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SUMMARY

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

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.

Apportioned Colorado River water is widely acknowledged to be in excess of the river's natural flows, and consumptive use of these waters typically exceeds natural flows. This causes an imbalance in the basin's available water supply and demand. Stress on basin water supplies is exacerbated by a long-term drought dating to 2000. In the future, observers expect ongoing strain on the basin's limited water supplies, which will be further stressed by climate change.

River Management

The *Law of the River* is the commonly used shorthand for the multiple laws, court decisions, and other documents governing Colorado River operations; its foundational document is the Colorado River Compact of 1922. Pursuant to the compact, the basin states established a framework to apportion water supplies between the river's Upper and Lower Basins, with the dividing line between the two basins at Lee Ferry, AZ. Each basin was allocated 7.5 million acre-feet (MAF) annually under the compact, and an additional 1.5 MAF in annual flows was made available to Mexico under a 1944 treaty. Further agreements and court decisions addressed other issues (e.g., intrastate allocations of flows), and subsequent federal legislation provided authority and funding for federal facilities that allowed users to develop their allocations. A 1963 Supreme Court ruling confirmed that Congress designated the Secretary of the Interior as the *water master* for the Lower Basin, a role in which the federal government manages the delivery of all water below Hoover Dam.

Reclamation and basin stakeholders closely track the status of two large reservoirs—Lake Powell in the Upper Basin and Lake Mead in the Lower Basin—as an indicator of basin storage conditions. Under criteria agreed upon by basin states, dam releases from these facilities are tied to specific water storage levels. On August 16, 2021, Reclamation declared the first-ever *Tier One* shortage condition in the Lower Basin beginning in 2022, which reduces deliveries to water contractors in Arizona and Nevada, as well as to Mexico. Reclamation also projected a high likelihood of Lake Powell's 2022 surface water elevation falling below target levels established to protect hydropower infrastructure at Glen Canyon Dam.

Operational Changes and Drought Contingency Plans

The federal government has led multiple efforts attempting to improve the basin's water supply outlook, resulting in previous collaborative agreements in 2003 and 2007. After several years of negotiations, in 2019 Reclamation and the basin states agreed on a new set of plans to alleviate the strain on basin water supplies. Congress authorized these drought contingency plans (DCPs) for the Upper and Lower Basins in 2019 in the Colorado River Drought Contingency Plan Authorization Act (P.L. 116-14). Among other things, the DCPs required reductions beyond previous curtailment plans based on Lake Mead storage levels, committed Reclamation to additional water conservation efforts, and put in place plans to coordinate Upper Basin operations to enhance Lake Powell storage levels and hydropower generation. Although the DCPs were widely lauded for their consensus-based development, many remain concerned about the basin's long-term water supply imbalance and the related potential for a compact call (a "call" on water rights between the Lower and Upper Basins). A central question facing decisionmakers is whether to renew interim agreements (including the DCPs) prior to their expiration in 2026, along with what (if any) additional changes might be necessary to prevent future shortages.

Congressional Role

Congress plays a multifaceted role in federal management of the Colorado River Basin. Congress funds and oversees management of basin facilities and has held oversight hearings on drought in the basin and elsewhere. Congress also has enacted legislation involving allocation of Colorado River waters (e.g., authorization of Indian water rights settlements; new water storage facilities) and authorities to mitigate water shortages (i.e., the DCPs and other related efforts). In the future, Congress may be asked to amend or extend these authorities to combat long-term water shortages.

biological opinion (BiOp) issued by the FWS in 1997 served as a basis for the program. Modifications to the 1997 BiOp were made in 2002, and in 2005, the BiOp was renewed for 50 years. Nonfederal entities received an incidental take permit under Section 10(a) of the ESA for their activities in 2005 and shortly thereafter implemented a habitat conservation plan.

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. The estimated total cost of the program over its lifetime is approximately $626 million in 2003 dollars ($882 million in 2018 dollars) and is to be split evenly between Reclamation (50%) and the states of California, Nevada, and Arizona (who collectively fund the remaining 50%).[56] 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 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.

Tribal Water Rights

Twenty-two federally recognized tribes in the Colorado River Basin have quantified water diversion rights that have been confirmed by court decree or final settlement. These tribes collectively possess rights to 2.9 MAF per year of Colorado River water.[57] As of 2015, these tribes typically were using just over half of their quantified rights.[58] Additionally, 13 other basin tribes have reserved water rights claims that have yet to be resolved, although the total potential amount of these claims has not been estimated.[59] Increased water use by tribes with existing water rights, and/or future settlement of claims and additional consumptive use of basin waters by other tribes, is likely to exacerbate the competition for basin water resources.

The potential for increased use of tribal water rights (which, once ratified, are counted toward state-specific allocations where the tribal reservation is located) has been studied in recent years. In 2014, Reclamation, working with a group of 10 tribes with significant reserved water rights claims on the

[56] As of the end of 2018, more than $295 million had been spent on program implementation. Lower Colorado River Multi-Species Conservation Program, "Funding," https://www.lcrmscp.gov/steer_committee/funding.html. Accessed February 22, 2019.

[57] Reclamation 2012 Supply/Demand Study, Technical Report C, Appendix C9, p. C9-4.

[58] Colorado River Research Group, *Tribes and Water in the Colorado River Basin,* June 2016, at https://www.coloradoriverresearchgroup.org/uploads/4/2/3/6/42362959/crrg_tribal_water_rights.pdf. 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 diversion rights.

[59] Colorado River Research Group, *Tribes and Water in the Colorado River Basin,* June 2016, at https://www.coloradoriverresearchgroup.org/uploads/4/2/3/6/42362959/crrg_tribal_water_rights.pdf.

Colorado River, initiated a study known as the *10 Tribes Study*.[60] The study, published in 2018, estimated that, cumulatively, the 10 tribes in the study could have reserved water rights (including unresolved claims) to divert nearly 2.8 MAF per year.[61] Of these water rights, approximately 2 MAF per year were confirmed by a court decree or final settlement and an additional 785,273 AF (mostly in the Upper Basin) remained unresolved.[62] The report estimated that, overall, the 10 tribes are diverting (i.e., making use of) almost 1.5 MAF of their 2.8 MAF in resolved and unresolved claims. **Table 1** shows these figures at the basin and sub-basin levels.[63] According to the study, the majority of unresolved claims among the 10 tribes are Upper Basin claims associated with the Ute Tribe in Utah (370,370 AF per year), the Navajo Nation in Utah (314,926 AF), and the Navajo Nation in the Upper Basin in Arizona (77,049 AF).

Table 1. Ten Tribes Study: Tribal Water Rights and Diversions

(values in terms of acre-feet per year)

	Current Use Diversions	Reserved/Settled Water Rights	Unresolved Water Rights	Total Estimated Tribal Water Rights
Upper Basin	672,964	1,060,781	762,345	1,823,125
Lower Basin	800,392	952,190	22,928	975,119
Total Basin	**1,473,356**	**2,012,971**	**785,273**	**2,798,244**

Source: U.S. Bureau of Reclamation, Colorado River Ten Tribes Partnership, *Colorado River Basin Ten Tribes Partnership Tribal Water Study,* Study Report, December 2018.

Note: Unresolved water rights include claims for potential water rights that have yet to be resolved.

Drought and the Supply/Demand Imbalance

When the Colorado River Compact was originally approved in 1922, it was assumed based on the historical record that average annual flows on the river were 16.4 MAF per year.[64] According to Reclamation data, from 1906 to 2020, observed historical natural flows on the river at Lee Ferry, AZ—the common point of measurement for observed basin flows—averaged 14.7 MAF annually.[65] Natural flows from 2000 to 2020 (i.e., during the ongoing drought) averaged considerably less than that—12.4 MAF annually.[66] At the same time, consumptive use and losses in the basin have grown since the compact was approved and have regularly exceeded natural flows (in particular during the current drought).[67] Consumptive use in the basin generally increased from 1971 to 2002 but declined after the 2003 approval

[60] The tribes are the Chemehuevi Indian Tribe, Cocopah Indian Tribe, Colorado River Indian Tribes, Fort Mojave Indian Tribe, Jicarilla Apache Nation, Navajo Nation, Quechan Indian Tribe, Southern Ute Indian Tribe, Ute Indian Tribe, and Ute Mountain Ute Tribe.

[61] U.S. Bureau of Reclamation, Colorado River Ten Tribes Partnership, *Colorado River Basin Ten Tribes Partnership Tribal Water Study,* Study Report, December 2018, p. 5.11-1, at https://www.usbr.gov/lc/region/programs/crbstudy/tws/finalreport.html. Hereinafter, Ten Tribes Study, 2018.

[62] Ten Tribes Study, 2018, pp. 5.11-1-5.11-2.

[63] Ten Tribes Study, 2018, p. 5.11-4.

[64] 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, at https://www.nap.edu/read/11857/chapter/1.

[65] Data available from Bureau of Reclamation, Lower Colorado River Operations, "General Modeling Information," at https://www.usbr.gov/lc/region/g4000/riverops/model-info.html. Hereinafter, Bureau of Reclamation Flow Data.

[66] Bureau of Reclamation Flow Data, 1906-2020.

[67] *Consumptive uses and losses* include reservoir evaporation and other consumptive use losses, which average in excess of 2 MAF per year.