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# Management of the Colorado River: Water Allocations, Drought, and the Federal Role


## SUMMARY

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The Colorado River Basin covers more than 246,000 square miles in seven U.S. states (Wyoming, Colorado, Utah, New Mexico, Arizona, Nevada, and California) and Mexico. Pursuant to federal law, the Bureau of Reclamation (part of the Department of the Interior) manages much of the basin's water supplies. Colorado River water is used primarily for agricultural irrigation and municipal and industrial (M&I) uses; it is also important for hydropower production, fish and wildlife, and recreational uses.

### River Management

A collection of compacts, treaties, statutes, and other authorities govern Colorado River allocations and apportionments. The foundational management document, the Colorado River Compact of 1922, established a framework to apportion water supplies between the river's Upper and Lower Basins, divided at Lee Ferry, AZ. The compact allocated 7.5 million acre-feet (MAF) annually to each basin, and a 1994 treaty made an additional 1.5 MAF in annual flows available to Mexico. A Supreme Court case and related decrees inform the Secretary of the Interior's management of the delivery of all water below Hoover Dam.

Consumptive use plus other water losses (e.g., evaporation) on the Colorado River typically exceed the basin's flows. This imbalance, coupled with a long-term drought dating to 2000, has stressed basin water supplies. Reclamation closely tracks the status of two large reservoirs—Lake Powell in the Upper Basin and Lake Mead in the Lower Basin—as indicators of basin storage conditions. Since the onset of drought in the early 2000s, storage levels at these reservoirs have fallen. To alleviate these trends, water releases from both lakes have been tied to specific water storage levels. Since 2020, pursuant to previous agreements, Reclamation has reduced water deliveries in Arizona and Nevada and reduced its deliveries to Mexico based on falling Lake Mead storage levels. In the Upper Basin, Lake Powell's storage also has continued to drop; some worry this could jeopardize hydropower generation at Glen Canyon Dam.

### Efforts to Address Drought

The federal government has led multiple efforts to improve the basin's water supply outlook, resulting in collaborative agreements in 2003 and 2007 and in the 2019 drought contingency plans (DCPs) for the Upper and Lower Colorado River Basins. In May 2023, the Department of the Interior and basin states announced a consensus-based proposal in which the three Lower Basin states will conserve a total of 3 MAF prior to 2026, with 2.3 MAF of these reductions compensated by the federal government using appropriated funds. Despite these efforts, low water storage levels throughout the basin pose widespread concerns among observers and stakeholders.

Most of the agreements to conserve Colorado River Basin water supplies expire in 2026, and Reclamation is currently leading a process analyzing options for "long-term" (post-2026) operational changes. To date, Upper and Lower Basin leaders have been unable to agree on a preferred set of actions to guide long-term basin operations and have submitted competing plans to the federal government. Reclamation published its initial summary of draft alternatives in late 2024 and plans to further refine these options. Meanwhile, basin states continue to pursue a consensus-based solution for long-term operations.

### Congressional Role

Congress funds and oversees management of basin water and power facilities. Congress has enacted legislation affecting Colorado River waters (e.g., Indian water rights settlements, new water storage facilities) and authorizing water shortage mitigation (e.g., the DCPs and other related efforts). Section 50233 of P.L. 117-169 (popularly known as the Inflation Reduction Act) provided $4.0 billion for drought mitigation in the West. The majority of this funding is being used to compensate water contractors for recently agreed-upon delivery reductions. Congress may consider further amending existing authorities or funding mitigation activities for basin water shortages.

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# Introduction

From its headwaters in Colorado and Wyoming to its terminus in the Gulf of California, the Colorado River Basin covers more than 246,000 square miles. The basin spans seven U.S. states (Wyoming, Colorado, Utah, New Mexico, Arizona, Nevada, and California) and two countries (the United States and Mexico). Pursuant to federal law, the Bureau of Reclamation (Reclamation), a component of the Department of the Interior (DOI), plays a prominent role in the management of the basin's waters. In the Lower Basin (i.e., Arizona, Nevada, and California), Reclamation also serves as *water master* on behalf of the Secretary of the Interior, a role that elevates the status of the federal government in basin water management.[1] The federal role in managing Colorado River water is magnified by the multiple federally owned and operated water storage and conveyance facilities in the basin, which provide low-cost water and hydropower supplies.

Colorado River water is used primarily for agricultural irrigation and municipal and industrial (M&I) purposes. The river's flow and stored water also are important for power production, fish and wildlife, and recreation, among other uses. A majority of basin water supplies (70%) are used to irrigate 5.5 million acres of land; basin waters also provide M&I water supplies to nearly 40 million people.[2] Much of the area that depends on the river for its water supplies is outside of the drainage area of the Colorado River Basin. Storage and conveyance facilities on the Colorado River provide trans-basin diversions that serve areas such as Cheyenne, WY; multiple cities in Colorado's Front Range (e.g., Fort Collins, Denver, Boulder, and Colorado Springs, CO); Provo, UT; Albuquerque and Santa Fe, NM; and Los Angeles, San Diego, and the Imperial Valley in Southern California (**Figure 1**). Colorado River hydropower facilities can provide up to 4,200 megawatts of electrical power per year.[3] The river also provides habitat for a wide range of species, including several species listed under the federal Endangered Species Act (ESA; 87 Stat. 884, 16 U.S.C. §§1531-1544). It flows through seven national wildlife refuges and 11 National Park Service (NPS) units; these and other areas of the river support important recreational opportunities.[4]

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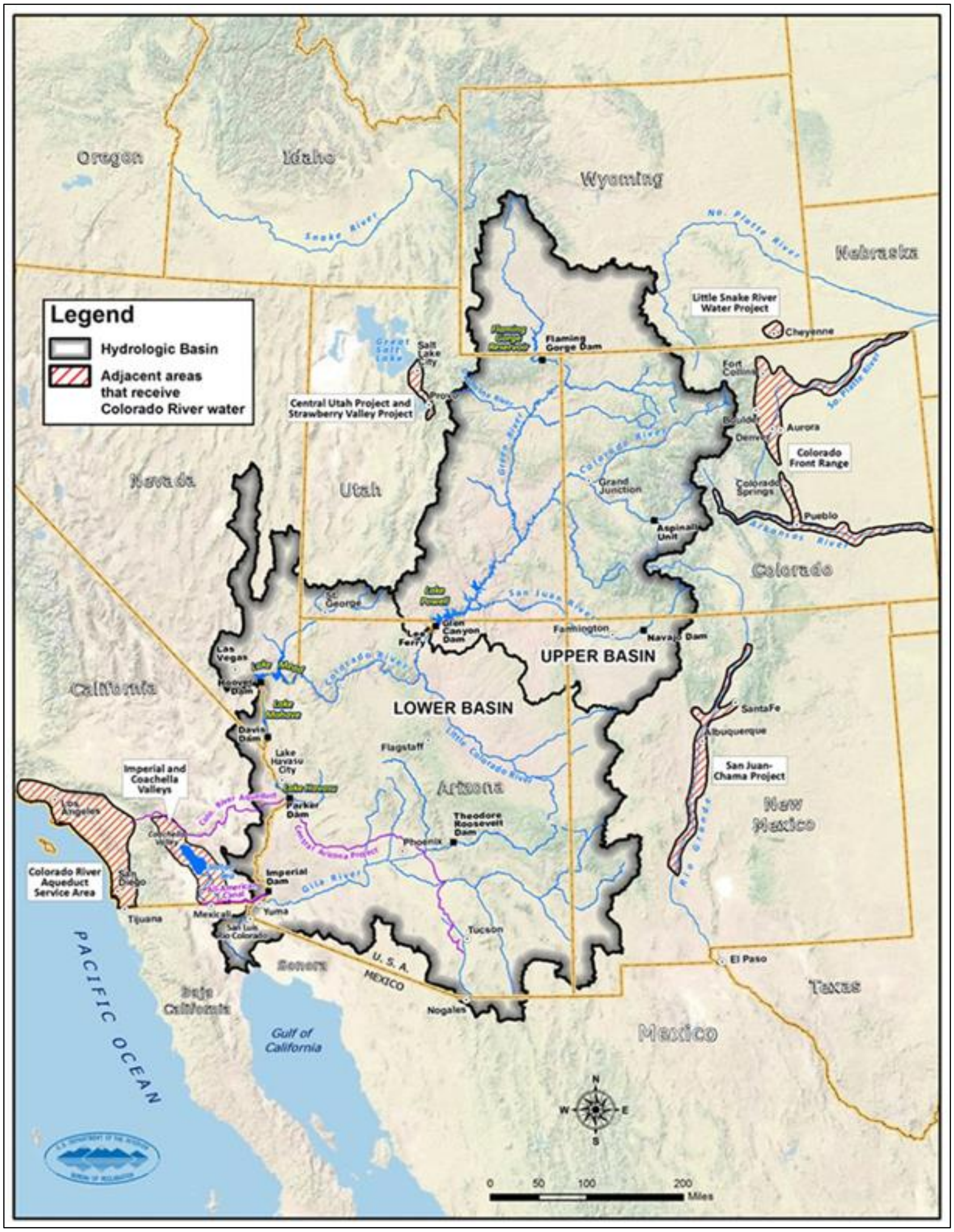
[1] As discussed later in "The Law of the River: Foundational Documents and Programs," the Boulder Canyon Project Act of 1928 made the Secretary of the Interior responsible for the distribution (via contract) of all Colorado River water delivered below Hoover Dam (i.e., the Lower Basin), and authorized such regulations as necessary to enter into these contracts. Subsequent court decisions confirmed the Secretary's power to apportion surpluses and shortages among and within Lower Basin states; this forms the basis for the designation Lower Basin *water master*. No similar authorities or designations have been provided for the Upper Basin.

[2] U.S. Bureau of Reclamation (Reclamation), *Colorado River Basin Water Supply and Demand Study*, December 2012, p. 4, https://www.usbr.gov/lc/region/programs/crbstudy/finalreport/index.html.

[3] Reclamation, *Colorado River Basin Water Supply and Demand Study*, p. 3.

[4] Reclamation, *Colorado River Basin Water Supply and Demand Study*.

**Figure 1. Colorado River Basin and U.S. Areas That Import Colorado River Water**




**Source:** Bureau of Reclamation, *Colorado River Basin Water Supply and Demand Study*, 2012.

Precipitation and runoff in the basin are highly variable. Water conditions on the river depend largely on snowmelt in the basin's northern areas. From 1906 to 2024, natural flows in the Colorado River Basin averaged about 14.6 million acre-feet (MAF) annually.[5] Flows have dipped significantly since 2000;

[5] CRS analysis of Reclamation, "Provisional Natural Flow Data, 1906-2024 (Excel File, 0.3 MB) Based on the August, 2024 24 MS," https://www.usbr.gov/lc/region/g4000/NaturalFlow/LFnatFlow1906-2024.2024.9.12.xlsx. Hereinafter, Reclamation Flow Data.

annual natural flows from 2000 to 2024 averaged approximately 12.4 MAF per year.[6] According to Reclamation, the 23-year period from 2000 to 2022 was the driest 23-year period in more than 100 years of Colorado River record keeping, and among the driest periods in the past 1,200 years.[7] Climate change impacts, including warmer temperatures and altered precipitation patterns, may further increase the likelihood of prolonged drought in the basin.[8] In most years, consumptive use of basin waters is considerably more than flows, resulting in drawdown of basin storage.

Congress plays a prominent role in the management of the Colorado River. Congress funds and oversees Reclamation's management of Colorado River Basin facilities, including facility operations and programs to protect and restore endangered and threatened species. Congress has also approved and continues to consider Indian water rights settlements involving Colorado River waters, and development of new and expanded water storage in the basin. In addition, Congress has approved supplemental funding to mitigate drought and stretch basin water supplies, and new authorities for Reclamation to combat drought and enter into agreements with states and those who are contracted to receive water from federal Colorado River infrastructure (i.e., contractors). This report provides background on management of the Colorado River, with a focus on recent developments. It also discusses the congressional role in the management of basin waters.

# The Law of the River: Foundational Documents and Programs

The *Law of the River* refers to a collection of compacts, treaties, statutes, and other authorities that govern Colorado River allocations and apportionments.[9] In the latter part of the 19th century, interested parties in the Colorado River Basin began to recognize that local interests alone could not solve the challenges associated with development of the Colorado River. Plans conceived by parties in California's Imperial Valley to divert water from the mainstream of the Colorado River were thwarted because these proposals were subject to the sovereignty of both the United States and Mexico.[10] The river also presented engineering challenges, such as deep canyons and erratic water flows, and economic hurdles that prevented local or state groups from building the necessary storage facilities and canals to provide an adequate water supply. In part because local or state groups could not resolve these "national problems," Congress considered options to control the Colorado River and resolve potential conflicts between the states.[11] In an effort to resolve these conflicts and avoid litigation, Congress gave its consent for the states and Reclamation to enter into an agreement to apportion Colorado River water supplies in 1921.[12]

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[6] CRS Analysis of Reclamation Flow Data.

[7] Reclamation, "Request for Input on Development of Post-2026 Colorado River Reservoir Operational Strategies for Lake Powell and Lake Mead Under Historically Low Reservoir Conditions," 87 *Federal Register* 37884, June 24, 2022. For additional discussion on historic drought in the Colorado River, see Subhrendu Gangopadhyay et al., "Tree Rings Reveal Unmatched 2nd Century Drought in the Colorado River Basin," *Geophysical Research Letters*, vol. 49, no. 11 (June 2022).

[8] Bradley Udall and Jonathan Overpeck, "The Twenty-First Century Colorado River Hot Drought and Implications for the Future," *Water Resources Research*, vol. 53, no. 3 (March 2017), pp. 2404-2418.

[9] For an example of how courts characterize the Law of the River, see Navajo Nation v. Dep't of the Interior, 26 F.4th 794, 800 (9th Cir. 2022).

[10] Arizona v. California, 373 U.S. 546 (1963).

[11] S. Doc. No. 67-142 (1922). For example, the states in the Upper Basin (Colorado, Wyoming, Utah, and New Mexico), where the majority of the river's runoff originates, feared that a storage facility making water available downstream might form a basis for claims to priority access to basin waters by Lower Basin states before Upper Basin states could develop means to access their share.

[12] Ch. 72, 42 Stat. 171 (1921). In lieu of litigation, interstate compacts have historically been a preferred means of allocating (continued...)

The below sections discuss the resulting agreement, the Colorado River Compact, as well as key statutory authorities, the Supreme Court's decision in *Arizona v. California*, and other documents and agreements that form the basis of the Law of the River.

## Colorado River Compact

The Colorado River Compact of 1922, negotiated by the seven basin states and the federal government, was initially signed by all but one basin state (Arizona).[13] Under the compact, the states established a framework to apportion the water supplies between the Upper Basin and the Lower Basin, with the dividing line between the two basins located at Lee Ferry, AZ,[14] below the confluence of the Colorado and Paria Rivers near the Utah border.[15] Each basin was apportioned 7.5 MAF annually for beneficial consumptive use, and the Lower Basin was given the right to increase its beneficial consumptive use by an additional 1 MAF annually. The agreement also required that Upper Basin states release (i.e., not deplete) at least 75 MAF to the Lower Basin over any 10-year period (i.e., 7.5 MAF per year), thus allowing for averaging over time to make up for low-flow years.[16] The compact did not address inter- or intrastate allocations of water (which it left to future agreements and legislation), nor did it address tribal rights or other rights that existed at the time the compact was finalized.[17] The compact also contemplated how the basins could share the burden of provisioning water to Mexico, the river's natural terminus, the details of which were addressed in subsequent international agreements.[18] The compact was not to become binding until it had been approved by the legislatures of each of the signatory states and by Congress.

## Boulder Canyon Project Act

Congress approved and modified the Colorado River Compact in the Boulder Canyon Project Act (BCPA) of 1928.[19] The BCPA ratified the 1922 compact, and authorized the construction of a federal facility to impound water in the Lower Basin (Boulder Dam, later renamed Hoover Dam) and of related facilities to deliver water in Southern California (e.g., the All-American Canal, which delivers Colorado River water to California's Imperial Valley). The BCPA apportioned the Lower Basin's 7.5 MAF per year among the three Lower Basin states: 4.4 MAF per year to California, 2.8 MAF to Arizona, and 300,000 acre-feet (AF) to Nevada, with the states to divide any surplus waters among them. It also directed the Secretary of the Interior to serve as the sole contracting authority for Colorado River water use in the Lower Basin and authorized several storage projects for study in the Upper Basin.

water among competing uses. Pursuant to the U.S. Constitution, Article I, Section 10, Clause 3, no such compacts can be entered into without the consent of Congress.

[13] Because the Colorado River Compact of 1922 did not specify the apportionments for individual states, Arizona initially refused to sign and ratify the agreement out of concern that rapidly growing California would lay claim to most of the Lower Basin's share of water. Arizona signed and ratified the compact in 1944.

[14] *Lee Ferry* is the dividing line between basins designated in the compact. *Lees Ferry* (or *Lee's Ferry*), approximately 1 mile upstream from that point, is the location of the USGS streamgage that has measured flows dating to 1921. After the compact was signed, the Lees Ferry streamgage, along with a gage on the Paria River, became the measurements used to determine compliance with the compact.

[15] Arizona receives water under both the Upper and the Lower Basin apportionments, because parts of the state are in both basins.

[16] Pursuant to later agreements (i.e., the U.S. Mexico Water Treaty) and operating criteria (the Long-Term River Operating Criteria, or LROC), the Upper Basin currently must release water to the Lower Basin at a rate of 8.23 million acre-feet (MAF) per year under most circumstances. For more information, see below section, "Colorado River Basin Project Act of 1968."

[17] Boulder Canyon Project Act (BCPA), 45 Stat. 64-65, as codified in 43 U.S.C. §617l-q; cf. Boulder Canyon Project Adjustment Act, 54 Stat. 799, as codified in 43 U.S.C. §618m (containing similar savings clause language).

[18] Colorado River Compact Art. III(c). See below section, "1944 U.S.-Mexico Water Treaty."

[19] BCPA, Ch. 42, 45 Stat. 1057 (1928), codified as amended at 43 U.S.C. §617.

Congress's approval of the compact in the BCPA was conditioned on a number of factors, including ratification of the compact by California and five other states (thereby allowing the compact to become effective without Arizona's concurrence), and California agreeing by act of its legislature to limit its water use to 4.4 MAF per year and not more than half of any surplus waters. California met this requirement by passing the California Limitation Act of March 4, 1929, and the compact became effective on that date.[20]

## 1944 U.S.-Mexico Water Treaty[21]

In 1944, the United States signed a water treaty with Mexico (1944 U.S.-Mexico Water Treaty) to guide how the two countries share the waters of the Colorado River.[22] The treaty established water allocations for the two countries and created a governance framework (i.e., the International Boundary and Water Commission) to resolve disputes arising from the treaty's execution. The treaty requires the United States to provide Mexico with 1.5 MAF of Colorado River water annually, plus an additional 200,000 AF when a surplus is declared. During drought, the United States may reduce deliveries to Mexico in similar proportion to reductions of U.S. consumptive uses. The treaty has been supplemented by additional agreements between the United States and Mexico, known as *minutes*, regarding matters related to the treaty's execution and interpretation.[23]

## Arizona v. California

Arizona ratified the Colorado River Compact in 1944, at which time the state began to pursue a federal project (later named the Central Arizona Project, or CAP) to bring Colorado River water to its primary population centers in Phoenix and Tucson. California opposed the project, claiming it had senior water rights based on its "first in time" use under the doctrine of prior appropriation and that any diversions from Colorado River *tributaries* should be included in Arizona's allotted 2.8 MAF under the Colorado River Compact.[24] In 1952, Arizona filed suit against California in the U.S. Supreme Court to settle these and other issues.[25]

Eleven years later, in the 1963 *Arizona v. California* decision, the Supreme Court ruled in favor of Arizona.[26] The ruling was notable in forgoing typical Reclamation deference to state law under the

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[20] The Department of the Interior (DOI) also requested that California prioritize its Colorado River rights among users before the Colorado River Compact became effective; the state established priority among these users for water in both "normal" and "surplus" years in the California Seven-Party Agreement, signed in August 1931.

[21] For more information on the 1994 U.S.-Mexico Water Treaty and Colorado River water sharing issues with Mexico, see CRS Report R42917, *Mexico: Background and U.S. Relations*, by Clare Ribando Seelke and Joshua Klein.

[22] The treaty also included water-sharing provisions relating to the Lower Rio Grande and Tijuana Rivers. See Treaty Between the United States of America and Mexico Respecting Utilization of Waters of the Colorado and Tijuana Rivers and of the Rio Grande, U.S.-Mex., February 3, 1944, 59 Stat. 1219, https://www.ibwc.gov/Treaties_Minutes/treaties.html. Mexico ratified it on October 16, 1945, and the United States ratified the treaty on November 1, 1945. It became effective on November 8, 1945.

[23] International Boundary and Water Commission (IBWC), "Minutes Between the United States and Mexican Sections of the IBWC," https://www.ibwc.gov/Treaties_Minutes/Minutes.html. For more information on recent minutes, see section, "Minute 319 and Minute 323 Agreements with Mexico."

[24] Historically, water in the western United States (versus riparian rights in the eastern portion) has been governed by some form of the *rule of prior appropriation*. Under this rule, the party that first appropriates water and puts it to *beneficial use* thereby acquires a vested right to continue to divert and use that quantity of water against claimants junior in time.

[25] Article III of the Constitution states that in all cases in which a state shall be a party, the Supreme Court has original jurisdiction. U.S. Constitution, Article III, §2, cl. 2. In original jurisdiction cases, the Supreme Court issues detailed decrees that are more akin to trial court judgments than the Supreme Court's usual appellate decisions.

[26] The 1963 Supreme Court decision in *Arizona v. California* is the first in a line of Supreme Court decisions and orders in the same litigation that address water allocation disputes within the Lower Basin. 373 U.S. 546, 601 (1963), 376 U.S. 340 (1964) (order issued), 383 U.S. 268 (1966) (amending judgment), 466 U.S. 144 (1984) (amending order), 530 U.S. 392 (2000) (continued...)

Reclamation Act of 1902 and formed the basis for the Secretary of the Interior's role as *water master* for the Lower Basin.[27] The Court determined that the BCPA serves as the framework for apportioning the Lower Basin's share of the mainstream waters of the Colorado River, neither the BCPA nor water contracts require any specific formula for apportioning shortages, and the Secretary of the Interior exercises considerable control in managing the delivery of water from Lake Mead to the Lower Basin. The Court determined that the Colorado River Compact guides resolution of disputes regarding allocations between basins, that statutory authority—in this case the BCPA—guides Lower Basin water allocations originating from the main stream of the River, and that tributary allocations are reserved to the states.[28] Although California argued its historical use of the river trumped Arizona's rights to the Arizona allotment, the Court rejected this argument because Congress had spoken definitively to the contrary.[29]

A key element of the suit concerned the extent to which Arizona's Gila River diversions should count toward its allocation in the Colorado River Compact and BCPA. The Supreme Court concluded that the BCPA and compact's 7.5 MAF allocations within and between basins apply only to the mainstream of the Colorado River.[30] Tributary allocations, such as from Arizona's diversion of water from the Gila River, are governed under separate authorities.[31]

As detailed in the Supreme Court's opinion, Congress granted DOI the exclusive authority to enter into contracts with Lower Basin users to apportion stored water pursuant to BCPA Section 5.[32] The resulting contracts determine how mainstream water is delivered to Lower Basin users. In the event of shortages, the Secretary of the Interior has discretion to determine how to divide the burden of shortages in the Lower Basin among the three states, within the parameters of the BCPA and water contracts.[33] The Court clarified that DOI is not bound by a single approach to addressing shortages and acknowledged that one valid option could be to reduce lower basin deliveries proportionally to statutory allocations of the first 7.5 MAF (California 4.4/7.5, Arizona 2.8/7.5, and Nevada 0.3/7.5). DOI also has the authority and discretion to elect an alternate basis for apportioning shortages, subject to statutory constraints.[34] These constraints include the congressionally directed priorities for uses of the dam and reservoir, as well as limitations reflected in statute or the Colorado River Compact.[35]

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(subsequent determination), 531 U.S. 1 (2000) (supplemented), 547 U.S. 150 (2006) (consolidated decree); cf. California v. United States, 438 U.S. 645 (1978).

[27] Pursuant to Section 8 of the Reclamation Act of 1902 (32 Stat. 388), Reclamation is not to interfere with state laws "relating to the control, appropriation, use, or distribution of water used in irrigation," and "the Secretary of the Interior, in carrying out provisions of the Act, shall proceed in conformance with such laws." However, the Court in *Arizona v. California* noted that the Secretary must be able to manage the projects of the Colorado River Basin without being subject to "the varying, possibly inconsistent, commands of the different state legislatures." The Court therefore construed the Secretary's authority "to permit him, within the boundaries set down in the Act, to allocate and distribute the waters of the mainstream of the Colorado River." Arizona v. California, 373 U.S. at 587, 589-590 (1963).

[28] Arizona v. California, 373 U.S. at 564-165 (1963).

[29] Arizona v. California, 373 U.S. at 593 (1963).

[30] Arizona v. California, 547 U.S. at 161-166 (2006).

[31] Arizona v. California, 547 U.S. at 161-166 (2006). In addition to the Central Arizona Project legislation discussed in the next section, *Arizona v. California* also addressed Gila River disputes between Arizona and New Mexico prior to reaching the mainstream, which is beyond the scope of this report.

[32] Arizona v. California, 373 U.S. at 593-594 (1963). As the court explained, BCPA §5 serves as the basis for DOI's authority to apportion Lower Basin water deliveries.

[33] Arizona v. California, 373 U.S. at 594 (1963; allowing the Secretary, "in case of shortage," to "adopt a method of proration" and to consider "priority of use, local laws and customs, or any other factors that might be helpful in reaching an informed judgment in harmony with the Act, the best interests of the Basin States, and the welfare of the Nation").

[34] Arizona v. California, 373 U.S. at 592-593 (1963).

[35] Arizona v. California, 373 U.S. at 584 (1963; referencing BCPA contract authority limitations including that irrigation and (continued...)

In 1964, the Supreme Court issued a decree implementing its opinion in *Arizona v. California*.[36] The decree has been updated multiple times since, most recently in 2006.[37] The decree requires the United States to follow specific priorities for managing water flows from federal structures based on the BCPA.[38] In the event flows are insufficient to provide 7.5 MAF per year to the Lower Basin, the decree instructs DOI to account for *present perfected rights* (i.e., water rights already in place at the time the Colorado River Compact became effective) in order of their priority dates.[39] Additionally, the decree quantified water rights for five tribes, although it did not address any rights or priorities of any additional Indian Reservation.[40] After consulting with states and "major" contracting parties, DOI has the authority to apportion flows pursuant to the BCPA and other statutes based on the following priority use order: (1) river regulation, navigation improvements, and flood control; (2) irrigation and domestic uses, including the satisfaction of present perfected rights; and (3) electric power.[41] The decree also identifies specific quantities of present perfected rights and their date of recognition.[42]

*Arizona v. California* continues to play a significant role in Colorado River allocations. Multiple federal statutes pertaining to Colorado River basin management refer to the *Arizona v. California* decree and codify its requirements.[43] Following the decree, Arizona sought congressional authorization of a new project to access and convey its Colorado River supplies as provided for in the Supreme Court's decree. Congress authorized that project in 1968, on the condition that California's and Nevada's water deliveries receive priority over Arizona's during times of drought (see below, "Colorado River Basin Project Act of 1968").

## Upper Basin Compact and Colorado River Storage Project Authorizations

Congress did not allow projects originally authorized for study in the Upper Basin under BCPA to move forward with federally funded construction until the Upper Basin states determined their individual water

domestic uses are for "permanent service," that nothing should disrupt compact-designated allocations between basins, and that reclamation law provisions generally apply unless Congress explicitly provides otherwise); cf. BCPA, see footnote 19.

[36] Arizona v. California, 376 U.S. 340 (1964). The 1964 decree determined, among other things, that all water in the mainstream of the Colorado River below Lee Ferry and within the United States would be "water controlled by the United States" and that the Secretary would release water under only three types of designations for a year: "normal, surplus, and shortage."

[37] The Supreme Court supplemented the 1964 decree in 1966, 1979, 1984, and 2000; in 2006 it issued a consolidated decree incorporating the 1964 decree and supplements. See footnote 26. Among other things, the decrees set forth tribal water rights and present perfected rights of various parties in the Lower Basin.

[38] Arizona v. California, 376 U.S. 340 (1964); 547 U.S. 150 (2006; allowing for Colorado River water releases to satisfy Mexico treaty obligations "without regard" to the priorities specified in the BCPA as referenced in subdivision II(A) of the decree).

[39] Arizona v. California, 547 U.S. 150 (2006), 154-155, 166. Present perfected rights are those existing as of June 25, 1929, in accordance with state law and exercised by actually diverting a specific quantity of water and/or reservation of water rights for federal use. Arizona v. California, 547 U.S. at 154.

[40] Arizona v. California. 373 U.S. at 598-602. Indian reserved water rights were first recognized by the Supreme Court in Winters v. United States, 207 U.S. 564, 575-577 (1908). Under the Winters doctrine, when Congress reserves land (i.e., for an Indian reservation), it implicitly reserves water sufficient to fulfill the purpose of the reservation. Because the establishment of Indian reservations (and, therefore, of Indian water rights) generally predated large-scale development of water resources for non-Indian users, the water rights of tribes often are senior to those of non-Indian water rights. For more information on the resulting settlements, see below section, "Tribal Water Rights" and CRS Report R44148, *Indian Water Rights Settlements*.

[41] Arizona v. California, 547 U.S. 150 at 154-156 (2006). The Court did not clarify what a constituted "major delivery contract." Arizona v. California, 547 U.S. at 155.

[42] Arizona v. California, 547 U.S. at 167-181 (2006). In sum, California, including tribal uses within the state, is entitled to approximately 3 MAF based on present perfected rights. Present perfected rights total approximately 1.05 MAF in Arizona and .000013 MAF in Nevada. California's rights include Imperial Irrigation District rights to 2.6 MAF (priority date of 1901), Palo Verde Irrigation District rights to 0.2 MAF (priority date of 1877), tribal rights totaling approximately 0.16 MAF with priority dates ranging from 1873 to 1903, and an additional 0.04 MAF from other uses.

[43] See, for example, 43 U.S.C. §§1521, 1525.

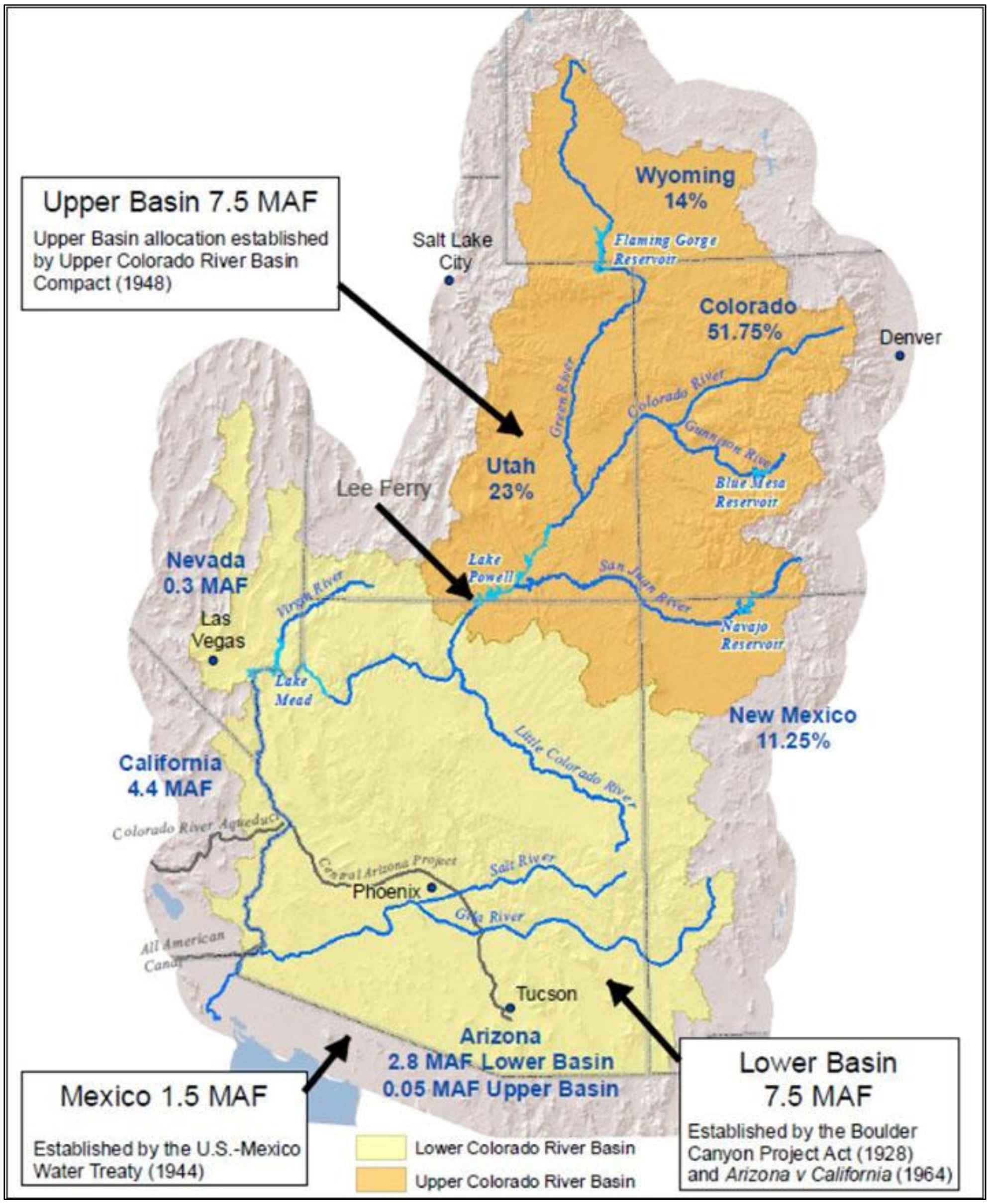
allocations, which occurred under the Upper Colorado River Basin Compact of 1948.[44] Because there was some uncertainty as to the exact amount of water that would remain in the system after Lower Basin obligations were met, the Upper Basin Compact established state allocations in terms of percentage: Colorado (where the largest share of runoff to the river originates) is the largest entitlement holder in the Upper Basin, with rights to 51.75% of any Upper Basin flows after Colorado River Compact obligations to the Lower Basin have been met. Other states also received percentage-based allocations, including Wyoming (14%), New Mexico (11.25%), and Utah (23%). Arizona was allocated 50,000 AF in addition to its Lower Basin apportionment, in recognition of the portion of the state in the Upper Basin. **Figure 2** shows basin allocations by state following approval of the Upper Basin Compact (i.e., the allocations that generally guide current water deliveries). The Upper Basin Compact also established the Upper Colorado River Commission, an interstate administrative water agency charged with administering the provisions of the Upper Basin Compact.[45]

[44] Upper Colorado River Basin Compact, 1948.

[45] For more information, see Upper Colorado River Commission, "About the UCRC," http://www.ucrcommission.com/about-us/.

**Figure 2. Colorado River Basin Allocations**

(shown as percentage of allocation or million acre-feet [MAF])




**Source:** Congressional Research Service, using data from U.S. Geological Survey; Esri Data & Maps, 2017; Central Arizona Project; and Esri World Shaded Relief Map.

**Notes:** Although both the Upper and Lower Basins were each allocated 7.5 MAF, there was uncertainty about how much water would remain in the Upper Basin after Colorado River Compact obligations to Lower Basin states were fulfilled. Therefore, outside of 50,000 acre-feet provided annually to Arizona, the Upper Basin Compact includes apportionments in terms of percentage of the overall Upper Basin allocation.

Subsequent federal legislation paved the way for development of Upper Basin waters. The Colorado River Storage Project (CRSP) Act of 1956 authorized CRSP *initial units* of Glen Canyon, Flaming Gorge, Navajo, and Aspinall in the Upper Basin. The act also established the Upper Colorado River Basin Fund, which receives revenues collected in connection with the projects, to be made available for defraying the project's costs of operation, maintenance, and emergency expenditures.

## Colorado River Basin Project Act of 1968

The Colorado River Basin Project Act (CRBPA), enacted in 1968, authorized additional projects in both the Upper and Lower Basins and made other changes to basin management. In the CRBPA, Congress authorized a major new water conveyance project in Arizona, the Central Arizona Project (CAP),[46] as well as several other Upper Basin projects (e.g., the Animas La Plata and Central Utah projects). The CRBPA also established funding mechanisms for revenues from power generation from relevant Upper and Lower Basin facilities to be used to fund specific expenses in each respective basin. The act also provided direction on how to address shortages in the Lower Basin when the Colorado River cannot supply annual consumptive use of 7.5 MAF in Arizona, California, and Nevada.

The CRBPA represented a legislative compromise between the interests of California and Arizona. The act authorized the CAP but provides that, in the event of shortage conditions, California's 4.4 MAF allocation would have priority over CAP water supplies.[47] Specifically, when there are shortages, the CRBPA directs that diversions to the CAP are to be limited to ensure sufficient consumptive use for certain California and Nevada users whose water rights predate the CAP, consistent with the 1964 *Arizona v. California* decree.[48]

In addition, the CRBPA directs the Secretary of the Interior to develop a plan for meeting future water needs, develop criteria for operating federally authorized reservoirs in the basin to ensure that the reservoirs satisfy existing needs and legal obligations, and report annually on implementation of the plan.[49] Section 602 of the CRBPA directs the Secretary of the Interior to consultatively develop operational criteria—known as *Long-Range Operating Criteria* (LROC)—for federally authorized Colorado River reservoirs in the following order of priority: (1) treaty obligations to Mexico, (2) the Colorado River Compact requirement for the Upper Basin to not deplete more than 75 MAF to Lower Basin states over any 10-year period, and (3) carryover storage to meet these needs.[50] The Secretary of the Interior may modify the criteria based on "actual operating experience or unforeseen circumstances" after correspondence and consultation with representatives of the basin states.[51] The Secretary of the Interior first adopted LROC in 1970; they were last modified in 2005.[52] The LROC coordinated Lake Mead and Lake Powell operations and, among other things, required that the Upper Basin release waters to the Lower Basin at a rate of at least 8.23 MAF under most circumstances (i.e., 7.5 MAF for the compact's

[46] See 43 U.S.C. §§1501-1556. The Central Arizona Project was authorized in 43 U.S.C. §1521. Some portions of the Colorado River Basin Project Act (CRBPA) were codified as amendments to the CRSPA. 43 U.S.C. §§620a, 620a-1.

[47] 43 U.S.C. §1521.

[48] See 43 U.S.C. §1525 (allowing for limitations to Arizona supplies sufficient to enable 4.4 MAF of annual consumption "by holders of present perfected rights, by other users in the State of California served under existing contracts with the United States by diversion works heretofore constructed, and by other existing Federal reservations in that State, and by users of the same character in Arizona and Nevada"). The legislation references Section II(B)(1) of the *Arizona v. California* 1964 Supreme Court decree, 376 U.S. 340, which is associated with the 1963 opinion Section III, Apportionment and Contracts in Time of Shortage, 373 U.S. 546, 592-594. See also 43 U.S.C. §1521(b) (allowing modifications to Central Arizona Project diversions).

[49] 43 U.S.C. §§1501(b), 1552.

[50] 43 U.S.C. §1552(a)-(b). The Grand Canyon Protection Act (P.L. 102-575) directs DOI to operate Glen Canyon Dam in a specific manner. In addition to compliance with laws governing Colorado River water apportionment, DOI must adopt criteria and operating plans separate from and in addition to the ones specified in Section 602 of the CRBPA consistent with Grand Canyon National Park values. However, the legislation states that the provisions are not intended to affect state water rights to Colorado River allocations that have been secured by "any compact, law, or decree." P.L. 102-575, §1802, 106 Stat. 4669 (1992). The CRBPA provides that if the federal government fails to comply with applicable law in operating Glen Canyon Dam, any affected state can sue to enforce its provisions in the Supreme Court. 43 U.S.C. §1551(c).

[51] 43 U.S.C. §1552(b).

[52] Operating Criteria, 70 *Federal Register* 15873 (March 29, 2005); Colorado River Reservoirs, Coordinated Long-Range Operations, 35 *Federal Register* 8951 (June 10, 1970). Through later legislation, Congress required that, in preparing the LROC and Annual Operating Plan, the Secretary of the Interior must consult the governors of the basin states and with the public, see Grand Canyon Protection Act of 1992, P.L. 102-575, §1804(c)(3), 106 Stat. 4669.

non-depletion obligation, plus 750,000 AF (50%) for the Upper Basin's portion of U.S.-Mexico Water Treaty obligations.

# Water Storage and Operations

The Colorado River Basin's large surface water storage projects can store as much as 60 MAF, or about four times the Colorado River's annual flows, to insulate water users from annual variability in flows. Thus, storage and operations in the basin receive considerable attention, particularly at the basin's two largest dams and their storage reservoirs: Glen Canyon Dam/Lake Powell in the Upper Basin (26.2 MAF of storage capacity) and Hoover Dam/Lake Mead in the Lower Basin (26.1 MAF of storage capacity). The status of these projects is monitored closely by Reclamation and interested stakeholders as an indicator of basin health.

Glen Canyon Dam, completed in 1963 at the southern end of the Upper Basin, serves as the linchpin for Upper Basin storage and regulates flows from the Upper Basin to the Lower Basin, pursuant to the Colorado River Compact. From 2000 to 2020, it generated an average of approximately 3.8 billion kilowatt-hours (KWh) of electricity per year, which the Western Area Power Administration (WAPA) supplies to 5.8 million customers in Upper Basin States.[53] Other significant storage in the Upper Basin includes the initial units of the CRSP: the Aspinall Unit in Colorado (including Blue Mesa, Crystal, and Morrow Point dams on the Gunnison River, with combined storage capacity of more than 1 MAF),[54] the Flaming Gorge Unit in Utah (including Flaming Gorge Dam on the Green River, with a capacity of 3.8 MAF), and the Navajo Unit in New Mexico (including Navajo Dam on the San Juan River, with a capacity of 1 MAF). The Upper Basin is also home to 16 participating projects, which are authorized to use water for irrigation, M&I uses, and other purposes.[55]

Hoover Dam, completed in 1936, provides the majority of the Lower Basin's storage and generates on average about 4 billion KWh of electricity per year for customers in California, Arizona, and Nevada.[56] Also important for Lower Basin Operations are Davis Dam/Lake Mohave, which regulates flows to Mexico under the 1944 Treaty, and Parker Dam/Lake Havasu, which impounds water for diversion into the Colorado River Aqueduct (thereby allowing for deliveries to urban areas in Southern California) and CAP (allowing for diversion to users in Arizona). Further downstream on the Arizona/California border, Imperial Dam (a diversion dam) diverts Colorado River water to the All-American Canal for use in some of the river's largest agricultural areas in California's Imperial and Coachella Valleys.

Groundwater storage in the Colorado River basin is generally regulated by individual basin states and constitutes an important related source of water often drawn upon by users as a complement or alternative to surface water supplies. Groundwater accounts for 40% of basin water supply, and reliance on the source is expected to increase as surface water storage declines.[57] Recent studies have indicated that

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[53] Statement of Reclamation Commissioner Camille Calimlim Touton in U.S. Congress, Senate Committee on Energy and Natural Resources, Subcommittee on Water and Power, 117th Cong., 2nd sess., May 25, 2022. For a more detailed discussion of the effects of long-term drought on Glen Canyon Dam, see CRS Report R47497, *Long-Term Drought and Glen Canyon Dam: Potential Effects on Water Deliveries and Hydropower*, by Charles V. Stern and Ashley J. Lawson.

[54] The Curecanti Unit was renamed the Aspinall Unit in 1980 in honor of U.S. Representative Wayne N. Aspinall of Colorado.

[55] In total, 16 of the 22 Upper Basin projects authorized as part of CRSP have been developed. (Of the six remaining projects, five were determined by Reclamation to be infeasible, and Congress deauthorized the Pine River Extension Project.) For a complete list of projects, see Reclamation, "Colorado River Storage Project," https://www.usbr.gov/uc/rm/crsp/index.html.

[56] Reclamation, "Hoover Dam Frequently Asked Questions and Answers," accessed October 30, 2023, https://www.usbr.gov/lc/hooverdam/faqs/powerfaq.html.

[57] Reclamation, *Colorado River Basin Water Supply and Demand Study*, December 2012, https://www.usbr.gov/lc/region/programs/crbstudy/finalreport/Study%20Report/StudyReport_FINAL_Dec2012.pdf.

groundwater storage levels in the basin have been declining more rapidly than levels of surface water and may further jeopardize the basin's water supply outlook.[58]

## Annual Operations

Reclamation monitors Colorado River reservoir levels and projects them 24 months into the future in monthly studies (called *24-month studies*).[59] The studies take into account forecasted hydrology, reservoir operations, and diversion and consumptive use schedules to model a single scenario of reservoir conditions. The studies inform operating decisions by Reclamation looking one to two years into the future. They express water storage conditions at Lake Mead and Lake Powell in terms of elevation, as feet above mean sea level.

In addition to the 24-month studies, the CRBPA requires the Secretary of the Interior to transmit to Congress and the governors of the basin states, by January 1 of each year, an *Annual Operating Plan* (AOP). In the AOP, Reclamation describes the actual operation for the preceding operating year and the projected operation for the coming year.[60] The AOP's projected January 1 water conditions for the upcoming calendar year establish a baseline for future annual operations.[61]

Since the adoption of operational guidelines by Reclamation and basin states in 2007 (see section, "2007 Interim Guidelines/Coordinated Operations for Lake Powell and Lake Mead"), Reclamation has tied operations of Hoover and Glen Canyon Dams to specific pool elevations at Lake Mead and Lake Powell. For Lake Mead, the first level of shortage (a *Tier One Shortage Condition*) in the 2007 guidelines, under which Arizona's and Nevada's allocations are curtailments (along with releases to Mexico), is triggered if the Lake Mead pool elevation falls below 1,075 feet. For Lake Powell, releases under tiered operations are based on storage levels in both Lake Powell and Lake Mead. Drought contingency plans (DCPs) for the Upper and Lower Basins, enacted in 2019,[62] overlaid additional operational changes tied to elevations in both reservoirs, including a new *Tier Zero* shortage beginning at a higher reservoir elevation (up to 1,090 feet) and additional curtailments for other existing tiers (e.g., *Tier Two*).[63] For Lake Powell, the Upper Basin DCP incorporated a Drought Response Operations Agreement (DROA) that established a target lake elevation of 3,525 feet. It also provided for altered releases from Glen Canyon Dam and Upper Basin reservoirs in order to protect Lake Powell from falling below an elevation that would no longer produce hydropower. These efforts are discussed more in the below section "Recent Developments and Agreements."

### Recent Conditions

Since 2000, water levels have fallen significantly at Lake Mead and Lake Powell (**Figure 3**). In 2020, falling water levels in Lake Mead resulted in Reclamation implementing Lower Colorado River Basin delivery curtailments for Arizona and Nevada in accordance with previous plans. The first delivery

[58] Karem Abdelmohsen et al., "Declining Freshwater Availability in the Colorado River Basin Threatens Sustainability of Its Critical Groundwater Supplies," *Geophysical Research Letters*, vol. 52, no. 10 (May 2025), https://doi.org/10.1029/2025GL115593.

[59] Current 24-month studies, as well as two- and five-year probable projections of Lakes Mead and Powell elevations, are available at Reclamation, "Colorado River System Projections Overview," https://www.usbr.gov/lc/region/g4000/riverops/coriver-projections.html.

[60] The operating year for Glen Canyon Dam runs from October 1 through September 30; the operating year for Hoover Dam runs from January 1 through December 31.

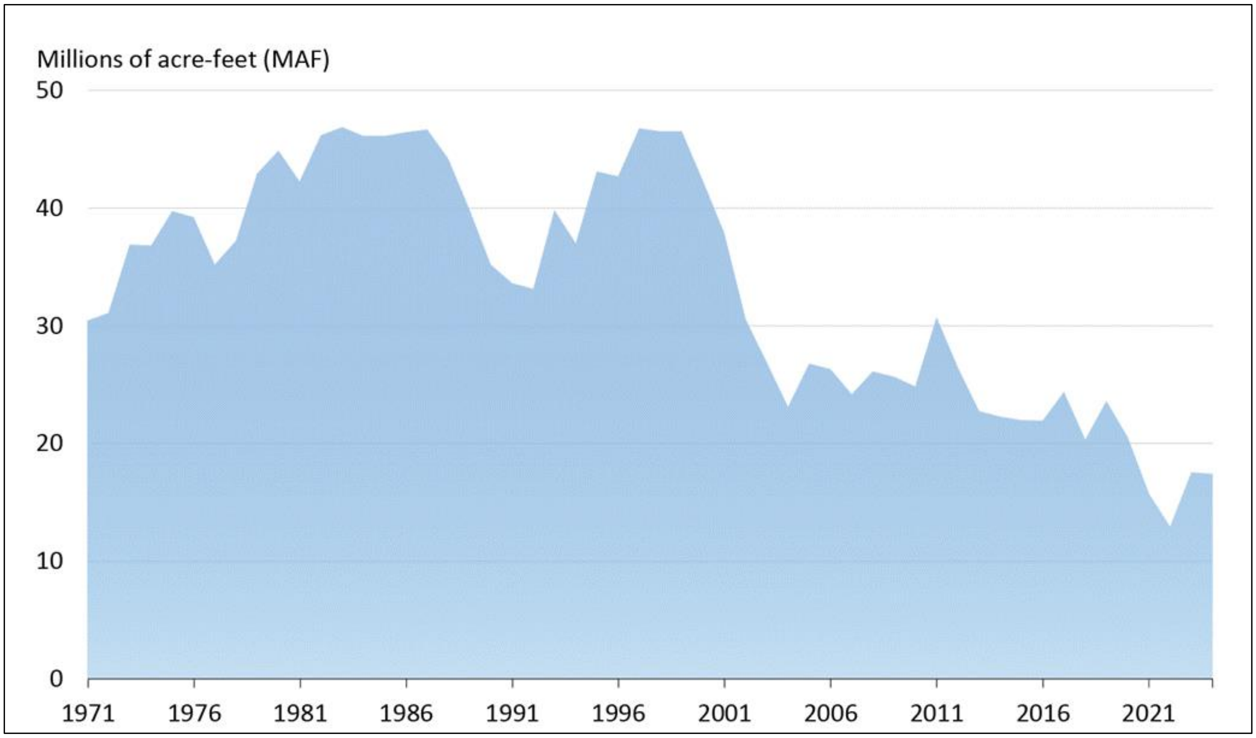
[61] Current and historical AOPs are available at Reclamation, "Annual Operating Plan for Colorado River Reservoirs," https://www.usbr.gov/uc/water/rsvrs/ops/aop/.

[62] See below section, "2019 Drought Contingency Plans."

[63] For more details, see below section, "Lower Basin Drought Contingency Plan."

curtailments in the basin occurred in 2020, when a "Tier Zero" reduction went into effect (as agreed to in the 2019 DCPs). In August 2021, Reclamation declared a Tier One Shortage Condition for 2022, and it implemented cuts under Tier Two and Tier One in 2023 and 2024, respectively.[64] These reductions coincided with Lake Powell falling below the target elevation of 3,525 feet, which had not occurred since the late 1960s.[65] As of late 2025, combined storage in both reservoirs remained near historically low levels.

**Figure 3. Lakes Mead and Powell Combined Storage, 1971-2024**




**Source:** Congressional Research Service, using Bureau of Reclamation data at https://data.usbr.gov/visualizations/reservoir-conditions/.

# Mitigating the Environmental Effects of Colorado River Basin Development

Construction of most of the Colorado River's water supply infrastructure predated major federal environmental protection statutes, such as the National Environmental Policy Act (NEPA; 42 U.S.C. §§4321 et seq.) and the ESA. Thus, many of the environmental impacts associated with the development of basin resources were not originally taken into account. Over time, multiple efforts have been initiated to mitigate these effects. Some of the highest-profile efforts have been associated with water quality (in

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[64] Reclamation, "Interior Department Announces Actions to Protect Colorado River System, Sets 2023 Operating Conditions for Lake Powell and Lake Mead," press release, August 16, 2022, https://www.usbr.gov/newsroom/news-release/4294; Reclamation, "Reclamation Announces 2024 Operating Conditions for Lake Powell and Lake Mead," press release, August 15, 2023, https://www.usbr.gov/newsroom/news-release/4603.

[65] Reclamation, "Lake Powell to Temporarily Decline Below 3,525 Feet," press release, March 4, 2022, https://www.usbr.gov/newsroom/#/news-release/4117; 3,525 feet is established as a target because it is 35 feet above 3,490 feet, the level at which power production would cease.

particular, salinity control) and the effects of facility operations on endangered and threatened species. These efforts are discussed below.

## Salinity Control

Salinity and water quality are long-standing issues in the Colorado River Basin. Parts of the Upper Basin are covered by salt-bearing shale (which increases salt content of water inflows), and salinity content increases as the river flows downstream due to both natural leaching and return flows from agricultural irrigation. The 1944 U.S.-Mexico Water Treaty did not set water quality or salinity standards in the Colorado River Basin. After years of dispute between the United States and Mexico regarding the salinity of the water reaching Mexico's border, the two countries reached an agreement on August 30, 1973, with the signing of Minute 242 of the International Boundary and Water Commission.[66] The agreement guarantees Mexico that the average salinity of its treaty deliveries will be no more than 115 parts per million higher than the salinity content of the water diverted to the All-American Canal at Imperial Dam in Southern California. To control the salinity of Colorado River water in accordance with this agreement, Congress passed the Colorado River Basin Salinity Control Act of 1974, which authorized desalting and salinity control facilities to improve Colorado River water quality. The most prominent of these facilities is the Yuma Desalting Plant, which was largely completed in 1992 but has never operated at capacity due to cost and other factors.[67] In 1974, the seven basin states also established water quality standards for salinity through the Colorado River Basin Salinity Control Forum.[68]

## Endangered Species Efforts and Habitat Improvements

Congress enacted the ESA in 1973. As the federal government listed some basin species under ESA in accordance with the act,[69] federal agencies and nonfederal stakeholders consulted with the U.S. Fish and Wildlife Service (FWS) to address the conservation of the listed species. As a result of these consultations, several major programs have been developed to protect and restore listed fish species on the Colorado River and its tributaries. Summaries of some of the key programs are below.

### Upper Colorado Endangered Fish Recovery Program

The Upper Colorado Endangered Fish Recovery Program was established in 1988 to assist in the recovery of four species of endangered fish in the Upper Colorado River Basin.[70] Congress formally authorized this

[66] See International Boundary and Water Commission, *Minute 242, Permanent and Definitive Solution to the International Problem of the Salinity of the Colorado River*, August 30, 1973, https://www.ibwc.gov/Treaties_Minutes/Minutes.html.

[67] The Yuma Desalting Plant's limited operations have been partly due to the cost of its operations (desalination can require considerable electricity to operate) and surplus flows in the Colorado River during some years. In lieu of operating the plant, high-salinity irrigation water has been separated from the United States' required deliveries to Mexico and disposed of through a canal that enters Mexico and discharges into wetlands called the Ciénega de Santa Clara, near the Gulf of California. Whether and how the plant should be operated and how the impacts on the Ciénega de Santa Clara from the untreated irrigation runoff should be managed remain topics of some debate in the basin and between Mexico and the United States.

[68] Additional information about the forum and related salinity control efforts is available at Colorado River Basin, "Salinity Control Forum," https://www.coloradoriversalinity.org/.

[69] Several listed species are found throughout the Colorado River Basin. Some are specifically found in the Colorado River, such as the razorback sucker (*Xyrauchen texanus*), bonytail chub (*Gila elegans*), Colorado pikeminnow (*Ptychocheilus Lucius*), and humpback chub (*Gila cypha*). Consultation about an agency action's effects on these species is required by 16 U.S.C. §1536(a).

[70] The fish species are the humpback chub, bonytail chub, Colorado pikeminnow, and razorback sucker. For more information, see Upper Colorado River Endangered Fish Recovery Program at http://www.coloradoriverrecovery.org/uc. For general background information on the Endangered Species Act (87 Stat. 884, 16 U.S.C. §§1531-1544), see CRS Report R46677, *The Endangered Species Act: Overview and Implementation*.

program in 2000.[71] The program is implemented through several stakeholders under a cooperative agreement signed by the governors of Colorado, Utah, and Wyoming; the Secretary of the Interior; and the Administrator of WAPA. The recovery goals of the program are to reduce threats to species and improve their status so they are eventually delisted from the ESA. Some of the actions taken in the past include providing adequate instream flows for fish and their habitat, restoring habitat, reducing nonnative fish, augmenting fish populations with stocked fish, and conducting research and monitoring. Reclamation is the lead federal agency for the program and provides the majority of federal funds for implementation. Other funding includes a portion of Upper Basin hydropower revenues from WAPA and funding from FWS; the states of Colorado, Wyoming, and Utah; and water users, among others.

### San Juan River Basin Recovery Implementation Program

The San Juan River Basin Recovery Implementation Program was established in 1992 to assist in the recovery of ESA-listed fish species on the San Juan River, the Colorado's largest tributary.[72] The program is a partnership implemented under a cooperative agreement between DOI and the states of Colorado and New Mexico, the Jicarilla Apache Nation, the Navajo Nation, the Southern Ute Indian Tribe, and the Ute Mountain Ute Indian Tribe.[73] It is concerned with the recovery of the razorback sucker (*Xyrauchen texanus*) and Colorado pikeminnow (*Ptychocheilus Lucius*). Congress authorized this program with the aim to protect the genetic integrity and population of listed species, conserve and restore habitat (including water quality), reduce nonnative species, and monitor species. The program is coordinated by FWS, and Reclamation is responsible for operating the Animas-La Plata Project and Navajo Dam on the San Juan River in a way that reduces effects on the fish populations. The program is funded by a portion of revenues from hydropower revenues from WAPA in the Upper Basin, Reclamation, the Bureau of Indian Affairs, and participating states. Recovery efforts for listed fish are coordinated with the Upper Colorado Endangered Fish Recovery Program.

### Glen Canyon Dam Adaptive Management Program

The Glen Canyon Dam Adaptive Management Program was established in 1997 in response to a directive from Congress under the Grand Canyon Protection Act of 1992 to operate Glen Canyon Dam "in such a manner as to protect, mitigate adverse impacts to, and improve the values for which Grand Canyon National Park and Glen Canyon National Recreation Area were established."[74] This program uses experiments to determine how water flows affect natural resources south of the dam. Reclamation is in charge of modifying flows for experiments, and the U.S. Geological Survey conducts monitoring and other studies to evaluate the effects of the flows.[75] The results are expected to better inform managers how to provide water deliveries and conserve species.

### Lower Colorado Multi-Species Conservation Program

The Multi-Species Conservation Program (MSCP) is a multistakeholder initiative to conserve 27 species (8 listed under ESA) along the Lower Colorado River while maintaining water and power supplies for

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[71] P.L. 106-392.

[72] For more information, see U.S. Fish and Wildlife Service, "San Juan River Basin Recovery Implementation Program," https://www.fws.gov/southwest/sjrip/.

[73] It also includes participation by water development interests in Colorado and New Mexico.

[74] For more information, see Reclamation, Glen Canyon Dam Adaptive Management Program, "Glen Canyon Dam High Flow Experimental Release," https://www.usbr.gov/uc/progact/amp/ltemp.html.

[75] Regardless of the status and results of flow experiments, the total annual volume of water released from Glen Canyon Dam remains dictated by the Law of the River, as described above.

farmers, tribes, industries, and urban residents.[76] The MSCP began in 2005 and is planned to last for at least 50 years.[77] The MSCP was created through consultation under ESA. To achieve compliance under ESA, federal entities involved in managing water supplies in the Lower Colorado River Basin met with resource agencies from Arizona, California, and Nevada; Native American Tribes; environmental groups; and recreation interests to develop a program to conserve species along a portion of the Colorado River. A biological opinion (BiOp) issued by the FWS in 1997 covers operations and maintenance activities conducted by Reclamation along the Colorado River from Lake Mead to the Southerly International Boundary; consultation was reinitiated in 2002, and a new BiOp was issued later that year.[78] Nonfederal stakeholders also applied and received an incidental take permit under Section 10(a) of the ESA for their activities.[79] This resulted in a habitat conservation plan for the MSCP that formed the basis for the program.[80] A Lower Colorado River Multi-Species Conservation Program Implementing Agreement integrated the federal and nonfederal activities in the MSCP and was signed by stakeholders in 2005.[81]

The objective of the MSCP is to create habitat for listed species, augment the populations of species listed under ESA, maintain current and future water diversions and power production, and abide by the incidental take authorizations for listed species under the ESA. In 2003, the estimated total cost of the program over its lifetime was approximately $626 million, split evenly between Reclamation (50%) and the states of California, Nevada, and Arizona (who collectively fund the remaining 50%). The management and implementation of the MSCP is the responsibility of Reclamation, in consultation with a steering committee of stakeholders.

### Hydropower Revenues Funding Colorado River Basin Activities

Hydropower revenues finance a number of activities throughout the Colorado River Basin. In the Lower Basin, the Colorado River Dam Fund uses power revenues generated by the Boulder Canyon Project (i.e., Hoover Dam) to fund operational and construction costs for related Reclamation facilities. A separate fund, the Lower Colorado River Basin Development Fund, collects revenues from the Central Arizona Project (CAP), as well as from a surcharge on revenues from the Boulder Canyon and Parker-Davis Projects that was enacted under the Hoover Power Plant Act of 1984 (P.L. 98-381). These revenues are available without further appropriation toward defraying CAP operation and maintenance costs, salinity control efforts, and funding for Indian water rights settlements identified under the Arizona Water Settlements Act of 2004 (i.e., funding for water systems of the Gila River Indian Community and the Tohono O'odham Nation, among others). In the Upper Basin, the Upper Colorado River Basin Fund collects revenues from the initial units of the Colorado River Storage Project and funds operation and maintenance expenses, salinity control, the Glen Canyon Dam Adaptive Management Program, and endangered fish studies on the Colorado and San Juan rivers, among other things.

**Source:** Department of the Interior, *Department of the Interior Budget Appendix, FY2023 Budget Request.*

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76 The stakeholders include six federal and state agencies, six tribes, and 36 cities and water and power authorities. Stakeholders serve more than 20 million residents in the region, and irrigate 2 million acres of farmland. For more information, see Lower Colorado River Multi-Species Conservation Program at https://www.lcrmscp.gov/.

77 The program was authorized under Subtitle E of Title IX of P.L. 111-11.

78 U.S. Fish and Wildlife Service, *Reinitiation of Formal Section 7 Consultation on Lower Colorado River Operations and Maintenance - Lake Mead to Southerly International Boundary, Arizona, California and Nevada*, April 30, 2002, https://www.usbr.gov/lc/region/g2000/BO2002operations.pdf.

79 The incidental take permit is valid for 50 years from its date of issuance and covers the implementation of the Lower Colorado River Multi-Species Conservation Program, diversions of water from the river, demand for and receipt of hydropower, and flow and non-flow actions along the Colorado River with the geographic scope of the permit.

80 Lower Colorado River Multi-Species Conservation Program, *Final Lower Colorado River Multi-Species Conservation Program Volume II: Habitat Conservation Plan*, December 17, 2004, https://lcrmscp.gov/lcrm-prod/lcrm-prod/pdfs/hcp_volii_2004.pdf.

81 Lower Colorado River Multi-Species Conservation Program, *Implementing Agreement*, April 4, 2005, https://lcrmscp.gov/lcrm-prod/lcrm-prod/pdfs/imp_agr_2005.pdf.

# Tribal Water Rights

Tribal water rights are often senior to other uses on the Colorado River.[82] Tribal water diversions based on these rights typically come out of individual state allocations. There are 30 federally recognized tribes in the Colorado River Basin, many of whom have settled or unresolved (i.e., currently claimed for use but unsettled) tribal water rights.[83] As of early 2023, 11 basin tribes had reserved (i.e., held for future use) water rights claims that have not been quantified and settled; the total potential amount of these claims is unknown.[84] According to Reclamation, as of December 2020, tribes held diversion rights to approximately 3.4 MAF per year of Colorado River water.[85] Previous studies noted that these tribes were using just over half of their quantified rights.[86]

Because of the magnitude and seniority of tribal water rights, future decisions about the settlement and development of tribal water rights in the Colorado River Basin are likely to influence the availability of basin water resources for various uses. Increased consumptive water use by tribes with existing quantified and settled water rights, and/or future settlement of claims and additional consumptive use of basin waters by tribes with reserved rights, would exacerbate competition for basin water resources. At the same time, some tribes have entered into arrangements to lease or conserve their waters to other users; new agreements along these lines have the potential to secure water supplies for some non-tribal users without other viable alternative sources of water.

# Long-Term Drought and the Supply/Demand Imbalance

Current water allocation issues in the Colorado River Basin stem from a well-documented imbalance between available water supplies and demand. Lower and Upper Basin allocations in the Colorado River Compact were based on the assumption (formed by the available record at the time) that average annual flows on the river were 16.4 MAF per year.[87] However, actual flows over time have been considerably less than that (approximately 14.6 MAF from 1906 to 2024)[88] and have dropped further in recent years. At the same time, while consumptive use of basin waters has generally decreased from peak levels in the 1990s and early 2000s, the ongoing drought has continued to stress basin water supplies and drawdown storage in Lakes Mead and Powell. From 2000 to 2019, Colorado River flows at Lee Ferry averaged 12.7

[82] Tribal water rights claims typically arise out of the right of many tribes to water resources dating to treaties establishing their reservations. These water rights are often senior to those of non-Indian water rights holders because they date to the creation of the reservation (i.e., prior to the awarding of most state water rights). For more information on Indian water rights settlements, see CRS Report R44148, *Indian Water Rights Settlements*.

[83] For a list of the tribes, see Reclamation, "Colorado River Basin," https://www.usbr.gov/ColoradoRiverBasin/.

[84] CRS analysis of enacted Indian water rights settlements and Reclamation, *Colorado River Basin Water Supply and Demand Study*, Technical Report C- Water Demand Assessment, Appendix C9, Tribal Water Demand Scenario Quantification, Dec. 2012, pp. C9-33–C9-34. Tribes with claims yet to be fully adjudicated or quantified as of early 2023 include the Navajo Nation; the Ute Indian Tribe of the Uintah and Ouray Reservation; the Havasupai Tribe; the Hopi Tribe; the Kaibab Band of Paiute Indians; the Pascua Yaqui Tribe; San Carlos Apache Tribe; the San Juan Southern Paiute Tribe; the Tohono O'odham Nation; Tonto Apache Tribe; and the Yavapai Apache Nation.

[85] Reclamation, *Review of the Colorado River Interim Guidelines for Lower Basin Shortages and Coordinated Operations for Lake Powell and Lake Mead*, December 2020, p. 14, https://www.usbr.gov/ColoradoRiverBasin/documents/7d/7.D.Review_FinalReport_12-18-2020.pdf.

[86] Colorado River Research Group, *Tribes and Water in the Colorado River Basin*, June 2016. According to this study, tribal consumptive use in 2015 (including leasing of tribal water to non-tribal entities) totaled 1.7 MAF of the 2.9 MAF in recognized diversion rights at that time.

[87] National Research Council, Committee on the Scientific Bases of Colorado River Basin Water Management, Water Science and Technology Board, *Colorado River Basin Water Management: Evaluating and Adjusting to Hydroclimatic Variability*, 2007, https://www.nap.edu/read/11857/chapter/1.

[88] CRS analysis of Reclamation flow data.

MAF per year, while all consumptive use and losses over that same period have been estimated at 19.3 MAF per year.[89] This condition, in which depletion of basin waters exceeds available supplies and draws on basin storage, is typically referred to as the Colorado River Basin's *structural deficit*.

The majority of Colorado River Basin water supplies are used for agricultural irrigation. A 2024 study estimated that from 2000 to 2019, an average of 52% (12.4 MAF per year) of basin waters were consumed each year for agricultural irrigation purposes throughout the basin, with another 18% (4.4 MAF per year) used for M&I or commercial purposes, with remaining basin water consumptive uses accounted for by indirect uses in the form of evaporation from reservoirs (11%) and other sources (19%).[90] Of the subset of waters consumed directly by human users (i.e., agriculture and M&I uses), the same estimates attributed 47% (7.9 MAF per year) to irrigated agriculture in the form of cattle-feed crops (i.e., alfalfa and other hays); the 2024 study estimated that these crops account for 60% (3.1 MAF) of direct consumptive use in the Upper Basin and 42% (3.9 MAF) of consumptive use in the Lower Basin.[91] M&I waters accounted for 22% (974.5 thousand acre-feet) and 28% (2.6 MAF) of Upper Basin and Lower Basin consumption, respectively.[92] Under recent conservation efforts, many of these totals may have decreased.

Most observers agree that that if current trends hold, substantial additional reductions will be needed to sustain reservoirs at their current levels. A 2023 study estimated that a 13%-20% reduction in basin-wide use, or 2.4-3.2 MAF per year below historical levels as of 2020, would be needed to stabilize and restore basin reservoir levels.[93]

## Colorado River Accounting

A key difference between Upper and Lower Basin reporting involves how each basin accounts for consumptive use. In accordance with Articles I and V of the *Arizona v. California* decree,[94] a Lower Basin Water Accounting Report (published annually) reports only on *diversions from the system for consumptive use*. Conversely, the comparable Upper Basin accounting—the Upper Basin Consumptive Use and Losses Report (published every five years)—is prepared in response to congressional direction in the CRBPA, which directed "a detailed breakdown of the beneficial consumptive use of water on a State-by-State basis."[95] Reclamation defines *beneficial consumptive use* to include *any removal from the system for beneficial consumptive use*, which Reclamation defines to include both diversions and losses from mainstream reservoir evaporation that occur prior to diversions.[96] Thus, even though Lower Basin consumptive use is typically below the compact threshold of 7.5 MAF, the total amount of water regularly exceeds this threshold, after accounting for evaporative losses.

# Recent Developments and Agreements

Drought conditions throughout the basin have raised concerns about potential negative impacts on water supplies. Concerns center on what sort of changes to the current water management regime might result if

[89] CRS analysis of Reclamation flow data and Brian D. Richter et al., "New Water Accounting Reveals Why the Colorado River No Longer Reaches the Sea," *Communications Earth & Environment*, vol. 5, no. 134 (2024), p. 7, https://doi.org/10.1038/s43247-024-01291-0. Hereinafter, Richter et al. (2024).

[90] Richter et al. (2024), p. 7.

[91] Richter et al. (2024), p. 5.

[92] Richter et al. (2024), p. 5.

[93] John C. Schmidt et al., "The Colorado River Water Crisis: Its Origin and the Future," *WIREs Water*, vol. 2, no. 1672 (2023), https://doi.org/10.1002/wat2.1672.

[94] See footnote 26.

[95] 43 U.S.C. §1551.

[96] See Reclamation, Upper Colorado River Basin Consumptive Uses and Losses Report, 2016-2020, February 2022, p. 6.

the Secretary of the Interior were to determine that a shortage condition exists in the Lower Basin. Some in Upper Basin States are also concerned about the potential for a *compact call* of Lower Basin states on Upper Basin states. This is the commonly used term for the hypothetical attempt of Lower Basin states to force deliveries of Colorado River water under the compact.[97]

Drought and other uncertainties related to water rights priorities (e.g., potential tribal water rights claims) spurred the development of several efforts that generally attempted to relieve pressure on basin water supplies, stabilize storage levels, and provide assurances of available water supplies. Some of the most prominent developments since the year 2000 (i.e., the beginning of the current drought) are discussed below.

## 2003 Quantitative Settlement Agreement

Prior to the 2003 finalization of the QSA, California had been using approximately 5.2 MAF of Colorado River on average each year (with most of its excess water use attributed to urban areas). Under the QSA, which is an agreement between several California water districts and DOI, California agreed to reduce its use to the required 4.4 MAF under the Law of the River.[98] It sought to accomplish this aim by quantifying Colorado River entitlement levels of several water contractors; authorizing efforts to conserve additional water supplies (e.g., the lining of the All-American Canal); and providing for several large-scale, long-term agriculture-to-urban water transfers. The QSA also committed the state to a path toward restoration and mitigation related to the Salton Sea in Southern California.[99]

A related agreement between Reclamation and the Lower Basin states, the Inadvertent Overrun and Payback Policy (IOPP), went into effect concurrently with the QSA in 2004.[100] IOPP is an administrative mechanism that provides an accounting of inadvertent overruns in consumptive use compared to the annual entitlements of water users in the Lower Basin. These overruns must be "paid back" in the calendar year following the overruns, and the paybacks must be made only from "extraordinary conservation measures" above and beyond normal consumptive use.[101]

## 2004 Arizona Water Settlements Act

The 2004 Arizona Water Settlements Act (AWSA) altered the allocation of CAP water in Arizona. It ratified three water rights settlements (one in each title) between the federal government and the State of Arizona, the Gila River Indian Community (GRIC), and the Tohono O'odham Nation, respectively.[102] For the state and its CAP water users, the settlement resolved a final repayment cost for CAP by reducing the water users' reimbursable repayment obligation from about $2.3 billion to $1.7 billion. Additionally, Arizona agreed to new tribal and non-tribal allocations of CAP water so that approximately half of CAP's

[97] For more background, see Anne Castle and John Fleck, "The Risk of Curtailment Under the Colorado River Compact," November 20, 2019, https://ssrn.com/abstract=3483654.

[98] California Quantification Settlement Agreement by and Among Imperial Irrigation District, the Metropolitan Water District of Southern California, and Coachella Valley Water District, October 10, 2003.

[99] The Salton Sea is an inland water body in Southern California that was historically sustained by Colorado River irrigation runoff from the Imperial and Coachella Valleys, but is shrinking. Toxic dust from exposed seabed is a major concern for surrounding areas. For more information on the Salton Sea, see CRS Report R46625, *Salton Sea Restoration*.

[100] Reclamation, *Record of Decision for the Colorado River Water Delivery Agreement*, October 10, 2003, pp. 16-19.

[101] Reclamation, *Record of Decision for the Colorado River Water Delivery Agreement*, October 10, 2003, pp. 16-19.

[102] Congress passed the Colorado River Basin Project Act of 1968 and authorized construction of CAP despite significant uncertainty related to tribal water rights related to the Colorado River. The Gila River, Arizona's largest tributary of the Colorado River, runs directly through the Gila River Indian Community, which encompasses approximately 372,000 acres south of and adjacent to Phoenix. Additionally, the Tohono O'odham Nation possessed reserved water rights near Tucson with the potential to disrupt that city's water supplies.

annual allotment would be available to Native American tribes in Arizona, at a higher priority than most other uses. The tribal communities were authorized to lease the water, so long as the water remains within the state via the state's water banking authority. The act authorized funds to cover the cost of infrastructure required to deliver the water to the Indian communities, much of it derived from power receipts accruing to the Lower Colorado River Basin Development Fund. It also authorized funding for the study of a potential New Mexico Unit of CAP.

## 2007 Interim Guidelines/Coordinated Operations for Lake Powell and Lake Mead

Another development in the basin was the 2007 adoption of the Colorado River Interim Guidelines for Lower Basin Shortages and the Coordinated Operations for Lake Powell and Lake Mead (2007 Interim Guidelines). DOI developed the guidelines to implement the LROC, through issuance of the *Annual Operating Plan for Colorado River Reservoirs* (AOP), as directed by the 1968 CRBPA.[103] Development of the agreement began in 2005, when, in response to drought in the Southwest and the decline in basin water storage, the Secretary of the Interior instructed Reclamation to develop coordinated strategies for Colorado River reservoir operations during drought or shortages.[104] The resulting guidelines included criteria for releases from Lakes Mead and Powell determined by "trigger levels" in both reservoirs, as well as a schedule of Lower Basin curtailments at different operational tiers. For Lake Powell, preset inflow measurements determine the reservoir's annual operational "balancing" tier and resulting releases to Lake Mead. In the Lower Basin, the guidelines stipulated that Arizona and Nevada, which have junior rights to California, receive reduced allocations if Lake Mead elevations dropped below 1,075 feet. At the time, it was thought that the 2007 Guidelines would significantly reduce the risk of Lake Mead falling to an elevation of 1,025 feet.

The 2007 agreement also included for the first time a mechanism by which parties in the Lower Basin were able to store conserved water in Lake Mead, known as Intentionally Created Surplus (ICS). Reclamation accounts for this water annually, and the users storing the water may access the surplus in future years, in accordance with the Law of the River. As of the end of calendar year 2022, the portion of Lake Mead water in storage that was classified as ICS was 3.33 MAF.[105] That is, as of the end of the 2022, approximately one-third of the water stored in Lake Mead was previously conserved ICS volume.

The 2007 guidelines are considered "interim" because they are scheduled to expire in 20 years (i.e., at the end of 2026). Thus, Reclamation began coordinating a review on the effectiveness of the 2007 guidelines in 2020, and in 2022, formally initiated the review process for post-2026 operations.[106] The review is expected to encompass negotiations related to renewal of the Upper and Lower Basin DCPs, which are an overlay on the 2007 guidelines (see below section, "2019 Drought Contingency Plans").

[103] Secretary of the Interior, *Record of Decision: Colorado River Interim Guidelines for Lower Basin Shortages and the Coordinated Operations for Lake Powell and Lake Mead*, December 2007, p. 4, https://www.usbr.gov/lc/region/programs/strategies/RecordofDecision.pdf.

[104] Prior to this time, the Secretary of the Interior had the authority to declare a shortage, but no shortage criteria had been publicly announced or published. (Criteria for surplus operations were put in place in 2001.)

[105] Reclamation, *Colorado River Accounting and Water Use Report, Calendar Year 2024*, https://www.usbr.gov/lc/region/g4000/wtracct.html. Hereinafter, Reclamation 2024 Water Accounting Report.

[106] Reclamation, "Request for Input on Development of Post-2026 Colorado River Reservoir Operational Strategies for Lake Powell and Lake Mead Under Historically Low Reservoir Conditions," 87 *Federal Register* 37884-37888, June 24, 2022.

## System Conservation Program

In 2014, Reclamation and several major basin water supply agencies executed a memorandum of understanding to provide federal funding for voluntary conservation projects and reductions of water use, with this new *system water* to be stored in Lake Mead or Lake Powell.[107] The initial term of this agreement was through the end of 2019.[108] Congress formally authorized federal participation in these efforts, initially known as the Pilot System Conservation Program, in the Energy and Water Development and Related Agencies Appropriations Act, 2015 (P.L. 113-235, Division D). Congress subsequently amended and extended the authority in 2019 (P.L. 115-244, Division A) and 2022 (P.L. 117-328), and the program has continued to compensate users for conservation in recent years.[109] Reclamation estimated that as of the end of 2024, cumulative reservoir protection volumes in the Lower Basin, including compensated System Conservation water, totaled 2.031 MAF in Lake Mead.[110] The Upper Colorado River Basin Commission carried out similar System Conservation Program projects in the Upper Basin as a pilot program from 2015 to 2018, and these projects were reinitiated in 2023 and 2024.[111]

## Minute 319 and Minute 323 Agreements with Mexico[112]

In 2017, the United States and Mexico signed Minute 323, which extended and replaced elements of a previous agreement signed in 2012—Minute 319—related to implementation of the 1944 U.S.-Mexico Water Treaty.[113] Minute 323 includes, among other things, options for Mexico to hold water in reserve in U.S. reservoirs for emergencies and water conservation efforts, as well as U.S. commitments for flows to support the ecological health of the Colorado River Delta. It also extended the initial Mexican reduction commitments made under Minute 319 (which were similar in structure to the 2007 reductions negotiated for Lower Basin states) and established a Binational Water Scarcity Contingency Plan that included additional reductions that would be triggered if DCPs are approved by U.S. basin states (see the following section, "2019 Drought Contingency Plans").

## 2019 Drought Contingency Plans

Ongoing drought conditions and the potential for water supply shortages prompted discussions and negotiations focused on how to conserve additional basin water supplies. After several years of negotiations, on March 19, 2019, Reclamation and the Colorado River Basin states finalized DCPs for both the Upper Basin and the Lower Basin. These plans, which are an overlay of the 2007 Interim Guidelines discussed above, required final authorization by Congress to be implemented. Congress

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[107] *System water* refers to water that is provided to increase water supplies as a whole, without being directed toward additional consumptive use for specific contractors or water users.

[108] See "Agreement Among the United States of America, Through the Department of the Interior, Bureau of Reclamation, the Central Arizona Water Conservation District, the Metropolitan Water District of Southern California, Denver Water, and the Southern Nevada Water Authority, for a Pilot Program for Funding the Creation of Colorado River System Water Through Voluntary Water Conservation and Reductions in Use," Agreement No. 14-XX-30-W0574, July 30, 2014, https://www.usbr.gov/lc/region/programs/PilotSysConsProg/PilotSCPFundingAgreement7-30-2014.pdf.

[109] 43 U.S.C. §620 note.

[110] Reclamation 2024 Water Accounting Report, Table 25.

[111] Upper Colorado River Commission, *Sixty-Seventh Annual Report*, September 30, 2024, http://www.ucrcommission.com/wp-content/uploads/2025/07/UCRC-WY2024-Annual-Report.pdf.

[112] For more information on the 1994 U.S.-Mexico Water Treaty and Colorado River water sharing issues with Mexico, see CRS Report R45430, *Sharing the Colorado River and the Rio Grande: Cooperation and Conflict with Mexico*, by Nicole T. Carter, Stephen P. Mulligan, and Charles V. Stern.

[113] International Boundary & Water Commission, "Minutes Between the United States and Mexican Sections of the IBWC," https://www.ibwc.gov/Treaties_Minutes/Minutes.html.

approved the plans on April 16, 2019, in the Colorado River Drought Contingency Plan Authorization Act. Similar to the 2007 guidelines, these plans are scheduled to be in place through 2026. At the time of their enactment, the combined efforts represented by the DCPs were expected to cut the risk of Colorado River reservoirs reaching critically low elevations by approximately 50%.[114] Each of the basin-level DCPs is discussed below in more detail.

## Upper Basin Drought Contingency Plan

The Upper Basin DCP aims to protect against Lake Powell reaching critically low elevations through coordinated Upper Basin reservoir operations. It also authorizes storage of conserved water in the Upper Basin that would serve as the foundation for a water use reduction effort (i.e., a *Demand Management Program*) that may be developed in the future.[115]

Under the Upper Basin DCP's Drought Response Operations Agreement (DROA), the Upper Basin states agree to operate system units to keep the surface of Lake Powell above 3,525 feet, which is 35 feet above "minimum power pool" (i.e., 3,490 feet, the minimum elevation needed to run the dam's hydroelectric plant). Under DROA, the two main mechanisms to do this are altering the timing of releases from Glen Canyon Dam and operating "initial unit" reservoirs on the mainstream of the Colorado River (e.g., Navajo Reservoir, Blue Mesa Reservoir, and Flaming Gorge Reservoir) to protect Lake Powell elevations, potentially through storage drawdown. Operational changes may occur either through DROA's emergency provisions, which allow the Secretary of the Interior to make supplemental water deliveries at his or her discretion (after consultation with basin states), or through a planning process establishing formal triggers for Upper Basin water deliveries to Lake Powell, based on agreed-upon hydrological targets.

The other primary component of the Upper Basin DCP, the Upper Basin DCP Demand Management Program, has not been formally established. It would entail willing seller/buyer agreements allowing for temporary paid reductions in water use that would provide for more storage volume in Lake Powell. As noted, the Upper Colorado River Commission operated an Upper Basin System Conservation Pilot Program from 2015 to 2018; that program compensated water users for temporary, voluntary efforts that resulted in additional water conserved in Lake Powell. A future Upper Basin DCP Demand Management Program may expand on some of those efforts.

Due to falling lake levels, Reclamation implemented drought response operations under DROA that led to reduced storage in other Upper Basin mainstream reservoirs in 2021 and 2022.[116] Separately, Reclamation also began planning efforts under DROA, known as the *Drought Response Operations Plan*, and approved this plan in 2022.[117] Although Lake Powell storage rebounded in part due to these efforts (and wet conditions) in 2023, it has again fallen in 2025 and could drop to minimum power pool in 2026 under dry scenarios (**Figure 4**). Such a scenario may affect the regulation of Colorado River flows and Glen Canyon Dam hydropower generation.

[114] U.S. Congress, House Committee on Natural Resources, Subcommittee on Water, Oceans, and Wildlife, *Oversight Hearing on the Colorado River Drought Contingency Plan*, 116th Cong., 1st sess., March 28, 2019, H.Hrg. 116-10 (Washington: GPO, 2019).

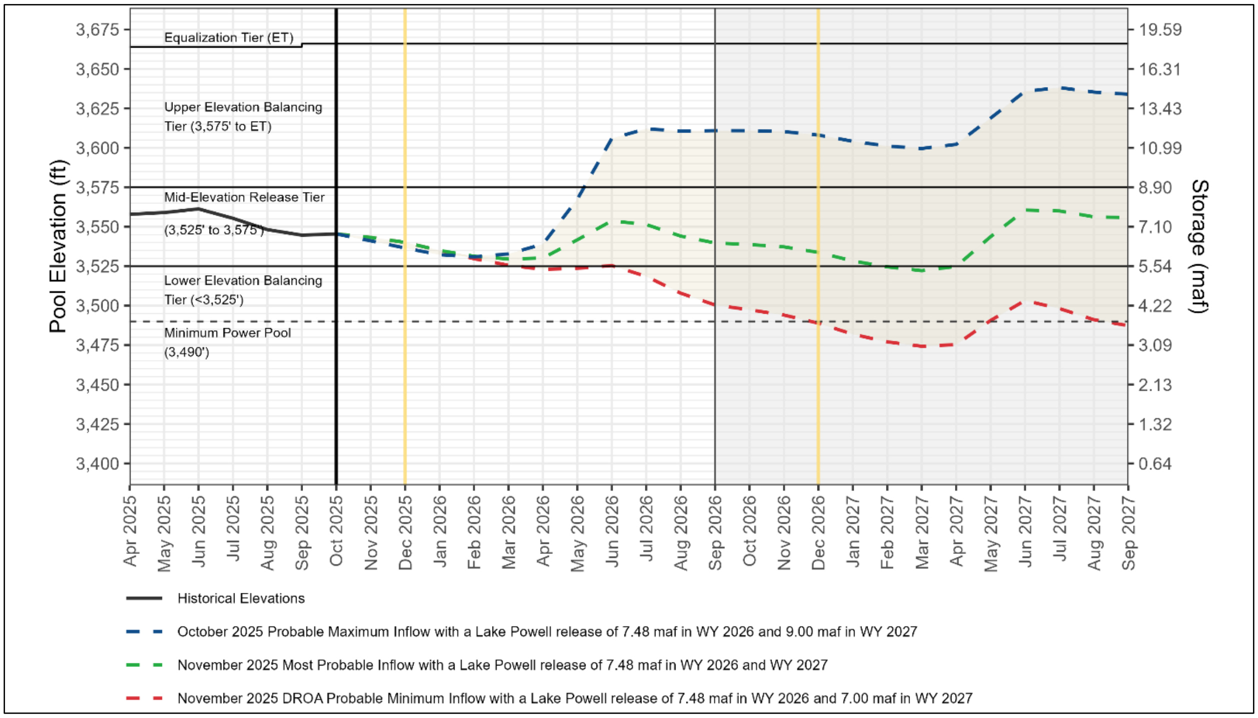
[115] While such a mechanism exists for the Lower Basin, a comparable program has not been developed in the Upper Basin.

[116] For example, in 2021, 180,000 acre-feet (AF) was transferred to Lake Powell from Flaming Gorge Reservoir (125,000 AF), Blue Mesa Reservoir (36,000 AF), and Navajo Reservoir (20,000 AF).

[117] For more information, see Reclamation, Colorado River Basin Drought Contingency Plans, "Drought Response Operations Agreement," https://www.usbr.gov/dcp/droa.html.

**Figure 4. Lake Powell End-of-Month Elevation Projections**

(October and November 2025 24-month study inflow scenarios)




**Source:** Bureau of Reclamation, "24-Month Study Projections," January/March 2025, https://www.usbr.gov/lc/region/g4000/riverops/24ms-projections.html.

**Notes:** WY = Water Year; DROA = Drought Response Operations Agreement; maf = million acre-feet.

## Lower Basin Drought Contingency Plan

The Lower Basin DCP is designed to require Arizona, California, and Nevada to curtail deliveries and thereby contribute additional water to Lake Mead storage at predetermined "trigger" elevations. It is also designed to create additional flexibility to incentivize voluntary conservation of water to be stored in Lake Mead, thereby increasing lake levels. Under the DCP, Nevada and Arizona (which were already set to have their supplies curtailed beginning at 1,075 feet under the 2007 Interim Guidelines) have committed to contributing additional supplies to maintain higher lake levels (i.e., beyond previous commitments). These reductions begin at 1,090 feet and would reach their maximums when reservoir levels drop below 1,025 feet.

The Lower Basin DCP includes—for the first time—delivery reductions for California. These curtailments begin with a 200,000 AF delivery reduction at Lake Mead elevations between 1,040 and 1,045 feet and would increase by 50,000 AF for each additional 5-foot drop in Lake Mead elevation below 1,040 feet, to as much as 350,000 AF at elevations of 1,025 feet or lower. The curtailments are categorized in terms of tiers (also sometimes referred to as levels), with Tier One shortage conditions the term adopted for elevations from 1,050-1,075 feet, and Tier Two shortage conditions the term for elevations between 1,025 feet and 1,050 feet.

The curtailments in the Lower Basin DCP are in addition to those agreed to under the 2007 Interim Guidelines and under Minute 323 with Mexico. Specific and cumulative delivery reductions prior to the latest round of reductions agreed to in 2024 (see below section, "Near-Term Operations: 2023/2024 Supplemental Environmental Impact Statement") are shown in **Table 1**. In addition to the state-level reductions, under the Lower Basin DCP Reclamation also agreed to pursue efforts to add 100,000 AF or more of system water within the basin. Some of the largest and most controversial reductions under the Lower Basin DCP were committed to by Arizona, where pursuant to previous changes under the 2004 AWSA, a large group of agricultural users were already facing major reductions to their CAP water supplies prior to the enactment of DCP.

**Table 1. Lower Basin Water Delivery Curtailment Volumes Prior to 2024**

(values in thousand acre-feet)

| | 2007 Interim Shortage Guidelines | | Minute 323 Delivery Reductions | DCP Curtailment | | | Binational Water Scarcity Conting. Plan | Total Volume of Curtailment (% of Lower Colorado River Apportionment) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Lake Mead Elevation (ft)** | **AZ** | **NV** | **Mexico** | **AZ** | **NV** | **CA** | **Mexico** | **AZ** | **NV** | **CA** | **Lower Basin** | **Mexico** |
| 1,090 - >1,075 | 0 | 0 | 0 | 192 | 8 | 0 | 41 | 192 (6.8%) | 8 (2.6%) | 0 (0%) | 200 | 41 |
| 1,075 - >1,050 | 320 | 13 | 50 | 192 | 8 | 0 | 30 | 512 (18.2%) | 21 (7%) | 0 (0%) | 533 | 80 |
| 1,050 - >1,045 | 400 | 17 | 70 | 192 | 8 | 0 | 34 | 592 (21.1%) | 25 (8.3%) | 0 (0%) | 617 | 104 |
| 1,045 - >1,040 | 400 | 17 | 70 | 240 | 10 | 200 | 76 | 640 (22.8%) | 27 (9.0%) | 200 (4.5%) | 867 | 146 |
| 1,040 - >1,035 | 400 | 17 | 70 | 240 | 10 | 250 | 84 | 640 (22.8%) | 27 (9.0%) | 250 (5.6%) | 917 | 154 |
| 1,035 - >1,030 | 400 | 17 | 70 | 240 | 10 | 300 | 92 | 640 (22.8%) | 27 (9.0%) | 300 (6.8%) | 967 | 162 |
| 1,030 - 1,025 | 400 | 17 | 70 | 240 | 10 | 350 | 101 | 640 (22.8%) | 27 (9.0%) | 350 (7.9%) | 1,017 | 171 |
| <1,025 | 480 | 20 | 125 | 240 | 10 | 350 | 150 | 720 (22.8%) | 30 (10.0%) | 350 (7.9%) | 1,100 | 275 |

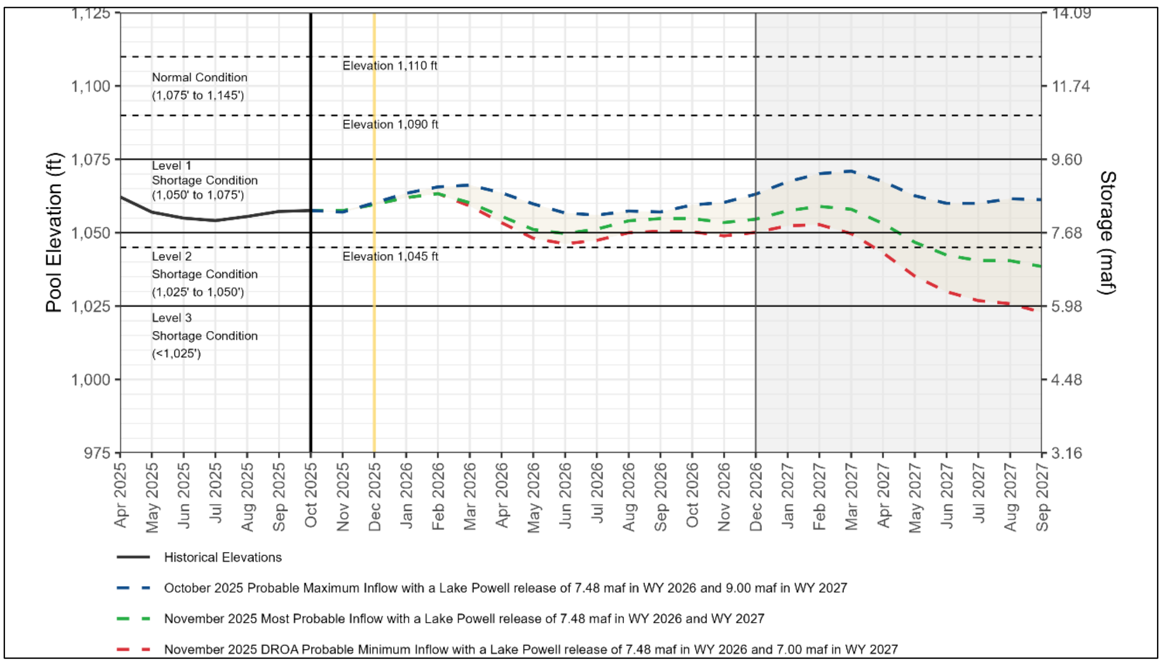
**Sources:** CRS, using data in the 2007 Interim Shortage Guidelines, Minute 323 between Mexico and the United States, *Lower Basin Drought Contingency Plan*, and the Binational Water Scarcity Contingency Plan in Minute 323 between Mexico and the United States.

**Notes:** DCP = drought contingency plan; Conting. = Contingency. Does not reflect additional 2024-2026 curtailments agreed to in the Bureau of Reclamation's March 2024 *Final Supplemental Environmental Impact Statement for Near-Term Colorado River Operations*. (See below section, "Near-Term Operations: 2023/2024 Supplemental Environmental Impact Statement.")

In 2019, at the time of the passage of the Colorado River Drought Contingency Plan Authorization Act, Reclamation asserted that the Lower Basin DCP would significantly reduce the risk of Lake Mead elevations falling below critical elevation of 1,020 feet.[118] Combined with the commitments from Mexico, total planned reductions under shortage scenarios (i.e., all commitments to date, combined) were expected to decrease Lower Basin consumptive use by 241,000 AF to 1.375 MAF per year, depending on the curtailments triggered by Lake Mead's elevation.[119] Despite these efforts, Lake Mead has continued to decline since the Lower Basin DCP was finalized, and this trend is projected to continue under most scenarios (**Figure 5**). These developments have triggered additional Lower Basin conservation efforts, which are discussed below.

**Figure 5. Lake Mead End-of-Month Elevation Projections**

(October and November 2025 24-month study inflow scenarios)




**Source:** Bureau of Reclamation, "24-Month Study Projections," January/March 2025, https://www.usbr.gov/lc/region/g4000/riverops/24ms-projections.html.

**Notes:** WY = Water Year; DROA = Drought Response Operations Agreement; maf = million acre-feet.

## Near-Term Operations: 2023/2024 Supplemental Environmental Impact Statement

Ongoing declines in Lakes Mead and Powell highlighted the need for additional "near-term" operational changes prior to the expiration of existing agreements in 2026. At a June 14, 2022, Senate hearing, the Commissioner of Reclamation announced that basin states would need to conserve an additional 2-4 MAF beyond current levels to protect Lake Mead and Lake Powell

[118] U.S. Congress, House Committee on Natural Resources, Subcommittee on Water, Oceans, and Wildlife, *Oversight Hearing on the Colorado River Drought Contingency Plan*, 116th Cong., 1st sess., March 28, 2019, H.Hrg. 116-10 (Washington: GPO, 2019).

[119] For a summary of the curtailments that add up to this amount, see "1,090 - >1,075" row of **Table 1**.

storage volumes over the 2023-2026 period.[120] The Commissioner noted that if the targets were not met with voluntary actions by the states by August 2022, DOI was prepared to act unilaterally.[121] No major water savings commitments were announced in response to Reclamation's June statement.[122]

In October 2022, Reclamation announced its intent to revise the 2007 Interim Guidelines in 2023 and 2024 (i.e., prior to post-2026 operational changes to the guidelines, which are proceeding separately) to address continued low runoff conditions in the basin. As part of this process, Reclamation published in the Federal Register its notice of intent to prepare a supplemental environmental impact statement (SEIS) for changes to the 2007 Interim Guidelines in three areas: Lake Mead operations during shortage conditions, coordinated operation of Lake Powell and Lake Mead, and midyear review for implementation of the operational guidelines.[123] As part of this process, Reclamation solicited proposals in these areas from the basin states, with a preference for "consensus" proposals.

On January 31, 2023, all of the basin states except California responded to Reclamation's notice with a combined proposal (the *Six State Proposal*),[124] while California submitted its own proposal (the *California Proposal*) separately.[125] The Six State Proposal requested that Reclamation model in its SEIS 1.543-1.943 MAF per year in new delivery reductions on Lower Colorado River Basin contractors, to be implemented through two mechanisms. First, reductions to account for 1.543 MAF of evaporative losses would be allocated among Lower Basin contractors and Mexico, and would be assessed at most Lake Mead elevations based on stream reach (i.e., position in the basin relative to bodies of water affected by evaporation) and recent consumptive use levels.[126] Second, additional operational tier changes and delivery reductions are tied to Lake Mead elevations of 1,050 feet and lower.[127] For its part, the California Proposal would have included 1.0-1.95 MAF per year in new delivery reductions for Lower Basin contractors (i.e., not based on evaporation), depending on Lake Mead elevations. Both state proposals also suggested changes to Lake

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[120] Statement of the Honorable Camille Touton in U.S. Congress, Senate Committee on Energy and Natural Resources, *Short and Long Term Solutions to Extreme Drought in the Western U.S.*, 117th Cong., 2nd sess., June 14, 2022. These amounts were based on a 2022 Reclamation analysis. See Reclamation, "Colorado River System Mid Term Projections," June 16, 2022, https://www.usbr.gov/ColoradoRiverBasin/documents/20220616-ColoradoRiverSystemMid-termProjections-Presentation.pdf.

[121] Statement of the Honorable Camille Touton in U.S. Congress, Senate Committee on Energy and Natural Resources, *Short and Long Term Solutions to Extreme Drought in the Western U.S.*, 117th Cong., 2nd sess., June 14, 2022.

[122] In a July 18, 2022, letter to Reclamation, the Upper Colorado River Commission declined to contribute a specific volume of reductions to these efforts, and instead laid out a five-point plan as the basis for its water conservation efforts. Letter from Charles Cullom, Director, Upper Colorado River Commission, to Camille Touton, Commissioner, U.S. Bureau of Reclamation, July 18, 2022, http://www.ucrcommission.com/wp-content/uploads/2022/07/2022-July-18-Letter-to-Reclamation.pdf.

[123] Reclamation, "Notice of Intent to Prepare a Supplemental Environmental Impact Statement for December 2007 Record of Decision Entitled Colorado River Interim Guidelines for Lower Basin Shortages and Coordinated Operations For Lake Powell and Lake Mead," 87 *Federal Register* 69042, November 17, 2022.

[124] Letter from Colorado River Basin State Representatives of Arizona, Colorado, Nevada, New Mexico, Utah, and Wyoming to Tanya Trujillo, Assistant Secretary, Water & Science, U.S. Department of the Interior, January 31, 2023. Hereinafter, Six State Proposal.

[125] Letter from Colorado River Board of California to Deputy Interior Secretary Tommy Beaudreau et al., U.S. Department of the Interior, January 31, 2023.

[126] This amount also assumes the assessment of evaporative losses on Mexico.

[127] Six State Proposal. These reductions would move the current Tier Three reduction schedule (which begins at 1,025 feet) up to a Lake Mead elevation of 1,050 feet and would institute additional delivery reductions at Lake Mead elevations of 1,030 feet or lower.

Powell's operational tiers to allow more water to be left in that reservoir, although they would do so in different ways.

Reclamation released multiple iterations of its draft SEIS in 2023. In April, it released a draft with modeling for a "no action" alternative and two action alternatives.[128] Both alternatives would have imposed an equal amount of new reductions in 2024 tied to Lake Mead elevations, with the primary difference being the approach for apportioning reductions; Action Alternative 1 assumed reductions based on priority order of water rights (i.e., large curtailments [in terms of percentage] for Arizona and Nevada), whereas Action Alternative 2 assumed the Secretary would use existing federal authorities to impose the same percentage-based delivery reductions on all Lower Basin users (i.e., without regard to senior water rights in California).[129] Outside of the approach to Lower Basin shortage operations, the SEIS action alternatives included similar options in other areas.[130]

On May 22, 2023, DOI announced a consensus-based proposal in which the three Lower Basin states would conserve a total of 3 MAF prior to 2026, with 2.3 MAF of these reductions compensated by the federal government via $4.0 billion in previously appropriated funds in budget reconciliation legislation commonly referred to as the Inflation Reduction Act (IRA; P.L. 117-169).[131] This proposal included total curtailments of at least 3.0 MAF in operating years 2023 through 2026, on top of existing contributions. The states requested, and DOI agreed, to temporarily withdraw the April draft SEIS.[132] Reclamation released a new draft SEIS in October 2023 and formally adopted the consensus-based alternative on March 5, 2024.[133] **Table 2** compares state-level commitments before and after the SEIS.

[128] Reclamation, *Near Term Colorado River Operations: Draft Supplemental Environmental Impact Statement*, April 2023, https://www.usbr.gov/ColoradoRiverBasin/SEIS.html.

[129] The Supreme Court has determined the Secretary of the Interior is not bound by a single approach to addressing Colorado River supply shortages in the Lower Basin. See Arizona v. California, 373 U.S. at 593 (1963). The Court stated that the Secretary may consider reducing Lower Basin deliveries proportionally to statutory allocations of the first 7.5 MAF (California 4.4/7.5, Arizona 2.8/7.5, and Nevada 0.3/7.5), but the Secretary also has the authority and discretion to elect an alternate basis for apportioning shortages, subject to statutory constraints. Arizona v. California, 373 U.S. at 592-593 (1963).

[130] For instance, both alternatives proposed altering Lake Powell releases so that at lower Lake Powell levels, releases would be below the compact's required average of 7.5 MAF per year (potentially as low as 6.0 MAF per year). At Lake Powell elevations between 3,500 and 3,525 feet, releases to the Lower Basin would be maintained at 6.0 MAF. At elevations below 3,500 feet, releases could be further reduced.

[131] DOI, "Biden-Harris Administration Announces Historic Consensus System Conservation Proposal to Protect the Colorado River Basin," press release, May 22, 2023, https://www.doi.gov/pressreleases/biden-harris-administration-announces-historic-consensus-system-conservation-proposal. These funds are discussed further in the below section, "Funding and Oversight of Existing Facilities and Programs." See CRS In Focus IF12437, *Bureau of Reclamation Funding in the Inflation Reduction Act (P.L. 117-169)*, by Charles V. Stern and Anna E. Normand.

[132] DOI, "Biden-Harris Administration Announces Historic Consensus System Conservation Proposal to Protect the Colorado River Basin," press release, May 22, 2023.

[133] Reclamation, *Final Supplemental Environmental Impact Statement for Near-Term Colorado River Operations*, March 2024, https://www.usbr.gov/ColoradoRiverBasin/documents/NearTermColoradoRiverOperations/20240300-Near-termColoradoRiverOperations-FinalSEIS-508.pdf.

**Table 2. Comparison of Colorado River Delivery Curtailments Before and After 2024 SEIS for Near-Term Operations**

(curtailment amounts in thousand acre-feet)

| Lake Mead Elevation (Feet) | Pre-2024 Curtailments (2007 ROD, 2019 DCP) | | | | 2024 SEIS (2007 ROD, 2019 DCP, 2023 Lower Division Proposal) | | | |
|---|---|---|---|---|---|---|---|---|
| | AZ | NV | CA | Total | AZ | NV | CA | Total |
| 1,090 - >1,075 | 192 | 8 | — | 200 | 472 | 78 | 400 | 950 |
| 1,075 - >1,050 | 512 | 21 | — | 533 | 792 | 91 | 400 | 1,283 |
| 1,050 - >1,045 | 592 | 25 | — | 617 | 872 | 95 | 400 | 1,367 |
| 1,045 - >1,040 | 640 | 27 | 200 | 867 | 920 | 97 | 600 | 1,617 |
| 1,040 - >1,035 | 640 | 27 | 250 | 917 | 920 | 97 | 650 | 1,667 |
| 1,035 - >1,030 | 640 | 27 | 300 | 967 | 920 | 97 | 700 | 1,717 |
| 1,030 - 1,025 | 640 | 27 | 350 | 1,017 | 920 | 97 | 750 | 1,767 |
| <1,025 | 640 | 27 | 350 | 1,100 | 1,000 | 100 | 750 | 1,850 |

**Source:** Bureau of Reclamation, *Final Supplemental Environmental Impact Statement for Near-Term Colorado River Operations*, March 2024, https://www.usbr.gov/ColoradoRiverBasin/documents/NearTermColoradoRiverOperations/20240300-Near-termColoradoRiverOperations-FinalSEIS-508.pdf.

**Notes:** SEIS = supplemental environmental impact statement; 2007 ROD = Record of Decision for 2007 Interim Shortage Guidelines; 2019 DCP = 2019 Drought Contingency Plan for Lower Colorado River Basin; Lower Division Proposal = April 2023 Consensus Proposal by Lower Colorado River Basin States. State commitments in 2024 SEIS may vary such that collectively a total of 3.0 MAF of SEIS conservation would occur through 2026.

# Long-Term/Post-2026 Operations

Parallel to the process analyzing near-term operational changes, in 2022, Reclamation initiated efforts to study and recommend alternatives for *long-term* (post-2026) operations on the Colorado River.[134] Most of the major agreements discussed herein are scheduled to expire at the end of calendar year 2026. The post-2026 operational planning process aims to identify a range of alternatives to be employed in Colorado River management for decades into the future. If basin interests fail to come to an agreement on post-2026 operational terms, the federal government, through the Secretary of the Interior, may opt to propose such terms on a unilateral basis (i.e., similar to what DOI initially proposed in the spring of 2023 for near-term operations).[135]

[134] More information on Reclamation's process for post-2026 operational planning is available here: Reclamation, "Colorado River Post 2026 Operations," January 17, 2025, https://www.usbr.gov/ColoradoRiverBasin/post2026/index.html.

[135] The Boulder Canyon Project Act of 1928 made the Secretary of the Interior responsible for the distribution (via contract) of all Colorado River water delivered below Hoover Dam (i.e., the Lower Basin), and authorized such regulations as necessary to enter into these contracts. Subsequent court decisions confirmed the Secretary's power to apportion surpluses and shortages among and within Lower Basin states; this forms the basis for the designation Lower Basin *water master*. No similar authorities were provided for the Upper Basin.

## Comparison of Recent Post-2026 Operations Proposals

Despite reportedly lengthy negotiations, Upper and Lower Basin states have been unable to agree on a consensus-based plan for post-2026 operations, and the basins submitted separate plans with significant differences to Reclamation in March 2024. The Lower Basin's plan, among other things, proposed total basin storage (i.e., not Lake Mead volume) as the basis to dictate water cuts, with cuts at lower storage levels shared between the Upper and Lower Basins.[136] The average conservation commitment in this proposal under most conditions was 1.5 MAF. For its part, the Upper Basin's plan proposed Lower Basin cuts based on combined Lake Mead and Lake Powell storage, and that Lake Powell water releases be based on that lake's storage conditions (i.e., lower storage would result in less volume released, regardless of the compact's required releases).[137] In addition to these proposals, a number of other entities submitted long-term operational alternatives for consideration.[138]

Reclamation released its initial five alternatives to the public in November 2024, in advance of its planned draft environmental impact statement (DEIS). Reclamation stated that its intent in doing so was to afford the public and affected water users more information about the process.[139] Reclamation supplemented this information with a more detailed alternatives report on January 17, 2025.[140] Reclamation's alternatives report included the following five alternatives:

- No Action Alternative
- Federal Authorities Alternative
- Federal Authorities Hybrid Alternative
- Cooperative Conservation Alternative
- Basin Hybrid Alternative

According to Reclamation's initial analysis, the No Action Alternative is not expected to be adopted and will only be included in the expected DEIS as a requirement of the National Environmental Policy Act.[141] A summary of some of the primary differences in the approaches of the four action alternatives is provided below.

### Lower Basin Shortage Guidelines for Lake Mead Elevations

All of the action alternatives propose guidelines for reduced deliveries to Lower Basin users under specific circumstances. The Federal Authorities Alternative would reduce deliveries based

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[136] Letter from the Colorado River Basin States Representatives of Arizona, California, and Nevada to the Honorable Camille Calimlim Touton, Commissioner, Bureau of Reclamation, March 6, 2024, https://www.snwa.com/assets/pdf/lower-basin-alternative-letter-march2024.pdf.

[137] Letter from the Colorado River Upper Division States Representatives of Colorado, New Mexico, Utah, and Wyoming to the Honorable Camile Calimlim Touton, Commissioner, Bureau of Reclamation, March 5, 2024, http://www.ucrcommission.com/wp-content/uploads/2024/03/UDS-Alternative-Submittal-March-5-2024.pdf.

[138] For a full listing of submitted proposals, see Reclamation, "Alternatives Development," January 17, 2025, https://www.usbr.gov/ColoradoRiverBasin/post2026/alternatives/index.html.

[139] Reclamation, Post-2026 Colorado River Reservoir Operational Strategies for Lake Powell and Lake Mead Narrative of National Environmental Policy Act Alternatives, https://www.usbr.gov/ColoradoRiverBasin/documents/post2026/alternatives/Post-2026_Colorado_River_Operations_EISNarrative_of_Alternatives_20241120_508.pdf.

[140] Reclamation, *Alternatives Report, Post-2026 Operational Guidelines and Strategies for Lake Powell and Lake Mead*, January 2025, https://www.usbr.gov/ColoradoRiverBasin/documents/post2026/alternatives/Post-2026_Alternatives_Report_20250117_508.pdf.

[141] 42 U.S.C. §§4321 et seq. Reclamation's environmental impact statement reportedly also will analyze a continuation of current strategies as a comparative baseline for other alternatives.

on Lake Mead and Lake Powell combined storage (Mead/Powell combined storage), on a water rights priority basis among users, beginning at 70% of capacity and increasing linearly to a maximum of 3.5 MAF per year at 20% of capacity. The Federal Authorities Hybrid Alternative would similarly reduce deliveries based on Mead/Powell combined storage but would do so on a pro rata (i.e., equitably distributed) basis, beginning at 60% of capacity (1.5 MAF per year) and also reaching a maximum of 3.5 MAF per year at 20% of capacity. The Cooperative Conservation Alternative would determine shortages on a priority basis based on a "dual indicator" of basin-wide reservoir storage (i.e., seven-reservoir storage) and hydrology, beginning at 80% of capacity and increasing to a maximum of 4.0 MAF per year. The Basin Hybrid Alternative also would determine shortages based on basin-wide storage, beginning at 80% of capacity and increasing to a static reduction zone of 1.5 MAF per year from 68% to 38% full, and reaching a maximum of 2.1 MAF per year at 31% of capacity. The latter approach is expected to be modeled on both a priority and pro rata basis, with and without tribal shortages included. Both the Cooperative Conservation Alternative and the Basin Hybrid Alternative would avoid cuts to tribes and limit individual state shortages to 1.5 MAF per year.

### Coordinated Reservoir Operations

All of the proposed action alternatives for the environmental impact statement (EIS) include coordinated reservoir operation alternatives at Lakes Mead and Powell. The Federal Authorities Alternative would allow for Lake Powell releases based on Lakes Mead and Powell storage, ranging from 9.5 MAF per year to 5.0 MAF per year and including a 40-foot zone for releases of 8.23 MAF per year. It also would allow for additional deliveries for equalization or reduced deliveries to protect an elevation of 3,490 feet at Lake Powell. The Federal Authorities Hybrid Alternative would use several metrics to determine Lake Powell releases ranging from 12.0 MAF per year to 4.7 MAF per year, including Lakes Mead and Powell storage, 10-year running average hydrology, and Lower Basin deliveries. It also would allow for reduced deliveries to protect the 3,490 feet elevation. The Cooperative Conservation Alternative would determine Lake Powell releases based on Upper Basin (CRSP) hydrology and storage, with releases ranging from 11.0 MAF to 5.0 MAF per year, subject to downward revision based on hydrology. These releases would switch to "run-of-river" releases (i.e., releases equal to inflows) at Lake Powell elevations of 3,510 feet or lower. Finally, the Basin Hybrid Alternative would primarily use Lake Powell elevation, and to determine releases, which would range from 12.0 MAF to 5.0 MAF, with potential releases from CRSP units to protect Glen Canyon Dam infrastructure.

### Lake Mead and/or Lake Powell Storage and Delivery of Conserved and Non-System Water

Most of the authorities would allow for storage of conserved water in Lakes Mead and Powell. The Federal Authorities Alternative would not include any mechanism for storing and accounting for newly conserved water and would only allow for delivery of intentionally created surplus in accordance with prior agreements. The other alternatives would allow these mechanisms to varying extents, with the Federal Authorities Hybrid Alternative allowing for 2 MAF of conserved water in Lake Powell and 5 MAF in Lake Mead; these amounts would not be excluded from Lake Powell and Lake Mead release determinations and from Lake Mead Shortage determinations but would be excluded from Lake Powell release determinations. The Cooperative Conservation Alternative would allow a total of 8 MAF in both reservoirs of conserved water, with all of these amounts excluded from Upper and Lower Basin release and shortage determinations. The Basin Hybrid Alternative would allow for 3 MAF of conserved water in Lake

Powell and 8 MAF in Lake Mead, with all of these amounts excluded from release and shortage determinations.

### Additional Activities Above Lake Powell

All of the alternatives would allow for releases from Upper Basin Initial Units to protect Glen Canyon Dam infrastructure (i.e., similar to ongoing DROA releases). Unlike the other alternatives, the Federal Authorities Alternative does not assume any Upper Basin Conservation in Lake Powell to supplement that lake's storage; the Federal Authorities Hybrid Alternative, the Cooperative Conservation Alternative, and the Basin Hybrid Alternatives all assume varying amounts in a Lake Powell conservation pool, with some portion of this amount able to be converted to offset Lower Basin shortages under specified conditions. The exact amount in the pool, and the amounts available for conversion to offset Lower Basin shortages, would vary by alternative.

# Issues for Congress

## Funding and Oversight of Existing Facilities and Programs

The principal role of Congress as it relates to storage facilities on the Colorado River is funding and oversight of facility operations, construction, and programs to protect and restore listed species (e.g., Glen Canyon Dam Adaptive Management Program and the Upper Colorado River Endangered Fish Program). In the Upper Basin, Colorado River facilities include the 17 active participating units in the Colorado River Storage Projects, as well as the Navajo-Gallup Water Supply Project. In the Lower Basin, major facilities include the Salt River Project and Theodore Roosevelt Dam, Hoover Dam and All-American Canal, Yuma and Gila Projects, Parker-Davis Project, Central Arizona Project, and Robert B. Griffith Project (now Southern Nevada Water System). Congressional appropriations in support of these projects and programs typically account for a portion of overall project budgets, with the remainder of funding coming from power revenues (made available without further appropriation) and nonfederal partners. Congress has also authorized and appropriated funding for the Colorado River Basin in general (e.g., the Pilot System Conservation Plan).

Congress has also addressed Colorado River funding outside of the regular appropriations process. In the 117th Congress, for example, in Section 50233 of the IRA Congress provided $4.0 billion for projects that mitigate drought in the 17 arid and semiarid *reclamation states* in the West,[142] with priority given to Colorado River Basin activities. This funding is available through FY2026 and may be used for a variety of activities, including some of the previously authorized activities discussed above and as compensation for new delivery reductions. Reclamation announced initial plans for this funding on October 12, 2022, in the form of a new program, the *Lower Colorado River Basin System Conservation and Efficiency Program*.[143] The program has three components:

- Under the first component (1a), Colorado River water delivery contractors or entitlement holders submitted proposals resulting in water remaining in Lake Mead at a set price of $330 per acre-foot for a one-year agreement, $365 per

[142] *Reclamation states* refers to the 17 states designated by Congress to be in the Reclamation service area, pursuant to the Reclamation Act of 1902, as amended. 34 Stat. 259.

[143] Reclamation, "Biden-Harris Administration Announces New Steps for Drought Mitigation Funding from Inflation Reduction Act," press release, October 12, 2022, https://www.usbr.gov/newsroom/news-release/4353.

acre-foot for a two-year agreement, and $400 per acre-foot for a three-year agreement. These proposals were due in November 2022.

- For the second component (1b), Reclamation accepted proposals for additional water conservation and efficiency projects that could involve a variety of pricing options as proposed by Colorado River water delivery contractors or entitlement holders. These proposals were due in November 2022.
- For the third component (2), Reclamation accepted proposals for long-term system efficiency improvements that will result in multi-year system conservation. These proposals were due in August 2023.

Reclamation has announced a number of water savings agreements using the IRA funds (in particular under components 1a and 1b),[144] but the full magnitude of water savings that will result from these voluntary agreements remains unclear. If the agreements are successful, additional federal funding similar to that provided in the IRA may be requested in the future to mitigate the effect of long-term drought in the basin and reduce consumptive use from recent levels.

In addition to the aforementioned new program being implemented with IRA funding, Reclamation also previously announced that $250 million of the act's funding would go toward Salton Sea restoration activities over the 2022-2026 timeframe.[145] Restoration of the Sea is a priority of the Imperial Irrigation District, one of the largest water rights holders on the Colorado River.[146]

## Tribal Water Rights Settlements and Leasing

Many tribal water rights are senior to other water rights in the basin, and thus are likely to play an important role in the future of the Colorado River. The extent to which tribes develop their water rights, or are willing and able to market their water to other users, has ramifications for water availability in the basin. As previously noted, Congress has approved Indian water rights settlements associated with more than 2.5 MAF of tribal diversion rights on the Colorado River (these rights are a subset of the water allocations per state in which they are located); a portion of this water has been developed to date. Congress may be asked to fund new or upgraded infrastructure to develop existing tribal water rights, as well as to consider new settlements that would add to the existing tribal diversions.

In the 119th Congress, S. 953 and H.R. 2025 both would authorize a major potential settlement of Colorado River Basin water rights claims of the Navajo Nation, the Hopi Tribe, and the San Juan Southern Paiute Tribe (who occupy lands within the Navajo Reservation in Arizona and Utah but do not have a reservation of their own) for the waters of the Little Colorado River and the Colorado River in the state of Arizona. The bills would authorize federal contributions of $5.0 billion to the tribes, with $1.715 billion dedicated to a major pipeline project that Reclamation is to complete by the year 2040.[147] The bills also would set allocations of Colorado River water for

[144] For example, see DOI, "Biden-Harris Administration Announces Major Milestone to Protect Short-Term Stability of Colorado River Basin," press release, March 5, 2024, https://www.doi.gov/pressreleases/biden-harris-administration-announces-major-milestone-protect-short-term-stability.

[145] Reclamation, "Inflation Reduction Act Funds Landmark Agreements to Accelerate Salton Sea Restoration," press release, November 28, 2022, https://www.usbr.gov/newsroom/news-release/4380.

[146] For more on Salton Sea restoration, see CRS In Focus IF11104, *Salton Sea Management and Restoration Efforts*, by Pervaze A. Sheikh and Charles V. Stern. For more on Imperial Irrigation District's position on the Salton Sea, see Imperial Irrigation District, "Salton Sea," https://www.iid.com/water/salton-sea.

[147] Up to $1.715 billion of the authorized funding would go towards a pipeline to divert Upper Colorado River water (continued...)

each tribe: the allocation for the Navajo Nation in Arizona under the settlement would be 44,700 AF per year, plus 2,300 AF per year for the Hopi; both of these amounts would be derived from Arizona's Upper Colorado River Basin allocation. The settlement also would award rights for Lower Colorado River Basin water (3,600 AF per year of Lower Basin water) and all water from the mainstem and tributaries of the Little Colorado River (i.e., itself a tributary of the Colorado River) that reach both reservations, along with rights to washes and groundwater below the reservations.

## New Facilities and Other Alterations

Congress may be asked to consider the status of congressionally authorized infrastructure on the Colorado River, in particular Glen Canyon Dam. Should water levels fall below the hydropower intakes at the dam, it could affect releases to the Lower Basin.[148] Some have proposed consideration of options that would allow for greater Lower Basin releases below the intakes, thereby allowing for releases pursuant to the compact at lower Lake Powell elevations. Lower Basin state representatives recently asked that Reclamation revisit its post-2026 operational alternatives to not only include reduced Lower Basin releases to protect a Lake Powell elevation of 3,490 feet but also consider Glen Canyon Dam infrastructure modifications that would allow for releases below this level.[149] Reclamation has previously undertaken accelerated maintenance actions at the dam to determine the reliability of using river bypass tubes at the dam to enable Lower Basin releases at storage levels below minimum power pool, although these releases would be less than what is normally possible through the intakes.[150] Reclamation is also studying the efficacy of physical modifications to Glen Canyon Dam to allow for additional releases below critical elevations.[151] Significantly altering Glen Canyon Dam likely would require authorization by Congress.

Some states may pursue further development of their unused Colorado River water (i.e., rather than cutting their use). For example, one project that would develop Upper Basin waters, the proposed Lake Powell Pipeline (LPP), would direct approximately 86,000 AF of Utah's Upper Basin Colorado River Basin annual apportionment from Lake Powell to Washington County, UT (i.e., the St. George, UT, area, which is technically located within the Lower Basin drainage area).[152] The pipeline would begin near Glen Canyon Dam in Arizona and would run through Arizona and Utah to Sand Hollow Reservoir near St. George, UT. Reclamation is the lead agency

from Lake Powell to the tribal areas covered in the settlement. The pipeline would have a capacity of up to 7,100 AFY of potable Colorado River Water to the Navajo Nation (for use in delivering up to 6,750 AFY to serve Navajo communities and up to 350 AFY to serve the San Juan Southern Paiute Southern Area), and up to 3,076 AFY of potable Colorado River Water to the Hopi Tribe.

148 For more information, see CRS Report R47497, *Long-Term Drought and Glen Canyon Dam: Potential Effects on Water Deliveries and Hydropower*.

149 Letter from Colorado River Basin States Representatives of Arizona, Colorado, and Nevada to the Honorable Doug Burgum, Secretary of the Interior, February 13, 2025.

150 Reclamation, "Glen Canyon Dam Put to the Test," *UC Today Newsletter*, Winter 2023, https://www.usbr.gov/uc/special/20230100-UCToday.html.

151 Reclamation, "Glen Canyon Dam Put to the Test," *UC Today Newsletter*, Winter 2023, https://www.usbr.gov/uc/special/20230100-UCToday.html.

152 While St. George, UT, is technically within the Lower Colorado River Basin's drainage, Utah's state allocation comes out of waters available to the Upper Basin. Thus, the LPP would transport Upper Basin waters.

for the project under NEPA and is coordinating an EIS for the most recently proposed version of the project.[153]

The debate over the LPP is illustrative of the issues future water development proposals may face in the basin. Supporters argue that the pipeline is needed to provide a secondary water source for the St. George area (in addition to its primary water source from the Virgin River). However, environmental groups have argued that the proposed development and diversion of additional Upper Basin waters is ill-advised in light of climate change and the basin's over-allocation.[154] The six other Colorado River Basin states have raised concerns related to the proposed LPP's "legal and operational issues," and have criticized the use of the LPP NEPA process as a de facto forum for resolving a conflict among basin states. The six states previously requested that Reclamation refrain from issuing a final EIS until these issues can be resolved on a consensus basis.[155]

# Concluding Observations

There is wide acknowledgement that existing directives for managing Colorado River Basin waters are inadequate to address the ongoing persistent drought and water uses and do not account for the basin's current and projected hydrology. The original basis for the Colorado River Compact assumed more water than is typically available for consumptive uses, and drought in the basin has exacerbated this issue. Although recent agreements have conserved water relative to previous baselines, inflows have also decreased and have regularly fallen short of forecasted levels.[156] The resulting drawdown of basin storage threatens both hydropower production and water deliveries. Long-term flow projections estimate that available supplies will continue to decrease, whereas new demands and diversions (e.g., development of tribal water rights) will continue to increase competition for scarce resources.

Despite agreement that major water delivery reductions are necessary to protect power generation and reservoir storage, there remain considerable differences of opinion as to precisely what form these actions should take. The question of which basins, states, and contractors will be subject to water delivery reductions, and of what amount, as well as what (if any) mitigation should accompany these efforts, takes on an added level of urgency due to the river's economic importance to many areas. The relative priority of water rights in the basin, compared to priority for health, safety, and other uses, is a central issue facing decisionmakers charged with allocating the basin's scarce water resources. Related questions, including alterations to basin infrastructure and accounting, are also likely to figure prominently in ongoing basin negotiations. Due to its unique authorities in the basin, the federal government is likely to be heavily involved in these discussions.

153 For project NEPA documents and studies, see https://www.usbr.gov/uc/DocLibrary/EnvironmentalImpactStatements/LakePowellPipeline/index.html#intro.

154 Letter from Utah Rivers Council et al. to Rick Baxter, Program Manager, Bureau of Reclamation Provo Area Office, September 8, 2020.

155 Letter from Colorado River Basin States Representatives of Arizona, California, Colorado, Nevada, New Mexico, and Wyoming to David Bernhardt, Secretary of the Interior, September 8, 2020.

156 Jian Wang et al., "Evaluating the Accuracy of Reclamation's 24-Month Study Lake Powell Projections," Center for Colorado River Studies, February 18, 2022.

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