control Project.

This Unit is contiguous with the boundaries of the Eden Valley Irrigation and Drainage District, which includes the communities of Eden and Farson, Wyoming. The Henry's Fork area, near the Utah border and west of Flaming Gorge Reservoir, was added as a Colorado River Salinity Control site in 2014 and is now being used to reduce salt loading into Flaming Gorge Reservoir.

In 2014, Wyoming and the Bureau of Reclamation worked together to form the Wyoming Basin States Program, in which Reclamation awarded a sole source contract to Wyoming Water Development Office at the end of 2014. The contract is for five years and provides \$1.6 million for the first year and \$300,000 for the four subsequent years for a total of \$2.7 million. The Bureau of Reclamation already has similar types of contracts currently with Colorado and Utah.

The State Engineer's Office, Department of Environmental Quality and Water Development Office actively participate in the activities of the Colorado River Basin Salinity Control Forum, the Forum's Work Group and the Colorado River Basin Salinity Control Advisory Council. The Forum and Advisory Council meet semi-annually, typically in May and October. The Forum's Work Group meets about six times per year.



# UPPER COLORADO RIVER BASIN FUND MEMORANDUM OF AGREEMENT



Transformers at Glen Canyon Dam  
(Photo: Glen Canyon Adaptive Management Group)

During 2009 and 2010, the Upper Basin States were informed by the Colorado River Energy Distributors Association (CREDA) that it was going to seek to end collection of hydropower revenues as defined under Section 5(e) of Colorado River Storage Project Act. These accounts were generally called “aid to irrigation” and were to be collected to help the Upper Basin States use their full compact apportionments. The trouble was, aid to irrigation funding was to be used for relatively narrow purposes, specifically the creation and operation of new federal irrigation projects. Since none were being built, or planned, and the desire to form new federal projects or districts had waned, CREDA saw no reason to continue to collect these monies. If it could stop doing so, the savings could be passed to its power customers in the form of reduced power rates. CREDA’s customer base for the use of hydropower is extensive and includes power distributors in all Upper Basin States (Figure 4).

The Upper Basin States disagreed. The funds were intended to assist the states in development of their compact-apportioned water, and it was not their fault that the conditions on use of the funds were outdated which made the money essentially unusable. Through a series of negotiations between the states, Reclamation, CREDA, and Western Area Power Administration, a Memorandum of Agreement was crafted that reached a middle ground without the need for federal legislation. The states agreed

that they would forego 50 percent of the revenue required to be collected on the condition that the remaining 50 percent would have more flexible spending rules attached. Through the end of the Agreement, the parties anticipated that \$161 million would be collected for the states from hydropower sales, whereas without the Agreement \$322 million would have been collected from power customers. Wyoming’s 15.5 percent amounted to approximately \$25 million over the Agreement’s term. In essence, the states traded \$2 of unspendable money for \$1 of spendable money. In return, CREDA could pass the 50 percent savings along as a rate benefit to customers. It was a win-win for both. The Agreement was fully executed in

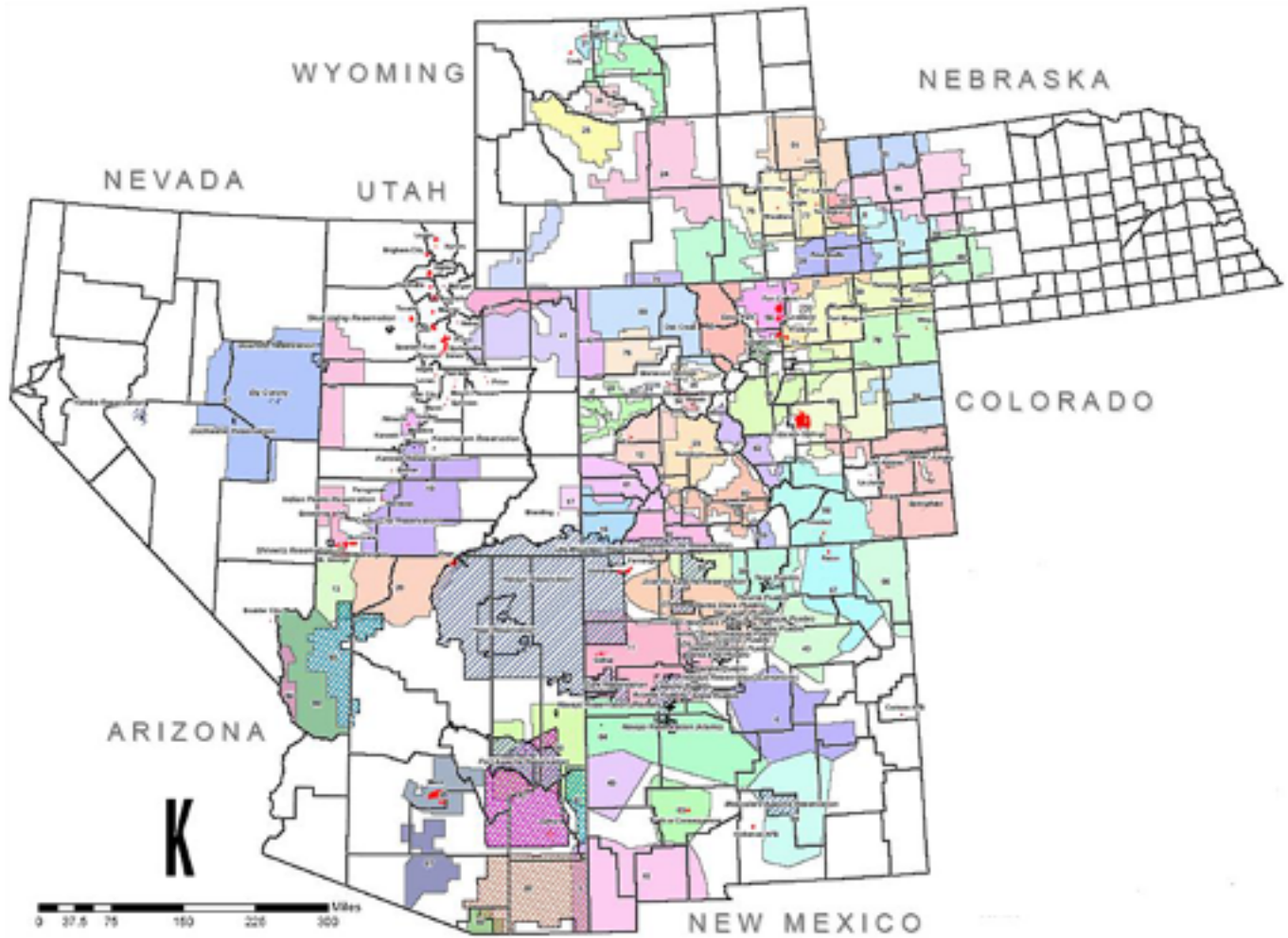
early 2011, with Governor Mead signing for Wyoming, and runs until September 30, 2025.

In practice, the spending flexibility hoped for has not been fully achieved. All proposed projects must be submitted to and approved by the Bureau of Reclamation. Wyoming has been successful in getting a few projects approved. However, the small number of federal facilities in Wyoming’s Green and Little Snake River Basins makes finding projects somewhat more difficult. For example, Wyoming is home to only a few federal facilities in those basins: Fontenelle Reservoir, the Big Sandy area (EVIDD is a federal district), and the federal facilities in the Bridger Valley (Stateline and Meeks Cabin Dams and associated facilities). The states continue to work with Reclamation to find more flexibility for these dollars to achieve the benefits the states foresaw when the Agreement was negotiated. To date, the states and the Upper Colorado River Commission have committed Agreement dollars in the following amounts:

Wyoming:	\$ 4,295,294
Colorado:	\$70,187,960
Utah:	\$19,053,000
New Mexico:	\$ 3,850,000
UCRC:	\$ 1,253,000

Total committed through April 2016: \$98,639,254

**Figure 4: Map of Colorado River Storage Project Hydropower Deliveries** (Source: Western Area Power Administration. Visit [www.wapa.gov](http://www.wapa.gov) for more information.)





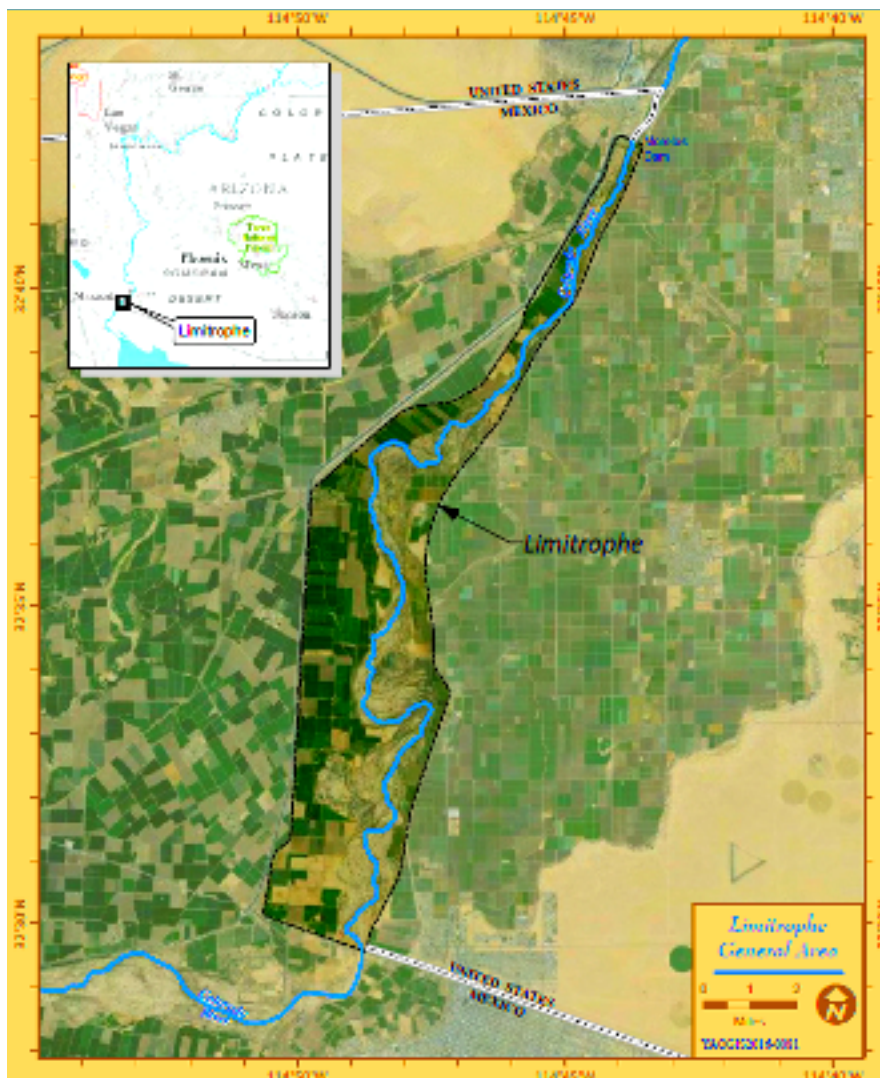
# BINATIONAL NEGOTIATIONS WITH MEXICO

In 2012, representatives of the United States and Mexico signed Minute 319 to the 1944 Treaty with Mexico which has a five-year term. Generally, the agreement outlined several actions to proactively manage the Colorado River System for binational benefits and mitigate risks associated with variable water supplies and growing demands. This includes sharing of Colorado River water shortages and surpluses under specifically defined Lake Mead water elevations.

Mexico has agreed to voluntarily share in shortages when the Secretary of the Interior determines a shortage condition exists in the Lower Colorado River Basin. Mexico will also get to share in the temporary benefit of surpluses available within the United States when the Secretary determines a domestic surplus condition exists in the Lower Basin. Mexico can now create Intentionally Created Mexican Allocation (ICMA) stored in the United States through water conservation or new water source

projects. As part of a joint-cooperative pilot program, Mexico agreed to allow some ICMA to be converted to Intentionally Created Surplus for use within the United States. This will enable the United States to fund water conservation projects in Mexico resulting in additional water for use in the United States, and to repair and improve water infrastructure and environmental enhancement in Mexico. It will also allow Mexico to provide water for environmental flows in the Colorado River limitrophe and its delta.

As part of Minute 319, the U.S. and Mexico, in conjunction with the environmental community from both countries, agreed to a release of water from Morelos Dam at the northern international boundary. The intent was to provide numerous ecological benefits in the reach of river channel from Morelos Dam to the Sea of Cortez.



Limitrophe between United States and Mexico  
(Map: United States Bureau of Reclamation)

The “limitrophe” section of the Colorado River is that reach of the lower river separating the U.S. from Mexico, and runs from near Yuma, AZ, to San Luis Rio Colorado, Sonora, Mexico, a distance of approximately 20 miles.

Over the course of about eight weeks starting in May 2014, 105,000 AF of water was released, termed the “pulse flow,” and allowed to run down the normally dry river channel. The resulting benefits from this water release continue to be studied.

Minute 319 also provides a mechanism for addressing salinity concentration concerns potentially caused by creating ICMA and other delivery changes. Minute 242 specified that the salinity concentration of the water delivered at the Northerly International Boundary shall be no more than 115 parts per million, plus or minus 30 parts per million, higher than the salinity of the Colorado River arriving at Imperial Dam. This is referred to as the salinity differential. Pursuant to Minute 319, Mexico will calculate the differential as if the ICMA that it created had been delivered to the Northern International Boundary. At the same time, to mitigate actual salinity in the River, Mexico may choose to divert some of its apportionment through the Wellton-Mohawk bypass drain or discharge it directly to the channel of the Colorado River downstream from Morelos Dam.

Minute 319 further commits both countries to investigate longer-term projects that would require additional Treaty minutes. These include water conservation projects such as: (1) the proposed Alamo Canal Regulating Reservoir Conservation Pilot Project; (2) a project to convey Mexican water through the All-American Canal, which, at a minimum, could be used for water deliveries to Mexico in emergency situations; and (3) new water sources projects, including a Binational Desalination Plant in Rosarito, a Binational Desalination Plant near the Gulf of California (Sea of Cortez), and beneficial use of the New

River, which flows from Mexico northward into the Salton Sea.

Reclamation and the United States Section of the International Boundary and Water Commission committed that they would not approve a Minute of this nature without the support and approval of the Basin States. To that end, several domestic agreements in connection with Minute 319 were also executed in November 2012 in Coronado, California. These included a Memorandum of Agreement between the United States Section of the International Boundary and Water Commission, the Department of the Interior, the seven Basin States and various water agencies ensuring the United States will continue to involve the Basin States in future Colorado River negotiations with Mexico and will implement Minute 319 in accordance with the parameters agreed to by the states. They also include an Operating Agreement, Forbearance Agreement, Funding Agreement and Delivery Agreement ensuring the participating United States entities will receive the benefits they are expecting in connection with Minute 319.

Minute 319 is set to expire at the end of 2017 and there are ongoing efforts to develop a succeeding minute (termed Minute 32x) which will likely extend portions of Minute 319 as well as add some additional components. There is a strong desire by the Department of Interior to complete the negotiations and have a newly signed minute by the end of 2016. The Basin States are active participants in these negotiations.

## UPPER BASIN CONSUMPTIVE USE STUDIES

Currently, there is a significant amount of effort involving the State Engineer’s Office to better understand the consumptive use of water in the Green River Basin. One of the larger projects recently completed had two objectives: (1) produce irrigated acreage maps for wet and dry years using satellite imagery over the last 25 years; and (2) produce spatial and temporal maps of monthly and growing season crop evapotranspiration for the basin for years 2011 and 2015. The spatial monthly crop evapotranspiration maps provided the first accurate estimates of evapotranspiration in the basin. Two years of crop evapotranspiration data is a big step towards achieving the goal of obtaining more accurate estimates of consumptive use.

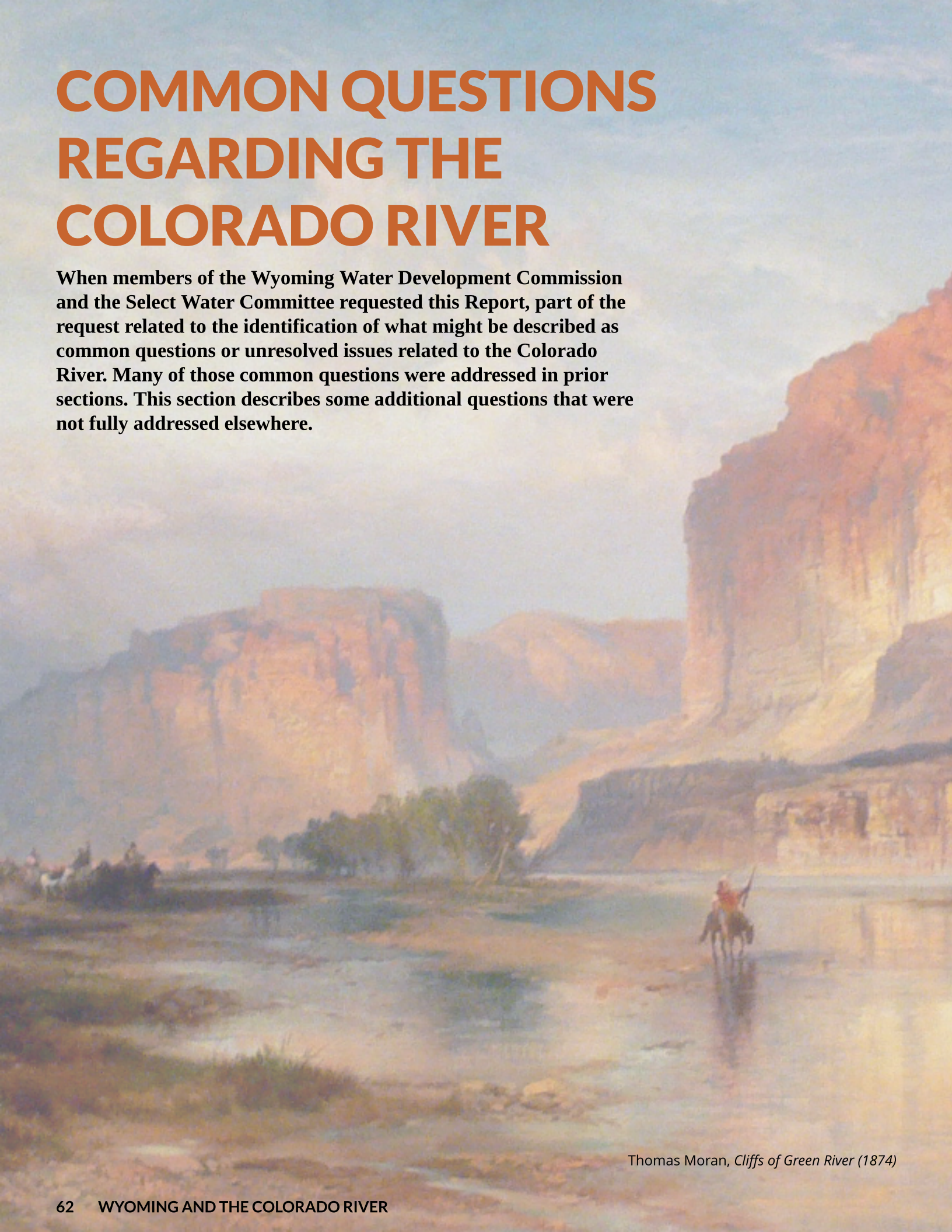
In 2013, the State Engineer’s Office hired a consultant to develop a consumptive use model for the Green River and Little Snake Basins. The model, called StateCU, can be used to determine daily crop consumptive use and to calculate monthly water budgets by diversion structure. StateCU gives the State Engineer’s Office the ability to use diversion data and climate data to calculate consumptive use on a basin level more efficiently and accurately.

Finally, the Upper Colorado River Commission and the four Upper Basin States are engaged in ongoing work to develop standardized consumptive use protocols. The Commission’s project “Assessing Agricultural Consumptive Use in the Upper Colorado River Basin” reviews the methodologies currently used by each state to assess depletions, and evaluates the possibility of using remote sensing technologies in the process.



# COMMON QUESTIONS REGARDING THE COLORADO RIVER

When members of the Wyoming Water Development Commission and the Select Water Committee requested this Report, part of the request related to the identification of what might be described as common questions or unresolved issues related to the Colorado River. Many of those common questions were addressed in prior sections. This section describes some additional questions that were not fully addressed elsewhere.



Thomas Moran, *Cliffs of Green River* (1874)

# HOW DURABLE ARE THE COLORADO RIVER COMPACTS AND CAN THEY BE TERMINATED?

Occasionally the view is expressed by some that the Colorado River Compacts should be terminated. Because the Compacts are contracts, state law, and federal law, there are various and differing ideas about how termination might be accomplished. Ultimately, however, the Compacts themselves dictate how they can be terminated. The 1922 Compact in Article X, and the 1948 Compact in Article XX, both say the same thing: “This compact may be terminated at any time by the unanimous agreement of the signatory States.” The legislatures in each of the signatory states approved the Compacts including this termination provision, as did Congress. So, one state alone cannot simply walk away, and no other mechanism for termination is provided. Only by unanimous agreement of all signatory states will either Compact terminate.

# IS THE UPPER BASIN’S OBLIGATION TO THE LOWER BASIN A DELIVERY OBLIGATION?

The 1922 Compact is clear that the Upper Basin States cannot deplete the flow at Lee Ferry below 75 MAF in any 10-year period. It does not require the delivery of that amount. The operational effect of this language has never been firmly settled because the flows recorded at Lee Ferry have always been in excess of that amount (Table 4). If one assumes that because the Compact protects present perfected rights, it is reasonable to conclude that all pre-compact rights could continue to divert in the Upper Basin even if the flow at Lee Ferry fell below the compact obligation, and that only post-compact rights bear the burden of curtailment. In essence, the Upper Basin cannot be demanded to produce water mother nature herself does not provide.

For purposes of the 75 MAF in 10 year obligation, the 1922 Compact limits the obligation to post-compact uses in the Upper Basin, which is not the same as a pure delivery obligation. In other words, while the post-compact acts of man cannot deplete the river below that threshold, the Upper Basin is not required to deliver that same amount regardless of hydrology or the level of pre-compact use in the Upper Basin. Depending on future hydrology, the distinction between a non-depletion obligation and a delivery requirement could be very real in application.



**Table 4: Historic Flow and Progressive  
10-year Total at Lee Ferry (1986 – 2015)**

Water Year	Historic	Progressive
1986	16,866	126,573
1987	13,450	131,754
1988	8,160	131,545
1989	7,995	131,207
1990	8,125	128,382
1991	8,132	128,198
1992	8,023	127,898
1993	8,137	118,515
1994	8,306	106,303
1995	9,242	96,436
1996	11,530	91,100
1997	13,873	91,523
1998	13,441	96,804
1999	11,540	100,349
2000	9,530	101,754
2001	8,361	101,983
2002	8,348	102,308
2003	8,372	102,543
2004	8,348	102,585
2005	8,395	101,738
2006	8,508	98,716
2007	8,422	93,265
2008	9,180	89,004
2009	8,406	85,870
2010	8,436	84,777
2011	13,227	89,643
2012	9,534	90,829
2013	8,289	90,746
2014	7,590	89,988
2015	9,157	90,750

# HOW WOULD CURTAILMENT OCCUR UNDER THE COMPACTS?

The 1948 Compact does not contemplate a “compact call” per se, but instead requires that the Upper Basin States curtail their use prospectively so that they do not violate the 1922 Compact’s non-depletion obligation. If conditions warrant, each state would curtail its use in the proportion that its use in the prior year bore to the total depletion claimed in the Upper Basin for that year. A real challenge to all the Upper Basin States would be how to administer such curtailment activity if it was needed. Preparations would have to begin in advance of failing to meet the 75 MAF in 10 year threshold that might be viewed as a crystal ball exercise.

For example, if one assumes that, late in a given poor runoff year, the previous ten years of Lee Ferry flows totaled 75.4 MAF. The following year would contain some risk of violating the 75 MAF in 10 year obligation if a flow of about 7.14 MAF or less was all that was available at Lee Ferry. Preparations would have to begin for possible curtailment the following year, including: (1) public outreach; (2) computation of the total curtailment

needed (the amount of additional water needed to keep Lee Ferry at or above the non-depletion obligation); (3) each Upper Basin State’s share of the total curtailment; and (4) the necessary forecasting of storage in and hydraulic release capacity of Glen Canyon Dam. The amount curtailed a year hence will depend on how much water is in the system at that future time, which is unknowable months or a year in advance. Obviously, if Lake Powell is very low, one concern would be whether Glen Canyon Dam could make sufficient releases even if curtailment occurs. In sum, to implement appropriate curtailment, one needs to know how much each state needs to curtail in an environment where that amount will be constantly changing, a year before it is known how much snow will fall in the intervening winter. Curtailment could be more or less than originally estimated, or could go away altogether as the result of a heavy snow season or rainy spring. Therefore, knowing exactly how much to curtail cannot be known with certainty until the curtailment must occur because the target is constantly moving.

# HOW MIGHT POST-COMPACT RIGHTS IN WYOMING BE PROTECTED DURING CURTAILMENT?

As discussed previously, should the day come where the Upper Basin must curtail water uses to comply with the 10 year non-depletion obligation, Wyoming must have sufficient and reliable information with regard to its own uses in the Colorado River Basin. With this information, Wyoming can best protect its apportionment and all its water users.

In the event of curtailment, the priority system will inform any regulation in Wyoming, meaning that the most junior rights will be curtailed until sufficient curtailment occurs. Wyoming can likely expect to see senior, pre-compact rights being voluntarily and temporarily transferred to junior uses through Temporary Water Use Agreements. Most likely, this will involve senior irrigation rights

making temporary transfers to junior municipal and industrial uses. Wyoming has seen this type of response on the North Platte River during curtailment.

Wyoming will also likely seek to release water stored in priority in lieu of curtailment when and where possible. This speaks to the Wyoming’s current efforts to: (1) maximize the usable storage in Fontenelle Reservoir; (2) work with the Bureau of Reclamation on providing state accounts in federal reservoirs like Fontenelle and Flaming Gorge; and (3) evaluate the need for changes to state statute or rule to develop and operate a water banking program. All these efforts are designed to protect Wyoming water users in case of extreme drought and curtailment.



# WHAT IS THE “STRUCTURAL DEFICIT?”

All the Basin States have recognized some form of what has been termed a structural deficit in the Lower Basin, primarily centered on Lake Mead. In essence, demands on the reservoir outpace inflows by about 1.2 MAF in a normal year.

“Normal” annual releases from Lake Powell (8.23 MAF) and inflows from the Paria River (20,000 AF) are about 8.25 MAF. With other side inflows estimated to average 0.75 MAF, inflows to Lake Mead are about 9.0 MAF per year. The annual Lower Basin apportionments and Mexico Treaty obligation released from Lake Mead are:

California	= 4.4 MAF
Arizona	= 2.8 MAF
Nevada	= 0.3 MAF
<u>Mexico Delivery</u>	<u>= 1.5 MAF</u>
Total	= 9.0 MAF

If you add to the above releases the evaporative losses from Lake Mead as well as other “systems losses” estimated at approximately 1.2 MAF per year, the Lower Basin is in a deficit of about 1.2 MAF of water each year. It should be noted that releases from Lake Powell have

frequently been higher than 8.23 MAF under the 2007 Interim Shortage Guidelines.

A logical question is how is this problem solved? A true mass balance on Lake Mead, including charging for actual evaporation and other system losses, is one step. Additional demand reduction in the Lower Basin and/or Mexico is another. Augmentation of the river in meaningful quantities would also help. However, none of these has happened or will happen overnight given the economic cost to the Lower Basin. Where, for example, will California get water to satisfy its needs when its in-state water project is jeopardized by catastrophic drought and uncertainty due to endangered species issues surrounding the San Francisco Bay Delta? As senior priority in the Lower Basin, California is pressed to maximize deliveries of its Colorado River apportionment. Further, Arizona will not simply stop delivering water to the economic engine in the center of that state. The answer is likely found in the incremental steps taken to solve earlier issues on the river. A seven-state consortium should work through each major decision in a manner that keeps the ultimate goal (no structural deficit) in sight, while addressing individual problems rationally and without resorting to interstate litigation.



Hoover Dam and Lake Mead

(Photo: United States Bureau of Reclamation)

# WHAT IS THE IMPACT OF INDIAN RESERVED WATER RIGHTS?

The U.S. Supreme Court, in the *Arizona v. California* case and others, has concluded that when the United States created reservations it also reserved for American Indian Tribes water sufficient to achieve the specific purposes for which the land was reserved. There are no tribes within Wyoming's borders that claim rights to Colorado River water. But Wyoming is the only state of the seven Colorado River Basin States where that is true. At least 22 federally recognized tribes assert rights to Colorado River water, but neither the 1922 Compact nor the 1948 Compact affected tribal rights. Both Compacts state that nothing in them shall be construed as "affecting the obligations of the United States of America to Indian tribes." However, in 1963, the U.S. Supreme Court in *Arizona v. California* quantified the rights of five tribes to mainstream Colorado River water totaling the right to divert about 952,000 AF annually. The Court also directed that the water consumed under these rights be counted as part of the allocation made to the state in which the reservation is located.<sup>84</sup> Since 1963, many tribal rights throughout the Basin have been quantified through water settlements.<sup>85</sup>

Within the entire Colorado River Basin, tribes hold quantified reserved water rights to approximately 2.9 MAF

of annual diversions.<sup>86</sup> Five tribes have reservations that lie partly or wholly within the Upper Basin.<sup>87</sup> Four of those tribes are party to water settlements that quantify at least part of their rights totaling approximately 1.36 MAF of diversions annually, of which they currently divert an estimated 744,207 AF annually.<sup>88</sup> In many cases, these rights are senior to other users. Additionally, thirteen tribes within the Colorado River Basin have yet to fully adjudicate or otherwise quantify their water rights.<sup>89</sup>

Unquantified tribal water rights in the Basin could be substantial. For instance, the proposed settlement agreement between the Navajo Nation and the state of Utah alone would provide the Nation with an additional 81,500 AF of annual depletions from the Colorado River. Further, the Navajo Nation has made claims to reserved water in multiple states, and in both basins. Other tribes, including the Hualapai and Havasupai, have substantial reservation land bases, but are just now beginning to negotiate settlements of their reserved rights.<sup>90</sup> Once all tribal rights are fully quantified, and then fully put to use, they will have substantial impacts on the already strained water resources in the Colorado River Basin.

# WHY IS THERE A SHORTFALL BETWEEN WATER ALLOCATED IN 1922 AND WATER AVAILABLE IN 2016?

When negotiations of the 1922 Compact began, the negotiators were provided data from the Bureau of Reclamation regarding how much water was available. The hydrologic data that had been collected up to that point in time indicated annual Colorado River flow at Lee Ferry to be 16.4 MAF. Based on that information, the 1922 Compact ultimately apportioned 16.0 MAF to the states, and recognized a claim for water to go to Mexico. It is now believed that there is significantly less water available. Current long-term data suggest an average annual flow of about 13.5 MAF. Also, flows are highly

erratic, ranging from 4.4 MAF to over 22 MAF. This situation could be termed a "legal" shortage, and will be an ongoing issue.

In addition, there is also "hydrologic" shortage that should be recognized. This occurs each and every year in at least some portions of Wyoming's Colorado River Basin and happens because mother nature simply has not supplied enough water to satisfy all the water needs on a given stream.



# HOW DO THE COMPACTS TREAT IMPORTED WATER?

Sometimes the question arises as to how to handle water not covered by the 1922 or 1948 Compacts. For example, imported water or non-system groundwater are occasionally discussed in terms of who gets to benefit from making such water available, can they market it, and whether or not it is subject to constraints in use under Compact curtailment.

Absent an identified project the merits of which could be debated specifically, it is worth noting, at least at a high level, the kinds of questions such a proposal raises. First, the Compacts apportion use of the natural flows in the Colorado River System. To the extent water is brought in from outside the physical Colorado River Basin, its use could be wholly dedicated to the importer whose labor and money made it available. Not being native water to the Colorado River System, it could not be forced downriver, and its use could not be curtailed like other uses from the river. Potentially, it could be used to forestall curtailment, or exchanged to satisfy other demands. It is doubtful such water would suffer the constraints that inhibit inter-basin (Upper Basin to Lower Basin) transfers, if transmission losses and conveyance tracking could be accounted for, and if it satisfied Wyoming's export statute.

To date in Wyoming, such pure imported water concepts have been few and none realized, largely because surrounding basins are also heavily used and no significant unappropriated water is easily found. This is why some imported water concepts have in the past included such things as moving water from the Missouri River, the Great Lakes, the Columbia River Basin, or even in the form of icebergs towed south from Alaska. In fact, the Colorado River Basin Project Act explicitly provided for consideration of water imported from outside of the Basin.

A separate question surfaces when the proposed source of imported, or augmentation, water is from non-system

groundwater within the confines of the Colorado River Basin. The science of groundwater/surface water interactions recognizes that in the near-surface geologic environment, surface water and groundwater are often interconnected. Groundwater can and does feed streams, and its overuse can deplete streamflow. Some states like Colorado have spent significant resources defining their groundwater basins and identifying areas where the groundwater and surface water supplies are so interconnected that they are regulated as one resource. In Wyoming, we have made similar determinations in the Bates Creek Basin, and the LaGrange area, both in the North Platte River Basin. This is an important question to raise, because an appropriator may not be able to claim or market the water (as wholly imported or "augmentation" water) as a separate source if, through hydrogeologic processes, it would ultimately surface in the Colorado River or its tributaries. It may be inappropriate to pump water from even poorly connected aquifers, to be sold as imported water unaffected by the Compacts, if that water would eventually end up as surface flows in the same stream subject to Compact apportionment a few days, weeks, or years hence.

The answer is likely different if the groundwater is demonstrably not connected to the Colorado River System. If such a condition is proven, the water could be considered non-system water. And, it could then be treated much like a physical import of surface water from outside the Basin, and likely suffer no Compact constraints or curtailment of use. The question becomes one of how to determine whether such groundwater qualifies as non-system water. Currently, no uniform tests exist amongst the Basin States, and the various states can have different definitions in statute or rule as to what constitutes sufficient hydrologic connection.



# SUMMARY

Wyoming's early role in the Laramie River lawsuit helped spawn western river compacting when it was revealed that priorities apply across state lines of prior appropriation states. Wyoming has been unavoidably enmeshed in all things related to the great Colorado River ever since. What happens in Mexico and the Lower Basin can have ripple effects on Lake Powell, and therefore effects on Wyoming's compact apportionments and compliance obligations.

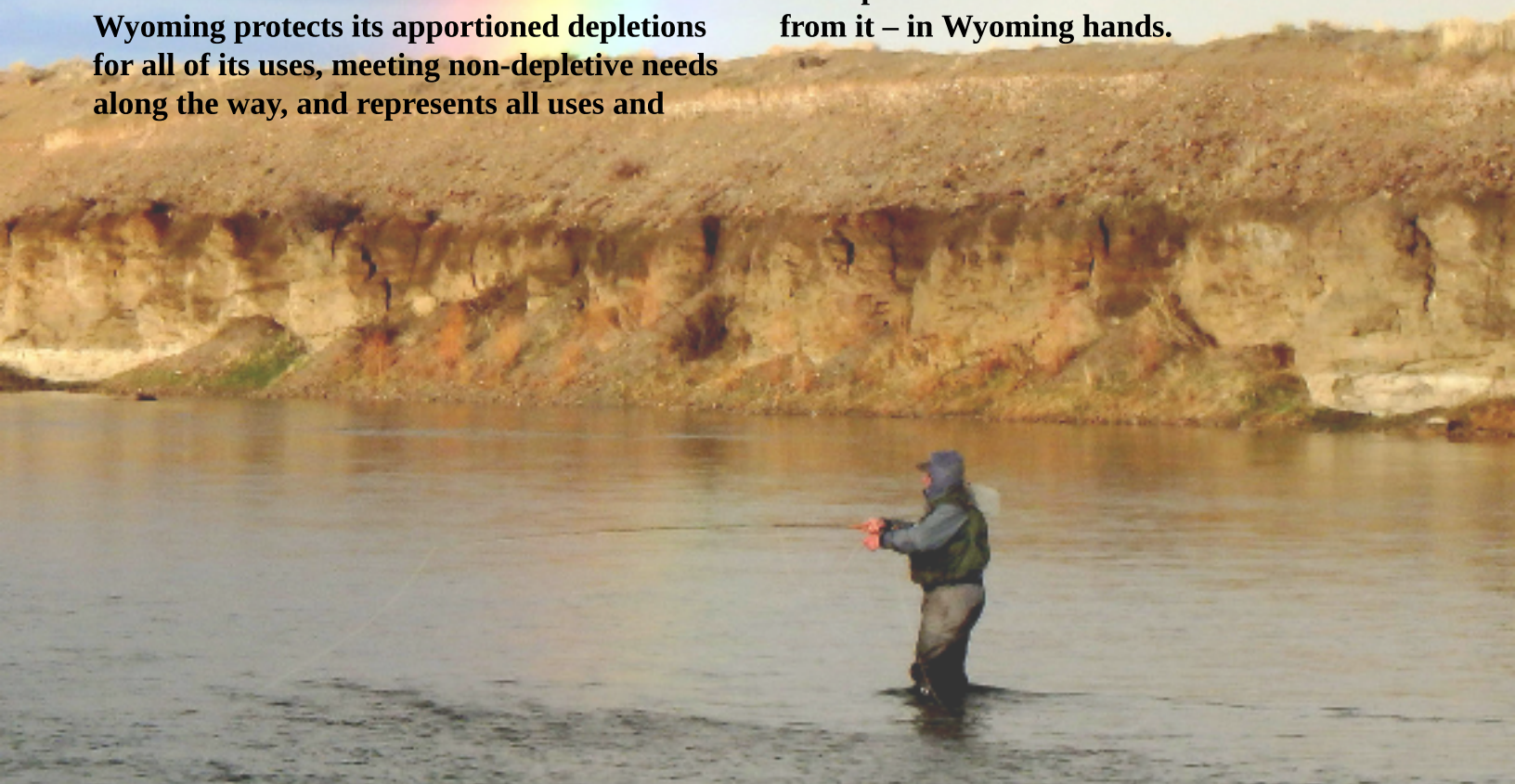
Wyoming is not an island at the head of the river, and it has historically had a strong voice and enduring presence at the table when Colorado River issues are at stake. As well, as a compact signatory, Wyoming is more than just a "stakeholder" on the river; it is a consultative partner with the federal agencies and the roles they serve.

Wyoming protects its apportioned depletions for all of its uses, meeting non-depletive needs along the way, and represents all uses and

users within its borders.

It is a complicated river system, with the interests of states and their users, tribal nations, the federal government, national parks, environmental interests, hydropower interests, municipalities and others all working to help this river serve its part of the country during deep and prolonged drought.

Historically, this river has been managed through agreements that express consensus on what can be done – rather than litigation on issues where consensus fails – and that practice must continue. When any state fails to see the value of negotiated solutions and instead chooses to litigate, the entire basin will have lost. This is an important reason for Wyoming to stay in tune and involved in issues up and down the river. Wyoming must work to keep its future on the river – and benefits from it – in Wyoming hands.



Green River at Seedskaadee National Wildlife Refuge  
(Photo: United States Fish and Wildlife Service)



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- <sup>2</sup> U.S. Department of the Interior Bureau of Reclamation, Colorado River Basin Water Supply and Demand Study, SR-3 (Dec. 2012), available online at <http://www.usbr.gov/lc/region/programs/crbstudy.html>.
- <sup>3</sup> All of Wyoming compacts, as well as court decrees and the Mexican Water Treaty of 1944, can be found in Documents on the Use and Control of Wyoming's Interstate Streams, Wyoming's Compacts, Treaties and Court Decrees (2006), available online at <https://sites.google.com/a/wyo.gov/seo/>.
- <sup>4</sup> There is no single, universally agreed upon definition of the "Law of the River." It is, however, useful as a shorthand reference to describe the longstanding and complex law affecting the interstate and international use, management, and allocation of water in the Colorado River System. This Report relies in part on a listing of documents compiled by the Bureau of Reclamation in 2008. However, many states, including Wyoming, would likely submit that programs or laws such as The Upper Colorado River Endangered Fish Recovery Program and The Grand Canyon Protection Act are not part of the Law of the River because they are not specific to the allocation, distribution and use of water. They are included in the Law of the River section of this Report only to describe their indirect relationship with water allocations and use.
- <sup>5</sup> U.S. Department of the Interior Bureau of Reclamation, The Colorado River Documents 2008 (Sept. 2010).
- <sup>6</sup> Codified in Wyoming at Wyo. Stat. Ann. § 41-12-301 (Appendix at 1).
- <sup>7</sup> Wyoming v. Colorado, 259 U.S. 419 (1922).
- <sup>8</sup> The Colorado River Compact: Report of Frank. C. Emerson, Commissioner for Wyoming, January 18, 1923.
- <sup>9</sup> Colorado River Compact, art. III(a).
- <sup>10</sup> Colorado River Compact, art. III(b).
- <sup>11</sup> Colorado River Compact, art. III(c).
- <sup>12</sup> Arizona v. California, 376 U.S. 340, ¶ I(H) (1964) (June 25, 1929 is the effective date of the Boulder Canyon Project Act).
- <sup>13</sup> 43 U.S.C. § 617 et seq. (Appendix at 2).
- <sup>14</sup> Boulder Canyon Project Act, Sec. 4.(a).
- <sup>15</sup> Arizona v. California, 373 U.S. 546 (1963).
- <sup>16</sup> Boulder Canyon Project Act, Sec. 6.
- <sup>17</sup> Agreement Requesting Apportionment of California's Share of the Waters of the Colorado River Among the Applicant's in the State, dated August 18, 1931 (Appendix at 3).
- <sup>18</sup> Treaty between the United States of America and Mexico Respecting Utilization of Waters of the Colorado and Tijuana Rivers and of the Rio Grande, U.S.-Mex., Feb. 3, 1944, 59 Stat. 1219. (Appendix at 4).
- <sup>19</sup> Id., art. 10(b).
- <sup>20</sup> Codified in Wyoming at Wyo. Stat. Ann. § 41-12-401 (Appendix at 5).
- <sup>21</sup> Colorado River Compact, art. II(f) & (g).
- <sup>22</sup> Upper Colorado River Basin Compact, art. IX.
- <sup>23</sup> Upper Colorado River Basin Compact, art. VIII(g).
- <sup>24</sup> 43 U.S.C. § 620 et seq. (Appendix at 6).
- <sup>25</sup> 43 U.S.C. § 620d(e).
- <sup>26</sup> Appendix at 7.
- <sup>27</sup> Arizona v. California, 373 U.S. 546, 568 (1963).
- <sup>28</sup> Arizona v. California, 376 U.S. 340 (1964) (Appendix at 7a.).
- <sup>29</sup> 43 U.S. C. § 1501 et seq. (Appendix at 8).
- <sup>30</sup> Criteria for the Coordinated Long-Range Operation of Colorado River Reservoirs Pursuant to the Colorado River Basin Project Act of September 30, 1968 (Pub. L. No. 90-537), published at 35 Fed. Reg. 8951 (June 10, 1970) (Appendix at 9).
- <sup>31</sup> Review of Existing Coordinated Long-Range Operating Criteria for Colorado River Reservoirs (Operating Criteria), 70 Fed. Reg. 15873 (March 29, 2005).
- <sup>32</sup> Minute No. 242, Permanent and Definitive Solution to the International Problem of the Salinity of the Colorado River, August 30, 1973 (Appendix at 10).
- <sup>33</sup> Minute No. 242, Permanent and Definitive Solution to the International Problem of the Salinity of the Colorado River, August 30, 1973.
- <sup>34</sup> 43 U.S.C. §1571 (Appendix at 11).
- <sup>35</sup> Yuma Desalting Plant Pilot Run – Final Report. Bureau of Reclamation (2012).
- <sup>36</sup> Cooperative Agreement for Recovery Implementation Program for Endangered Species in the Upper Colorado River Basin (1988) (Appendix at 12).

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<sup>37</sup> Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin, dated September 29, 1987 (Appendix at 12a.).

<sup>38</sup> Grand Canyon Protection Act, 106 Stat. 4669, 4669-4673 (1992) (Appendix at 13).

<sup>39</sup> *Id.*, Section 1802(b).

<sup>40</sup> Colorado River Interim Surplus Guidelines, 66 Fed. Reg. 7772 (January 25, 2001) (Appendix at 14).

<sup>41</sup> Quantification Settlement Agreement, dated October 10, 2003 (Appendix at 14a).

<sup>42</sup> Colorado River Interim Guidelines for Lower Basin Shortages and the Coordinated Operations for Lake Powell and Lake Mead, Record of Decision (December 13, 2007) (Appendix at 15).

<sup>43</sup> Minute No. 316, Utilization of the Wellton-Mohawk Bypass Drain and Necessary Infrastructure in the United States for the Conveyance of Water by Mexico and Non-Governmental Organizations of Both Countries to the Santa Clara Wetland During the Yuma Desalting Plant Pilot Run, April 16, 2010 (Appendix at 16a.).

<sup>44</sup> Minute No. 317, Conceptual Framework for U.S. Mexico Discussions on Colorado River Cooperative Actions, June 17, 2010 (Appendix at 16b.).

<sup>45</sup> Minute No. 318, Adjustment of Delivery Schedules for Water Allotted to Mexico for the Years 2010 Through 2013 as a Result of Infrastructure Damage in Irrigation District 014, Rio Colorado, Caused by the April 2010 Earthquake in the Mexicali Valley, Baja California, December 17, 2010 (Appendix at 16c.).

<sup>46</sup> Minute No. 319, Interim International Cooperative Measures in the Colorado River Basin through 2017 and Extension of Minute 318 Cooperative Measures to Address the Continued Effects of the April 2010 Earthquake in the Mexicali Valley, Baja California, November 20, 2012 (Appendix at 16d.).

<sup>47</sup> Mike Purcell, Colorado River Compact Administration Project (June 27, 2005).

<sup>48</sup> Wyoming State Engineer's Office, Colorado River Compact Administration Program: Consumptive Use Determination Plan (Jan. 2008).

<sup>49</sup> Bureau of Reclamation, Provisional Upper Colorado River Basin Consumptive Uses and Losses Report 2011-2015 (March, 2016) available online at <http://www.usbr.gov/uc/library/envdocs/reports/crs/pdfs/cul2011-15prov.pdf>.

<sup>50</sup> State

Engineer's Office, Green River Basin Consumptive Use Report, 2011 – 2015 (2016).

<sup>51</sup> Wyoming Water Development Commission, Green River Basin Plan (Dec. 2010).

<sup>52</sup> Lytle Water Solutions, LLC, Flaming Gorge Reservoir Water Supply and Delivery Feasibility Study Report (June 2015).

<sup>53</sup> Green River Pipeline Cost Analysis, Utah Division of Water Resources (Oct. 2002).

<sup>54</sup> An evaluation of possible trans-basin diversions from the Snake River to the Green River, Wyoming State Engineer's Office (1971).

<sup>55</sup> Wyo. Stat. Ann. § 41-2-121(a)(ii)(E)(VIII).

<sup>56</sup> In addition to the Law of the River elements discussed in this section, other elements and federal laws also contain constraints tending to impair the viability of trans-basin transfers including the California Seven Party Agreement of 1931, The Colorado River Storage Project Act of 1956, the Colorado River Basin Project Act of 1968, the National Environmental Policy Act of 1969, the Endangered Species Act of 1973, and the 2007 Interim Shortage Guidelines/ Coordinated Reservoir Operations.

<sup>57</sup> David J. Guy, When the Law Dulls the Edges of Chance: Transferring Upper Basin Water to the Lower Basin, 1991 UTAH L. REV. 25, 33 (1991)(citing David Getches, Legal Issues Surrounding the Galloway Group Proposal to Market Colorado Water to San Diego, 3-4 (Jan. 8, 1985) (American Bar Association, Section of Natural Resources Law)(unpublished manuscript)).

<sup>58</sup> Arguments exist which attempt to interpret this language differently. See Sergio J. Viscoli, The Resource Conservation Group Proposal to Lease Colorado River Water, 31 NAT. RESOURCES J. 887, 896 (1991).

<sup>59</sup> Article III(a)(2) of the 1948 Compact apportions to the states a "consumptive use per annum of the quantities resulting from the application of . . . percentages to the total quantity of consumptive use per annum appropriated" under the 1922 Compact. The 1948 Compact determines consumptive use "by the inflow-outflow method in terms of man-made depletions of the virgin flow at Lee Ferry." This method of accounting requires reckoning of uses made above Lee Ferry, not uses made below Lee Ferry.

<sup>60</sup> U.S. CONST. art. I, § 8.

<sup>61</sup> *Sporhase v. Nebraska ex rel. Douglas*, 458 U.S. 941 (1982).



# REFERENCES, CONT'D.

<sup>62</sup> Wyo. Stat. Ann. § 41-3-115.

<sup>63</sup> *Intake Water Co. v. Yellowstone River Compact Comm'n*, 769 F.2d 568, 570 (9th Cir. 1985).

<sup>64</sup> *Tarrant Reg'l Water Dist. v. Herrmann*, 133 S. Ct. 2120, 2136 (2013).

<sup>65</sup> Resolution of the Upper Colorado River Commission Concerning a Proposal by the Galloway Group, Ltd., to Lease Water Apportioned to the Upper Basin States to the San Diego County Water Authority (Dec. 17, 1984).

<sup>66</sup> Letter from Arizona Governor Bruce Babbitt to San Diego County Water Authority (Oct. 29, 1984).

<sup>67</sup> There were a number of water marketing proposals, including trans-basin proposals, submitted for consideration in the Bureau of Reclamation's 2012 Water Supply and Demand Study. See U.S. Department of the Interior Bureau of Reclamation, Colorado River Basin Water Supply and Demand Study (Dec. 2012), available online at <http://www.usbr.gov/lc/region/programs/crbstudy.html>.

<sup>68</sup> A more detailed discussion of these past proposals, as well as a review of water marketing related to the Colorado River in general, can be found in: Colorado River Governance Initiative, Cross-Boundary Water Transfers in the Colorado River Basin: A Review of Efforts and Issues Associated with Marketing Water Across State Lines or Reservation Boundaries (Getches-Wilkinson Center for Natural Resources, Energy, and the Environment, Univ. of Colo. Law Sch. 2013); See also James S. Lochhead, An Upper Basin Perspective on California's Claims to Water from the Colorado River Part II: The Development, Implementation and Collapse of California's Plan to Live Within Its Basic Apportionment, 6 U. Denv. Water L. Rev. 318 (2003).

<sup>69</sup> Colorado's Water Plan, Ch. 3, 3-5 (2015).

<sup>70</sup> Leah S. Glaser, Bureau of Reclamation, San Juan-Chama Project (2011).

<sup>71</sup> See <http://www.water.utah.gov/lakepowellpipeline/GeneralInformation/default.asp> (last accessed Oct. 12, 2016).

<sup>72</sup> Wyo. Stat. Ann. § 41-3-110.

<sup>73</sup> Technical Memorandum to the 2012 Snake/Salt River Basin Plan prepared by Wyoming State Engineer's Office, Interstate Streams Division (July 3, 2012).

<sup>74</sup> Prepared by the Bureau of Reclamation and the Wyoming State Engineer's Office (Sept. 1996).

<sup>75</sup> 1991 Wyo.

Sess. Laws 80 (ch. 18, § 2).

<sup>76</sup> Wyo. Stat. Ann. § 41-2-1301.

<sup>77</sup> Third Amended and Restated Agreement for Interstate Water Banking among the Arizona Water Banking Authority and the Southern Nevada Water Authority and the Colorado River Commission of Nevada (May 20, 2013).

<sup>78</sup> U.S. Department of the Interior Bureau of Reclamation, Moving Forward: Phase 1 Report (May 2015), available online at: <http://www.usbr.gov/lc/region/programs/crbstudy/MovingForward/Phase1Report/fullreport.pdf>. The Phase 1 Report also contains many more examples of water transfer arrangements.

<sup>79</sup> *Id.* at 4-26.

<sup>80</sup> U.S. Department of the Interior Bureau of Reclamation, Operation of Glen Canyon Dam Final Environmental Impact Statement (March 1995).

<sup>81</sup> U.S. Department of the Interior Bureau of Reclamation, Environmental Assessment, Development and Implementation of a Protocol for High-Flow Experimental Releases from Glen Canyon Dam, Arizona, 2011 through 2020 (Dec. 2011).

<sup>82</sup> Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin. U.S. Fish and Wildlife Service. Revised 2015.

<sup>83</sup> Colorado River Basin Salinity Control Forum, Congressional Briefing Document (May, 2016).

<sup>84</sup> *Arizona v. California*, 376 U.S. 340, ¶ II(D) (1964).

<sup>85</sup> See, e.g., San Juan River Basin in New Mexico Navajo Nation Water Rights Settlement Agreement (Dec. 17, 2010); Colorado Ute Indian Water Rights Settlement Act of 1988, Pub. L. No. 100-585, 102 Stat. 2973 (1988); Colorado Ute Indian Water Rights Settlement Agreement (Dec. 10, 1986).

<sup>86</sup> U.S. Department of the Interior Bureau of Reclamation, Colorado River Basin Water Supply and Demand Study, Appendix C9 (Dec. 2012), available online at <http://www.usbr.gov/lc/region/programs/crbstudy.html>.

<sup>87</sup> *Id.*

<sup>88</sup> *Id.*

<sup>89</sup> *Id.*

<sup>90</sup> See [http://www.tribalwateruse.org/?page\\_id=569](http://www.tribalwateruse.org/?page_id=569).

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A full color copy of this document is available for download on the Wyoming State Engineer's Office Interstate Streams web page: <http://seo.wyo.gov/interstate-streams/know-your-basin/green-river-basin>. This version of the document has been printed in gray-scale to reduce costs.