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Sources of Controversy in the Law of the Colorado River: An Upper Basin View

Lawrence J. MacDonnell[1]

Introduction

The first two decades of the 21st Century have been characterized by prolonged periods of drought in the Colorado River Basin, causing some to argue that the region's hydrologic system has shifted into long-term aridification.[2] One effect has been to highlight the disparity between the amounts of water allocated for use under various legal arrangements and the physical availability of water, even in a system with over sixty million acre-feet (maf) of storage. This prolonged and deepening shortage of water also highlights other disagreements in the legal framework governing uses of the system's total water supply. Serious disagreements respecting key provisions of the Law of the River were largely avoided when the system contained enough water to satisfy all interests. That is no longer the case. The purpose of this working paper is to explore some of the uncertainties in the Law of the River most likely to cause conflicts in times of water shortage and to consider ways for their resolution.[3] The paper concludes that some long-standing assumptions about aspects of the Law of the River must give way to the realities of growing water scarcity. The paper begins with a brief summary of the conclusions from each of the six areas of uncertainty.

Summary

1. Uncertainties Concerning Mainstream Water Use Entitlements in the Lower Basin

Interpretation: Consumptive uses of water from the main Colorado River for the three mainstream states are not a fixed allocation but aspirational and adjustable according to water availability after accounting for water for Mexico and losses and need to be adjusted accordingly.

2. Uncertainties Respecting Uses of Water from Lower Basin Tributaries

Interpretation: All beneficial consumptive uses of tributary water in the Lower Basin are included within the Articles III (a) and (b) apportionment and need to be fully identified and accounted for annually. The effect of these uses on water availability in the main Colorado must be taken into account. Uses exceeding 8.5 maf/year may constitute a violation of the Law of the River under certain circumstances such as if their existence causes a failure to meet treaty obligations with Mexico.

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[2] Colorado River Research Group, "When is a drought not a drought? Drought, aridification, and the 'new normal,'" March 2018, available online at https://www.coloradoriverresearchgroup.org/uploads/4/2/3/6/42362959/crrg_aridity_report.pdf.

[3] For a detailed discussion of the Law of the River, *see* Lawrence J. MacDonnell, Colorado River Basin, 4 Waters & Water Rights, Part XI A. (Amy K. Kelley, ed. 3d Ed. 2009, 2021 Update)(hereinafter Colorado River Basin).

3. Uncertainties Respecting the Status of Article III (b) Water

Interpretation: Authorization for the Lower Basin to increase its consumptive uses an additional one million acre-feet (maf) resulted in an agreement limiting the Lower Basin to total protected consumptive uses of 8.5 maf/year, including those in the tributaries. Uses exceeding 8.5 maf are contingent and need to be identified and managed, if necessary.

4. Uncertainties Respecting the Meaning of Article III (d) in an Era of Climate Change-Induced Water Shortages

Interpretation: The Upper Basin's obligation not to deplete flows at Lee Ferry below 75 maf over consecutive ten-year periods (75/10) must take into account climate-change-induced reductions in water availability unrelated to Upper Basin depletions and find more flexible ways to satisfy this obligation that reflect actual water availability.

5. Uncertainties Respecting the Sources of Water to Satisfy the Mexico Treaty Obligation

Interpretation: The traditional view that the Upper Basin has an obligation to provide 750,000 acre-feet per year to meet the Treaty obligation to Mexico needs to be reconsidered when Lower Basin uses exceed 8.5 maf/year, when Mexico adjusts its delivery requirements to reflect shortages, and in view of the fact that, in some manner, the treaty water is a national obligation.

6. Uncertainties Respecting Uses of Tribal Water Rights, including Existing but Unquantified Rights

Interpretation: Tribes with reservations in the basin have rights to more than 20% of the system's water. The states and the United States should search out opportunities to enter into voluntary, compensated agreements with willing tribes to forego uses of portions of their water rights as needed to help maintain and increase system water.

Discussion

I. Uncertainties Concerning Mainstream Water Use Entitlements in the Lower Basin

In a five-year period early in the most recent prolonged drought starting in 2001, consumptive uses and losses of water in the Lower Basin averaged more than 11 maf/year, forcing releases from Lakes Mead and Powell substantially exceeding their inflows.[4] This dramatic change in basin water availability prompted the need to revisit the extent to which uses and losses in the basin appeared to exceed its annual supply of water.[5] It also raised questions about water allocations that had enabled this level of use. This section reviews the

[4] Bureau of Reclamation, Colorado River System Consumptive Uses and Losses Report 2001-2005 (Rev'd 2012), Summary Table at iv (hereafter Consumptive Uses and Losses Report).

[5] Reclamation's Colorado River Basin Water Supply and Demand Study, completed in 2012, confirmed that basin uses now exceed supplies and projected a potential shortfall of 3.2 maf per year by 2060. At 9.

elements of the Law of the River under which allocations to consumptively use water in the Lower Basin are made. It starts with the cornerstone document, the Colorado River Compact.

A. Under the 1922 Colorado River Compact

Under Articles III (a) and (b) of the 1922 Colorado River Compact, the Lower Basin holds the right to the perpetual beneficial consumptive use of 8.5 million acre-feet (maf) from the Colorado River system, defined as the Colorado River and its tributaries within the United States.[6] When the commissioners gathered in Washington, D.C. in January 1922, they envisioned a compact that would apportion the use of system water to each state.[7] Once they realized that would not be possible, they hit upon the idea of dividing the drainage basin into two parts—separated along hydrologic and topographical lines at Lee Ferry—and apportioning the use of equal amounts of water to each part. Various ideas for quantifying that apportionment emerged, until finally they converged on the notion of equal apportionments of beneficial consumptive use of 7.5 maf/year in each basin. To assure the Lower Basin that the Upper Basin would not unfairly withhold water (since 85-90 percent of the system's water originates there), the Upper Division states agreed to a provision under which they would not deplete the flows at Lee Ferry below 75 maf in consecutive ten-year periods.[8] To assuage Arizona's concerns that 7.5 maf would not be sufficient to take care of existing and future uses in its tributaries, especially the Gila River basin, the commissioners added Article III (b), enabling the Lower Basin to increase its beneficial consumptive use by an additional 1 maf/year. Thus the Compact apportioned the beneficial consumptive use of 8.5 maf/year of water from the Colorado River system to the Lower Basin in perpetuity.

Although the primary shortcoming of the 1922 Compact was that its allocation of fixed quantities of consumptive use that, including water for Mexico, turned out to exceed the system's reliable water supply, there are other ambiguities that have arisen during its 100-year life. It left the problem of individual state uses unresolved and added the wrinkle of dividing the basin hydrologically rather than politically so that small portions of Utah and New Mexico are included in the Lower Basin, and a small portion of Arizona is located in the Upper Basin. It did not include a definition of beneficial consumptive use, leaving uncertain accounting for reservoir evaporation and transit losses. And, while Article III (b) was added primarily to satisfy Arizona concerns, its purpose is not clear because its language appears to make this water usable to the entire Lower Basin, not one state.[9]

B. From the 1928 Boulder Canyon Project Act

[6] The Compact does not define "beneficial consumptive use," a shortcoming that has led to ongoing disagreements. *See* Charles J. Meyers, The Colorado River, 19 Stan. L. Rev. 1, 18-19 (1966).
[7] For a review of the compact negotiations, see Anne J. Castle & Lawrence J. MacDonnell, The Colorado River Compact and the Apportionment of Basin Water Uses, Ch. 1 in Cornerstone: A Century of the Colorado River Compact (Forthcoming, Jason A. Robison, ed.).
[8] Colorado River Compact, Article III (d).
[9] Norris Hundley Jr., Water and the West: The Colorado River Compact and the Politics of Water in the American West, 2nd ed. 2009 at 200-03 (hereinafter Water and the West).

Arizona's refusal to ratify the seven-state compact, much less agree to a division of the water among the states of the Lower Division, prompted Congress to include provisions in the Boulder Canyon Project Act (BCPA) that brought some clarity but added complications. It required that California agree to limit itself to consumptive use of 4.4 maf of water from the amount apportioned in Article III (a) of the Compact—that is, 4.4 maf/year out of 7.5 maf/year.[10] But the BCPA also authorized California to use half of any excess or surplus water not apportioned by the Compact—a source of water that the Compact potentially allocated to meet any future Mexico obligations.[11] It further gave pre-approval to a compact among Arizona, California, and Nevada (not including New Mexico or New Mexico) that would apportion use of the 7.5 maf/year provided under Article III (a) of the Compact, giving 4.4 maf/year to California, 2.8 maf/year to Arizona, and 300,000/year to Nevada and would enable Arizona to use the remaining half of any excess or surplus water unapportioned by the Compact.[12] While it made these provisions expressly subject to the Compact, in practice its terms had the effect of altering the Compact as against the Upper Basin, enabling increased uses in the Lower Basin.

C. From the Interior Contracts with the three Mainstream Lower Division States

Another provision of the BCPA required that any entity wanting to store water in what became Lake Mead and have that water delivered to its point of diversion must have a contract with the Secretary of the Interior.[13] Once the BCPA became effective in June 1929 upon ratification by six states and California's commitment to limit its uses of Article III (a) water to 4.4 maf (California Limitation Act), the Secretary of the Interior began negotiations with California water users for water storage and delivery contracts.[14] The resulting contracts essentially adopted the allocation recommendations provided in the so-called Seven Party Agreement,[15] establishing seven priorities of use for a total of 5.362 maf/year. No effort was made in the Seven Party Agreement to identify the source of the Compact apportionment that would supply these delivery contracts, but the total allocation of the first four priorities was 4.4 maf—the amount agreed to in the Limitation Act. Since these were contracts for storage of water in Lake Mead, the water could only come from the main Colorado River. The agricultural entities holding the first three priorities were to receive 3.850 maf (described only in terms of acreage, not water and not separately quantified among the using entities) and the fourth priority Metropolitan Water District of Southern California (MWD) received 550,000 acre-feet.

[10] Boulder Canyon Project Act, Section 4 (a)(BCPA).
[11] Colorado River Compact, Article III (c).
[12] BCPA, Section 4.
[13] BCPA, Section 5.
[14] A helpful discussion of this process is provided in Ray Lyman Wilbur & Northcutt Ely, Hoover Dam Documents 101- (Second Edition of The Hoover Dam Power and Water Contracts), 1948. See also Ray Lyman Wilbur & Northcutt Ely, The Hoover Dam Power and Water Contracts and Related Data, With Introductory Notes (United States Department of the Interior, 1933).
[15] Boulder Canyon Project Agreement, Requesting Apportonment of California's Share of the Waters of the Colorado River Among the Applicants in the State, August 18, 1931.

MWD also received an additional 550,000 acre-feet under the fifth priority, and the agricultural users received the balance under the sixth and seventh priorities. The contracts, made with the individual water-using entities, were made subject to the 1922 Compact and the BCPA. They provided for these quantities to be delivered to the entity's point of diversion, thus leaving out any associated reservoir evaporation or transit losses.

The State of Nevada and the Secretary of the Interior entered into a storage and delivery contract in 1942, initially for 100,000 acre-feet and then, as amended in 1944, for 300,000 acre-feet. The language in this contract included some notable additions beyond the California contracts. Article 4 (a) of the amended 1944 Nevada contract provides that "[s]ubject to the availability thereof for use in Nevada under the provisions of the Colorado River Compact and the Boulder Canyon Project Act …," the United States will provide "a total quantity not to exceed Three Hundred Thousand (300,000) acre-feet each calendar year." That amount is to cover diversions from Lake Mead as well as "all other waters diverted for use within the State of Nevada from the Colorado River system …."[16] Note that the allocation is not to beneficial consumptive use of 300,000 acre-feet per year but to the diversion of that amount. In practice, the Nevada allocation has been treated as a right to the beneficial consumptive use of 300,000 acre-feet of water from Lake Mead annually.

The State of Arizona finally entered into a storage and delivery contract with Interior in 1944. Section 7 (a) of the Arizona contract states that "[s]ubject to the availability thereof for use in Arizona under the provisions of the Colorado River Compact and the Boulder Canyon Project Act …," the United States will deliver a "maximum" of 2.8 maf. Section 7 (d) adds: "The obligation to deliver water at or below Boulder Dam shall be diminished to the extent that consumptive uses now or hereafter existing in Arizona above Lake Mead diminish the flow into Lake Mead, and such obligation shall be subject to such reduction on account of evaporation, reservoir and river losses, as may be required to render this contract in conformity with said compact and said act." Section 7 (g) states that Arizona acknowledges the rights of New Mexico and Utah to use of water under the 1922 Compact. And Section 7 (l) provides: "All consumptive uses of water by users in Arizona, of water diverted from Lake Mead or from the main stream of the Colorado River below Boulder Dam, whether made under this contract or not, shall be deemed, when made, a discharge pro tanto of the obligation of this contract." It provided for the storage and delivery of 2.8 maf/year, subject to availability (Article 7 (a)).

Reflecting the ongoing dispute between Arizona and California concerning rights to water in the Lower Basin, the Arizona contract provided:

> Neither Article 7, nor any other provision of this contract, shall impair the right of Arizona and other states and the users of water therein to maintain, prosecute or defend any action respecting, and is without prejudice to, any of the respective contentions of said states and water users as to (1) the intent, effect, meaning, and

[16] The U.S. Supreme Court ruled this provision was beyond the scope of authority given to the Secretary to the degree it intends to include uses on Nevada (or Arizona) tributaries. Arizona v. California, 373 U.S. 546, 590-91.

> interpretation of said compact and said act; (2) what part, if any, of the water used or contracted for by any of them falls within Article III (a) of the Colorado River Compact; (3) what part, if any, is within Article III (b) thereof; (4) what part, if any, is excess or surplus waters unapportioned by said Compact; and (5) what limitations on use, rights of use, and relative priorities exist as to the waters of the Colorado River system; provided, however, that by these reservations there is no intent to disturb the apportionment made by Article III (a) of the Colorado River Compact between the Upper Basin and the Lower Basin. (Article 10).

The contracts follow the approach taken by Congress in the BCPA, effectively allocating the use of 7.5 maf/year from the main Colorado, and including new allocations from the mainstream of excess or surplus water not apportioned under the Compact. The absence of quantification in the contracts for the agricultural users in California had to be rectified later. It wasn't until the Arizona contract in 1944 that Interior began taking into account some of the associated water losses such as reservoir evaporation and also the unresolved claims to use by New Mexico and Utah users within the Lower Basin, although it did not subsequently implement these provisions. All of the contracts are made subject to the Compact, leaving open the question of how the Compact might affect their provisions. These contracts figured prominently in the thinking of the Special Master, and to a lesser extent, the U.S. Supreme Court, in the upcoming *Arizona v. California* litigation.

D. Arizona v. California

1. The Special Master's Report[17]

More than eight years after Arizona filed its complaint in the U.S. Supreme Court against California in 1952, Special Master Rifkind filed his final report with the Court. At the heart of this dispute were competing theories about the respective rights of Arizona and California to Lower Basin water. The Master found that the dispute concerned only the uses of mainstream water stored in Lake Mead, governed by the Boulder Canyon Project Act, the California Limitation Agreement, and the Secretarial contracts.[18] Under his analysis, the Colorado River Compact concerns only matters between the two basins and thus does not apply to disputes between the states. He found Congressional intention in the BCPA to serve as authority for the allocation of water in Lake Mead.[19] The required secretarial contracts served as the mechanism for making that allocation, except for present perfected rights existing as of the effective date of the BCPA (June 25, 1929).[20]

Because the language in the BCPA requiring California to agree to limit itself to beneficial consumptive uses of no more than 4.4 maf/year stated that this water was from the water

[17] Simon H. Rifkin, Special Master, Report to the U.S. Supreme Court, Arizona v. California, December 5, 1960 (Special Master's Report).
[18] Id., at 138.
[19] Id., at 151.
[20] Id., at 152-53.

apportioned to the Lower Basin in Article III (a) of the Compact, the Master decided that Congress misspoke, intending instead to apply that limitation only to mainstream water stored in Lake Mead.[21] Moreover, this allocation represented water delivered at its points of diversion without diminishment for reservoir evaporation or river losses.

Next the Master turned to an analysis of the meaning of excess or surplus water used in the BCPA and decided it had a meaning different than that used in the Compact.[22] Rather than water beyond the 16 maf apportioned in Articles III (a) and (b) of the Compact, he determined it referred to water available for use beyond the 7.5 maf consumed from the mainstream in the Lower Basin in a year. Thus, he decided, the BCPA and the resultant Secretarial contracts provided that Arizona and California could each use one-half (less 4% from Arizona's share for use by Nevada) of any water available in the Lower Basin mainstream once the first 7.5 maf had been consumed.

Consequently, the Master concluded that the contracts "require that this water be apportioned as follows: of the first 7.5 million acre-feet of consumptive use in one year, 4.4 for use in California, 2.8 in Arizona and .3 in Nevada; of the remaining consumptive uses during that year, 50% for use in California and 50% in Arizona, subject to the possibility that Arizona's share may be reduced to 46% if the Secretary contracts to allocate 4% of surplus for use in Nevada."[23] All uses from federal and Indian reservations were to come out of the allocation of the state in which the reservations are located.

2. The Decision of the U.S. Supreme Court[24]

The Court essentially agreed with the Special Master's findings that Congress in the BCPA had allocated consumptive use of the first 7.5 maf of mainstream water in the Lower Basin each year, giving Arizona 2.8 maf, California 4.4 maf, and Nevada 400,000.[25] The Court agreed that the BCPA governed only uses of the mainstream, not the full river system contemplated by the Compact.[26] The Court took a more expansive view of federal authority than did the Master, deciding that the BCPA established federal control over all water in the mainstream below Lee Ferry, not just stored in Lake Mead.[27] The Court also agreed with the Master's conclusion that federal and tribal water uses from the mainstream should come out of the allocations made to the state in which they occur.[28]

E. Understanding these allocations in a time of declining water supplies

[21] Id., at 170.
[22] Id., at 194-97.
[23] Id., at 224-25.
[24] Arizona v. California, 373 U.S. 546 (1963).
[25] 373 U.S. at 565
[26] 373 U.S. at 567-68
[27] 373 U.S. at 590-591
[28] 373 U.S. at 595.

1. The traditional understanding of fixed allocations to the three mainstream states in the Lower Basin must yield to the reality of a declining water supply

As discussed, the Compact clearly expresses the commissioners' intention that the Compact establish specific legal apportionments of Colorado River system water for annual beneficial consumptive use for domestic and agricultural purposes within the two basins. They anticipated that there would be a further apportionment of unapportioned water in the future and did not expressly authorize or prohibit uses that went beyond the initial Compact apportionments, suggesting that such uses might be addressed in a future apportionment.[29] The Special Master treated these apportionments as a ceiling on uses that could be established under the ambit of the Colorado River Compact. Water available above this amount constitutes surplus which first must go to meet the Mexico delivery obligation.

As discussed, Congress inserted considerable confusion into this arrangement in the BCPA. Norris Hundley provides a useful analysis of the legislative history of the BCPA demonstrating Congressional (and U.S. Supreme Court) confusion about the terms of the Compact and the Upper Basin's release of 75 maf over consecutive ten-year periods under Article III (d), confusing the 7.5 maf of water to be used in the entire Lower Basin annually under Article III (a) with the average of 7.5 maf that would be available in the main river at Lee Ferry.[30]

How to make sense of these contradictory determinations? First, it is important to start with the foundation document, the 1922 Compact. Unquestionably, the Compact apportioned the waters of the entire Colorado River system, including the tributaries. That document provides for beneficial consumptive uses in the Lower Basin, including portions of New Mexico and Utah, of a total of 8.5 maf/year. The Special Master and the U.S. Supreme Court avoided the problem of reconciling the Compact with the BCPA by deciding that the Compact applied only to basin versus basin disputes, not to disputes among states. But, of course, the BCPA is the legislation that gave congressional assent to the Compact. Moreover, it makes express reference to the Compact as governing all activities under the BCPA.[31] The contracts all include provisions making their allocations subject to the terms of the Compact. I begin this analysis with the presumption that any consumptive uses in the Lower Basin in excess of 8.5 maf/year

[29] Colorado River Compact, Article III (f) & (g).

[30] Norris Hundley, Jr., Clio Nods: Arizona v. California and the Boulder Canyon Act - A Reassessment, 3 Western Historical Quarterly 17 (1972).

[31] BCPA, Section 1 (construction of works), Section 4 (a) (effective date of act), Section 8 (a) (operation of reservoirs, canals, and other works), Section 13 (b) (as to the rights of the U.S. and those claiming under it to use of the water), Section 13 (c) (as to rights of way for water and power), and more broadly, in Section 13 (d) ("The conditions and covenants referred to herein shall be deemed to run with the land and the right, interest, or privilege therein and water right, and shall attach as a matter of law, whether set out or referred to in the instrument evidencing any such patent, grant, contract, concession, lease, permit, license, right-of-way, or other privilege from the United States or under its authority, or not, and shall be deemed to be for the benefit of and be available to the States of Arizona, California, Colorado, Nevada, New Mexico, Utah, and Wyoming, and the users of water therein or thereunder, by way of suit, defense, or otherwise, in any litigation respecting the waters of the Colorado River or its tributaries.")

exceed those agreed to in the 1922 Compact, are not protected, and can constitute violations in the Law of the River.

One immediate problem is that consumptive uses in the Lower Basin are accounted for annually only on the main Colorado River while we are interested in knowing consumptive uses of water from the entire Colorado River system in the Lower Basin. As required under the 1968 Colorado River Basin Project Act, Reclamation does produce this information for five-year periods, but its most recent report for the Lower Basin is for the period 2001-2005. In that report, total Lower Basin consumptive uses averaged 9.906 maf, with reservoir and channel losses averaging an additional 1.105 maf.[32] Arizona consumed 2.707 maf/year on average from the main Colorado and another 1.933 maf/year from its tributaries; California consumed an average of 4.712 maf/year from the main Colorado; Nevada consumed an average of 0.302 maf from the main Colorado and 0.102 from tributaries; New Mexico consumed an average of 0.028 maf/year from tributaries; and Utah consumed an average of 0.124 maf/year from tributaries.[33] Annual accounting reports show that the three mainstream states have reduced consumptive uses from the main Colorado River since that report period, but most of that water has been retained in Lake Mead for subsequent use.[34]

The allocations as defined by the U.S. Supreme Court are not fixed quantities of water. They represent an ability to consumptively use the first 7.5 maf from the main Colorado if and when available.[35] That they cannot be understood as fixed is evident from a consideration of the supply of water now available for their use. Under the Compact, the 1968 Colorado River Basin Project Act, and the Long Range Operating Criteria as modified by the Interim Guidelines, the predominate release from Lake Powell was expected to be 8.23 maf/year, water needed to meet the Upper Basin's Article III (d) obligation not to deplete flows at Lee Ferry below 75 maf over consecutive ten-year periods and 750,000 acre-feet to supply the Upper Basin's presumed share of the Mexico obligation (assuming inflows of 20,000 acre-feet from the Paria River below Glen Canyon Dam).[36] The addition of 8.25 maf/year to Lake Mead is not sufficient to provide enough water to meet mainstream headgate diversions of 7.5 maf, cover river channel losses

[32] Bureau of Reclamation, Colorado River System Consumptive Uses and Losses, 2001-2005 (2011, rev'd 2012). Aside from the fact this information is so out-of-date, there is also some confusion comparing the information provided about uses and losses in the Colorado River Basin Water Supply and Demand Study (Appendix C11) showing considerably higher tributary uses and losses, especially for the Gila, than the Consumptive Uses and Losses Report.

[33] It's important to recognize that this period predated the agreement reached in the Interim Guidelines.

[34] The Secretary of the Interior issued new operating guidelines for the Colorado River in 2007, known as the Interim Guidelines, under which the mainstream states were authorized to forego consumptive use of Lake Mead water in any given year and keep that water, called intentionally created surplus (ICS), in a storage account for subsequent use. Thus in 2019 the three mainstream states consumptively used only 6.566 maf but ICS in storage in Lake Mead totaled 2.313 maf. Bureau of Reclamation, Colorado River Accounting and Water Use Report: Arizona, California, and Nevada, Calendar Year 2019, Table 1.

[35] In Section II (B) (1), the Arizona v. California Decree states that the Secretary must first determine there is sufficient water available to be able to deliver 7.5 maf of consumptive uses to Arizona, California, and Nevada. 376 U.S. 340, 342 (1964).

[36] The Interim Guidelines took the important step in recognizing the possibility that releases from Powell might be only 7.48 maf in certain years.

and inadvertent overdeliveries, and offset reservoir evaporation while still providing the required 1.5 maf/year to Mexico. This is known as the "structural deficit," causing an estimated 1.2 maf shortfall annually that must be drawn from reserves in Lake Mead if excess water is not released from Lake Powell. Declining storage levels in Lake Mead, however, may lead to shortage declarations under which the Secretary reduces uses in a manner now governed by the Interim Guidelines and the Lower Basin's Drought Contingency Plan.[37]

2. Presumptive Allocations for Beneficial Consumptive Use from the Main Colorado in the Lower Basin Need to be Revisited

The U.S. Supreme Court in its decree in *Arizona v. California* conditioned its allocation of mainstream Colorado River water with the phrase—"[i]f sufficient mainstream water is available for release, as determined by the Secretary of the Interior to satisfy 7,500,000 acre-feet of annual consumptive use in the aforesaid three States, then of such 7,500,000 acre feet of consumptive use, there shall be apportioned 2,800,000 acre-feet for use in Arizona, 4,400,000 acre-feet for use in California, and 300,000 acre-feet for use in Nevada."[38] The Decree further authorized the Secretary to release additional amounts of water from Lake Mead to enable increased uses if he determines surplus water is available.[39] Conversely, should the Secretary determine that there is not sufficient water available in Lake Mead to enable 7.5 maf of consumptive uses, he is authorized to declare a shortage and reduce water deliveries as he determines necessary.[40] While the Secretary has limited his discretion in making surplus and shortage determinations with the Interim Guidelines and the Lower Basin Drought Contingency Plan Agreement, the matter of the actual extent of the three mainstream states' allocations should be reconsidered as part of the upcoming renegotiation process intended to replace existing guidance with new guidance by 2026.[41] The current practice of regarding the three main Colorado River states in the Lower Basin as holding fixed allocations, especially given the Compact's intention of enabling use of a total of 8.5 maf/year among the five Lower Basin states, creates a false expectation and an unnecessary sense of pressure to try to provide that amount of water each year. To a degree, the shortage provisions help to make more explicit the uncertainties associated with actual water uses in any given year, but there is enormous pressure to avoid a shortage declaration and related pressure to increase releases from Lake Powell when possible to bolster storage in Lake Mead to avoid a shortage declaration.

[37] Lower Basin Drought Contingency Plan Agreement, Attachment B to the Agreement Concerning Colorado River Drought Contingency Management and Operations ("Companion Agreement") (2019).
[38] The initial decree, issued in 1964, was consolidated and finalized in Arizona v. California, 547 U.S. 150, 155 (2006) (Article II (B)(1)).
[39] 547 U.S. 150, 157 (Article II (B)(2).
[40] Article II (B)(3). Except that the Secretary must satisfy present perfected rights in the order of their priority dates without regard to state lines.
[41] The Interim Guidelines expire December 31, 2025 (through preparation of the 2026 Annual Operating Plan). Record of Decision, Colorado River Interim Guidelines for Lower Basin Shortages and Coordinated Operations for Lake Powell and Lake Mead, Section G., 8 (A) (December 2007).

Congressional decisions in the BCPA, as interpreted by the U.S. Supreme Court, apply only among the three affected states: Arizona, California, and Nevada. The availability of sufficient water to meet the annual allocation is a decision made by the Secretary that should not only take into account the presumed allocations but also the effects on releases from the Upper Basin that might jeopardize beneficial consumptive uses in that Division. It should also address associated water losses. And it should account for so-called inadvertent overruns and deliveries to Mexico. We need to move beyond the fiction of presumed allocations established in an era of relative water abundance and more carefully define realistic amounts that can be consumptively used from the Colorado in the Lower Basin.

3. Lower Basin Water Use Allocations Need to be Adjusted to Account for Reservoir Evaporation, River Channel Losses, Inadvertent Overruns, and Bypass Flows

Virtually no provision is made in the Law of the River for considering how to account for the losses of water that occur separate from human uses.[42] Decisions respecting water use allocations in the Lower Basin appear to have been made under the assumption that there was sufficient unused water in the system to compensate for these losses. Under present conditions that is no longer true. On average, reservoir evaporation and channel losses on the main Colorado River in the Lower Basin totaled 1.1 maf between 2001 and 2005.[43] In 2019, users in Arizona and California ordered deliveries of nearly 575,000 acre-feet that they decided not to divert and use (inadvertent overruns).[44] Also in that year the United States bypassed 143,000 acre-feet of water through a drain to Mexico carrying highly saline water not deliverable to Mexico under the Treaty.[45] In short, there are large losses of water on the main Colorado River below Lee Ferry that significantly affect water availability, especially in times of reduced water supply.

The Upper Division states use an inflow-outflow methodology for determining consumptive uses and losses, thus directly incorporating reservoir evaporation and channel losses in these determinations.[46] The Upper Colorado River Commission also uses the inflow-outflow methodology to determine consumptive uses and losses from Lake Powell to Lee Ferry. As a consequence, the Upper Basin is fully accounting for losses of system water caused by human activities, including depletions for human uses and other losses.

At present, evaporation and other losses in the Lower Basin serve only to reduce the available water supply upon which the Secretary makes determinations respecting annual water deliveries. Consequently, they only become relevant in times in which storage levels in

[42] The primary exception is the Upper Colorado River Basin Compact that allocates reservoir and transit losses to each Upper Division state.
[43] Bureau of Reclamation, Colorado River Consumptive Uses and Losses, 2001-2005, Table Summary.
[44] Bureau of Reclamation, Calendar Year 2019, Colorado River Accounting and Water Use Report: Arizona, California, and Nevada, Tables 7 & 8. Much of this water finds other uses but some results in overdeliveries to Mexico.
[45] Id., Table 1.
[46] Upper Colorado River Compact, Article 6.

Lake Mead decline to the point that the Secretary would declare a shortage. But, of course, failure to adjust normal deliveries to account for these water losses serves to draw down storage levels in Mead more rapidly, making shortage declarations more likely. There have been discussions about sharing these losses, but no agreement has been reached. It is time to incorporate these water losses directly into the accounting for annual consumptive uses in the Lower Basin.

II. Uncertainties Respecting Uses of Water from Lower Basin Tributaries

A. The Colorado River Compact

The 1922 Compact clearly contemplates that uses of water from any part of the Colorado River system, including tributaries in the Lower Basin, would come out of the apportionments made to the two basins in Articles III (a) and (b). The late addition of Article III (b) resulted specifically from Arizona's concerns that 7.5 maf/year would not be sufficient to cover all present and future uses from its tributaries as well as from the main river. The Arizona commissioner Norviel made every effort to keep Arizona's uses from the Gila and its tributaries out of the Compact but without success. When it became apparent that he would not be able to do so, Norviel huddled with Reclamation Commissioner Davis to come up an estimate of total water needs in the Lower Basin, including in the Gila Basin of Arizona, and proposed a 44.5/55.5 division of system water between the Upper and Lower Basins to enable full uses in the Lower Basin.[47] At this point in the negotiations, however, support for a 50-50 division had solidified. Commissioner Scrugham of Nevada then offered several ways to proceed, including enabling the Lower Basin to increase its uses by 1 maf/year.[48] In the following meeting, the commissioners adopted a revised Article III that including the additional 1 maf in part (b). Under the Compact, therefore, total Lower Basin beneficial consumptive uses from all sources were not expected to exceed 8.5 maf/year. As stated, however, the annual average between 2001 and 2005 was 9.9 maf, including more than 2.1 maf from tributaries.[49]

We have already seen that water use allocations from the main Colorado River are dependent on water availability and not fixed, and need to be adjusted to account for a variety of problems that their present configuration cause. In the tributaries there is no clear allocation or administrative system by which to determine the extent of annual uses and which uses are within the Compact apportionment. Consequently, there is no existing means to administer tributary uses if that becomes necessary. Once again, confusion in this area can be traced back to the BCPA and evidence that many of the congressional representatives actively involved in the debate surrounding passage of the BCPA apparently did not understand that the Compact's

[47] Minutes of the 21st Meeting at 33.
[48] Id. at 35.
[49] Consumptive Uses and Losses Report, 2001-2005, Summary Table.

apportionment of water was for the entire Colorado River system while they were dealing only with the water of the main Colorado River.[50]

B. Treatment of Tributary Uses in the Boulder Canyon Project Act

The BCPA gave contingent Congressional approval to the Colorado River Compact, approval made effective in 1929 when six states, including California, ratified the Compact once again. It affirmed the primacy of the Compact in Section 8 (a), stating unequivocally:

> The United States, its permittees, licensees, and contractees, and all users and appropriators of water stored, diverted, carried, and/or distributed by the reservoir, canals, and other works herein authorized, shall observe and be subject to and controlled by said Colorado River compact in the construction, management, and operation of said reservoir, canals, and other works and the storage, diversion, delivery, and use of water for the generation of power, irrigation, and other purposes, anything in this Act to the contrary notwithstanding, and all permits, licenses, and contracts shall so provide.

The BCPA largely ignored the tributaries, misallocating Article III (a)'s apportionment of 7.5 maf to the entire Lower Basin to only the three mainstream states.[51] In a failed attempt to entice Arizona to sign the Colorado Compact, the BCPA proposed a three-state compact that would have given Arizona full use of its tributaries and removed the Gila from serving to meet any obligations to Mexico.[52] While no such compact ever was agreed-to by the three states, the U.S. Supreme Court gave it unexpected weight in *Arizona v. California*.

C. Arizona v. California

1. Before the Special Master

Arizona filed its complaint with the U.S. Supreme Court in 1952 seeking to quiet title to 3.8 maf of Colorado River system water in the Lower Basin.[53] Arizona claimed rights to this amount of water on the basis of its Secretarial contract for 2.8 maf and its assertion that the water apportioned for use in the Lower Basin in Article III (b) was intended to cover Arizona's uses from the Gila basin. It acknowledged that actual beneficial consumptive uses from the Gila and its tributaries in Arizona exceeded 1 maf but asserted that the measure of use should be based on depletions of water reaching the main Colorado River—thought at the time the

[50] The problem began at the 1927 Governor's conference with a proposal to divide the 7.5 maf presumed available at Lee Ferry, giving 4.4 maf to California, 2.8 maf to Arizona, and 0.3 maf to Nevada. This idea that it was 7.5 maf at Lee Ferry that needed to be divided carried through in Congress. Water and the West, at 265.
[51] BCPA, Section (4) (a).
[52] As Hundley explains, California was directly opposed to the Gila provision but allowed it to go forward knowing that it would never agree to a compact with this language. Water and the West, at 269.
[53] State of Arizona, Motion for Leave to File Bill of Complaint and Bill of Complaint, In the Supreme Court of the United States, October Term 1952.

Compact was negotiated to be an annual average of about 1 maf.[54] California argued that Arizona's uses of Gila Basin water in the state needed to be considered under the Compact and should act to reduce the amount of water allocated to Arizona in the litigation. As mentioned, the Special Master determined that the Compact was inapplicable in consideration of matters between individual states and decided instead to follow language in the three-state compact proposed in the BCPA giving Arizona full use of the Gila in addition to the 2.8 maf allocated in its secretarial contract.[55] The U.S. Supreme Court went further and concluded that Congress in the BCPA left uses of tributary water to the states in which the tributaries occur.[56]

Some of the parties asked the Special Master to make a determination of respective rights in each of the tributaries, but he declined—stating that, except for the Gila in New Mexico,[57] there wasn't a sufficient present controversy to apply equitable apportionment principles.[58] He acknowledged that increased uses of water in the tributaries would reduce flows into the main Colorado and thus reduce the supply of water available for use by the three mainstream states in the Lower Basin (as well as Mexico.) But he regarded that problem as too remote to be considered at that time (1960). Unfortunately, more than 60 years later we are still without any interstate agreement about tributary uses—a fact that continues to be a source of controversy between the basins as well as among the states of the Lower Basin. It is time for the five states in the Lower Basin to remedy this situation.

III. Uncertainties Respecting Article III (b) Water

Article III (b) giving the Lower Basin the right to increase its beneficial consumptive use by 1 maf/year in addition to the 7.5maf/year provided under Article III (a) was added to the Compact relatively late in the process in a move widely agreed to have been made to satisfy Arizona's concerns that the 7.5 maf apportionment would not be sufficient to cover existing and future uses in the Gila Basin of Arizona as well as from the main Colorado River. Its language makes clear that it refers to use of Colorado River system water, the same as Article III (a). The Special Master affirmed that view in his report[59] and concluded that the fundamental purpose of Articles III (a) and (b) was to eliminate priority of use as the basis for establishing

[54] Statement of Position of Arizona, Arizona v. California, No. 10 Original, 1955 Term (U.S. Supreme Court) at 5. Arizona has sought to reduce the amount of consumptive uses it makes from the Gila Basin on the theory that the Gila is a "losing" river, that is much of its flow is lost through natural processes as it moves from the mountains to the Colorado River and would never have reached the mainstream. For a discussion of this "salvage by use" concept, *see* Kuhn & Fleck at 132-37.

[55] Special Master's Report, at 179, fn. 38; 383.

[56] Arizona v. California, 373 U.S. 546, 565 (1963): "We have concluded, for reasons to be stated, that Congress in passing the Project Act intended to and did create its own comprehensive scheme for the apportionment among California, Arizona, and Nevada of the Lower Basin's share of the mainstream waters of the Colorado River, leaving each State its tributaries." The Court was concerned that California would be able to increase its consumptive uses from the main Colorado if Arizona were to be charged with its tributary uses. Uses of water in the Lower Basin tributaries remain subject to the Colorado River Compact.

[57] Special Master's Report at 324-25.

[58] Special Master's Report at 317-18.

[59] Special Master's Report at 143.

rights in the Colorado River system.[60] He regarded the apportionments as limitations on the consumptive uses (which he defined as diversions less returns) that could be made in the two basins, stating: "it is clear that the Lower Basin may utilize and consume more than the 8,500,000 acre-feet of water per annum apportioned to it by subdivisions (a) and (b) of Article III of the Compact, if the water is actually available, but against the Upper Basin it can acquire appropriative rights to no greater quantity than is sufficient to satisfy a consumptive use of that magnitude."[61] So the fundamental meaning of Article III (b) is simply to increase the Lower Basin's protected allowance of beneficial consumptive uses of Colorado River system water, mainstream and tributary. Uses of Colorado River system water in the Lower Basin beyond 8.5 maf/year can be made, but they are not protected by the Compact. With annual system water supplies now less than uses and losses, these additional uses are potentially subject to administration. That is why it is now time to make the full extent of tributary uses clear and integrate these uses together with mainstream uses to bring them into compliance with the Colorado River Compact.

IV. Uncertainties Respecting the Meaning of Article III (d) in an Era of Climate Change-Induced Water Shortages

Article III (d) of the Colorado River 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 reckoned in continuing progressive series beginning with the first day of October next succeeding the ratification of this compact." As additions to the system's water supply in the Upper Basin have declined during the past two decades, the ability of the Upper Division states to meet this obligation has come increasingly into doubt.

The annual volume of releases from Lake Powell is governed by the 1968 Colorado River Basin Project Act and the Interim Guidelines that presently serve as operating criteria.[62] Releases are tied to storage elevations in Lake Powell and Lake Mead and are established in four "tiers" intended to equalize or balance storage in the two reservoirs. In general, the objective is to help avoid a shortage declaration in the Lower Basin while protecting uses in the Upper Basin.[63] As mentioned, declines in the storage levels of Lake Mead result when releases for use in the three mainstream Lower Division states and Mexico plus reservoir evaporation exceed inflows. Because of greater drawdowns at Mead, annual releases from Lake Powell have

[60] Special Master's Report at 141.
[61] Special Master's Report at 140.
[62] Secretary of the Interior, Record of Decision Colorado River Interim Guidelines for Lower Basin Shortages and the Coordinated Operations for Lake Powell and Lake Mead, Part XI. (G) (6) (December 2007.)
[63] Under previous Long Range Operating Criteria, the so-called minimum objective release was 8.23 maf/year, representing the presumed 7.5 maf/year obligation under Article III (d) plus one-half of the presumed Mexico delivery obligation (750,000 acre-feet), adjusted for additions of 20,000 acre-feet per year from the Paria River. Additional water could be released under Section 602 (a) of the CRPSA if the Secretary determined it was available without jeopardizing Upper Basin uses.

generally been greater than 8.23 maf over the more than two-decade period of drought.[64] As a result, the Lower Basin has avoided a shortage declaration (until 2022), but storage levels in Lake Powell have dropped substantially and threaten to reach dangerously low levels if the drought persists.

It has generally been presumed that if the 10-year flow obligation to the Lower Basin is not met, water uses in the Upper Division states will have to be curtailed as necessary to make up the difference. The Upper Colorado River Basin Compact includes provisions for addressing this possibility, providing: "In the event curtailment of use of water by the States of the Upper Division at any time shall become necessary in order that the flow at Lee Ferry shall not be depleted below that required by Article III of the Colorado River Compact, the extent of curtailment by each State of the consumptive use of water apportioned to it by Article III of this Compact shall be in such quantities and at such times as shall be determined by the [Upper Colorado River] Commission …."[65] The Upper Division states are evaluating options for avoiding or managing this eventuality, but the consequences of any such curtailment are likely to be disruptive and to raise considerable controversy.

Placing the full burden of a climate-disrupted water supply on the Upper Division states has prompted questions about the meaning and applicability of Article III (d). When the commissioners negotiated this provision in 1922, the apparent water supply seemed sufficient for those commissioners from the Upper Basin to agree to the 75/10 commitment. Even so, Commissioner Carpenter remarked that imposing required minimum flows was problematic: "If you crowd us on the minimum we will have to have a protecting clause on precipitation, because we can't control that. Nature will force us into a violation, any possibility of which we should strenuously avoid in our compact, because that would provoke turmoil and strife."[66] The language of Article III (d) saying that the States of the Upper Division "will not cause" the flow to be depleted below 75/10 suggests that natural reductions in water availability resulting from reduced precipitation would not be regarded as the fault of the Upper Division states. There is special force to this interpretation in view of the fact the Upper Basin is only using about 4.4 maf/year of its 7.5 maf apportionment.

V. Uncertainties Respecting the Sources of Water to Satisfy the Mexico Treaty Obligation

The background leading to the Treaty agreement in 1944 to provide 1.5 maf/year of water to Mexico is fascinating and complicated,[67] but the language of Article 10 (a) is unusually clear:

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[64] Monthly and annual releases from Glen Canyon Dam and other Reclamation reservoirs in the basin are reported in Colorado River Accounting and Water Use Report: Arizona, California, and Nevada (Bureau of Reclamation, annual calendar year).

[65] Upper Colorado River Basin Compact, Article IV.

[66] Minutes of the 16th Meeting, Colorado River Commission, November 14, 1922 at 28.

[67] The best account is provided by Norris Hundley, Jr., Dividing the Waters: A Century of Conflict Between the United States and Mexico (1966).

> Of the waters of the Colorado River, from any and all sources, there are allotted to Mexico: (a) A guaranteed annual quantity of 1,500,000 acre-feet (1,850,234,000 cubic meters) to be delivered in accordance with the provisions of Article 15 of this Treaty.[68]

There had long been sharp disagreement in the United States about the quantity of water that should be provided to Mexico under international agreement.[69] Ultimate resolution turned on a number of factors but included the widespread belief that at least half of the water would simply come from return flows in Arizona and California that could not (or would not) be used in the United States.[70]

Recall that the Colorado River Compact, anticipating a future delivery obligation to Mexico, had apportioned to this obligation first the use of excess or surplus water not apportioned to the two basins in Articles III (a) and (b) and then, if that source of water proved insufficient, the burden was to be shared equally by the two basins.[71] As hopes of such surplus water dissipated, recognition set in that the uses apportioned to each basin would have to be reduced to provide water to Mexico. For many years after the Treaty there was still sufficient water available in the main Colorado River at the Mexican boundary to readily meet the Treaty obligation. That relative abundance of water declined with the construction and filling in the 1960s of the four large reservoirs constructed in the Upper Basin under the Colorado River Storage Project Act—Lake Powell, Flaming Gorge, the Curecanti (Aspinall) Unit, and Navajo. With completion of the Central Arizona Project in the 1990s enabling Arizona to use its full 2.8 maf entitlement from the main Colorado River, sources of water to meet the Treaty obligation became increasingly unclear. Compounding the problem was the recognition that return flows from projects at the lower part of the basin in the United States would only provide a small part of the required water.

A. Water from the Upper Basin

The Upper Basin's obligation to provide water to meet the Treaty obligation to Mexico depends on whether that obligation is being met out of water surplus "over and above the aggregate of the quantities specified in paragraphs (a) and (b) [of Article III]…."[72] A literal reading of this language suggests that the Mexico deliveries must come from annual supplies greater than 16 maf. Presumably these supplies include water available in Lower Basin tributaries as well as in the main river. As hydrologic analyses began to make clear that average annual runoff in the Upper Basin was declining, the states of the Upper Division began expressing their concern about having to provide water for the Mexico delivery when there was

[68] Utilization of Waters of the Colorado and Tijuana Rivers and of the Rio Grande, Treaty Between the United States of America and Mexico, Article 10, Signed at Washington, February 3, 1944. In somewhat less clear language, the Treaty also provided for sharing surpluses and shortages.
[69] *See, e.g.,* Dividing the Waters at 52-55, 68-74, 102-06, 108-10.
[70] Dividing the Waters at 127.
[71] Colorado River Compact, Article III (c).
[72] Id..

not enough for their users to be able to consumptively use the 7.5 maf/year apportioned by the Compact.

These matters came to a head after the U.S. Supreme Court decision in *Arizona v. California* gave Arizona 2.8 maf/year from the main Colorado, opening the door for it to return to Congress seeking funding to build the Central Arizona Project (CAP). During the 1965 hearings on the initial CAP authorization bill,[73] the Upper Colorado River Commission introduced a report showing that consumptive uses in Upper Division states could not exceed 6.3 maf/year, rather than 7.5 maf/year, and still meet their Article III (d) Compact obligation.[74] The report further determined that including additional releases of 750,000 acre-feet per year to meet the Mexico obligation would drop annual consumption to about 5.6 maf/year. While not wishing to block the CAP, numerous spokespeople from the Upper Basin made the point that it was their users that would bear the burden of decreased water availability and that, even with 75 maf passing to the Lower Basin every ten years, eventually there would not be sufficient water in the main Colorado to support consumptive uses of 7.5 maf/year in the Lower Basin and also deliver 1.5 maf/year to Mexico. The Upper Basin argued that if releasing 75 maf every 10 years to the Lower Basin limited the Upper Basin to less than 7.5 maf/year of depletions and if the Lower Basin fully depleted all of the releases from the Upper Basin, the the Lower Basin should meet the obligation to Mexico from sources other than releases from the Upper Basin. At the 1967 hearings, Governor Love of Colorado stated: "It has long been our position that the delivery of 75,000,000 acre-feet of water in every consecutive 10-year period at Lee Ferry, together with the flow originating in downstream tributaries, provides sufficient water to satisfy the lower basin allocation and the Mexican Treaty burden."[75]

Congress, in the 1968 Colorado River Basin Project Act that authorized construction of the Central Arizona Project, established a list of priorities to govern operation of Glen Canyon Dam.[76] First priority is given to "releases to supply one-half the deficiency described in article III (c) of the Colorado River Compact, if any such deficiency exists and is chargeable to the States of the Upper Division, …"[77] Under the Long Range Operating Criteria provided for in the Project Act, the Secretary established a minimum objective release from Glen Canyon Dam of 8.23 maf/year—an amount widely regarded as including 7.5 maf to meet the Article III (d)

[73] Lower Colorado River Basin Project, Hearings Before the Subcommittee on Irrigation and Reclamation of the Committee on Interior and Insular Affairs, House of Representatives, 89th Congress, First Session, August 23, 24, 25, 26, 27, 30, 31, and September 1, 1965.

[74] Id. at 467. Water Supplies of the Colorado River Available for Use by the States of the Upper Division and for Use from the Main Stem by the States of Arizona, California and Nevada in the Lower Basin 5, prepared for the Commission by the engineering firm of Tipton and Kalmbach. The report also stated: "The obvious conclusion is that **a** firm water supply is not available in the Colorado River to satisfy **a** basic beneficial consumptive-use requirement of 7.5 maf from the main stem by Arizona, California and Nevada, plus delivery of 1.5 maf of water to Mexico." At 7.

[75] Colorado River Basin Project, Hearings Before the Subcommittee on Irrigation and Reclamation of the Committee on Interior and Insular Affairs, House of Representatives, 90th Congress, First Session March 13,14 and 17, 1967 at 523.

[76] Colorado River Basin Project Act, Section 602 (a).

[77] Section 602 (a) (1).

requirement and 730,000 acre-feet (plus 20,000 acre-feet from the Paria River) to meet half the Mexico obligation.[78] This operating criteria presumed that there was already a supply deficiency that was chargeable to the Upper Basin.

Three substantially below-average years of runoff in the Colorado River system in the Upper Basin beginning in 2000 prompted the Governor's Representatives on Colorado River Operations in four states of the Upper Division to send a letter to their counterparts in the Lower Division challenging the existence of any obligation for the Upper Basin to provide water to meet the Mexico obligation and denying the existence of any deficiency.[79] The letter stated:

> The fundamental issue for the Upper Basin relates to whether a deficiency exists under Article III (c) of the Compact, which would trigger an obligation of the Upper Basin to share in any such deficiency. As you are aware, it has been our consistent position that because no such deficiency has been shown to exist, the Upper Basin has no obligation in this regard.[80]

Arizona argued that a deficiency of supply did exist, disputing the Upper Basin's view that Lower Basin uses exceeding 8.5 maf/year (they were in excess of 10 maf/year) came from surplus water, and asserting that there could be no surplus unless the annual supply in the system exceeded 16 maf.[81] The potential for litigation of this matter was avoided when the states and Department of the Interior agreed in 2007 on revised Interim Guidelines for the operation of Lakes Powell and Mead through the end of 2025. Consequently, the underlying issue remains unresolved.[82]

B. Water from the Lower Basin

Presumably the states of the Lower Division have an obligation to provide at least half of the water committed annually to Mexico. One of the ways the 1944 Treaty obligation of 1.5

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[78] Criteria for Coordinated Long-Range Operation of Colorado River Reservoirs Pursuant to the Colorado River Basin Project Act of September 30,1968 (P. L. 90-537), June 8, 1970. The states of the Upper Division do not believe a deficiency exists requiring releases of water from Glen Canyon to meet the Mexico obligation.

[79] Letter from Scott Balcomb et al. to Herb Guenther et al., October 7, 2004.

[80] Id. *See also* David H. Getches, Competing Demands for the Colorado River, 56 U.Colo.L.Rev. 413, 421-23 (1985); John U. Carlson & Alan E. Boles, Jr., Contrary View of the Law of the Colorado River: An Examination of Rivalries Between the Upper and Lower Basins, 32 Rocky Mt. Min. L. Inst. 21-1, 21-5(2) (1986).

[81] Arizona's views are present in W. Patrick Schiffer, et al., From A Colorado River Compact Challenge to the Next Era of Cooperation Among the Seven Basin States, 49 Ariz. L. Rev. 217, 220-22 (2007).

[82] There is also the issue whether the Upper Basin's obligation includes its share of the river losses between Lee Ferry and the Mexican border. Schiffer at 225. Estimating losses at 286,000 acre-feet, Arizona concludes releases from Lake Powell for Mexico should be 900,000 acre-feet per year. Arizona proposes that "[a]n annual Compact accounting (including an accurate system supply calculation for the entire Colorado River Basin) by Reclamation should be the measure to determine whether and to what extent there is a deficiency each year, which would determine the extent of any required first-priority release from Lake Powell of the Upper Division States' one-half of the Mexican Treaty obligation (footnote omitted)." Arizona's proposal ignored whether any system-wide deficiency was caused by exceeding the Compact limits on depletions in either basin.

maf/year was made acceptable to the basin states (except California) was the analysis by various interests concluding that much or most of the Treaty obligation would be supplied from unusable return flow and other water. The American Commissioner to the International Boundary Commission, Lawrence M. Lawson, testified to the Senate Foreign Relations Committee considering approval of the Mexico Treaty that natural flows at Yuma had remained unchanged despite the drought of the 1930s, testimony Kuhn and Fleck characterized as "the closest one can get to outright fraud,"[83] and Lawson added that, with the Yuma, Gila, and Central Arizona projects and the desilter at Imperial Dam in place, there would be enough return flows and other water available to meet as much as two-thirds of the Treaty requirements.[84] He was followed by a staff member, Robert Lowry, who testified that water for Mexico would include return flows of 930,000 acre-feet, desilting water of 100,000 acre-feet, and unused Gila River water of 100,000 acre-feet, leaving only 370,000 acre-feet/year to come from other sources.[85] Testimony from a representative of the Bureau of Reclamation supported the assertion that there would be 930,000 acre-feet of return flow going to Mexico.[86]

Because much of this water was expected to come from return flows from the highly saline soils in the Yuma and Gila Projects, questions arose about the usability of the water and its acceptability to Mexico under the Treaty. Royce Tipton, a water engineer from Colorado who served as a consultant to the U.S. Section of the International Boundary Commission and was a member of the American negotiating team, testified that Mexico was obligated under the Treaty to accept any and all water reaching its measuring points during the year, irrespective of quality.[87] Asked by Senator Downey of California if he believed that a court or an international arbitration panel would agree the Treaty obligated Mexico to accept water unusable for irrigation, Tipton replied: "That is my unqualified opinion, Senator…."[88]

Events proved these witnesses to be wrong. It was in fact the problem of salinity that forced a reduction in the proposed irrigable acreage in the Gila Project, required Reclamation to install wells in the Wellton-Mohawk Division to pump out highly saline water from the rising water table underlying irrigated lands, and, when the salinity in this water proved deadly for

[83] Eric Kuhn & John Fleck, Science Be Dammed (2019) at 124.

[84] Testimony of L.M. Lawson, American Commissioner, International Boundary Commission, United States and Mexico, Water Treaty with Mexico, Hearings Before Committee on Foreign Relations, United States Senate, Seventy-Ninth Congress, First Session, on Treaty with Mexico Relating to Utilization of the Waters of Certain Rivers, Part 1, January 22, 23, 24, and 25, 1945, at 82-86 (Mexico Treaty Hearings).

[85] Testimony of Robert L. Lowry, Engineer, American Section International Boundary Commission, Mexico Treaty Hearings, Part 1 at 236.

[86] Testimony of John R. Riter, Hydraulic Engineer, Bureau of Reclamation, Mexico Treaty Hearings Part 2 at 352. See also, Charles A. Carson, Attorney, Colorado River Commission of Arizona, Statement on Behalf of Arizona in Support of Ratification of the Treaty with Mexico: "Our engineers estimate that when we in the lower basin, the deserts of Arizona and the deserts of southeastern California, have reached our ultimate development and utilized every drop of Colorado River water which we can under the law and the Colorado River compact lawfully use, that there will enter the boundary reach of the river of the river, below Imperial Dam, return flow and desilting water in excess of 1,000,000 acre-feet per year. Some estimates run as high as 1,375,000 acre-feet." Mexico Treaty Hearings at 362.

[87] Testimony of Royce Tipton, Mexico Treaty Hearings, Part 2 at 348, 341.

[88] Id. at 341,

irrigation use in Mexico, led first to construction of a bypass channel carrying these saline waters into Mexico to avoid including it in water delivered to Mexico for irrigation use, and then led to Minute 242 and the Colorado River Basin Salinity Control Act under which the United States made a series of commitments to protect the quality of water delivered to Mexico.[89] Consequently, return flows available for use in Mexico were much less than anticipated, and the Wellton-Mohawk and Yuma Project water bypassed to avoid entering the Colorado River does not count as water delivered to Mexico under the Treaty.[90] Nor is Arizona charged with the consumptive use of this water.[91] Moreover, anticipated return flows from the Central Arizona Project never materialized. And leakage from the All-American Canal disappeared when the canal was concrete-lined in the early 2000s with federal and state funding.[92]

For many years there was sufficient unused water coming from upstream to enable releases from Hoover and Davis Dams more than necessary to meet the Mexico obligation. Completion of the Central Arizona Project in the 1990s meant that California could no longer rely on annual surplus declarations allowing it to consume more than its 4.4 maf basic entitlement.[93] The emergence of severe drought conditions in the basin forcing reductions in releases from Lake Powell further reduced storage levels in Lake Mead and constrained releases from Mead in order to avoid a shortage declaration. As a result, the availability of water to meet the Mexico obligation is much less certain.

As explained, releases from Powell will typically continue to include at least the 7.5 maf/year necessary to meet the Compact's Article III (d) obligation as well as an additional 730,000 acre-feet per year. Thus, with inflows from the Paria River and assuming no transit losses, 750,000 acre-feet per year from the Upper Basin will reach Lake Mead to meet the Mexico obligation.[94] Releases from Mead, as regulated by Parker and Davis Dam, serve multiple uses along the main Colorado River before some portion ultimately passes into Mexico. While Reclamation accounts for the total quantity of Treaty water arriving in Mexico annually, it makes no accounting for the sources of water that supply this delivery obligation. Under Minute 323, Mexico now has agreed to share shortages, an agreement that addresses one of

[89] A short summary is provided in Bureau of Reclamation, Bypass Flow Replacement or Recovery Methods History and Background, available online: https://www.usbr.gov/lc/region/programs/bypass/history.html. See also Tina Marie Bell, The Gila Project, Bureau of Reclamation (1997) at 18, 27-28.

[90] Minute 242, Permanent and Definitive Solution to the International Problem of the Salinty of the Colorado River, International Boundary and Water Commission, August 30, 1973, Article 2.

[91] Colorado River Basin Salinity Control Act, Public Law 93-320, § 101 (c). As stated in Balancing Water Needs on the Lower Colorado River: Recommendations of the Yuma Desalting Plant/Cienega de Santa Clara Workgroup, April 22, 2005 at 3: "Under current practice, the WMIDD drainage flow that is bypassed to the Cienega de Santa Clara is treated as if the return flows were beneficially used. This means that, from an accounting sense, return flow credits are issued to the State of Arizona, and thus no Arizona water users are directly impacted by the bypass."

[92] See https://www.iid.com/water/library/all-american-canal-lining-project.

[93] James S. Lochhead, An Upper Basin Perspective on California's Claims to Water from the Colorado River, Part II: The Development, Implementation and Collapse of California's Plan to Live within its Basic Apportionment, 6 U. Denver Water L. Rev. 318 (2004).

[94] River channel losses and evaporation are generally offset by inflows between Lee Ferry and Lake Mead.

the Treaty's ambiguities.[95] Given the increasing limits on the available water supply in the Lower Basin, it may be time to make explicit the sources of water that meet the Mexico obligation and the effect these deliveries have on existing uses in the Lower Basin.

c. Water from the United States

The Colorado River Basin Project Act declared that the satisfaction of the requirements of the Mexican Water Treaty from the Colorado River "constitutes a national obligation which shall be the first obligation of any water augmentation project planned pursuant to section 201 of this Act, and authorized by the Congress."[96] Since no such water augmentation plan ever brought water to the Colorado River system, the question arises whether satisfaction of the Mexico Treaty obligation is still a "national obligation." In the final floor debate of the bill that would become the Colorado River Basin Project Act, Wayne Aspinall, chair of the House Interior and Insular Affairs Committee, said: "The committee believes that the time has come for this water delivery burden to Mexico to be shifted from the backs of seven children to the entire family- from the seven Colorado River Basin States to the United States as a nation."[97]

In many respects, the Bureau of Reclamation acts to ensure that the delivery of the last increments of this obligation is met through a variety of water management options in the Lower Basin including releases from Lake Mead, excess water stored at the Drop 2 (Brock) Reservoir, and the well field in the 5-mile zone near the border. According to Terry Fulp, retired director of Reclamation's Lower Colorado Region, water for Mexico is delivered much like for any other big user on the lower main river.[98] Orders are made on a monthly basis and translated in daily deliveries. Releases are made from Mead accordingly, with only limited ability to manage any changes—especially below Parker Dam. Only small amounts are added from other sources. But there is no accounting for how much of the water is supplied from the Upper Basin or the Lower Basin. From a management standpoint, this approach makes sense. In a time in which additional releases from Lake Powell might lead to reductions in storage levels necessary to efficiently operate the hydroelectric power facilities or, worse, to levels making deliveries of 75 maf/ten years as required under Article III (d) of the Colorado River Treaty impossible, the amounts of water supplied from each basin become relevant. Is it consistent with the Compact that the Upper Basin is obligated to meet its Compact obligation to provide one-half of the Mexico water obligation, while the Lower Basin exceeds its apportioned 8.5 maf/year uses and does not account for its system losses? Consideration should be given to whether the United States can find ways to fund the acquisition of the full required annual delivery to Mexico from sources in the Lower Basin without requiring releases of 730,000 acre-

[95] Minute 323, Joint Report of the Principal Engineers with the Implementing Details of the Binational Water Scarcity Contingency Plan in the Colorado River Basin, International Boundary and Water Commission, September 27, 2017.
[96] Colorado River Basin Project Act, Section 202.
[97] Comments of Wayne Aspinall concerning H.R. 3300, Colorado River Basin Progress, Congressional Record, May 15, 1968 at 13407.
[98] Interview with Terry F. Fulp, retired Regional Director, Lower Colorado River Region, Bureau of Reclamation, June 14, 2021.

feet/year from Lake Powell when storage levels are low. The reduction of releases from Lake Powell to 7.48 maf in a year when storage levels in Powell are at risk of falling below 3525 feet below mean sea level under the Interim Guidelines is a step in this direction.

VI. Uncertainties Respecting Uses of Tribal Water Rights, including Existing but Unquantified Rights

As described in Policy Brief #4 from the Water and Tribes Initiative, 22 of the 30 tribes with reservations in the Colorado River Basin hold quantified rights to use 3.2 maf/year of water from the Colorado River system, and there are 12 tribes with rights not yet fully quantified.[99] Most of these rights originated as "Winters" rights, created at the time the reservations were established if not before.[100] Consequently these rights tend to be very senior and represent a significant claim on the water allocated to each state for use in the Colorado River Basin.[101] Present uses of these rights vary considerably among the tribes, but few tribes have been able to make complete use to date.

Indian reserved water rights are unique in many ways.[102] They come into existence because the purposes for which the reservation were made cannot be accomplished without water. Unlike under prior appropriation, their existence does not arise from actual use. They are perpetual and are not lost by non-use. They are quantified on the basis of the original purposes for which the reservation was established, but their use is not limited to those purposes. Should quantified but unused tribal reserved rights be placed to actual use today their priority will date to the time the reservation was established, not the time they are placed to use. Tribal reserved rights most often are quantified on the basis of practicably irrigable acreage contained within the reservation, but tribal lands are not always located in areas well-suited for agricultural use. Perhaps the greatest need at present is for adequate systems to provide safe drinking water and to support emerging businesses such as casinos as well as to upgrade existing irrigation systems.[103]

There is considerable interest among some tribes to lease a portion of their used and unused rights, including off-reservation. It is likely that Congressional approval is required to allow tribes to lease water off-reservation in most instances, and Congress has provided such authority in a number of tribal water rights settlements. At least twelve settlements for tribes in the Colorado River basin include provisions enabling some form of leasing.[104] According to the Water and Tribes Initiative report, "[s]everal of the Central Arizona Tribes (Salt River Pima

[99] The Status of Tribal Water Rights in the Colorado River Basin at 1, Tribes and Water Initiative, Policy Brief # 4, April 9, 2021(Policy Brief #4).
[100] Winters rights refer to tribal reserved water rights recognized by the U.S. Supreme Court in Winters v. United States, 207 U.S. 564 (1908).
[101] The U.S. Supreme Court decided in *Arizona v. California* that tribal reserved water rights for reservations located within a state were included in that state's allocation. Arizona v. California, 373 U.S. 546, 601 (1963).
[102] For a summary of their legal features, see Colorado River Basin, Section 4 (b). (Colorado River Basin.)
[103] Colorado River Basin Ten Tribes Partnership Tribal Water Study: Study Report, December 2018.
[104] Colorado River Basin, Appendix A.

Maricopa Indian Community, Ft. McDowell Yavapai Nation, Ak Chin Indian Community, San Carlos Apache Tribe, and Gila River Indian Community) collectively lease approximately 117,100 af/yr or 18 % of their total water rights of the 626,806 maf/yr to non-Indian water users under leasing agreements."[105] The Colorado River Indian Tribes have been participating in programs for conservation of water to increase system water and to help maintain storage levels in Lake Mead.[106] The Gila River Indian Community also has entered into agreements foregoing delivery of a portion of its CAP entitlements to help maintain storage levels in Lake Mead.[107]

While it is encouraging to see such examples of increasing opportunities for tribes to enjoy the benefits of their water rights, the opportunities are situation-specific and highly uneven. Almost all the tribes with authority to lease hold rights to water delivered through the Central Arizona Project, a largely serendipitous outcome.[108] The lower mainstream tribes appear to have some flexibility as long as their arrangement has the support of the state in which the reservation is located.[109] The Jicarilla Apache, another tribe authorized to lease water off-reservation as part of its water rights settlement agreement, received water from the San Juan River (Colorado River system tributary,) water that is diverted through the San Juan-Chama Project into the Rio Chama/Rio Grande basin and thus easily available for use off reservation in this basin.[110]

The Colorado River system states have much at stake should tribes find ways to increase their legally-entitled uses of system water. At the same time tribes generally lack the resources to develop and use their water rights and are looking for ways to enjoy the benefits that their use would provide. There are clearly overlapping interests that should be explored.

VII. What to Do?

For most of the 20th Century during which only California was using its basic allocation, sufficient water appeared to be available to agree to a delivery commitment of 1.5 maf/year to Mexico, to allow California to use more water than provided for under its basic allocation, to disregard evaporation and other system losses, and to support federal funding for the Central Arizona Project. As Nevada and then Arizona began taking their full allocations in the 1990s, pressure grew for California to reduce its surplus water uses considered to have been otherwise available for use in Arizona and Nevada. Still the Upper Division states were not using their full

[105] Policy Brief #4, at 3.
[106] See, e.g., System Conservation Implementation Agreement ("SCIA") Between the United States Bureau of Reclamation and the Colorado River Indian Tribes to Implement a Pilot System Conservation Program ("Pilot Program"), September 14, 2016; Colorado River Indian Tribes, Colorado River Indian Tribes Offer Large Supply of Water to Arizona's Drought Contingency Plan Providing Buffer for Lake Mead, available online at https://www.crit-nsn.gov/FINAL%20PRESS%20RELEASE%20PDF.pdf.
[107] Agreement Between the United States of America and the Gila River Indian Community for the Creation of Intentionally Created Surplus for Firming, May 19, 2019.
[108] *See* discussion of the Central Arizona Project in Colorado River Basin, at §4 (D).
[109] See, e.g., Forbearance Agreement between the Quechan Indian Tribes and the Metropolitan Water District, 2005, approved in Arizona v. California, 547 U.S. 150, 152 (2006).
[110] Contract Between the United States and the Jicarilla Apache Tribe, December 8, 1992.

allocations, presumably leaving enough unused water available annually (or through storage) to enable uses and losses in the main Colorado in the Lower Basin well beyond 7.5 maf/year. Few foresaw the dramatic changes in hydrology witnessed in the 21st Century.

To their credit, basin decision makers responded well to these changing conditions—crafting a system for reducing deliveries whenever storage levels in Lake Mead dropped to specified levels (a shortage condition) and developing incentives for voluntarily reducing annual uses while authorizing their storage in Lake Mead for future use (intentionally created surplus).[111] When those measures proved insufficient they developed additional arrangements generally called Drought Contingency Plans in 2019 that anticipated increasing shortages. Reliance on reservoir management provided a means of adjusting deliveries based strictly on reservoir elevation levels, a strategy that finessed many of the issues raised in this paper. As the states, the Bureau of Reclamation, and other interests begin discussions respecting replacements for the Drought Contingency Plans and the Interim Guidelines, addressing some or all of the uncertainties considered in this working paper may be necessary to reach new agreements. Given the magnitude of the challenges facing the basin, it is conceivable the parties would be willing to consider more fundamental changes to some existing pieces of the Law of the River—changes that would help make uses more consistent with water availability on a long-term basis. A recent article by a long-time Arizona water manager calling for all states to reduce uses and address losses is a hopeful sign.[112]

I have long been intrigued by the idea of a negotiated agreement (sometimes called a "grand bargain") that would represent significant compromises on all sides but that would have the potential to move the basin's supply-demand balance closer to long-term sustainability.[113] The pieces, it seems to me, are some kind of limitation on additional consumptive uses in the Upper Basin,[114] agreement on how to meet the Mexico Treaty obligation, flexibility with the Upper Basin's 75 maf/10-year obligation, and reduction or elimination of the structural deficit.

While the three mainstream Colorado River states have reduced their consumptive uses in recent years, uses and losses in these states continue to be the primary driver of the growing gap between system water supply and basin uses. This paper argues that overstated expectations of the amount of water allocated to each state for consumptive use, unwillingness to recognize that uses and losses in Lower Basin tributaries reduce water availability in the main river, and long-standing failure to account for reservoir evaporation, river losses, inadvertent

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[111] For a brief summary of responses to prolonged drought in the first two decades of the 21st Century *see* Lawrence J. MacDonnell, The Law of the Colorado River: Coping with Severe Sustained Drought, Part II (2021), Available at SSRN: https://ssrn.com/abstract=3811024.

[112] Tom McCann, Coming to terms with the reality of the Lower Colorado River Basin's future water use, Posted June 9, 2012 on JFleck at Inkstain, available online at http://www.inkstain.net/fleck/category/colorado-river/.

[113] *See* Lawrence J. MacDonnell, The Disappearing Colorado River, Western Economics Forum 1, Fall 2010.

[114] It is worth noting there remains a strongly held view by many in the Upper Basin that the Upper Division states are permanently entitled to consumptively use 7.5 million acre-feet/year, a perspective that would resist any cap voluntarily placed on depletions in the Upper Basin. Indeed, some have argued that the apportionment of 7.5 maf/year for use in the Upper Basin in Article III (a) of the Colorado River Compact overrides the 75/10 commitment in Article III (d). *See, e.g.,* Carlson and Boles, at §21.5 (1)(a).

overruns, and bypassed flows continue to result in unsustainable uses of mainstream Colorado River water. There can be no long-term prospect for balancing supply and demand without expressly addressing these historical practices.

The basin's water allocation and management system needs a recalibration. Short-term fixes, even ones as creative as the Interim Guidelines, cannot keep pace with the challenges posed by the shrinking water supply. It is time to jettison the luxury of relying on fixed allocations of water as certainties (either basin to basin or state to state,) of fixed delivery obligations, of unmanaged uses in the Lower Basin tributaries, of unaccounted evaporation and river losses, of assumptions that there is sufficient unused water available in the Upper Basin to shore up overuse in the Lower Basin. Uses need to be more directly linked to actual water availability, with mechanisms incorporated into basin water management by which uses regarded as essential can be assured necessary water is available while other uses can be compensated sufficiently to enable temporary nonuse if necessary. Uses need to be able to adjust as basin needs change. It is time to return to basics, humbled perhaps by our failings in understanding the limits of nature and in recognition of our historic default that more is better.

There are others far better equipped than I to know how best to accomplish the necessary rearrangements. A few things seem clear. The basin needs a water budget that is adjustable as hydrological trends change.[115] Existing uses must be protected to the degree necessary and possible. Incentives must be provided to reduce uses no longer regarded as necessary. Uses that continue must be responsive to water availability. Needs of the native ecological systems in the basin must be taken care of. Tribes must be better incorporated into basin decision making.

My purpose here has been to argue that, despite much improvement in basin decision making in recent years, it still relies heavily on assumptions that either were never valid or that can no longer be considered valid in a basin with such a constrained water supply. The Colorado River Compact sought to avoid the harsh realities of the prior appropriation doctrine by essentially providing co-equal rights to use the system's water supply. That vision of an essential resource shared equitably and without unnecessary dispute among the basin states and Mexico is one that must guide our efforts in the upcoming years.

[115] A useful warning is given by Fleck and Udall not to simply establish a new baseline that will itself be shortly out of date. John Fleck & Brad Udall, Managing Colorado River Risk (Editorial,) 372 Science 885 (2021).