

Arizona Journal of Environmental Law & Policy  
Spring, 2014

Article  
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## **\*130 ARIZONA v. CALIFORNIA & THE COLORADO RIVER COMPACT: FIFTY YEARS AGO, FIFTY YEARS AHEAD**

*Hydrologic conditions in the Colorado River Basin have changed markedly in the fifty-year period since the U.S. Supreme Court announced the seminal Colorado River decision of Arizona v. California in 1963. As projected by the Bureau of Reclamation in its recent Colorado River Basin Water Supply and Demand Study, this pattern of change is anticipated to persist during the next fifty years. Water demands exceeded supplies on average in the basin for the first time in recorded history over the past decade, and this supply-demand imbalance is forecast to widen between now and 2060, absent changes in the status quo. Rooted in concerns about reliance interests and expectations attached to Colorado River water in the Lower Basin, this Article considers the nuanced relationship between Arizona v. California and the Colorado River Compact as this relationship is implicated by the supply-demand imbalance.*

*We initially provide an overview of the Compact's prominent role in the Arizona v. California litigation--notwithstanding the majority's ultimate disregard of it in the final decision. We then consider Arizona v. California's facilitation of water uses and losses in the Lower Basin over the past several decades and essential parameters put into place by the Compact that bear on future efforts to manage these uses and losses. We conclude by advocating for the formulation of a Lower Basin water budget that is informed by the Compact's basinwide apportionment scheme as a means for navigating the supply-demand imbalance.*

### **TABLE OF CONTENTS**

I. INTRODUCTION	132
II. THE COMPACT, THE PROJECT ACT, AND THEIR ROLE IN ARIZONA V. CALIFORNIA	134
A. Compact	134
B. Project Act	136
C. Treatment of the Compact and Project Act in <sup>Arizona v. California</sup>	137

III. ARIZONA V. CALIFORNIA AND THE COMPACT IN CONTEMPORARY TIMES	143
A. Mainstream Uses & Losses	14444
B. Tributary Uses & Losses	14646
C. Untitled Water Use	14848
D. Flow Obligations and Future Mainstream Supply	15151
E. Prescription: A Lower Basin Water Budget	155
IV. CONCLUSION	15858

## \*132I. INTRODUCTION

In the landmark 1963 decision of *Arizona v. California*, the U.S. Supreme Court decided that Congress had allocated via the Boulder Canyon Project Act (Project Act) consumptive use of 7.5 million acre-feet (maf) of water from the Colorado River mainstream among Arizona, California, and Nevada.<sup>1</sup> In making this determination, the Court avoided consideration of how this purported congressional allocation fit within the apportionment of Colorado River system water previously made by the seven states of the Colorado River Basin in the 1922 Colorado River Compact (Compact).<sup>2</sup> Arizona filed this original action with the Supreme Court in 1952 seeking to have the Court quiet its title to 3.8 maf of system water.<sup>3</sup> Like the other parties to the litigation, Arizona believed it was asking the Court to decide its rights to consumptively use a portion of the 8.5 maf of system water apportioned under the Compact to users in Arizona, California, Nevada, New Mexico, and Utah--located in what had been defined in the Compact as the "Lower Basin."<sup>4</sup> The parties sought to persuade the Court of their respective rights under different theories, but they all initially assumed they were asking the Court to divide the use of the 8.5 maf apportioned by the Compact.<sup>5</sup> Treating the Project Act as dispositive of the litigation, however,<sup>6</sup> the Court took a different track. It again said nothing about how the congressional allocation announced in \*133 the case fit within the Compact's framework and suggested that states were free to use water from tributaries to the Colorado River in the Lower Basin.<sup>7</sup>

The apparent result of the Court's decision in *Arizona v. California* was to create two independent allocation schemes: one contemplating consumptive use in the Lower Basin of up to 8.5 maf from the mainstream and tributaries, the other contemplating consumptive use of 7.5 maf from the mainstream and unrestricted uses along the tributaries.<sup>8</sup> An important but unintended consequence of this apparent dichotomy has been an enlargement of consumptive uses and losses of system water exceeding that originally anticipated by the Compact and currently pushing up against the physical supplies of water available for use in the Lower Basin. The Bureau of Reclamation in its recent Colorado River Basin Water Supply and Demand Study (Basin Study) projected the imbalance between water supplies and demands in the basin to approach 3.2 maf annually between now and 2060 (equivalent to more than *one-trillion* gallons of water per year).<sup>9</sup> With basinwide water demands exceeding water supplies on average for the first time in the roughly 100-year historical record during the past decade,<sup>10</sup> the ongoing viability and legal status of these enlarged Lower Basin uses has become and will continue to be important.

Stemming from concerns about the impacts of the supply-demand imbalance on reliance interests and expectations attached to Colorado River water in the Lower Basin, this Article examines the relationship between *Arizona v. California* and the Compact from historical and contemporary angles. Part II considers arguments made by Arizona and California in the litigation related to their rights under the Compact, the rejection of these Compact-based arguments by two Special Masters and the Supreme Court, and the ways in which the final determination that Congress had allocated consumptive use of 7.5

maf of mainstream water to Arizona, California, and Nevada confused the Compact's meaning and administration. Part III then takes a contemporary turn. It initially assesses the role played by the Court's decision in facilitating water uses and losses along the Colorado River mainstream and tributaries in the Lower Basin. It then focuses on what are termed "untitled water uses" and their legal status under the Compact, as well as related issues concerning future mainstream supplies in the Lower Basin as influenced by specific Compact provisions. \*134 Finally, it concludes on a prescriptive note by addressing the topic of a Lower Basin water budget informed by the Compact and tailored to reconcile the uses and losses facilitated by *Arizona v. California* with hydrologic realities in the basin. We begin with an overview of the Compact, the Project Act, and *Arizona v. California*.

## II. THE COMPACT, THE PROJECT ACT, AND THEIR ROLE IN *ARIZONA V. CALIFORNIA*

### A. Compact

A basic sense of the Compact's apportionment scheme for water use throughout the Colorado River system is essential to appreciating the nuanced historical and contemporary relationship between *Arizona v. California* and the Compact. The Compact's "primary purpose"<sup>11</sup> is "to provide for the equitable division and apportionment of the use of the waters of the Colorado River System."<sup>12</sup> To this end, the Compact divides the Colorado River Basin into two "basins"--the "Upper Basin" and "Lower Basin"--at Lee's Ferry, in northern Arizona,<sup>13</sup> and apportions to each of these basins the use of water from the "Colorado River System," which is defined as "that portion of the Colorado River and its tributaries within the United States."<sup>14</sup> Generally speaking, the "Upper Basin" consists of parts of Colorado, New Mexico, Utah, and Wyoming above Lee's Ferry that lie within the hydrologic boundaries of the Colorado River Basin or that fall outside these boundaries but to which water from the basin is diverted.<sup>15</sup> "Lower Basin" is defined in a similar manner primarily with respect to parts of Arizona, California, and Nevada, but also small parts of New Mexico and Utah, below Lee's Ferry.<sup>16</sup>

Outlined in Article III, the Compact's apportionment scheme provides for beneficial consumptive use within the United States of up to 16.0 maf of water from the Colorado River system annually. (One acre-foot equals 325,851 gallons of water.)<sup>17</sup> Article III(a) authorizes the Upper and Lower Basins each to consumptively use 7.5 maf of water \*135 per year,<sup>18</sup> and Article III(b) gives the Lower Basin the right to increase its annual consumptive use by 1.0 maf.<sup>19</sup> In addition to setting out the Upper and Lower Basins' respective 7.5 maf and 8.5 maf entitlements, Article III(c) incorporates a 1.5 maf annual entitlement held by Mexico under a 1944 Treaty.<sup>20</sup>

Two flow obligations accompany these entitlement-related provisions. Article III(c) dictates that the flows needed to satisfy Mexico's treaty entitlement must be "supplied first from the waters which are surplus over and above the aggregate of the quantities specified in paragraphs (a) and (b)."<sup>21</sup> If such surplus is insufficient for this purpose, Article III(c) calls for the deficiency to be "equally borne by the Upper Basin and Lower Basin" and requires the "Upper Division states" (Colorado, New Mexico, Utah, and Wyoming)<sup>22</sup> to deliver at Lee's Ferry "water to supply one-half of the deficiency."<sup>23</sup> Similarly, Article III(d) prohibits the Upper Division states from causing the Colorado River's flow at Lee's Ferry to be depleted below 75,000,000 acre-feet during any consecutive ten-year period.<sup>24</sup>

Dovetailing with these provisions addressing the Upper and Lower Basins' entitlements and flow obligations are two additional paragraphs within Article III that concern "further equitable apportionment" of water use from the Colorado River system--*i.e.*, equitable apportionment that would be supplemental to Article III's existing scheme. Article III(f) authorizes further equitable apportionment at any time after October 1, 1963, if either the Upper or Lower Basin has reached its "total beneficial consumptive use" as prescribed by Article III(a) and (b).<sup>25</sup> In turn, Article III(g) generally outlines the process through which such further equitable apportionment is to take place.<sup>26</sup> Broadly speaking, this process must be initiated by two or more of the basin states and entails convening a commission of appointed federal and state representatives analogous to the original Colorado River Commission.<sup>27</sup>

### \*136B. Project Act

Following on the heels of the Compact's formation in 1922, Congress passed the Project Act six years later in 1928 primarily to authorize construction of what became Hoover Dam and the All-American Canal, but also to confer federal approval on a six-state Colorado River Compact.<sup>28</sup> Members of Congress from the Upper Division states wanted a compact before they

would be willing to support funding these substantial water development projects in the Lower Basin.<sup>29</sup> Several attempts had been made to get the seventh (holdout) basin state, Arizona, to sign the Compact, and Congress made another attempt in the Project Act. Section 4(a) of the Act approved in advance a three-state compact that would give from the 7.5 maf of water use apportioned to the Lower Basin in Article III(a) of the Compact consumptive use of 2.8 maf to Arizona, 4.4 maf to California, and 0.3 maf to Nevada.<sup>30</sup> No such three-state compact was ever formed. Included within this section of the Project Act is a provision requiring California to limit its consumptive use of Colorado River water to no more than 4.4 maf of the water use apportioned to the Lower Basin by Article III(a).<sup>31</sup> As discussed below, this limitation became especially important in the *Arizona v. California* litigation. With regard to its relationship to the Compact, the Project Act makes clear that its provisions are intended to be consistent with the Compact's, including those in Article III highlighted above. Section 8(a) provides:

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.<sup>32</sup>

### **\*137C. Treatment of the Compact and Project Act in Arizona v. California**

Moving forward roughly three decades from the Project Act's enactment, the parties to the *Arizona v. California* litigation all initially assumed the issue presented concerned allocation of the water use apportioned to the Lower Basin by the Compact. Thus Nevada argued: "For some thirty-four years there have been grave differences of opinion and interpretations of [the] Compact between the respective parties thereto .... [T]he basic question in this case is the final judicial interpretation thereof ... no final decree of the Court can terminate the controversy that is not premised upon the interpretation of that basic law."<sup>33</sup> To this New Mexico added: "the adjudicatory power of the nation is called upon to interpret that compact made by and among sovereigns."<sup>34</sup> Simply put, over its roughly eleven-year course, *Arizona v. California* was largely driven by contested interpretations of the Compact's framing provisions in Article III and the meaning of § 4(a) of the Project Act. We focus in this section exclusively on the Compact-related arguments presented by Arizona and California during the litigation and the treatment of these arguments by Special Masters Haight and Rifkind and ultimately the Court.<sup>35</sup>

**1. Arizona's Arguments.** Arizona's initial litigation strategy was to attempt to limit California's uses of Compact water to 4.4 of the 7.5 maf annually apportioned to the Lower Basin under Article III(a)--emphasizing the limitation contained in § 4(a) of the Project Act--and to argue that water uses in the Lower Basin tributaries had been excluded from this apportionment.<sup>36</sup> The particulars of these arguments today are less important than the basic fact that Arizona felt it needed to fit its case within the Compact's framework. Later, Mark Wilmer changed Arizona's position regarding the meaning of the Compact by asserting the water apportioned by Article III(a) was that obligated to come from the Upper Basin under Article III(d).<sup>37</sup> On this view, Arizona pointed out that Article III(d) water was **\*138** the only water shared by the two otherwise hydrologically-separate basins and thus the only water about which the Upper Basin was concerned.<sup>38</sup> This interpretation served both to protect Arizona's uses of the Lower Basin tributaries and to explain the reference in § 4(a) of the Project Act that limited California's water use to 4.4 maf of that apportioned by Article III(a). Alternatively, Arizona asserted that Congress, in the Project Act, had modified the Compact so as to exclude the Lower Basin tributaries from its coverage.<sup>39</sup>

**2. California's Arguments.** In contrast, California emphasized how the water use apportioned to the Lower Basin in Article III(a) of the Compact was from the Colorado River *system*, defined as the mainstream and tributaries in the United States.<sup>40</sup> Not only did this mean that California shared in the right to use water contributed to the mainstream from Lower Basin tributaries, it also meant that Arizona's uses of the tributaries (especially, the Gila River) had to be counted against its share of the 7.5 maf of water use in Article III(a).<sup>41</sup> California further argued that the additional 1.0 maf of consumptive use authorized in the Lower Basin by Article III(b) was not a permanent apportionment--and certainly had not been apportioned exclusively to provide for Arizona's uses along the Gila--and should be considered only when allocating rights to use surplus water as provided in § 4(a) of the Project Act.<sup>42</sup> Treating this 1.0 maf as surplus would mean California and Arizona would **\*139** equally share it.<sup>43</sup> Further, in rebuttal to Arizona's later argument that the Compact governed only water coming from the Upper Basin under Article III(d), California noted two things. First, this flow obligation is stated as 75.0 maf over consecutive ten-year periods, not as 7.5 maf per year. Second, Article III(a) apportions consumptive use of 7.5 maf annually,

while Article III(d) provides only an average of 7.5 maf of flow at Lee's Ferry--insufficient to enable 7.5 maf of consumptive use from the mainstream in the Lower Basin.<sup>44</sup>

It also should be highlighted that California at one point early in the litigation moved to join all seven basin states, arguing their joinder was essential because the suit involved issues of Compact interpretation that affected all of their interests.<sup>45</sup> As described by California at this juncture in the proceeding, "[n]o decree determining the meaning and effect of that Compact, considered as a contract, can be fully effective in the absence of [all of the] parties to it."<sup>46</sup> Ultimately, Special Master Haight denied California's motion as to the basin states as a whole, solely joining New Mexico and Utah in their limited capacities as Lower Basin states.<sup>47</sup> It seems very possible that the absence of the Upper Division states in the litigation, as a consequence of Special Master Haight's ruling, subsequently prompted Special Master Rifkind and the Supreme Court to avoid resting their respective decisions on interpretations of the Compact.

**3. Special Master Rifkind's Treatment.**<sup>48</sup> In his Final Report to the Supreme Court, Special Master Rifkind concluded that "the provisions of the Compact are addressed \*140 solely to the relations of basin to basin and not of state to state ...."<sup>49</sup> He thus declined to consider these provisions dispositive of the litigation.<sup>50</sup> Instead, he concluded Congress in the Project Act had itself already apportioned the uses of mainstream water that were in fact the only direct subject of dispute.<sup>51</sup> Even so, he had a Compact problem to overcome. As mentioned above, Congress in § 4(a) of the Project Act had limited California's use to 4.4 maf of the water apportioned to the Lower Basin in Article III(a) of the Compact and had authorized a three-state agreement under which Arizona would receive consumptive use of 2.8 maf of that same Article III(a) water.<sup>52</sup> Faced with the fact that Article III(a) apportions water from the "Colorado River System"--again, defined as the mainstream *and* its tributaries, rather than the mainstream alone--the Master decided that Congress had really meant to refer to 7.5 maf of mainstream water in § 4(a) of the Project Act and had mistakenly referred to this water as Article III(a) water as a "shorthand."<sup>53</sup>

Despite his view that the Project Act controlled the litigation, the Master did offer some noteworthy interpretations of contested Compact provisions in dicta. He rejected Arizona's arguments that the Compact applied only to the mainstream, concluding: "[T]he plain words of the Compact permit only one interpretation--that Article III (a), (b), (c), (f), and (g) deal with both the mainstream and the tributaries."<sup>54</sup> He also construed the allocations to the Upper and Lower Basins in Article III(a) and (b) as limits on consumptive use, not a source of supply.<sup>55</sup> In addition, he viewed Article III(b) as equivalent in legal effect to Article III(a)--*i.e.*, as a permanent apportionment to the Lower Basin to consumptively use up to 1.0 maf of system water beyond the 7.5 maf provided in Article III(a).<sup>56</sup> Finally, the Special Master concluded that the phrase "beneficial consumptive use" as used in Article III(a) and (b) referred to "consumptive use (as opposed to non-consumptive use, *e.g.*, water power) measured by the formula of diversions less return flows, for a beneficial (that is, non-wasteful) purpose."<sup>57</sup>

**\*1414. U.S. Supreme Court's Treatment.** The Supreme Court's majority opinion adopted the Master's conclusion that Congress had already apportioned use of Lower Basin mainstream waters in the Project Act.<sup>58</sup> It avoided commentary altogether on Congress's reference to Article III(a) water in § 4(a).<sup>59</sup> The opinion noted that the Project Act adopted a few definitions from the Compact and required in § 8(a) that contracts for the use of water, among other things, were "subject to" the Colorado River Compact.<sup>60</sup> But "[s]uch references, unlike the explicit adoption of terms, were used only to show that the Act and its provisions were in no way to upset, alter, or affect the Compact's congressionally approved divisions of water between the basins," and they were not "intended to make the Compact and its provisions control or affect the Act's allocation among and distribution of water within the States of the Lower Basin."<sup>61</sup>

Justice Douglas, writing in dissent, asserted that "the Compact is the mainspring from which all rights flow."<sup>62</sup> He generally agreed with California's arguments, noting that the Compact apportioned consumptive use of 8.5 maf of system water to the Lower Basin in Article III(a) and (b) and that Congress in § 4(a) of the Project Act required California to limit itself to use no more than 4.4 maf of the 7.5 maf apportioned by Article III(a).<sup>63</sup> Thus, in Justice Douglas's view, the limitation should not be viewed solely in terms of mainstream water use. He contended interpretation of the Project Act required consideration of the Compact.<sup>64</sup>

The Court subsequently issued its implementing Decree in *Arizona v. California* in 1964 (one year after the opinion).<sup>65</sup> The Decree gives the Secretary of the Interior authority to manage reclamation facilities on the mainstream below Lee's Ferry to assure delivery of water committed to Mexico under the Treaty (and Compact) and to provide water as \*142 available to enable consumptive uses in Arizona, California, and Nevada.<sup>66</sup> The Decree authorizes the Secretary to deliver enough water to enable consumptive use of more than 7.5 maf per year in these states collectively if sufficient water is available (surplus conditions).<sup>67</sup> When only enough water is available to enable consumptive use of 7.5 maf (normal conditions), Arizona gets to

consume 2.8 maf, California 4.4 maf, and Nevada 0.3 maf.<sup>68</sup> If supplies are insufficient for consumptive use of 7.5 maf (shortage conditions), then the Secretary--in consultation with the contractors--is to apportion the shortages subject to certain guidelines (*i.e.*, an order of priority and related limitation).<sup>69</sup> The Decree defines “consumptive use” as diversions less return flows, leaving reservoir evaporation and other losses to be accounted for in determining the amount of water available for release annually, rather than treating these losses as “consumptive use.”<sup>70</sup> The Decree effectively revised provisions in the Arizona and Nevada water delivery contracts that would have diminished uses to offset any consumption above Lake Mead.<sup>71</sup> It also authorizes the Secretary to deliver any apportioned but unused water to other Lower Division states.<sup>72</sup>

**5. Summary.** *Arizona v. California* decided that Congress in the Project Act had already awarded annual consumptive use of 2.8 maf to Arizona, 4.4 maf to California, and 0.3 maf to Nevada from the Colorado River mainstream in the Lower Basin. The Court expressly disavowed any intent to interpret, apply, or alter the Compact.<sup>73</sup> But its decision \*143 appeared to transform the Compact’s apportionment to the Lower Basin of 8.5 maf of consumptive use from both the mainstream and the tributaries to an apportionment of 7.5 maf of mainstream consumptive use by Arizona, California, and Nevada, leaving uses of the tributaries to the states through which they pass.<sup>74</sup> In the next Part, we turn to an analysis of the consequences of the Court’s decision on current and future levels of water depletions in the Lower Basin and on the role played by the Compact in bringing these depletions into balance with water availability.

### III. ARIZONA V. CALIFORNIA AND THE COMPACT IN CONTEMPORARY TIMES

Much has changed in and around the Colorado River Basin since *Arizona v. California* was decided fifty years ago, and the ratio of water supplies to demands marks one of the most fundamental and prominent of these changes. Hydrologic conditions in the basin are not what they used to be. As mentioned in the introduction, water demands exceeded water supplies on average across the past decade, a pattern that had not been observed previously in the roughly century-long historical record.<sup>75</sup> Nor does it appear that these conditions are likely to abate anytime soon. The Basin Study again projects a 3.2 maf annual imbalance to emerge between water supplies and demands over the next fifty years.<sup>76</sup> Climate change and its impacts on Lee’s Ferry flows weigh heavily on the supply side of this imbalance. An 8.7% decrease in average “virgin” levels of Lee’s Ferry flows is projected in the Basin Study between now and 2060, which translates to annual flows of 13.7 maf as contrasted with the historical average of 15.0 maf.<sup>77</sup> On the demand side, Upper Basin water demands are projected to increase from roughly 3.8 maf as of 2010 to somewhere between slightly below 5.0 maf and 6.0 maf by 2060.<sup>78</sup> Even higher projected increases exist for the \*144 Lower Basin-- namely, water demands slightly above 8.0 maf per year in all growth scenarios by 2015, approaching 8.5 maf in several scenarios by 2035, and ranging from approximately 8.5 maf to 10.0 maf across scenarios by 2060.<sup>79</sup>

These figures raise serious concerns, in our view, about the extent to which current and projected water demands in the Lower Basin comport with hydrologic realities in the Colorado River Basin. *Arizona v. California* has facilitated, and will continue to facilitate, these demands in both direct and indirect ways. Our overarching argument in this Part is that the Compact’s basinwide apportionment scheme provides a crucial framework for managing these demands going forward. In short, water uses and losses facilitated by *Arizona v. California* should be reconciled with the Compact as a means for navigating the Lower Basin’s water future. We unfold this argument throughout the five sections below. The first and second sections examine the various types of water uses and losses facilitated by *Arizona v. California* in the Lower Basin--initially along the Colorado River mainstream and subsequently on its tributaries. The third section then addresses “untitled water use” (a phrase explained below) resulting from these uses and losses based on their relation with the Lower Basin’s 8.5 maf entitlement in Article III(a) and (b). In the fourth section, we turn to the flow obligations in Article III(c) and (d) and their bearing on future mainstream water supplies available for release under the *Arizona v. California* decree. Finally, the fifth section concludes prescriptively by advocating for the formulation of a water budget in the Lower Basin that is informed by the Compact’s apportionment scheme and framed realistically around hydrologic conditions in the basin.

#### A. Mainstream Uses and Losses

Over the past five decades since its announcement, *Arizona v. California* has served to facilitate extremely high levels of consumptive uses and losses along the Colorado River mainstream in the Lower Basin. It would be no exaggeration to say that these uses and losses constitute the foundation of major components of the Lower Division states’ (and U.S. Southwest’s) economies. Would Las Vegas exist without Colorado River water? Consider similarly the Central Arizona

Project's role in fueling Phoenix's growth, the Colorado River Aqueduct's significance for Los Angeles and its greater metropolitan area, and in the agricultural sector water routed through the All-American Canal for irrigation in California's Imperial Valley. All of these water demands are authorized and governed by *Arizona v. California*.

To put a finer point on the scope of mainstream consumptive use facilitated by *Arizona v. California* in the Lower Basin, the broad pattern apparent over the past few decades--as evidenced most recently by the Basin Study--is that the Lower Division states \*145 gradually have grown into (and reliant upon) the collective 7.5 maf entitlement set forth in the *Arizona v. California* decree for normal conditions.<sup>80</sup> Generally falling below 7.0 maf per year throughout the 1970s and 1980s, 1989 marked the first year in which these states collectively consumed 7.5 maf of mainstream water.<sup>81</sup> This growth trend continued through the 1990s and early 2000s--reaching its highest point of 8.41 maf in 2002--before tapering off from 2002 to 2010.<sup>82</sup> Mainstream use in the Lower Basin was 7.38 maf as of 2010 and averaged 7.62 maf per year across the prior ten years.<sup>83</sup> The essential point of these figures is as obvious as it is significant: *Arizona v. California* has facilitated levels of mainstream use in the Lower Division states in contemporary times--and extensive reliance interests rooted in this consumptive use--that approximate or exceed the states' collective 7.5 maf decree entitlement.

Supplementing the foregoing mainstream use, *Arizona v. California* also has facilitated water users in the Lower Division states becoming reliant on the "buffer" of water needed to cover reservoir evaporation and other losses in order to enable their consumptive use. As mentioned earlier, for purposes of measuring the Lower Division states' levels of "consumptive use" (individually and collectively), the *Arizona v. California* decree utilizes the "diversions less return flow" method, which does *not* treat as "consumptive use" reservoir evaporation and other losses.<sup>84</sup> Instead, these losses are taken into account by the Secretary of the Interior when assessing the amount of water available for release under the decree in a given year.

Figures in the Basin Study reveal that the size of this water "buffer" for reservoir evaporation and other losses in the Lower Basin is significant. Reservoir evaporation losses throughout the Colorado River Basin averaged 1.81 maf annually across the preceding decade--a period of unusually low storage levels--and totaled 1.69 maf in 2010.<sup>85</sup> More than half of these losses occurred from the large mainstream reservoirs in the Lower Basin: Lake Mead, Lake Mojave, and Lake Havasu. A ballpark range for these losses across this period is 0.90 maf in 2010 to 1.25 maf in 2000, with 1.0 maf as a rough annual average for the decade.<sup>86</sup> Augmenting these losses are losses due to phreatophytes along the Colorado River mainstream in the Lower Basin, which averaged 0.64 maf per year from 2000 to 2010.<sup>87</sup> An additional form of losses are those attributable to "operational inefficiency" in the Lower Basin--*i.e.*, "return flows from the Wellton-Mohawk Irrigation and Drainage District that \*146 are not allowed to return to the river due to salinity concerns and non-storable flows that are delivered to Mexico in excess of Treaty requirements."<sup>88</sup> The former losses (unusable return flows) averaged 109,000 acre-feet annually between 1990 and 2010,<sup>89</sup> while the latter type of losses (non-storable releases) averaged 74,000 acre-feet per year from 1964 to 2009.<sup>90</sup> Taken together, these figures translate to an annual average of 183,000 acre-feet of total operational inefficiency losses. Again, the takeaway point with regard to all of these losses--reservoir evaporation, phreatophyte, and operational efficiency--is that the Lower Division states have grown dependent on a considerable buffer of water to facilitate the levels of consumptive use authorized by their *Arizona v. California* decree entitlements.

## ***B. Tributary Uses and Losses***

Turning from the Colorado River mainstream to its tributaries in the Lower Basin, it is worth revisiting the Court's view with regard to their treatment under the *Arizona v. California* Decree, which, as discussed above in Part II, is premised on the following conclusion: "Congress in the Project Act intended to apportion only the mainstream, leaving to each State its own tributaries."<sup>91</sup> The Decree accordingly does not govern Lower Basin tributary uses and losses--with the exception of New Mexico's use of water from the Gila River system<sup>92</sup>--and thus historically *may* have conveyed the impression that unfettered use can be made of the Lower Basin tributaries under the Law of the River. Extending from this aspect of the Court's decision, a close look is in order at the precise levels of tributary water uses and losses that *Arizona v. California* has facilitated within the Lower Division states (principally, Arizona) during recent years.

Unfortunately, reliable and current figures for consumptive uses and losses along the Lower Basin tributaries are more difficult to obtain than their mainstream counterparts,<sup>93</sup> but an appendix to the Basin Study contains some useful data for the past several decades. Overall, these figures reveal extensive reliance on tributary water in the Lower Basin, and the Gila River is the elephant in the room in this regard. Annual consumptive uses and losses along it ranged from slightly above 2.5 maf to slightly below 4.5 maf from 1971 and 2005 and consistently have fallen between 3.0 maf and 3.5 maf during the past

two decades.<sup>94</sup>\*147 Virtually all of these uses and losses have taken place within Arizona (New Mexico figures are negligible). Second in hydrologic prominence is the Little Colorado River. From 1971 to 2000, roughly 120,000 to 180,000 acre-feet of consumptive uses and losses occurred along it in Arizona and New Mexico annually, again with the vast majority of these amounts attributable to Arizona.<sup>95</sup> As for the Virgin River, annual consumptive uses and losses for it spanned from approximately 60,000 to 150,000 acre-feet between 1971 and 2000, with the lion's share of these amounts occurring in Utah.<sup>96</sup> Turning lastly to the Bill Williams River--which flows solely in Arizona--annual consumptive uses and losses along it fell between roughly 20,000 and 70,000 acre-feet from 1971 to 2000.<sup>97</sup> Simply put, viewed from a system-wide perspective, these figures illustrate that significant amounts of water were used and lost annually from the Lower Basin tributaries throughout this thirty-year period.

Although it is far from ideal in 2013 to rely on figures from 2000 to calculate "current" aggregate consumptive uses and losses along the Lower Basin tributaries, these figures appear to be the most recent *reliable* ones available in the Basin Study or other sources for the three main tributaries other than the Gila River.<sup>98</sup> All told, the collective amount of Lower Basin tributary uses and losses in 2000 was roughly 3.59 maf.<sup>99</sup> Adding this amount to the corresponding figures for Lower Basin mainstream uses and reservoir evaporation and phreatophyte losses during this year, 9.25 maf,<sup>100</sup> the resulting total is 12.84 maf. At the risk of overwhelming the reader with all of these figures, the takeaway point here is that it is this final amount, 12.84 maf (equivalent to almost 4.2 *trillion* gallons of water), that accurately reflects the scope of consumptive uses and losses facilitated by *Arizona v. California*, and on which the Lower Division states have depended, in recent years.

#### \*148C. *Untitled Water Use*

How exactly do the foregoing water uses and losses authorized (directly and indirectly) by *Arizona v. California* square with the Lower Basin's 8.5 maf entitlement in Article III(a) and (b) of the Compact? This question marks another key aspect of the Court's decision--above and beyond its facilitation of the uses and losses as a freestanding matter of import for the basin's hydrology--and raises the issue of "untitled water use." As used here, this phrase refers to beneficial consumptive use in excess of the 8.5 maf annually apportioned from the Colorado River system to the Lower Basin. The precise extent of this untitled water use hinges on the specific types of uses and losses that are deemed subject to Article III(a) and (b)--*i.e.*, how these provisions are interpreted in terms of the specific types of uses and losses that must be accounted for as "beneficial consumptive use" under them.

Our overall assessment extending from the preceding figures is that substantial untitled water use has been occurring in the Lower Basin in recent years--perhaps 2.0 maf as a ballpark annual minimum. *Arizona v. California*'s enabling of this untitled water use is a pattern to which serious attention should be paid as the Lower Basin attempts to navigate current and projected future hydrologic conditions in the basin. Underlying our assessment that substantial untitled water use has been occurring in the Lower Basin in recent years are two legal assumptions that need to be made transparent at the outset of this section. Both assumptions concern issues of Compact interpretation raised,<sup>101</sup> but ultimately left unresolved, in *Arizona v. California* that persist up to the present and directly influence the perceived extent of untitled water use.

Our first assumption is that Article III(a) and (b) of the Compact *do* require accounting for water use from the Lower Basin tributaries in relation to the 8.5 maf entitlement allocated by these provisions. Whether or not the Compact governs the Lower Basin tributaries has been a contentious issue for decades--a point amply illustrated by *Arizona v. California* itself as highlighted above in Part II. An affirmative position on this issue dictates that water uses along the Lower Basin tributaries must be counted as "beneficial consumptive use" in relation to the Lower Basin's 8.5 maf entitlement in Article III(a) and (b).<sup>102</sup> Our primary goal in this section is not to engage in a full-fledged analysis of this issue. We are persuaded, however, that the Lower Basin tributaries indeed constitute part of the "Colorado River System" as that term is incorporated into Article III(a) and (b). This construction is supported by the plain definition of "Colorado River System": "that portion of the Colorado River and its tributaries within the United States of America."<sup>103</sup> Special Master Rifkind likewise interpreted the Compact in this manner (albeit in dicta) in his report \*149 as identified above in Part II.<sup>104</sup> Moreover, even the Court's opinion itself--inadvertently or purposefully--contains language favoring this interpretation.<sup>105</sup>

Turning to the second assumption, we do *not* view Article III(a) and (b) as accounting for reservoir evaporation and other losses as "beneficial consumptive use," such that these losses must be charged against the Lower Basin's 8.5 maf entitlement. This construction also finds support from Special Master Rifkind's report<sup>106</sup>--again, as noted above in Part II--as well as from various reports issued by Compact negotiators upon which the Special Master relied.<sup>107</sup> From our perspective, it is exclusively

consumptive uses--along the mainstream *and* tributaries--that must be considered when assessing whether the Lower Basin is exceeding or falling within its 8.5 maf entitlement (*i.e.*, whether untitled water use is occurring).

These two assumptions again frame our assessment of the scope of untitled water use that has been occurring in the Lower Basin in recent years. Relying on water use figures from the Basin Study for the past decade (2000 to 2010), the annual amount of this untitled water use appears to range from at least 1.9 maf to 2.8 maf per year.

Figures from 2000 provide initial evidence of this untitled water use. As mentioned earlier, although more up-to-date data would be extremely useful in this realm, 2000 is the most recent year for which the Basin Study includes *reliable* consumptive use figures for the mainstream and all four tributaries noted above: Gila River, Little Colorado River, Virgin River, and Bill Williams River.<sup>108</sup> Mainstream use in the Lower Basin was 8.03 maf in 2000,<sup>109</sup> and the collective amount of tributary use was roughly 3.27 maf.<sup>110</sup> Taken together, \*150 approximately 11.3 maf of combined mainstream and tributary use thus occurred in the Lower Basin during this year. Assessing this amount against the 8.5 maf entitlement in Article III(a) and (b), the resulting sum equates to 2.8 maf of untitled water use in 2000.

A second illustration of this untitled water use comes from consumptive use figures for the Lower Basin in 2005. This year is the most recent one for which the Basin Study includes such figures for the Gila River--as just noted, reliable post-2000 figures do not appear for the other three tributaries. Mainstream use in the Lower Basin was 7.07 maf in 2005, and use along the Gila River alone was approximately 3.3 maf.<sup>111</sup> Combining these two amounts, the sum, 10.37 maf, equates to 1.87 maf of untitled water use in the Lower Basin.<sup>112</sup> Although plainly limited due to its singular focus on the Gila River, this figure represents the low end of the range suggested above (1.9 maf to 2.8 maf) for the annual amount of untitled water use in the Lower Basin throughout the past decade.

Ultimately, the exact amount of untitled water use that has been occurring in the Lower Basin in recent years is not as important for our purposes as is the existence of this overall pattern as a key consequence of *Arizona v. California* in contemporary times. How much untitled water use will be possible in the years ahead? And what specific legal consequences attach if particular water uses in the Lower Basin are classified as titled versus untitled? The former question implicates material covered in the next section addressing future mainstream supplies, while the latter question raises the issue of precisely how untitled water use is legally significant under the Compact.

Three related points are worth noting in this latter regard. First, Article III(a) and (b) do not appear to operate as water use "caps," such that they categorically prohibit untitled water use in the Lower Basin. Second, the Compact nonetheless does not appear to contemplate that untitled water use bears a protected legal status comparable to that associated with titled water use. More precisely, the Lower Basin--and, derivatively, individual water users within the Lower Division states--likely do not hold legal title to untitled water use under the Compact in the same manner as is the case for water use that falls within Article III(a) and (b). In fact, although it may be a remote possibility, if a second Compact commission were convened under Article III(f) and (g), that commission \*151 apparently would have authority to engage in "further equitable apportionment"<sup>113</sup> of the untitled water use as it saw fit.<sup>114</sup> Third, depending upon how Article III(c) of the Compact is interpreted, water associated with untitled water use in the Lower Basin might be treated as "surplus" waters required by this provision to be put toward Mexico's 1.5 maf treaty entitlement before the Upper Division states are obligated to contribute any treaty flows.

In sum, *Arizona v. California*'s enabling of untitled water use in the Lower Basin is a key consequence of the Court's decision given the basin's current and projected future hydrology. Significant untitled water use has been occurring in the Lower Basin in recent years as outlined above, and it is unclear to what extent, if any, this pattern will be hydrologically possible in coming decades (a topic addressed below). What is apparent from the material covered in this section, however, is that the Compact's framework provides essential parameters for addressing any such untitled water use. Critical points in this regard are twofold: (1) untitled water use needs to be understood as lacking legal protection afforded titled water use and being susceptible to divestment via further equitable apportionment under Article III(f) and (g), and (2) untitled water use similarly needs to be recognized as potentially subject to curtailment under Article III(c) in order to satisfy Mexico's treaty entitlement. These parameters serve as important guidelines for managing untitled water use in the Lower Basin going forward.

#### ***D. Flow Obligations and Future Mainstream Supply***

Two factors are inextricably connected with the preceding aspects of *Arizona v. California*: (1) the relationship between existing and projected future levels of water use in the Lower Basin, as facilitated by the Court's decision, and (2) future water supplies in the Colorado River mainstream below Lee's Ferry. Of utmost importance in this regard are the Compact's flow obligations in Article III(c) (treaty flow obligation to Mexico) and Article III(d) (non-depletion obligation of Upper Division states). These provisions ultimately control the volume of annual releases from Lake Powell and the corresponding level of Lee's Ferry flows.<sup>115</sup> In turn, these releases and flows bear directly on the amount of mainstream water deemed available by the Secretary of the Interior for consumptive use under the \*152 *Arizona v. California* Decree. How do existing and projected levels of mainstream use in the Lower Basin comport with future mainstream supplies as influenced by hydrologic conditions in the basin and the Article III(c) and (d) flow obligations? This question marks a critical intersection between *Arizona v. California* and the Compact in contemporary times. Water uses founded on the *Arizona v. California* Decree in the Lower Basin are one thing; Article III(c) and (d) flows sufficient to sustain such uses are another. In this context, the Compact again provides essential parameters for managing future levels of Lower Basin water use.

The precise amount of Lake Powell releases and Lee's Ferry flows required annually by Article III(c) and (d) hinge partly on how these provisions are interpreted--a point addressed below. Also influencing these release and flow volumes (and thus Lower Basin mainstream supplies), however, are two hydrologic factors identified at the beginning of this Part: climate change and Upper Basin water use. As described previously, the Bureau of Reclamation's recent Basin Study projected that climate change-related impacts on Upper Basin water supplies between now and 2060 will result in a roughly 9 percent decrease in average levels of "virgin" flows at Lee's Ferry from those observed in the historical record at 15.0 maf.<sup>116</sup> This reduction translates to average annual Lee's Ferry flows of 13.7 maf, although this figure represents the mean of the Basin Study projections, and the median is nearly 1.0 maf lower at 12.7 maf.<sup>117</sup> On the demand side, six different Upper Basin scenarios are explored in the Basin Study as noted above. The range of annual demands across these scenarios spans from slightly below 5.0 maf to 6.0 maf by 2060 when excluding treaty flow contributions and reservoir evaporation and other losses.<sup>118</sup> The overarching trend depicted by these projections is thus one of diminished average annual Lee's Ferry flows combined with gradually increasing Upper Basin water use.

As these two factors converge--with projected Lee's Ferry flows declining and Upper Basin water demands increasing--average levels of Lake Powell releases and Lee's Ferry flows inevitably will approach the minimum amount required from the Upper Division states under Article III(c) and (d). This convergence poses two extremely salient questions: (1) what precisely is that minimum amount? and (2) exactly how much mainstream use can be sustained by it within the Lower Basin? Of critical importance to Lower Basin water planning, these questions frame the remaining material in this section.

\*153 Up to this point in the Law of the River's history, 8.23 maf has been the minimum annual release from Lake Powell based on Article III(c) and (d).<sup>119</sup> This practice can be gleaned from the Bureau of Reclamation's annual operating plans for the 2000-2010 period. Eight of these years involved releases of 8.23 maf, while the other two years entailed releases of 8.98 maf and 9.40 maf.<sup>120</sup> The annual average across the decade was 8.40 maf. As mentioned earlier in this Part, consumptive mainstream use in the Lower Basin averaged 7.62 per year during this time frame.<sup>121</sup> This ratio of 8.40 maf in average releases to 7.62 maf in average uses across the past decade deserves close attention as it relates to future levels of mainstream use in the Lower Basin.

It may be possible based on this release-to-use ratio to continue average levels of mainstream use at a level roughly on par with the 7.5 maf entitlement set forth in the *Arizona v. California* decree for the Lower Division states in normal conditions. The ratio suggests that *perhaps* average annual releases from Lake Powell of 8.23 maf in the future, combined with tributary inflows and carryover reservoir storage, would enable 7.5 maf of average annual mainstream use in the Lower Basin. But this assumption is admittedly speculative. Among other things, variable annual levels of tributary inflows into the mainstream, and reservoir evaporation and other losses along the mainstream, directly affect available Lower Basin water supplies. That said, the ratio between average annual releases and Lower Basin mainstream use from 2000 to 2010 (again, 8.40 maf to 7.62 maf) is roughly proportional to the ratio suggested here (8.23 maf to 7.50 maf).

\*154 One thing that appears uncontestable from the release-to-use ratio for the 2000-2010 period, however, is that a future pattern of average annual releases of 8.23 maf from Lake Powell will *not* enable higher levels of Lower Basin mainstream use like those projected in the Basin Study. These projected Lower Basin water demands were identified at the outset of this Part, and as with the Upper Basin projections discussed above they vary across six scenarios. Overall, the projections anticipate annual levels of mainstream use in the Lower Division states exceeding 8.0 maf in all scenarios by 2015,

approaching 8.5 maf in several scenarios by 2035, and ranging from approximately 8.5 maf to 10.0 maf across the scenarios by 2060.<sup>122</sup> Simply put, these demand levels inherently would necessitate average annual releases of more than 8.23 maf.<sup>123</sup>

Of course there is another possibility. Average annual releases from Lake Powell might fall below 8.23 maf in coming decades and render impossible average annual levels of Lower Basin mainstream use on par with the 7.5 maf entitlement prescribed for normal conditions by the *Arizona v. California* decree. Of central importance here is Article III(c). Average annual releases of 7.5 maf from Lake Powell can be expected under Article III(d) in the future if its decadal obligation is regarded as a fixed rather than a potentially contingent one.<sup>124</sup> Beyond this baseline, however, Article III(c) appears to control.<sup>125</sup> As noted above, it might be interpreted to require water needed to supply Mexico's treaty entitlement to come from untitled water uses in the Lower Basin.<sup>126</sup> Or, alternatively, it might be construed to require an annual basinwide accounting to determine the respective Article III(c) flows called for from the Upper and Lower Basins in a given year.<sup>127</sup> As was the case in the previous \*155 section, thorough legal analysis of Article III(c) goes beyond the scope of this piece.<sup>128</sup> Nonetheless, alongside the factors discussed above (projected decreases in Lee's Ferry flows and increases in Upper Basin water demands), this interpretive issue bears directly on future mainstream supplies in the Lower Basin, particularly the prospect of less than 7.5 maf of annual mainstream use being possible.

Ultimately, in the event that Article III(c) is interpreted and administered in a way that causes average annual releases from Lake Powell (and thus average annual Lee Ferry flows) to drop below the historical minimum of 8.23 maf going forward, the possibility of shortage declarations under the *Arizona v. California* Decree becomes real.<sup>129</sup> One need look no further than the Bureau of Reclamation's announcement of a 7.48 maf release from Lake Powell in 2014 for indicia of this possibility. This announcement identifies the 7.48 annual release and goes on to describe that "the longer-term projections from Reclamation's hydrologic models show a very small chance of lower basin delivery shortages in 2015, with the first significant chance of reduced water deliveries in the lower basin in 2016."<sup>130</sup> To what extent, if any, might untitled water use occurring along the Lower Basin tributaries need to be curtailed to augment mainstream flows in these circumstances (*e.g.*, to satisfy Mexico's treaty entitlement)? No precedent exists with respect to this question. As for mainstream use in this situation, we would face the irony that the entitlement of the project that precipitated *Arizona v. California*, the CAP, would be subordinated via § 301 of the Colorado River Basin Project Act to the 4.4 maf basic entitlement collectively held by mainstream water users in California under the decree.<sup>131</sup>

### ***E. Prescription: A Lower Basin Water Budget***

The upshot of the wide-ranging material canvassed in this Part is that a water budget needs to be in place within the Lower Basin. The budget must be composed to account for how the uses and losses facilitated by *Arizona v. California* comport with hydrologic realities facing the Colorado River Basin. It needs to balance depletions in the Lower Basin (all uses and losses) with realistic assumptions about water availability, including likely Lee's Ferry flows coming annually from the Upper Basin. As identified above, annual water demands in the Lower Basin have substantially exceeded the 8.5 maf entitlement in recent years, and these demands are projected to increase markedly over the next several decades. Water supplies, on the other hand, are projected to decrease. Lower Basin water \*156 uses almost certainly will need to be adjusted to make this budget balance given these circumstances, and the Compact in our view provides a principled framework for thinking through these adjustments. This final section offers modest food for thought about formulating a Lower Basin water budget in this manner.

As an initial matter, Article III(c) and (d) play a critical role in the process of formulating a water budget for the Lower Basin that is hydrologically realistic. Both provisions serve to discipline the scope of reliance interests and future expectations that tenably can be founded on mainstream supplies available for release under the *Arizona v. California* Decree. In line with the material covered in the previous section, it is uncertain whether average annual releases from Lake Powell (and thus Lee's Ferry flows) will exceed 7.5 maf pursuant to Article III(c) and (d) in coming decades, and this reality is critical to water management and planning activities in the Lower Division states. Average annual releases of 7.5 maf stemming from Article III(d) are a conservative but realistic baseline in our view. As highlighted above, however, it is contested and unclear to what extent, if any, the Upper Basin will be obligated to augment this baseline with Article III(c) flows. Article III(c)'s future interpretation and administration constitute a freestanding priority in this context.<sup>132</sup> That said, our basic point here is that, although average annual releases of 7.5 maf per Article III(d) appear credible as a future source of mainstream supplies, it is uncertain beyond this baseline whether Article III(c) will serve to augment the pool of water available for release under the *Arizona v. California* decree. A Lower Basin water budget should be framed around both this essential parameter and the

related consideration of how much mainstream use actually will be possible within the Lower Division states in proportion to corresponding levels of average annual Lee's Ferry flows.<sup>133</sup>

Article III(a) and (b) play a similarly critical role to Article III(c) and (d) in the context of devising a Lower Basin water budget that abides by hydrologic realities in the basin. Integral to this process is figuring out which water uses (and perhaps losses) facilitated by *Arizona v. California* constitute titled versus untitled uses under the Compact. As mentioned previously, whereas titled water uses are protected as legal appropriations by the Compact, untitled water uses are not afforded the same legal status and protection. A threshold assessment of which particular types of uses and losses are indeed governed, and thus accounted for, by the Compact is a necessary precursor to segregating titled from \*157 untitled uses in the Lower Basin.<sup>134</sup> Beyond this threshold determination, however, the Lower Basin needs to formulate some method for designating from among the uses (and perhaps losses) governed by the Compact those that are titled versus untitled. Water uses undertaken pursuant to present perfected rights constitute titled uses categorically. Lines need to be drawn, however, for the varied water uses (and perhaps losses) outside this category. These lines will dictate which water uses potentially will be subject to curtailment for purposes of satisfying Mexico's entitlement under Article III(c) or divestment via further equitable apportionment under Article III(c) and (f). Our goal here is not to try to prescribe the optimal approach in this regard, but rather to highlight how the boundaries of Article III(a) and (b) should inform this key aspect of a Lower Basin water budget.

It bears mentioning on a final budget-related note the necessity of successive efforts to the Basin Study for enhancing existing understanding of water supply and demand conditions in the Colorado River Basin. Ongoing attention should be paid to the impacts of climate change on Upper Basin water supplies--again, these impacts bear directly on Lee's Ferry flows and thus on the volume of mainstream supplies available for release under the *Arizona v. California* decree. Much greater attention likewise should be placed on annual flow and use levels for the Lower Basin tributaries. Such figures have been historically neglected as compared to their mainstream counterparts.<sup>135</sup> Lower Basin tributary flow levels are \*158 crucial, however, to assessing the overall amount of water existent in the Colorado River system in a given year. This accounting arguably is pivotal to determining the Upper and Lower Basins' respective obligations for treaty flow contributions under Article III(c). Similarly critical are current and accurate figures for annual levels of Lower Basin tributary use. Meaningful assessments of untitled water use in the Lower Basin cannot be made absent these figures. In all of these respects and others, the Basin Study is a cornerstone of technical knowledge that needs to be built upon in order to put into place a Lower Basin water budget that is realistically attuned to the basin's hydrology.

#### IV. CONCLUSION

We return in conclusion to Justice Douglas's minority viewpoint on the Compact in *Arizona v. California* fifty years ago: "the Compact is the mainspring from which all rights flow."<sup>136</sup> Reflecting a similar (albeit cautionary) perspective was Special Master Rifkind's interpretive dicta, which he provided in recognition of the possibility that the Court might resolve the case by construing the Compact.<sup>137</sup> The parties' voluminous briefs and pleadings provide comparable evidence of the Compact's perceived centrality throughout the litigation. Yet a majority of the Supreme Court charted a different course. The Court refrained from addressing the Compact's foundational provisions in Article III. Instead, it considered the meaning of these terms solely as incorporated into § 4(a) of the Project Act, and it announced an apportionment scheme for mainstream water in the Lower Basin whose relationship with the Compact's basinwide scheme is complicated by this distinct interpretive approach.

But, of course, what is past is prologue.<sup>138</sup> In considering the contemporary relationship between *Arizona v. California* and the Compact, we must turn our attention from fifty years ago to fifty years ahead in the Colorado River Basin. Through its decision, the Court in *Arizona v. California* has directly and indirectly facilitated large-scale consumptive uses and losses in the Lower Basin as well as extensive reliance interests and future expectations associated with these uses and losses. These interests and expectations must be managed prudently given current and projected hydrologic conditions. The Compact puts into place essential parameters to this end. Article III(c) and (d) prescribe flow obligations that bear directly on the supply of mainstream water available for consumptive use (and to enable such use) in the Lower Basin under the *Arizona v. California* Decree. Article III(a) and (b) similarly demarcate a line between titled and untitled water use that holds important implications for the relative degree of security afforded water users in the Lower Basin--specifically, with regard to the prospect of curtailment for treaty flow purposes or \*159 divestment via further equitable apportionment. All told, just as a current and accurate sense of mainstream and tributary uses and losses facilitated by *Arizona v. California* is critical to Lower Basin water management, equally vital are these parameters as boundaries serving to inform the make-up of a Lower Basin

water budget tailored to this era of limits.

#### Footnotes

<sup>a1</sup> Professor Robison is a current Visiting Professor and incoming Assistant Professor at the University of Wyoming College of Law. He and Professor MacDonnell would like to thank Brian Annes, a second-year law student at the University of Wyoming College of Law, for his excellent editorial assistance with this piece. Professor Robison also would like to thank the University of Wyoming College of Law for a generous summer research grant provided to undertake this project.

<sup>aa1</sup> Larry MacDonnell is a member of the adjunct faculty, Colorado Law, and retired Professor of Law, University of Wyoming College of Law.

<sup>1</sup> *Arizona v. California*, 373 U.S. 546 (1963). For a more complete discussion of this litigation, see Lawrence J. MacDonnell, *Arizona v. California: Its Meaning and Significance for the Colorado River and Beyond after Fifty Years*, 4 ARIZ. J. ENV'TL LAW & POLICY 88 (2013). The authors would like to express their gratitude to the expert staff of the William A. Wise Law Library at the University of Colorado for their work in collecting and digitizing the vast number of documents generated throughout this litigation. See *Arizona v. California* Collection at <http://lawlibrary.colorado.edu/arizona-v-california-collection> (last visited Nov. 16, 2013).

<sup>2</sup> COLORADO RIVER COMPACT, H.R. DOC. NO. 80-717 (1948), reprinted in RAY LYMAN WILBUR & NORTHCUTT ELY, THE HOOVER DAM DOCUMENTS, at App. 203, A17-A22 [hereinafter COMPACT].

<sup>3</sup> Motion for Leave to File Bill of Complaint and Bill of Complaint at 30, *Arizona v. California*, 373 U.S. 546 (1963) [hereinafter *Arizona Complaint*], available at <http://hdl.handle.net/10974/275>. An action to quiet title is “[a] proceeding to establish a plaintiff’s title to land by compelling the adverse claimant to establish a claim or be forever estopped from asserting it.” BLACK’S LAW DICTIONARY 32 (8th ed. 2004). See also *id.* at 1282 (defining “‘quiet” as “[t]o make (a right, position, title, etc.) secure or unassailable by removing disturbing causes or disputes”).

<sup>4</sup> COMPACT, *supra* note 2, at Art. II(g) (containing “Lower Basin” definition).

<sup>5</sup> See *infra* notes 34 to 47 and accompanying text.

<sup>6</sup> *Arizona v. California*, 373 U.S. at 564-65 (“We have concluded ... 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.”).

<sup>7</sup> *Id.* at 565.

<sup>8</sup> The Colorado River Compact’s apportionment scheme is detailed *infra* Part II.A., and the apportionment scheme announced in *Arizona v. California* is outlined *infra* notes 65-72 and accompanying text.

<sup>9</sup> BUREAU OF RECLAMATION, U.S. DEP’T OF THE INTERIOR, COLORADO RIVER BASIN WATER SUPPLY AND DEMAND STUDY, STUDY REPORT SR-36 (2012) [hereinafter STUDY REPORT], available at [http://www.usbr.gov/lc/region/programs/crbstudy/finalreport/Study%20Report/StudyReport\\_FINAL\\_Dec2012.pdf](http://www.usbr.gov/lc/region/programs/crbstudy/finalreport/Study%20Report/StudyReport_FINAL_Dec2012.pdf). As one acre-foot of water equals roughly 325,851 gallons, an annual supply-demand imbalance of 3.2 maf is equivalent to a shortfall of approximately 1,042,723,200,000 gallons. U.S. Geological Survey, Water Science Glossary of Terms, <http://ga.water.usgs.gov/edu/dictionary.html> (last visited Nov. 19, 2013).

<sup>10</sup> See STUDY REPORT, *supra* note 9, at SR-7, fig.2 (depicting current water supply-demand imbalance).

11 RAY LYMAN WILBUR & NORTHCUTT ELY, THE HOOVER DAM DOCUMENTS A234 (1948) (containing a congressional report from Herbert Hoover, federal representative and commission chairman, stating that “the primary purpose of the compact is to make an equitable division and apportionment of the waters of the river.”) [hereinafter HOOVER DAM DOCUMENTS], available at [http:// www.riversimulator.org/Resources/LawOfTheRiver/HooverDamDocs/HooverDam1948.pdf](http://www.riversimulator.org/Resources/LawOfTheRiver/HooverDamDocs/HooverDam1948.pdf).

12 COMPACT, *supra* note 2, at Art. I.

13 *Id.* at Art. II(e) (defining Lee’s Ferry as a point on the Colorado River mainstream one mile below the mouth of the Paria River).

14 *Id.* at Art. II(a).

15 *Id.* at Art. II(f). A portion of Arizona falls within the Upper Basin.

16 *Id.* at Art. II(g).

17 United States Geological Survey, WATER SCIENCE GLOSSARY OF TERMS, (last visited Nov. 19, 2013), <http://ga.water.usgs.gov/edu/dictionary.html>.

18 Specifically, Article III(a) provides: “There is hereby apportioned from the Colorado River System in perpetuity to the Upper Basin and to the Lower Basin respectively the exclusive beneficial consumptive use of 7,500,000 acre feet of water per annum ....” COMPACT, *supra* note 2, at Art. III(a).

19 Article III(b)’s text is as follows: “In addition to the apportionment in paragraph (a), the Lower Basin is hereby given the right to increase its beneficial consumptive use of such waters by one million acre feet per annum.”

20 Utilization of the Waters of the Colorado and Tijuana Rivers and of the Rio Grande, Treaty Between the United States of America and Mexico, U.S.-Mex., Feb. 3, 1944, T.S. 994, Art. 10(a) (2012).

21 COMPACT, *supra* note 2, at Art. III(c).

22 *Id.* at Art. II(c). The “Lower Division states” are Arizona, California, and Nevada. *Id.* at Art. II(d).

23 *Id.* at Art. III(c).

24 *Id.* at Art. III(d).

25 *Id.* at Art. III(f).

26 *Id.* at Art. III(g).

27 *Id.*

28 Boulder Canyon Project Act, §§ 4, 13(a), 43 U.S.C. §§ 617c & 617l(a) (2012) [hereinafter “Project Act”].

- 29 NORRIS HUNDLEY, *WATER AND THE WEST: THE COLORADO RIVER COMPACT AND THE POLITICS OF WATER IN THE AMERICAN WEST* 215-81 (2d. ed. 2009).
- 30 Project Act, *supra* note 28, at § 4. Further sweeteners for Arizona included the state’s ability to use one-half of any surplus waters, exclusive consumptive use of the Gila River and its tributaries within the state, and assurance that uses along the Gila River would never be curtailed to meet treaty obligations to Mexico. Influential leaders in Arizona like former Governor Hunt, however, held grave concerns about (*inter alia*) the Compact’s inclusion of the Gila River system and its lack of a specified share of treaty water for Mexico. HUNDLEY, *supra* note 29, at 239.
- 31 Project Act, *supra* note 28, § 4. California accepted this limitation when its legislature enacted the California Limitation Act. Act of March 4, 1929; Cal. Statutes and Amendments to the Codes, ch. 16, pp. 38-39 (1929).
- 32 Project Act, *supra* note 28, at § 8(a) (emphasis added).
- 33 Statement of the State of Nev. at 1 (1956), *Arizona v. California*, 373 U.S. 546 (1963) (No. 10), available at <http://hdl.handle.net/10974/388>. In this same pleading, Nevada asserted that “a prolonged trial is in the offing with the final determination ... dependent upon the meaning of such Compact.” *Id.* at 5.
- 34 Statement of Position of N.M. at 2-3 (1956), *Arizona v. California*, 373 U.S. 546 (1963) (No. 10), available at <http://hdl.handle.net/10974/300>.
- 35 The Supreme Court initially referred the case to Special Master Haight shortly after preliminary pleadings were filed in 1952, and Special Master Haight served in this role until his death in 1955. *Arizona v. California*, 373 U.S. at 551 (1963). At this point, the Court appointed Special Master Rifkind to handle the proceeding, which he did through a roughly two-year trial spanning from 1958 to 1960 and up to submission of his final report to the Court on January 16, 1961. *Id.*
- 36 *Arizona* Complaint, *supra* note 3, at 25-26.
- 37 Opening Brief for Arizona at 20, *Arizona v. California*, 373 U.S. 546 (1963) (No. 9 Original), available at <http://hdl.handle.net/10974/287>. As mentioned earlier, Article III(d) obligates the Upper Division states not to consume water in amounts that would reduce flows at Lee’s Ferry below 75.0 maf over consecutive ten-year periods. Arizona further noted the correlation between the 7.5 maf entitlement in Article III(a) and the annualized average of 7.5 maf obligated to flow from the Upper Basin to the Lower Basin under Article III(d). *Id.* at 28-30.
- 38 *Id.* at 21 (“Accordingly, the only water available to both Basins and to which therefore both could lay claim was water rising in the Upper Basin.”); *id.* at 22 (“The Upper Basin was not interested in Lower Basin tributaries.”). Arizona did concede, however, that “the amount of water available to the Lower Basin from its tributaries may well have been taken into account by the [Compact] Commissioners in appraising the extent of Lower Basin needs for additional water from the main stream of the Colorado River as bearing upon the quantity of main stream water which the Upper Basin should deliver at Lee Ferry.” *Id.* at 24.
- 39 *Id.* at 53 (“In providing that Arizona should have the exclusive use of the Gila and its tributaries within Arizona [in § 4(a) of the Project Act], Congress either construed the Compact as not apportioning Lower Basin tributaries, or modified the Compact so as to exclude the Gila and its tributaries in Arizona from the water apportioned by the Compact.”).
- 40 Answer of Defendants to Bill of Complaint at 11, *Arizona v. California*, 373 U.S. 546 (1963) (No. 10), available at <http://hdl.handle.net/10974/448>.
- 41 *See id.* (describing apportionment in Article III(a) as “from the waters of the entire Colorado River System, including the Gila

River and its tributaries, and not merely from the virgin flow of the main stream.”). *See also id.* at 12 (discussing how water uses from the “Gila River and its tributaries under rights which existed as of June 25, 1929, are chargeable against the apportionment made to the Lower Basin by Article III(a) of the Compact.”).

42 *Id.* at 13, 27. California asserted the provision “does not relate solely to waters found flowing in the Gila River or any other specific portion of the Lower Basin,” but rather to “[t]he first million acre-feet of beneficial consumptive uses above 7,500,000 acre-feet per annum, wherever such uses in the Lower Basin may occur.” *Id.* at 13. California’s attempt to characterize this water as unapportioned surplus apparently resulted from a position California Senator Hiram Johnson had taken in discussions leading up to the Project Act’s enactment.

43 The limitation contained in Section 4(a) of the Project Act included the right for California to use one half of any surplus water in addition to the state’s basic entitlement of 4.4 maf. Project Act, *supra* note 28, at § 4.

44 Brief of Cal. Defendants at 70-72 (1959), *Arizona v. California*, 373 U.S. 546 (1963) (No. 9), *available at* <http://hdl.handle.net/10974/361>.

45 Motion to Join, as Parties, the States of Colo., N.M., Utah, and Wyo. at 16-21 (1954), *Arizona v. California*, 373 U.S. 546 (1963) (No. 10) [hereinafter “Joinder Motion”], *available at* <http://hdl.handle.net/10974/317>; Brief of the Cal. Defendants in Support of Their Motion to Join, as Parties, the States of Colo., N.M., Utah, and Wyo. at 31-51, 54-58, 61-64 (1954), *Arizona v. California*, 373 U.S. 546 (1963) (No. 10) [hereinafter “Joinder Brief”], *available at* <http://hdl.handle.net/10974/318>. Both citations contain lengthy lists of specific issues of Compact interpretation assertedly warranting joinder.

46 Joinder Motion, *supra* note 45, at 2.

47 Special Master’s Report on the Motion of the California Defendants to Join as Parties the States of New Mexico, Utah, Colorado and Wyoming at 68, *Arizona v. California*, 373 U.S. 546 (1963) (“The Motion filed herein on July 15, 1954 by the California defendants to join Upper Basin states as parties ought to be denied as to Colorado and Wyoming, and denied as to Utah and New Mexico in their capacities as Upper Basin states.”).

48 For an insightful discussion of the role of Special Masters in interstate water disputes, see Ann-Marie C. Carstens, *Lurking in the Shadows of Judicial Process: Special Masters in the Supreme Court’s Original Jurisdiction Cases*, 86 MINN. L. REV. 625 (2002).

49 Simon H. Rifkind, Special Master, Report, Dec. 5, 1960, *Arizona v. California*, 373 U.S. 546 (1963) 1960 Term (U.S.), at 139 [hereinafter “Rifkind Report”], *available at* <http://hdl.handle.net/10974/312>.

50 *Id.*

51 *Id.* at 138, 151, 201. Arizona only needed certainty with respect to its right to consumptively use mainstream water that would be diverted by the proposed Central Arizona Project--an additional 1.2 maf beyond that already in use within the state.

52 Project Act, *supra* note 28, at § 4.

53 Rifkind Report, *supra* note 49, at 173.

54 *Id.* at 142.

55 *Id.* at 149.

56 *Id.* at 147. The Master dismissed Arizona’s argument that this provision imposed a duty on the Upper Basin to make this amount of water available. He also dismissed California’s more substantive argument that Article III(b) water had not been “apportioned” in the same manner as Article III(a) water, but rather that Article III(b) had merely authorized the additional 1.0 maf of consumptive use in the Lower Basin. *Id.* at 150.

57 *Id.* at 148.

58 *Arizona v. California*, 373 U.S. 546, 564-65 (1963).

59 The majority opinion emphasized the statute’s legislative history suggesting Congress had been concerned only with the mainstream in the Lower Basin. The Court repeated the Master’s view that New Mexico and Utah would never have allowed apportionment of Article III(a) water among only the three states riparian to the mainstream. *Id.* at 567-75.

60 *Id.* at 566-67.

61 *Id.* at 567.

62 *Id.* at 638.

63 *Id.* at 632-38. Justice Douglas noted the unfairness of burdening California with the Mexican Treaty obligation through depletions from the Gila River while simultaneously denying California the benefit of accounting for that water to bolster its rights to use mainstream water. *Id.* at 638 (“It is manifestly unfair to charge [California] with those waters under Article III(c) of the Compact and to say that she is entitled to none of them in computing the 4,400,000 acre-feet which the Limitation Act and the Project Act give her out of the waters of Article III(a) of the Compact.”).

64 *Id.* at 636 (“The Project Act needs the Compact to achieve a settlement of the issue of the apportionment of water involved in this case.”); *id.* at 638 (“The compact is, indeed, the underpinning of the Project Act.”).

65 *Arizona v. California*, 376 U.S. 340, 342 (1964). The Court issued a consolidated Decree in the case in 2006. *Arizona v. California*, 547 U.S. 150 (2006) [hereinafter “Decree”].

66 Decree, *supra* note 65, at Art. II(B).

67 *Id.* at Art. II(B)(2). Of this surplus, California is entitled to use 50%, Arizona 46%, and Nevada 4%. *Id.*

68 *Id.* at Art. II(B)(1).

69 *Id.* at Art. II(B)(3). Specifically, present perfected rights must be satisfied first--in order of priority and without regard to state lines--and no more than 4.4 maf of mainstream water (including that associated with present perfected rights) can be apportioned for use in California. *Id.*

70 *Id.* at Art. I(A).

71 *Id.* at Art. II(C). It also removed the requirement in the Arizona contract that would have diminished deliveries to account for reservoir evaporation and other losses. The relevant contract provision states:  
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.

United States Department of the Interior, Bureau of Reclamation, Boulder Canyon Project, Arizona-California-Nevada Contract for Delivery of Water, § 7, (1944), *reprinted in* HOOVER DAM DOCUMENTS, *supra* note 11, at App. 1016, A561.

72 Decree, *supra* note 65, at Art. II(B)(6).

73 *See id.* at Art. VIII(D) (“This decree shall not affect ... [a]ny issue of interpretation of the Colorado River Compact.”).

74 *Id.* at Art. VI. The Decree does limit New Mexico’s consumption of the Gila River and its tributaries. *Id.*

75 *See* STUDY REPORT, *supra* note 9, at SR-7 fig 2.

76 *Id.* at SR-36.

77 BUREAU OF RECLAMATION, U.S. DEP’T OF THE INTERIOR, COLORADO RIVER BASIN WATER SUPPLY AND DEMAND STUDY, TECHNICAL REPORT B - WATER SUPPLY ASSESSMENT B-66 (2012) [hereinafter WATER SUPPLY ASSESSMENT], *available at* [http://www.usbr.gov/lc/region/programs/crbstudy/finalreport/Technical%20Report%20B%20-%20Water%20Supply%20Assessment/TR-B\\_Water\\_Supply\\_Assessment\\_FINAL.pdf](http://www.usbr.gov/lc/region/programs/crbstudy/finalreport/Technical%20Report%20B%20-%20Water%20Supply%20Assessment/TR-B_Water_Supply_Assessment_FINAL.pdf). To be clear, this projected 8.7% decrease in Lee’s Ferry flows stems from one of four water supply scenarios examined in the Basin Study--the Downscaled Global Circulation Model (GCM) Projected scenario--which is the only scenario that addresses future changes in climate trends and variability that depart from those observed in the historical record or derived from paleo reconstructions. *Id.* at B-4 to B-5.

78 BUREAU OF RECLAMATION, U.S. DEP’T OF THE INTERIOR, COLORADO RIVER BASIN WATER SUPPLY AND DEMAND STUDY, TECHNICAL REPORT C - WATER DEMAND ASSESSMENT C-8 figs.C-3, C-26 figs.C-9 (2012) [hereinafter WATER DEMAND ASSESSMENT], *available at* [http://www.usbr.gov/lc/region/programs/crbstudy/finalreport/Technical%20Report%20C%20-%20Water%20Demand%20Assessment/TR-C-Water\\_Demand\\_Assessment\\_FINAL.pdf](http://www.usbr.gov/lc/region/programs/crbstudy/finalreport/Technical%20Report%20C%20-%20Water%20Demand%20Assessment/TR-C-Water_Demand_Assessment_FINAL.pdf). The projected range excludes treaty flow contributions from, and reservoir evaporation and other losses within, the Upper Basin.

79 *Id.* at C-26 fig.C-9.

80 *Id.* at C-8 fig.C-3.

81 *Id.*

82 *Id.*

83 *Id.*

84 Decree, *supra* note 65, at Art. I(A) (defining “consumptive use” as “diversions from the stream less such return flow thereto as is available for consumptive use in the United States or in satisfaction of the Mexican Treaty obligation.”).

85 WATER DEMAND ASSESSMENT, *supra* note 78, at C-8 fig.C-3.

86 *Id.* at C-46 fig.C-19.

87 *Id.* at C-49 fig.C-20. Phreatophytes are “deep-rooted plants that obtain water from the water table or in the vadose zone just above the water table.” *Id.* at C-48.

88 *Id.* at C-47.

89 *Id.* at C-25 fig.C-8 n.4.

90 *Id.* at C-50. The Brock Reservoir is expected to reduce this quantity to 7,000 acre-feet annually. *Id.*

91 *Arizona v. California*, 373 U.S. 546, 591 (1963).

92 Decree, *supra* note 65, at Art. IV.

93 For a brief discussion of the importance of these consumptive use and loss figures for the Lower Basin tributaries, as well as provisions of the Compact and Colorado River Basin Project Act apparently requiring their generation and dissemination, see *infra* note 135 and accompanying text.

94 BUREAU OF RECLAMATION, U.S. DEP’T OF THE INTERIOR, COLORADO RIVER BASIN WATER SUPPLY AND DEMAND STUDY, app. C11 at C11-15-16 figs.C11-10, C11-11 (2012) [hereinafter TRIBUTARIES APPENDIX], *available at* [http://www.usbr.gov/lc/region/programs/crbstudy/finalreport/Technical%20Report%20C20C%20-%20Water%20Demand%20Assessment/TRC\\_Appendix11\\_FINAL.pdf](http://www.usbr.gov/lc/region/programs/crbstudy/finalreport/Technical%20Report%20C20C%20-%20Water%20Demand%20Assessment/TRC_Appendix11_FINAL.pdf).

95 *Id.* at C11-10 figs.C11-4, C11-5.

96 *Id.* at C11-11 figs.C11-6, C11-7.

97 *Id.* at C11-13 fig.C11-8.

98 The Basin Study contains annual consumptive use and loss figures for the Little Colorado River, Virgin River, and Bill Williams River for the 2001 to 2005 period, but these figures are apparently being investigated and likely contain data as well as methodological inconsistencies. *Id.* at C11-10 fig.C11-4 (Little Colorado), C11-11 fig.C11-6 (Virgin), C11-13 fig.C11-8 (Bill Williams).

99 This 3.59 maf of overall tributary uses and losses in 2000 consisted of approximately 3.25 maf along the Gila River, 160,000 acre-feet along the Little Colorado River, 125,000 acre-feet along the Virgin River, and 55,000 acre-feet along the Bill Williams River. *Id.* at C11-10 fig.C11-4 (Little Colorado), C11-11 fig.C11-6 (Virgin), C11-13 fig.C11-8 (Bill Williams), C11-16 fig.C11-10 (Gila).

100 Lower Basin mainstream consumptive use totaled 7.4 maf in 2000. WATER DEMAND ASSESSMENT, *supra* note 78, at C-8 fig.C-3. Evaporation losses from Lake Mead, Lake Mohave, and Lake Havasu collectively fell at roughly 1.25 maf. *Id.* at C-48 fig.C-19. Mainstream phreatophyte losses in the Lower Basin were 600,000 acre-feet. *Id.* at C-49 fig.C-20. Because the precise amount of operation inefficiency losses in 2000 is unclear from the Basin Study, the 12.84 maf total identified here excludes these additional losses.

101 *See, e.g.*, Joinder Motion, *supra* note 45, at 16-18; Joinder Brief, *supra* note 45, at 32-35, 46-47.

102 So, too, under this view must water in the Lower Basin tributaries be accounted for when assessing whether “surplus” waters exist within the Colorado River system, as this term is used in Article III(c), for purposes of determining the Upper and Lower Basins’ respective obligations to contribute treaty flows to Mexico.

103 COMPACT, *supra* note 2, at Art. II(a) (emphasis added).

104 Rifkind Report, *supra* note 49, at 142.

105 *Arizona v. California*, 373 U.S. 546, 558 (1963) (“Arizona, because of her particularly strong interest in the Gila, intensely resented the Compact’s inclusion of the Colorado River tributaries in its allocation scheme”); *id.* at 563 (discussing California’s argument “that the Project Act, like the Colorado River Compact, deals with the entire Colorado River System, not just the mainstream”); *id.* at 568-69 (declining to address Arizona’s argument that the Compact apportions only mainstream waters but subsequently stating that “[i]nclusion of the tributaries in the Compact was natural in view of the upper States’ strong feeling that the Lower Basin tributaries should be made to share the burden of any obligation to deliver water to Mexico which a future treaty might impose.”). *See also id.* at 557-58 (identifying incorporation of “Colorado River System” definition into Article III(a), (b), and (c)).

106 Rifkind Report, *supra* note 49, at 148.

107 *See, e.g.*, Supplemental Report of Delph E. Carpenter, Commissioner for Colorado, Colorado River Commission (March 20, 1923) in HOOVER DAM DOCUMENTS, *supra* note 11, at A102 (“[B]eneficial consumptive use’ refers to the amount of water exhausted or lost to the stream in the process of making all beneficial uses .... [I]t is the ‘diversion minus the return flow.’”).

108 TRIBUTARIES APPENDIX, *supra* note 94, at C11-10 fig.C11-4 (Little Colorado), C11-11 fig.C11-6 (Virgin), C11-13 fig.C11-8 (Bill Williams).

109 WATER DEMAND ASSESSMENT, *supra* note 78, at C-8 fig.C-3.

110 This 3.27 maf of tributary use consisted of approximately 3.0 maf from the Gila River, 130,000 acre-feet from the Little Colorado River, 100,000 acre-feet from the Virgin River, and 40,000 acre-feet from the Bill Williams River. TRIBUTARIES APPENDIX, *supra* note 94, at C11-10 fig.C11-4 (Little Colorado), C11-11 fig.C11-6 (Virgin), C11-13 fig.C11-8 (Bill Williams), C11-16 fig.C11-10 (Gila).

111 WATER DEMAND ASSESSMENT, *supra* note 78, at C-8 fig.C-3 (Lower Basin mainstream); TRIBUTARIES APPENDIX, *supra* note 94, at C11-16 fig.C11-10 (Gila River).

112 Notably, this untitled water use jumps to approximately 2.66 maf if the Basin Study’s *unreliable* figures for 2005 are taken into account for the other Lower Basin tributaries: Little Colorado River (110,000 acre-feet), Virgin River (575,000 acre-feet), and Bill Williams River (100,000 acre-feet). TRIBUTARIES APPENDIX, *supra* note 94, at C11-10 fig.C11-4 (Little Colorado), C11-11 fig.C11-6 (Virgin), C11-13 fig.C11-8 (Bill Williams). The 575,000 acre-feet figure for the Virgin River is abnormally high, and the 100,000 acre-feet figure for the Bill Williams River likewise contrasts markedly with pre-2001 figures.

113 COMPACT, *supra* note 2, at Art. III(f).

114 These legal conclusions are based on formal statements made by two prominent members of the Colorado River Commission: Delph Carpenter and Herbert Hoover. As described by Delph Carpenter, “[b]y the compact the unapportioned waters are reserved for ‘further equitable apportionment’ between the two basins. This negates any suggestion that excess uses in either basin will be regarded as legal ‘appropriations.’” HOOVER DAM DOCUMENTS, *supra* note 11, at A101. Carpenter thus viewed such “excess uses” as “by sufferance and without legal foundation” and incapable of perfecting any “claim which will prevent further ‘equitable apportionment’ between the basins.” *Id.* In a similar fashion, Herbert Hoover recognized the permissibility of untitled water use

under the Compact, while expressing a distinct view on the fate of this water use in a “further equitable apportionment”--namely, that “such appropriations would doubtless receive formal recognition by the commission.” *Id.* at A36.

115 Colorado River Basin Project Act, 43 U.S.C. § 1552(a) (2012).

116 WATER SUPPLY ASSESSMENT, *supra* note 77, at B-66. As noted previously, this roughly 9 percent projected decrease in Lee’s Ferry flows stems from one of four water supply scenarios examined in the Basin Study: the Downscaled Global Circulation Model (GCM) Projected scenario. This scenario is the only one of the four that contemplates future changes in climate trends and variability that depart from (*i.e.*, rather than replicate) those observed in the historical record or derived from paleo reconstructions. *Id.* at B-4 to B-5.

117 *Id.* at B-66.

118 WATER DEMAND ASSESSMENT, *supra* note 78, at C-27 fig.9.

119 This 8.23 maf annual release consists of an annualized amount of 7.50 maf under Article III(d) plus 0.73 maf pursuant to Article III(c) and 0.02 maf of inflow from the Paria River.

120 The nine years involving releases of 8.23 maf included 2001-2007, 2009, and 2010, and the 8.98 maf and 9.40 maf releases occurred in 2008 and 2000, respectively. BUREAU OF RECLAMATION, 2001 ANNUAL OPERATING PLAN FOR COLORADO RIVER SYSTEM RESERVOIRS, [http:// www.usbr.gov/uc/water/rsvrs/ops/aop/01aop.fin.html](http://www.usbr.gov/uc/water/rsvrs/ops/aop/01aop.fin.html); 2002 ANNUAL OPERATING PLAN FOR COLORADO RIVER SYSTEM RESERVOIRS 11, [http:// www.usbr.gov/uc/water/rsvrs/ops/aop/aop02\\_final.pdf](http://www.usbr.gov/uc/water/rsvrs/ops/aop/aop02_final.pdf); 2003 ANNUAL OPERATING PLAN FOR COLORADO RIVER SYSTEM RESERVOIRS 14, [http:// www.usbr.gov/uc/water/rsvrs/ops/aop/aop03\\_final.pdf](http://www.usbr.gov/uc/water/rsvrs/ops/aop/aop03_final.pdf); 2004 ANNUAL OPERATING PLAN FOR COLORADO RIVER SYSTEM RESERVOIRS 15, [http:// www.usbr.gov/uc/water/rsvrs/ops/aop/AOP04\\_final.pdf](http://www.usbr.gov/uc/water/rsvrs/ops/aop/AOP04_final.pdf); 2005 ANNUAL OPERATING PLAN FOR COLORADO RIVER SYSTEM RESERVOIRS 15, [http:// www.usbr.gov/uc/water/rsvrs/ops/aop/aop05\\_final.pdf](http://www.usbr.gov/uc/water/rsvrs/ops/aop/aop05_final.pdf); ANNUAL OPERATING PLAN FOR COLORADO RIVER RESERVOIRS 17 (2006), [http:// www.usbr.gov/lc/region/g4000/AOP2006/aop06\\_final.pdf](http://www.usbr.gov/lc/region/g4000/AOP2006/aop06_final.pdf); ANNUAL OPERATING PLAN FOR COLORADO RIVER RESERVOIRS 16 (2007), [http:// www.usbr.gov/uc/water/rsvrs/ops/aop/aop07\\_final.pdf](http://www.usbr.gov/uc/water/rsvrs/ops/aop/aop07_final.pdf); ANNUAL OPERATING PLAN FOR COLORADO RIVER RESERVOIRS 16 (2008), [http:// www.usbr.gov/lc/region/g4000/AOP2008/AOP08\\_Final.pdf](http://www.usbr.gov/lc/region/g4000/AOP2008/AOP08_Final.pdf); ANNUAL OPERATING PLAN FOR COLORADO RIVER RESERVOIRS 17 (2009), [http:// www.usbr.gov/uc/water/rsvrs/ops/aop/AOP09\\_final.pdf](http://www.usbr.gov/uc/water/rsvrs/ops/aop/AOP09_final.pdf); ANNUAL OPERATING PLAN FOR COLORADO RIVER RESERVOIRS 18 (2010), [http:// www.usbr.gov/lc/region/g4000/AOP2010/AOP10.pdf](http://www.usbr.gov/lc/region/g4000/AOP2010/AOP10.pdf); ANNUAL OPERATING PLAN FOR COLORADO RIVER RESERVOIRS 16 (2011), [http:// www.usbr.gov/uc/water/rsvrs/ops/aop/AOP11\\_final.pdf](http://www.usbr.gov/uc/water/rsvrs/ops/aop/AOP11_final.pdf).

121 WATER DEMAND ASSESSMENT, *supra* note 78, at C-8 fig.C-3.

122 *Id.* at C-27 fig.9.

123 As just one illustration of this point, if average annual releases of 8.40 maf indeed are sufficient to enable 7.62 maf of average annual mainstream use in the Lower Division States, then average annual releases of 9.37 maf apparently would be necessary to enable the 8.5 maf of mainstream use anticipated by these projections.

124 *See* COLORADO RIVER GOVERNANCE INITIATIVE, *Does the Upper Basin Have a Delivery Obligation or an Obligation Not to Deplete the Flow of the Colorado River at Lee Ferry?* (2012), available at [http:// waterpolicy.info/archives/docs/Delivery%20Obligation%20memo.pdf?p=1693](http://waterpolicy.info/archives/docs/Delivery%20Obligation%20memo.pdf?p=1693).

125 As discussed above in Part II, Article III(c) governs the Upper and Lower Basins’ respective obligations to contribute flows to satisfy Mexico’s 1.5 maf annual treaty entitlement, specifying as the first source of supply for these flows “surplus” waters. COMPACT, *supra* note 2, at Art. III(c).

126 Specifically, if “surplus” waters, as this term appears in Article III(c), is construed as water used in excess of the Lower Basin’s 8.5 maf entitlement in Article III(a) and (b), then untitled water uses in the Lower Basin apparently would have to be curtailed in order to supply treaty flows to Mexico. The Upper Division states would not be obligated to contribute such flows in the event that water associated with curtailed untitled water use in the Lower Basin were sufficient to satisfy Mexico’s 1.5 maf entitlement.

127 This approach follows if “surplus” under Article III(c) is construed as water in excess of the 16.0 maf apportioned to the Upper and Lower Basins collectively by Article III(a) and (b).

128 For such an analysis, see Colorado River Governance Initiative, Respective Obligations of the Upper and Lower Basins Regarding the Delivery of Water to Mexico: A Review of Key Legal Issues 26-40 (2012), available at <http://www.waterpolicy.info/archives/docs/Obligations%20Regarding%20the%20Delivery%20of%20Water%20to%20Mexico.pdf?p=1689>.

129 Decree, *supra* note 65, at Art. II(B)(3).

130 Bureau of Reclamation, *Bureau of Reclamation Forecasts Lower Water Release from Lake Powell to Lake Mead for 2014*, <http://www.usbr.gov/newsroom/newsrelease/detail.cfm?RecordID=44246> (last visited Dec. 18, 2013).

131 Colorado River Basin Project Act, § 301(b), 43 U.S.C. § 1521(b) (2012).

132 Article III(c)’s construction and future administration raise at least two significant interpretive issues: (1) whether water in the Lower Basin tributaries must be accounted for when determining if “surplus” waters exist within the Colorado River system for purposes of Article III(c), and (2) whether “surplus” waters consist of water over and above that associated with the Lower Basin’s individual 8.5 maf entitlement in Article III(a) and (b) or, alternatively, the Upper and Lower Basins’ collective 16.0 maf entitlement rooted in these provisions.

133 To the extent that existing and projected future mainstream uses in the Lower Division states are predicated on average annual releases from the Upper Basin of more than 7.5 maf --e.g., on historical annual releases of 8.23 maf--the viability of these mainstream uses going forward hinges on the extent to which Article III(c) is interpreted and administered in a manner that involves augmenting the 7.5 maf baseline from Article III(d) to supply these higher volumes.

134 Assessing which particular types of water uses and losses are subject to the Compact raises the interpretive issues mentioned earlier in this Part regarding (1) whether the Compact’s apportionment scheme extends to the Lower Basin tributaries, and (2) whether the Compact accounts for reservoir evaporation and other losses as “beneficial consumptive use” in relation to the Upper and Lower Basins’ entitlements in Article III(a) and (b). Again, our view is that the Compact’s apportionment scheme applies to the entire “Colorado River system” (mainstream and tributaries) but does not treat reservoir evaporation and other losses as “beneficial consumptive use.” See *supra*, notes 102-107 and accompanying text.

135 It is worth noting in this regard that Article V of the Compact requires “[t]he chief official of each signatory State charged with the administration of water rights, together with the Director of the United States Reclamation Service and the Director of the United States Geological Survey” to cooperate for purposes of “the systematic determination and co-ordination of the facts as to flow, appropriation, consumption and use of water in the Colorado River Basin, and the interchange of available information in such matters.” COMPACT, *supra* note 2, at Art. V. Data regarding the “flow, appropriation, consumption and use of water” along the Lower Basin tributaries appears to fall squarely within this mandate, in our view, based on Article V’s inclusion of the term “Colorado River Basin.” The Compact defines this term as “all of the drainage area of the *Colorado River System* and all other territory within the United States of America to which the waters of the *Colorado River System* shall be beneficially applied.” *Id.* at Art. II(b) (emphasis added). Again, the “Colorado River System” encompasses “that portion of the Colorado River *and its tributaries* within the United States of America.” *Id.* at Art. II(a) (emphasis added). Section 601(b) of the Colorado River Basin Project Act similarly directs the Secretary of the Interior to “make reports as to the annual consumptive uses and losses of water from the *Colorado River system* after each successive five-year period.” Colorado River Basin Project Act, § 601(b), 43 U.S.C. §

1551(b) (2012) (emphasis added). The Act expressly incorporates the Compact’s definition of “Colorado River system” as it appears in this provision, and likewise expressly requires in § 601(b) that the Secretary include in these reports “[s]pecific figures on quantities consumptively used from the major tributary streams flowing into the Colorado River.” *Id.* at §§ 601(b), 606.

<sup>136</sup> *Arizona v. California*, 373 U.S. 546, 638 (Douglas, J., dissenting).

<sup>137</sup> Rifkind Report, *supra* note 49, at 141.

<sup>138</sup> WILLIAM SHAKESPEARE, *THE TEMPEST* act 2, scene 1 (David Linley ed. 2013) (“what’s past is prologue, what to come [i]n yours and my discharge.”).