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Citation Information

Mark Squillace, A Bold Plan for Saving the Colorado River, 30.1 *Brown J. World Affairs* (2023), available at <https://bjwa.brown.edu/30-1/a-bold-plan-for-saving-the-colorado-river/>

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A Bold Plan for Saving the Colorado River

MARK SQUILLACE

I. INTRODUCTION

Heading into the 2022-2023 water year, the condition of the Colorado River looked dire. The water levels on the River's two main reservoirs (also the two largest reservoirs in the United States)—Lake Powell and Lake Mead—had both plummeted to below 25 percent of the infrastructure's capacity. The numerous smaller reservoirs in the Upper Basin had been drawn down substantially to bolster the supply at Lake Powell. Still, it seemed plausible that the power head at Lake Powell—a hydroelectric facility that serves as many as 5.5 million people in six states—would be lost sometime in the following year.

The winter of 2022-2023 delivered a massive snowpack that brought welcome, if temporary, relief from this ominous situation. But the River remains in a perilous state. Over the past two decades, water users have routinely consumed more than the system's average annual production. One good water year does not change the scientific consensus that the Colorado River Basin will likely experience hotter, dryer weather in future decades due to climate change. Average flows in the River system will likely continue to decline.

The water consumption rate cannot continue to exceed the water supply without serious, negative consequences for the millions of people who depend on the River for water and power. Furthermore, the reduced flows caused by

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FALL/WINTER 2023 • VOLUME XXX, ISSUE I

excessive water consumption will severely compromise the River's ecological condition.

Despite the risks associated with dwindling flows, reducing water consumption poses significant legal, administrative, and political challenges. New water users are extracting or proposing to extract more water out of the system at a time when water resources are already being consumed at unsustainable rates. This exacerbates the existing water supply challenges. Moreover, 30 Native American tribes have historic rights to the River's water resources that predate and thus take precedence over non-native rights; however, many of these rights have not yet been quantified or put to a beneficial use due to a lack of infrastructure.

This article outlines a plan for realistic and relatively modest changes to current water law and policy that could lead to a long-term, sustainable solution to the ongoing Colorado River crisis. These changes can be carried out under the existing prior appropriation legal framework that governs surface water allocation in the seven Basin States. Indeed, implementing these changes presents significant challenges. Many water users will likely feel threatened by any modifications to the existing system, and stiff resistance to such changes should be expected. However, the system cannot continue operating as it has in the recent past without risking collapse. My proposal is a multi-part plan to modify the prevailing system in ways that will reduce water consumption to align with long-term average supply. This plan is offered not as the final word. Rather, it is a framework for engaging in the serious discussion that must be had among the River system's myriad stakeholders.

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II. BACKGROUND

The Colorado River system winds through two countries, the United States and Mexico. In the United States alone it spans seven states—Arizona, California, Colorado, Nevada, New Mexico, Utah, and Wyoming—each of which plays an important role in managing the River's resources. The U.S. Department of the Interior and its Bureau of Reclamation also oversee the operation and management of much of the River's infrastructure, including the two largest reservoirs in the United States, Lake Powell and Lake Mead. In addition, 30 Native American tribes have rights to the water resources of the River and the rights of many tribes have yet to be quantified.

Given its cumbersome political position, it is not surprising that efficient management of the River has proved challenging. The state and federal governments, however, have made substantial efforts to promote better management,

beginning with their adoption of the Colorado River Compact in 1922. The agreement established a barebones program for dividing the River between the Upper Basin (Colorado, New Mexico, Utah, and Wyoming) and the Lower Basin (Arizona, California, and Nevada) at Lees Ferry, which lies just below the Utah border in Arizona. The expectation was that the Upper and Lower Basins would each receive a roughly equal amount of water, or 7.5 million acre-feet (MAF) of water per year. Estimates of Colorado River flows at the time of the Compact's signing were roughly 18 MAF and thus, the Compact's allocation of 15 MAF among the seven States must have seemed relatively safe, even with the understanding that Mexico would also receive an allocation of water, later quantified in a 1944 treaty at 1.5 MAF. However, the original estimates of the River's average annual flows were inflated, at least in part because the Compact was negotiated during one of the wetter periods in the River's history. Climate change and climate-related drought

have taken a further toll on the River's water resources. Indeed, one study found that during the twenty-first century

Only 12.3 MAF has been available—an almost 50 percent decrease from estimated flows in 1922.

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The water allocated to the three Lower Basin States was effectively divided among them by the U.S. Supreme Court, which gave California 4.4 MAF, Arizona 2.8 MAF, and Nevada the remaining 0.3 MAF. Until recently, the Lower Basin States used the entire 7.5 MAF allocated to them by the 1922 Compact. In fact, for many years they were able to use even more than the Compact allocated to them due to a lower demand for water in the Upper Basin.

The Upper Basin states—Colorado, New Mexico, Utah, and Wyoming—wisely chose to divvy up their share of the water by percentage. Unlike the Lower Basin, the Upper Basin's annual consumption has never come close to what it has long assumed was its collective right to 7.5 MAF. For that reason, many Upper Basin states' officials continue to believe that they are entitled to expand their consumptive rights so that they can secure their claim to half of the River's water resources.

This argument is largely entangled with the debate over the 1922 Compact and its language regarding water allocation. The Compact requires that the Upper Basin “not cause the flows of the River at Lees Ferry to be depleted below an aggregate of 75 MAF for any period of ten consecutive years.” This

aggregate averages out to 7.5 MAF per year—the presumed allotment for the Lower Basin. Some Upper Basin advocates have argued, however, that this “non-depletion” obligation should be distinguished from a “delivery” obligation. Under this theory, any failure to meet the ten-year 7.5 MAF obligation resulting from climate change is arguably not a violation of the Compact by the Upper Basin states. Nevertheless, whatever the cause of lower flows, all States must accept that the 1922 Compact was based on a serious factual mistake. Therefore, the Compact provides a wholly inadequate basis for managing the River going forward.

To their credit, the States and the federal government have made strides toward addressing the River’s long-term shortages. These efforts have focused primarily on the Lower Basin and led to the 2007 Interim Guidelines, which set contingency plans for reduced deliveries when certain drought parameters were met. These Guidelines were updated in 2019 with a Drought Contingency Plan. But even as these measures have been implemented, the River’s drought conditions have worsened.

In response to this situation, the Bureau of Reclamation embarked on an environmental assessment process in 2023 to consider short-term water conservation options, and the States responded with an initial offering outlining their preferred outcomes. More importantly, in that same year, the Bureau also announced a process to develop guidelines and strategies for long-term protection of the Colorado River. The following proposal responds most specifically to the latter initiative.

The first step in designing a plan that responds to the crisis facing the River system involves quantifying current water usage. This will help inform decision-makers about the best opportunities for reducing water consumption. It should come as no surprise to those familiar with the River that agriculture consumes approximately 79 percent of the water. Fifty-five percent of Colorado River water goes to growing livestock feed—mostly alfalfa—much of which is exported to foreign countries. Residential use accounts for just 12 percent of water consumption, which is relatively equally distributed across industrial, commercial, and thermoelectric power production.

The Bureau’s current efforts to identify both short and long-term solutions for the crisis on the Colorado River system confirm what most people who have studied the River know: current management is not adequate for addressing the crisis. Something bolder is needed. The plan outlined here will require significant commitments from the Basin States, but it is designed to be flexible and to adapt to changing River conditions.

III. A BOLD PLAN FOR SAVING THE COLORADO RIVER

At the outset, all parties with a stake in the management and use of the Colorado River must recognize that the best and fairest solution to the current crisis requires mutual sacrifices. Realistically, these sacrifices will have to be made under the basic framework of the prior appropriation system, which governs surface water allocation in all seven Basin States. Nonetheless, as proposed below, some modifications to the rules that govern prior appropriation must be considered.

A. A NEW COLORADO RIVER COMPACT

To address the River's serious management issues, the States should adopt a new compact. This compact would not necessarily replace the 1922 Compact but rather redesign the somewhat chaotic system that currently governs River management. A useful model for the proposed new compact is the Great Lakes Compact of 2008. The Great Lakes states did not allocate the water supply by percentage, as was done by the Upper Basin of the Colorado River, which would have allowed the States to adapt to changing conditions as necessary to reflect variations in the water supply. Nonetheless, the Great Lakes Compact adopted two useful innovations. First, it requires each state to create a program for the management and regulation of new and increased water diversions within five years. More specifically, it requires States to modernize their water laws in a common and consistent way to help ensure the overall health of the Great Lakes system. Overseeing the implementation is the Governors' Compact Council, which includes representatives from each of the Great Lakes states.

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One of the difficulties of the current Colorado River management regime is that no state wants to change its laws in ways that might benefit other states unless those other States are prepared to do the same. In the approach taken in the Great Lakes Compact, all states agree to make the necessary changes on a specified timeline with oversight by a designated central authority established by the Compact. Under the framework of mutually binding change, the specific policy recommendations outlined below exemplify the kinds of material changes that the Colorado River Basin states could agree to adopt in order to reduce the strain on the River's water supply.

A second important innovation from the Great Lakes Compact was the decision to include the Canadian provinces of Ontario and Quebec in negotiations. While the Colorado River Basin States have worked hard to include

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Mexico and relevant tribal governments in their negotiations, this has proved especially challenging with the Tribes due to the sheer number that hold rights to water from the Colorado River system. It may be unrealistic to assume that all 30 tribes and Mexico will agree to a set of standards for modernizing water management, but a strong case can be made for equitably sharing the burden of addressing the River crisis (especially with tribes, which enjoy the oldest water rights in the water rights system but often lack the infrastructure to put their water to a beneficial use). Further, the Federal government might promote equitable sharing by offering financial incentives to Mexico and the tribes if they agree to participate. Side agreements with Mexico and the tribes could be used to memorialize their commitment to working with the Colorado River states toward the common goal of protecting the River and conserving its resources.

B. CLOSE THE RIVER TO NEW APPROPRIATIONS

6 An important preliminary step to saving the Colorado River is closing it to most new water rights appropriations, including tributary groundwater. As previously noted, consumptive use of the River's water resources already exceeds the supply. This leaves little room for additional appropriations, something that states on the River system must accept.

An important exception, however, is for tribal water rights. While protecting tribal water rights that are not currently being used will exacerbate the already difficult problem of overconsumption, it would be grossly unfair to place the burden of responding to the current crisis on tribal communities. These communities have too often been denied a meaningful role in managing the River's water resources despite holding water rights that are both substantial and senior to most other water rights. In addition to tribal water rights, certain small domestic users—primarily well owners—who do not contribute measurably to water consumption should be exempt from the River closure policy. Lastly, states may have to accept the perfection of some inchoate rights, primarily the rights of those holding valid existing water permits, although state policies that allow permit holders to extend their permits for multiple decades should be tightened. Beyond these limited exceptions, all Basin states should treat the Basin as closed to new appropriations.

C. MODERNIZE THE PRIOR APPROPRIATION SYSTEM

As previously noted, no Basin state is likely to make significant changes to

its water allocation system unless other Basin states agree to similar sacrifices. If all states were to make the agreed-on changes on a set timeline, perhaps they could overcome the current resistance to change. These changes could be limited, at least initially, to water rights that impact the Colorado River Basin. That said, the changes proposed here broadly reflect good government practice, and states might wisely choose to accept the changes for all water rights granted by their states.

Equally important, the proposed compact, unlike the 1922 compact, should be drafted flexibly to accommodate new or modified agreements among the states and changing River conditions. Furthermore, the text should be drafted carefully to avoid backsliding, perhaps introducing sanctions in the form of reduced water allocations where states fail to meet the compact's terms.

1. Redefine All Basin Water Rights by Diversion Amount and Consumptive Use Amount

Historically, water rights have been defined in terms of the amount that can be diverted. Yet states have long known the importance of determining the amount of water that users consume. This has proved particularly important for water transfers, since states generally limit transfers based on historic consumptive use. If states are committed to reducing consumption on the Colorado River, they will need to know more about the nature and quantity of all users' consumption, and then restrict future consumption accordingly.

Redefining all states' water rights, even if limited to the Colorado River Basin, will take time and impose costs on the water administration system. But this process can likely be streamlined for agricultural water rights because states can leverage the existing work of their agricultural colleges, which have already made good progress in estimating water consumption based on geography, soil types, and crops grown. Of course, consumption can change. A program to redefine water rights in terms of consumptive use might inadvertently spawn efforts to boost consumption in order to maximize an individual's water rights. However, if the historic consumptive use test is applied rigorously, states can minimize this concern. Defining consumptive use for individual water rights will establish a baseline against which states can measure reductions in such use. These reductions could be purchased, ideally in exchange for a permanent commitment to use less water, which would likely prove much more cost-effective than purchasing temporary reductions.

The Basin states could also agree to redefine all their Colorado River

rights in terms of both diversion and consumptive amount by a certain date, perhaps five years after signing the compact. The process of quantifying consumptive use could be facilitated by requiring water users to estimate their use with relevant evidence, including evidence about crops grown during specific periods. These estimates would not bind states, but this data could help avoid disparate consumptive use determinations among similar operations.

2. Tighten Diligence Requirements

8 The process for obtaining a water right typically involves two steps. First, the applicant requests a permit from the relevant water agency to put unappropriated water to beneficial use. If that permit is approved, the state government gives the permittee a reasonable amount of time to construct the necessary diversion works and put the water to the approved beneficial use. Typically, the maximum amount of time to perfect a water right is set by statute, and if the permittee is not diligent in perfecting their water right in this way, the state may cancel the permit. However, state laws frequently allow the diligence period to be extended, often multiple times, and have historically been overly generous in granting these extensions. Municipalities have been particularly aggressive in seeking inchoate rights that they consider necessary to ensure the availability of water resources over the long term and as cities grow. But when cities claim the right to use unperfected water rights 30, 40, or even 50 years into the future, close scrutiny of these claims should be made, and states should perhaps curtail future rights in the absence of compelling evidence—at least where Colorado River water is involved.

Some extensions might be justified, but states must recognize that unperfected water rights in the Colorado River Basin not only threaten existing rights but will create more conflicts when unused water rights are finally secured for Native American tribes. By compact, the Basin states could agree to set specific, strict diligence standards for Colorado River water permittees that, while fair, lead to immediate permit cancellation upon failure to meet these standards.

3. Tighten Abandonment Standards

As with diligence requirements, states have often been lax in enforcing abandonment standards. Prior appropriation states have long followed a “use it or lose it” principle that results in the loss of water rights that have not been used

for their appropriation's intended purpose after a certain number of successive years. This issue is complicated by the fact that states have widely different standards for abandonment. Historically, common law principles allowed property rights, including water rights, to be deemed abandoned by showing nonuse and intent to abandon the right. Some states have laws that establish a rebuttable presumption of abandonment after a certain amount of time has elapsed. The problem with this common law approach is showing intent: parties will go to extraordinary lengths to deny any intention to abandon what is likely a valuable right, and courts often seem sympathetic to such claims.

Many states have adopted forfeiture statutes, whereby rights are automatically lost after nonuse for a set period of years. Here again, courts frequently show reluctance to enforce the forfeiture of a water right—even when the statutory conditions have been met. The abandonment of water rights seems an inherently problematic concept given that a water rights holder will rarely acknowledge intent to abandon their rights. By compact, the Basin states should agree to reject abandonment programs and adopt strict forfeiture standards for Colorado River water rights. When water has not been used for a set period of years and was otherwise legally available to the holder, forfeitures should occur automatically. Furthermore, commencing the reuse of water before a formal declaration of forfeiture should not be allowed to avoid forfeiture because that would undermine the principle that forfeiture happens automatically once its conditions are met.

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4. Tighten Beneficial Use Standards

One of the bedrock principles of prior appropriation law is that water rights are limited to “beneficial use.” Beneficial use is consistently defined, somewhat unhelpfully, as “the basis, the measure, and the limit of the water right.” It essentially commands water users to avoid wasting water. What

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constitutes waste, however, can be difficult to define. Is it wasteful, for example, for a farmer to flood and irrigate their fields when much of the water will rejoin the stream as return flows and be used downstream by other water users?

The beneficial use standard has sometimes been harnessed to describe the “duty of water.” That is, a particular quantity of water that can be used for ir-

rigation under beneficial use principles. For example, farmers in the Imperial Valley often use six acre-feet of water or more to grow alfalfa year-round, much of which is exported to Asia. While farmers profit through the global market for alfalfa, is this really a beneficial use of scarce Colorado River water resources? What if the duty of water for growing alfalfa in the Imperial Valley were limited to five feet per acre or less? This might preclude the last cutting of alfalfa if the farmer continued to operate using past practices, but it would not preclude growing alfalfa, or even getting that last cutting if they could find a way to grow it with less water. It might, however, deny farmers the water they might otherwise want to irrigate a late summer alfalfa crop when temperatures are high, crop growth is low, and water supplies are the most limited. A change in the water duty would not dictate to the farmer what they could grow or when, but it might incentivize the farmer to change their irrigation practices to conserve more water, grow a less water-intensive crop, or perhaps grow a different strain of alfalfa that uses less water.

10 The focus on reducing production of alfalfa and other forage crops might seem unfair; for better or worse, though, reductions in these crops offer the best opportunity to achieve significant water savings at a relatively modest cost. Indeed, a study from the Pacific Institute found that “partial season irrigation” of alfalfa reduced water consumption by 22.7 inches per year in the Palo Verde Valley in the Lower Basin. Adopting this practice throughout the lower Colorado River Basin (primarily in California) would reduce alfalfa production by 25 percent but could yield as much as 834,000 acre-feet of water per year for \$62 per acre-foot (\$51.7M). Ultimately, political leaders must decide whether late-season alfalfa irrigation in the Lower Basin is deemed a non-beneficial use of water, whether farmers are paid to give up that water, or whether some middle ground might be found. Regardless of the specific policy solution, modest changes in the way we grow alfalfa presents an opportunity to save a significant amount of water at a relatively small cost.

The Basin States could agree by compact to tighten their beneficial use standards to limit late-season irrigation, especially in the Lower Basin, where temperatures are hot, yields are relatively low, and water supplies are limited. To make this policy more politically viable, the states might offer some compensation in exchange for reductions in water use, but these reductions must be permanent. It is unrealistic to expect that government can pay for reductions year after year. As a legal matter, however, tightening beneficial use standards should not implicate a valid claim of a compensable taking under the Fifth Amendment of the U.S. Constitution. After all, beneficial use is the limit of the

water right and property rights are not granted for non-beneficial use of water. Moreover, beneficial use has long been understood as a dynamic concept subject to changing conditions, and given the dire circumstances facing the Colorado River, tighter beneficial use standards seem a reasonable strategy for stretching the Basin's limited water supplies.

5. Modify the “No Injury” Rule for Water Transfers

As we seek to reduce consumption in the Colorado River Basin, water transfers will likely become more important. Transfers will not reduce consumption; on the contrary, they will likely lock in consumption for the long term. Facilitating the transfer of existing water rights could ease the demand for new water appropriations and help move water to where it is most needed.

Historically, prior appropriation states have followed a “no injury” rule as a condition for approving water transfers. This rule tends to drive up the transaction costs for getting a transfer approved and, in the process, discouraging transfers. When transfers prove too difficult or expensive to consummate, water users, especially municipalities, look to new infrastructure to meet perceived water needs. This further depletes water supplies and can cause significant adverse environmental consequences.

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Reforming water transfer law will be difficult because it must ensure that the transfers do not unduly harm existing users and it must protect rural communities that will likely lose access to some water. But the current system, which protects against even *de minimis* injuries, disincentivizes water transfers that can be carried out without causing serious harm to existing users or rural communities.

Two particular reforms that the states could agree on in a new compact could help streamline the transfer process without causing undue harm. First, the “no injury” rule could be relaxed to allow non-material injuries to existing users. The “material injury” concept comes from conflicts that arise between groundwater users and surface water users who are drawing from the same source of supply.

While relaxing the “no injury” rule will be controversial, such a modification would not be out of step with existing prior appropriation law, which allows changes in water rights that can cause even material injury to existing users. For example, a farmer can switch to crops that consume more water, recapture and reuse water applied to the land—so long as it is done on the land for which the right was appropriated—or change irrigation practices in ways that consume

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more water or change the timing of return flows. While protecting the settled expectations of existing water users is important, such protections should not extend to minor injuries that make it more difficult to move water resources to places and uses where they are most needed.

A second reform that should alleviate concerns about modifying the “no injury” rule would encourage transfers that allow farmers to keep farming. The rule could be modified by prioritizing and incentivizing only those transfers that leave the farmer with sufficient water to continue to farm—albeit by growing a different crop or engaging in other practices that consume less water, such as deficit irrigation and rotational fallowing.

6. Reinvigorate Public Interest Limits in Water Law

In all of the Colorado River Basin states (except Colorado), the public interest serves as an explicit limit on the allocation of water rights. While the public interest is rarely defined, it affords some basis for limiting water rights that infringe on important public values.

12 In a previous article, I laid out the case for restoring the public interest in Western water law. Yet doing so could easily be perceived as threatening to the settled rules of the prior appropriation doctrine. Furthermore, enforcing public interest limits would likely lead to claims that vested property rights have been taken for public use without just compensation in violation of federal and state constitutions. Whatever the merits of these arguments, they are not frivolous and would likely pose significant obstacles to using public interest to limit existing water rights. However, that does not mean that the public interest is irrelevant to protecting the Colorado River. The River’s protection still holds broad appeal and the public interest could be used to limit or deny the approval of new water rights and bolster arguments supporting some of the other reforms proposed here, including tightening diligence requirements, abandonment standards, and beneficial use standards.

7. Adopt Separate Side Agreements with Mexico and the Tribes

As with the Great Lakes Compact, the Basin states should negotiate separate side agreements with Mexico and the tribes. These agreements should reflect the principles that animate the proposed new compact, namely restoring a

healthy Colorado River system. It should also reflect the joint efforts by the two countries to restore the Colorado River Delta. Establishing an agreement with Mexico should prove relatively easy and could build on the existing agreements whereby Mexico has accepted some reductions in water delivery in exchange for storage rights in Lake Mead.

An agreement with the 30 Native American tribes, while harder to achieve, is critically important if efforts to save the Colorado River are to succeed. The states should not expect that all 30 tribes will have uniform views about how their needs and rights should be addressed. But tribes generally seem amenable to working with the states to achieve their goals, even if that means making some accommodations regarding their legal rights. In particular, some of the tribes need assistance in gaining access to the water that they are lawfully entitled to, and the federal and state governments can agree to support projects to make this access possible. Given the large number of tribes and their disparate interests, it may be that not all of the tribes will be willing to sign on to an agreement. Nonetheless, any agreement should include a significant majority of tribes. Moreover, the agreement should guarantee that the state and federal governments are prepared to treat all tribes fairly—whether or not they are signatories.

Beyond negotiating these necessary side agreements, the Basin states should commit to a transparent process recognizing that Mexico and the tribes are full partners with the states in achieving the goal of a healthy Colorado River system. This will help ensure that the commitments made in the proposed Compact and side agreements are sustainable over the long term.


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CONCLUSION

Saving the Colorado River requires bold thinking. By making mutual and equitable sacrifices with the recognition that all parties have a stake in the River's long-term health, the Basin states can make meaningful reforms.

The goal of restoring a healthy River system can best be advanced if the states come together to negotiate and adopt a new, flexible compact that commits them to modernizing their prior appropriation laws to reflect present-day realities. This should be carried out alongside complementary side agreements with Mexico and the 30 Native American tribes with a stake in the River system.

Many of the reforms proposed here have been previously discussed, but perennially rejected. That must change. Reforming long-standing policies that undergird prior appropriation law will be difficult, and no state would or should

have to do so independently. The path forward will be far easier if all Basin states mutually agree to a common set of reforms. In this way, the Basin states, Mexico, and affected tribal governments will be best positioned to achieve the universally shared goal of a healthy Colorado River system. 

NOTES

1. “Glen Canyon Unit”, Bureau of Reclamation, <https://www.usbr.gov/uc/rm/crsp/gc/>; Madison Selcho, “Is draining human-made Lake Powell a practical solution to drought in the West?”, *Deseret*, August 1 2022.

2. “March Brought Record Snowpack Accumulation to Many Colorado Basins”, U.S. Department of Agriculture, <https://www.nrcs.usda.gov/conservation-basics/conservation-by-state/colorado/news/march-brought-record-snowpack-0>.

3. “Colorado River Basin Water Supply and Demand Study”, Bureau of Reclamation, <https://www.usbr.gov/lc/region/programs/crbstudy.html>.

4. Jennifer Yachnin, “Even in a ‘Megadrought,’ Some Eye New or Expanded Colorado River dams,” *EE News*, June 22 2022.

5. Getches-Wilkinson Center, *The Status of Tribal Rights in the Colorado River Basin*, <https://www.getches-wilkinsoncenter.cu.law/wp-content/uploads/2021/04/Policy-Brief-1-The-Status-of-Tribal-Water-Rights.pdf>.

6. Prior appropriation is a legal doctrine that provides for the allocation of water resources based on priority of right. The earliest users with valid rights receive all of their water before later users receive any water. See Overview of Prior Appropriation Rights, National Sea Grant Law Center, NSGLS, 21-05-02.

7. *Arizona v. California*, 373 U.S. 546, 565 (1963). “Congress gave the Secretary of the Interior adequate authority to accomplish the division. Congress did this by giving the Secretary power to make contracts for the delivery of water and by providing that no person could have water without a contract.”; *Sporhase v. Nebraska*, 458 U.S. 941, 954 (1982). Court held that water is an article of commerce subject to plenary federal control.

8. Getches-Wilkinson Center, *supra* n. 5, at 1, n.2. “The 30 federally recognized tribes in the Colorado River Basin include: Ak-Chin Indian Community, Chemehuevi Indian Tribe, Cocopah Indian Tribe, Colorado River Indian Tribes, Fort McDowell Yavapai Nation, Fort Mojave Indian Tribe, Gila River Indian Community, Havasupai Tribe, Hopi Tribe, Hualapai Indian Tribe, Jicarilla Apache Nation, Kaibab Band of Paiute Indians, Las Vegas Tribe of Paiute Indians, Moapa Band of Paiute Indians, White Mountain Apache, Navajo Nation, Pascua Yaqui Tribe, Quechan Indian Tribe, Salt River Pima-Maricopa Indian Community, San Carlos Apache Tribe, San Juan Southern Paiute Tribe, Shivwits Band of Paiute Indian Tribe of Utah (Constituent Band of the Paiute Indian Tribe of Utah), Southern Ute Indian Tribe, Tohono O’odham Nation, Tonto Apache Tribe, Ute Indian Tribe, Ute Mountain Ute, Yavapai-Apache Nation, Yavapai- Prescott Indian Tribe, and Pueblo of Zuni.”

9. In the United States, water volumes are typically described in terms of “acre-feet” An acre-foot (the amount of water that would cover an acre of land at a depth of one foot), is equal to 325,851 gallons of water.

10. Colorado River Water Users Association, *The Colorado River Compact 2*, <https://watercenter.dev.colostate.edu/wp-content/uploads/sites/33/2019/11/Law-of-the-River-The-Colorado-River-Compact.pdf>; Utilization of Waters of the Colorado and Tijuana Rivers and of the Rio Grande art. 10(a), Mex.-U.S., Feb. 3, 1944, 9 Bevans 1166, 1944 U.S.T. LEXIS 112.

11. E.C. LaRue, Water Power and Flood Control of Colorado River Below Green River, Utah 104-106 (1925). <https://pubs.usgs.gov/wsp/0556/report.pdf>. When measured at Lees Ferry (the cutoff between the Upper and Lower Basins), the discharge rate in 1920 was 19.1

MAF, and in 1921, 19.7 MAF. However, by 1922, the discharge was only 16.2 MAF, and in 1923, the year after the treaty was adopted, it dropped to 14.8 MAF.

12. David Tarboton, “How Dry Can the Colorado River Basin Get,” *Utah State University Today*, July 1, 2022.

13. *Arizona v. California*, 373 U.S. 546, 557, 560 (1963). The Colorado River Compact of 1922 only divided the water between the Upper and Lower Basins. The 1928 Boulder Canyon Project Act, however, pre-approved a Lower Basin Compact to divide the Lower Basin as described in the text.

14. Jason A. Robison and Douglas S. Kennedy, *Equity and the Colorado River*, 42 ENVTL. L. 1157, 1184 (2012). “Over [1971-1999], water use in the Upper Basin grew from approximately 3.0 MAF to 3.3 MAF, and water use in the Lower Basin grew from roughly 6.6 MAF to 8.0 MAF.”

15. Colorado River Compact, Art. III(d).

16. Robison, *supra* n. 13, at 1191.

17. Water Education Foundation, *Colorado River Drought Contingency Plan*, 116 P.L. 14, 133 Stat. 850 (2023), <https://www.watereducation.org/aquapedia/colorado-river-seven-states-agreement>.

18. BUREAU OF RECLAMATION, *SUPPLEMENTAL EIS FOR NEAR-TERM COLORADO RIVER OPERATIONS (last updated July 5 2023)*, <https://www.usbr.gov/ColoradoRiverBasin/interimguidelines/seis/index.html>. The purpose of the SEIS is to consider modifications to the 2007 Interim Guidelines for operating the Glen Canyon and Hoover Dams to address the historic drought, historically low reservoirs, and low runoff conditions in the Colorado River Basin.; *Letter from the seven Colorado River Basin states to the Honorable Camille Touton, Comm’r, Bureau of Reclamation*, May 23, 2023, <https://doi.gov/sites/doi.gov/files/seven-states-letter-5-22-2023.pdf>.

19. Bureau of Reclamation, *Colorado River Post 2026 Operations*, <https://www.usbr.gov/ColoradoRiverBasin/post2026/index.html>.

20. Elena Shao, “The Colorado River is Shrinking. See ‘What’s Using all the Water,’” *New York Times*, May 22, 2023.

21. *Id.* Approximately, 10-12 percent of the alfalfa produced is exported, which means that approximately 5.5–6.6 percent of the water consumed on the Colorado River is used for exported alfalfa.

22. *Id.*

23. Mich. Comp. Laws Serv. § 324.34201 (2023). The Compact is formally known as the Great Lakes–St. Lawrence River Basin Water Resources Compact.

24. Rethinking the Great Lakes Compact, 2006 Mich. St. L. Rev. 1347, 1367.

25. Mich. Comp. Laws Serv. § 324.34201(4.1(3)).

26. Amy Cordalis and Daniel Cordalis, *How Arizona v. California Left an Unwanted Cloud Over the Colorado River Basin*, 5 ARIZ. J. ENVTL. L. & POL’Y 333, 356-57 (2014).

27. Noah D. Hall, *Toward a New Horizontal Federalism: Interstate Water Management in the Great Lakes Region*, 77 U. Colo. L. Rev. 405, 438; Austen L. Parrish, *Mixed Blessings: The Great Lakes Compact and Agreement, the IJC, and International Dispute Resolution*, 2006 MICH. ST. L. REV. 1299 (2006).

28. “Groundwater Resources,” Colorado State University, <https://waterknowledge.colostate.edu/hydrology/groundwater-resources/>. Tributary Groundwater is best defined as “[g]roundwater that is hydrologically connected to a surface stream and which has the ability to influence the amount or direction of flow of water in that stream” Different States, however, use different definitions and the States would have to agree to a common definition for purposes of the proposed Compact.

29. Getches-Wilkinson Center, *supra* n.?? at 3. In addition to unquantified rights, the tribes hold an estimated 3.4 MAF of quantified diversion rights.

30. *Id.*

31. Water rights are generally acquired through a two-stage process. First, a party applies for a permit (called a conditional right in Colorado). If granted, the permit holder is authorized to

use the water for the specific purpose for which it was sought. Once the water is put to beneficial use, the party may apply for a water right. Permit holders are required to exercise reasonable diligence in putting their water to beneficial use. States generally limit the diligence period to five or six years, although that period can be extended if the permit holder can show an intention to use the water coupled with concrete action amounting to diligent efforts to finalize the intended appropriation. *Colorado River Water Conservation Dist. v. City & County of Denver*, 640 P.2d 1139 (Colo.1982). Municipal suppliers often receive long diligence periods due to their need to plan for future demand. These inchoate rights, however, cast a cloud on the water system because they receive a priority date as of the date of their original application, which allows them to jump the priority line when they finally blossom into a water right.

32. Colo. Rev. Stat. § 37-92-103 (2023). In Colorado, an unperfected permit is called a “conditional water right.”

33. Water transfers include changing the use of the water (e.g., from agricultural to municipal), changing the place of use, or changing the point of diversion. See generally, *Water Transfers in the West*, (Western Governors Ass’n, 2012), http://www.westernstateswater.org/wp-content/uploads/2012/12/Water_Transfers_in_the_West_2012.pdf.

34. Colorado State University, *Agricultural Experiment Station Initiatives*, <https://agsci.colostate.edu/agriculture-csu/agricultural-experiment-station-initiatives/>. “Colorado State University has conducted three years of research estimating consumptive water use over an area spanning 1,100 acres of high-altitude irrigated grass pastures that represent the dominant irrigated land uses in western Colorado.”

35. “Beneficial use” is, essentially, the amount of water needed to serve the purpose of the water right without waste.

36. Wyo. Stat. Ann. § 41-4-506. For example, Wyoming requires “final proof of appropriation ... within five years” after the time specified in the approved permit application for completion of the diversion works.

37. *Municipal Subdistrict Northern Colorado Water Conservancy District v. Chevron Shale Oil Co.*, 986 P.2d 918 (Colo. 1999). The Colorado Supreme Court accepted Chevron’s claim of reasonable diligence in developing substantial conditional rights for shale oil development despite the fact that the rights date back to the early 1950s, and Chevron had no realistic possibility of developing the resource due to the lack of economic feasibility.

38. *Pagosa Area Water & Sanitation Dist. v. Trout Unlimited*, 219 P.3d 774, 776 (Colo. 2009). As an example, the Colorado Supreme Court allowed a 50-year planning period for San Juan River diversions.

39. Adam Schempp, *Western Water in the 21st Century: Policies and Programs That Stretch Supplies in a Prior Appropriation World*, 40 ELR 10394, 10395 (2010). “[W]ater rights that are not put to use may be recovered by the state and reallocated to new users; hence the adage, ‘use it or lose it.’”

40. Colo. Rev. Stat. § 37-92-402(11). In Colorado, ten years of nonuse creates a rebuttable presumption that a water right has been abandoned.

41. *East Twin Lakes Ditches & Water Works, Inc. v. Bd. of Cty. Comm’rs*, 76 P.3d 918, 920, 925 (Colo. 2003). The Colorado Supreme Court denied abandonment of a water right that had not been used for approximately 30 years based on the owner’s claim that they did not intend to abandon the right.

42. Wyo. Stat. Ann. § 41-3-401 (2023). For example, in Wyoming, a water rights holder is deemed to have abandoned their right after five consecutive years of nonuse.

43. *Sturgeon v. Brooks*, 73 Wyo. 436, 281 P.2d 675 (1954). Despite a law that seemed to make forfeiture automatic after five years, the Wyoming Supreme Court held that a forfeiture action cannot be brought once reuse has commenced, even where the right had not been used for 5 consecutive years.

44. Wyo. Stat. Ann. § 41-3-101. See also, Colo. Rev. Stat. § 37-92-103(4) (2023), which defines beneficial use as the “use of that amount of water that is reasonable and appropriate

under reasonably efficient practices to accomplish without waste the purpose for which the appropriation is lawfully made.”

45. See Lawrence J. MacDonnell, *Prior Appropriation: A Reassessment*, 18 U. DEN. WATER L. REV. 228, 233 n. 29 (2015).

46. Gerald McKenna, “How Do We Save Water: Stop Growing Alfalfa in Imperial County”, *Desert Sun*, Feb. 5, 2023.

47. Alfalfa is grown throughout the Colorado River Basin but uses much less water per acre in those portions of the Basin that experience hard winters. Samantha Daniel, *Pasture and Forage Minute: Snow Cover for Alfalfa, Critical Cold Considerations*, UNIVERSITY OF NEBRASKA INSTITUTE OF AGRICULTURE AND NATURAL RESOURCES CROPWATCH (Jan. 5, 2023), <https://cropwatch.unl.edu/2023/pasture-and-forage-minute-snow-cover-alfalfa-critical-cold-considerations>. Still, even in the Upper Basin, alfalfa commands a significant portion of water resources used there. Brian Maffly & Mark Eddington, *One Crop Uses More Than Half of Utah's Water. Here's Why*, THE SALT LAKE TRIBUNE (Mar. 13, 2023, 3:58 PM), <https://www.sltrib.com/news/environment/2022/11/24/one-crop-uses-more-than-half>.

48. Maryna Kuzmenko, *Phenotyping for Drought Resistance of Alfalfa*, <https://www.petiolepro.com/blog/drought-resistance-of-alfalfa/>; Matt Yost, et al., *Drought Tolerance Guide for Alfalfa in Utah*, (Utah St. Ext., Aug. 2022)

<https://extension.usu.edu/crops/research/drought-tolerance-guide-for-alfalfa>. Alfalfa is naturally drought tolerant. It simply goes dormant when not it lacks adequate water. But more research is needed into producing alfalfa strains with higher yields and lower water consumption.

49. Michael Cohen, Juliet Christian-Smith, and John Berggren, *Water to Supply the Land: Irrigated Agriculture in the Colorado River Basin*, (Pac. Inst. 2013). <https://pacinst.org/wp-content/uploads/2013/05/pacinst-crb-ag.pdf>. According to the Pacific Institute Study, “partial season irrigation” “involves stopping irrigation during the late summer months when crop growth is low and water supplies are typically the most limited. *Id.* at 62. According to the Pacific institute Study, “partial season irrigation” “involves stopping irrigation during the late summer months when crop growth is low and water supplies are typically the most limited.

50. *Id.* at 63. This would add a significant amount of water to the average of 12.3 MAF that has been available during the 21st century.

51. U.S. const., amend. 5. “... nor shall private property be taken for a public use without just compensation.”

52. *Tulare Dist. v. Lindsay-Strathmore Dist.*, 45 P.2d 972, 1007. “What may be a reasonable beneficial use, where water is present in excess of all needs, would not be a reasonable beneficial use in an area of great scarcity and great need. What is a beneficial use at one time may, because of changed conditions, become a waste of water at a later time.”; *Penn Cent. Transp. Co. v. City of N.Y.*, 438 U.S. 104, 124. Under this test, the Court would consider the nature of the regulation and whether it interfered with reasonable investment-backed expectations. Tighter beneficial use standards could result in a partial loss of a water right, and if a taking was alleged, the claim would be analyzed under the *Penn Central* test.; *Id.* Because water is simply a usufruct that is limited to “beneficial use,” it could be difficult to show that requiring discontinuance of an arguably wasteful water practice amounts to a taking.

53. Denver Water, *What is the Gross Reservoir Expansion Project?*, <https://www.denverwater.org/grossreservoir/about-the-project/what-is-the-gross-reservoir-expansion-project>. Last visited Jul. 14, 2023. For example, Denver Water chose an expensive expansion of its Gross Reservoir rather than relying on some combination of better conservation and water transfers. Colorado River Connected, *Windy Gap Firming Project*, <https://coloradoriverconnected.org/water-diversions/windy-gap-firming-project/>. Last visited July 2023 - likewise, the Northern Colorado Water Conservancy District’s Windy Gap Firming Project is scheduled to divert water from the Colorado River to meet the anticipated needs of its municipal customers.

54. *A&B Irrigation v. Spackman*, 315 P.3d 828, 832 (Idaho 2013). (The case involves a conflict between senior surface water rights holders alleging material injury from the pumping of

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junior groundwater rights holders.)

55. Mark Squillace, *Marketing Conserved Water*, 46 *Envtl.L.*1, 6 (2016).

56. Deficit irrigation can mean simply eliminating the last cutting of a crop like alfalfa. It can also refer to a more sophisticated irrigation method that involves timing the application of water just at the point when the crop begins to show stress. This can save a lot of water without unduly impacting crop yields. Rotational fallowing involves taking parcels of land “out of production every season on a rotating basis to free up a fixed amount of water annually.” *Id.* at 5-19.

57. Mark Squillace, *Restoring the Public Interest in Western Water Law*, 2020 *Utah L. Rev.* 627 (2020). Although the Colorado Constitution makes the water of all-natural streams in the states “the property of the public, and . . . dedicated to the use of the people,” in *Board of County Commissioners of the County of Arapahoe v. United States*, the Colorado Supreme Court held that “[c]onceptually, a public interest theory is in conflict with the doctrine of prior appropriation because a water court cannot, in the absence of statutory authority, deny a legitimate appropriation based on public policy.” 891 P.2d 952, 972 (Colo. 1995).

58. *Id.*

59. See generally, *The Water and Tribes Initiative*, available at, <https://www.waterandtribes.org>.