

# COMMITTEE ON WATER, PARKS, AND WILDLIFE

BAUER-KAHAN, Chair

## INFORMATIONAL HEARING

Tuesday, May 2, 2023

9:00 am – State Capitol, Room 444

### ***Update on the Status of the Colorado River and Potential Impacts on California***

The Colorado River is a critical resource in the West. The 1,440-mile-long Colorado River passes through parts of seven U.S. states – Arizona, California, Colorado, Nevada, New Mexico, Utah, and Wyoming, two Mexican states (Baja California and Sonora), and many Native American tribal lands, which depend on it for water supply, hydropower, recreation, fish and wildlife habitat, and other benefits. The river is used to irrigate 5.5 million acres of agricultural land and to provide municipal and industrial water supplies to 40 million people.

Water from the Colorado River is regulated by dams and stored in reservoirs. Two major dams along the Colorado River are the Glen Canyon Dam and the Hoover Dam. Lake Powell, the reservoir associated with the Glen Canyon Dam, has a storage capacity of 25.16 million acre-feet (MAF).<sup>1</sup> Lake Mead, the reservoir associated with the Hoover Dam, has an operational storage capacity of 26.12 MAF.<sup>2</sup> Including smaller dams and reservoirs, the Colorado River system is able to store approximately 60 MAF.<sup>3</sup>

When one factors in the Colorado River Basin’s longest drought on record (1999-present), projected population growth, and climate change modeling that suggests longer dry periods, conflict over the allocation of Colorado River flows is only likely to increase absent new actions to address the imbalance of supply and demand.

### **Colorado River background**

The Colorado River is managed and operated under numerous compacts, federal laws, court decisions and decrees, contracts, and regulatory guidelines collectively known as the "Law of the River."<sup>4</sup> This collection of documents apportions the water and regulates the use and management of the Colorado River among the seven basin states and Mexico. The Colorado River Compact, signed in 1922, is the cornerstone of the “Law of the River” and divided the river into two basins: the Upper Basin (Colorado, New Mexico, Utah, and Wyoming) and the

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<sup>1</sup> U.S. Geologic Survey. (2022). Lake Powell’s storage capacity updated for first time since 1986. Accessed April 24, 2023, at [www.usgs.gov/news/national-news-release/lake-powells-storage-capacity-updated-first-time-1986](http://www.usgs.gov/news/national-news-release/lake-powells-storage-capacity-updated-first-time-1986).

<sup>2</sup> National Park Service. (2022). Storage capacity of Lake Mead. Accessed April 24, 2023, at [www.nps.gov/lake/learn/nature/storage-capacity-of-lake-mead.htm](http://www.nps.gov/lake/learn/nature/storage-capacity-of-lake-mead.htm).

<sup>3</sup> National Research Council. (2007). Colorado River Basin Water Management: Evaluating and Adjusting to Hydroclimatic Variability. Washington, DC: The National Academies Press. Accessed April 24, 2023, at <https://doi.org/10.17226/11857>.

<sup>4</sup> U.S. Bureau of Reclamation. (2015). Law of the river. Accessed April 24, 2023, at [www.usbr.gov/lc/region/pao/lawofrvr.html](http://www.usbr.gov/lc/region/pao/lawofrvr.html).

Lower Basin (Arizona, California and Nevada) (Figure 1). Each basin was allocated 7.5 MAF of the river’s water on a 10-year average basis.<sup>5</sup>



Figure 1. Colorado River Basin map showing Upper Basin and Lower Basin states. (Source: <https://www.usbr.gov/lc/region/programs/crbstudy.html>)

Mexico was not a signatory to the Colorado River Compact; however, the Mexican Water Treaty of 1944 (1944 Treaty) committed the U.S. to deliver 1.5 MAF of water to Mexico on an annual basis, plus an additional 200,000 acre-feet (AF) under surplus conditions. The 1944 Treaty is overseen by the International Boundary and Water Commission (IBWC).

There are 30 federally recognized tribes in the Colorado River Basin and none were party to the Colorado River Compact. Twenty two of these tribes have recognized rights to use 3.2 MAF of Colorado River system water annually, or approximately 22% to 26% of the basin’s average annual water supply. In addition, 12 of the tribes have unresolved water rights claims, which will likely increase the overall volume of tribal water rights in the basin when resolved. Under the Upper Colorado River Basin Compact and the U.S. Supreme Court’s decree in *Arizona v. California*, all tribal water uses are accounted for within the apportionment of the states where the water use occurs and are generally senior to most state-based water rights.<sup>6</sup> With many of

<sup>5</sup> Colorado River Compact. (1922). Accessed April 24, 2023, at [www.usbr.gov/lc/region/pao/pdf/crcompact.pdf](http://www.usbr.gov/lc/region/pao/pdf/crcompact.pdf).

<sup>6</sup> University of Montana Center for Natural Resources and Environmental Policy. (2021). Policy Brief #4: The Status of Tribal Water Rights in the Colorado River Basin. Accessed April 24, 2023, at [www.naturalresourcespolicy.org/publications/policy-brief-4-final-4.9.21-.pdf](http://www.naturalresourcespolicy.org/publications/policy-brief-4-final-4.9.21-.pdf).

the oldest water rights in the basin, the tribes are in a position to play a significant role in balancing water demand and supply and otherwise shaping the future of the region.

### Hydrology

Precipitation and runoff in the basin are highly variable. Water conditions on the river depend largely on snowmelt in the basin's northern areas. When the Colorado River Basin states drafted the Colorado River Compact in 1922, the basin had a population of approximately 5.8 million and the negotiators apportioned the Colorado River's water based on the assumption that the annual average flow was 16.4 MAF at Lee Ferry, Arizona.<sup>7</sup> However, the period 1905-1922, which was used to estimate water production allocated under the Colorado River Compact, had the highest long-term annual flow volume at Lee Ferry in the 20th century.<sup>8</sup> Long-term data (1906-2018) show that natural flows in the Colorado River Basin average about 14.8 MAF annually. Flows have dipped significantly during the current drought (2000-present) with natural flows from 2000 to 2018 averaging approximately 12.4 MAF per year.<sup>9</sup> Recent research shows that the 22-year period from 2000 to 2021 is the driest period in at least 1200 years.<sup>10</sup>

Today, the Colorado River Basin provides water for approximately 40 million people. From 1971 to 2002, total consumptive use and losses grew from 13 MAF to over 16 MAF annually. These levels dropped after the 2003 approval of the Quantitative Settlement Agreement (QSA) (see QSA section below) and have ranged from 14 to 15.5 MAF since that time, in part due to decreasing consumptive use in the Lower Basin. Even with decreasing consumptive use, the downward trend in natural flows has caused a significant drawdown of basin storage levels.<sup>11</sup>

### California and the Colorado River

Specific allocations for each basin state were not established under the Colorado River Compact. The Lower Basin states were given their annual allocations in 1928 as part of the Boulder Canyon Project Act, which also authorized construction of Hoover Dam.<sup>12</sup> The annual allotments in the Upper Basin were established by the Upper Colorado River Basin Compact of 1948.<sup>13</sup>

Under the "Law of the River," California has senior rights compared to other Colorado River Lower Basin states, and California's Colorado River apportionment is 4.4 MAF annually, plus half of any surplus. In 1931, California water agencies entered into the "Seven-Party Agreement" that divided California's apportionment amongst Palo Verde Irrigation District (PVID), Imperial

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<sup>7</sup> National Research Council. (2007).

<sup>8</sup> Congressional Research Service. (2020). Management of the Colorado River: Water Allocations, Drought, and the Federal Role. Accessed April 24, 2023, at <https://crsreports.congress.gov/product/pdf/R/R45546/13>.

<sup>9</sup> U.S. Bureau of Reclamation. (2022a). Colorado River Basin Natural Flow and Salt Data-Current Natural Flow Data 1906-2016. Accessed April 24, 2023, at [www.usbr.gov/lc/region/g4000/NaturalFlow/current.html](http://www.usbr.gov/lc/region/g4000/NaturalFlow/current.html).

<sup>10</sup> Williams, A.P., Cook, B.I., and Smerdon, J.E. (2022). Rapid intensification of the emerging southwestern North American megadrought in 2020–2021. *Nature Climate Change*, Vol 12, 232-234. Accessed April 24, 2023, at [www.nature.com/articles/s41558-022-01290-z.epdf](http://www.nature.com/articles/s41558-022-01290-z.epdf).

<sup>11</sup> Congressional Research Service. (2020).

<sup>12</sup> Boulder Canyon Project Act. (1928). Accessed April 24, 2023, at [www.usbr.gov/lc/region/pao/pdffiles/bccompact.pdf](http://www.usbr.gov/lc/region/pao/pdffiles/bccompact.pdf).

<sup>13</sup> Upper Colorado River Basin Compact. (1948). Accessed April 24, 2023, at [www.usbr.gov/lc/region/pao/pdffiles/ucbsnact.pdf](http://www.usbr.gov/lc/region/pao/pdffiles/ucbsnact.pdf).

Irrigation District (IID), Coachella Valley Water District (CVWD), Metropolitan Water District of Southern California (MWD), the City of Los Angeles, the City of San Diego, and the County of San Diego (Table 1).

*Table 1. Seven Party Agreement details showing division of California’s 4.4 MAF per year<sup>14</sup>*

<b>Priority level</b>	<b>Use</b>	<b>Water amount</b>
Priority 1	PVID (based on irrigation of 104,500 acres)	Not to exceed 3.85 MAF per year
Priority 2	Reclamation’s Yuma Project lands in California (not to exceed 25,000 irrigated acres)	
Priority 3	IID and lands served by the All American Canal <sup>a</sup> ; and PVID for use in the Lower Palo Verde Mesa (16,000 irrigated acres)	
Priority 4	MWD	550,000 AF per year
Priority 5	MWD and San Diego	550,000 AF per year and 112,000 AF per year <sup>b</sup>
Priority 6	IID and lands served by the All American Canal <sup>a</sup> ; and PVID for use in the Lower Palo Verde Mesa (16,000 irrigated acres)	Not to exceed 300,000 AF per year
<i>Total of Priorities 1 through 6 is 5.362 MAF per year</i>		
Priority 7	All remaining water available for use in California, for agricultural use in California’s Colorado River Basin.	

<sup>a</sup> As modified by State Water Board Revised Order WRO 2002-0013, IID effectively has a right to 3.1 MAF annually.<sup>15</sup>

<sup>b</sup> Transferred to MWD.

<sup>14</sup> Department of Water Resources. (1998). Bulletin 160-98: California Water Plan, Chapter 9. Accessed April 26, 2023, at <https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=8789>.

<sup>15</sup> State Water Resources Control Board. (2002). Order WRO 2002 – 0013. Accessed April 24, 2023, at [www.waterboards.ca.gov/waterrights/board\\_decisions/adopted\\_orders/orders/2002/wro2002-13.pdf](http://www.waterboards.ca.gov/waterrights/board_decisions/adopted_orders/orders/2002/wro2002-13.pdf).

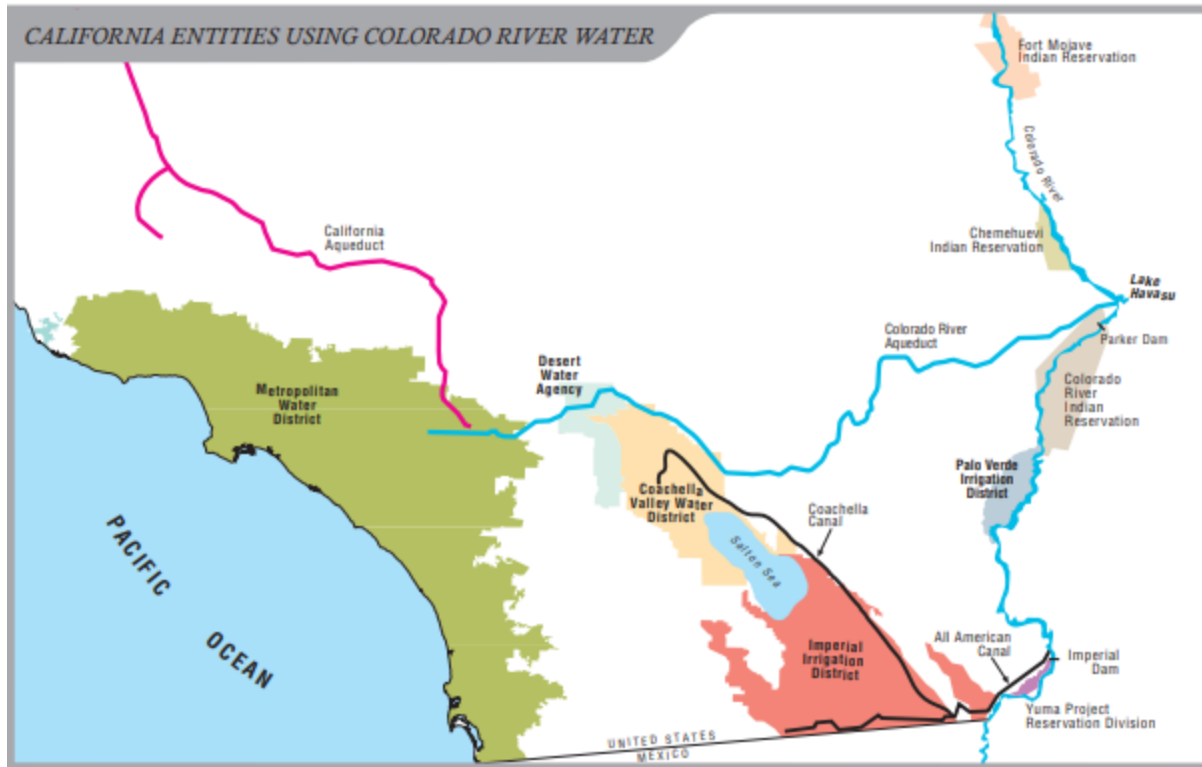


Figure 2. Map showing California entities using Colorado River water. (Source: <https://www.mwdh2o.com/member-agencies/>)

### Quantification Settlement Agreement (QSA)

The QSA is a historic water agreement signed in 2003 that limits California’s Colorado River water usage to 4.4 MAF annually. The QSA came in response to California consistently using available surplus water above its annual Colorado River entitlement of 4.4 MAF. Additionally, the water needs of the six other Colorado River Basin states had grown, making the river’s shared use increasingly crucial. Key elements of the QSA include water conservation measures, environmental mitigation obligations, regulatory provisions, and funding agreements. The QSA includes water transfers from IID to the San Diego County Water Authority (SDCWA) and CVWD of up to 300,000 AF per year for at least 35 years.<sup>16</sup> By transferring water out of the Imperial Valley, the QSA reduces the amount of water available for agricultural use in the area. In turn, this reduces the amount of water flowing into the Salton Sea – further increasing salinity and causing the sea’s shoreline to recede (see Salton Sea section below). Any additional reductions in Colorado River usage in the Imperial Valley will result in additional impacts to the Salton Sea.

### The Salton Sea

The Salton Sea is California's largest lake and was once famous for its sport fishery and recreational uses. It is located in southern Riverside County and northern Imperial County in

<sup>16</sup> Imperial Irrigation District. (n.d.). QSA – Water Transfer. Accessed April 24, 2023, at [www.iid.com/water/library/qa-water-transfer](http://www.iid.com/water/library/qa-water-transfer).

southeastern California. The sea is approximately 35 miles long and up to 15 miles wide with approximately 320 square miles of water surface and 105 miles of shoreline.

The modern Salton Sea was created in 1905 as a result of flood flows from the Colorado River. Since then, approximately 90% of the freshwater inflow to the Salton Sea is agricultural runoff from the Imperial Valley, preventing the sea from drying up as had occurred in the past. As the Salton Sea has no outlets, salts and nutrients concentrate in it. Currently, the Salton Sea has a salinity level that is approximately 60% higher than the ocean. Increasing levels of salinity have significantly reduced the presence of fish in the sea. In addition, as the sea has become increasingly nutrient polluted (eutrophication), the occurrences of fish die-offs and unpleasant odors have made the area a much less attractive destination for recreation.

The surface elevation of the Salton Sea has steadily declined since the implementation of the QSA. When the water transfer began in 2003, IID was required to put mitigation flows into the sea for 15 years. Mitigation flows into the sea stopped as of January 1, 2018. A decrease of over ten feet in elevation from 2003 to 2023 has resulted in a net exposure of 27 square miles of dry lake bed – known as “playa.”<sup>17</sup>

In many areas, the playa consists of fine sediments that were deposited at the bottom of the sea over many years. Due to the high winds and arid climate around the sea, the wind picks up significant amounts of fine dust, increasing the amount of particulate matter in the air and contributing to poor air quality in the Imperial and Coachella Valleys. Particulate matter is especially dangerous to children and the elderly. Over time, particulate matter can become trapped in the lungs, causing asthma attacks, bronchitis, lung diseases, and can exacerbate existing heart conditions. While not solely attributable to the playa, Imperial County has one of the highest rates of asthma-related emergency room visits for children in California.<sup>18</sup>

In order to facilitate the signing of the QSA, the state agreed to assume most of the financial responsibility for mitigating negative environmental impacts and for Salton Sea restoration efforts. The QSA limits the funding for mitigation related to the water conservation and transfer activities, as well as Salton Sea restoration, for certain QSA parties (IID, SDCWA, and CVWD) to \$163 million in 2003 dollars, adjusted for inflation. The Legislature enacted several bills in 2003 to implement the QSA.<sup>19</sup> These legislative measures spell out the financial responsibility assumed by the state, consistent with the QSA, and also establishes a number of broad goals for the restoration effort.

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<sup>17</sup> Pacific Institute. (2023). Current Information on the Salton Sea. Accessed April 24, 2023, at <https://pacinst.org/current-information-salton-sea/>.

<sup>18</sup> Farzan, S.F., Razafy, M., Eckel, S.P., Olmedo, L., Bejarano, E., and Johnston, J.E. (2019). Assessment of Respiratory Health Symptoms and Asthma in Children near a Drying Saline Lake. *International journal of environmental research and public health*, 16(20), 3828. Accessed April 24, 2023, at <https://doi.org/10.3390/ijerph16203828>.

<sup>19</sup> SB 277 (Ducheny), Chapter 611, Statutes of 2003; SB 317 (Kuehl), Chapter 612, Statutes of 2003; SB 654 (Machado), Chapter 613, Statutes of 2003.

California has committed more than \$500 million for restoration and mitigation projects since the QSA, with the majority of funding being appropriated in the last five years.<sup>20</sup> Under a recent agreement, the U.S. Department of the Interior will provide an additional \$250 million.<sup>21</sup>

### Mexico and the Colorado River

The Colorado's natural terminus is the Gulf of California in Mexico, but because of dams and diversion facilities throughout the Colorado River Basin, natural flow rarely reaches the Gulf. Water diverted at Morelos Dam near the California-Baja California land boundary is primarily used to irrigate Mexicali Valley farmland and supply the cities of Mexicali, Tecate, and Tijuana.

In 2007, Mexico and the U.S. agreed to a formal process managed by the IBWC to discuss issues of mutual concern to both nations related to the Colorado River. The discussions resulted in a series of Minutes (agreements) to the 1944 Treaty designed to increase cooperation between the two countries on management of the river.

Among the agreements, Minute 319 partially resolved the question of when Mexico will take a shortage in its Colorado River supplies.<sup>22</sup> Mexico agreed to take a lesser amount of water during times of drought in exchange for establishment of the Intentionally Created Mexican Apportionment, which allows Mexico to store water in Lake Mead during times of surplus or when, because of infrastructure problems, it cannot use its entire annual allocation. Minute 319 also solidified ongoing water supply and environmental restoration work in the Mexican Delta. In 2014, the gates of Morelos Dam were lifted to allow a pulse flow of water into the final stretch of the Colorado River for eight weeks.

A continuation of Minute 319 called Minute 323 was finalized in September 2017.<sup>23</sup> The agreement provides a continuous flow of water to the Colorado River Delta and expands the restored habitat area from 1,700 to 4,300 acres. Mexico is allowed to continue storing water in Lake Mead and both the U.S. and Mexican governments agreed to provide funding and other resources for research projects along the border and throughout the region. In 2021, a May to October release of 35,000 AF of water occurred to help create environmental benefits for plants, birds and wildlife.<sup>24</sup>

Minute 323 requires that the U.S. contribute \$31.5 million to conservation projects in Mexico focused on improving infrastructure. These projects are expected to save about 200,000 AF of water each year. The funding comes from the U.S. government, as well as MWD, IID, Southern Nevada Water Authority, and Central Arizona Water Conservation District. In return, these

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<sup>20</sup> California Natural Resources Agency. (2022). Annual Report on the Salton Sea Management Program – 2021. Accessed April 24, 2023, at [https://saltonsea.ca.gov/wp-content/uploads/2022/02/2022-Annual-Report\\_English\\_Feb-24-2022\\_Final.pdf](https://saltonsea.ca.gov/wp-content/uploads/2022/02/2022-Annual-Report_English_Feb-24-2022_Final.pdf).

<sup>21</sup> Various parties. (2022). Commitment to Support Salton Sea Management Related to Water Conservation in the Lower Colorado River Basin. Accessed April 24, 2023, at [www.usbr.gov/lc/region/saltsea/pdf\\_files/Salton\\_Sea\\_Agreement\\_signed\\_12.9.22.pdf](http://www.usbr.gov/lc/region/saltsea/pdf_files/Salton_Sea_Agreement_signed_12.9.22.pdf).

<sup>22</sup> International Boundary and Water Commission. (2012). Minute 319 Fact Sheet. Accessed April 24, 2023, at [www.ibwc.gov/Files/Minutes/Min319\\_Env\\_Fact\\_Sheet.pdf](http://www.ibwc.gov/Files/Minutes/Min319_Env_Fact_Sheet.pdf).

<sup>23</sup> International Boundary and Water Commission. (2017). Minute 323. Accessed April 24, 2023, at <https://www.ibwc.gov/Files/Minutes/Min323.pdf>.

<sup>24</sup> Water Education Foundation. (n.d.). Colorado River water and Mexico. Accessed April 24, 2023, at <https://www.watereducation.org/aquapedia/mexico-and-colorado-river-water>.

water agencies will receive a portion of the conserved water. In addition to funding for conservation projects, the U.S. government and nongovernmental agencies will fund \$18 million for habitat restoration and monitoring.<sup>25</sup> Minute 323 expires in 2026 at the same time as the 2007 Interim Guidelines and the 2019 Drought Contingency Plan (see below sections).

### Interim Guidelines (2007)

The Secretary of the Interior issued a Record of Decision in December 2007 outlining Colorado River Interim Guidelines for Lower Basin Shortages and Coordinated Operations for Lake Powell and Lake Mead (Interim Guidelines) that are in place through 2026.<sup>26</sup> The key components of the guidelines are:

- 1) A shortage strategy for Lake Mead and the Lower Division states;
- 2) Coordinated operations of Lake Powell and Lake Mead through a full range of operations;
- 3) A mechanism for the creation and delivery of conserved system and non-system water in Lake Mead (Intentionally Created Surplus); and
- 4) The modification and extension of the existing Interim Surplus Guidelines.<sup>27</sup>

The shortage strategy in the Interim Guidelines spells out the Lake Mead levels at which the Secretary of Interior will deem the Lower Basin to be in a “shortage condition” thereby reducing the amount of water available for consumptive use (see Figure 3).

### Drought contingency plans (2019)

As drought across the Colorado River Basin worsened after 2007, the risk of Lake Mead levels reaching critically low elevations became more real. With the realization that the Interim Guidelines were inadequate in light of the drought and projected future hydrology, the U.S. Bureau of Reclamation (Reclamation) and the basin states developed operational tools that would reduce the risk of Lake Mead and Lake Powell reaching critically low elevations (1,020’ and 3,490’/3,525’, respectively). In 2019, the Upper Basin and Lower Basin Drought Contingency Plans (DCPs) were signed.

The Upper Basin DCP is designed to reduce the risk of reaching critical elevations at Lake Powell and to help assure continued compliance with the 1922 Colorado River Compact. The Drought Response Operations Agreement (DROA) is one element of the Upper Basin DCP. The DROA identifies a process to temporarily move water stored in the Colorado River Storage Project Initial Units above Lake Powell – Aspinall, Flaming Gorge, and Navajo – to Lake Powell when it is projected to approach elevation 3,525’, which was identified in the DROA as the target elevation. This elevation provides a 35-foot buffer above the minimum power pool of 3,490’, which is the quantity of water needed to generate power out of the dam. Maintaining an

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<sup>25</sup> Ibid.

<sup>26</sup> U.S. Department of the Interior. (2007). Record of Decision - Colorado River Interim Guidelines for Lower Basin Shortages and the Coordinated Operations for Lake Powell and Lake Mead. Accessed April 24, 2023, at [www.usbr.gov/lc/region/programs/strategies/RecordofDecision.pdf](http://www.usbr.gov/lc/region/programs/strategies/RecordofDecision.pdf).

<sup>27</sup> Ibid.



elevation above 3,525’ allows for compliance with interstate water compact obligations, maintains the ability to generate hydropower at Glen Canyon Dam, and minimizes adverse effects to resources and infrastructure in the Upper Basin.<sup>28</sup>

The Lower Basin DCP requires additional water savings contributions by Lower Basin States; allows for additional flexibility for water storage and recovery to incentivize conservation; includes efforts to create or conserve 100,000 AF of system water annually; and triggers the Binational Water Scarcity Contingency Plan with Mexico (see Figure 3).<sup>29</sup> Under the various agreements that outline shortage reductions, California does not take reductions until a Tier 2b declaration.

**Shortage Reductions and Water Savings Contributions**  
**Under the 2007 Interim Guidelines, Minute 323, Lower Basin Drought Contingency Plan (DCP)\*,**  
**and Binational Water Scarcity Contingency Plan**  
 (Volumes in thousand acre-feet)

Lake Mead Elevations (in feet)	2007 Interim Guidelines Shortage Reductions (U.S.)		Minute 323 Delivery Reductions (Mexico)	Total Combined Shortage Reductions (U.S. and Mexico)	DCP Water Savings Contributions (U.S.)			Binational Water Scarcity Contingency Plan Water Savings (Mexico)	Combined Volumes of Shortage Reductions and Water Savings Contributions by Lower Basin State and by Country (U.S. and Mexico)					Total Combined Volumes (U.S. and Mexico)	
	AZ	NV	Mexico	Lower Basin States + Mexico	AZ	NV	CA	Mexico	AZ Total	NV Total	CA Total	Lower Basin States Total	Mexico Total	Lower Basin States + Mexico	
1,090 ->1,075	0	0	0	0	192	8	0	41	192	8	0	200	41	241	
<b>Tier 1</b> → 1,075 ->1050	320	13	50	383	192	8	0	30	512	21	0	533	80	613	
<b>Tier 2a</b> → 1,050 ->1,045	400	17	70	487	192	8	0	34	592	25	0	617	104	721	
<b>Tier 2b</b> {	1,045 ->1,040	400	17	70	487	240	10	200	76	640	27	200	867	146	1,013
	1,040 ->1,035	400	17	70	487	240	10	250	84	640	27	250	917	154	1,071
	1,035 ->1,030	400	17	70	487	240	10	300	92	640	27	300	967	162	1,129
<b>Tier 3</b> →	1,030 - 1,025	400	17	70	487	240	10	350	101	640	27	350	1,017	171	1,188
	<1,025	480	20	125	625	240	10	350	150	720	30	350	1,100	275	1,375

\*Under the Lower Basin DCP, the United States will take affirmative actions to create or conserve 100,000 acre-feet or more of Colorado River system water on an annual basis to contribute to conservation of water supplies in Lake Mead and other Colorado River reservoirs in the Lower Basin. All actions taken by the United States shall be subject to applicable federal law, including availability of appropriations.

Figure 3: Chart showing shortage reductions and water savings contributions under the 2007 Interim Guidelines, Minute 323, Lower Basin DCP, and Binational Water Scarcity Contingency Plan. (Source: [https://ibwc.gov/Files/CF\\_CO\\_DBunk\\_CFUpdate.pdf](https://ibwc.gov/Files/CF_CO_DBunk_CFUpdate.pdf))

Recent updates

On August 16, 2021, Reclamation declared the first-ever official water shortage on the Colorado River by declaring a Tier 1 shortage.<sup>30</sup> This triggered the largest mandatory water cuts in the

<sup>28</sup> U.S. Bureau of Reclamation. (2023a). Colorado River Basin Drought Contingency Plans. Accessed April 24, 2023, at [www.usbr.gov/dcp/](http://www.usbr.gov/dcp/).

<sup>29</sup> U.S. Bureau of Reclamation. (2022b). “Colorado River System Status Update: Overview of the Lower Basin DCP and “500 Plus” Plan.” Presentation to the IBWC Colorado River Citizens Forum. Accessed April 24, 2023, at [https://ibwc.gov/Files/CF\\_CO\\_DBunk\\_CFUpdate.pdf](https://ibwc.gov/Files/CF_CO_DBunk_CFUpdate.pdf).

<sup>30</sup> Goodland, M. (2021). Bureau of Reclamation declares first-ever shortage on the Colorado River basin, triggering water reductions. Colorado Politics. Accessed April 24, 2023, at [www.coloradopolitics.com/news/bureau-of-reclamation-declares-first-ever-shortage-on-the-colorado-river-basin-triggering-water-reductions/article\\_c4d53aae-fed6-11eb-99ab-572607ec7d67.html](http://www.coloradopolitics.com/news/bureau-of-reclamation-declares-first-ever-shortage-on-the-colorado-river-basin-triggering-water-reductions/article_c4d53aae-fed6-11eb-99ab-572607ec7d67.html).

Colorado River Basin as of that date. On August 16, 2022, Reclamation declared the first-ever Tier 2a Shortage Condition under the Lower Basin DCP for Lake Mead.<sup>31</sup>

As of April 24, 2023, Lake Mead was at 29% capacity at an elevation of 1,047.09'.<sup>32</sup> Water elevation of 950', or eight percent of capacity, is the minimum power pool needed to generate power at Hoover Dam. Water elevations between 950' to 895' are considered "inactive pool" because water can be released from the dam downstream but does not generate hydropower. A water elevation of 895' is considered "dead pool," which is when downstream releases from Hoover Dam are no longer possible. Recent 24-month projections show that Lake Mead is likely to remain in shortage conditions, either Level 1 or Level 2, between now and March 2025.

As of April 24, 2023, Lake Powell was at 24% capacity at an elevation of 3,525.31'.<sup>33</sup> Elevation 3,370' is known as "dead pool" and is the point at which no "excess" water can be passed through the dam – only the volume of water that enters the reservoir will be able to be delivered downstream. Due to recent inflows and anticipated snowmelt, projections show that Lake Powell is likely to have increasing water elevations and is unlikely to drop below minimum power pool (elevation 3,490') between now and March 2025.<sup>34</sup>

### Next steps

In June 2022, the Reclamation Commissioner testified before the U.S. Senate Committee on Energy and Natural Resources and called on water users across the basin to take actions to prevent the reservoirs from falling to critically low elevations. The basin states had until Monday, August 15, 2022, to reach an agreement to save two to four MAF of water in 2023, or Reclamation would take action to preserve the system. An agreement was not reached, and the Level 2a Shortage Condition was declared on August 16, 2022.

In November 2022, the Secretary of the Interior directed Reclamation to prepare a Supplemental Environmental Impact Statement (SEIS) to the final Environmental Impact Statement (EIS) completed for the 2007 Interim Guidelines in order to modify operating guidelines for Glen Canyon Dam and Hoover Dam to address the historic drought and low runoff conditions in the Colorado River Basin.<sup>35</sup> The need for the revised operating guidelines is based on the potential that continued low runoff conditions in the basin could lead to critically low reservoir conditions at Lake Powell and Lake Mead that impact both water delivery and hydropower operations in 2023 and 2024.<sup>36</sup>

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<sup>31</sup> U.S. Department of the Interior. (2022). Interior Department Announces Actions to Protect Colorado River System. Accessed April 24, 2023, at [www.doi.gov/pressreleases/interior-department-announces-actions-protect-colorado-river-system-sets-2023](http://www.doi.gov/pressreleases/interior-department-announces-actions-protect-colorado-river-system-sets-2023)

<sup>32</sup> U.S. Bureau of Reclamation. (2023b). Lower Colorado River water supply report, 4/24/2023. Accessed April 24, 2023, at [www.usbr.gov/lc/region/g4000/weekly.pdf](http://www.usbr.gov/lc/region/g4000/weekly.pdf).

<sup>33</sup> Ibid.

<sup>34</sup> U.S. Bureau of Reclamation. (2023c). 24-Month Study Projections. Accessed April 24, 2023, at [www.usbr.gov/lc/region/g4000/riverops/24ms-projections.html](http://www.usbr.gov/lc/region/g4000/riverops/24ms-projections.html).

<sup>35</sup> Federal Register. (2022). Notice of Intent To Prepare a Supplemental Environmental Impact Statement for December 2007 Record of Decision. Accessed April 24, 2023, at [www.federalregister.gov/d/2022-25004](http://www.federalregister.gov/d/2022-25004).

<sup>36</sup> U.S. Bureau of Reclamation. (2022c). Annual Operating Plan for Colorado River Reservoirs 2023. Accessed April 24, 2023, at [www.usbr.gov/uc/water/rsvrs/ops/aop/AOP23\\_draft.pdf](http://www.usbr.gov/uc/water/rsvrs/ops/aop/AOP23_draft.pdf).

Reclamation set a new deadline of January 31, 2023, for the basin states to contribute a plan to address anticipated shortages that could be analyzed as an alternative under the SEIS. The four Upper Basin states, plus Arizona and Nevada, submitted a plan on January 30, 2023.<sup>37</sup> The six-state plan calls for incorporating system losses (e.g., evaporation) into allocations. Though a tenth of Colorado River water is eventually lost due to evaporation and leaks in infrastructure as it travels to the Lower Basin, system water losses have not traditionally been factored into state water allotments. Under the six-state proposal, California would stand to lose as much as a third of the water it gets from the Colorado River (more than 1 MAF per year) if reservoir levels continue to drop. Arizona and Nevada's reductions would be far less since they are upstream and less affected by system losses than California.

California submitted a separate plan for consideration on January 31, 2023.<sup>38</sup> California's proposed framework seeks to protect Lake Mead elevation of 1,000' and Lake Powell elevation of 3,500' by modifying some parameters governing reservoir operations, maximizing the impact of existing plans and voluntary conservation actions, and increasing cutbacks if Lake Mead elevations decline. It also seeks to protect baseline water needs of communities across the West by prioritizing water supplies for human health and safety. California's plan includes reductions in California use of up to 400,000 AF per year, with IID taking on 250,000 AF of that total.

Reclamation released the draft SEIS on April 11, 2023.<sup>39</sup> The draft SEIS analyzes a no action alternative, as well as the following two alternatives:

*Action Alternative 1:* Action Alternative 1 models potential operational changes to both Glen Canyon Dam and Hoover Dam. This alternative includes modeling for reduced releases from Glen Canyon Dam, as well as an analysis of the effects of additional Lower Colorado River Basin shortages based predominately on the priority of water rights.

Action Alternative 1 models progressively larger additional shortages as Lake Mead's elevation declines, and larger additional shortages in 2025 and 2026, as compared with 2024. The total shortage contributions in 2024, including those under existing agreements, are limited to 2.083 MAF because this is the maximum volume analyzed in the 2007 Interim Guidelines final EIS.

*Action Alternative 2:* Action Alternative 2 is similar to Action Alternative 1 in how it models potential operational changes to both Glen Canyon Dam and Hoover Dam. However, Action Alternative 2 distributes reductions in the same percentage across all Lower Basin water users under shortage conditions.

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<sup>37</sup> Arizona, Colorado, Nevada, New Mexico, Utah, and Wyoming. (2023). Six State Modeling Alternative. Accessed April 24, 2023, at [www.snwa.com/assets/pdf/seis-letter.pdf](http://www.snwa.com/assets/pdf/seis-letter.pdf).

<sup>38</sup> Colorado River Board of California. (2023). California SEIS submittal package. Accessed April 24, 2023, at [www.mwdh2o.com/media/sc4f2txf/california-seis-submittal-package\\_01312023.pdf](http://www.mwdh2o.com/media/sc4f2txf/california-seis-submittal-package_01312023.pdf).

<sup>39</sup> U.S. Bureau of Reclamation. (2023d). Supplemental Environmental Impact Statement for Near-term Colorado River Operations. Accessed April 24, 2023, at [www.usbr.gov/ColoradoRiverBasin/SEIS.html](http://www.usbr.gov/ColoradoRiverBasin/SEIS.html).

While both the 2007 Interim Guidelines and the 2019 DCP encompass shortages and contributions that reflect the priority system, the incremental, additional shortages identified in Action Alternative 2 for the remainder of the interim period would be distributed in the same percentage across all Lower Basin water users. Action Alternative 2 has progressively larger additional delivery shortages as Lake Mead's elevation declines and models larger Lower Basin shortages in 2025 and 2026 as compared with 2024. The total shortage contributions in 2024, including those under existing agreements, are also limited to 2.083 MAF.

The draft SEIS is available for public comment for 45 calendar days and the final SEIS is anticipated to be available with a Record of Decision in summer 2023. A seven-state consensus-based solution is still possible.

#### Management after 2026

Population growth within the basin is projected to increase to between 49.3 million (slow growth scenario) and 76.5 million (rapid growth scenario) by 2060. Demand for consumptive uses is projected to range between 18.1 MAF and about 20.4 MAF by 2060 depending on population growth.<sup>40</sup> As noted above, the 2007 Interim Guidelines and 2019 DCPs expire at the end of 2026. Reclamation's final decision under the SEIS later this year will likely be instructive for negotiations around new operating rules that will be in place after 2026.

#### Efforts in Southern California to reduce demand and diversify supplies

Southern California relies on a variety of water sources, including imports from the Colorado River, Owens Valley, and Northern California through the State Water Project (SWP); desalination; recycled water; and local surface water and groundwater. In recent years, Southern California water agencies have increased their efforts to diversify water supplies and implement conservation measures due to increased variability in supplies imported from the Colorado River and through the SWP. Many of these agencies have identified potable reuse of recycled water as the next major source of local water supply, while continuing water-use efficiency efforts throughout the region.

IID is the fourth largest irrigation district in the U.S., delivering water to 500,000 acres of farmland. As detailed previously, IID has the largest share of Colorado River water at 3.1 MAF per year. Over 95% of water delivered in the IID service area goes to support agriculture. Since the implementation of the QSA, IID has been conserving water to meet the conservation schedules within the QSA, reaching 314,000 AF of conserved water in 2016. This is in addition to 105,000 AF generated annually by a conservation program funded by MWD and 67,700 AF conserved by the All-American Canal Lining Project. When all QSA conservation measures are at full implementation, IID will conserve about 15% (over 487,000 AF) of its consumptive use entitlement each year. Water conservation efforts include temporary land fallowing, and both

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<sup>40</sup> U.S. Bureau of Reclamation. (2012). Colorado River Basin Water Supply and Demand Study. Accessed April 24, 2023, at [www.usbr.gov/watersmart/bsp/docs/finalreport/ColoradoRiver/CRBS\\_Executive\\_Summary\\_FINAL.pdf](http://www.usbr.gov/watersmart/bsp/docs/finalreport/ColoradoRiver/CRBS_Executive_Summary_FINAL.pdf).

system and on-farm conservation efforts that steadily ramp up annually until leveling off in 2026.<sup>41</sup>

MWD serves 26 public water agencies – cities, municipal water districts and one county water authority – that then deliver supplies directly or indirectly to 19 million people in its 5,200 square mile service area, which includes portions of Los Angeles, Orange, Riverside, San Bernardino, San Diego, and Ventura counties. About 25% of MWD’s water typically comes from the Colorado River and another 30% originates in the Northern Sierra and is imported through the SWP. The remaining 45% comes from a mix of what are considered local supplies, which includes the City of Los Angeles’ eastern Sierra deliveries as well as recycling, desalination, and groundwater supplies.<sup>42</sup>

Pure Water Southern California is a potential water recycling program that would reuse water currently sent to the ocean. A partnership between MWD and the Los Angeles County Sanitation Districts, the program will purify wastewater to produce up to 150 million gallons (460 AF) per day. The project is currently in environmental planning and is anticipated to begin operation in 2032.

SDCWA delivers wholesale water supply to 24 retail water agencies, including cities, special districts, and a military base, that serve about 3.3 million people in San Diego County. Historically, SDCWA depended almost exclusively on water supplies imported by MWD from the Colorado River and Northern California. That changed in 2003 with the QSA, which started the largest farm-to-urban water conservation-and-transfer agreement in the nation, which now accounts for about half of San Diego County’s water supply. In late 2015, the Claude “Bud” Lewis Carlsbad Desalination Plant was completed. The Carlsbad plant is the largest seawater desalination plant in the U.S. and now accounts for about 10% of San Diego County’s water supply.

In Orange County, the Groundwater Replenishment System (GWRS) has been operational since January 2008. The GWRS is a water purification project that can produce up to 100 million gallons (around 300 AF) per day of water from highly treated wastewater. This is enough water to meet the needs of nearly 850,000 residents in north and central Orange County. After its final expansion is complete in 2023, production will increase to up to 130 million gallons of water (nearly 400 AF) per day. After treatment, the water is used to replenish the Orange County Groundwater Basin, which has an annual yield of nearly 300,000 AF. GWRS water now accounts for 30% of the replenishment of the groundwater basin, which historically had been replenished by the Santa Ana River. Orange County imports about 15% of its water supply from the SWP and the Colorado River.

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<sup>41</sup> Imperial Irrigation District. (2021). Water conservation. Accessed April 24, 2023, at [www.iid.com/water/water-conservation](http://www.iid.com/water/water-conservation).

<sup>42</sup> Metropolitan Water District of Southern California. (n.d.). Securing our imported supplies. Accessed April 24, 2023, at [www.mwdh2o.com/securing-our-imported-supplies/](http://www.mwdh2o.com/securing-our-imported-supplies/).