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U.S.-Mexican Water Sharing: Background and Recent Developments

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Summary

The United States and Mexico share the waters of the Colorado River and Rio Grande pursuant to binational agreements. Increasing water demands and reduced supplies deriving from drought and air temperatures increase the challenges and significance of reliable water sharing.

The International Boundary and Water Commission (IBWC) is charged with addressing issues that arise during application of binational water treaties. The IBWC is a binational entity with a U.S. Section that operates under foreign policy guidance from the U.S. Department of State. Under the binational 1944 Water Treaty, disputes and new developments can be resolved through agreed-upon interpretations of the treaty, called *minutes*.

Mexican-U.S. relations generally grew closer during the George W. Bush and Obama Administrations. Water sharing was addressed through IBWC technical meetings and bilateral talks between government officials; these meetings and talks were the primary forum for addressing treaty compliance and frustrations of water users in Texas with Mexico's water delivery regime. Treaty minutes were used to enhance bilateral cooperation and provide flexibility in how treaty compliance was accomplished. It remains uncertain what principles will guide and what mechanisms will be used during the Trump Administration to address water conflicts and what role enhanced cooperation (e.g., measures similar to recent binational efforts in the Colorado River basin) may play in U.S.-Mexican water sharing.

Colorado River. The Colorado River flows through seven U.S. states before reaching Mexico; 97% of its basin is in the United States. Under the 1944 Water Treaty, the United States is required to provide Mexico with 1.5 million acre-feet (AF) of Colorado River water annually. This figure represents about 10% of the river's average flow.

Minute 319 is a set of binational cooperative measures in the Colorado River basin agreed upon in 2012. It provides for more cooperative basin water management, including environmental flows to restore riverine habitat. Minute 319 also provides for Mexico to share in cutbacks during shortage conditions in the basin; such cutbacks are not required under the 1944 Water Treaty. Under Minute 319, Mexico can delay its water deliveries from the United States under the 1944 Water Treaty and store its delayed deliveries in Lake Mead, thereby increasing the lake's elevation. Lake Mead elevation is the baseline used for determining shortage conditions and associated water delivery cutbacks for U.S. lower basin states. Minute 319 is to remain in force through December 31, 2017. It could be extended or replaced with a new minute, or it could be allowed to expire. Negotiations on a new minute were under way at the end of the Obama Administration. For the Colorado River basin, issues before Congress may be largely related to oversight of Minute 319 implementation, as well as developments in negotiations related to the future of Minute 319 or its successor (if any).

Rio Grande. The Rio Grande is governed by two separate agreements. Deliveries to Mexico in the northwestern portion of the shared basin (near El Paso/Ciudad Juárez) occur under a 1906 convention, whereas deliveries for the southeastern portion (which is below Fort Quitman, TX) are laid out in the 1944 Water Treaty. Some Members of Congress have raised concerns about the adequacy of Mexico's water deliveries in the Rio Grande basin and the resulting economic impacts, especially in Texas border counties. During the 115th Congress, Members of Congress and other Texas stakeholders may continue their efforts to promote the adoption of mechanisms to achieve a Mexican water-delivery regime that provides more reliability and benefit for Texas.

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U.S.-Mexican Water Sharing

How to share water has long been a complex issue for the U.S.-Mexican border region, and it has been the cause of both tension and cooperation in the broader U.S.-Mexican relationship.¹ The two countries share a nearly 2,000-mile border. Multiple rivers cross or form the border at various points. The principal shared river basins are the Colorado River and the Rio Grande. This report is a primer on U.S. and Mexican water sharing. It focuses on the sharing of surface waters.

After presenting an introduction to U.S.-Mexican water sharing, this report describes the legal obligations and processes under the treaty on Utilization of Waters of the Colorado and Tijuana Rivers and of the Rio Grande (hereinafter Treaty or 1944 Water Treaty).² It then describes developments in the Colorado River and Rio Grande basins.

Development of U.S.-Mexican Water Sharing

In the 19th century, questions arose regarding the boundaries between the two countries and the sharing of international rivers. Early agreements, starting in 1848, sought to clarify the location of the border.³ The two countries entered into the Convention of March 1, 1889, to apply agreements related to the nations' borders that were defined by international waters.⁴ Starting in 1906, binational water agreements began to emerge; a 1906 convention on the sharing of Rio Grande for irrigation purposes distributed water in the vicinity of El Paso, TX.⁵ In 1944, the two countries entered into the 1944 Water Treaty. The Treaty designated the International Boundary and Water Commission (IBWC) responsible for facilitating resolution of issues arising during application of U.S.-Mexican treaties. The two principal rivers shared by the U.S. and Mexico are

- the Colorado River, which is predominantly in the United States and crosses the Mexican border on its way to the Gulf of California (**Figure 1**), and
- the Rio Grande, with major tributaries in the United States and Mexico and whose riverbed is the U.S.-Mexican border in Texas (**Figure 2**).

¹ For background on the broader U.S.-Mexican relationship, see CRS Report R42917, *Mexico: Background and U.S. Relations*, by (name redacted) .

² 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 (hereinafter 1944 Water Treaty or the Treaty).

³ Treaty of Guadalupe Hidalgo, U.S.-Mex., February 2, 1848, at http://www.ibwc.state.gov/Files/Treaty_of_1848.pdf (ending the Mexican-American War).

⁴ Convention Between the United States and Mexico regarding the Water Boundary, U.S.-Mex., December 2, 1889, at http://www.ibwc.state.gov/Files/TREATY_OF_1889.pdf (hereinafter 1889 Boundary Convention).

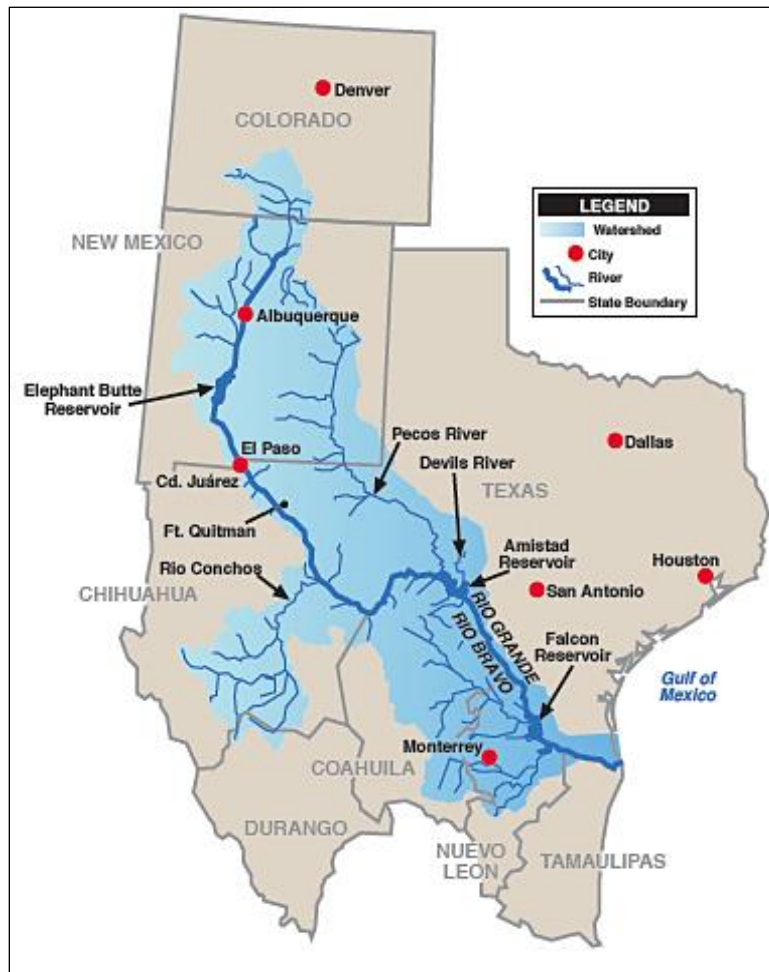
⁵ Convention of May 21, 1906, on the Equitable Distribution of the Waters of the Rio Grande, at <http://www.ibwc.gov/Files/1906Conv.pdf>.

Figure I. Colorado River Basin



Source: The Earth Institute at Columbia University, at <http://blogs.ei.columbia.edu/wp-content/uploads/2012/12/CO-River-Basin-REVISED.jpg>; modified by the Congressional Research Service (CRS).

Figure 2. Rio Grande Basin



Source: Texas Commission on Environmental Quality, *Biennial Report to the 85th Legislature (FY2015-FY2016)*, SFR-57/6, Austin, TX, December 2016, at https://www.tceq.texas.gov/assets/public/comm_exec/pubs/sfr/057_16/SFR-057-16-X.pdf.

Water stored in aquifers generally is not addressed by the U.S.-Mexican binational water-sharing agreements. Groundwater may play a significant role in water supply in some parts of the U.S.-Mexican border, especially during dry conditions. For more on shared groundwater, see the box “Border Aquifers Are Largely Not Addressed by Binational Agreements.”

Border Aquifers Are Largely Not Addressed by Binational Agreements

Binational aquifers are transboundary water resources that can be particularly important for meeting needs during dry times. Roughly 20 binational aquifers are significant sources of domestic water supply for overlying populations. For example, the Hueco Bolson aquifer provides water for Ciudad Juárez's 1.5 million residents and 40% of El Paso's 730,000 residents. Many border aquifers have experienced significant declines in volume and/or quality. No broad bilateral agreement exists on U.S.-Mexican border groundwater management and use.

Declining water levels, deteriorating water quality, and increasing use of groundwater resources have raised concerns about the long-term availability of the border's aquifers. Knowledge about the extent, depletion rates, and quality of transboundary aquifers is limited, and in some areas extremely limited. A 2016 study entitled "Identifying and Characterizing Transboundary Aquifers Along the Mexico-US border: An Initial Assessment" identified 36 aquifers along the U.S.-Mexican border.

As the level of water in an aquifer falls, surface water flows can decline. For example, historically the Hueco Bolson aquifer was recharged primarily by precipitation, and the aquifer contributed to the flow of the Rio Grande (i.e., the Rio Grande gained water from the aquifer). However, as the aquifer's level declined due to pumping levels exceeding recharge rates, the river-aquifer flows reversed. The Rio Grande began to recharge the aquifer, resulting in diminished surface water flows; that is, the river became a losing stream in the reach of the Hueco Bolson, as surface water entered the Hueco Bolson aquifer.

A binational aquifer quantity and quality assessment program has been initiated, pursuant to the U.S.-Mexican Transboundary Aquifer Assessment Act (P.L. 109-448, 42 U.S.C. §1962 note); four border aquifers were identified as priorities for study under the legislation. The act authorized the Secretary of the Interior, through the U.S. Geological Survey, to collaborate with the states of Arizona, New Mexico, and Texas through their Water Resources Research Institutes and with the International Boundary and Water Commission, stakeholders, and Mexican counterparts to provide information and a scientific foundation for state and local officials to address pressing challenges along the U.S.-Mexican border. According to the act's accompanying Senate report (S.Rept. 109-17),

Ground-water pumping has lowered the water table, depleted aquifers, and reduced the base flow of many streams thus decreasing the quantity of water available to support critical riparian habitats. Excessive ground-water pumping in some major urban centers, such as in the El Paso/Juárez metropolitan region, has caused land subsidence that has damaged homes and essential urban infrastructure. In addition to the effects of ground- and surface-water depletion, degradation of water quality has reduced habitat suitability for the region's diverse biota.

Both U.S. and Mexican entities fund the aquifer assessment program. After multiple years of no U.S. federal funding, federal funds for the assessments resumed in FY2016, with \$1 million provided, and additional funding was provided during the first months of FY2017. Before the resumption of federal funding in FY2016, federal funding had totaled \$2 million and had last been provided in FY2010. In November 2016, a binational study of the San Pedro aquifer, located along a portion of the Arizona-Sonora border, was released. The study identified available data and data gaps; discharges from the aquifer into the San Pedro River are in decline, with climate cycles and pumping likely contributing to the decline, according to the study. A study of the Santa Cruz aquifer, to the west of the San Pedro aquifer, is anticipated in 2017.

Sources: R. Sanchez, V. Lopez, and G. Eckstein, "Identifying and Characterizing Transboundary Aquifers Along the Mexico-US border: An Initial Assessment," *Journal of Hydrology*, no. 535 (2016), pp. 101-119; G. E. Eckstein, "Buried Treasure or Buried Hope? The Status of Mexico-U.S. Transboundary Aquifers Under International Law," *International Community Law Review*, vol. 13 (2011), pp. 273-290; W. A. Alley, *Five-Year Interim Report of the United States-Mexico Transboundary Aquifer Assessment Program: 2007-2012*, U.S. Geological Survey, Reston, VA, 2013; Christopher E. Wilson, Erik Lee et al., *The State of the Border Report: A Comprehensive Analysis of the U.S.-Mexico Border*, Woodrow Wilson Center, El Colegio de la Frontera Norte, Arizona State University, May 2013; J.B. Callegary et al., *Binational Study of the Transboundary San Pedro Aquifer: International Boundary and Water Commission*, 2016.

1944 Water Treaty

The 1944 Water Treaty establishes water allocations for the United States and Mexico and creates the current governance framework for the IBWC to resolve disputes arising from the Treaty's execution.⁶ In April 1945, the Senate provided its advice and consent to the Treaty, subject to

⁶ 1944 Water Treaty, Article 2.

certain “understandings.”⁷ Similar to treaty reservations and declarations, understandings are interpretative statements made by the Senate that clarify or elaborate on provisions in a treaty but do not alter them.⁸ In November 1945, President Truman ratified the 1944 Water Treaty, subject to the Senate’s understandings.⁹

International Boundary and Water Commission

In March 1, 1889, the United States and Mexico signed the convention that established the International Boundary Commission (IBC) to apply border agreements.¹⁰ The 1944 Water Treaty reconfigured the IBC and expanded its role, creating the International Boundary and Water Commission (IBWC).¹¹ The IBWC is charged with addressing issues that arise during application of the boundary and water treaties.¹²

The IBWC is an international body consisting of U.S. and Mexican Sections, each led by a commissioner, two principal engineers, a legal adviser, and a foreign affairs secretary.¹³ The U.S. Section of the IBWC (USIBWC) is headquartered in El Paso, TX, and the Mexican Section is located across the border in Ciudad Juárez. The USIBWC is a federal government agency that operates under the foreign policy guidance of the Department of State,¹⁴ and it is included in the Department of State’s budget.¹⁵ The commissioner to the USIBWC is appointed by the President.¹⁶ The position historically has not been subject to Senate confirmation, and the tenure of U.S. commissioners has ranged from a few months to 27 years.¹⁷ IBWC funding typically is

⁷ *Congressional Record*, 79th Cong., 1st Sess., 1945. Vol. 91, pt. 3:3492.

⁸ Congressional Research Service, *Treaties and Other International Agreements: The Role of the United States Senate*, A Study Prepared for the Senate Comm. on Foreign Relations 11 (Comm. Print 2001) (hereinafter *Treaties and Other International Agreements*). For further background on the Senate’s role in providing reservations, understandings, and declarations to treaties, see CRS Report RL32528, *International Law and Agreements: Their Effect upon U.S. Law*, by (name redacted).

⁹ See 59 Stat. 1219.

¹⁰ See 1889 Boundary Convention.

¹¹ 1944 Water Treaty, Article 2.

¹² *Ibid.* Article 2 states: “The application of the present Treaty, the regulation and exercise of the rights and obligations which the two Governments assume thereunder, and the settlement of all disputes to which its observance [sic] and executive may give rise are hereby entrusted to the International Boundary and Water Commission....”

¹³ *Ibid.* The members of the IBWC are granted diplomatic status and enjoy “the privileges and immunities appertaining to diplomatic officers” and may “freely carry out their observations, studies and field work in the territory of either country.” *Ibid.* However, all works and structures that are wholly located within one country—despite the potential international character of such works—remain under the exclusive jurisdiction of the country in which they are located. *Ibid.* Each country is responsible for the expenses incurred. *Ibid.*

¹⁴ “The International Boundary and Water Commission—Its Mission, Organization and Procedures for Solution of Boundary and Water Problems,” IBWC, accessed December 21, 2016, at http://www.ibwc.state.gov/About_Us/About_Us.html, http://www.ibwc.state.gov/About_Us/Commissioner.html.

¹⁵ U.S. Department of State, Office of Inspector General, Report of Inspection, U.S. Section of the International Boundary and Water Commission, Report No. ISP-I-05-26, March 2005, pp. 5-6 (hereinafter OIG Report).

¹⁶ See 1899 Boundary Convention, Article II. The most recent U.S. commissioner was appointed by President Obama on January 19, 2010. “Office of the Commissioner,” IBWC, accessed December 20, 2016, http://www.ibwc.state.gov/About_Us/Commissioner.html.

¹⁷ “History of U.S. Section Commissioners,” IBWC, accessed December 20, 2016, http://www.ibwc.state.gov/About_Us/Commish_History.html.

provided through annual Department of State, Foreign Operations, and Related Programs appropriations.¹⁸

A 2005 report from the Office of Inspector General at the Department of State concluded that the IBWC has resolved most border water disputes since 1944, although its processes may be slow to reach resolution.¹⁹ The IBWC employs a combination of technical expertise and diplomacy (backed by the U.S. Department of State and Mexico's Foreign Ministry) to find solutions and agreement, which are formalized in amendments to the 1944 Water Treaty called *minutes*.²⁰ For the United States, the executive branch has the authority to approve or disapprove the proposed minutes to the 1944 Water Treaty.²¹

The Minute Process

The Treaty authorizes the IBWC to develop rules and to issue proposed decisions, called minutes,²² regarding matters related to the Treaty's execution and interpretation.²³ Once issued, a proposed minute is forwarded within three days to the government of each country for approval.²⁴ If neither country announces its disapproval within 30 days, the minute is considered adopted.²⁵ If either government disapproves, the matter is removed from IBWC control and the two governments negotiate the issue.²⁶ If an agreement is reached between the governments following negotiation, the IBWC must take any further actions "as may be necessary to carry out such agreement."²⁷ The Department of State is the U.S. agency responsible for responding to proposed minutes and attempting to negotiate a resolution if either government disapproves.²⁸

Minutes that have been adopted pursuant to the 1944 Water Treaty have addressed a range of issues, including the operation and maintenance of cross-border sanitation plants,²⁹ water conveyance during droughts,³⁰ construction of dams,³¹ water salinity problems,³² and many others.³³ In many cases, minutes are adopted (or not objected to) by the Secretary of State without

¹⁸ See, for example, P.L. 113-234, div. J, tit. I, 128 Stat. 2130, 2579.

¹⁹ OIG Report, 7.

²⁰ Ibid.

²¹ 1944 Water Treaty, Articles 2, 25.

²² The term *minutes* in this context was originally derived from the more traditional use of the term, meaning notes used to memorialize a meeting between the representatives of the two governments. See Robert J. McCarthy, "Executive Authority, Adaptive Treaty Interpretation, and the International Boundary and Water Commission, U.S.-Mexico," *University of Denver Water Law Review* 197 (2011), pp. 217-218. The term eventually evolved to mean a proposed decision issued by the IBWC pursuant to the 1944 Water Treaty. Ibid.

²³ 1944 Water Treaty, Articles 24, 25.

²⁴ Ibid, Article 25.

²⁵ Ibid.

²⁶ Ibid.

²⁷ Ibid.

²⁸ Ibid., Article 2.

²⁹ IBWC Minute 206, January 13, 1958.

³⁰ IBWC Minute 307, March 16, 2001.

³¹ IBWC Minute 182, September 23, 1946.

³² IBWC, Minute 242, August 30, 1973; Agreement Confirming Minute No. 242 of the International Boundary and Water Commission, U.S.-Mex., August 30, 1973, 24 U.S.T. 1968, 1971.

³³ For a collection of the IBWC's minutes, see "Minutes Between the United States and Mexican Sections of the IBWC, IBWC, accessed December 20, 2016, at http://www.ibwc.gov/Treaties_Minutes/Minutes.html.

involvement from Congress or the Senate. Because these minutes are agreed to by the executive branch pursuant to the authority of the 1944 Water Treaty, they are considered binding agreements between the United States and Mexico called executive agreements, and the power to enter into them lies within the executive branch.³⁴ In providing its consent to 1944 Water Treaty, however, the Senate included an understanding that the IBWC and the Secretary of State could not commit the United States to build any “works” at the United States’ expense without prior approval by Congress.³⁵ Accordingly, Congress has passed legislation authorizing the construction of public works and projects pursuant to the Treaty.³⁶

Water Distribution Requirements

The 1944 Water Treaty defines the basic water distribution arrangements as follows:

- For the Colorado River basin, the United States is to provide Mexico annually with 1.5 million acre-feet (AF)³⁷ of water.³⁸
- For the Rio Grande basin below Fort Quitman, TX:
 - Mexico has the rights to two-thirds of the flows that feed into the Rio Grande from the six major tributaries that enter from Mexico: the Conchos, San Diego, San Rodrigo, Escondido, and Salado Rivers and the Las Vacas Arroyo (stream).³⁹
 - the United States receives all flows from Rio Grande tributaries in the United States and one-third of flows from the six Mexican tributaries.⁴⁰ Mexico’s water delivery from these six tributaries must average at least 350,000 AF per year, measured in five-year cycles.⁴¹

If Mexico fails to meet its minimum flow obligations for a five-year cycle because of “extraordinary drought”—a term not defined in the 1944 Water Treaty or in any minute—it must make up the deficiency during the next five-year cycle with water from the Mexican tributaries.⁴² Minute 234 established that Mexico may repay a water debt using three sources of water: (1) excess water from its tributaries; (2) a portion of its allotment from its tributaries; or (3) a transfer

³⁴ Because a properly enacted treaty is the “Supreme Law of the Land,” the power to enter into an agreement required or contemplated by the treaty lies within the President’s executive function. U.S. Const. Article VI, §2 (“the laws of the United States ... [and] all treaties made, or which shall be made, under the authority of the United States, shall be the supreme Law of the Land.”); *Treaties and Other International Agreements*, p. 5. For further background on international agreements made pursuant to treaties, see CRS Report RL32528, *International Law and Agreements: Their Effect upon U.S. Law*, by (name redacted) , and for a discussion of the legal status of minutes adopted under the 1944 Water Treaty, see Robert Jerome Glennon & Peter W. Culp, “The Last Green Lagoon: How and Why the Bush Administration Should Save the Colorado River” *Ecology Law Quarterly* 903 (2002), pp. 981-984.

³⁵ *Congressional Record*, 79th Cong., 1st Sess., 1945. Vol. 91, pt. 3:3492.

³⁶ See 22 U.S.C. §§277a et seq.

³⁷ An acre-foot (AF) is about 326,000 gallons of water, enough to cover an acre of land with one foot of water.

³⁸ 1944 Water Treaty, Article 10.

³⁹ *Ibid.*, Article 4(A)(c).

⁴⁰ *Ibid.*, Article 4(B).

⁴¹ *Ibid.*, Article 4(B)(c).

⁴² *Ibid.*, Article 4. For more on compliance, see Allie Alexis Umoff, “An Analysis of the 1944 U.S.-Mexico Water Treaty: Its Past, Present, and Future,” *Environs: U.C. Davis School of Law Environmental Law and Policy Journal*, vol. 32, no. 1 (2008); hereinafter, Umoff 2008.

of its stored water in international reservoirs,⁴³ such as the Falcon Dam⁴⁴ and Amistad Dam,⁴⁵ located on the Rio Grande on the border of Texas and Mexico.

If Mexico fails to meet its minimum flow obligations for a five-year cycle and there is no agreement that an extraordinary drought existed, Article 24(d) of the 1944 Water Treaty provides certain mechanisms for dispute settlement. First, the IBWC has the authority “to settle all differences that may arise between the two Governments with respect to ... application of the Treaty, subject to the approval of the two Governments.”⁴⁶ However, if the commissioners are unable to reach agreement on a dispute, the dispute is to be settled through diplomatic channels between the United States and Mexico.⁴⁷ Article 24 also provides that the countries may seek recourse in any “general or special agreements which the two Governments have concluded for the settlement of controversies.”⁴⁸ However, it does not appear that these mechanisms have been necessary in the past. As discussed throughout this report, the United States and Mexico previously have used the minute process and diplomatic efforts to reconcile disputes regarding the 1944 Water Treaty.

Article 9 of the 1944 Water Treaty provides the IBWC with some flexibility regarding the diversion of water from the Rio Grande. For example, in cases of extraordinary drought occurring in one of the countries, the IBWC may permit water to be withdrawn from the other country in order to help alleviate drought conditions.⁴⁹ Further, the IBWC may allow one country to use water allocated to the other country if it can be done “without injury to the latter and can be replaced at some other point on the river.”⁵⁰ However, if the IBWC authorizes temporary diversions of water from one country to another, the use of such water does not establish a permanent right to divert.⁵¹ Under Article 9, the IBWC also is responsible for keeping records concerning the water belonging to both Mexico and the United States.⁵²

The 1944 Water Treaty establishes a hierarchy of uses for the water: (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) any other beneficial uses which may be determined by the commission.⁵³ A frequent critique of this hierarchy is that it does not include an obligation to maintain water for ecological purposes.⁵⁴ In addition, the original 1944 Water Treaty does not contain provisions that establish requirements for water quality, but only establishes the quantity requirements outlined above.⁵⁵ The lack of express language related to water quality led to tensions regarding salinity levels in the United States deliveries to Mexico after the Treaty was

⁴³ IBWC Minute 234, December 2, 1969.

⁴⁴ “Falcon Dam & Power Plant,” IBWC, accessed January 24, 2017, at http://www.ibwc.state.gov/Organization/Operations/Field_Offices/Falcon.html.

⁴⁵ “Amistad Dam and Power Plant, Del Rio, Texas, IBWC, accessed January 24, 2017, at http://www.ibwc.state.gov/Organization/Operations/Field_Offices/amistad.html

⁴⁶ Treaty, Article 24(d).

⁴⁷ *Ibid.*

⁴⁸ *Ibid.*

⁴⁹ *Ibid.*, Article 9(f).

⁵⁰ *Ibid.*, Article 9(d).

⁵¹ *Ibid.*, Article 9(e).

⁵² *Ibid.*, Article 9(j).

⁵³ *Ibid.*, Article 3.

⁵⁴ See, for example, Umoff 2008.

⁵⁵ See 1944 Water Treaty.

ratified.⁵⁶ As discussed in the “Salinity” section, below, the two countries agreed to Minute 242 in 1973 to resolve the dispute.⁵⁷

Regarding management of reservoirs in the basin that are wholly in one country, the Protocol accompanying the original 1944 Water Treaty establishes that constructed works, such as dams and conveyance structures, in one country that are used only partly for Treaty compliance shall be constructed and operated by the federal agencies of that country, in conformance with the Treaty and in cooperation with the IBWC.⁵⁸ Subsequent minutes, such as Minute 319 (discussed later in the subsection “Minute 319: Water Conservation and Environmental Protection”), have integrated operational activities in specific circumstances for specific works.⁵⁹ The extent to which Mexico operates its reservoirs to support Treaty compliance is discussed in the “Southeastern Rio Grande Basin (below Fort Quitman, TX)” section below, which focuses on Mexico’s Rio Grande water delivery shortfalls.

Other Treaty Provisions

The 1944 Water Treaty established other requirements beyond water distribution obligations. Among other things, the Treaty (1) provided for the construction of certain dams and channels along the rivers;⁶⁰ (2) required the IBWC to establish studies and prepare plans for flood control;⁶¹ (3) provided that the IBWC should study and plan for the generation of hydroelectric energy along the rivers;⁶² and (4) required the IBWC to establish regulations for the maintenance and operation of reservoirs.⁶³ Discussion of these treaty requirements is beyond the scope of this report.

Colorado River Basin

As depicted in **Figure 1**, the Colorado River flows through seven U.S. states (Arizona, California, Colorado, Nevada, New Mexico, Utah, and Wyoming) and forms the border between the Mexican states of Baja California Norte and Sonora, before emptying into the Gulf of California; 97% of the basin is in the United States. Disputes have occurred over the use of the Colorado River water supplies for most of the past century. Although many of these disputes have related to state allocations on the U.S. side of the border, issues have also arisen over water quality, availability, and conservation between the United States and Mexico.

⁵⁶ See Umoff 2008, p. 78.

⁵⁷ IBWC Minute 242, Aug 30, 1973.

⁵⁸ The Protocol states that for “construction or use of works for storage or conveyance of water, flood control, stream gaging, or for any other purpose, which are situated wholly within the territory of the country of that Section, and which are to be used only partly for the performance of treaty provisions, such jurisdiction shall be exercised, and such functions, including the construction, operation and maintenance of the said works, shall be performed and carried out by the Federal agencies of that country which now or hereafter may be authorized by domestic law to construct, or to operate and maintain, such works. Such functions or jurisdictions shall be exercised in conformity with the provisions of the Treaty and in cooperation with the respective Section of the Commission, to the end that all international obligations and functions may be coordinated and fulfilled.” Treaty, Protocol.

⁵⁹ See “Minute 319: Water Conservation and Environmental Protection” in this report.

⁶⁰ Treaty, Article 5.

⁶¹ *Ibid.*, Article 6.

⁶² *Ibid.*, Article 7.

⁶³ *Ibid.*, Article 8.

When the 1944 Water Treaty was signed, Colorado River flows were estimated at some 16.8 million AF per year. Recent flows have averaged volumes closer to 14.4 million AF annually.⁶⁴ That is, the 1944 Water Treaty requirement that the United States provide Mexico with 1.5 million AF annually means that the United States retains roughly 90% of the average flow, but less than originally estimated. In December 2012, the Department of the Interior's Bureau of Reclamation published a study documenting that the demand for the basin's water in the United States in some years exceeds supply, and that the demand-supply imbalance is anticipated to worsen in coming decades.⁶⁵ While discussion of Colorado River water issues within the United States is beyond the scope of this report, concern about meeting future demands in the United States is significant to the context of discussions about the basin's water sharing with Mexico.

The following treaty implementation issues in the Colorado River basin are discussed in more detail below: salinity, environmental protection, and Minute 319. For a snapshot of drought conditions in the basin, see the drought monitor maps in **Appendix**.

Salinity

While the United States has consistently delivered Mexico's minimum allotment of Colorado River water, disputes did arise about the quality of the water. In the 1960s, salinity in the Colorado River rose dramatically. Mexico was receiving water that was too salty for human, livestock, or agricultural uses. The IBWC facilitated agreement by both countries to Minute 218, which took effect in 1965 for a period of five years and required the United States to extend a drainage channel to reduce salinity. Five years later, Mexican farmers remained angry about the salinity issue. After the Mexican government threatened to take the water dispute to the International Court of Justice, the United States agreed to a new minute, Minute 242, in 1973. Per Minute 242, the United States agreed to construct additional channels to control salinity, fund clean-up of the Mexicali Valley lands damaged by the accumulation of salts, and keep salinity levels of delivered water below a certain level.⁶⁶ Minute 242 remains in force, and the United States continues to comply with its provisions. While the IBWC-backed resolution to this crisis proved to be successful, the agreement took a long time and required external pressure to be reached.⁶⁷

Instream Flows for Environmental Protection

Prior to significant expansion of the basin's water consumption, the Colorado River Delta, at the terminus of the Colorado River, covered 9,650 square miles in the United States and Mexico. The

⁶⁴ "U.S., Mexico: The Decline of the Colorado River," *Stratfor Global Intelligence*, May 13, 2013.

⁶⁵ U.S. Department of the Interior, Bureau of Reclamation, *Colorado River Basin Water Supply and Demand Study*, December 2012, at <https://www.usbr.gov/lc/region/programs/crbstudy/finalreport/index.html>.

⁶⁶ Part of the U.S. effort to manage the salinity of its water and implement the provisions of Minute 242 included the construction of the Yuma Desalting Plant (YDP) by the Department of the Interior's Bureau of Reclamation. The facility was authorized in the Colorado River Basin Salinity Control Act of 1974 (P.L. 93-320) and completed in 1992, but it has rarely operated since its construction. YDP's limited operations have been due in part to the cost of its operations (desalination can require considerable electricity to operate) and surplus flows in the Colorado River during many years compared to what was expected. In lieu of operating the YDP, high-saline irrigation water has been disposed separately from the United States' required deliveries to Mexico (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 YPD should be operated, and how the impacts on the Ciénega de Santa Clara from the reduced discharge of the untreated irrigation runoff should be managed, remain topics of some debate in the basin.

⁶⁷ Umoff 2008.

Mexican side of the delta contains wetlands, woodlands, and desert areas, which are home to many endangered species; part of Mexico's delta is a designated United Nations Biosphere Reserve. According to environmental advocates, insufficient water flowing into the delta has contributed to the degradation of 90% of the delta's wetlands.⁶⁸ These advocates recommend that annual flows accompanied by short-duration, high-volume releases (known as *pulses* or *pulse flows*) of water every four years would restore the wetlands.⁶⁹ These environmental stakeholders have argued that environmental protection should be part of how the United States and Mexico share the river's water. Other stakeholders are less supportive of these restoration efforts; some are concerned that such efforts may reduce the allocations available for U.S. users. Others do not want to support these efforts until Mexico's practices related to water deliveries in the Rio Grande basin have been addressed (discussed in "Stakeholder Perspectives," below).

The issue of instream flows for environmental protection entered bilateral discussions in the IBWC in the late 1990s. In recent years, bilateral discussions in the basin coalesced around improved management of and conservation of both the Colorado River and its delta. Both governments, along with state officials and conservation groups, worked with the IBWC to develop an agreement that would allocate water to Mexico based on whether there was a surplus or drought and allow for joint investments to create greater environmental protection, as well as greater water conservation (i.e., ability to store water) for Mexico. These discussions led to Minute 319.

Minute 319: Water Conservation and Environmental Protection

For the Colorado River basin, issues before Congress may be largely related to oversight of the implementation of Minute 319. Minute 319 is set to expire on December 31, 2017;⁷⁰ it may be renewed, replaced, or allowed to expire. Given many basin stakeholders' support for the activities allowed by Minute 319 and remaining uncertainty over water management during drought conditions, U.S. and Mexican negotiators during the Obama Administration had been trying to negotiate a more comprehensive minute.⁷¹

Minute 319 was signed on November 20, 2012, and is to be enforced for five years. It allows for temporary adjustments to water deliveries to Mexico based on drought or surplus water conditions, joint investments to create greater environmental protection, measures to incentivize water conservation, and greater water storage for Mexico in upstream reservoirs in the United States. Minute 319 was the result of negotiations between both governments, with input from affected state officials and nongovernmental groups from both countries. Minute 319, when taken together with two prior and related minutes, has been viewed as recognizing environmental uses as a beneficial use for the basin's treaty waters.⁷²

⁶⁸ CRS phone interview with Carlos de la Parra, Professor in the Department of Urban Studies and the Environment at El Colegio de la Frontera Norte, Mexico, July 8, 2013.

⁶⁹ Sierra Club, *Regional Conservation Committee: Colorado River Report*, February 2001.

⁷⁰ Minute 319 states: "If by December 31, 2016, the Commission has not completed a comprehensive Minute that extends or replaces the substantive provisions of this Minute through no later than December 31, 2016, the Commissioners shall instruct their respective Principal Engineers to develop recommendations for a potential comprehensive Minute by working with and taking into consideration the advice of the Consultative Council and any other institution that each Commissioner deems necessary, by reviewing the experiences gained through implementation of this Minute and by considering the reports and other documentation that have been prepared."

⁷¹ Gary Pitzer, "Two Countries, One River: Crafting a new Agreement," *Western Water*, 2016.

⁷² Stephen P. Mumme, "Enhancing the U.S.-Mexico Treaty Regime on Transboundary Rivers: Minutes 317-319 and the Elusive Environmental Minute," *The Journal of Water Law*, vol. 25, no. 1 (2016).

Key elements of the agreement include the following:

- extending provisions of Minute 318 (Cooperative Measures to Address the Continued Effects of the April 2010 Earthquake in the Mexicali Valley, Baja, California), to allow Mexico to defer delivery of its Colorado River water allocation while Mexico repairs earthquake-damaged infrastructure;
- delivering additional water (i.e., above the 1.5 million AF annual delivery required by the Treaty) to Mexico when water levels are high in Lake Mead;
- reducing deliveries to Mexico during water shortage conditions in the Colorado River basin (i.e., Mexico's annual water deliveries would be reduced if Lake Mead elevations indicate shortage conditions, similar to reduction by the U.S. lower basin states);⁷³
- creating a mechanism by which U.S. water deliveries to Mexico can be held in United States reservoirs for subsequent delivery;
- continuing to address salinity concerns per Minute 242; and
- implementing a pilot program of jointly funded water efficiency and conservation projects in Mexico to free up water for Colorado River delta pulse flows as well as base flows.

Under the Minute 319 pilot program, stored water was used for a pulse flow from March 23, 2014, to May 18, 2014; the releases were intended to simulate a spring flood. The high releases meant that, after multiple years of the river not reaching its estuary, the instream flows were sufficient for the river to reconnect with its estuary. The releases and the impacts on instream flow, stream topography, salinity, groundwater, vegetation, birds, and aquatic species are being monitored through 2017. The goal of the pilot program's pulse flow is to improve understanding of water management alternatives for ecosystem restoration. An interim report providing preliminary results was released in 2016;⁷⁴ the final report is anticipated in June 2018.

Under Minutes 318 and 319, Mexico deferred delivery and stored in Lake Mead some of its water under the 1944 Water Treaty. According to the U.S. IBWC commissioner, Mexico's deferred deliveries added to the volume of water stored in the reservoir (i.e., raised the lake's water

⁷³ Minute 319 uses the same set of Lake Mead reservoir elevations for Mexico's shortage reductions as those in the Record of Decision: Colorado River Interim Guidelines for Lower Basin Shortages and Coordinated Operations for Lake Powell and Lake Mead for lower basin states' water shortage reductions; hereinafter referred to as the December 2007 ROD Colorado River Interim Guidelines, at <https://www.usbr.gov/lc/region/programs/strategies/RecordofDecision.pdf>. Minute 319 stipulates: "the Government of the United States will provide the most current information to Mexico on basin conditions as often as required, including precipitation, stream flow, and water storage conditions in the basin and their historical behavior; the consumptive water uses for the different basin states, and the historical trend; and the status of the determination of shortage conditions in the Colorado River Basin within the United States...." This level of data sharing is higher than required in the Rio Grande basin.

⁷⁴ K. Flessa, E. Kendy, and K. Schlatter, *Minute 319 Colorado River Limitrophe and Delta Environmental Flows Monitoring*, Report for the IBWC, May 19, 2016, https://www.ibwc.gov/Files/Minutes%20319/2016_EFM_InterimReport_Min319.pdf. Based on data through December 4, 2015, some of the report's interim observations were 4,000 acres of the channel and adjacent lands were inundated resulting in connectivity from the dam to the river's estuary for the first time since 1997; bird diversity and abundance improved in the floodplain in 2014 and in 2015; certain river reaches experienced higher groundwater infiltration rates than others (i.e., the higher releases resulted in local groundwater recharge rather than the water remaining as instream flows for downstream river reaches); most sediment transport from the high flows was near the dam's release; channel width was not widened; managed restoration sites experienced greater number and diversity of bird species; active management of riparian sites would be required for improved restoration of native riparian species; and a larger amount of freshwater would be required to enhance the fish and zooplankton in the upper estuary.

elevation).⁷⁵ Ongoing efforts, including but not limited to actions under Minute 318 and Minute 319, resulted in nearly 10 additional feet of water elevation in Lake Mead at the end of 2016, according to the Bureau of Reclamation, which is the federal agency responsible for operating Lake Mead.⁷⁶ These water conservation efforts, including the water in storage as the result of Minute 318 and Minute 319, helped to keep the projection of the elevation of Lake Mead on January 1, 2017, higher than 1,075 feet above sea level.⁷⁷ If the projection had shown a water elevation below 1,075 feet, the following would have occurred:

- reductions in Colorado River water deliveries for the lower basin states would have been triggered, and
- Mexico would have reduced its delivery pursuant to Minute 319.

Instead, the lake's elevation was projected to be close to 1,079 feet, almost 4 feet above the shortage trigger of 1,075 feet.⁷⁸ In the absence of Minute 319 or similar provisions in the future, lower basin states would not benefit from Mexico sharing in cutbacks during basin shortage conditions or from higher Lake Mead elevations resulting from any delayed deliveries by Mexico of its water under the 1944 Water Treaty.⁷⁹

Some viewed Minute 319 as a step forward in bilateral water management and environmental protection efforts.⁸⁰ Others, particularly some stakeholders in Texas frustrated by Mexico's water deliveries to the United States in the Rio Grande basin, did not support the level of cooperation represented by Minute 319.⁸¹

As previously noted, negotiations on a new minute (often referred to by basin stakeholders as Minute 32X) were under way at the end of the Obama Administration.⁸² The Trump Administration's actions related to Minute 319 or a new minute related to the Colorado River are likely to be influenced by the general character of the relationship between the two countries in 2017, by basin water conditions and reservoir levels in the basin, and by basin stakeholders' interest in reducing uncertainty on water-sharing arrangements during future shortages in the basin.

⁷⁵ Edward Drusina, (Guest Columnist), "Commentary: IBWC ensures US, Mexico fulfill water delivery," *The Monitor*, January 15, 2017, at http://www.themonitor.com/opinion/columnists/commentary-ibwc-ensures-us-mexico-fulfill-water-delivery/article_a76ab0b6-d9ec-11e6-9e02-efcc1b61680a.html; hereinafter Drusina Commentary January 15, 2017. Drusina is the U.S. commissioner of the IBWC. The commentary also stated "without Mexico's stored water, Lake Mead would have dropped to levels triggering cutbacks to U.S. water users and Mexico."

⁷⁶ Email from Bureau of Reclamation to CRS, February 27, 2017.

⁷⁷ Ibid. According to the data provided to CRS, the amount that was left in Lake Mead by Mexico's deferred delivery under Minute 318 and Minute 319 (before adjustment for evaporation) minus the volume of the 2014 pulse flow was approximately 261,000 AF, which is estimated to translate to roughly 3 feet of water elevation at Lake Mead.

⁷⁸ The August 2016 14-Month Study Estimate for January 1, 2017, was 1,078.93; the full estimate set is available at <https://www.usbr.gov/lc/region/g4000/24mo/2016/AUG16.pdf>. According to the 2007 ROD Colorado River Interim Guidelines (see footnote 73), the Secretary of the Interior is to determine operation of Lake Mead for the following calendar year using the projected elevation of water at Lake Mead on January 1 based on the August 24-Month Study projections; these projections determine whether the basin conditions are surplus, normal, or shortage (which would result in lower basin state).

⁷⁹ Under the 1944 Water Treaty, the minimum U.S. delivery to Mexico is the same regardless of shortage conditions in the basin. In Minute 319, Mexico agreed to share in shortage conditions through December 31, 2017. For more on lower basin Colorado River water cutbacks during shortage conditions, see the 2007 ROD Colorado River Interim Guidelines referenced in footnote 73.

⁸⁰ CRS phone interview with Carlos de la Parra, Professor at El Colegio de la Frontera Norte, Mexico, July 8, 2013.

⁸¹ Drusina Commentary January 15, 2017.

⁸² Ibid.

Rio Grande Basin

The Rio Grande dries up at various points as it travels from Colorado to the Gulf of Mexico. Consequently, what looks like a continuous basin in **Figure 2** actually operates as two separate binational basins divided into

- the northwestern El Paso-Juárez Rio Grande basin from south of Elephant Butte Dam in New Mexico past the water withdrawals and return flows of El Paso, Texas, and Ciudad Juárez, Chihuahua; and
- the southeastern Lower Rio Grande basin, including its tributaries (e.g., Rio Conchos) from Fort Quitman, Texas, to the Gulf of Mexico.

Binational water-sharing agreements differ in the two binational Rio Grande basins. In the northwestern El Paso-Juárez basin, the United States is required to deliver water to Mexico. In the southeastern Lower Rio Grande basin, it is largely Mexico that is obligated to deliver water to the United States. A common characteristic of both basins is that the water demands regularly exceed supply; this imbalance becomes particularly apparent during droughts. While the northwestern El Paso-Juárez water issues have raised significant local concerns recently, the delivery of water from Mexico in the southeastern Rio Grande basin has received the majority of national media and political attention. Both parts of the Rio Grande basin can experience multiyear droughts; see the drought monitor maps in **Appendix** for various snapshots of drought in the basin from 2011 to 2016.

Northwestern Rio Grande Basin (El Paso-Ciudad Juárez)

Under the 1906 convention that guides U.S. deliveries to Mexico at Ciudad Juárez, the United States is to deliver to Mexico 60,000 AF (enough water to irrigate about 25,000 acres) for use in the Juárez Valley of Chihuahua. However, during conditions of extraordinary drought, these deliveries to Mexico are reduced proportionally to reductions in available supplies in the broader basin. From 1939 to 2015, deliveries to Mexico were reduced in roughly 30% of the years; the United States is not required to repay any reduced deliveries. U.S. deliveries to Mexico have been reduced in recent years as follows: 23,200 AF (39% of full allotment) in 2012; 3,700 AF (6%) in 2013; 18,300 AF (30%) in 2014; 33,800 AF (56%) in 2015; and 43,787 AF (73%) in 2016.

In recent years, U.S. water deliveries to Mexico in the northwestern binational Rio Grande basin have drawn regional attention because the Middle Rio Grande (the portion of the river that traverses New Mexico) has experienced particularly low flow conditions and low storage at reservoirs due to drought. Junior water rights holders (whose water allocations are reduced prior to those with more senior rights) in New Mexico and Texas have received deeply curtailed deliveries (as low as 4% of a full allotment) in recent years.

Specifically, U.S. stakeholders associated with the U.S. Bureau of Reclamation's Rio Grande Project are interested in how water is being delivered to Mexico when the basin is affected by drought.⁸³ The Rio Grande Project furnishes irrigation water for approximately 178,000 acres in

⁸³ In particular, the timing of the water releases in 2012 for delivery to Mexico and their potential impacts on U.S. regional interests (e.g., potential conveyance losses because releases for Mexico would not be timed with deliveries to U.S. water districts) raised concerns among some U.S. stakeholders (Letter from Patrick R. Gordon, Texas Commissioner, Rio Grande Compact Commission, to Edward Drusina, Commissioner, U.S. Section, International Boundary and Water Commission, April 9, 2012; Texas Agrilife Research Center, *Drought Watch*, February 2013). Mexican growers had sought the surface-water deliveries because pumping problems had impaired their ability to start the agricultural season using groundwater.

New Mexico and Texas, as well as electric power. In years when water stored in project reservoirs was low, water users have seen significant curtailment in their water deliveries.

Southeastern Rio Grande Basin (below Fort Quitman, TX)

In the southeastern Lower Rio Grande basin, Mexico is required to deliver water to the United States under the 1944 Water Treaty. As previously noted, the southeastern Lower Rio Grande water delivery account is managed largely on five-year cycles. Mexico's compliance with Treaty delivery requirements often has been accomplished through wet-weather flows (i.e., excess flows) rather than through purposeful releases from Mexican reservoirs to provide for reliable delivery to the United States.

Mexico met its deliveries within the five-year cycles until the 1994-2003 drought.⁸⁴ Significant irrigated agricultural production developed in the Rio Conchos basin during the 1980s and early 1990s. It is the change in water deliveries from the Rio Conchos that garnered most of the critical attention during the 1994-2003 drought. During that drought period, Mexico accrued a water debt through two five-year water cycles.⁸⁵ Diffusion of tensions over the debt was accomplished through presidential intervention, negotiation of new minutes under the 1944 Water Treaty, and investments in improved water efficiency. Hurricane-induced wet conditions cleared the remaining water debt in 2005.⁸⁶ The most significant tributary in the southeastern Rio Grande basin is Mexico's Rio Conchos, which historically contributed 70% of the flow in the Rio Grande but as of the 1990s was contributing only 40% of the flow.

Mexico's Rio Grande Deliveries: 2010-2015 Cycle and 2015-2020 Cycle

A delivery cycle started October 25, 2010, and ended October 24, 2015. Final accounting for the 2010-2015 cycle indicated a shortfall of 15% (216,250 AF) in Mexico's water deliveries.⁸⁷ The debt largely resulted from low deliveries early in the cycle. According to a U.S. Department of

⁸⁴ During the two five-year cycles between 1992 and 2002, Mexico incurred water debt, failing to deliver the 1,750,000 AF (average annual 350,000 AF) required under the Treaty. See Umoff, 2008. In Minute 293 from October 1995, the United States agreed to loan Mexico water to alleviate the drought. However, in subsequent years Mexico's water debt continued to increase. Minute 308, from June 2002, required Mexico to immediately transfer 90,000 AF of water from international reservoirs to the United States, as partial repayment of the water debt, and required Mexico to conduct studies to improve drought management. After extended negotiations, the two countries reached a solution to eliminate Mexico's water debt for the aforementioned shortages in 2005.

⁸⁵ As previously noted, Minute 234, established in 1969, includes a procedure whereby Mexico may pay a water debt using three different sources of water. Minute 234 requires that the deficit payments from these three sources be made concurrently with required deliveries in the following five-year cycle. The United States and Mexico differ in their interpretation and implementation of Minute 234. For example, Mexico claimed that in the event of extraordinary drought, only the deficit incurred during the 1992-1997 five-year water cycle needed to be repaid in the following five-year cycle (i.e., by 2002), and any deficit incurred during the 1997-2002 cycle could be deferred until the next five-year cycle. The United States argued that Minute 234 required that the water debt incurred during the 1997-2002 cycle be made up concurrently with the 1992-1997 water debt. The matter was left unresolved.

⁸⁶ C. Reed, "The Texas-Mexico Water Dispute and Its Resolution (?): Agricultural Liquid & Land Practice and Discourse along the Rio Conchos, Chihuahua, 1990-2005," (Ph.D. dissertation, The University of Texas at Austin, 2007); hereinafter Reed 2007. For additional information, see footnote 84 of this report.

⁸⁷ The end of cycle debt occurred even with Mexico delivering approximately 100,000 AF of water from supplemental water sources that are not formally part of the water treaty. A significant cause of the missed delivery for the five-year cycle stems from a deficit of more than 249,000 AF of the annual 350,000 AF target that occurred during the second year of the cycle—that is, deliveries from Mexico were less than 30% of the annual target for the October 2011 to October 2012 period.

State status report delivered to Congress in September 2015, the U.S. Department of State and the U.S. Section of the IBWC were working with Mexico to

establish the modalities for predictable and compliant water deliveries. A key area of focus has been for Mexico to adopt procedures that would reliably deliver adequate water without the accumulation of future deficits and expressly incorporate Mexico's Treaty obligations to the United States in the country's annual apportionment of internal water resources. These efforts, undertaken in concert with Texas authorities, have achieved substantial positive momentum in the course of 2015. In our view, Mexico is in a position to meet its delivery obligation in 2015 and clear any prior-year deficiencies in the next five-year cycle.⁸⁸

By January 25, 2016, Mexico had paid off the debt from the previous cycle, while simultaneously making deliveries under the current cycle.⁸⁹ The first year of the 2015-2020 cycle ended with Mexico delivering 216,562 AF, which was 133,439 AF below the target delivery.

The predictability and consistency of the Mexican deliveries within the five-year cycle is a point of tension among some basin interests. This tension was particularly acute during 2012, when Texas water-rights holders faced persistent dry conditions and Mexican water deliveries were significantly below the annual delivery target. Two binational reservoirs on the Rio Grande store much of the water that Mexico delivers to the United States; these reservoir releases help regulate when the water is delivered to U.S. interests, thereby increasing the value of the delivered water in meeting U.S. water demands. Some U.S. stakeholders have argued that the uncertainty regarding the timing of Mexico's deliveries reduces the effective utilization and management of the delivered water, its storage, and its release. Mexico, on the other hand, has argued that its deliveries are in compliance with the cycle provided for in the 1944 Water Treaty.

An Over-Allocated Basin

Demands for water in the southeastern Rio Grande basin exceed average supply; it is an over-allocated basin. This imbalance became acute during the 1994-2003 drought. During that drought, the water supply for U.S. agriculture in the Lower Rio Grande basin averaged 78% of the full allocation from 1994 to 1996, and 53% from 1997 to 2004.⁹⁰ Currently, Texas water users, other than priority water users that generally receive their full water allocations (i.e., municipal, domestic, and industrial users), can expect to receive on average 70% of their water allocation in average water years.⁹¹

Over-allocation in Mexico's Rio Grande basin also exists.⁹² Much of Mexico's over-allocation is attributed to the expansion of Mexican irrigated agriculture from 1965 to 1994, first in Tamaulipas and later in Chihuahua. Significantly, Texas agricultural water withdrawals did not increase at a similar rate during this period in part because agriculture was already well established on the U.S. side of the border. Growth in industrial activity near the border associated

⁸⁸ Department of State, *Status Update to Report to the Congress on Water Deliveries from Mexico to the Rio Grande under Existing Treaty Obligations*, September 4, 2015. Hereinafter September 2015 Status Update to Congress.

⁸⁹ IBWC, U.S. Section, "Mexico Pays Rio Grande Water Debt in Full," press release, February 26, 2016, http://www.ibwc.state.gov/Files/Press_Release_022416.pdf.

⁹⁰ S. Sandoval-Solis, "Water Planning and Management for Large Scale River Basin Case of Study: the Rio Grande/Rio Bravo Transboundary Basin," (Ph.D. dissertation, The University of Texas at Austin, 2011). Hereinafter Sandoval-Solis 2011.

⁹¹ Sandoval-Solis 2011.

⁹² Sandoval-Solis 2011.

largely with the maquiladora (export assembly plant) industry in Mexico and population growth in the basin's urban areas on both sides of the border also increased demands for urban water supplies.

After the 1994-2003 drought, efforts were made to better align water demand and supply in the southeastern Rio Grande basin; these efforts included buyback of water rights and infrastructure improvements (e.g., reducing water losses from agricultural and municipal water distribution systems). Much of the focus has been on reducing agricultural water use since it accounts for 84% of water withdrawals in the southeastern Rio Grande basin. Some of these efforts were undertaken binationally.⁹³ Support for some of these investments was provided by Minute 309.⁹⁴ Although progress has been made, demand still exceeds supply.⁹⁵ Some stakeholders have also questioned how much water savings has been accomplished through these investments and whether the investments in Mexico resulted in improved water deliveries by Mexico under the 1944 Water Treaty.⁹⁶

In coming years, unconventional oil and gas development in northeastern Mexico may represent an emerging water use in the Rio Grande basin that may influence how Mexico uses and manages water in its portion of the basin. The use of water for hydraulic fracturing as well as the disposal of wastewaters from oil and gas development also may draw attention to water quality protections and monitoring.

Stakeholder Perspectives

Some U.S. interests have contended that Mexico's water-delivery process treats U.S. deliveries as a secondary priority to meeting Mexico's own water uses; unpredictable deliveries from Mexico have angered some U.S. stakeholders because of the more prescriptive nature of the U.S. water-delivery requirement to Mexico (i.e., specified quantities are required to be delivered annually). They have pointed to high storage levels in some Mexican reservoirs as evidence to support their position. They have sought the release of waters from these reservoirs to help with the agricultural water needs in the most eastern portion of the Rio Grande basin. These interests view Mexico's high reservoir levels as its hoarding of a shared resource.

Other basin stakeholders have argued that Mexico's delivery flexibility was explicitly provided for in the 1944 Water Treaty to deal with the annual variability of water conditions in the basin. While the flexibility in delivery schedule can be viewed as generous to Mexico, some Mexican interests view the water delivery requirements in the Treaty as generous to the United States. They argue that although 30% of the water in the southeastern Rio Grande basin historically originated in the United States, 50% of the basin's water has been allotted to the United States.⁹⁷ This occurs in part because U.S. tributaries are allotted 100% to the United States.

⁹³ For example, efforts to improve irrigation efficiency in the largest irrigation district in the Rio Conchos basin were undertaken using assistance from the North American Development Bank (NADBank). NADBank also invested in irrigation efficiency conveyance improvements in U.S. border counties. NADBank provided \$40 million in grants for these activities in Mexico, and \$40 million for activities in the United States (Reed 2007).

⁹⁴ Minute 309, *Volumes of Water Saved with the Modernization and Improved Technology Projects for the Irrigation Districts in the Rio Conchos Basin and Measures for Their Conveyance to the Rio Grande*, July 3, 2003, available at <http://www.ibwc.gov/Files/Minutes/Min309.pdf>.

⁹⁵ Sandoval-Solis 2011.

⁹⁶ Reed 2007.

⁹⁷ Spener 2013.

For Mexico, conserving water in its reservoirs can be viewed as part of a long-term drought risk management strategy. The strategy in some Mexican sub-basins to conserve water in some reservoirs during drought also may be influenced by the less developed levels of agricultural insurance and government assistance programs in Mexico. These types of programs in the United States reduce the agriculture sector's economic exposure to droughts and other natural disasters.

Diplomatic Responses

The U.S. and Mexican Sections of the IBWC met regularly from late 2012 through 2016 to discuss Mexico's water deliveries. In April 2013, the U.S. Section of the IBWC reported that the Mexican government had initiated some releases from a reservoir on the San Rodrigo River per the U.S. Section's (and the Mexican state of Tamaulipas's)⁹⁸ repeated requests.⁹⁹ Since April 2013, U.S. and Mexican political officials have stepped in to support IBWC efforts to resolve the current water dispute. According to U.S. and Mexican officials, the water dispute was a topic of conversation between high-level government officials in 2013.¹⁰⁰ Mexican president Enrique Peña Nieto reportedly had instructed his Foreign Ministry to prioritize working with the IBWC, the U.S. Department of State, Mexico's Water Commission, and authorities from Texas to reach a mediated settlement to the dispute as soon as possible.¹⁰¹ Among the outcomes of diplomatic efforts has been an exchange of technical data to assist in developing options for future water management in the basin. In 2015, the U.S. Department of State raised water issues in meetings with Mexican officials and the IBWC organized a July 2015 meeting in Texas with representatives from the state of Texas and Mexico's national water agency. The Texas meeting's discussion covered basin water modeling efforts and various means to improve the predictability and compliance of Mexico's water deliveries.

Congressional Responses and Outlook

Several Members of Congress have noted the complaints of Texas farmers, local officials, and state officials about the rate of Mexico's water deliveries.¹⁰² Some Members of Congress expressed concerns about the adequacy of the efforts by the U.S. Section of the IBWC and the U.S. Department of State to press Mexico to comply more consistently with its 1944 Water Treaty obligations. On December 16, 2014, P.L. 113-235, the Consolidated and Further Continuing Appropriations Act of 2015, became law; Section 7045(g)(3) of Division J of the law required the U.S. Section of the IBWC to report to the Committees on Appropriations on various water delivery and accounting issues:

Not later than 45 days after the enactment of this Act, the Secretary of State, in consultation with the Commissioner for the United States Section of the International Boundary and Water Commission (IBWC), shall report to the Committees on Appropriations on the efforts to work with the Mexico Section of the IBWC and the Government of Mexico to establish mechanisms to improve the transparency of data on, and predictability of, the water deliveries from Mexico to the United States to meet

⁹⁸ Spener, 2013.

⁹⁹ Letter from Edward Drusina, U.S. IBWC Commissioner, to the Honorable U.S. Representatives Cuellar, Gallego, Hinojosa, and Vela, April 5, 2013.

¹⁰⁰ CRS phone interview with State Department official, July 11, 2013; CRS phone interview with Mexican official, July 5, 2013; September 2015 Status Update to Congress.

¹⁰¹ CRS phone interview with State Department official, July 11, 2013; CRS phone interview with Mexican official, July 5, 2013.

¹⁰² See, for example, "Water Fights Flare," *Frontera Norte-Sur*, May 7, 2013.

annual water apportionments to the Rio Grande, in accordance with the 1944 Treaty between the United States and Mexico Respecting Utilization of Waters of the Colorado and Tijuana Rivers and of the Rio Grande, and on actions taken to minimize or eliminate the water deficits owed to the United States in the current 5-year cycle by the end of such cycle: Provided, That such report shall include a projection of the balance of the water delivery deficit at the end of the current 5-year cycle, as well as the estimated impact to the United States of a negative delivery balance.

The joint explanatory statement for the FY2016 Consolidated Appropriations Act (Division K, P.L. 114-113) carried forward reporting requirements from P.L. 113-235 related to Mexico's water deliveries in the Rio Grande Valley. Similar reporting requirements were included in the Senate Appropriations Committee's version of the FY2017 foreign operations measure (S. 3117 of the 114th Congress). Foreign assistance programs for Mexico and other countries are currently operating under a continuing resolution through April 2017 (P.L. 114-254); it remains unclear whether the reporting requirements will continue. The U.S. Department of State delivered to Congress four reports in response to legislative directions. These reports were delivered in February 2015, March 2015, September 2015, and February 2016.

Outlook for the 115th Congress

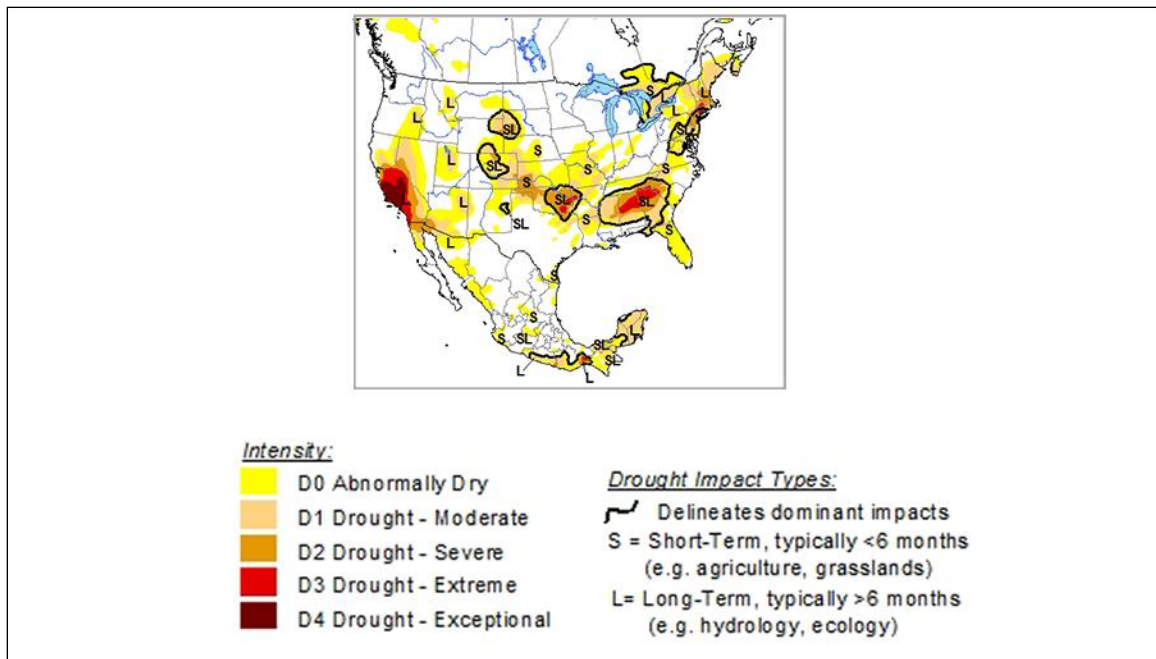
Mexican-U.S. relations generally grew closer during the George W. Bush and Obama Administrations. Water sharing was addressed through technical meetings led by the IBWC and bilateral talks between Mexican and U.S. federal government officials; these meetings and talks were the primary forum for addressing treaty compliance and frustrations of water users in Texas with Mexico's water delivery regime. Binational cooperation and improved knowledge of the state of border water resources was furthered through data-sharing and joint-research efforts (e.g., aquifer assessments). Binational cooperation also was integral to the pulse flow and habitat restoration pilot in the Colorado River basin and to the ongoing research and monitoring efforts to document the impacts of the flows. The binational developments in water sharing in the Colorado River basin included greater participation by stakeholders in lower basin states, the private sector, and nongovernmental organization. It remains uncertain what principles will guide efforts to address water-sharing conflicts and the role of enhanced cooperation (e.g., measures similar to Minute 319) during the Trump Administration.

For the Colorado River basin, issues before Congress may be largely related to oversight of the implementation of Minute 319, as well as developments in negotiations related to the future of Minute 319 or its successor (if any). Questions that Congress may confront related to water sharing in the Rio Grande basin include what are the most effective mechanisms and approaches for achieving a Mexican water delivery regime that provides more reliability and benefit for Texas water stakeholders.

Appendix. Drought Monitor 2011 to 2016

Water sharing becomes more complicated during droughts, and both the Colorado River and the Rio Grande basins are prone to multiyear droughts. The North American Drought monitor provides maps created by U.S., Mexican, and Canadian experts that synthesize various drought indices and impacts. **Figure A-1** shows the most recent drought monitor available, when this report was published; **Figure A-2** shows the drought monitor in October 2015 and October 2016. **Figure A-3** shows the evolution of drought conditions from 2011 through 2015. For the Rio Grande, as shown in **Figure A-3**, both 2011 and 2012 were marked by dry conditions, resulting from high heat, low precipitation, and low runoff throughout most of the basin. For the Colorado River, dry conditions developed more noticeably in 2012 and persisted in varying degrees through October 2016.¹⁰³

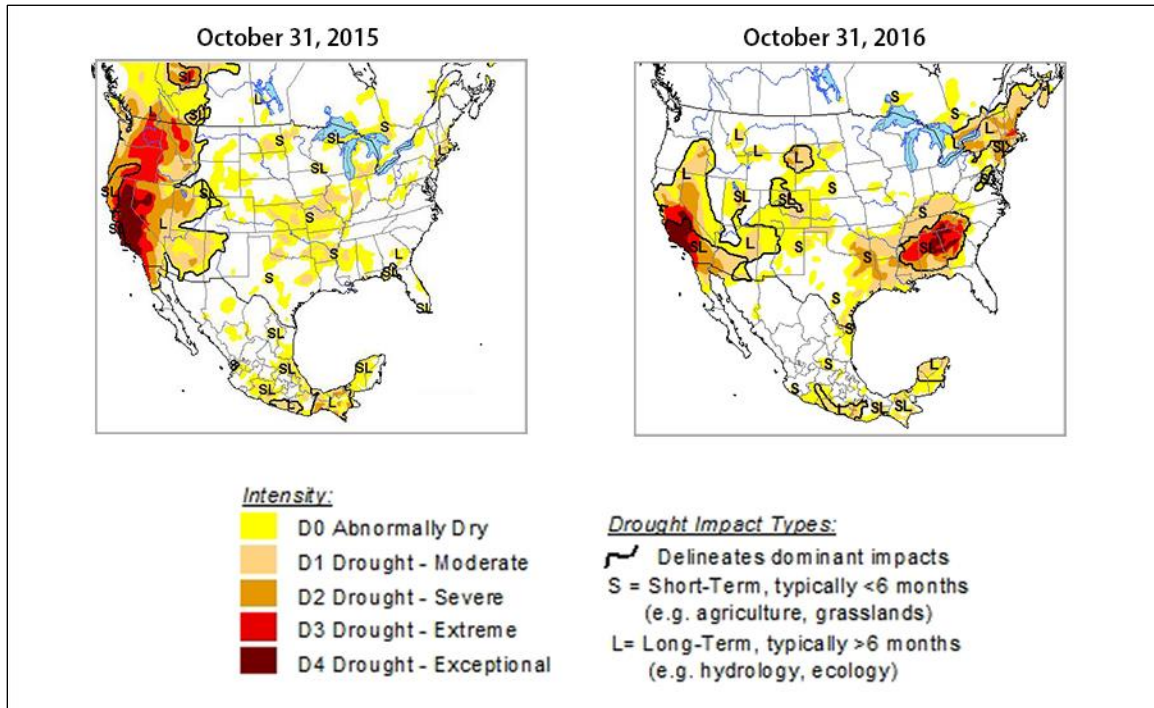
Figure A-1. Drought Monitor for December 31, 2016



Source: North American Drought Monitor maps (minor modifications by CRS), available at <http://www.ncdc.noaa.gov/temp-and-precip/drought/nadm/index.php>.

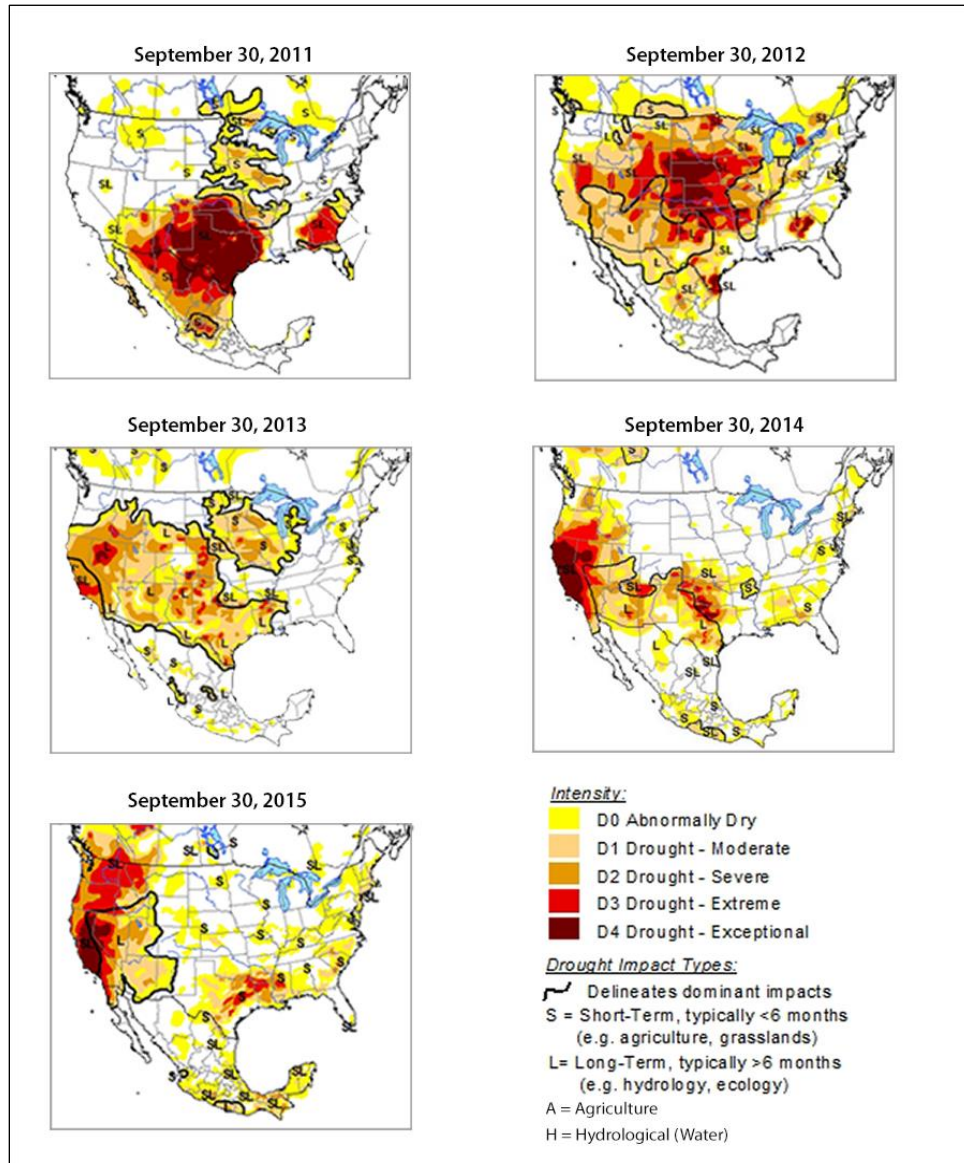
¹⁰³ For more on the causes and consequences of drought, see CRS Report R43407, *Drought in the United States: Causes and Current Understanding*, by (name redacted) and (name redacted)

Figure A-2. Drought Monitor for October 2015 and October 2016



Source: North American Drought Monitor maps (minor modifications by CRS), available at <http://www.ncdc.noaa.gov/temp-and-precip/drought/nadm/index.php>.

Figure A-3. Evolution of North American Drought from 2011 to 2015



Source: North American Drought Monitor maps (minor modifications by CRS), available at <http://www.ncdc.noaa.gov/temp-and-precip/drought/nadm/index.php>.

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