New Mexico's Major Reservoirs—An Overview

> "Suffice it to say that there is no western water issue that so strikes fear into the heart of western water managers as the issue of the federal operation of dams and reservoirs on western rivers. There is also no issue that is so shrouded in the mystery of arcane operating agreements as are the operations of these facilities."
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> Em Hall, *Introduction,* Natural Resources Journal, Vol. 47, No. 3 (2007)

Rivers are the lifeblood of New Mexico. Most of the water in New Mexico's rivers is managed through a highly engineered and regulated system of dams and reservoirs. The impact of such water storage facilities on rivers and their importance in extending and managing scarce water supplies for human use and irrigation cannot be overstated. The objective is, of course, to capture surface-water—snow melt and runoff from rainfall—and release it for later use when needed downstream.

The state's reservoirs store water for a number of different purposes: flood control (generally water is released as soon as downstream conditions allow), conservation storage (storing the natural flow of the river for later use, usually municipal or agricultural), power production, sediment control, fish and wildlife benefits, and recreation. Each storage dam and reservoir may have several of these purposes, and federal reservoirs' purposes are strictly defined by congressional authorizations. In recent years, the operations of some dams have been altered to reduce the impacts they may have on bird and fish species and their habitat.

This paper describes the salient facts about the major water storage reservoirs in New Mexico. For each reservoir, we address the purposes of water storage allowed by law, storage capacity, the responsible operating agency, and some key operational issues. This is by necessity a vast simplification of the topic. Books, articles, research reports, operation manuals, and other materials on these topics run into the hundreds. Millions of dollars have been spent on technical studies and computer models to understand, and sometimes alter, the operations of various dams and reservoirs.

Each storage dam and reservoir may have several of these purposes; and for federal reservoirs, their purposes are strictly defined by congressional authorizations.

The goal here, however, is to provide legislators and others a short, handy reference guide, to some of the more important dams and reservoirs.

Small Reservoirs and Dams

The discussion in this paper is mostly limited to reservoirs that have storage capacities of at least 20,000 acre-feet. Numerous small reservoirs, some of which play critical roles in water management are not detailed here. Such reservoirs may hold irrigation water or be used for municipal purposes. They have been built with a variety of funding sources, usually local landowners and irrigators. Most have interesting operational features. (See box for several examples).

Examples of Small Reservoirs in New Mexico

McClure and *Nichols* reservoirs, in the canyon of the Santa Fe River, just above the City of Santa Fe, are used for the Santa Fe municipal supply, holding 3,255 and 684 acre-feet respectively. The growing city also uses well water and is beginning to use San Juan-Chama water diverted from the Rio Grande. They were both constructed after 1929 and all but 1,061 acre-feet of their combined storage is subject to Article VII of the Rio Grande Compact (see below).

Bluewater Lake, on the western side of the state, is partially owned by the New Mexico Department of Game and Fish and partially by the Bluewater-Toltec Irrigation Company. Storage levels vary widely depending upon snowmelt runoff, monsoonal rainfall, and irrigation drawdowns, but the average storage is about 16,000 acre-feet. The concrete arch dam was built in 1927 and was rehabilitated in the 1980s.

Bonito Lake, located in the Sierra Blanca range northwest of Ruidoso, was created by the Southern Pacific Railroad in 1931. It is owned and operated by the city of Alamogordo. The dam and lake are in the Lower Pecos basin, while Alamogordo is in the Tularosa Basin. A 90-mile pipeline carries water to Alamogordo and Holloman Air Force Base. The lake holds about 3,000 acre-feet and annual quantities are split between Alamogordo and Holloman Air Force Base, with small amounts going to Carrizozo, Nogal, and Ft. Stanton. In 2012 flooding after the Little Bear fire filled Bonito with forty feet of sediment. Clean-up is expected to take up to five years and cost $24 million.

There are also hundreds of small flood control dams that do not store water for beneficial use, but instead are required to release floodwater within a certain amount of time (typically ninety-six hours), or as soon as downstream conditions safely allow. Such dams are usually owned and managed by soil and water conservation districts and are currently the subject of much discussion. Many were built long ago to protect farms and agricultural areas and were built using relatively low standards for the design of their emergency spillways. Now, instead of fields, developed subdivisions lie below many of them, necessitating upgraded spillways to meet current dam safety standards. These upgrades are expensive and there is a considerable debate about how to pay for them. The owners of the dams, who had no control over allowing the downstream developments to occur, cannot bear full responsibility. The Office of the State Engineer estimates that there are 162 deficient dams statewide and that $5 million per year is needed for ten years to address the upgrades. It is clear that a statewide assessment of dams is needed, as well as a reasonable process in order to fund and prioritize upgrades to problem dams.

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Interstate Compacts

A few of New Mexico's rivers begin within the state and then flow into adjacent state—the Canadian, Pecos, Gila, and several smaller streams. Other rivers like the Rio Grande and the San Juan River, flow into New Mexico from Colorado and then continue into other states. In both cases, agreements or "compacts" have been found necessary for the equitable sharing of water.

New Mexico is party to eight interstate stream compacts:

- Animas-La Plata Project Compact..(1968)
- Canadian River Compact.....(1950)
- Colorado River Compact .....(1922)
- Costilla Creek Compact.....(1946)
- La Plata River Compact .....(1925)
- Pecos River Compact .....(1948)
- Rio Grande Compact.....(1939)
- Upper Colorado River Basin Compact .....(1949)

Overview of Major Reservoirs

This overview begins upstream in the Rio Grande Basin, since most of New Mexico's reservoirs are located on the Rio Grande and its tributaries. Then it addresses the Canadian and Pecos River basins. The overview ends with Navajo Reservoir on the San Juan and part of the Colorado River Basin. The Colorado River and Rio Grande basins are separated by the Continental Divide.

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Rio Grande Basin

Heron Reservoir

Capacity: 401,320 acre-feet

Storage as of September 1, 2014: 70,800 acre-feet

Responsible agency: U.S. Bureau of Reclamation

Authorization: PL 87-483 (1962)

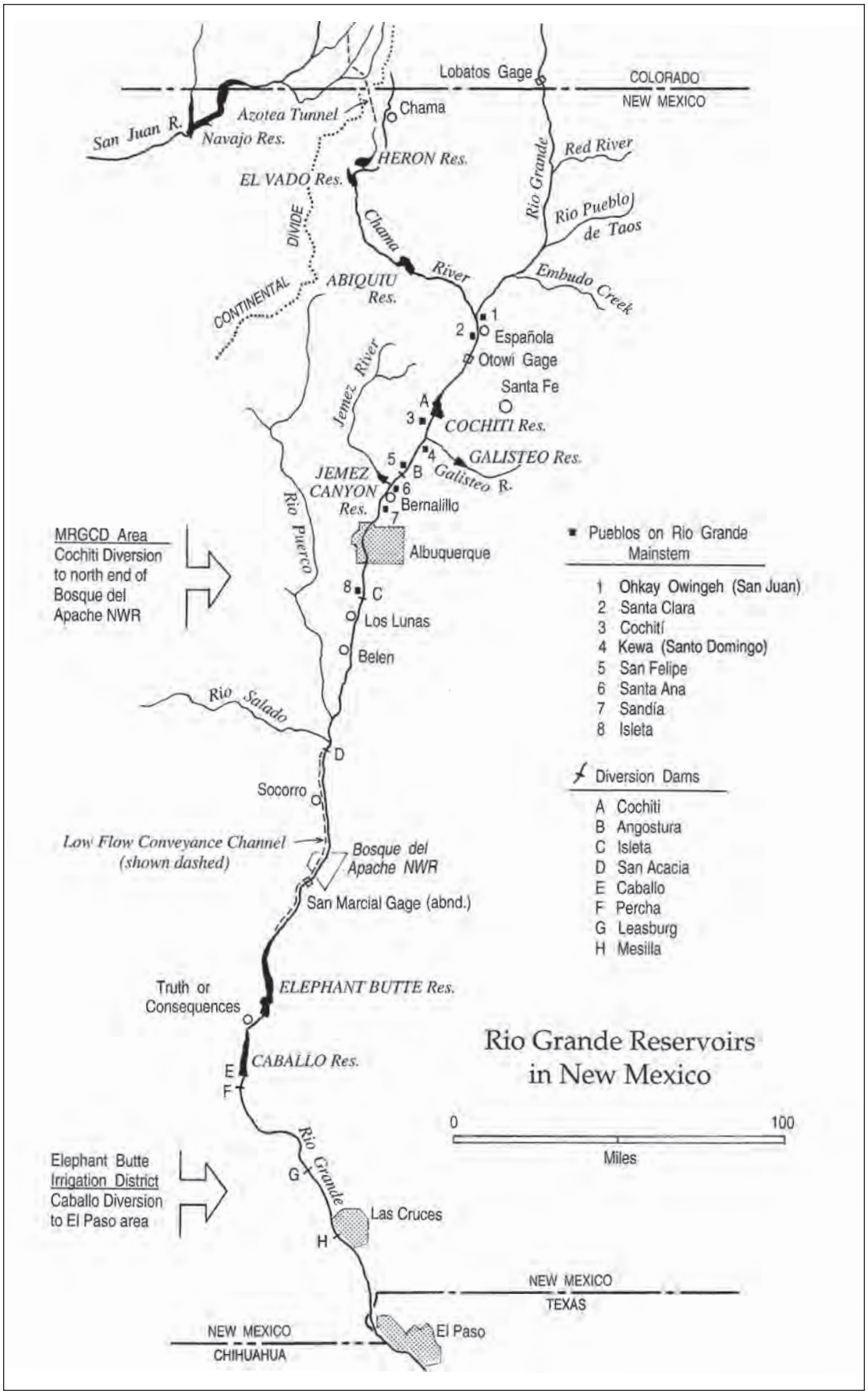
Heron Dam was constructed by the U.S. Bureau of Reclamation (Reclamation) and completed in 1971 as part of the San Juan-Chama (SJC) Diversion Project. The dam and reservoir are located on Willow Creek, a tributary of the Rio Chama. Water is withdrawn in Colorado from three tributaries of San Juan River and is delivered to Heron via the Azotea Tunnel under the Continental Divide. Eventually the water is released to the Rio Chama and ultimately flows into the Rio Grande. Thus Heron stores *imported* Colorado River basin water, not water that is native to the Rio Grande basin. "Native" Rio Grande water originates in the Rio Grande watershed. Any native Rio Chama basin water that enters the reservoir is bypassed monthly, meaning that it is not held in the reservoir but is allowed to pass through the dam and flow downstream. Native inflows, however, are minor in relation to Heron's overall capacity—they total about 15,000 acre-feet per year. Also, at the Otowi gage where the Rio Grande flow is measured, the SJC water is not counted as native water and therefore is not subject to the Rio Grande Compact.

Municipal Domestic and Industrial Supplies	**Acre-feet Provided**
City of Albuquerque (ABCWUA)	48,200
Jicarilla Apache	6,500
City and County of Santa Fe	5,605
County of Los Alamos	1,200
City of Española	1,000
Town of Belen	500
Village of Los Lunas	400
Village of Taos	400
Town of Bernalillo	400
Town of Red River	60
Twining Water & Sanitation District	15
Irrigation Supplies	
Middle Rio Grande Conservancy District	20,900
Pojoaque Valley Irrigation District	1,030

The water stored at Heron is for use by the entities that have contracted to receive it, most notably Albuquerque, Santa Fe, and the Middle Rio Grande Conservancy District (MRGCD).

The SJC water is to be used primarily for municipal/industrial and agricultural purposes. Carry-over storage of SJC water in Heron from year to year is not allowed. Contractors are obliged to take delivery of the water by December 31 of each year and either use it or store it elsewhere. If a waiver of the deadline is granted, water may remain in Heron until the following September 30. Waivers are issued fairly often. Diversions from the San Juan River basin to fill Heron were initiated in 1970. Since then an average of 94,200 acre-feet has been imported into the Rio Grande basin each year.

Operation of Heron was a major issue in the Rio Grande silvery minnow litigation, where several environmental groups sued



Rio Grande Basin

by Jerold Widdison for the Utton Transboundary Resources Center. Originally published in the Natural Resources Journal (2007).

the federal government under the Endangered Species Act. In the course of the extensive litigation from 1999 to 2010, federal district court Judge James Parker ruled that Reclamation has discretion to use agricultural and municipal contracted water from Heron to maintain minimum stream flows for the minnow, and therefore should consider this water when developing measures to meet the biologic needs of endangered species. The entities for which the water was intended—Albuquerque and the MRGCD—argued that it was unfair and contrary to law for their contracted water to be taken for the minnow. In April of 2010, the 10th Circuit Court of Appeals vacated the district court ruling as moot, because a new Biological Opinion had since been issued in 2003, setting out new flow requirements. [However, silvery minnow litigation was re-initiated in 2014.] The litigation has ended for now, but the issue is not resolved. The Middle Rio Grande Endangered Species Act Collaborative Program is working hard to develop a recovery program.

El Vado reservoir is where the Bureau of Reclamation stores "prior and paramount" water for the six Middle Rio Grande Pueblos: Kewa (Santo Domingo), Cochiti, San Felipe, Santa Ana, Sandia, and Isleta.

El Vado Reservoir

Capacity: Reduced by sedimentation to a current capacity of less than 190,000 acre-feet)

Storage as of September 1, 2014: 51,600 acre-feet

Responsible agency: U.S. Bureau of Reclamation

Authorization: 1927 Conservancy Act, NMSA § 73-14-1 through 73-14-88; Act of 1928, 45 Stat. 312 (appropriating federal funds to pay for Pueblos' share of Conservancy works)

El Vado Dam and reservoir were built as part of the Middle Rio Grande Conservancy District works in 1935. Reclamation rehabilitated the dam in the 1950s and storage rights were assigned to it in 1963. El Vado is primarily used to store native Rio Chama flows for use by the MRGCD for irrigation. It is the reservoir where Reclamation stores "prior and paramount" water for the six Middle Rio Grande Pueblos: Kewa (Santo Domingo), Cochiti, San Felipe, Santa Ana, Sandia, and Isleta. It also played prominently in the minnow litigation. An unresolved issue is that both the MRGCD and Reclamation claim title to the works of the Middle Rio Grande Project, including El Vado.

El Vado operations involve the storage of natural inflow that exceeds current MRGCD irrigation demand. As one of the few reservoirs constructed after 1929 that stores native Rio Grande water, El Vado is subject to Article VII of the Rio Grande Compact. Typical operations include filling the reservoir as much as possible during spring runoff and drawing it down during the irrigation season. El Vado is operated during the irrigation season to pass all the natural flow of the Rio Chama up to 100 cubic feet per second (cfs), in order to provide water for the Rio Chama acequias. After the end of the year, and when it is determined how

much water New Mexico owes Texas under the Compact, water may be released from El Vado to meet New Mexico's delivery obligation at Elephant Butte.

El Vado also provides power generation during its operations for Los Alamos County, whenever flows and water elevations fit the criteria necessary for power production. The dam is operated to regulate flows in the Rio Chama, a national Wild and Scenic River, by the release of water for irrigation and also by the pass-through of San Juan-Chama water to Abiquiu Dam. Weekend releases for river rafting are also accommodated as conditions permit.

Abiquiu Reservoir

Capacity: 183,099 acre-feet of SJC storage

- Primarily for ABCWUA, but small amounts are leased to other SJC contractors

Storage as of September 2014:
129,014 acre-feet

Responsible agency:
U.S. Army Corps of Engineers

Authorization: Flood Control Act of 1948, PL 81-858; Flood Control Act of 1960, PL 86-645; PL 97-140 (1981) SJC storage; PL 100–522 (1988) native storage

Below El Vado, on the Rio Chama, is Abiquiu Reservoir, about thirty miles upstream from the Chama's confluence with the Rio Grande. This reservoir was built in 1962 for flood and sediment control purposes by the U.S. Army Corps of Engineers. In 1981, the authorizing legislation was amended to allow limited storage of Albuquerque's SJC water. For this purpose, the city of Albuquerque—predecessor-in-interest to the Albuquerque Bernalillo County Water Utility Authority—acquired storage easements, to an elevation of 6,220 feet, from landowners. The storage capacity is annually reduced by accumulation of sediment. The channel capacity of the Rio Chama downstream of Abiquiu is limited to 1,800 cubic feet per second, so when flood operations are in effect—because of spring runoff or summer storms in northern New Mexico—flood waters are released at 1,800 cubic feet per second or less, in order to maintain safe channel conditions downstream.

Because Abiquiu primarily stores Albuquerque's San Juan-Chama water and that water is now being used for a portion of the urban area's drinking water supply, it is anticipated that Abiquiu may have space available for storage of native Rio Grande water. Storage of native water

Article VII of the Rio Grande Compact

Article VII of the Rio Grande Compact comes up frequently because of its broad implications. It applies to storage of native water in reservoirs on the Rio Grande or its tributaries and does not include water imported from another basin; specifically, San Juan-Chama water, which is imported from the Colorado River Basin and stored in Rio Grande reservoirs. Under Article VII, no storage is allowed in any reservoir upstream of Elephant Butte built after 1929 when the usable project water in Elephant Butte and Caballo Reservoirs falls below 400,000 acre-feet, unless the relinquishment of credit waters in Elephant Butte occurs.

Article VII affected operations in thirteen years from 1956 to 2008, or about 25 percent of the time. The provision primarily affects El Vado Reservoir, because the other Rio Grande reservoirs store San Juan-Chama water and/or flood flows, the latter of which are released as soon as downstream conditions safely allow. At a smaller scale, it affects McClure and Nichols reservoirs. The purpose, of course, is to help ensure an adequate flow into Elephant Butte. An exception to Article VII is applied in the case of El Vado for the storage of "Prior and Paramount" water rights for the several Rio Grande Pueblos, because the Compact by its own terms does not affect the water rights of Native American Pueblos and Tribes.

Water-resource experts concerns have been to optimize water management and not to over-deliver to Texas, and to reduce evaporative losses from the high rates of loss that Elephant Butte experiences.

within the available space approved for SJC water is authorized by law, but major hurdles must be overcome for native storage on a permanent basis to occur, such as environmental clearances and agreements with underlying real property owners.

Flexibility was in play with Abiquiu operations when the reservoir was used for storage under the Conservation Water Agreement in 2001–2003 and the Emergency Drought Water Agreement of 2003, both of which were entered into between the State of New Mexico and the United States, and approved by the Rio Grande Compact Commission. Such flexibilities in storage at Abiquiu have attracted interest and attention among water-resource experts when they have considered alternative storage scenarios for Rio Grande water. Their concerns have been to optimize water management, not over-deliver to Texas, and reduce the high evaporative losses from the Elephant Butte reservoir. To settle part of the litigation over the silvery minnow, the ABCWUA agreed to work with environmental groups to develop a 30,000 acre-foot environmental storage pool at Abiquiu to be used for ecosystem purposes during times of low flow on the Rio Grande.

Cochiti Reservoir

Capacity: 50,000 acre-feet recreation pool; 590,000 acre-feet flood control pool

Storage as of September 2014: 47,065 acre-feet

Responsible agency: U.S. Army Corps of Engineers

Authorization: Flood Control Act of 1960, PL 86-645; PL 88-293 (50,000 acre-feet of SJC water for recreation, fish, and wildlife)

Cochiti Reservoir is the only impoundment in the Rio Grande's Middle Valley that exists on the mainstream of the river. The dam and most of the reservoir are on Pueblo de Cochiti land. The Reservoir was built for flood and sediment control purposes and primarily to protect Albuquerque from extreme flooding events. A permanent recreational pool was authorized in 1964 and 5,000 acre-feet of SJC water was allocated annually; first to create a 50,000 acre-foot pool, and thereafter, to replace the annual evaporative losses. Cochiti Dam's construction was completed in August of 1975. During high water, the reservoir intrudes into Bandelier National Monument. Between this impact and its effects on the natural hydrograph of the river, environmentalists have called Cochiti "the dam that got away."

Cochiti Dam passes all inflow except when restraining flood inflows or when the permanent pool is being refilled. The dam directly regulates Rio Grande flows into the river's Middle Valley. The channel capacity below Cochiti is limited to 7,000 cubic feet per second to pass safely flood flows. The cubic feet per second measurements are taken at the Central Avenue Bridge in Albuquerque. The San Marcial railroad bridge some 200 miles downstream creates another choke point for safely passing flood flows.

Cochiti Pueblo has a strong voice in the management of the reservoir and in

working with the Corps of Engineers they have allowed minor deviations in operations at Cochiti. This has provided extra storage of water that is released to create pulse flows to promote spawning of the silvery minnow. Due to the history of issues that arose during the planning and construction of the reservoir, and damage that has in fact resulted to agricultural lands and sacred sites, the Pueblo is cautious about any potential changes to the dam's authorized operations.

Jemez Canyon Dam and Reservoir and Galisteo Dam and Reservoir are also Corps of Engineers facilities. Their primary purpose is flood control and trapping sediment.

Elephant Butte Reservoir

Capacity: Two million acre-feet

Storage as of September 2014: 164,829 acre-feet

Responsible agency: U.S. Bureau of Reclamation

Authorization: Rio Grande Reclamation Project, enacted in 1905, PL No. 58-108.

At the downstream end of the Rio Grande's Middle Valley is Elephant Butte Dam, built in 1912–1916 by the fledgling Reclamation Service, now the United States Bureau of Reclamation. At the time, the dam was the largest in the world. Controversy abounded between the federal government and private interests over the right to impound waters of the Rio Grande in this approximate location, and threads of that controversy continue to the present day.

Elephant Butte Reservoir is the principal storage facility for the federal Rio Grande Project. Reclamation delivers irrigation water under contracts between Reclamation and the Elephant Butte Irrigation District for 90,000 water-righted acres in New Mexico and El Paso County Water Improvement District No. 1 for 69,000 water-righted acres in Texas. New Mexico's Rio Grande Compact delivery obligation takes place at the spillway of Elephant Butte Dam: thus about 57 percent of the water delivered under the Compact, is actually delivered to southern New Mexico farmers. Elephant Butte is also operated to ensure that the obligation of the United States under the 1906 Treaty with Mexico to deliver 60,000 acre-feet per year is met. That delivery is managed by the International Boundary and Water Commission (IBWC), by means of a diversion facility near Ciudad Juárez. The full Rio Grande Project delivery is 790,000 acre-feet. When a full amount is not available, water to the irrigation districts and Mexico are reduced on a pro rata basis. In 2008, a new operating agreement was negotiated which specifies procedures for allocation and releases. The State of New Mexico filed a challenge to the agreement in federal district court in *New Mexico v. United States* in 2011. Texas filed suit in the United States Supreme Court over compact deliveries in 2013. For more information, please see the chapter "Water

Due to the history of issues that arose during the planning and construction of the reservoir, and damage that has in fact resulted to agricultural lands and sacred sites, the Pueblo is cautious about any potential changes to the dam's authorized operations.

Elephant Butte Reservoir is the principal storage facility for the Bureau's Rio Grande Project.

Water-resource experts' concerns have been to optimize water management and not over-deliver to Texas, and to reduce evaporative losses from the high rates of loss that Elephant Butte experiences.

Litigation in the Lower Rio Grande" in this edition of *Water Matters!* and "*Texas v. New Mexico and Colorado*" on the Utton Center web page.

Recreation is also an important function at Elephant Butte. More than one million people annually visit the Elephant Butte Lake State Park. As with most of the reservoirs, there is both compatibility, and at times tension, between recreational uses and Elephant Butte's primary purpose of water storage. The size of the reservoir varies greatly, depending upon storage levels. Evaporative losses on the lake are estimated at about ten feet annually. When the lake is full, at 2 million acre-feet, evaporative losses are estimated at 140,000 acre-feet per year or roughly two times the annual use of Albuquerque. This evaporation lead many to think about how to reduce such losses or how to store water at higher elevations where the evaporative losses are not so great. Water has seldom gone over the dam's spillway, although this occurred in the high flood year of 1941. Now the dam is operated in ways that avoid actual spills, although this has not been a concern in recent low-water years. When Elephant Butte spills, it erases all accrued debits and credits under the Rio Grande Compact. The last spills under the Compact occurred in the wet years of the late 1980s. Operation of Article VII of the Compact is based on water levels at Elephant Butte. (See box above.)

Caballo Reservoir

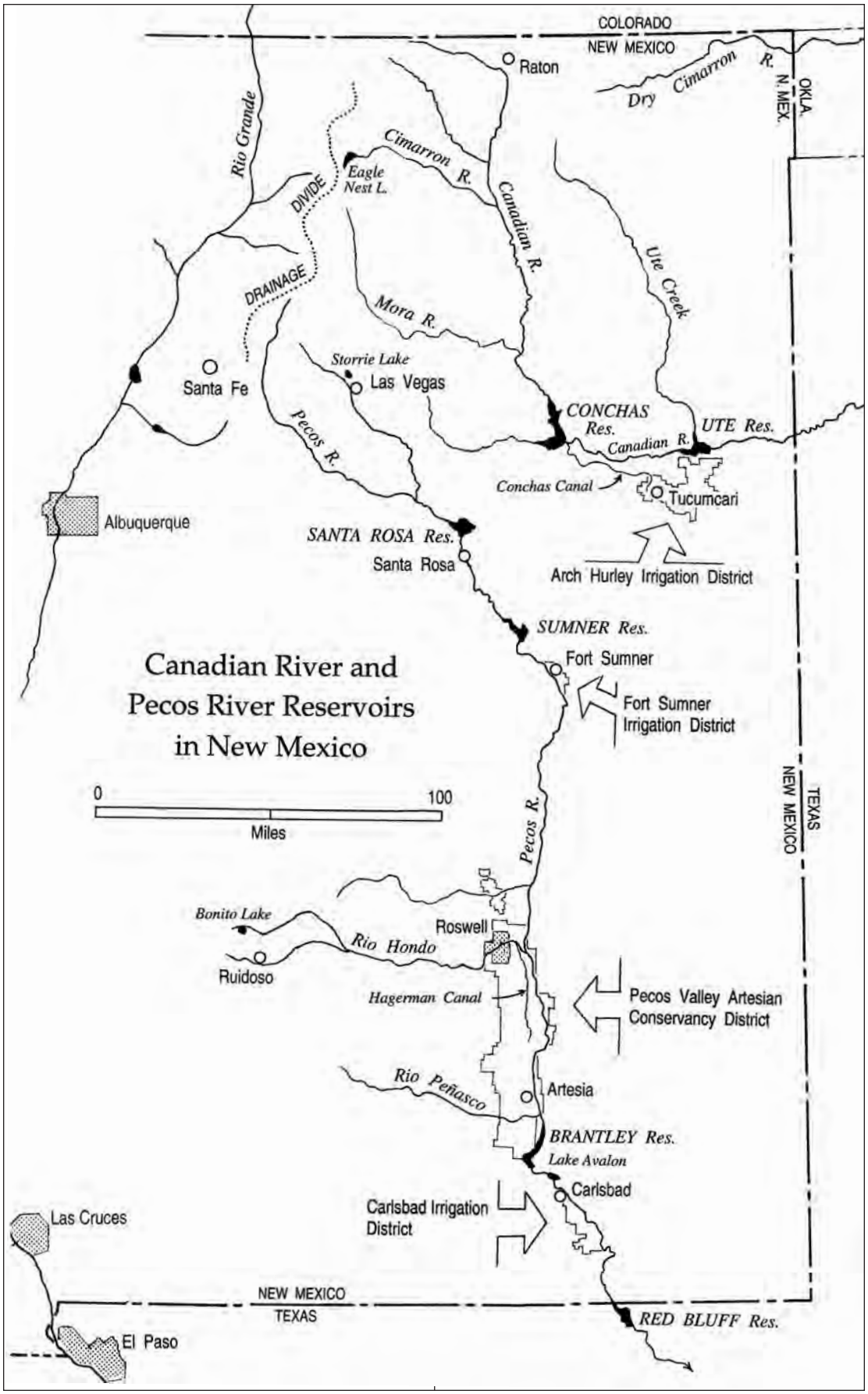
Capacity: 350,000 acre-feet flood storage; 50,000 acre-feet target

Storage as of September 2014: 27,816 acre-feet

Responsible agency:
U.S. Bureau of Reclamation

Authorization: Rio Grande Reclamation Project, enacted in 1905, PL No. 58-108

Caballo is a reservoir that works in conjunction with Elephant Butte, providing storage for irrigation, power, and flood control. Since its construction in 1938, Caballo Dam has provided supplemental storage for Rio Grande Project storage. Water released from Elephant Butte for power production is re-impounded in Caballo for use in irrigation the following season. Further, Caballo is operated for flood control in cooperation with the International Boundary and Water Commission (IBWC) to limit flow in the Rio Grande below the dam and to meet the 1906 Treaty deliveries to Mexico's Acequia Madre irrigation canal. Per a 1996 Court Order, which resulted from a negotiated settlement with EBID and El Paso #1 irrigation districts, Caballo's storage is targeted not to exceed 50,000 acre-feet from October 1 to January 31 each year. A variety of exceptions are specified, but any significant variation from the target requires that Reclamation consult and collaborate with the districts.



Canadian River Basin

By Jerold Widdison for the Utton Transboundary Resources Center

Canadian River Basin

Eagle Nest Reservoir

Capacity: Approximately 78,000 acre-feet (maximum); 52,800 acre-feet (average)

Storage as of November 2014: About 19,000 acre-feet

Responsible agency: Interstate Stream Commission

Eagle Nest was built at the upstream end of the Canadian River Basin in 1918 in Cimarron Canyon by the Springer ranching family in order to capture the runoff from the Moreno Valley watershed for irrigation use. Over the years, Eagle Nest has become a popular lake for fishing, and in 2002 the reservoir was conveyed to the New Mexico Game and Fish Department. The dam is now operated and managed by the New Mexico Interstate Stream Commission, while recreational use of the lake is managed by New Mexico State Parks.

Water in the lake is owned by eighteen entities; it is primarily used for irrigation, but domestic water is also provided to the towns of Raton and Springer. After two years of litigation, a negotiated agreement was reached in 2006 on water deliveries to fulfill about 16,000 acre-feet of water rights demand per year. The capacity of the lake is limited to about elevation 8,140 feet, the crest of the dam being at 8,146 feet. The lake's level is closely tied to precipitation patterns in the immediate area: if there is good rainfall in the summer, not much water needs to be taken out for irrigation; with a poor snowpack, followed by a dry summer, the lake can be significantly drawn down.

Water in Eagle Nest is owned by 18 entities.

Ute Reservoir

Capacity: 200,000 acre-feet conservation storage; 24,000 per year under contract for municipal purposes

Storage as of November 2014: 150,000 acre-feet

Responsible agency: Interstate Stream Commission

Authorization: New Mexico Legislature (1957, 1959, 1975, 1978, 1982)

The Interstate Stream Commission built Ute Reservoir in 1962 by constructing a dam on the Canadian River near Logan, New Mexico. The ISC has operated it since that time. In the 1970s the dam's height was increased, so as to impound additional water. Its storage capacity is limited by the Canadian River Compact to 200,000 acre-feet. Storage of 24,000 acre-feet annually is subject to a purchase contract with the Ute Reservoir Water Commission. The Commission is an organization of entities including cities from Tucumcari south to the Portales area, and they have an option to purchase the water in the reservoir for consumptive use. Currently, the water in the reservoir is not being used for purposes other than recreation—boating and fishing. Ute Reservoir provides a potential renewable source of water to the communities in Eastern New Mexico that are dependent on the dwindling groundwater of the Ogallala Aquifer. The pending arrangements for proposed delivery of water from Ute Reservoir to the Eastern New Mexico Rural Water System are covered under a separate article in this edition of *Water Matters!*

Conchas Reservoir

Capacity: 198,000 acre-feet flood control purposes; 70,500 acre-feet sediment control; 252,000 acre-feet conservation storage (irrigation)

Storage as of September 2014: 157,017 acre-feet

Responsible agency: U.S. Army Corps of Engineers

Authorization: Emergency Relief Appropriation Act of 1935 (July 29, 1935); Flood Control Act of 1936

Conchas Dam was constructed by the Corps of Engineers in 1939. It was approved by President Roosevelt as a work relief project during the Great Depression. The dam is located just downstream from the confluence of the Canadian and Conchas rivers, about thirty-five miles northwest of Tucumcari. The lake provides conservation storage for the Arch Hurley Conservancy District in the vicinity of Tucumcari, and the Bell Ranch, located northeast of the lake. Recreation areas are leased to the State of New Mexico Parks and Recreation Division and private operators. The Arch Hurley district, also known as the Tucumcari Project, was authorized by the New Mexico Legislature in 1937, but construction was not completed until 1954. Irrigation of 42,321 acres is authorized, but the average is under 30,000, and the district has been chronically affected by drought.

Under the Canadian River Compact, New Mexico has free use of the Canadian for water originating above Conchas Dam and is entitled to 200,000 acre-feet of conservation storage for water originating in the Canadian River drainage basin in New Mexico below the dam. Ambiguities in the Compact sent the states of Oklahoma, Texas, and New Mexico to the Supreme Court in 1991. The Court determined that Ute Reservoir's capacity was limited to stored water not to exceed 200,000 acre-feet. Inflow to Conchas is reliant on rainfall and several years of persistent drought have taken a toll.

Under the Canadian River Compact, New Mexico has free use of the Canadian for water originating above Conchas Dam...

Pecos River Basin

Storrie Lake

Capacity: 22,900 acre-feet

Responsible agency: Storrie Project Water Users Association

Storrie Lake is a small reservoir just north of the City of Las Vegas, owned and managed by the Storrie Project Water Users Association. Water from the Gallinas River, tributary to the Pecos, is stored here and used primarily for irrigation. Water from the reservoir is also used for municipal purposes by the City of Las Vegas, and Storrie is operated for municipal purposes in conjunction with Bradner and Peterson Reservoirs. Bradner and Peterson are the city's primary reservoirs, and Storrie is a back-up, connected to them by a pipeline. Storrie becomes a critical component of the water supply system when Las Vegas is in a drought. Storrie was the subject of a dispute over public access to the lake in 2010, but the New Mexico State Parks Division of the New Mexico Department of Energy, Minerals and Natural Resources and the Storrie Project Water Users Association negotiated an agreement for a three-year lease, providing the parties time to reach a permanent agreement.

Storrie was the subject of a dispute over public access to the lake in 2010

Lower Pecos Reservoirs

Santa Rosa Reservoir

Capacity: 438,364 acre-feet flood storage; 92,236 acre-feet conservation storage (irrigation)

Storage as of September 23, 2014: 72,106 acre-feet

Responsible agency: U.S. Army Corps of Engineers

Authorizations: 52 Stat. 1224; 68 Stat. 1260; 94 Stat. 520

Sumner Reservoir

Capacity: 93,828 acre-feet flood storage; 40,398 acre-feet conservation storage (irrigation)

Storage as of September 23, 2014: 36, 325 acre-feet

Responsible agency: U.S. Bureau of Reclamation

Authorizations: November 6, 1935; Flood Control Act of 1939.

Brantley Reservoir

Capacity: 414,466 acre-feet flood storage; 40,000 acre-feet conservation storage (irrigation)

Storage as of September 23, 2014: 58,000 acre-feet

Responsible agency: U.S. Bureau of Reclamation

Authorizations: PL 92-514 (1972)

Lake Avalon

Capacity: 4,446 acre-feet; 3,866 acre-feet conservation storage (irrigation)

Storage September 23, 2014: Capacity (4,466 acre-feet)

Responsible agency: U.S. Bureau of Reclamation, built in 1907

Santa Rosa Reservoir, Sumner Reservoir, Brantley, and Avalon reservoirs are operated as a system for the Carlsbad Project, which primarily serves the Carlsbad Irrigation District (CID). The Carlsbad Project was originally authorized on November 28, 1905. The storage capacity of the Carlsbad Project is variable, depending upon the storage and operations

in each of the Carlsbad Project reservoirs. The total annual allowable storage as defined by the Pecos River Compact is 176,500 acre-feet, which is the maximum conservation storage allowed for irrigation. Each reservoir is constrained by its own conservation storage limits, with a portion of its storage space allocated for flood control. As on the Rio Grande, many agencies and interests are involved in decision-making on the Pecos.

Generally, water is kept in Santa Rosa and Sumner to take advantage of lower evaporative losses. This keeps capacity available in Brantley to capture runoff from monsoon season rainfall. When CID needs water for irrigation, water is moved to Brantley. Avalon is a small reservoir used for staging releases from Brantley for use by CID.

In the case of flood control operations by the Corps of Engineers and Reclamation, if a reservoir's conservation storage limits are exceeded, inflows are bypassed. Another driver is the Pecos Compact and the 1988 *Texas v. New Mexico* U.S. Supreme Court Amended Decree. In 1988 the U.S. Supreme Court held that New Mexico had under-delivered to Texas from 1950 to 1983 by about 10,000 acre-feet per year. New Mexico had to pay Texas $14 million and the Court mandated that New Mexico not fall behind on its required deliveries. Spills from Carlsbad Project storage are one source for meeting the delivery requirement. Another operational factor on the Pecos is how to augment flows for the endangered Pecos bluntnose shiner while conserving Carlsbad Project water supplies.

Irrigation in the Pecos Valley is not limited only to the Carlsbad area. Fort Sumner Irrigation District is located downstream from Sumner Dam and irrigates approximately 6,000 acres out of 10,000 authorized by its diversion right, which is a direct flow right of the natural river flow up to 100 cfs.

Another driver is the Pecos Compact and the 1988 *Texas v. New Mexico* U.S. Supreme Court Amended Decree.

The Pecos Valley Artesian Conservancy District (PVACD) relies on ground water and irrigates approximately 100,000 acres on the west side of the river from Roswell to south of Artesia. The Hagerman Canal supplies water to approximately 9,000 acres in the PVACD using a combination of surface-water diverted from the Rio Hondo and groundwater pumped from the Roswell basin. CID irrigates approximately 20,000 acres a year out of a total of 25,055 authorized by the Carlsbad Project.

The complex history of the Pecos Basin's development and history of water issues and litigation is fascinating and also critically important to understanding the current posture of water administration, not only in the Pecos, but throughout the state. The legal imperative to make deliveries to Texas and avoid priority administration has cost the State about $100 million. Currently, the Lower Pecos

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Basin Commission (an *ad hoc* group of water users advisory to the Interstate Stream Commission) has been advising the Interstate Stream Commission and federal agencies on compliance with the Compact. A settlement agreement on water rights was reached in 2003 and measures have been implemented such as the purchase of 18,000 acres of farmland. The Pecos presents an example of a successful regional cooperative approach to settling water rights, addressing endangered species, and meeting Compact deliveries.

The history of the Pecos Basin development and Compact difficulties is summarized in a readable summary by retired Representative Joe Stell in the first edition of *Water Matters!* For new Legislators, we recommend his article and also, for a more detailed discussion, the book HIGH AND DRY by Emlen Hall.

After flowing through New Mexico and Utah, the San Juan joins the Colorado River at Lake Powell.

Colorado River Basin

NAVAJO RESERVOIR

Capacity: 1,708,600 acre-feet

Storage as of September 2014: 1,074,000 acre-feet

Responsible agency: U.S. Bureau of Reclamation

Authorizing legislation: Colorado River Storage Project Act of April 11, 1956 (70 Stat.105); Act of June 13, 1962

Navajo Dam was constructed in 1962 on the San Juan River, a tributary of the Colorado River, pursuant to the Colorado River Storage Project Act. The San Juan River originates in southern Colorado and runs westward from the Continental Divide into New Mexico. After flowing through New Mexico and Utah, the San Juan joins the Colorado River at Lake Powell. Navajo Dam is located about thirty miles east of Farmington.

Navajo Dam and Reservoir are owned, operated, and maintained by Reclamation. Water is released primarily for irrigation, for municipal and industrial purposes, and for hydropower generation by the city of Farmington. In addition to regulating the flows of the San Juan River, Navajo Reservoir is the principal storage reservoir for the Navajo Indian Irrigation Project (NIIP). Water is released through a tunnel into a long aqueduct for use on the NIIP to irrigate about 110,000 acres of land on the Navajo Indian Reservation.

Navajo Dam is subject to the terms of the Upper Colorado River Basin Compact, the Colorado River Storage Project Act, and the act authorizing the San Juan-Chama Diversion and Navajo Indian Irrigation Project. It provides irrigation and municipal and industrial water supply, flood control, recreation, hydropower, and fish and wildlife benefits.

The San Juan Basin Recovery Implementation Program was initiated in 1992 to address two endangered fish in the San Juan below Navajo, and operations of the reservoir are affected by this Program. All of the federal agencies, the State of New Mexico, and major water rights interests are represented. The purpose is to work together to protect and promote recovery of the endangered fish without impairing water users. The Program has been considered to be a successful approach to addressing the endangered species issues on the San Juan.

In 2003, in the face of anticipated water shortages, the major water users in the San Juan Basin came together and developed a sharing of shortages agreement. Public Service Company of New Mexico, Arizona Public Service, and BHP Billiton reached agreement with the Navajo Nation, the Jicarilla Apache Nation, and others for alternative water administration and operation of Navajo Dam in the event of shortages. The agreements were accepted and supported by the Interstate Stream Commission and Reclamation.

In 2003, in the face of anticipated water shortages, the major water users in the San Juan Basin came together and developed a sharing of shortages agreement.

Conclusion

This article is a snapshot of New Mexico's major reservoirs. It only touches the surface of the myriad issues that confront the owners and managers of these reservoirs. As New Mexico moves into future challenges of scarce and extremely variable water supplies, it will become more important than ever to use and manage our reservoirs wisely.

By Susan Kelly, Esq. (2011)
Update by Diego Urbina (2014)

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