

The 1944 U.S.-Mexico Water Treaty in an Era of Climate Change and Environmental Priorities

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Introduction

The Colorado River (River) flows south through seven U.S. states before its confluence with the Gulf of California in Mexico (Figure 1). Most of the Colorado River Basin (Basin) is located in the United States, although it serves as an essential water source to both Mexico and the western U.S.¹ The Basin provides water to approximately 40 million people. This water supplies many important land uses and entities in the West, some of which include: municipalities, agricultural operations, Native American tribes, National Wildlife Refuges, National Recreation Areas, and National Parks. Additionally, Colorado River hydropower facilities can generate more than 4,000 megawatts of electricity to meet the power needs of the West which can offset the use of fossil fuels.²

Due to the many anthropogenic uses, the Basin has been altered significantly throughout the last century. The Colorado River currently runs dry before reaching the Gulf of Mexico unless it is an exceptionally wet year or water is designated for this purpose. The precipitation that feeds the Basin is extremely variable, and primarily consists of snowmelt in the Upper Basin (Figure 1).³ Data collected from Lees Ferry along the River from 1906-2019 indicate that natural flows in the Colorado River Basin in the 1900s averaged around 14.8 million acre-feet (MAF) annually. While in more recent times, Colorado River flows from 2009 to 2019 averaged only 13.2 MAF per year.⁴ The USBR predicts that demand will likely continue to increase over the coming decades, while supply will likely stay the same or decrease (Figure 2).⁵ Climate change will very likely exacerbate the uncertainty of the future water supply throughout the Basin, with many models predicting that there will be less supply.^{6,7}

¹ Carter, N., Mulligan, S., Seelke, C. 2017. U.S.-Mexican Water Sharing: Background and Recent Developments. Congressional Research Service. <https://fas.org/sgp/crs/row/R43312.pdf>.

² U.S. Bureau of Reclamation (USBR). 2012. Colorado River Basin Water Supply and Demand Study. https://www.usbr.gov/watersmart/bsp/docs/finalreport/ColoradoRiver/CRBS_Executive_Summary_FINAL.pdf. (USBR 2012).

³ Stern, C., Sheikh, P. 2019. Management of the Colorado River: Water Allocations, Drought, and the Federal Role. Congressional Research Service. <https://crsreports.congress.gov/product/pdf/R/R45546>.

⁴ USBR, Colorado River Basin Natural Flow and Salt Data. <https://www.usbr.gov/lc/region/g4000/riverops/model-info.html>.

⁵ USBR 2012.

⁶ Christensen, N. S., and D. P. Lettenmaier. 2007. A multimodel ensemble approach to assessment of climate change impacts on the hydrology and water resources of the Colorado River Basin. *Hydrol. Earth Syst. Sci.*

⁷ Harding, B., Wood, A., Prairie, J. 2012. The implications of climate change scenario selection for future streamflow projection in the Upper Colorado River Basin. *Hydrol. Earth Syst. Sci.*

To establish water allotment and settle subsequent issues along the Colorado River, the U.S. and Mexico signed the 1944 U.S.-Mexico Water Treaty.⁸ The United States and Mexico share the waters of the Colorado River pursuant to this binational agreement. Increasing water demands and potential supply uncertainty due to climate change and drought increase the challenges and significance of dependable water sharing. This paper seeks to explain how the 1944 US-Mexico Water Treaty works and how it is addressing drought, climate change, and changing environmental priorities, and what additional issues the Basin may face in the future.

Colorado River Basin



Figure 1. Hydrologic boundaries of the Colorado River Basin within the United States. This figure also includes depictions of the adjacent areas of the Basin that receive Colorado River water. Source: USBR 2012.

⁸ 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., 1944. <https://www.ibwc.gov/Files/1944Treaty.pdf> ('1944 Water Treaty').

Colorado River Water Supply and Demand

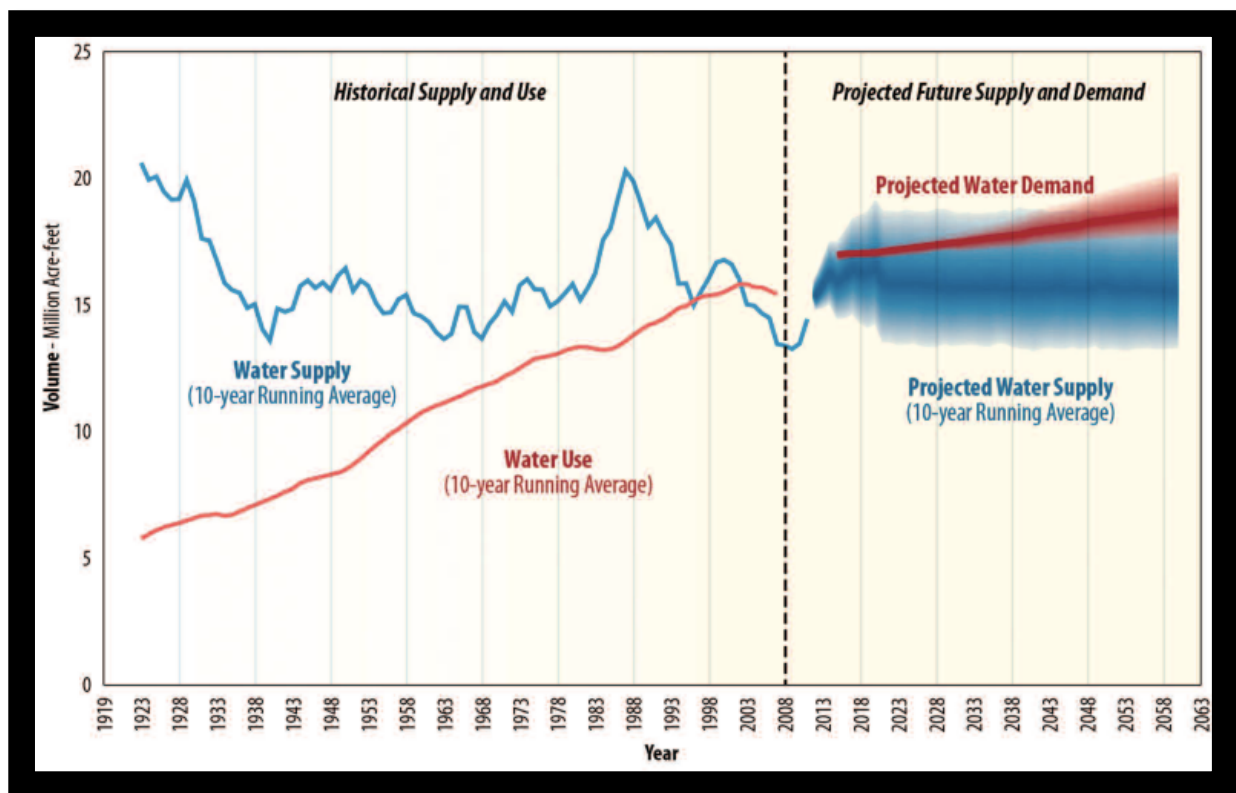


Figure 2. Historical and projected Colorado River water supply and demand. Water use and demand include Mexico’s allotment and losses due to evaporation, vegetation uptake, and operational activities. Source: USBR 2012.

Background

In 1848 the United States and Mexico signed the Treaty of Guadalupe Hidalgo, which ended the Mexican-American War. In subsequent decades the United States and Mexico attempted to establish their official border through a series of treaties.⁹ The Treaty of Guadalupe Hidalgo identified portions of the Rio Grande and Colorado Rivers as encompassing parts of the border between the countries.¹⁰ In 1922 the Basin states and federal government negotiated the Colorado River Compact. The Compact created a framework to allocate the water supply between the Upper Basin and Lower Basin. Each basin was apportioned 7.5 MAF annually but the Compact did not address international allocations of water for Mexico.¹¹

⁹ Carter, N., Mulligan, S., Stern, C. 2018. Sharing the Colorado River and the Rio Grande: Cooperation and Conflict with Mexico. Congressional Research Service. <https://fas.org/sgp/crs/row/R45430.pdf>.

¹⁰ Treaty of Peace, Friendship, Limits, and Settlement with the Republic of Mexico. 1848. <https://www.ourdocuments.gov/doc.php?flash=false&doc=26&page=transcript>.

¹¹ Colorado River Compact of 1922. <https://www.usbr.gov/lc/region/g1000/pdfiles/crcompct.pdf>. (Colorado River Compact of 1922).

International Boundary and Water Commission

The United States and Mexico created the International Boundary Commission (IBC) to form and operate border agreements in 1889.¹² The two countries gave authority to the IBC to oversee water allocation matters in the 1944 Water Treaty and renamed the commission the International Boundary and Water Commission (IBWC).¹³ The IBWC administers border demarcation, water allocation, water quality, and flood control matters. Both countries each have a section composed of the following members from each country; a commissioner, two engineers, a legal adviser, and a foreign affairs secretary. Together these sections make up the IBWC.¹⁴ The President appoints the U.S. IBWC commissioner, and there is currently no term limit.¹⁵ The 1944 Water Treaty outlined a way to address issues and/or new developments through binationally decided understandings of the treaty, called ‘minutes’.¹⁶

Minutes

More than 300 minutes have been adopted regarding the 1944 Water Treaty. These minutes have addressed many issues, including the operation of sanitation plants, water conveyance, water shortage, dams, water quality, and more.¹⁷ Minutes are considered binding executive agreements between the United States and Mexico, and the power to adopt or reject them is in the executive branch. However, Congress has to approve and appropriate funding for any project agreed upon in the minutes that requires federal funds.¹⁸

1944 Water Treaty

The main goal of the 1944 U.S.-Mexico Water Treaty (Treaty) was to allot Colorado River water to the United States and Mexico and establish a governance structure where the IBWC has the authority to resolve issues relating to the Treaty by issuing minutes. Additionally the Treaty addresses construction of dams and channels along the rivers, flood control, hydroelectric energy generation, and operation of reservoirs. Under the Treaty, Mexico is allotted 1.5 MAF of Colorado River water.¹⁹ Previous agreements between the U.S. states allotted that the Upper Basin and Lower Basin each get 7.5 MAF of Colorado River Water.²⁰ Therefore the total allotted Colorado River water is 16.5 MAF annually, which is greater than the flow of the River in recent years. When the United States and Mexico were negotiating the 1944 Water Treaty the estimates of the average volume of flow in the Colorado River was approximately 16-17 MAF annually.²¹

¹² 1889 Water Boundary Convention. https://www.ibwc.gov/Files/TREATY_OF_1889.pdf.

¹³ International Boundary and Water Commission (IBWC). History of the International Boundary and Water Commission. https://www.ibwc.gov/About_Us/history.html.

¹⁴ IBWC. Synopsis of the International Agreements Establishing and Institutionalizing the International Boundary and Water Commission. https://www.ibwc.gov/About_Us/synopsis.html.

¹⁵ Carter, N., Mulligan, S., Stern, C. 2018. Sharing the Colorado River and the Rio Grande: Cooperation and Conflict with Mexico. Congressional Research Service. <https://fas.org/sgp/crs/row/R45430.pdf>.

¹⁶ 1944 Water Treaty

¹⁷ IBWC. Minutes between the United States and Mexican Sections of the IBWC. https://www.ibwc.gov/Treaties_Minutes/Minutes.html.

¹⁸ Carter, N., Mulligan, S., Seelke, C. 2017. U.S.-Mexican Water Sharing: Background and Recent Developments. Congressional Research Service. <https://fas.org/sgp/crs/row/R43312.pdf>.

¹⁹ 1944 Water Treaty

²⁰ Colorado River Compact of 1922.

²¹ Carter, N., Mulligan, S., Stern, C. 2018. Sharing the Colorado River and the Rio Grande: Cooperation and Conflict with Mexico. Congressional Research Service. <https://fas.org/sgp/crs/row/R45430.pdf>.

More recently, the USBR has determined the average flow of the River between 1906 and 2019 is about 14.77 MAF, and the average flow from 2009 to 2019 is estimated to be approximately 13.2 MAF annually.²²

Mexico's allotment of 1.5 MAF in flows has historically been a constant requirement since the 1944 Water Treaty. So when River flows fall below 16.5 MAF, the United States was primarily responsible for reducing its use.²³ A USBR study concluded that the demand/supply imbalance will likely widen in the future (Figure 2).²⁴ Due to the increasing uncertainty of future water supply, both countries came together to negotiate a minute to address this and other issues, including setting aside water for environmental purposes. The minutes discussed below are the products of this negotiation.

Water for the Environment

Most development along the Colorado River Basin was built before major federal environmental protection laws, including the National Environmental Policy Act (NEPA) and the Endangered Species Act (ESA). Therefore, most of the environmental impacts caused by development within the Basin were not taken into account. There have many negative effects due to this development, including the loss of wetlands, and the listing of many species as endangered in the Basin.²⁵ Through consultations with the U.S. Fish and Wildlife Service required after a species is listed, programs have been enacted to protect and restore endangered species in the Colorado River Basin.²⁶

Historically, the Colorado River Delta covered almost 10,000 square miles in the United States and Mexico. The delta (which is mostly in Mexico) contains wetlands, woodlands, and desert habitats. These habitats are home to many endangered species, including plant, bird, and fish species. Diversion of water, conversion to agricultural lands, and groundwater pumping have contributed to the degradation of about 90% of the delta's wetlands.²⁷ IBWC began discussing allotting water for environmental purposes in the 1990s. Many groups assisted the IBWC in developing an agreement that would require both countries to set aside water that would be used to create 'pulse flows' in the delta. These discussions led to the passage of Minute 319, which was replaced by Minute 323. Those minutes are discussed below.²⁸

²² USBR, Colorado River Basin Natural Flow and Salt Data. <https://www.usbr.gov/lc/region/g4000/riverops/model-info.html>.

²³ Carter, N., Mulligan, S., Stern, C. 2018. Sharing the Colorado River and the Rio Grande: Cooperation and Conflict with Mexico. Congressional Research Service. <https://fas.org/sgp/crs/row/R45430.pdf>.

²⁴ USBR 2012

²⁵ United States Fish and Wildlife Service. Endangered Species. <https://www.fws.gov/endangered/?ref=topbar>.

²⁶ Tart, J. 2014. The Upper Colorado River Endangered Fish Recovery Program: Twenty-Five Years in the Making. University of Denver Water Law Review. <http://duwaterlawreview.com/the-upper-colorado-river-endangered-fish-recovery-program-twenty-five-years-in-the-making/>.

²⁷ Schlatter, K. et al. 2017. Integrating active restoration with environmental flows to improve riparian tree establishment in the Colorado River Delta. *Ecological Engineering*, vol. 106.

²⁸ Carter, N., Mulligan, S., Seelke, C. 2017. U.S.-Mexican Water Sharing: Background and Recent Developments. Congressional Research Service. <https://fas.org/sgp/crs/row/R43312.pdf>.

Minute 319 and 323

Minute 319

Minute 319 was signed on November 20, 2012, and expired in 2017. Minute 319 allowed for modifications to the quantity of water delivered to Mexico depending on drought or surplus water conditions within the Basin, defined processes to incentivize water conservation, gave Mexico more water storage opportunities in U.S. reservoirs, and outlined binational investments in environmental restoration programs.²⁹

As part of the commitment by both countries to improve environmental conditions in the Basin, a pilot program was conducted that was intended to simulate spring flood conditions. The goal of the environmental pilot program was to expand understanding of water management techniques for ecosystem restoration. Under the pilot program, water set aside by both countries was used to create a flow that would reach the Gulf of Mexico. Water was released from March 23, 2014 to May 18, 2014. After many years of the River running dry before it reached its estuary, the releases from this program were large enough for the River to reconnect with the ocean. An international team of researchers studied the the impacts on instream flow, stream topography, salinity, groundwater, vegetation, birds, and other aquatic species. The program was widely considered successful. Based on data collected from 2014 to 2015, approximately 4,000 acres of the River's channel and surrounding lands were flooded resulting in the River connecting to the Gulf of Mexico for the first time since 1997, bird diversity and abundance improved in the floodplain in 2014 and 2015, and some areas had higher groundwater infiltration rates.³⁰³¹

Minute 323

U.S. and Mexican officials signed Minute 323 on September 21, 2017, and it will expire in 2026. Minute 323 extends most of the elements that were established in Minute 319, with some additions. These additions include a provision allowing for a variability in flow that arrives in Mexico based on water levels in Lake Mead and initiates a Binational Water Scarcity Contingency Plan. The Binational Water Scarcity Contingency Plans require each country to save specific volumes of water at specific Lake Mead elevations for use when water supply improves. Minute 323 does not explicitly require pulse flows. Alternatively, Minute 323 allocates 210,000 AF of water to be used for environmental purposes over the course of the agreement, the water will be provided in equal parts by both countries and nongovernmental organizations. Additionally, Mexico agreed that it would allow for its allocation (1.5 MAF) to be reduced equivalent to the United States' reductions in dry years, and would receive more than its designated allocation in wet years. This exact amount of reduction and surplus that would be provided is based on specific Lake Mead elevation levels.³²

²⁹ IBWC. Minute 319. https://www.ibwc.gov/Files/Minutes/Minute_319.pdf.

³⁰ Munguía, Vicente & Cortez-Lara, Alfonso. 2014. Minute 319 of the International Boundary and Water Commission between the US and Mexico: Colorado River binational water management implications. *International Journal of Water Resources Development*. Vol 31.

³¹ Flessa, K., Kendy, E., Schlatter, K. 2016. Minute 319 Colorado River Limitrophe and Delta Environmental Flows Monitoring, Report for the IBWC.

https://www.ibwc.gov/Files/Minutes%20319/2016_EFM_InterimReport_Min319.pdf

³² IBWC. Minute 323. <https://www.ibwc.gov/Files/Minutes/Min323.pdf>.

The Future of the Basin

While the original 1944 Water Treaty did not address environmental concerns, drought, or climate change, it did allow for the Treaty to respond to changing future circumstances by allowing for the U.S. and Mexico to adopt agreed upon minutes. Recent iterations of these minutes, including Minute 319 and 323 have attempted to take into account water supply uncertainty, and increasing support for environmental restoration of the delta. Minute 323 has potential to benefit the Colorado River Basin's many habitats, as well as provide greater water certainty to users in both countries. Minute 323 expires in 2026, and in order to better prepare for the water scarcity concerns associated with climate change, improve ecological restoration, and ensure that use of Colorado River water is sustainable, additional steps will need to be taken.

Aquifers within the Colorado River Basin are not explicitly addressed by the 1944 Water Treaty or any subsequent minute. Aquifers are important water resources that can be especially important for meeting municipal, agricultural, or ecological needs during dry times. Many aquifers in the Basin have experienced substantial declines in volume or quality.³³

The 1944 Water Treaty establishes a hierarchy of uses for River water in the following order: (1) domestic and municipal uses; (2) agriculture and stock-raising; (3) electric power; (4) other industrial uses; (5) navigation; (6) fishing and hunting; and (7) other beneficial uses determined by the IBWC. This hierarchy does not include an obligation to maintain a minimum flow of water for environmental purposes. Additionally, the original 1944 Water Treaty does not establish requirements for water quality, which has led to salinity issues within the Basin.^{34,35}

There are many other factors that may shape future water agreements in the Basin including hydrologic conditions, increasing population, political administration changes, funding allocations, and economic activity around the Basin. In conclusion, we have made progress in trying to mitigate and adapt to a Colorado River Basin that is changing rapidly, but there are many more issues that need to be addressed.

³³ Sanchez, R., Lopez, V., Eckstein, G. 2016. Identifying and Characterizing Transboundary Aquifers Along the Mexico-US border: An Initial Assessment. *Journal of Hydrology*. no. 535.

³⁴ 1944 Water Treaty.

³⁵ Carter, N., Mulligan, S., Stern, C. 2018. Sharing the Colorado River and the Rio Grande: Cooperation and Conflict with Mexico. Congressional Research Service. <https://fas.org/sgp/crs/row/R45430.pdf>.