

Laws of the Colorado River Basin: Obsolete or Flexible for a Sustainable Future?

By Warren King

Key Findings:

- The Colorado River Compact has never been amended in its 89 years of existence.
- The current water adjudication process has hindered the ability of many Native American reservations to quantify their reserved rights within the basin.
- The lining of the All-American Canal and creation of the Yuma Desalting Plant pose potential threats to the Mexicali Valley and the Cienega de Santa Clara in Mexico.
- The Colorado River Compact's original wording places a delivery obligation on the Upper Basin which could potentially reduce Upper Basin water supplies in a time of shortage while Lower Basin supplies remain the same.

The 2012 Colorado College State of the Rockies Report Card
The Colorado River Basin:
Agenda for Use, Restoration, and Sustainability for the Next Generation

About the Author:

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“The question that is posed is whether that law, that series of laws, those pieces (the Law of the River), can continue to be effective at leading us into the next hundred years?...I think the challenge before us is substantial. We have reached a point in our uses of the water of the basin where the Bureau of Reclamation has now acknowledged that we are fully consuming every drop of water that the basin produces. We have already reached that point, and the question is: How do we move ahead with obvious continuing demands and needs and interests of all of the seven states, the Republic of Mexico, the many Indian tribes that have reservations within this area, and all of the diverse interests we have in the water and the river?”

-Lawrence J. MacDonnell, Professor of Law and Colorado River Legal Scholar, speaking at the Colorado College, October 5th, 2011 as part of the State of the Rockies Project Speakers Series

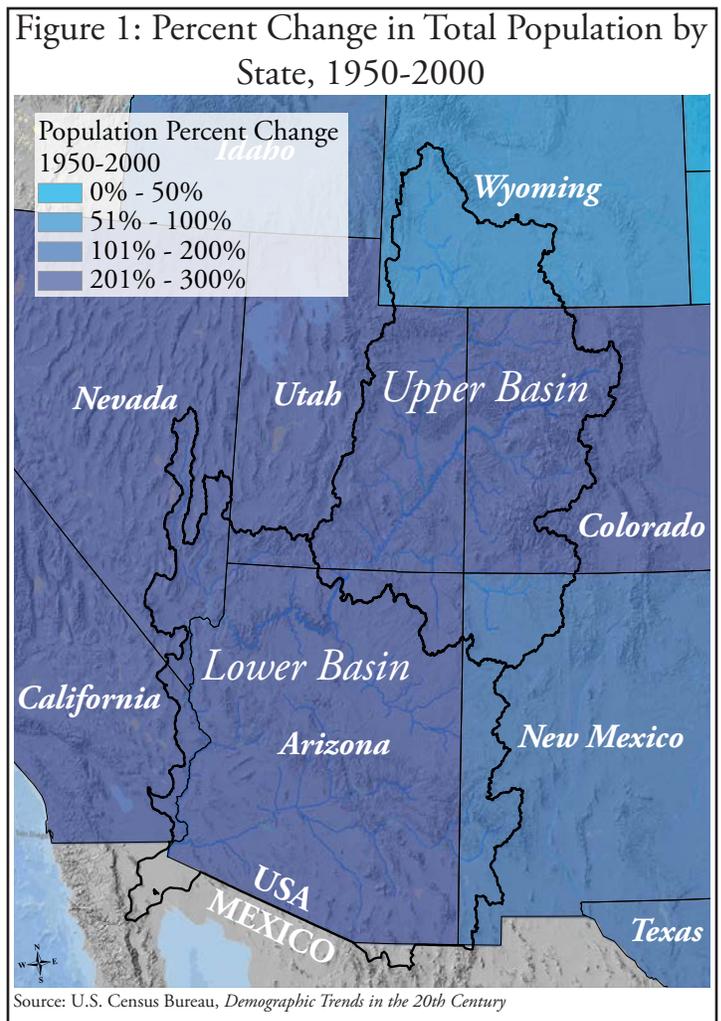
Introduction

In May of 1869 a young soldier, geologist, and explorer by the name of John Wesley Powell, along with a crew of ten others, set off down the Green River in Wyoming, in an effort to explore the Colorado River and contribute his findings to enhance American science.¹ The Colorado River Exploring Expedition may have been the byproduct of American expansionist idealism, but Powell differed from many of his time in his thoughts of the West. While the majority of Americans saw a land of plentiful opportunity and limitless expansion, Powell was one of the first to remark on its essential aridity and limited supply of natural resources. He challenged the popular belief that the growth of the American empire faced no environmental constraints.² Despite the efforts of those like Powell, development of the West boomed throughout the twentieth century. Few looked to oppose this notion of progress, and almost none acknowledged water availability as a limiting resource in future growth.

Of the seven states that make up the Colorado River Basin (Arizona, California, Colorado, Nevada, New Mexico, Utah, and Wyoming) at the time of Powell's expedition, only two- Nevada and California- had attained statehood, and the combined population of all seven basin states and territories was roughly 650,000.³ Today, the combined population of the same seven states according to the 2010 census is 56,762,410,⁴ with the majority of the growth occurring in the last 20 years. **Figure 1** provides a graphical representation of the growth trends witnessed in this region. In fact, Arizona's population jumped from 3.7 million in 1990 to over 5.1 million in 2000, a 40 percent increase, and Colorado's population rose by 30 percent, from 3.3 million to about 4.3 million in the same time period.⁵ These trends in population growth are not predicted to slow any time soon: three of the six fastest growing states in the nation (Arizona, Nevada, and Utah) are located within the basin, with states like Arizona, Colorado, and Nevada estimated to become home to an additional seven million people over the next 30 years.⁶ While population growth poses a significant challenge to the world in general, the Colorado River Basin, home to some of the driest states in the nation, faces a serious threat. An already over-allocated Colorado River (allocations currently exceed average flows by 15-20%) supplies water to nearly 30 million people, and

despite human ingenuity, no amount of additional storage alone will be able to accommodate the expected growth in water demands associated with the estimated population growth.⁷

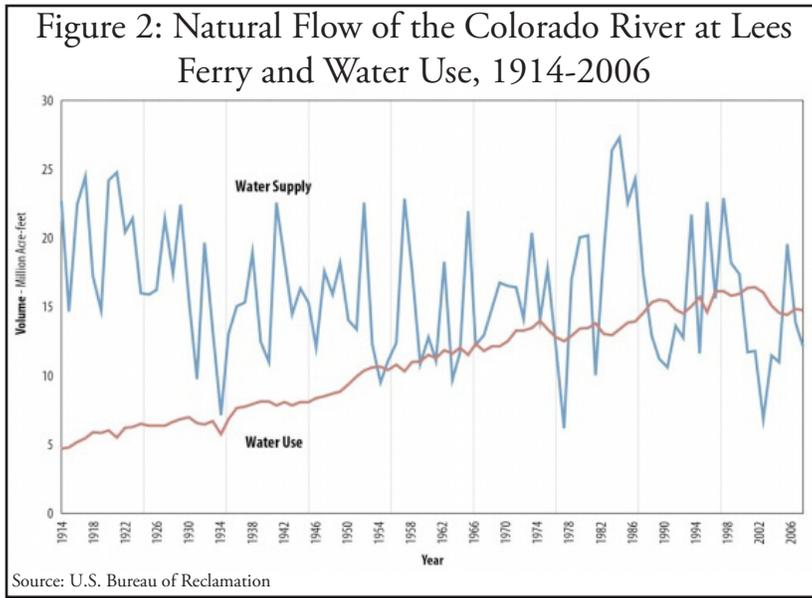
The trends in population growth witnessed in the basin region have been accompanied by an equally startling reduction in annual flow rates in the Colorado River. The annual flow rate as measured at Lee's Ferry, Arizona, over the past century is around 15 million acre-feet (maf).⁸ The annual natural flow, as well as historic supply and demand, can be



seen in **Figure 2**. From 1934 to 1984, the ten-year running average has almost always been below the annual average of 15 maf as seen in **Figure 3**.⁹ Of even greater concern is the drought that began a decade ago in 2002. From 2002 to 2005, the average annual flow was a mere 9.6 maf, the most severe multi-year drought on record.¹⁰ Similar to the trend in population growth, those of precipitation and flow rate show no signs of reversing. According to the Bureau of Reclamation (BOR), mean annual runoff in the basin is projected to decrease by 8.5% by 2050.¹¹ Additionally, a projected mean annual temperature increase and 7.2-9.6°F by 2099 may result in peak snowmelt runoff 15-35 days earlier than average, which could translate into a drop in water supply for meeting irrigation demands.¹²

years of legislation to be shaped without their active participation. In addition, the push for environmental protection in the basin has led many to argue for mandatory instream flows to protect vital riparian corridors. And all Colorado River water users and stakeholders face the challenge of working within the constraints of a set of laws that may not allow the flexibility needed to remedy all of these concerns. Perhaps one must ask, “Does the Law of the Colorado River Basin need to be amended?”

This question is complex even for experts, and nearly impossible to contemplate without at least a basic understanding of what constitutes the “Law of the River,” and how it has evolved over nine plus decades. This year’s *Report Card*, focusing entirely on the Colorado River Basin and its future sustainability, requires that we step back and consider the human constructs of laws and administrative arrangements (which largely underpin the physical infrastructure of dams, pipelines and reservoirs), that govern uses of water and thus conditions of land, people and environment in the basin. Too often society looks for easy answers to complex issues, resulting in more problems for the future. It is a challenge to understand enough about the Colorado River Basin in all of its multifaceted dimensions so that today’s youth can be informed and active participants in the dialog about a sustainable future. The Rockies Project believes today’s youth are up to the challenge. Thus, we put forth this *Report Card* to enhance the learning process.

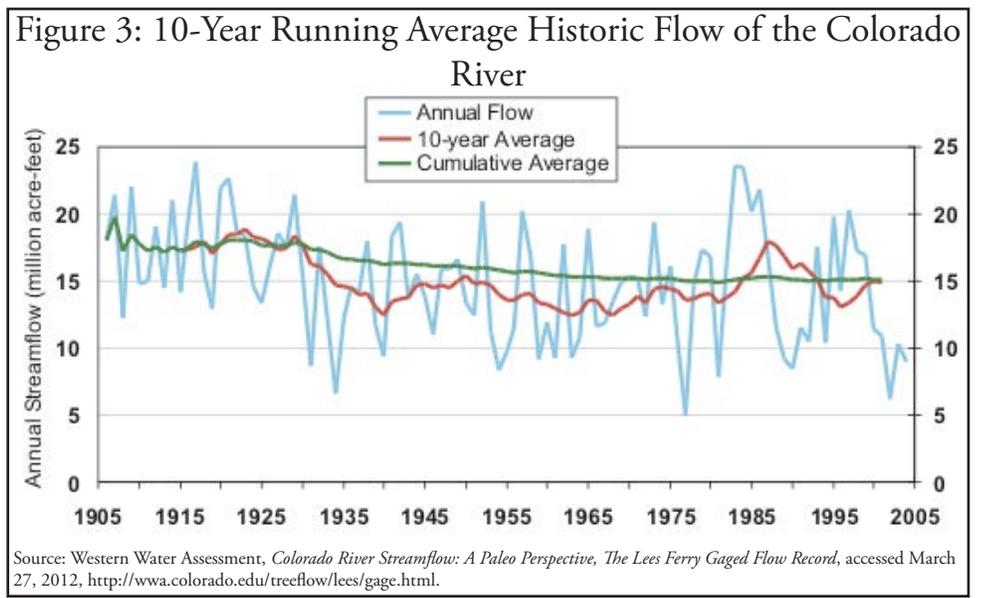


Currently this body of water is governed under what had been termed “The Law of the River,” a series of legislative acts and court opinions that have shaped the way Colorado River water has been allocated, used, and conserved for the last century. It may be preferable, however, in light of the integrated ecosystems management school of thought and the realization that the way land is managed has a direct effect on water quality and quantity, to call this legislative-administrative compilation the “Law of the Colorado River Basin.” Years of conflict and compromise have left us with the water allocations we see today; however, issues still persist. In the face of regional climate change and predicted flow reductions, Upper Basin states fear they face a delivery obligation to the Lower Basin, forcing them to take the brunt of the impact. Minority interests of Colorado River water, such as those represented by Native American reservations in the U.S. and those of the United Mexican States, have historically been ignored in practice, allowing

Nine Decades of Law in Historical Perspective

Prior Appropriation: Conceptual Foundation for Water Scarcity

Historically water rights in the western United States have been governed under the doctrine of prior appropriation. The mantra of those who abide by this law is “first in time, first in right,” meaning the first person to put a given quantity of water to “beneficial use” has a right to that water. Unlike



the riparian doctrine upheld in the East, title or ownership to property abutting a water source does not imply rights to that water. Prior appropriation as a legitimate law began its development with the passage of the Homestead Act in 1862. The Homestead Act, in an attempt to encourage the settlement of the West, allowed for the acquisition of “one quarter section or less of unappropriated public lands...at one dollar and twenty-five cents, or less, per acre”¹³ by any individual who had never taken up arms against the United States, pending the filing of an application. If after five years the land was improved upon and used for the actual purpose of settlement and cultivation, it was to remain as property of the said individual. The passage of the Act was followed by increased development; however, the majority of those lands claimed were bordering waterways. The expenses associated with actually developing a farm, as well as the ambiguous language of the Act, proved to be a deterrent for most of the nation’s population and an attractive opportunity for the likes of speculators, miners, and cattlemen. As a result much of the land claimed remained unoccupied or in the hands of those not intent on truly settling the region.

By the late 1800s, it became evident that the riparian doctrine that worked so well in the East was simply not suitable for the arid conditions of the West. In order to encourage expansion beyond riparian zones, a new sort of law developed, called prior appropriation. Those living in a particular region more often than not determine the laws that govern that area. This was the case in the development of water law in the West. Miners constituted a majority of the initial population to reach the West and as a result formed small “towns,” or mining camps.

Early mining techniques were a water-intensive endeavor and in a water deficient area necessitated the creation of some code, which would dictate how water was allocated. The first case to address this issue was *Irwin v. Phillips* in California in 1855. This case looked to answer the question, “Can an individual divert water for mining even though that diversion causes inadequate water supplies for those users downstream?”¹⁴ Several principles emerged from the opinion in this case: one being that the person who first applied water to a beneficial use would be entitled to use that amount of water in the future and would have priority over subsequent users; and another being that the court acknowledged this system had been created and agreed upon and was a legitimate measure for water allocation. It also established the idea of beneficial use and claimed riparian law irrelevant.¹⁵

As University of Wyoming professor of Law and Colorado River scholar, Larry MacDonnell, so eloquently describes the prior appropriation doctrine, “It staked out a definable interest in a limited common resource, measured by the actual capture and control of some portion of water... [and removed] it from the commons.”¹⁶ This easy to regulate, widely understandable system of water allocation allowed for the improvement of lands away from aquatic ecosystems and spurred the development of irrigation systems with which to accomplish this task. The prior appropriation doctrine over

decades has been transformed into the preeminent water doctrine of the western United States today. It maintains that “proper and legal” water use requires that the water be diverted from a specific source, at a certain flow rate, to be used at a particular location, and must be put to beneficial use for a specific purpose, with any return flow usable by others.¹⁷ The other key feature that has already been remarked upon, but is of sufficient importance to note, is that senior rights will always have priority over junior rights. A person’s right is senior only if that water was verifiably put to beneficial use prior to another user’s beneficial use of water. Many other court proceedings helped to clarify and reemphasize the doctrine of prior appropriation in the West and resulted in today’s form of western water law.

Legal Focus on the Colorado River

While prior appropriation has come to dominate water law in the West, the Colorado River itself is governed by a compilation of legislative acts and court opinions jointly titled “The Law of the River,” or as I prefer to call it “The Laws of the Colorado River Basin.” Beginning in 1902 and continuing to the present, over 30 opinions and laws have come to affect the way the waters of the Colorado River are managed, leading many to call it one of the most regulated rivers in the world.

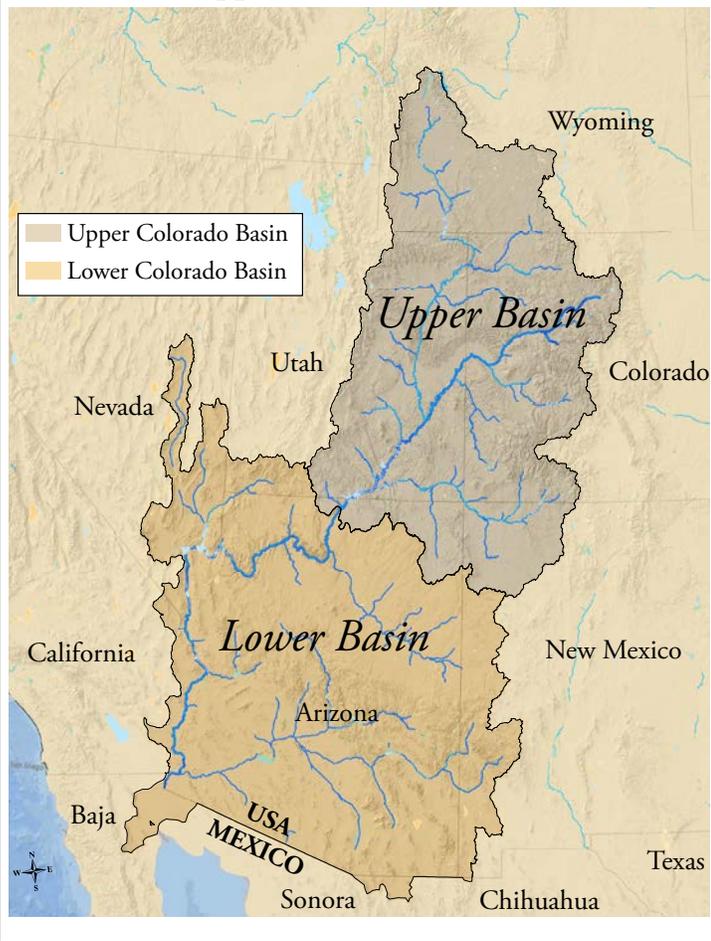
Diversion and Apportionment

With such an immense and diverse set of laws governing this river system, it is helpful to separate and group together those rulings that attempt to deal with similar issues. The first set of directives affecting the waters of the Colorado River look almost exclusively at the erection of diversion structures and issues of apportionment. The first of these came into effect in 1902 when Congress passed the Newlands, or Reclamation Act. Under this act “...all monies received from the sale and disposal of public lands in [the West]... [would be] set aside, and appropriated as a special fund in the Treasury to be known as the ‘reclamation fund.’” These funds were to be used in the examination and survey for the construction of irrigation works for “...the development of waters for the reclamation of arid and semi-arid lands in the said States and territories.”¹⁸ This act funded some of the first irrigation projects for the arid lands of 20 states in the American West, including the Yuma Reclamation Project, the first diversion structure and reclamation project on the Colorado River. In 1920, this initial push for development was renewed with the passage of the Kincaid Act (41 Stat. 600). The Kincaid Act directed the Secretary of the Interior to make a full and comprehensive study and to report on the possible diversion and uses of the waters of the Colorado River,¹⁹ thus paving the way for what was to come: massive human constructs of water impoundment, diversion, and use.

The enthusiasm for putting this water to work continued into the 1920s, when in the course of only ten years, the foundation on which the Law of the River operates was developed. The year 1922 proved to be a landmark year with the adoption of the Colorado River Compact, as well as the rendering of the final opinion of the Supreme Court in the

case of *Wyoming v. Colorado* (259 U.S. 419). *Wyoming v. Colorado*, while affecting the way the basin was managed, extended beyond this limited region by upholding the doctrine of prior appropriation regardless of state lines.²⁰ This decision issued on June 5, 1922, along with the fear that California would gain senior rights to an inequitable share of the basin's waters restricting Upper Basin use in the future, prompted the basin states to begin negotiations for, and finalize the Colorado River Compact on November 24 of that same year. The Colorado River Compact is regularly recognized as the cornerstone of the Law of the River. The Compact negotiations were riddled with dispute and in the end were saved only by the brokering of then Secretary of Commerce Herbert Hoover. Arizona held out as a signatory until 1944.

Figure 4: Colorado River Basin Map divided into Upper and Lower Basin

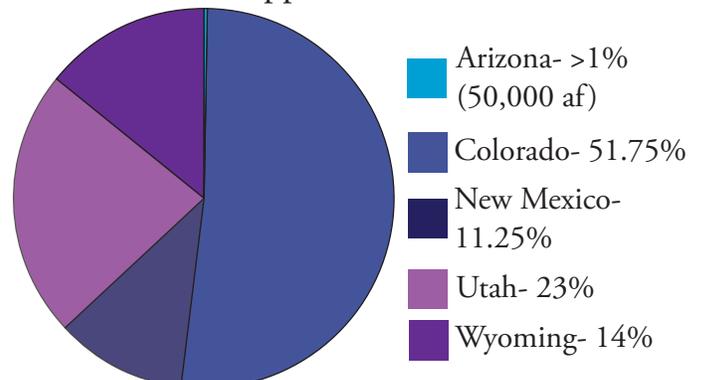


Although the Compact did not satisfy all of the original intents, it did "...provide for the equitable division and apportionment of the use of the waters of the Colorado River System."²¹ Using estimated average annual flows, it apportions a total of 15 maf among the seven basin states, granting the Upper and Lower Basins the "exclusive beneficial consumptive use of 7.5 maf per annum," and with the Lower Basin given rights to an additional 1 maf per annum.²² The Compact also states that the Upper Division is not to cause the flow of the river at Lee's Ferry, Arizona- the arbitrary dividing line between Upper and Lower Basin as established

by the compact as depicted in **Figure 4** -to be depleted below an aggregate of 75 maf over any ten-year period.²³ Although the Colorado River flowed through the United Mexican States into the Gulf of California, no Mexican representative was invited to take part in the Compact negotiations, nor was any water apportioned to Mexico. It was stated, however, that if the U.S. was to allow Mexico any rights to these waters, that water would be supplied first from any surpluses and if that proved insufficient, the deficiency would be shared by both Upper and Lower Basins.²⁴ The Colorado River Compact has never been amended in 89 years.

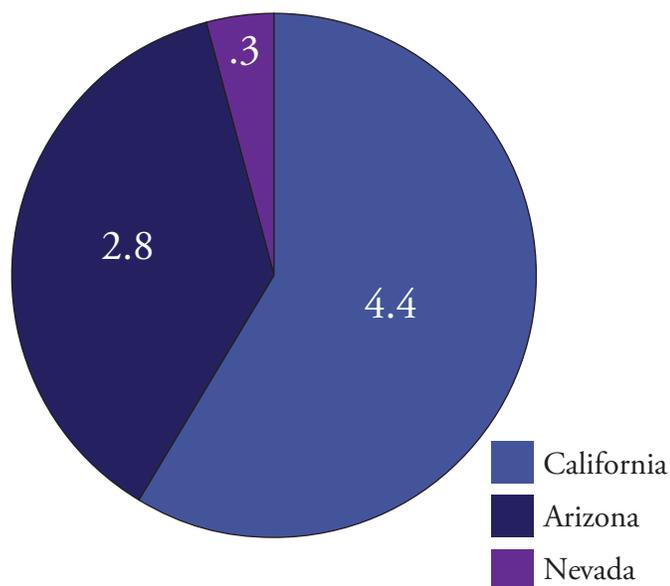
The Boulder Canyon Project Act, passed in 1928, authorized the construction of Boulder (Hoover) Dam and allowed the Lower Basin states of Arizona, California, and Nevada to use the stored water under contract with the United States.²⁵ It apportioned 300,000 af to the state of Nevada, 2.8 maf to the state of Arizona, and limited California to 4.4 maf per year, with Arizona and California allowed half of any surplus waters.²⁶ Arizona was also given exclusive rights to the Gila River.²⁷ Despite continued efforts by the states, such as the 1929 California Limitation Act (where California agreed to meet the obligations placed on it under the Boulder Canyon Project Act) and the 1931 California Seven-Party Agreement (where California listed the relative priorities of rights among the major water users in that state) the division of Lower Basin water shares was disputed until 1963 when it was finally settled in *Arizona v. California* (373 U.S. 546). Twenty years later, the Upper Basin states looked to do the same in terms of quantifying individual allocations for states; and did so with far more success, under the Upper Colorado River Basin Compact of 1948. This compact divided the 7.5 maf designated to the Upper Basin granting Colorado 51.75%, New Mexico 11.25%, Utah 23%, Wyoming 14% and Arizona 50,000 af per year.²⁸ The compact also reemphasizes the Upper Basin's delivery obligation in Article IV by providing principles that will guide the curtailment of water use by the Upper Basin so as not to deplete the flow at Lee's Ferry below that which is required under section III of the Colorado River Compact.²⁹ The Upper Basin Compact is an example of a well-thought-out system of allocations. **Figure 5** highlights the exact apportionments granted to each Upper Basin state under the Upper Colorado River Basin Compact.

Figure 5: Upper Colorado River Basin Apportionments



By 1963, most allocation issues had been resolved among the seven basin states. The Supreme Court Case, *Arizona v. California* (373 U.S. 546), put the last of those issues to rest. This case revolved almost exclusively around interpreting the Boulder Canyon Project Act of 1928. The Supreme Court's opinion, delivered by Justice Black, made more than a few determinations. First it was confirmed that Congress had allocated Colorado River water in the Boulder Canyon Project Act, giving 4.4 maf to California, 2.8 maf to Arizona, and 0.3 maf to Nevada, with any surplus being divided equally between California and Arizona.³⁰ **Figure 6** presents the finalized apportionments granted to each Lower Basin state. The Court, in response to Arizona's continued claim that it had a private right to the waters of the Gila River, also determined states have the exclusive rights to those tributaries originating within their boundaries, but designated the Secretary of the Interior as "water master" for the lower main stem, with the power to allocate water in times of shortage.³¹ Furthermore, the Court decision built upon the progress made in *Winters v. United States* (207 U.S. 564), stating that Indian reservations along the Colorado River have rights to use approximately 1.0 maf from the river, the uses to be counted against the shares allocated to the states in which the reservations are located.

Figure 6: Lower Colorado River Basin Apportionments (maf)



While the preceding discussion of laws and court decisions highlights the early diversion and apportionment laws put into place, it is important to note that there are other stakeholders up to the 1940s who had little or no say in the struggle for water rights. Aside from the brief mention of Mexico in both the 1922 Colorado River Compact and the 1928 Boulder Canyon Project Act, there was only one serious attempt to include Mexico's interests in the discussion of allocation, and it did not occur until 1944. In November of that year, the Mexican Water Treaty (59 Stat. 1219) was signed in Washington, D.C. This treaty was created in an effort to reserve for Mexico the proper quantities of water they were entitled to from both the Colorado and Rio Grande Rivers.

The section of the treaty regarding the waters of the Colorado is all that interests us here. The accord guarantees Mexico 1.5 maf per year and in times of surplus no more than 1.7 maf.³² This statement is qualified later on in Article 10 subparagraph (b), stating that "In the event of extraordinary drought... the water allotted to Mexico... will be reduced in the same proportion as consumptive use in the United States."³³ Moreover, the treaty makes no mention of water quality, remarking on neither sediment nor salinity issues.

With so many competing and growing interests and a variable water supply, it became evident that more water was necessary. While augmenting supply by constructing large trans-basin diversions has never been out of the question, those entrusted with the task of increasing available water had a more reasonable solution- dams.

Storage: Troughs for the Thirsty

Until 1956, the Upper Basin had failed to obtain any funding for the installation of any form of water storage along the Colorado. In fact, the only major dam on the river up to that point was the Hoover Dam, the construction of which was completed in 1936. Twenty years later the Colorado River Storage Project Act (70 Stat. 105) (CRSP) was enacted, authorizing the construction of Glen Canyon, Flaming Gorge, Navajo and Curecanti dams "In order to initiate the comprehensive development of the water resources of the Upper Colorado River Basin..." and "...[make] it possible for the states of the Upper Basin to utilize...the apportionments made to and among them in the Colorado River Compact and the Upper Colorado River Basin Compact..."³⁴ The new units allowed for river regulation, power production, and irrigation in the Upper Basin. Glen Canyon Dam, in particular, was installed as an insurance measure to make sure the Upper Basin could meet their delivery obligation to the Lower Basin. This act marked the beginning of a search for additional water.

The 1962 Filling Criteria for Lakes Powell and Mead followed the passage of the CRSP and was responsible for dictating how Hoover and Glen Canyon Dams were to operate during the filling period, or until Lake Powell reached elevation 3700 and Lake Mead's storage was simultaneously at or above elevation 1146.³⁵ It also prohibited the diminution of Lake Powell below elevation 3490 and Lake Mead below elevation 1123. (These elevation limits were to be surpassed in years to come.)³⁶ The coordinated and integrated operation of Lakes Powell and Mead pointed towards an early move in the direction of holistic management. These filling criteria were latter expanded upon in 1970 with the creation of the Criteria for Coordinated Long-Range Operation of Colorado River Reservoirs, which provided for the coordinated operation of reservoirs in the Upper and Lower Basins and set conditions for water releases from Lakes Powell and Mead in normal, surplus, and shortage years.³⁷

The 1968 Colorado River Basin Project Act built upon the CRSP and Filling Criteria in the effort to meet the future water needs of the basin. The object of the act was to "...provide a program for the further comprehensive development of the water resources of the Colorado River Basin and for use in the Upper as well as in the Lower Colorado River

Basin.”³⁸ To accomplish this task, the Act authorized the construction of the Central Arizona Project (CAP), an initiative pursued by Arizona to transport water from the Colorado River to southern Arizona, including the major metropolitan areas of Phoenix and Tucson. It is currently the largest single source of “renewable” water supplies in the state, transporting close to 1.5 maf a year into Arizona.³⁹ Approval for the project was granted only after assurance that in a time of shortage California would maintain priority over the CAP. The Basin Project Act led to the creation of the Criteria for Long-Range Operation of Colorado River Reservoirs in 1970. Also worth noting is Congress’s declaration that “...the satisfaction of the requirements of the Mexican Water Treaty from the Colorado River constitute a national obligation....”⁴⁰ This is one of the first times the United States as a country recognized its water delivery commitment to Mexico. The Basin Project Act was one of the last pieces of legislation to authorize a major water development initiative.

Water Quality Counts

With the push for increased development of the waters subsiding, new issues rose into the limelight, and in 1965 water quality became an international issue. The International Boundary and Water Commission (IBWC) Minute No. 218 was signed in March of that year. Its purpose was to consider measures to reach a permanent and effective solution to the salinity problem in Mexico. This minute recommended the United States construct a bypass channel from the Wellton-Mohawk Irrigation District into Mexico to deposit irrigation runoff- the source of the excessive salinity- below Morelos Dam.⁴¹ In this manner those flows, which were contributing most directly to the increased Colorado River salinity levels, were excluded from the delivery to Mexico. In 1972, Minute 218 was replaced by Minute 241, which now required those waters excluded from Mexico’s delivery to be replaced by substituting in an equal quantity of other waters.⁴²

A more permanent solution to the Lower Colorado River salinity issue was reached one year later in 1973 with the creation of Minute 242. With the addition of this Minute,⁴³ the United States is required to adopt measures to assure that Mexico receives water with an average salinity of no more than 115 parts per million (ppm) \pm 30 ppm over the average annual salinity at Imperial Dam.⁴⁴ This stipulation, however, applies only to those 1.36 maf of water delivered through Morelos Dam and not to the additional 140,000 af delivered via the southern boundary delivery at San Luis. Such an explicit directive regarding water quality had to this point been unheard of.

Pursuant to Minute 242, the Colorado River Basin Salinity Control Act was passed in 1974, authorizing a number of desalination and salinity control projects including the construction of a major desalination plant in Yuma, Arizona.⁴⁵ Unlike many of the previous IBWC Minutes the Salinity Control Act looks to improve “...the quality of water available in the Colorado River for use in the United States...” as well as in Mexico.⁴⁶ Salinity and water quality, in general, were being seen as, if not priorities, then at least issues that needed remedying.

What About the Environment?

The modern environmental movement began in the U.S. in the mid-1960s, and the rise of environmental concern for the Colorado River followed in the 1980s. With basic apportionment and storage issues out of the way, and more interest groups intent on having their voices heard, environmental concerns took on a more prominent role in the legislative history of the basin. The commencement of the Glen Canyon Environmental Studies (GCES) in 1982 marked this transition. Glen Canyon Dam had been constructed prior to the passage of the National Environmental Policy Act of 1969, and therefore did not have a formal environmental impact statement (EIS) prepared during the proposal period.⁴⁷ As a result, there was little or no monitoring being done on the environmental impacts the dam was having on downstream riparian zones such as those in Glen, Marble, and the Grand Canyons.⁴⁸ The study program reported in its findings that the operation of Glen Canyon Dam was and would continue to affect downstream environments.⁴⁹ In response to such findings, subsequent monitoring and scientific programs were developed in an attempt to mitigate these damages.

The GCES program was followed in 1983 by the La Paz Agreement. This agreement between the United States and Mexico marked a new step in international relations as the two countries recognized “the importance of healthful environment to the long-term economic and social well-being of present and future generations of each country...”⁵⁰ and agreed to cooperate to protect the environment in the border area. The agreement would “establish the basis for cooperation between the Parties for the protection, improvement and conservation of the environment and the problems which affect it.”⁵¹ It also addressed pollution control and prevention. Although it only targeted the limitrophe region,⁵² it represented a significant step in terms of environmental protection along the Colorado River.

Similar to the La Paz Agreement, the Grand Canyon Protection Act of 1992 looked to resolve environmental issues in the basin by targeting a specific area for protection. It requires the Secretary of the Interior to operate Glen Canyon Dam “in such a manner as to protect, mitigate adverse impacts to, and improve the values for which Grand Canyon National Park and Glen Canyon National Recreation Area were established....”⁵³ It goes on to define a new set of operating criteria for Glen Canyon Dam and calls for the completion of a Glen Canyon EIS.⁵⁴ The Grand Canyon Protection Act and the resulting 1995 EIS served as the guiding documents for the Glen Canyon Adaptive Management Program implemented in 1996, which required modification to Glen Canyon operations and established a participatory stakeholder group and ecological monitoring program.⁵⁵

These few programs and acts provide only a specific supplementary role to the larger pieces of legislation, such as NEPA, the Clean Air Act, and the Endangered Species Act that play a much larger role in the protection of the river environment. The importance of these larger acts will be discussed in increased detail later in this section.

Surplus, Drought, and Mexico - Modern Challenges

The first decade of the twenty-first century has presented the Colorado River Basin with its fair share of trials and tribulations, leaving only one thing certain, uncertainty. In 2003, the Interim Surplus Guidelines for the basin were adopted. They recognized the increased demand for surplus water in the Lower Basin and the need for more specific criteria to assist the Secretary in making the annual surplus determinations. The guidelines are used annually to distinguish between normal, shortage, and surplus conditions.⁵⁶ The surplus conditions are broken down into four subsections, each dictating what actions are to be taken given various levels of surplus. Under all conditions the surplus waters are available for use by Arizona, California, and Nevada.⁵⁷

In 1999, coinciding with the development of the Surplus Guidelines, began one of the worst droughts in recent basin history. Water years 2000-2005 represent the driest five-year period in over 100 years of record keeping, with the 2002 inflow into Lake Powell being the lowest ever recorded since it began filling in 1963.⁵⁸ Such an unprecedented reduction in flows prompted the creation of the Interim Shortage Guidelines in 2007. The Shortage Guidelines, based on the preferred alternative reviewed in the Final EIS for the Guidelines, provide for the adoption of specific interim guidelines for Lower Basin shortages and coordinated operations of Lakes Powell and Mead. Normal, shortage, and surplus conditions for Lake Mead are described in more detail in **Figure 7**. The coordinated operations of Lakes Powell and Mead are illustrated in **Figure 8**. This figure shows the elevation in feet

Figure 7: Normal, Shortage, and Surplus levels for Lakes Powell and Mead based on Shortage Guidelines

Condition	Lake Mead Water Elevation
Surplus	<1,145 feet
Normal	1,075-1,145 feet
Shortage	>1,075 feet

Source: U.S. Bureau of Reclamation

of water and the corresponding live storage in maf of Lake Mead and the associated delivery that will take place given those specific conditions. It also illustrates the elevation and live storage of Lake Powell along with the release amounts that correspond with those specific levels or tiers. The levels of Lakes Mead and Powell are matched in this table and represent not only the conditions in Lake Powell that call for specific releases, but also the levels in Lake Mead that also necessitate a certain release from Lake Powell. It is in this way that the two reservoirs are operated in concert. The Shortage Guidelines also encourage the development of Intentionally Created Surplus (ICS), as a form of augmentation and conservation. "ICS" water is defined as water that has been conserved through extraordinary conservation measures, such as land fallowing.⁵⁹ It is anticipated that such development could yield 2.1-4.2 maf of additional ICS water.⁶⁰ The combined actions of coordinated dam operations and ICS creation should allow the basin to better deal with periods of drought like the present one.

Figure 8: Coordinated operations of Lakes Powell and Mead according to the 2007 Interim Guidelines

Lake Powell			Lake Mead		
Elevation (feet)	Operation According to the 2007 Interim Guidelines	Live Storage (maf) ¹	Elevation (feet)	Operation According to the 2007 Interim Guidelines	Live Storage (maf) ¹
3,700	Equalization Tier Equalize, avoid spills or release 8.23 maf	24.3	1,220	Flood Control Surplus or Quantified Surplus Condition	25.9
3,636- 3,666 (2008-2026)	Upper Elevation Balancing Tier³ Release 8.23 maf; if Lake Mead < 1,075 feet, balance contents with a min/max release of 7.0 and 9.0 maf	15.5 - 19.3 (2008 - 2026)	1,200 (approx.) ²	Domestic Surplus or ICS Surplus Condition Deliver > 7.5 maf	22.9 (approx) ²
			1,145	Normal or ICS Surplus Condition Deliver ≥ 7.5 maf	15.9
3,575	Mid-Elevation Release Tier Release 7.48 maf; if Lake Mead < 1,025 feet, release 8.23 maf	9.5	1,105	Shortage Condition Deliver 7.167 ⁴ maf	11.9
3,525	Lower Elevation Balancing Tier Balance contents with a min/max release of 7.0 and 9.5 maf	5.9	1,075	Shortage Condition Deliver 7.083 ⁵ maf	9.4
3,490		4.0	1,050	Shortage Condition Deliver 7.0 ⁶ maf	7.5
3,370		0	1,025	Shortage Condition Further measures may be undertaken ⁷	5.8
			1,000		4.3
			895		0

Diagram not to scale

¹Acronym for million acre-feet

²This elevation is shown as approximate as it is determined each year by considering several factors including Lake Powell and Lake Mead storage, projected Upper Basin and Lower Basin demands, and an assumed inflow.

³Subject to April adjustments which may result in a release according to the Equalization Tier.

⁴Of which 2.48 maf is apportioned to Arizona, 4.4 maf to California, and 0.287 maf to Nevada

⁵Of which 2.40 maf is apportioned to Arizona, 4.4 maf to California, and 0.283 maf to Nevada

⁶Of which 2.32 maf is apportioned to Arizona, 4.4 maf to California, and 0.280 maf to Nevada

⁷Whenever Lake Mead is below elevation 1,025 feet, the Secretary shall consider whether hydrologic conditions together with anticipated deliveries to the Lower Division States and Mexico is likely to cause the elevation at Lake Mead to fall below 1,000 feet. Such consideration, in consultation with the Basin States, may result in the undertaking of further measures, consent with applicable Federal Law.

Source: Bureau of Reclamation



In light of current conditions, and recognizing the possible affects of climate change, the SECURE Water Act was enacted in 2009. The SECURE Water Act provides authority for federal water and science agencies to work with state and local water managers to plan for climate change and other threats to water supplies. In 2010, Secretarial Order 3297 expanded upon the SECURE Water Act, establishing the WaterSMART program, as well as the basin study program. Together these programs look to pursue a sustainable water supply for the nation by establishing a framework to provide federal leadership and assistance on efficient use of water, sustainable use of natural resources, and the coordination of various conservation activities.⁶¹ The SECURE Water Act and WaterSMART program are unique in that they focus on sustainability in an attempt to secure water for future generations. They are two of the latest sustainability initiatives being pursued not only in the Colorado River Basin but also nationwide.

In the last ten years the basin has been subject to legislation regarding surplus, shortage, and conservation for the future. Most recently, however, the subject at hand is once again Mexico. In 2010, the IBWC Minutes 316, 317, and 318 were passed. Minute 316 addressed the issue of the possible effects of the pilot run of the Yuma Desalination Plant on the Cienega de Santa Clara.⁶² Minute 317 set up a conceptual framework for a bi-national council to assist in cooperative actions between the United States and Mexico.⁶³ Minute 318 attempted to mitigate the effects of the April 2010 earthquake in the Mexicali Valley by allowing Mexico to curtail its water supplies from the United States by storing unused water north of the Morelos Dam in U.S. facilities.⁶⁴ These international minutes represent growth in U.S.-Mexico relations and illustrate first-hand the cooperative potential that lies beneath the desire for more water.

The above discussion is but an overview of the multitude of laws, regulations, and court opinions that govern the Colorado River Basin. This compilation known as the “Law of the River” has come to dictate how the Colorado River operates and is managed. More so than precipitation patterns and seasonal snowmelt, human laws and resulting actions largely define conditions upon which the basin’s survival depends.

The Elephant in the Room: Larger Scale Federal Legislation

The Law of the River has its foundations in a relatively uncontested set of laws, treaties and court decisions, each dealing specifically with the river in terms of allocation, quantity, or quality. It is appropriate to look beyond these established laws that are relatively narrow in scope, and identify those larger federal acts that also have a major impact on how this basin is managed. It seems almost obvious that a complete picture of the “Law of the River” cannot be painted without such information.

Some of the pieces of legislation included in the following section do not currently play a significant role in the management of the Colorado River. They have been included

however because they represent potential avenues through which current policies could be forced to change and could affect the way the river is administered in the future.

The Wilderness Act is one of those acts that currently has little influence on management decisions in the Colorado River Basin, but could at some point in the future. Passed in 1964, the Wilderness Act set aside given tracts of land “to assure that an increasing population, accompanied by expanding settlement and growing mechanization, does not occupy and modify all areas within the United States and its possessions, leaving no lands designated for preservation and protection...”⁶⁵ It allowed Congress to set aside designated lands to remain unimpaired for future use in their primeval state. Section 4(b) of the act states that each agency administering a wilderness area is responsible for administering that area for such other purposes for which it may have been established. Following the Winter’s Doctrine, which established federally reserved water rights for Native American tribes, and the McCarran Amendment, which requires the U.S. to participate in state, general adjudication proceedings to establish federal water rights, one could argue that minimum instream flows are necessary to uphold Section 4(b) of the Wilderness Act. Therefore, a wilderness area could have federally reserved water rights to secure instream flows. In order to affect the Colorado River, however, sections of the river would have to be declared wilderness areas. It is evident that this is a stretch in terms of influencing decisions made regarding the basin; however, it is a route with at least a touch of promise.

The Wild and Scenic Rivers Act of 1968 could be applied in a similar fashion to enhance the protection of the Colorado River. The Wild and Scenic Rivers Act aims to protect for current and future generations select rivers with “outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, and other similar values” in free flowing condition.⁶⁶ For a river to qualify, the Act stipulates the river be free flowing without any diversion impoundment or other modification structures, possess one of the outstanding values, and be in the public’s interest to protect.⁶⁷ Currently only three tributaries to the Colorado are designated as wild and scenic rivers under the act; Fossil Creek and the Verde River in Arizona and the tributaries of the Virgin River in southwestern Utah.⁶⁸ Unfortunately, none of these tributaries has a significant impact on the Colorado River and therefore their protection under the Act does little to improve its quality. However, there is promise in the legislation itself. If more influential tributaries were to be classified as wild and scenic rivers, that extended protection could force water quality standards to be altered throughout the basin. However, the Colorado River and its tributaries are some of the most highly regulated waterways in the world. It would be hard for any major tributary in the basin to meet the strict qualification standards imposed by the act.

The National Environmental Policy Act (NEPA), signed into law by President Nixon in 1970, directed the federal government to “use all practicable means and measures... to create and maintain conditions under which man and nature

can exist in productive harmony.”⁶⁹ Looking past this lofty and rather ambitious goal, NEPA became a successful piece of legislation through its requirement that all federal agencies prepare an environmental impact statement (EIS) on any major federal actions significantly affecting the quality of the environment.⁷⁰ In the case of the Colorado River, for example, NEPA would require an EIS to be prepared prior to the construction of a dam or other diversion structure. All of the major dams and diversion structures built on the Colorado were approved and completed prior to the passage of this legislation. This does not mean, however, that it has become irrelevant in respect to the river. NEPA continues to influence what is and is not approved along and around the Colorado River. The operation of the Yuma Desalination Plant provides a firsthand look at NEPA at work today. A pilot run was completed from 2010-2011, pending the findings of an environmental assessment (EA) that resulted in IBWC Minute 316 in which the United States, Mexico, and NGOs provided the water necessary to sustain flows to the Cienega de Santa Clara. The plant is not currently in operation; however, if it were to be put back on line another EA or EIS would be required under NEPA to evaluate the effects on the environment.

Another act of significance to the Colorado River Basin is the Federal Water Pollution Control Act, or Clean Water Act (CWA). Enacted in 1972, the CWA bans the unpermitted discharge of pollutants into surface water without a permit. The CWA established the National Pollutant Discharge Elimination System (NPDES), a national permit program, and

requires dischargers to apply technology-based controls.⁷¹ The CWA is the predominant piece of legislation regarding water quality of the waters of the United States. It has protected the quality of the Colorado River since its entrance into law. The CWA regulates point source pollution extremely well, but is at a loss when it comes to non-point source pollution. Thus, any source of water pollution that does not meet the legal definition of “point source” in section 502(14) of the Clean Water Act (i.e., agricultural runoff) is not required to have a permit.⁷² A 1987 amendment to the act addresses the need for greater leadership in addressing non-point source pollution; however, as of today non-point sources continue to impair the waters of the Colorado.

The Endangered Species Act (ESA), passed in 1973, possesses the power to become one of the most formidable acts in terms of environmental protection not only in the basin but also across the country.⁷³ The ESA defines species in two categories, those that are “threatened” and those that are “endangered.” Those species listed are then published in the Federal Register and reviewed every five years. The qualification of the species dictates how much and what kind of protection they are to receive. Under the ESA § 9, all entities are prohibited from “taking” any endangered species, which includes significantly modifying a species habitat; and under § 7, all federal agencies are required to insure that their actions are “not likely to jeopardize the continued existence of any endangered species or threatened species.”⁷⁴ Though the ESA contains many more stipulations, these mandates are



most applicable to the Colorado River. The river itself is currently home to four endangered fish species; the bonytail chub, razorback sucker, humpback chub, and Colorado River squawfish, with hundreds of other threatened or endangered species calling the basin home.⁷⁵ As a result, the ESA has the ability to greatly limit actions taken by federal agencies along the river.⁷⁶ Although it has not been done yet, a favorable interpretation of §9 of the ESA by the court could in the future require mandatory instream flows to ensure that the habitats of these fish are not impaired to the point where it could qualify as “taking.”

While high salinity and sediment counts present the greatest environmental problems on the river, the leaching of heavy metals and other toxins from abandoned mining facilities poses a threat to the quality of the water as well. The Colorado River Basin has always been an area of active mining with rich reserves of coal, natural gas, and uranium. The byproducts of these activities include highly toxic contaminants that, if improperly disposed of, can leach into water systems damaging the quality of the water itself and harming those who rely on it. Many of these sites along the river have been abandoned over the years, leaving piles of tailings exposed to the elements. The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), commonly known as Superfund, was passed in 1980 as a way to deal with contaminated sites even if no liable party could be found. CERCLA established a strict liability system for releases of hazardous substances and developed a “superfund” program (now defunct), to assist with remediation costs.⁷⁷

Through CERCLA many of the once contaminated locations have been restored. In fact, only one major uranium site remains along the river in Moab, Utah, and remediation efforts are currently underway.⁷⁸ In many ways CERCLA is reactive. It attempts to assign liability to a responsible party and where none can be found allows the EPA to use the resources at hand to assist in the clean-up. In such cases the land has already been impaired. However, it can also be proactive. Stringent liability standards and the harsh criminal penalties that accompany them work as a deterrent for future generation of hazardous waste or illegal dumping. Both in its retroactive and preventative form, CERCLA has worked well to protect not only the Colorado River but also lands throughout the United States.

The “Law of the River,” in the traditional sense and as seen by many, includes the Colorado River Compact, the Boulder Canyon Project Act, the California Seven-Party Agreement, the Mexican Water Treaty, the Upper Colorado River Basin Compact, the Colorado River Storage Project Act, the opinion in *Arizona v. California*, the Colorado River Basin Project Act, the Criteria for Coordinated Long-Range Operation of Colorado River Reservoirs, IBWC Minute 242, and the Salinity Control Act.⁷⁹ However, by including only these aforementioned acts and opinions, you are limiting your view of the law, and leaving out some of the guiding principles.

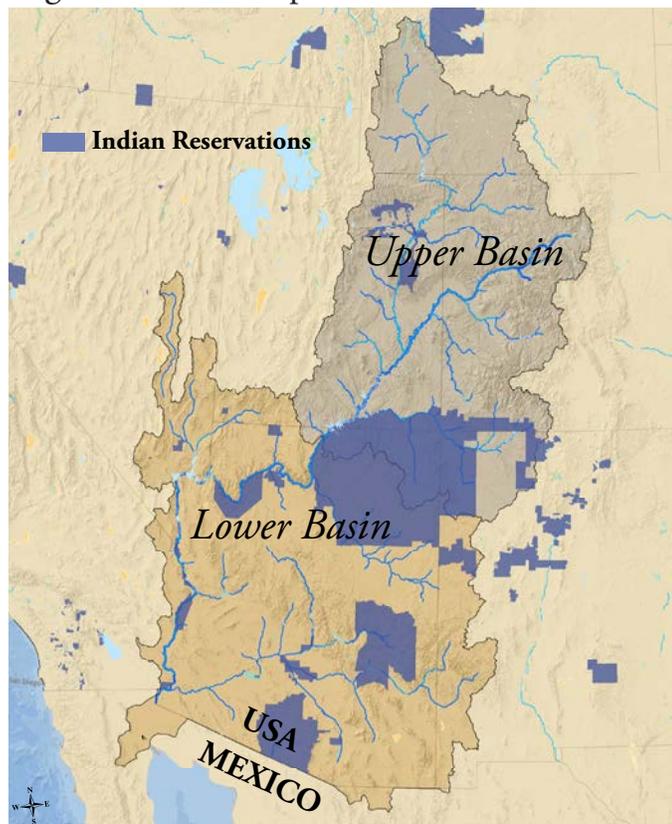
Challenges to a Sustainable Basin: Major Issues

Despite this extensive set of laws, opinions, minutes, and provisions, inequities and disputes remain an ever-present feature of the Colorado River Basin. The twenty-first century presents some real and imminent threats to the basin. The waters of the Colorado are already over-apportioned and current water shortages will be compounded by predictions of decreased regional precipitation, as well as soaring population growth trends. Currently there are no flows reserved for the environment; Native American reservations are struggling to secure the water they need; Mexico faces issues of water quality and quantity; the Upper Basin continues to struggle over the question of whether they have a delivery obligation, or whether there is an over-arching obligation not to deplete. All of this hinges on one big question: Is the “Law of the River Basin” flexible enough to deal with these new challenges?

Native American Water Rights Issues

There are 34 Native American reservations situated within the Colorado River Basin including the Navajo Nation, the largest in the United States. **Figure 9** depicts all major Native American reservations within the Colorado River Basin. The establishment of these reservations predates by decades formal decisions on “dividing the waters” and their inhabitants have been struggling to attain the amount of water they need. The lack of useable water has led to harsh living conditions in many regions. In fact, the highest rates of waterborne illness in the United States are found among Native tribes.⁸⁰ Many tribes have, and continue to fight for, increased apportionments; however, the root of this problem may lie in the Law of the River itself.

Figure 9: Basin Map with Indian Reservations



Source: U.S. National Land Atlas Federal and Indian Lands Areas



John Nestler

Efforts to Include Native Americans: Legislative History

While the “Law of the River” governs the waters of the Colorado in a broad sense, there is a subsection of law that has developed to dictate how these waters will be apportioned to Native American reservations, beginning with the individual reservation treaties signed by tribes throughout the United States. While the treaties differ, they all accomplish a similar task. They transfer rights or lands from Native American tribes to the U.S. and reserve other lands for the tribes. These treaties implicitly look to make farming communities out of the tribes. No treaty explicitly reserves water for these purposes; however, the reserved rights doctrine assumes reservations and public lands that have been set aside should have adequate water to fulfill the purpose for which that land was reserved.⁸¹ While most water rights in the West are based on priority, determined by when water was first put to beneficial use, reserved rights have priority dating back to when those reservations were first established.⁸² This was not legally recognized until *Winters v. United States* in 1908.

The General Allotment, or Dawes Act of 1887, was created in an attempt to parcel reservation lands into individual holdings, with the objective of instilling a sense of property ownership in the Native American community. It was seen as a step towards “civilizing” those once thought of as uncivilized. Under the Dawes Act, each head of a family was granted one-quarter section (160 acres), and each single person or orphan over eighteen was given one-eighth section.⁸³ The idea was that with such expansive lands families would take up farming and grazing practices while simultaneously giving up a nomadic way of life that required large ecosystems. If making reservations into agricultural societies was the intention of the act, would it not seem reasonable to assume that water rights be designated along with the lands? What good does 160 acres do if the “owner” cannot irrigate it? The Supreme Court, in *Winters v. United States*, answered these questions, affirming that it was indeed the intent of Congress to convert

the Native Americans into an agrarian people, and therefore that water was reserved. While this stipulation allows for water to be allocated in the future, it does not address the problem up front and because of that secures no actual water rights for reservations. The Merriam Report, completed in 1928, assessed the economic and social impacts of the Dawes Act and revealed the disastrous outcome of the allotment policy on Indians. As a result the Indian Reorganization Act of 1934 repealed the Dawes Act in an attempt to reduce state influence over Indian resources and eliminate the sale of reservation lands to non-Indians.⁸⁴

In 1905, the opinion delivered by the Supreme Court in the case of *United States v. Winans* was a step in the right direction in terms of securing water rights for Indian reservations. In this case, Lines and Audubon Winans owned a fishing operation on the Columbia River that utilized fish wheels.⁸⁵ The Yakima tribe contested that this operation was depleting their fish supply that had been granted to them in a treaty signed in 1855. The Winans claimed that when Washington became a state, it regained power over all property regardless of existing treaties.⁸⁶ This included those treaties previously made with Native Americans. As a result, the Winans were denying the Yakima their “right of taking fish at all usual and accustomed places in common with the citizens of the territory,” as well as their right to access the fishing grounds.⁸⁷ The Supreme Court ruled that a state entering the union does not rescind previous treaty rights granted to Native Americans and that an individual may not prohibit Native Americans access to those places. Although this case does not explicitly deal with water rights for reservations in the Colorado River Basin, it was an important step in confirming that reservation treaties would be upheld and that the rights granted to tribes under them would be sustained.

The Supreme Court case, *Winters v. United States*, decided in 1908 did address the water issue. The opinion, given by Justice McKenna states, “It was the policy of the

Government, it was the desire of the Indians to change those habits to become a pastoral and civilized people”; “The lands were arid and, without irrigation, were practically valueless”; without the cession of waters the lands would be “... valueless, and civilized communities could not be established thereon.”⁸⁸ Put simply, it was determined that Congress had set aside land for Indians, giving them less land so they would become agrarian and civilized. To take away water rights would be to take away this potential. It could not have been Congress’s intent to leave the tribes destitute and therefore Native American reservations have implied federally-reserved water rights. It was this opinion that entitled reservations to claim an allotment of water.

At the very foundation of the Law of the River lies the Colorado River Compact of 1922. Despite the opinion of the Supreme Court in the Winters case, no tribal representatives were present or even invited to the negotiations of the Compact. The lack of a minority tribal voice is evident from the limited mention of Native American water rights. In fact, Article VII is the only place in the Compact where Indian rights are mentioned. Article VII states, “Nothing in this compact shall be construed as affecting the obligations of the United States of America to Indian tribes.”⁸⁹ In the entire Compact one sentence is given to this issue. In retrospect it appears that the authors of the Compact were either unconcerned or simply ignorant. It is a telling sign that the heart of the Law of the River fails to address the issue of Native American water rights, and is one of the major reasons why this issue persists today.

It was not until 1952 that this issue was again brought up. The McCarran Amendment was a statute passed by

Congress that requires the U.S. to participate in state, general adjudication processes to establish federal water rights. Although Indian reservations are domestic sovereigns, they exist in a fiduciary relationship with the United States government.⁹⁰ In other words, they rely on the federal government for protection of their legal rights. Therefore, although reservations have implied water rights under the reserved rights doctrine, those rights still have to be quantified in state courts. The United States, under the McCarran Amendment, waives its sovereign immunity and takes part in the state adjudication process on behalf of the reservations to quantify those rights. The water that will be transferred to the reservations is a portion of that which has been allocated to the state under the Compact, making reserved water right adjudications highly controversial.

Only in 1963 was a process established for determining what quantities were necessary for reservations. This precedent came out of the opinion given by Justice Black in the Supreme Court case *Arizona v. California*. This case determined that the amount of practicably irrigable acreage (PIA) would set the standard for what was a sufficient amount of water. PIA is defined as that water necessary to fulfill all future, as well as present, needs of the Indian reservations, including enough water to irrigate all lands that are practicably irrigable.⁹¹ The court ruling also resulted in the reservation of nearly 1.0 maf of Colorado River water for the Chemehuevi, Cocopah, Yuma, Colorado River, and Fort Mohave Indian reservations on the lower mainstem of the Colorado.⁹² The principles established in *Arizona v. California* represent the most recent major precedents set in regard to Native American water rights.



Will Stauffer-Norris, The headwaters of the Green River in Wyoming’s Wind River Range

Current Path to Obtaining Water

Through this convoluted legal framework, reservations can supposedly acquire the reserved water rights to which they are entitled. Currently, water right disputes between reservations and states become quantified in one of two ways. The most common approach is through adjudication. This process can be initiated through a suit by the United States against all other water users from a source, or once governmental immunity is waived can be initiated by the United States, submitting itself to the suit by joining voluntarily. The second option is available due to the passage of the McCarran Amendment. Quantification through adjudication frequently utilizes the practicably irrigable acreage standard set in *Arizona v. California*. Seeking quantification in this way poses some serious problems for Native American reservations that wish to gain their water rights. First and foremost it is a painstakingly long process. It requires every water rights holder to go to court to defend his or her right. Each user must prove when he/she first put water to “beneficial use” in order to establish his/her position in the water use order. This means that if a reservation in Arizona wants to quantify their rights on the Colorado River, it would require all users in Arizona of the Colorado to enter into this process. The Navajo Nation, for example, has Upper as well as Lower Basin rights, and rights in Arizona, New Mexico and Utah. Hypothetically, in order to receive their full entitlement, all users from both states and those from the Upper and Lower Basin portions of Arizona would have to appear in court. With so many stakeholders involved, the proceedings would last decades. The adjudication process is slowed down further by various interest groups’ desire to slow the process. Because reservations have federally-reserved rights established at the time of the reservation agreement, their water rights trump almost all other rights in the state. Therefore, it is in no one’s interest, aside from the reservation’s, to quantify the reserved rights.

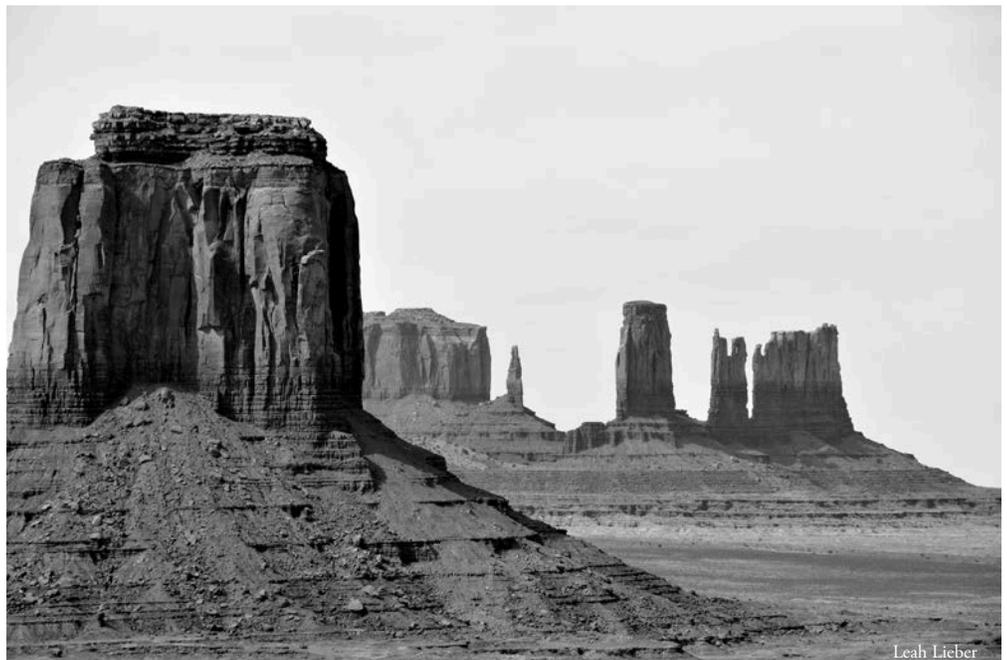
Due to the arduous nature of the adjudication process, many tribes look to avoid it by instead settling their rights in formal agreements with the state. Congress still must approve such agreements; however, such an approach to adjudication can drastically reduce the time, energy, and costs associated with quantification. Such agreements tend to have a much higher rate of success. According to David Getches, from 1982 to 1997, negotiated settlements had been reached with some 20 tribes in 10 states.⁹³ States more readily agree to such settlements because they often result in a reduction of the quantity of water the tribe initially claimed. Tribes benefit from these arrangements as states often provide funding to assist in the development of those waters. In this way tribes not only receive some assured water- though

not the full entitlement- but also receive assistance with the construction of the diversion and transport structures necessary to bring the water onto the reservation.

Issues

While quantification through both adjudication and settlement provide valid avenues for Native Americans to secure their water rights, we still see many reservations with well below adequate water supplies. It is possible to point out four principal barriers to actually recognizing these reserved rights; they include poverty, jurisdictional issues, other parties’ attempts to slow the process down, and a general lack of law pertaining to the subject.⁹⁴

The truth of the matter is that Native American reservations, especially those in the Colorado River Basin, have insufficient funds to properly represent their interests in court and erect the infrastructure necessary to utilize their entitlements. The median earnings in 1999 for all American Indian males (who worked full time, year round) was just under \$29,000, while the median earnings for all males nationwide was over \$37,000 for the same year.⁹⁵ The median earnings for males of the Navajo Reservation, the largest tribe in the Colorado River Basin, fall below both of these averages at \$26,000 a year. Perhaps more telling than median earnings is the poverty rate. In 1999, only 12.4 percent of the total U.S. population was living in poverty compared to 25.7 percent of all American Indians and Alaskan Natives, and 37 percent of all Navajo tribal members. Such extensive poverty represents a serious obstacle in the effort to secure water rights. The adjudication processes not only take a large amount of time but also consume an equally large amount of money in the form of legal expenses. While the U.S. pays for the majority of the legal expenses, reservations will often hire private attorneys as well in order to assure that their interests are properly represented. Even if the quantification settlements are resolved, reservations often lack the funds to construct the infrastructure necessary to transport the water to a location where it can be put to use. As Bidtah Becker, attorney for the Water Rights



Leah Lieber

Unit of the Navajo Nation Department of Justice, stated, “If we weren’t poor we wouldn’t be having these issues.”⁹⁶ She makes a very good point. If more was done in the way of financial assistance for the creation of infrastructure and the hiring of personal attorneys, quantification settlements could be pursued, allowing tribes their full reserved rights and the ability to develop their newly apportioned water.

The lack of wealth is not the only hindrance, however; jurisdictional issues often slow and complicate the process to an even greater extent. Some tribal reservations cross state boundaries and exist in more than one state at a time. This complicates the water adjudication process as it expands the number of parties involved. Nowhere is this issue more visible than in the Navajo Nation. The Navajo Nation Reservation has land in Arizona, New Mexico, and Utah. Because of this, the reservation’s water rights, when quantified, must be made up of portions of each state’s water allocation. **Figure 10** illustrates the multiple jurisdictions crossed into by the Navajo Nation. To complicate matters further the reservation also has claims to both Upper and Lower Basin waters. With so many competing interests it is easy to see why the Navajo Nation has not yet settled all of their water rights disputes. These types of jurisdictional problems could easily have been avoided had tribal representatives been given the opportunity to take part in compact proceedings when the water was

first being allocated. Issues like this will persist if minority interests are not better represented in negotiations over water issues in the Colorado River Basin.

While the adjudication process itself is lengthy, other parties often attempt to slow the process down further. As mentioned before, quantification proceedings require that all individuals with a stake in the river prove their rights in court. Often those with the most junior rights are the ones who suffer from Native American claims. Junior rights holders are subject to the possibility of losing part or all of their water rights. This, in turn, provides them with an incentive to draw out the process. Such a strategy can lead to an out-of-court settlement as opposed to a fulfillment of all claimed water rights, therefore reducing the amount of water being granted to tribes. Although the federal government is legally entrusted with the duty of protecting Native American rights, some claim that government lawyers themselves are not aggressive enough in the courtroom.

Although a lack of wealth, jurisdictional issues, and the interests of other parties all encumber the process, the overarching issue is the general lack of law on the subject. Since the passage of the Dawes Act in 1887, only three major court cases and three major pieces of legislation have affected the way we deal with Native American water rights issues. As Bidtah Becker explains, “There is so little law that most of the time is spent litigating legal questions. This makes it hard to get to the factual issues.”⁹⁷ Bidtah makes a good point with this statement. If you look at any one of the major court cases referred to, whether it be *United States v. Winans*, *Winters v. United States*, or *Arizona v. California*, the majority of the opinions given are dedicated to answering legal questions like, “Does a state entering the union negate previous treaty agreements?”; “What was Congress’s intent in establishing reservations?” and “How do you quantify reserved rights for reservations?”⁹⁸ Aside from *Arizona v. California*, none of these cases allocated any water to reservations. While these cases undoubtedly contributed to progress in the field of Indian water rights, there are still more questions to be answered before the Native Americans can swiftly obtain those rights belonging to them.

Mexican Water Rights Issues

The United States and Mexico share a 1,800-mile border and two major river systems, one of them being the Colorado.⁹⁹ For the last 112 miles of its journey the river passes through Mexico on its way to the Sea of Cortez. Through the creation of infrastructure, such as Morelos Dam and an intricate series of canals, the water is diverted to serve the needs of thousands of people, including the growing metropolitan area of Tijuana. **Figure 11** highlights the major pieces of infrastructure erected in Mexico. Despite a yearly allocation of 1.5 maf, Mexico faces problems similar to those currently being experienced by both the Upper and Lower Basin states where U.S. population growth rates are booming, agricultural production is on the rise, and precipitation events are predicted to decrease. All of this translates into one prominent issue- there’s just not enough water.

Figure 10: Navajo Nation with State, Basin, and other Indian Reservation Boundaries



Source: U.S. National Land Atlas Federal and Indian Lands Areas

Figure 11: Major Mexican Colorado River Infrastructure



Source: Microsoft Bing Maps

Legislative History

Getting Water

Mexican interests, like those of Native American tribes, have been largely ignored for the better part of the last century in regards to water allocations of the Colorado River. In fact, the Colorado River Compact, the cornerstone of the “Law of the River,” mentions Mexico only in passing in article 3(c), which states:

“If, as a matter of international comity, the United States of America shall hereafter recognize in the United States of Mexico any right to the use of any waters of the Colorado River System, such waters shall be supplied first from the waters which are surplus over and above the aggregate of the quantities specified in paragraphs (a) and (b); and if such surplus shall prove insufficient for this purpose, then, the burden of such deficiency shall be equally borne by the Upper Basin and the Lower Basin, and whenever necessary the States of the Upper Division shall deliver at Lee Ferry water to supply one-half of the deficiency so recognized in addition to that provided in paragraph (d).”¹⁰⁰

The phrasing “If America shall recognize in the United States of Mexico any right to the use of water...” is the most telling sign in this article. Not only does the Compact not allocate any water to Mexico, but it also does not even admit that Mexico has a right to any Colorado River water. Furthermore, if in the future the United States does recognize Mexico’s right, they are to receive only surplus waters from the river. Though the Upper and Lower Basins are intended to make up any “deficiency,” it is difficult to foresee a situation in which

those additional waters would be delivered. Again, as was the case with Native American representatives, the exclusion of Mexico from Compact proceedings has only made resolutions down the road more difficult.

It was not until 1944 that Mexico was formally recognized by the United States as having rights to any portion of water whatsoever. The signing of the Mexican Water Treaty that year was a monumental step in U.S.-Mexico relations, and in securing water for Mexico. The Treaty granted Mexico rights to water from both the Colorado and Rio Grande Rivers. It also sets the framework for implementing these measures, establishes the International Boundary and Water Commission (IBWC), and sets priorities for water allocation in the face of drought.¹⁰¹ Section III, article 10(a) guarantees for Mexico an annual quantity of 1.5 maf.¹⁰² Mexico is also entitled to any surplus waters, the total quantity of which, in addition to the guaranteed 1.5 maf, is not to exceed 1.7 maf annually.¹⁰³ Despite the guaranteed allocation to Mexico, the treaty itself is flawed in several ways. First, it gives little thought to future planning of water resources. The ideas of sustainability and an obligation to future generations were not of great concern, nor did they even exist, to the drafters of the treaty.¹⁰⁴ Of even greater concern is the glaring absence of any quality provisions. Not once in the treaty are there any guidelines to ensure the water that arrives in Mexico is of usable quality.¹⁰⁵ The treaty does possess a positive attribute in that it was left relatively general, granting future interpreters greater flexibility and discretion.¹⁰⁶

Quality Control

Beginning in the 1960s irrigation projects in the United States began to drastically increase salinity levels in the Colorado, impairing the water that made its way to Mexico. At one point salinity levels were so high they began to kill a portion of the Mexican crops.¹⁰⁷ In response to this problem the IBWC passed Minute 218 in 1965. Minute 218 “...to consider measures ‘to reach a permanent and effective solution’ of the problem of salinity of the waters of the Colorado River which reach Mexico.”¹⁰⁸ Highly saline drainage water from the Wellton-Mohawk agricultural district in Arizona was being introduced into the Colorado River just miles before reaching Mexico. As a result the Minute recommended the U.S. construct an extension to the current drainage canal that would allow these waters to be discharged below Morelos Dam.¹⁰⁹ Minute 241 replaced Minute 218 in 1972 when Mexico contested that they were not seeing the improvement in water quality they had expected. Minute 241 directed the United States to discharge Wellton-Mohawk water below Morelos Dam at the rate of 118,000 af per year and replace the diverted waters with those of an equal quantity and lower salinity.¹¹⁰

IBWC Minute 242 was the first addendum to the Mexican Water Treaty that really generated the results both parties were looking for. Minute 242 requires the United States to adopt measures to assure that the water that arrives at Morelos Dam has an average salinity of no more than 115 ppm \pm 30ppm over the average annual salinity at Imperial Dam.¹¹¹ This stipulation, however, applies only to those 1.36

maf of water delivered through Morelos Dam and not to the additional 140,000 af delivered via the southern boundary delivery at San Luis. To assist in meeting these obligations, Minute 242 recommended the extension of the Wellton-Mohawk bypass drain, and the construction of an additional bypass drain that would feed into the Santa Clara Slough.¹¹²

In 1974, pursuant to Minute 242, the Colorado River Basin Salinity Control Act was passed. Referred to above in the “Law of the River,” the Salinity Control Act authorized the construction of the Yuma Desalination Plant in Arizona in order to treat the bulk of the Wellton-Mohawk wastewater. It also called for the lining of the Coachella Canal in California and the construction of a well field along the southern border of the United States.¹¹³ While the act established measures to reduce salinity in the river in many ways, it was more of an attempt by the U.S. to reclaim “wasted” water. The Yuma Desalination Plant would allow for Wellton-Mohawk water to be put to beneficial use in the United States rather than being discharged into the slough in Mexico; the lining of the canal would eliminate seepage to Mexico; and the construction of a well field would allow the U.S. to extract whatever water aquifers on the U.S.-Mexico border may contain. In actuality, the authorization of many of these projects would come to inspire problems in the future.

Environmental Protection

Another critical feature absent from both the Colorado River Compact and Mexican Water Treaty is the protection and preservation of the environment in Mexico. Article 3 of the Treaty lists the priority of beneficial uses citing (1) domestic and municipal uses, (2) agriculture and stock-raising, (3) electric power, (4) other industrial uses, (5) navigation, (6) fishing and hunting, and (7) any other beneficial uses which may be determined by the Commission.¹¹⁴ Nowhere are ecological questions referenced. In an attempt to remedy this issue, the La Paz Agreement was adopted in 1983 to “... establish the basis for cooperation between the Parties for the protection, improvement and conservation of the environment and the problems which affect it, as well as to agree on necessary measures to prevent and control pollution in the border area.”

The issue of ecosystem preservation was not formally considered again until 2000 and the creation of Minute 306. Minute 306 was a conceptual framework for cooperation between the United States and Mexico to engage in joint studies that include possible approaches to ensure water for ecological purposes. It prompted the development of current environmental protection and restoration programs such as the Multi-Species Conservation Plan for the Lower Colorado River (MSCP) that attempts to mitigate losses of endangered species that results from poor river management and consumptive uses on the Lower Colorado.¹¹⁵ Efforts by NGOs, as well as other interested parties, have assisted in environmental protection of the region as well. In 2001, the Cocopah Tribe, whose reservation encompasses portions of the limitroph region, provoked talks of creating an international protection area.¹¹⁶ NGOs along with Arizona Fish and Wildlife began efforts to further this concept. The environmental group, Pro

Natura, has been doing its part in Mexico as well. To date, they have secured 5,000 af per year to maintain environmental instream flows and hope to purchase rights for an additional 45,000 af per year.¹¹⁷ Despite the nonexistence of environmental protection measures in either the Colorado River Compact or the Mexican Water Treaty, efforts have been made to ensure the continued proliferation of the riparian ecosystems.

Recent Legislation

In just the past two years an additional three Minutes have been agreed upon illustrating an increase in cooperative efforts. Minute 316, passed in 2010, authorized the pilot run of the Yuma Desalination Plant constructed subsequent to the Salinity Control Act. It looks predominantly at the effects the operation of the plant may have on the Cienega de Santa Clara. The water that created the wetland in 1976 and sustains the wetland today is the wastewater transported from the Wellton-Mohawk District. If the plant is in operation, a portion of that water will be reclaimed and returned to the Colorado River for consumptive use. As a result the wetland is subject to reduced in-flows. To mitigate any harm to the wetland, the United States, Mexico, and various NGOs each arranged to supply 1/3 of the water that would be removed due to YDP operations.¹¹⁸ Minute 316 provides an example of international collaboration and demonstrates the push for environmental protection.

The year 2010 brought with it the creation of two more IBWC Minutes, 317 and 318. Minute 317, simply put, established a framework for a binational council.¹¹⁹ Minute 318, like 316, showed again increased international cooperation. In April 2010, a massive earthquake struck in Mexico, destroying miles of irrigation infrastructure in the Mexicali Valley. As a result Mexico was unable to utilize its apportionment of Colorado River water. Minute 318 attempted to mitigate the effects of the earthquake on Mexico by allowing the deferment up to 260,000 af of its annual allotment of water while repairs are made to the irrigation system.¹²⁰ Through the year 2013, the United States has allowed Mexico to store their unused water in American facilities. Steps like those taken in the 2010 IBWC minutes show hope for future U.S.-Mexico relations pertaining to the Colorado River.

Issues

The recent successes in U.S.-Mexico cooperation are impressive; however, they do not mean there are not serious problems still in need of attention. The Yuma Desalination Plant, the All-American Canal Lining Project, and the implementation of Drop 2 Reservoir all pose serious challenges for the Mexican side. Though all separate projects, each has the ability to greatly reduce the quantity of water reaching Mexico. It is important to have an understanding of these current matters in order to identify what in the current legislation must be amended to remedy them.

The Lining of the All-American Canal

Stretching 80 miles from the Imperial Dam near Yuma, Arizona, this canal provides Colorado River water to an agricultural mecca and sizable population of residents in

southern California. The All-American Canal provides a classic illustration of the historically poor relationship between the United States and Mexico in issues pertaining to the Colorado River. The construction of the canal was authorized under the Boulder Canyon Project Act of 1928 and completed in 1942.¹²¹ For the majority of its existence the canal existed unlined. Due to the porous nature of the channel some 67,600 af of water being conveyed to California would seep out, making its way down to Mexico and replenishing subsurface aquifers along the way.¹²² This water is not counted as a part of the delivery required of the United States to Mexico and provides an essential source of water for numerous farmers in the Mexicali Valley. Since the construction of the canal, Mexico has installed numerous pumping units to retrieve approximately 18,000 af per year.¹²³ In 1988, the USBR sought approval for a plan to line the canal in an effort to eliminate the water that was being “lost” to Mexico. In 1994, the final environmental impact statement was completed; later that year a Record of Decision was signed, allowing for the lining of a 23-mile segment.¹²⁴ Construction began in 2007 and was completed in early 2010.

The proposition and subsequent EIS quickly sparked international debate. The lining of the canal would eliminate the majority of the seepage that had made its way to Mexico, resulting in economic loss to farmers and rampant environmental degradation of the Mexicali Valley. One of the major issues brought up was the applicability of U.S. environmental statutes such as NEPA, the Endangered Species Act, and the Migratory Bird Treaty Act to trans-boundary situations. These issues were addressed again in 1999 when the USBR conducted a reexamination of the EIS and in 2005 when a biological analysis was completed. The conclusion of both reports was

that no consultation with the USFWS was required for the trans-boundary effects on Mexico. In 2006, a Supplemental Information Report was issued, stating no substantial changes or new information existed and therefore no supplemental EIS was required.

The Consejo de Desarrollo Economico de Mexicali, A.C. v. U.S. case in 2007 was prompted by a group of parties filing for injunctive relief.¹²⁵ They argued that the project was an unconstitutional deprivation of property, a usurpation of water right, a breach of affirmative duty owed by the Secretary to implement the project in such a manner consistent with reasonable utilization of water in the Mexicali Valley, and that the project violated NEPA, the Endangered Species Act, the Migratory Bird Treaty, and the Settlement Act, among many other things.¹²⁶ Systematically the court dismissed these complaints. The court ruled that the Tax Relief and Health Care Act of 2006 rendered the claims made by the appellant moot. Under the Tax Relief Act, the lining project was granted permission to proceed “notwithstanding any other provision of law.”¹²⁷ This essentially preempted the court from making any ruling regarding the necessity of an additional EIS.

The environmental consequences of this decision are fairly self-explanatory and the economic impact it will have on Mexicali Valley farmers may be substantial. What is less obvious, however, is the precedent that this decision may have made. In this instance, Congress opted to ignore trans-boundary environmental issues and instead chose to proceed with development at all costs. The resulting issue is that this example has set the precedent that access to Colorado River water will supersede environmental protection in the future—not only in Mexico but in the U.S. as well.¹²⁸ The negotiations that took place regarding the lining project were ultimately



one-sided. The issues raised by Mexico were quickly dismissed. Osvel Hinojosa-Huerta, Director of the Water and Wetlands Conservation division of the Mexican NGO ProNatura, summed up the events as “an example of how negotiations can fail” and an illustration of fighting instead of collaboration.¹²⁹ Although viewed as a success by some in the U.S. (it won the 2010 APWA Project of the Year Award), it is in just as many ways an example of a failure; a failure of environmental protection and more importantly a failure of international negotiation. Despite the resulting environmental degradation and a dangerous precedent, the lining of the All-American Canal must be viewed as a learning process. The lessons learned here could and must be applied to the decisions to operate the Yuma Desalination Plant and any other action on the Colorado River threatening the trans-boundary environment.

Yuma Desalting Plant

The Cienega de Santa Clara is a 40-hectare slough in Mexico, home to eight wetland varieties, 250 bird species including the endangered Yuma clapper rail, and one of the last remaining stopping grounds for North American migratory birds.¹³⁰ It was “artificially” create in 1972 following the passage of IBWC Minutes 241 and 242. Minutes 241 and 242 attempted to remedy the salinity crisis in Mexico by requiring the United States to discharge Wellton-Mohawk irrigation water below Morelos Dam, keeping it out of the Colorado River, and separate from the 1.5 maf requirement. As a result the water was diverted and dumped below the dam, creating the thriving wetland present today. Although unintentionally created, the Cienega has helped to restore life to the now desolate delta region.

However, this area of biological proliferation is in danger once again. In 1974, the Colorado River Basin Salinity Control Act was passed, authorizing the construction of a desalination plant in Yuma, Arizona. The plant now fully constructed and with two pilot runs completed utilizes the diverted agricultural runoff from the Wellton-Mohawk Irrigation District in its desalination process. The treated water is then returned to the Colorado River to be counted towards the delivery requirement to Mexico. The resulting brine is left to flow into the Cienega. Two major problems arise here. First, the Cienega will see reduced inflows. This is likely to reduce the size of the slough and adversely affect the ecosystem. Second, the water that does make its way to the Cienega will have such high concentrations of salinity that it may be of little use or, in fact, harmful to the environment. In essence, it appears that full utilization of the Yuma plant’s capacity would result in the destruction of the Cienega.

It is important to note, however, that in 2010, prior to the 18-month pilot run of the plant, the IBWC passed Minute 316 that asserted no harm would come to wetlands in Mexico as a result of the plant’s operations. This was assured through the joint commitment of the United States, Mexico, and various NGOs each of whom agreed to make up 1/3 of the water the Cienega lost during the pilot run. In this way the parties cooperated to ensure the Cienega would remain unimpaired.

The real issues arise when one looks towards the future. If the YDP was to become fully operational, would such an agreement be made between parties? Replacing water taken from the Cienega would essentially go against the intent of the plant, which was to reduce the amount of water lost to Mexico. It is difficult to imagine a scenario in which such an agreement would be made in the future.

The concerns raised above focus predominantly on the environmental impacts of operating the Yuma Desalination Plant, but there are efficiency concerns as well. For example, is the amount of energy required to run the plant worth the small amount of water treated? According to Ken Bowman of the Wellton-Mohawk Irrigation District, the plant is “...a complete waste of money.”¹³¹ During the 2010-2011 pilot run, only 30,000 additional af were recovered.¹³² Additionally, due to the salinity requirements put in place after the passage of IBWC Minute 242, the United States attempts to deliver water with the highest salinity mandated by the Minute. As a result, much of the purified water has brine added back to it prior to its entrance into the Colorado River. Jennifer McCloskey of the USBR Yuma office actually stated, “It is our job to put salt back.”¹³³ The process is full of inefficiencies and may be the reason the plant has not yet been put to full use.

The Yuma Desalination Plant is a prime example of the issues Mexico may have to face in the coming years. Changes in regional precipitation patterns along with the over-allocation of current supplies means that full utilization of the Yuma plant may become a reality in the coming years. However, given the inefficiencies associated with the process, as well as the potential environmental impacts that may result from the plant’s operations, it is now more than ever necessary to address these issues and find alternative solutions. The Yuma Desalination Plant is not the answer to the looming water crisis. If anything, it will only compound the existing problems facing those reliant upon the Colorado River Basin.

Drop Two Storage Reservoir

Drop Two Storage Reservoir is the newest creation in a series of reservoirs being built by the USBR in an attempt to reclaim non-storable flows. Non-storable flows consist of that water, which has been ordered downstream from Parker Dam but cannot be delivered. A delivery may be cancelled for various reasons, including a precipitation event that makes the order unnecessary. Due to a lack of sufficient storage capacity, this water is typically unable to be put to beneficial use and as a result makes its way to Mexico.¹³⁴ In 2006, Public Law 109-432 (the same statute that authorized the All-American Canal Lining Project) directed Reclamation to design, construct, and operate a water storage facility to eliminate this loss.¹³⁵ With construction completed, Drop 2 now allows for the capture of close to 72,000 af per year of non-storable flows.¹³⁶ Under the new system this water will be collected and re-released later to meet delivery obligations to Mexico. The issue posed here is similar in nature to that discussed in the All-American Canal Lining case. From an environmental perspective the reduction in excess flows making their way to Mexico could potentially threaten the limitroph and delta regions even more



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and from an economic and social perspective this will contribute in a loss of available water for farmers and municipalities who until recently received this water separate from the Treaty obligation. It is hoped that lessons learned in the All-American Canal fiasco will be applied here in order to limit the impact on the environment and reduce the strain in relations between Mexico and the United States.

The Law of the River: Rigid Relic or Flexible Foundation for the Future?

The twenty-first century poses a plethora of problems, none of which could have been envisioned by the drafters of the Colorado River Compact in 1922. The idea of global climate change was nearly sixty years away from being conceived; the combined population of the western states and territories was only 650,000; the United States as a nation had just begun to tap into its vast natural capital, and environmental consequences were largely ignored; Mexican and Native American interests were largely ignored; and no one believed the mighty Colorado would ever be stretched to the point of over-allocation. Nonetheless, in 2011 climate change has become a very real phenomena and regional climate models project changing precipitation patterns in the basin area. The population of the seven basin states has soared to over 56 million as of 2010, stressing the water resources of an arid land. Legislation such as NEPA, the Endangered Species Act, and the Clean Water Act have been passed, representing the change in social opinion towards a greater degree of environmental consciousness. Mexican and Native American interests have since started to be addressed. And allocations of water now exceed the average flow of the Colorado River by 15-20%.

Of course, no one in 1922 could have predicted such drastic and varying changes in the basin. It is a waste of time to critique the prophetic abilities of the drafters of the Compact. Instead the issue at hand is to analyze the complex legislation that has evolved since the passage of the Compact and determine whether this set of laws has the inherent flexibility necessary to deal with the problems facing the Colorado River Basin and its water users today.

A Rigid Relic?

The most obvious examples of rigidity in the “Law of the River” are highlighted in the ongoing Mexican and Native American water rights issues, in shortage scenarios resulting from changes in regional precipitation patterns, and the environmental degradation caused by the absence of secured instream flows.

The situation with Mexico has presented several issues each of which underscore the Law of the River’s rigidity. Most relevant to this discussion are the All-American Canal Lining Project, the construction of Drop 2 Reservoir and the operation of the Yuma Desalination Plant. In each of these instances it is obvious that Mexican interests were largely ignored during the initial planning process. This represents a failing of the Law of the River in facilitating the international discussion required to handle trans-boundary issues. The IBWC was created in an effort to manage such negotiations; however, in light of recent events it has failed to operate effectively. Instead of opening discussion on the lining project the case was brought to court, and it could be argued, resulted in an unfair resolution. In the cases of Drop 2 and the YDP, it remains to be seen whether the Law of the River and IBWC will be able to responsibly and equitably resolve any resulting problems.

Concerns dealing with Native American water rights are an even more striking example of the failings of the Law of the River. Nearly all reservations within the Colorado River Basin lack the water necessary to support their populations. The original 1922 Compact mentioned tribal water rights only in passing in Article VII, stating, “Nothing in this compact shall be construed as affecting the obligations of the United States of America to Indian tribes.”¹³⁷ Despite this vague promise no tribes were brought to the table for discussion and all of the waters of the Colorado River system were subsequently fully apportioned, explicitly reserving none for reservations. While succeeding court cases such as *Winters v. United States* and *Arizona v. California* established reserved water rights, as well as a process through which reservations could quantify these rights, the Law of the River itself has done little to assure these interests are fulfilled. The adjudication and quantification process is long and expensive, often exceeding the funds available to the reservations. Even if a tribe is eventually able to quantify their rights, they frequently lack the infrastructure necessary to transport the water to where it is needed. There has been little done to remedy these persisting issues. It seems as though the Law of the River lacks the flexibility necessary to implement such necessary measures.

One of the most obvious examples of the Law of the River’s inability to deal with today’s problems is seen in the environmental damage that has resulted from the over-allocation of the Colorado River and the lack of secured water rights for instream flows. The Colorado River itself is home to four different endangered fish species, including the humpback cub, Colorado pikeminnow, bonytail, and the razorback sucker. While the introduction of invasive species and habitat loss have contributed to this decline, one remedy to biodiversity loss is more water.¹³⁸ Nowhere is the environmental

degradation of the basin more evident than in the delta region. The scene depicted by John Wesley Powell upon his arrival in the Delta is no more. The Colorado has not flowed all the way to the sea since the mid-1990s and the riparian environment has suffered as a result. Much of this can be attributed to the Law of the River’s lack of environmentally conscious legislation. The Compact itself never addresses the environment. At the time it was written there was no precedent for reserving water rights for instream flows. The recent shift in public values towards a more ecologically conscious mindset is not reflected in any of the original legislation. On top of this the programs that have been instituted to address the environmental issues are not working well.¹³⁹ Many are too specific and address only certain ESA goals rather than focusing on an ecosystem wide approach.¹⁴⁰ As a result a particular species may see a recovery; however, the riparian ecosystem as a whole may continue to suffer. The effects of projects such as the All-American Canal Lining and the Yuma Desalination Plant show first-hand the inflexibility of the Law of the River. Even today when environmental priorities have become important, projects such as these have been given approval despite the environmental impacts. That the Mexicali Valley was allowed to dry up as a result of the lining of the canal shows that working within the framework of the Law of the River, development will take precedent over the environment.

Perhaps the strongest argument made against the continued usefulness of Law of the River, however, lies in the wording of Article III paragraph (d) of the 1922 Compact. Here the Compact states, “The states of the Upper Division 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...”¹⁴¹ It is this sentence that has sparked an intense debate over whether the Compact contains a collective obligation not to deplete or whether the real burden



Will Stauffer-Norris, Flaming Gorge Dam

falls upon the Upper Basin, which is faced with a delivery obligation to the Lower Basin. Given regional climate change projections that predict reduced precipitation, the Upper Basin states fear that a strict interpretation of the Compact may require them to deliver the required 75 maf to the Lower Basin over any ten-year period regardless of available water. Lake Powell was constructed in an effort to hedge against this; however, with Lake Powell's levels plummeting from roughly 22 maf in 1998 to 14 maf in 2010, and quickly filling with sediment (nearly 100 million tons annually) thus reducing storage capacity, there is no way of knowing if Lake Powell can be relied on to meet this obligation in the future.¹⁴² Therefore, if precipitation patterns change, the Upper Basin will be forced to reduce its consumption in order to meet this delivery requirement. As overall water levels drop, so will water available for use by the Upper Basin. Water available to the Lower Basin, however, will remain consistent. **Figure 12** presents a generalized graph of the possible resulting scenario where the Upper Basin is forced to make annual deliveries thus giving up a high percentage of its 7.5 maf, while the Lower Basin and Mexico retain their initial allotments. High water years, such as the one in the spring of 2011, make those in charge too quickly forget about this very important issue. Everyone is willing to cooperate and in the abstract publicly state his or her commitment to collaboration. The trouble will arise in the coming years as water levels begin to drop substantially. Under such a scenario, people will again most likely act in their own self-interest, and in the case of the Lower Basin states that most undoubtedly means returning to a strict interpretation of the Compact in an effort to secure as much water as possible. The resulting inequality points out the incompatibility of the Law of the River with one of today's most important issues.

A Flexible Framework?

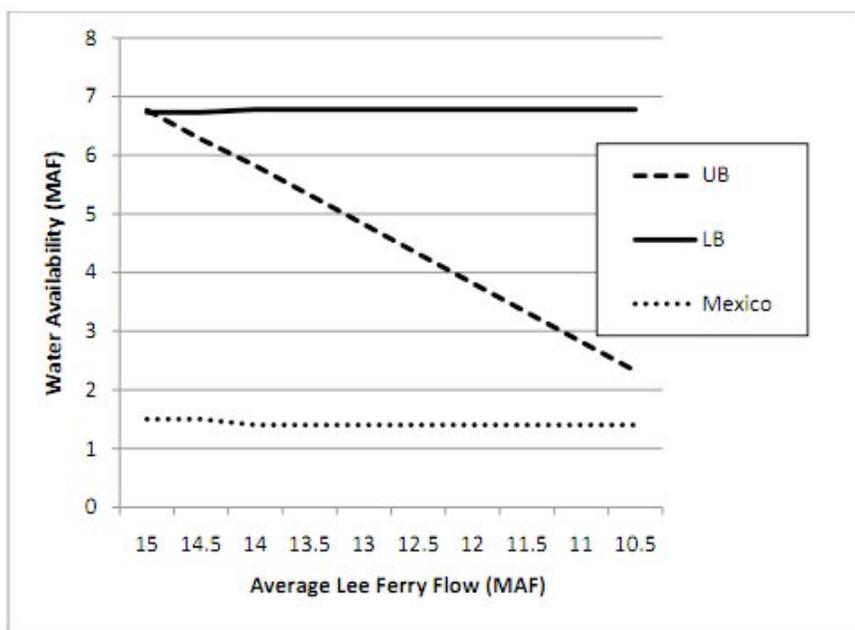
Just as the Law of the River has proven itself a rigid relic of the past, so has it shown instances of flexibility. There are multiple examples where working within this framework has led to beneficial results. Those most important to highlight include the IBWC Minute process, the 2007 shortage guidelines, and the Arizona-Nevada water sharing agreement. Many of the successes of the Law of the River stem from the 1922 Compact's relatively vague language; because it does not impose many stringent requirements it is open for interpretation and therefore allows for subsequent legislation and programs to be passed to remedy any issues that may develop over time.

The IBWC began as the International Boundary Commission (IBC) in 1889 as a way to facilitate talk between Mexico and the United States, and was later renamed the International Boundary and Water Commission (IBWC) following the Treaty with Mexico in 1944. It has since become the most important venue in resolving international disputes over the Colorado River. While created prior to the passage of the Colorado River Compact, the IBWC plays an essential role in amending the Law of the River. Much of this success is derived from the minute process. Unlike passing legislation in the United States, where Congress must ratify the bill, the IBWC has the authority to create minutes. Through this process the IBWC is able to quickly address concerns arising between the United States and Mexico. IBWC Minute 242, for example, led to the adoption of measures to reduce the average salinity in the waters reaching Mexico by the United States, thus beginning the process of remedying the salinity crisis in Mexico. More recently Minute 318 was created to mitigate the effects of the 2010 earthquake on Mexico by allowing for the storage of Colorado River water to Mexico in the United States. In both cases the flexibility of the Law

of the River allowed for the use of the Minute process which itself has become one of the more adaptive tools used in governing the Colorado River.

The creation of the 2007 Interim Shortage Guidelines is another example of this flexibility. Faced with the prospect of changing precipitation patterns, and in the midst of one of the worst droughts on record in the basin, the basin states were able to come together to create a set of specific interim guidelines for Lower Basin shortages and coordinated operations guidelines for management of Lake Powell and Lake Mead. The Shortage Guidelines also encourage the development of Intentionally Created Surplus (ICS), as a form of augmentation and conservation. These two programs should allow the basin to better deal with periods of drought. The '07 guidelines are exemplary of how legislation can be passed within the existing framework to tackle new issues.

Figure 12: Upper Basin Delivery Obligation



Source: Colorado River Governance Initiative, "Rethinking the Future of the Colorado River," *Draft Interim Report of the Colorado River Governance Initiative*, December, 2010.

Most hopeful of all, however, has been the Arizona-Nevada water sharing and storage agreement. It is one of the best examples of interstate water banking in existence today. Under this agreement the Arizona Water Banking Authority agreed to recharge and store unused Colorado River water in its groundwater aquifer for Nevada.¹⁴³ This way Nevada would have the water resources it needs to continue to grow while at the same time ensuring Arizona's unused water did not make its way to California where the region would become dependent upon it.¹⁴⁴ Such an agreement illustrates the flexibility inherent in the Law of the River and the Colorado River Compact.

Concluding Remarks

While the issues that remain, such as the unexpected future of the Cienega de Santa Clara, declining native fish populations, and under-served Indian reservations all highlight the rigidity of the Law of the River, one can just as easily look at the minutes created by the IBWC, the water sharing programs established in Arizona and Nevada, and the 2007 Shortage Guidelines as examples proving that disputes and issues can be resolved using the existing framework of the Law of the River and the Compact. What may be most important to acknowledge is what Southern Nevada Water Authority President Patricia Mulroy stated: "The Compact inextricably binds them [the basin states] together in a framework that is as rigid or as flexible as the parties as a whole desire."¹⁴⁵ That is to say, it may not be necessary to choose between stringently adhering to the Law of the River and creating a new Compact. What is most important is the political will of those involved to cooperate. However, given the issues that have arisen, and those that are destined to come, might it not be time to formalize this spirit of cooperation that Patricia Mulroy so vehemently defends? What is needed at this point is an amendment or an addition to the Law of the River, which will take into account the enduring issues and formalize a process for discussion and action on those existing and forthcoming issues.

¹Donald Worster, "A River Running West: Reflections on John Wesley Powell," *Journal of Cultural Geography* 26, no. 2 (2009): 113-126.

²Ibid.

³University of Virginia Library, *Historical Census Browser*, accessed August 1, 2011, <http://mapserver.lib.virginia.edu/php/start.php?year=V1870>. (Census data unavailable for territories Arizona, New Mexico, Utah, Wyoming.)

⁴United States Bureau of the Census, 2010 Decennial Census, Census 2010 Summary File 1 (SF 1) 100-Percent Data.

⁵National Research Council of the National Academies, *Colorado River Basin Water Management: Evaluating and Adjusting to Hydroclimatic Variability* (Washington, D.C.: The National Academies Press, 2007).

⁶Western Governors' Association, "Water Needs and Strategies for a Sustainable Future," (Denver, 2006).

⁷Doug Bennett. Interviewed by author, Las Vegas, Nevada. July 18, 2011.

⁸Western Water Assessment, *Colorado River Streamflow, a Paleo Perspective: The Lees Ferry Gaged Flow Record*, accessed August 6, 2011. <http://www.colorado.edu/treeflow/lees/gage.html>.

⁹Ibid.

¹⁰Ibid.

¹¹US Bureau of Reclamation, Basin Report: Colorado River, accessed November 8, 2011. <http://www.usbr.gov/climate/SECURE/factsheets/colorado.html>.

¹²Ibid.; Western Water Assessment, *Colorado River Basin Climate: Paleo, Present, Future*, accessed November 8, 2011. http://www.colorado.edu/colorado_river/docs/Colorado_River_Basin_Climate.pdf.

¹³*The Homestead Act of 1862*, Public Law 37-64, U.S. Statutes at Large 12 (1862).

¹⁴*Irwin v. Phillips*, et al. 5 Cal. 140 (1855).

¹⁵Ibid.

¹⁶Lawrence J. MacDonnell, "Out-of-Priority Water Use: Adding Flexibility to the Water Appropriation System," *Nebraska Law Review* 83, no.485 (2004).

¹⁷Ibid.

¹⁸*National Reclamation Act of 1902*, Public Law 57-161, U.S. Statutes at Large 32 (1902).

¹⁹*Kincaid Act of 1920*, 41 Stat. 600 (1920).

²⁰*Wyoming v. Colorado*, 259 U.S. 419 (1922).

²¹*The Colorado River Compact of 1922* art. I (1922).

²²*The Colorado River Compact of 1922* art. III, §(a) (1922).

²³*The Colorado River Compact of 1922* art. III, §(d) (1922).

²⁴*The Colorado River Compact of 1922* art. III, §(c) (1922).

²⁵*Boulder Canyon Project Act*, Public Law 70-642, U.S. Statutes at Large 32 (1928).

²⁶Ibid.

²⁷Ibid.

²⁸*Upper Colorado River Basin Compact*, Public Law 81-37, U.S. Statutes at Large 63 (1948).

²⁹Ibid.

³⁰*Arizona v. California*, 373 U.S. 546 (1963).

³¹Ibid.

³²*The Mexican Water Treaty*, 59 Stat. 1219 (1944).

³³Ibid.

³⁴*The Colorado River Storage Project Act*, Public Law 485, U.S. Statutes at Large 70 (1956).

³⁵*General Principles to Govern, and Operating Criteria for: Glen Canyon Reservoir (Lake Powell) and Lake Mead During the Lake Powell Filling Period*, 27 F.R. 6851 (1962).

³⁶Ibid.

³⁷*Criteria for Coordinated Long-Range Operation of Colorado River Reservoirs*, 70 F.R. 7138 (1970).

³⁸*Colorado River Basin Project Act*, Public Law 90-537, Statutes at Large 45 (1968).

³⁹Central Arizona Project, FAQ, accessed August 10, 2011, <http://www.cap-az.com/AboutUs/FAQ.aspx>.

⁴⁰*Colorado River Basin Project Act*, Public Law 90-537, Statutes at Large 45 (1968).

⁴¹International Boundary and Water Commission. "Minute No. 218: Recommendations on the Colorado River Salinity Problem," March 22, 1965.

⁴²International Boundary and Water Commission. "Minute No. 241: Recommendations to Improve Immediately the Quality of Colorado River Waters Going to Mexico," July 14, 1972.

⁴³A "minute" in this context is a written agreement between the United States and Mexico.

⁴⁴International Boundary and Water Commission. "Minute No. 242: Permanent and Definitive Solution to the International Problem of the Salinity of the Colorado River," August 30, 1973.

⁴⁵*Colorado River Basin Salinity Control Act*, Public Law 93-320, Statutes at Large 109 (1974).

⁴⁶Ibid.

⁴⁷National Research Council of the National Academies, *Colorado River Basin Water Management: Evaluating and Adjusting to Hydroclimatic Variability*.

⁴⁸United States Geological Survey, *Glen Canyon Environmental Studies: Multidisciplinary Studies of the Effects of Glen Canyon Dam*, accessed August 1, 2011. <http://walrus.wr.usgs.gov/grandcan/gces.html>.

⁴⁹National Research Council of the National Academies, *Colorado River Basin Water Management: Evaluating and Adjusting to Hydroclimatic Variability*.

⁵⁰"La Paz Agreement," August 14, 1983, *Treaties and Other International Acts Series*, no. 10827.

⁵¹Ibid.

⁵²The "Limitroph" region is the segment of the Lower Colorado River that serves as the international boundary between the U.S. and Mexico.

⁵³*Grand Canyon Protection Act of 1992*, Public Law 102-575, U.S. Statutes at Large 106 (1992).

⁵⁴The EIS was completed in 1995.

⁵⁵National Research Council of the National Academies, *Colorado River Basin Water Management: Evaluating and Adjusting to Hydroclimatic Variability*.

⁵⁶"Colorado River Interim Surplus Guidelines." *Federal Register* 66:17 (January 25, 2001) 7772-7782.

⁵⁷Ibid.

⁵⁸United States Bureau of Reclamation, *Drought in the Upper Colorado River Basin*, accessed August 3, 2011. <http://www.usbr.gov/uc/feature/drought.html>.

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