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Editor's Note

A word that crops up in many of the interstate compacts that govern western water use is "comity."

This rather quaint term is defined as "an atmosphere of social harmony" and that's what the authors of the compacts sought to promote. Comity seems to be a quality badly needed as we face the water challenges of the 21st century.

The story of water in the West is an ancient tale of more demand than supply since people from the ancient Clovis culture in New Mexico dug the first water wells about 12,000 years ago. Ever since, successive civilizations have sought to capture and use the most precious resource before it flows away.

The challenges facing Colorado as a headwaters state are somewhat unique: Although Colorado is the mother of great rivers, Coloradans must watch much of the water leave the state because fellow citizens downstream count on the same supply.

As population pressures mount and climate change threatens the overall supply of western water, the temptation grows to try to keep more.

That's where comity comes in. Those who negotiated the treaty-like water compacts set up rules that ensure the rights of all users to put an end to battles over water. The bad news for Coloradans is that much of the water that trickles from our mountains must be allowed to leave the state. But the good news is that our share of water is guaranteed in perpetuity despite the thirst of downstream neighbors.

As we learn of the ingenious schemes the authors of the compacts developed to share the water in a way that is fair to all, perhaps we can work to spread a bit more comity into the rest of our civic lives.

—Rebecca Cantwell

Citizen's Guide to Colorado's Interstate Compacts

This Citizen's Guide to Colorado's Interstate Compacts is part of a series of educational booklets designed to provide Colorado citizens with balanced and accurate information on a variety of subjects related to water resources.
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From Water Battles to Peace Treaties

Colorado and Other States Forge Water Compacts

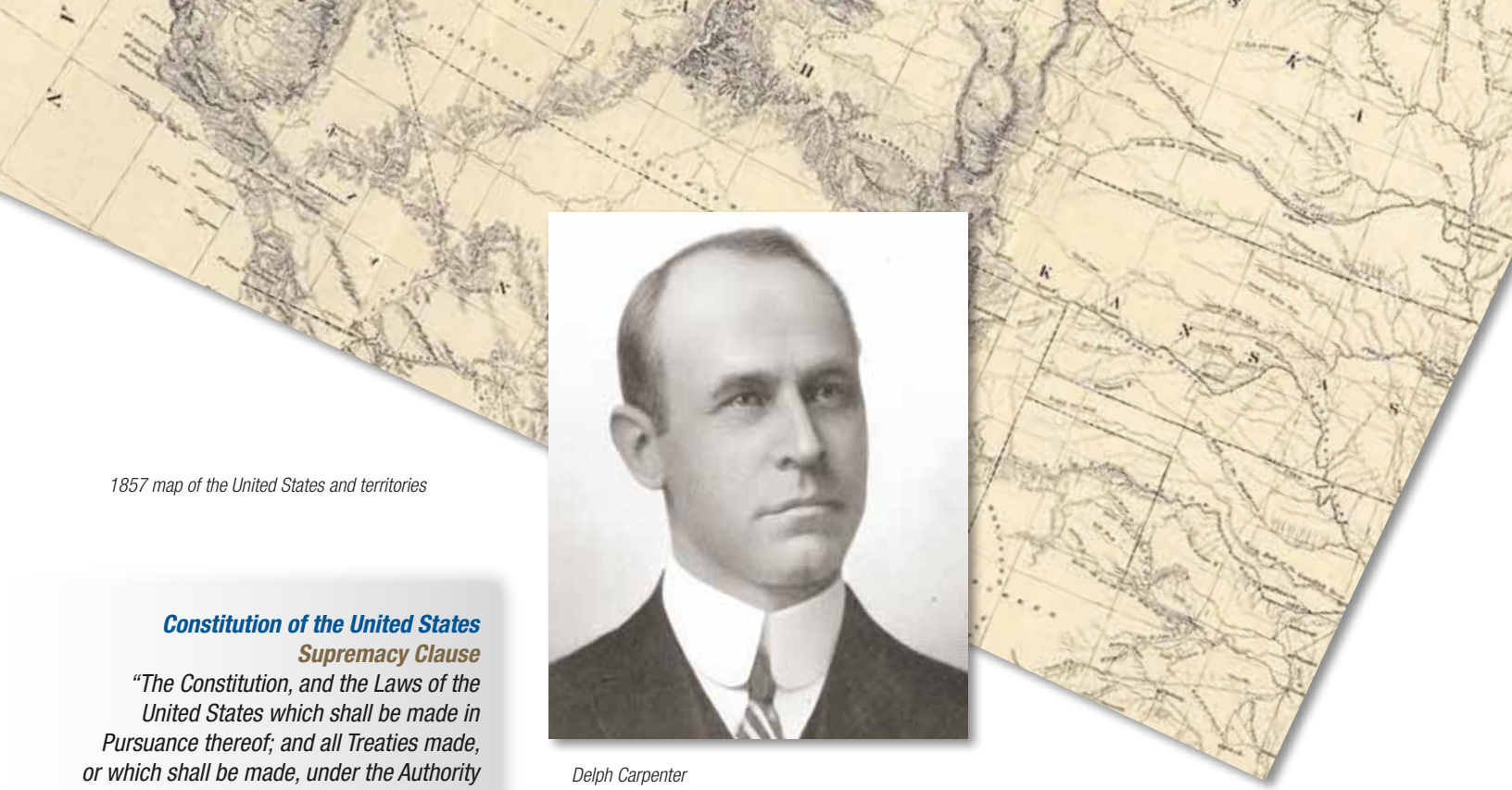
Visitors on top of Berthoud Pass in about 1930.

COLORADO STRADDLES THE CONTINENTAL DIVIDE, giving birth to four great rivers: the Platte, the Arkansas, the Rio Grande and the Colorado. As snow melts and trickles down the Rocky Mountains, the water gathers into great rivers that collect their tributaries and flow toward the Atlantic and Pacific oceans. Lifeblood of the environment, these rivers nourish cities and farms, industry and recreation. They shape the land and charge our spirits. They provide sustenance to tens of millions of Americans living in 19 states and Mexico. But in the arid West, there is rarely enough water to satisfy all desires.

Colorado and its neighboring states have argued for more than a century over who gets how much water from these rivers. The spirited battle among states began with lawsuits filed in the U.S. Supreme Court in the early 1900s. Within two decades, efforts to make peace began. The compact clause of the U.S. Constitution became the way states could conclude treaty-like agreements to share the most vital of all resources, the public's water.

The state of Colorado has rights and obligations at the headwaters as the mother of rivers. Nine interstate compacts, two Supreme Court equitable decrees and two Memoranda of Understanding govern how much water Colorado is entitled to use and consume within its boundaries. These water-sharing charters have fashioned enduring relationships between sister states. How they came to be, how they succeed and fail, how we adjust to them—*and they to us*—will continue to be a measure of our past, present and future.

Two men stand on the Continental Divide, circa 1900.



1857 map of the United States and territories

Delph Carpenter

Constitution of the United States

Supremacy Clause

"The Constitution, and the Laws of the United States which shall be made in Pursuance thereof; and all Treaties made, or which shall be made, under the Authority of the United States, shall be the supreme Law of the Land; and the Judges in every State shall be bound thereby, any things in the Constitution or Laws of any State to the Contrary notwithstanding."
U.S. CONST. art. VI, (2).

Commerce Clause (Power of Congress to Regulate Commerce)

"To regulate commerce with foreign nations, and among the several States, and with the Indian tribes. "
U.S. CONST. art. I, § 8(3).

Property Clause

"The Congress shall have Power to dispose of and make all needful Rules and Regulations respecting the Territory or other Property belonging to the United States; and nothing in this Constitution shall be so construed as to Prejudice any Claims of the United States, or of any particular State."
U.S. CONST. art. IV, § 3(2).

Compact Clause

"No State shall, without the consent of Congress…enter into any Agreement or Compact with another State… ."
U.S. CONST. art. I, § 10(2).

Finding a Better Way the Hard Way

Delph Carpenter had a map and a plan.

Carpenter knew water, loved Colorado and feared for its future.

A Greeley resident, lawyer, former state senator and first-generation descendent of original settlers of the 1870 Union Colony, Carpenter inherited the water creed of early Coloradans: Because we are higher up, we get all the water we need, and states downstream can have what's left.

Under the equal footing doctrine of the U.S. Constitution, by which each state is admitted on the same basis as every other state, Colorado cited its 1876 state constitution to claim title to all the water arising in its borders.

But by the early 20th century, this idea proved unworkable. Water battles were breaking out among the young states of the West. Under the U.S. Constitution, lawsuits between states go straight to the U.S. Supreme Court.

Carpenter stepped in at just the right time to help create lasting solutions that provide a framework still shaping how Coloradans and residents of downstream states use water.

Carving Up the West

Congress created the territories and states west of the Mississippi River from public domain obtained through the 1803 Louisiana Purchase, the 1846 Oregon Treaty and the 1848 Treaty of Guadalupe Hidalgo.

The 1862 Homestead Act allowed settlers to obtain rights to land owned and regulated by the United States under the property and commerce clauses of the U.S. Constitution. Affirmed by a series of subsequent land and water acts, the 1866 Mining Act allowed the territories and states to establish rights to water in the public domain that had not already been claimed.

Congress created Colorado Territory at the outset of the Civil War in 1861 when Kansas became a state. At that time, Kansas Territory had extended up the Arkansas River to the Continental Divide. Nebraska Territory extended up the South and North Platte rivers to the Divide. New Mexico Territory extended up the Rio Grande River into the San Luis Valley. Utah Territory encompassed the Colorado River and its tributaries west of the Divide.

Across the headwaters of these four great rivers, the creation of Colorado Territory cut a rectangular swath encompassing the great bend of the Divide.

Drought and Flood: The Bitter Teachers

For thousands of years, settlers in the area had faced periodic water shortages—from American Indians to Hispanics to the Anglo settlers who arrived in the 19th century.

When decades of drought hit the Southwest in the settlement years of the 1870s and 1890s, spiked by intervening floods, Western irrigators became convinced they needed federal financial assistance to build storage and flood control works to tame nature's "erratic" ways.

Along with this cry for help came "butt out" insistence on as much sovereignty as the states could maintain over the creation and administration of water rights within their own boundaries. Yet the states came to realize they needed one another and the federal government if they were to preserve a share of interstate waters for their own uses.

The opening salvo was a lawsuit. Kansas sued Colorado in the Supreme Court in 1902, contending that Colorado was illegally consuming Arkansas River water that Kansas owned under its riparian water law. If Kansas prevailed, Colorado would have had to pass the entire flow of the river to Kansas essentially undiminished in quantity or quality.

But Colorado fought back, claiming under its prior appropriation water law that it owned all water arising within its boundaries.

The federal government joined the fray. It claimed that the 1902 Reclamation Act reserved all remaining unappropriated water in the Western states for future reclamation projects.

None of these positions prevailed to the complete exclusion of the other. In its 1907 decision, *Kansas v. Colorado,* the Supreme Court enunciated the equitable apportionment doctrine. It ruled that states sharing an interstate river system may invoke the jurisdiction of the high court to adjust, or readjust from time to time, the relative share of water each may use and consume.

The next year, the high court held in the 1908 Winters case that American Indian reservations carried with them implied federal reserved water rights dating to the establishment of each reservation. Subsequent cases extended the reserved rights doctrine to national parks and monuments.

In sum, the Supreme Court held that the states and the federal government share jurisdiction over how water can be used. When states come into conflict with each other over their share of an interstate stream, continuing jurisdiction resides in the Supreme Court to treat each state fairly through the doctrine of equitable apportionment.

Delph Carpenter's 1922 map shows a 50 million acre-foot reservoir site above Lee Ferry in Glen Canyon, and a 31 million acre-foot reservoir downstream of the Grand Canyon in Boulder Canyon (now Lake Mead).

The Right Man at the Right Time

Delph Carpenter was well-positioned to help find the way out of the legal battles among states. He had already established his reputation as "the water man" in the Colorado Senate. When Carpenter lost his Senate seat in 1911, his former colleagues appointed him their interstate litigator and negotiator. Several water battles were pending or threatening the state of Colorado: against Kansas over the Arkansas River; against Wyoming in the Supreme Court over the Laramie River; against New Mexico and Texas over the Rio Grande; and against California and Arizona over the Colorado.

Early briefs and rulings in the Wyoming case came to Carpenter as an especially ominous thunderclap. The court seemed headed toward applying prior appropriation across state lines when each of the warring states used this doctrine internally. That doctrine holds that the first to actually use the water has first rights to it. If that principle held, a race to develop would be on, and California would win. California had more people, more development and more resources.

At the invitation of the warring states, the federal government stepped in to help sort out the conflicts. In January 1922, Herbert Hoover, then secretary of commerce, called the negotiators for Arizona, California, Colorado, Nevada, New Mexico, Utah and Wyoming to Washington, D.C., for the first meeting of the Colorado River Compact Commission.

Divide the Waters First; Get the Reservoirs Later

Congress had formed the commission to negotiate an agreement among the states on use of the waters of the Colorado River. Lawmakers invoked a clause in the Constitution that allows states to make treaty-like agreements called compacts. If negotiators reached agreement, their state legislatures then had to approve the deals. Congress and the president would have to give consent as well.

Carpenter was thrown to his most imaginative and scholarly devices. He determined that only through compacts would equity, stability and reliability be secured for the future of the states and the nation.

Carpenter came to the Colorado River Compact negotiations armed with a map and a plan for sharing the resources of the mighty Colorado River. His map showed a 50 million acre-foot reservoir site above Lee Ferry, Arizona in Glen Canyon, and a 31 million acre-foot reservoir downstream of the Grand Canyon in Boulder Canyon (now Lake Mead). His plan was to divide the waters between the upper and lower states at Lee Ferry and to get the reservoirs needed to operate the compact later. With the help of many others, Carpenter succeeded in achieving this outcome, although the Glen Canyon reservoir (now Lake Powell) was eventually built at the greatly reduced size of 27 million acre-feet.

Success with negotiating the 1922 Colorado River Compact led to eight more 20th century compacts to which Colorado is a party. But entering into a compact requires compliance, as demonstrated by the recently concluded *Kansas v. Colorado* compact litigation. Colorado lost several arguments that Kansas raised and had to pay Kansas $34 million in damages.

As a headwaters state, Colorado carries great responsibility to citizens of other states as well as its own to abide by the division of waters outlined in the compacts. ❑

Questions & Answers About Water Compacts

What is a compact?

A compact is an agreement between two or more states approved by their state legislatures and Congress under the authority of the U.S. Constitution (Article I, §10(2)). Compacts are akin to treaties between states. A water compact is a contract between two or more states setting the terms for sharing the waters of an interstate stream.

What is the primary purpose of a water compact?

The primary purpose is to establish under state and federal law how the water of an interstate stream system will be shared between users in different states.

What alternative does a state have to determine its interstate water share?

A state may file a lawsuit in the U. S. Supreme Court asking for an equitable apportionment of interstate stream waters among the states, where the court decides how to fairly divide the waters. Congress can also make an equitable apportionment, as it did by the Boulder Canyon Project Act for Arizona, California and Nevada's shares of Colorado River water.

Why would states favor negotiating a compact?

The states can fashion specific enforceable provisions to share the water of an interstate stream. A compact avoids the risk of repeated Supreme Court lawsuits to determine each state's fair share of the water. Ultimately, it creates certainty for the parties.

What does it mean when a water compact allocation between states refers to "beneficial consumptive use"?

Beneficial consumptive use is the amount of water, typically expressed in acre-feet or by percentage, which each state is entitled to use up entirely within its boundaries from the natural supply available in the river system.

Who can enforce a water compact?

A state can file suit in the Supreme Court for enforcement of its rights under the compact. A state may seek an injunction to require a non-complying state to abide by the provisions of the compact, repayment of water lost to the state and/or monetary compensation. Some compacts establish a commission that has administrative and enforcement power.

What is the effect of a compact on water-rights owners within a state?

The state has a duty to regulate water rights within its own state to avoid breaching the rights of another state.

Has the state of Colorado ever had to pay another state for breach of a compact?

Colorado paid Kansas about $34 million for breach of the Arkansas River Compact.

Can a state withdraw from or amend a compact?

Compacts typically prohibit unilateral withdrawal by a state and require unanimous consent of all signatory states for any amendment.

What role do federal reservoirs play in compact operation?

Reservoirs constructed, owned and managed by agencies of the U.S. government are often the most important means for administering the provisions of a compact to achieve its purposes and meet its terms.

Do Indian Tribal and federal agency reserved water rights have an equitable apportionment or compact water share?

The United States Supreme Court held in *Arizona v. California* that its equitable apportionment jurisdiction applies only to suits between states and not to Indian Tribes. The Court also held, under the Boulder Canyon Project Act, that all Colorado River mainstream uses for Tribal and federal agency reserved water rights within a State are to be charged against that State's interstate river apportionment. Typically, interstate water compacts contain a provision disclaiming any intent to affect Tribal water rights.

How do federal environmental laws come into play?

The Endangered Species Act, the Clean Water Act, the National Environmental Policy Act, the Federal Land Policy and Management Act, the National Forest Management Act, and other federal land and environmental laws impact the construction and operation of federal and non-federal reservoirs as well as direct flow diversions that use a portion of a state's compact-apportioned water.

The 1923 South Platte River Compact

Feeding Colorado's People and Crops

The South Platte River has always been Colorado's workhorse, providing water to most of its residents and serving its agricultural, industrial and urban needs. The pressures of more people and a scarce supply are expected to increase. Two out of every three Coloradans are projected to live in the basin by 2050. Meanwhile, more than 30 percent of the state's irrigated farmland—about 1 million acres—relies on its water.

Colorado shares the waters of the Platte primarily with Wyoming and Nebraska, and disputes over the use of the water have led to a full array of legal arrangements. Colorado's portion of Platte water is governed by four agreements: its two existing U.S. Supreme Court equitable apportionment decrees, an interstate compact and an interstate administrative agreement.

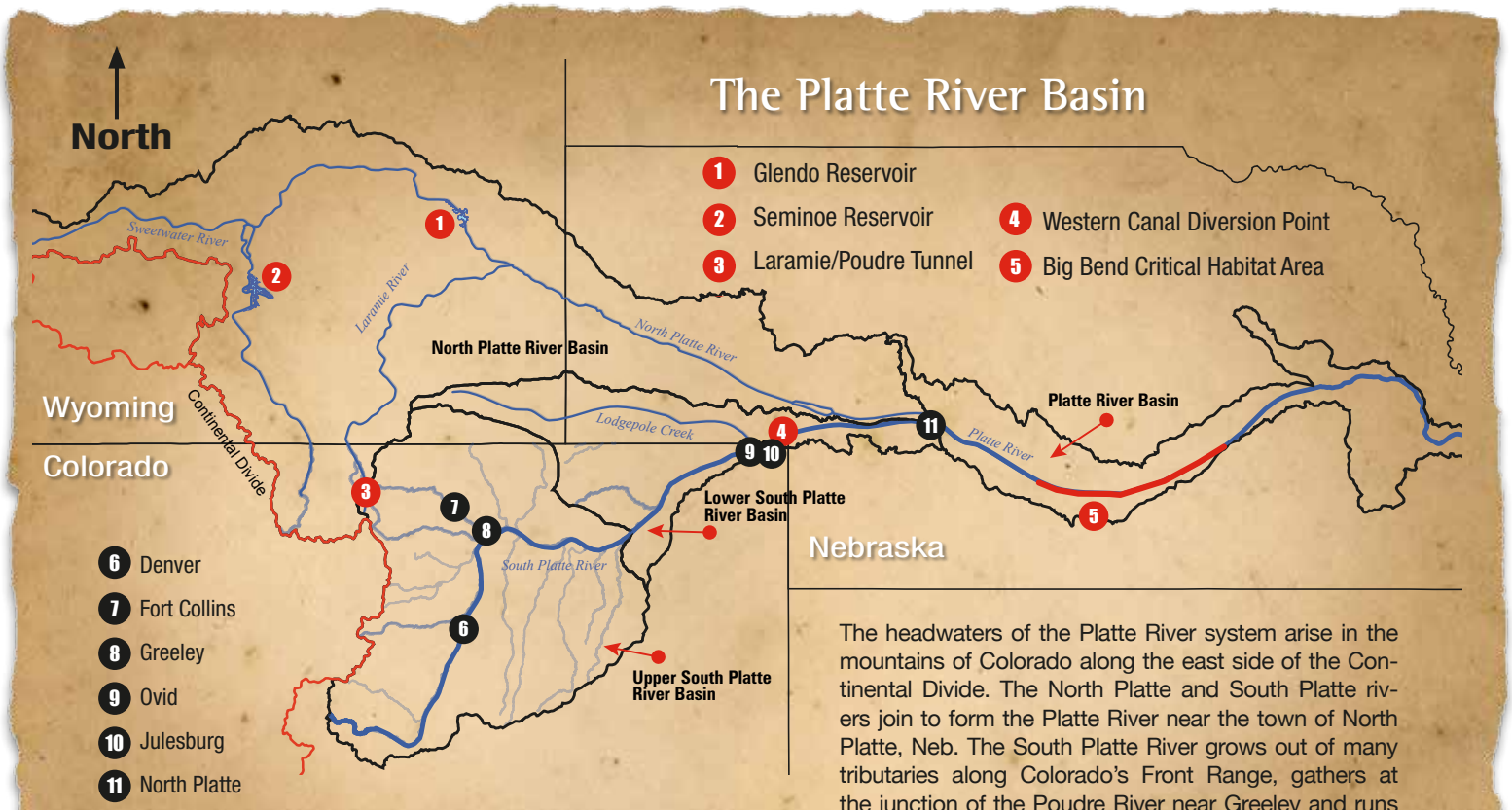
While the South Platte River Compact has produced much-needed certainty and protection to promote northern Colorado's development, growth and prosperity, challenges such as conserving endangered species and accommodating urban growth have emerged.

A Fertile Plain Below the Shining Mountains

Before the 1859 gold rush, the land area drained by the South Platte River was part of what Major Stephen Long called in his 1820 exploration report the "Great American Desert." In fact, the South Platte River pulled a disappearing act naturally. Once the mountain snowpack melted, it would vanish into riverbed sands from Fort Morgan, Colo., to the confluence with the North Platte River in Nebraska.

John C. Fremont's ebullience countered Long's foreboding pessimism. Exalting the "shining mountains" from Longs Peak to Pikes Peak, Fremont's

Benjamon Eaton helped build two canals near Greeley. He served in the Colorado legislature, helping craft the water provisions of the 1876 constitution, and later served as governor.



The headwaters of the Platte River system arise in the mountains of Colorado along the east side of the Continental Divide. The North Platte and South Platte rivers join to form the Platte River near the town of North Platte, Neb. The South Platte River grows out of many tributaries along Colorado's Front Range, gathers at the junction of the Poudre River near Greeley and runs into Nebraska below Julesburg. The Laramie and North Platte rivers arise in Colorado north of Rocky Mountain National Park and join in Wyoming. Colorado's share of Laramie and North Platte river water is governed by the Supreme Court's equitable apportionment decrees in *Wyoming v. Colorado* and *Nebraska v. Wyoming*. The State Engineers are authorized to administer the South Platte Compact.

1843 report described the soil of Colorado's Front Range country to be "excellent, admirably adapted to agricultural purposes" and "capable of supporting a large agricultural and pastoral population. The plain is watered by many streams."

Some of the "1859ers" settled into the river valleys of the South Platte after the discovery of gold at the confluence of the Platte and Cherry Creek. One was Benjamin Eaton, a farmer from Iowa who busted out as a miner in the foothills west of Golden. Setting out in 1860 to look for gold in San Juan Mountain country, he turned south into New Mexico. At the junction of the Santa Fe Trail and the Taos wagon road, he learned how to work water from an *acequia,* a community water distribution system, on the Maxwell Land Grant outside of Cimarron. Returning to Colorado in 1864, Eaton cut a similar direct flow irrigation ditch to his homestead farm on the Poudre River between Fort Collins and Greeley.

When the 1870 Union Colony settlers came into the Greeley area and failed at their first attempt to construct a workable water system, Eaton helped them build their two successful canals. He served in the Colorado legislature, helped craft the water provisions of the state's 1876 constitution, became governor and launched Weld County's sugar beet industry.

Delph Carpenter, a first-generation descendent of Union Colony settlers, gained a thorough knowledge of the South Platte River and specialized in irrigation law as an attorney. Carpenter's love of the mountains, plains and Colorado's water heritage tracked directly from his own parents as well as statesmen like Eaton. He fervently believed that Colorado's headwater rivers belonged to Colorado, but promoted interstate compacts as the appropriate method of solving water matters between states sharing a stream system.

After Carpenter left the state senate and became Colorado's interstate streams commissioner in 1911, he focused on every aspect of negotiation and litigation involving the North and South Platte rivers. He was unable to forge a compact with Wyoming and Nebraska on the North Platte and with Wyoming on the Laramie but succeeded with Nebraska on the South Platte.

Nebraska was amenable to the idea of an interstate compact when conflicts emerged. The resulting negotiations became the second effort to resolve a water controversy between two or more states in the arid West through such a treaty. Along with the Colorado River Compact, the South Platte River Compact set the precedent for many more.

Population Pressures in the South Platte Basin

The Colorado State Demography Office estimates that the state's population could increase from about 5 million people in 2009 to 10 million in 2050. The population of the South Platte River Basin could rise from about 3.5 million in 2009 to 6.5 million in 2050, roughly two-thirds of the state's residents. Because the native water supply of the South Platte River Basin within Colorado's compact apportionment is over-appropriated, meeting the water needs of the basin's future population will likely require a combination of measures. These likely will include additional conservation to reduce municipal water demand. Transfers of water from agricultural to municipal use through leases and purchase of senior agricultural rights will continue. Other measures will include reuse of water imported from other basins, new water imported from other basins and use of non-tributary groundwater. The timing of measures to meet the growing water demand will become increasingly important. If all the water needs were to come from current agricultural water rights, as many as 340,000 acres of the approximately 1 million irrigated acres in the basin could be dried up.

Delph E. Carpenter
Colorado Commissioner for South Platte River Compact

Delph Carpenter, the architect of the idea of using compacts to settle interstate water disputes, grew up along the South Platte River. Carpenter, a first-generation son of Union Colony settlers in Greeley, Colo., served as a Colorado state senator from 1909 to 1911. Following his re-election defeat, the Colorado General Assembly named Carpenter the state's interstate stream commissioner.

Delph Carpenter while a law school student.

His initial duty was to represent Colorado in the *Wyoming v. Colorado* equitable apportionment lawsuit in the U.S. Supreme Court. In 1916 he began negotiations with Nebraska that ultimately led to the South Platte River Compact. In 1918 he began his work with New Mexico on the La Plata River Compact.

Carpenter's travels on the Arkansas River in 1921 with the interstate stream commissioner from Kansas convinced him that storage facilities on the river could stabilize Colorado's water uses while improving return flows to downstream states.

In 1922, Carpenter came to the Colorado River Compact negotiations firmly convinced that the seven states needed to reach a fair agreement to share the waters of the Colorado River before the construction of the major reservoirs above and below Lee Ferry that would be necessary for compact operation.

Based on international law theories, Carpenter first insisted in the negotiations that the Upper Basin states were entitled to use the water originating in them, without limitation by the downstream states. However, his inevitable concession to the water needs of other states stemmed from his careful study of the U.S. Constitution and the practicality of what was necessary to secure a perpetual allocation of water for Colorado.

He found the framework for settling disputes among states in the compact clause of the U.S. Constitution, with the approval of Congress, acting in a spirit of cooperation and equal dignity. He called this "comity."

Compact Requires Colorado and Nebraska to Share the South Platte

In the months during the irrigation season when crops needed water to grow, Colorado had fully appropriated the direct flow potential of the South Platte River before the 1890s, but Nebraska's irrigation activities on the river were only starting. Nebraska sued Colorado in 1916 over the South Platte, claiming that irrigated farms in Colorado deprived Nebraska of water at the state line. In response, Carpenter explored the length and breadth of the river in Colorado, evaluating the operation of irrigation ditches. He worked doggedly to negotiate a compact with Nebraska.

Carpenter discovered that the South Platte River had distinct upper and lower parts. The upper part included the vast majority of irrigated lands. The lower part benefitted from return flows of unconsumed irrigation water draining back into the river where Morgan and Washington counties met. Below that point, the topography became, in Carpenter's view, an obstacle to further irrigation and reservoir development in Colorado.

When Nebraska became convinced that Colorado irrigation actually sweetened the river with a steady flow at the state line, it settled for a right to some of the water flowing into Nebraska from Colorado.

Between 1916 and 1923, when Nebraska approved and signed the compact, extensive studies revealed the relationship between water use, flows returning to the river after use and the relative needs of the water users of the two states. The provisions of the South Platte River Compact reflect that understanding, and time seems to have verified its framers' knowledge, discernment and vision.

Between April 1 and Oct. 15 of each year, the compact requires Colorado to curtail appropriations in the lower part of the river that impact flows at the state line and whose decrees are junior to June 14, 1897, when the flow at the state line is less than 120 cubic feet per second. This is the appropriation date of the Western Irrigation Canal, which diverts below Julesburg at the state line.

Nebraska also got full use of the water flowing in Lodgepole Creek above the point of division two miles north of the two states' boundary. Colorado is entitled to full and uninterrupted use of the waters of the South Platte River at all times between Oct. 15 and April 1 in the lower part of the basin. However, a compact provision allows Nebraska to build the Perkins County Canal which would divert water near Ovid, CO at a rate of up to 500 cubic feet per second into Nebraska during this same time frame, so long as Colorado has been able to divert 35,000 acre-feet prior to this diversion. To date, the Perkins County Canal has not been built.

Pumping Groundwater and Protecting Endangered Species

One consequence of the compact is that most Colorado appropriations for irrigation made after June 14, 1897 by ditches below Julesburg have since been abandoned. But wells were later drilled in the South Platte alluvium to supplement limited water supplies. To continue pumping, well owners must replace water to the stream to satisfy their out-of-priority depletions in order to protect senior ditch rights and maintain water deliveries to Nebraska.

To accomplish this replacement, well operators have turned in part to the compact's Oct. 15 to April 1 period for storing, recharging and exchanging water into the underground aquifer. Return flows from these wintertime recharge operations flow back into the river during the irrigation season to protect senior rights and the compact.

In addition to irrigation water, the Platte River in central Nebraska provides temporary habitat for migratory birds including the piping plover, interior least tern and whooping crane, while the lower Platte River in Nebraska offers habitat for the pallid sturgeon. These species are on the federal threatened or endangered species list. This means that water activities in Colorado that require federal permits to be built or to operate must mitigate for their impacts to the species in Nebraska.

To achieve the dual goal of preserving Colorado's entitlements under the South Platte River Compact and providing adequate mitigation toward conserving these birds and fish, senior officials and water users in all three states began a series of meetings in 1993. From this, 14 years of negotiations resulted in a recovery program that was adopted in 2006.

Colorado, Nebraska, Wyoming and the Department of the Interior are working with water and environmental interests to restore and protect important habitat and increase stream flows in the Platte River in Nebraska. ❑

An Agreement on the Waters of Sand Creek

Sand Creek is a small tributary of the Laramie River Basin in north-central Colorado. The Sand Creek Memorandum of Agreement allocates the waters diverted from Sand Creek between Colorado and Wyoming in accordance with the priority water rights in each state.

The original Sand Creek agreement was executed in 1939. In 1997, the agreement was amended to reflect actual administration. Specifically, the amendment requires Colorado to deliver 40 cubic feet per second to the state line, or as much as can be made available by administering water rights in Colorado for a seven-day period at the start of the irrigation season. Thereafter, Colorado is required to deliver additional water if needed for irrigation by senior water rights holders in Wyoming.

The agreement is administered by the Colorado Division of Water Resources and illustrates how states can cooperatively work together to resolve water rights issues on small tributaries without litigation.

The Laramie River and Wyoming v. Colorado

The first of the Platte River tributaries to be apportioned by the U.S. Supreme Court was the Laramie River. Wyoming filed suit against Colorado in 1911, and in 1922 the Supreme Court's ruling restricted Colorado's use of the water of the Laramie River.

Wyoming sued to prevent Colorado from diverting Laramie River water through the Laramie-Poudre Tunnel for irrigation in Weld County. The Supreme Court decided that the transbasin diversion would be allowed because Colorado law allowed it. The court recognized senior water rights in both states and allocated a specific portion of what it determined to be the "dependable flow" to Colorado. As a result, the court decided that Colorado would receive 39,750 acre-feet of water per year. The balance, estimated to be 312,250 acre-feet each year, would go to Wyoming.

A mass allocation of water such as this grants one state a specified amount of water and allows the other state to use the rest. Thus, Colorado is allowed to receive its allocation in low-flow years but in high-flow years is limited to that amount, while Wyoming is entitled to surplus flows.

The North Platte River and *Nebraska v. Wyoming*

Colorado, Wyoming and Nebraska held sporadic—but ultimately unsuccessful—negotiations to develop a North Platte River interstate compact for about 10 years before Nebraska filed suit against Wyoming in the U.S. Supreme Court in 1934.

A water supply shortage stemming from the severe drought of the 1930s and federal funding and construction of the Casper-Alcova Project (now known as the Kendrick), a large water storage and irrigation project in Wyoming, prompted Nebraska to initiate the lawsuit.

After 11 years of litigation, the Supreme Court issued its opinion and decree apportioning the North Platte River in 1945. Although Colorado was not initially included in the lawsuit, Nebraska asked the Court to impose a comprehensive, interstate priority system to govern water uses in all three states.

The court recognized that priority of appropriation should be the guiding principle. The court also emphasized that it should exercise its powers to protect existing water uses and existing economic reliance on those uses. The decree limited Colorado to uses for irrigation and the transbasin diversion out of the North Platte River Basin that existed at the time.

Colorado was allowed to divert water to irrigate 135,000 acres in Jackson County; store 17,000 acre-feet of water per year for irrigation purposes; and export out of the basin up to an average of 6,000 acre-feet per year.

The decree did not affect or restrict the use of water from the North Platte River and its tributaries in Colorado or Wyoming "for ordinary and usual domestic, municipal and stock watering purposes and consumption." The decree also did not affect the apportionment that had been made by the Supreme Court between Wyoming and Colorado in the Laramie River decree.

In 1953, Colorado negotiated a relaxation of the restrictions on irrigation in Jackson County's North Park as part of an agreement with Nebraska and Wyoming to appropriate federal funding for construction of Glendo Dam and its reservoir on the North Platte River in Wyoming. The court allowed Colorado to increase irrigated acreage to 145,000 acres.

Three States Reach a Pact

In 1986, Nebraska filed suit against Wyoming again. Among other issues, Nebraska sought to prevent Wyoming's construction of a reservoir for municipal water use on a tributary of the North Platte. It claimed that groundwater development along the river in Wyoming had depleted the waters apportioned to Nebraska.

Nebraska, for the first time, argued that the Supreme Court should consider the need for flows in the Platte River through central Nebraska to protect wildlife, including threatened and endangered species, as it addressed the states' competing claims. Colorado's participation was aimed at assuring that any resolution would not further limit Colorado's use of the waters of the North Platte River.

On the eve of trial before the court-appointed special master, the three states and the United States agreed to settlement principles that avoided trial and led to a settlement, which was adopted by the court in 2002. Limitations on Colorado's use of the North Platte River were unchanged except that new allowances for certain uses, including small-capacity wells and small reservoirs, were added to the decree.

The settlement also created the North Platte Decree Committee, consisting of water administration officials from the three states and the federal government, to oversee compliance and reporting under the decree and address future disputes. In the event of an irresolvable dispute, one or more of the states may request the court to exercise its retained jurisdiction.

U.S. Supreme Court Ruling Describing Role of Equitable Apportionment and Compacts

"The dry cycle (1930s drought) which has continued over a decade has precipitated a clash of interests which between sovereign powers could be traditionally settled only by diplomacy or war. The original jurisdiction of this Court is one of the alternative methods provided by the Framers of our Constitution."

Nebraska v. Wyoming, 325 U.S. 589, 608 (1945)

Rich Agricultural Basin Helps Feed Three States

Although sparsely populated, the Republican River basin is an active agricultural region, producing corn, wheat, sorghum, dry beans and sugar beets. The river's basin includes about 560,000 irrigated acres in Colorado or about one-fifth of the state's total. Most of this acreage is irrigated by groundwater pumped from the Ogallala Aquifer. Yuma County, located entirely within the basin, is the largest corn-producing county in Colorado. The larger municipalities in the basin in Colorado include Wray and Burlington.

Drought and Flood Prompt Need for Compact

In 1940 Colorado, Kansas and Nebraska began negotiations for a compact in response to an extended drought during the 1930s, interrupted by a devastating flood in 1935. With the understanding that the waters of the Republican River Basin needed to be allocated before federal development in the basin (including flood control projects) could be undertaken, the states began work.

One of those who urged negotiations for a compact was Nebraska Sen. George Norris, who lived in McCook, Neb., an area that was inundated during the 1935 flood. Governors of the three states appointed commissioners and after eight meetings, they signed a proposed compact in March 1941.

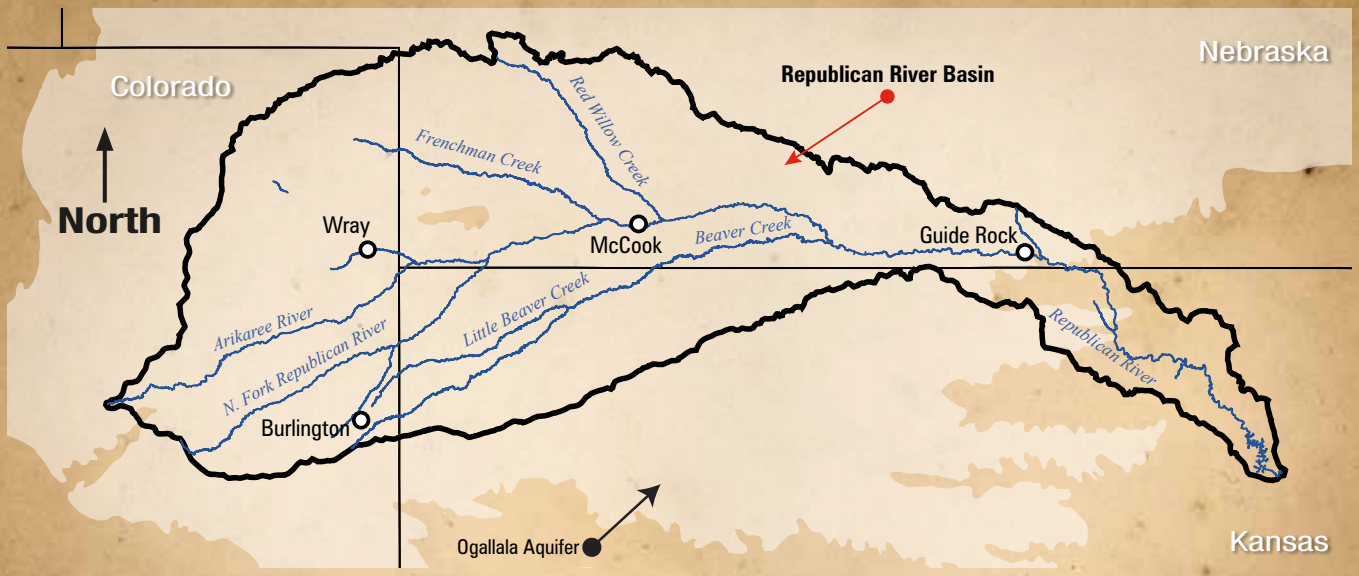
The agreement was ratified by the three state legislatures and consented to by Congress, but in 1942 President Franklin Roosevelt vetoed the bill approving the compact, in part because of an objection by the Federal Power Commission to a paragraph in the compact stating that the Republican River and tributaries within the basin were not navigable. After another round of negotiations that included a federal representative, a second Republican River Compact was signed by the commissioners on Dec. 31, 1942, ratified by the state legislatures, and approved by Congress and the president in 1943.

Three-Way Split of Republican's Waters

The compact encourages the states to use the waters of the Republican River Basin for beneficial purposes, to divide them equitably and to use them harmoniously. The compact also seeks to encourage efficient use of water and to control destructive floods.

The compact quantifies the average annual virgin water supply (defined as the water within the basin "undepleted by the activities of man") originating in the basin and its tributaries. Based on records for an 11-year period from 1929 to 1938, the average annual virgin water supply in the basin at the lowest crossing point was quanti-

The Republican River Basin



At 430 miles long, flowing from west to east, the Republican River Basin looks something like a drop of oil turned on its side. In Colorado, the basin lies between the South Platte River to the north and the north fork of the Smoky Hill River to the south. According to historian George Stewart, this river was named after a branch of Pawnee Indians known as "the Republicans." The Republican River begins in Nebraska at the junction of the North Fork of the Republican River and the Arikaree River, two rivers that rise in the northeastern plains of Colorado. They join in extreme southwestern Nebraska. After flowing east in Nebraska, the Republican River crosses the state line into Kansas and flows generally south until it joins the Smoky Hill River at Junction City, Kan., to form the Kansas River. The Kansas River then flows eastward to Kansas City, where it joins the Missouri River. The State Engineers and U.S. Geological Survey are authorized to administer the compact.

The Arikaree River (above) pictured just east of the Colorado-Nebraska state line. Colorado's allotment from the Arikaree River drainage basin is 15,400 acre-feet.

In 2004, the Colorado General Assembly created the Republican River Water Conservation District to assist efforts toward compact compliance.

fied as 478,900 acre-feet per year.

The compact also addresses the right to construct reservoirs or diversion works in an upper state for use in a lower state. The geography of the basin is such that Colorado is an upper state, but Kansas is both upstream and downstream of Nebraska. Water uses by federal agencies are included in allocations granted to the states.

For beneficial consumptive use, the compact allocated 54,100 acre-feet of water each year in Colorado; 190,300 acre-feet each year in Kansas; and 234,500 acre-feet each year in Nebraska, derived from the sub-basins and in the amounts specified in the compact. In addition, the entire water supply originating in the basin downstream from the lowest crossing of the river at the Nebraska-Kansas state line was allocated for beneficial consumptive use in Kansas.

If the water supply of any sub-basin varies by more than 10 percent of the 11-year average used as a basis for the compact, the allocations also change by the same percentage.

Officials of the three states organized themselves into the Republican River Compact Administration in 1959. Under accounting procedures adopted by the Administration, Colorado receives an allocation from Republican River sub-basins as illustrated in the table below.

Groundwater Pumping Prompts Controversies

In 1998, Kansas filed suit against Nebraska for violating the compact and named Colorado as a party but did not make any specific claims against Colorado. At the heart of Kansas' complaint was the assertion that the compact applied to groundwater as well as surface waters of the basin.

In 2000, the special master appointed by the U.S. Supreme Court to hear the case ruled that the Republican River Compact restricts a compacting state's consumption of groundwater to the ex-

Colorado's allotment from the Republican River	
North Fork of the Republican River drainage basin	10,000 acre-feet
Arikaree River drainage basin	15,400 acre-feet
South Fork of the Republican River drainage basin	25,400 acre-feet
Beaver Creek drainage basin	3,300 acre-feet
Frenchman Creek and Red Willow Creek drainage basins	The entire supply of the Frenchman Creek and Red Willow Creek drainage basins

In practice, the water supply is calculated each year and the total is apportioned among the states in proportion to the originally specified allotments.

Michael C. Hinderlider
Colorado Commissioner for Republican River Compact

Colorado's state engineer from 1923 to 1954, Michael Hinderlider epitomized the progressive era's ideal of the skilled water professional and public servant. Before becoming state engineer, he worked as a draftsman at the Denver Board of Public Works; hydrographer in the State Engineer's Office; and engineer for the U.S. Geological Survey in charge of river surveys in Colorado, Wyoming, Nebraska, Kansas, and North and South Dakota, and parts of Oklahoma, New Mexico and Utah.

As a practicing engineer, he helped with the design and construction of hydroelectric plants at Glenwood Springs and Redlands. He served as a consulting engineer to the U.S. Army Corps of Engineers for the design and construction of John Martin Reservoir and dam. The project became a key operating feature for delivery of water to Kansas under the Arkansas River Compact.

As state engineer, Hinderlider took great pride in being Colorado's interstate stream commissioner for the Rio Grande River and the Republican River compacts and representative for Colorado to all interstate stream commissions. Dedicated to river regulation and economic growth through scientific engineering and management, he bitterly opposed the creation of the Colorado Water Conservation Board in 1937, believing it was introducing politics into water matters.

Gary Earl prepares to plant dryland sorghum in a previously irrigated field near Wray in 2006.

tent the consumption depletes stream flow in the Republican River Basin.

After this ruling, the three states entered into intense negotiations to resolve their differences. In December 2002, the states entered into a settlement that waived all claims for monetary damages for past overuse of water against other states; established a general moratorium on new well development upstream of Guide Rock, Neb.; and created accounting procedures to be used to determine compact compliance.

The states agreed that compliance would generally be determined on a five-year running average except that in dry years, a two-year running average would be used for Nebraska. Averages (rather than yearly guarantees) generally allow more flexibility in water delivery and account for wide variations in precipitation.

The states also established a formal dispute resolution process and agreed that depletions to stream flows caused by well pumping would be determined by a groundwater computer model.

States Continue to Struggle with Compact Issues

Unfortunately, the final settlement did not permanently resolve all controversies between the states. Since 2002, Colorado and Nebraska have struggled to come into compact compliance. Kansas invoked the formal dispute resolution process and claimed $72 million in damages from Nebraska. Nebraska raised various issues regarding how compact compliance is determined. After the required non-binding arbitration, the arbitrator found that damages were significant but, citing an incomplete argument to substantiate the claim, recommended that Kansas be awarded a nominal $10,000 in damages and denied most of Nebraska's claims to change how compact compliance is determined.

Colorado has moved forward with its own plans to come into compact compliance as soon as possible. In 2004, the legislature created the Republican River Water Conservation District to assist efforts toward compact compliance. The District instituted a fee assessed on consumptive use of water within Colorado's portion of the basin and has used those funds as the local cost-share in programs to pay farmers to voluntarily retire irrigated lands, thus reducing the consumptive use of water within the basin.

The District has also planned to construct a pipeline to pump groundwater directly into the north fork of the Republican River to increase stream flows and offset stream depletions in order to comply with its compact allocations.

However, the final settlement stipulation requires that the Republican River Compact Administration approve the pipeline plan prior to operation. Citing concerns with the planned operation and accounting of the pipeline, Kansas and Nebraska rejected Colorado's proposal at the annual compact meeting in August, 2009. The following month, Colorado invoked the dispute resolution process to reach a decision and allow the project to proceed. ❑

The 1948 Arkansas River Compact

Three Eras of Dispute and a New Era of Peace

The Arkansas River has been subject to three separate eras of dispute, starting more than a century ago. In 2009, prospects for a lasting peace finally started to look brighter.

Irrigation in the Arkansas River Basin in Colorado began in 1859, shortly after the Pikes Peak gold rush, mostly using small ditches near Pueblo. Large-scale irrigation began in 1874 in the Rocky Ford area and most of the major irrigation systems in the river's valley were developed during the 1880s.

Because the water supply was inadequate, a number of reservoirs were constructed to store surplus flows during the spring runoff and when water was not needed for direct irrigation use. In addition, several projects were constructed to import water into the upper Arkansas River Basin, mostly from the Colorado River Basin.

Conflicts Lead to John Martin Reservoir

At the turn of the 20th century, conflicts between Kansas and Colorado over use of the Arkansas River led to the 1907 U.S. Supreme Court decision in *Kansas v. Colorado* that first laid out the doctrine of equitable apportionment of interstate rivers. Conflicts between Kansas and Colorado irrigators continued, however, leading to private lawsuits among them.

In 1936, Congress authorized the John Martin Reservoir project to provide flood control and storage for Colorado and Kansas to facilitate sharing of the waters of the Arkansas River. John Martin Dam impounds the Arkansas River downstream from its confluence with the Purgatoire River, roughly 60 miles upstream from the Colorado-Kansas state line. The reservoir is operated by the U.S. Army Corps of Engineers.

The U.S. Supreme Court in 1943 denied both Kansas' request for an equitable apportionment of the river flows and Colorado's request that the court apportion water stored in John Martin Reservoir between the states. In its ruling, the court suggested that the states should try again to negotiate a settlement under the compact clause of the U.S. Constitution.

Finally, in December 1948, after 17 meetings of the Arkansas River Compact Commission over a three-year period, the commissioners signed the compact, which was ratified by the legislatures of both states and approved by Congress in 1949.

But only a few decades of peace followed. Kansas appealed to the Supreme Court again in 1985, claiming that Colorado was in violation of the compact. The Supreme Court rejected two of Kansas' claims, but ruled in favor of one of them, finding in 1995 that well pumping in Colorado had depleted flows owed to Kansas.

The states finally brought *Kansas v. Colorado* to a close with an agreement on the final technical issues in mid-2009. Kansas and Colorado are now working closely together to monitor well pumping and replacement of well depletions, with frequent meetings and monthly exchanges of data. The two states also cooperate in the operation of a complex computer model to determine compact compliance. They have agreed on an out-of-court dispute resolution procedure they hope will prevent future litigation.

Protecting Existing and Future Use

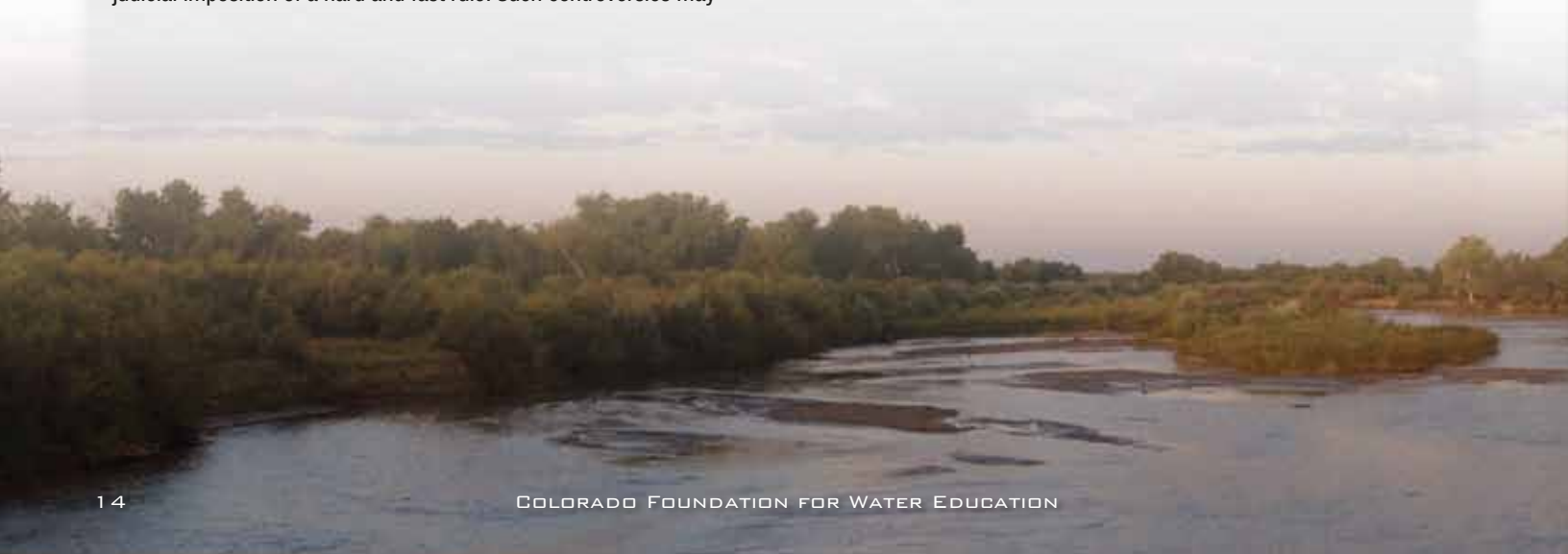
The compact was designed to settle existing disputes over the Arkansas, remove causes of future controversy, equitably divide the waters of the Arkansas between Colorado and Kansas and equitably apportion the benefits of John Martin Reservoir.

The Arkansas River Compact is unusual in that it does not apportion the waters of the river between the states in specific amounts or as a percentage of river flows. Instead, it includes language designed to protect the existing uses in both states from depletions due to future

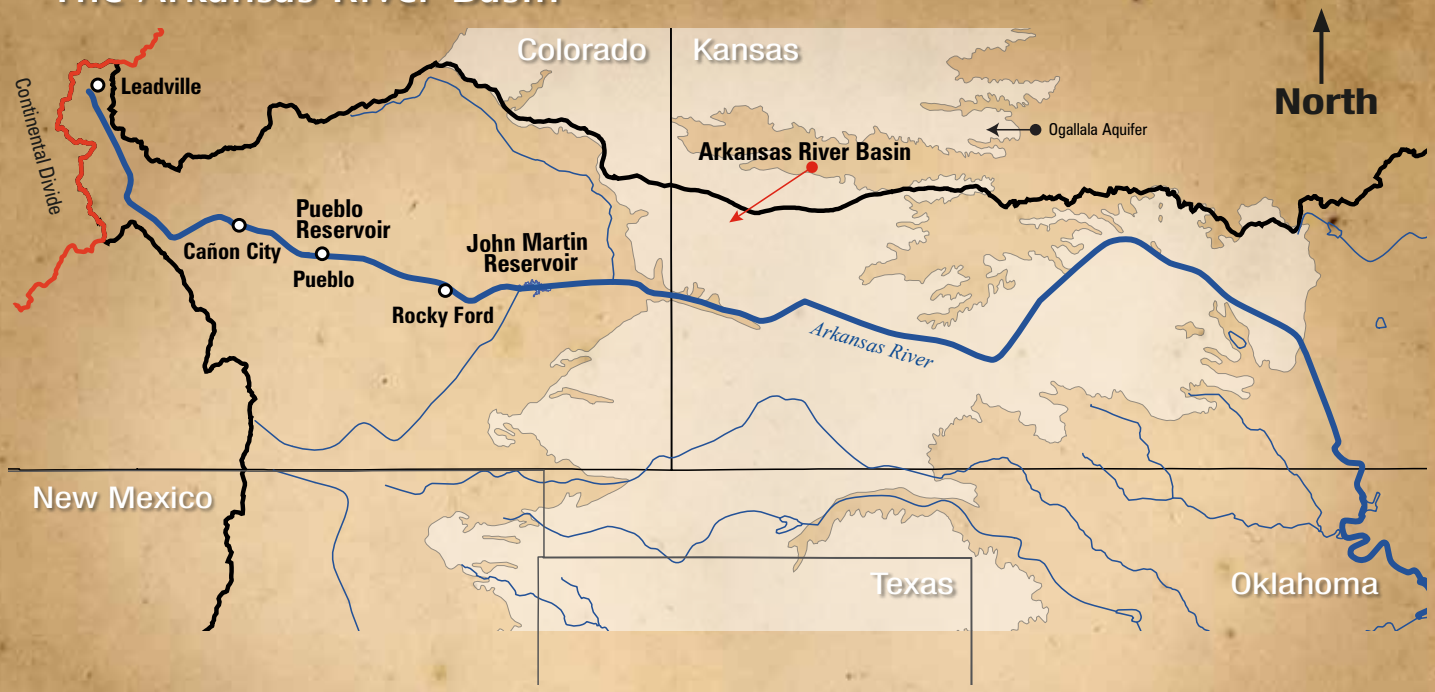
U.S. Supreme Court Ruling Describing Role of Equitable Apportionment and Compacts

"The reason for judicial caution in adjudicating the relative rights of states in such cases is that, while we have jurisdiction of such disputes, they involve the interests of quasi-sovereigns, present complicated and delicate questions, and, due to the possibility of future change of conditions, necessitate expert administration rather than judicial imposition of a hard and fast rule. Such controversies may appropriately be composed by negotiation and agreement, pursuant to the compact clause of the Federal constitution. … [S]uch mutual accommodation and agreement should, if possible, be the medium of settlement, instead of invocation of our adjudicatory power."

Kansas v. Colorado, 320 U.S. 383, 392 (1943).



The Arkansas River Basin



The Arkansas River Basin drains a large portion of southeastern Colorado, yet the flows of the Arkansas River are small compared to neighboring rivers with headwaters in the Colorado Rocky Mountains. The Arkansas River originates on the eastern slope of the Rocky Mountains above Leadville, just east of the Continental Divide, and then flows through a narrow gorge in the mountains until it emerges in the foothills region near Cañon City. After flowing through a narrow valley to Pueblo, the river meanders across the plains into Kansas. The narrow headwaters area of the Arkansas River produces a relatively constant, but limited runoff from snowmelt. As a result, the Arkansas River Basin is one of the most over-appropriated basins in the state. The Arkansas River Compact Administration is authorized to administer the compact.

Henry C. Vidal
Colorado Co-Commissioner for Arkansas River Compact

Henry Vidal practiced water law in the Arkansas River Valley and served as Pueblo County attorney for four years before moving to Denver in 1914. In 1933, Colorado selected Vidal to participate in a seven-state committee examining uses of the Arkansas River. Vidal supported southeast Colorado Congressman John Martin in the successful effort to obtain congressional authorization for construction of what became known as the John Martin Reservoir near Lamar, Colo. The reservoir, which began storing water in 1943, became the central feature for resolution of the long-standing dispute between Kansas and Colorado, and led to the Arkansas River Compact.

Harry B. Mendenhall
Colorado Co-Commissioner for Arkansas River Compact

Rocky Ford banker Harry Mendenhall receives credit for his part in the Mendenhall-Leavitt interim agreement, which the Arkansas River Compact Commission adopted as the permanent basis for the division of Arkansas River water between Colorado and Kansas. W.E. Leavitt was one of the Kansas commissioners. The agreement provided for a temporary arrangement for operating John Martin Reservoir during the irrigation season, pending the Arkansas River Compact negotiations.

Dividing the Waters of John Martin Reservoir

Different rules govern how water is stored during the winter and released during the summer at John Martin Reservoir. Winter storage begins November 1 and continues until March 31 of the following year. Summer storage occurs the rest of the year.

With a limited exception for releases that can be requested by Colorado during winter storage, all water entering the reservoir is stored in a common pool, subject to releases that may be requested by both states during the summer storage period.

The maximum rates give Colorado 60 percent of the releases and Kansas 40 percent of the releases. However, the amount of water released to either state was not limited.

By the 1970s, it was clear that the system for dividing the water stored at John Martin Reservoir was causing an inefficient race to empty the available water each April. The commissioners experimented with an account system in John Martin Reservoir and in 1980 adopted an operating plan for the reservoir that established separate storage accounts for the ditches downstream of John Martin in Colorado and for Kansas.

Under this plan, water is allocated into individual Kansas and Colorado user accounts each April rather than being physically released from the reservoir. This allows more timely and efficient use of water in accordance with actual demand.

Despite the subsequent conflicts between the states on other matters in *Kansas v. Colorado,* the 1980 operating plan has proved highly satisfactory and, with some minor amendments, continues in effect.

Gail Ireland (on the right) being sworn in as Colorado Attorney General on January 15, 1941.

Gail L. Ireland, Colorado Co-Commissioner for Arkansas River Compact

Born on a farm in Weld County, Gail Ireland served as Colorado's attorney general from 1940 to 1944 and represented Colorado in the ongoing water lawsuits with Kansas, Nebraska and Wyoming. He also served as an ex-officio member of the Colorado Water Conservation Board. After his elected service, Ireland rejoined the law firm of Ireland, Stapleton and Pryor and continued his water law practice.

developments—but without quantifying those uses.

In a nutshell, this compact allows future additional water uses in the Arkansas River Basin in Colorado and Kansas only if the waters of the Arkansas River "shall not be materially depleted in usable quantity or availability for use to the water users in Colorado and Kansas." The Supreme Court found Colorado in violation of this standard in *Kansas v. Colorado* because of post-compact groundwater development in Colorado that had reduced flows at the border between the states.

The compact recognizes that even with storage in John Martin Reservoir, there were some available flood flows and winter flows that were not yet appropriated in 1948. It allows future appropriations of such water in either state, so long as the rights of existing water users are protected. The compact allocates only the "waters of the Arkansas River," defined as the waters originating in the basin upstream from the Colorado-Kansas state line. It thus excludes the significant amount of water that is imported into the Arkansas River basin from the Western Slope.

Enforcement is to be accomplished primarily through the state agencies and officials charged with the administration of water rights within each state. The compact created the Arkansas River Compact Administration, an interstate agency that administers the provisions of the compact and sets procedures for operating John Martin Reservoir. ARCA also has the authority to investigate violations of the compact.

Colorado Well Pumping Leads to $34 Million Payment to Kansas

In 1985, Kansas alleged that Colorado had violated the material depletion standard due to three post-compact developments. The court agreed with one of those allegations: post-compact well pumping.

In 1996, the Division 2 water court in Colorado approved rules promulgated by the state engineer designed to address the well-pumping concern. Groundwater users in the Arkansas River Basin are required to provide replacement water for depletions to surface water rights in Colorado and to Kansas for depletions to usable state line flows.

In 2005, Colorado paid $34,615,146 to Kansas in damages for 428,005 acre-feet of depletions to usable river flows at the state line caused by well pumping from 1950 through 1996. Depletions after

With whitewater rafting as a major tourist attraction, Chaffee County obtained a recreational in-channel diversion water right on the Arkansas River in 2006.

. . . this compact allows future additional water uses in the Arkansas River Basin in Colorado and Kansas only if the waters of the Arkansas River "shall not be materially depleted in usable quantity or availability for use to the water users in Colorado and Kansas."

1996 have been and will be determined using a complex computer model of the basin and a 10-year accounting process. In the future, Colorado will make up depletions in water, not money. Colorado has been and remains in compliance with the compact since 1997.

In January 2008 after years of work, special master Arthur Littleworth issued a report to the court which, he wrote, was "crafted with the firm intent to end the 100-year history of litigation over rights to the Arkansas River." In March 2009, the court approved the most recent decree in *Kansas v. Colorado* but retained jurisdiction for limited purposes. Using the dispute resolution procedure under that decree, the states were able to resolve Kansas' concerns by an agreement dated June 26, 2009.

The Colorado State Engineer's Office began developing another set of compact rules, this time designed to proactively address Kansas' concern that certain improvements to surface water uses (as opposed to groundwater uses) in Colorado may violate the compact.

Kansas representatives have expressed concern that the recent trend toward improved efficiency in surface water irrigation systems diverting from the Arkansas River in Colorado will increase crop water consumption and reduce historical seepage and return flows owed to Kansas under the "no material depletion" standard of the compact.

Draft irrigation improvement rules are designed to evaluate the effect of proposed improvements of irrigation technology on return flows and provide the irrigators with multiple options for maintaining their historical seepage and return flows to the Arkansas River. The proposed new rules were submitted to the Colorado Water Division 2 Court in September 2009 for approval. A court date was set for late 2010. ❑

Rafting and Fishing on the Arkansas

Colorado water users have come up with creative agreements that improve the upper reaches of the Arkansas River for river rafting and fishing. Through agreements with the Bureau of Reclamation on stretches of the river above Pueblo Reservoir, Colorado stakeholders have been able to improve the world-class whitewater rafting season on the upper Arkansas as well as improve flows for fishing without endangering Colorado's ability to comply with the compact.

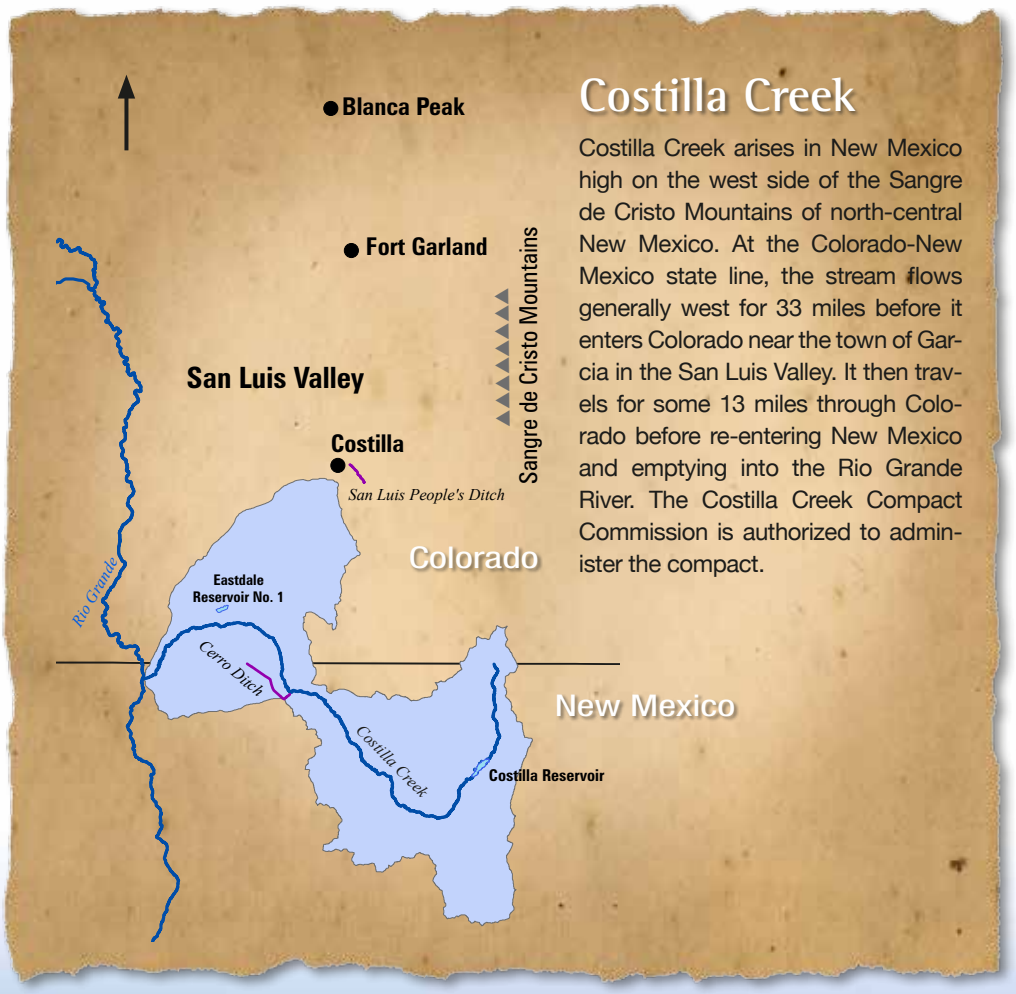
The 1944 Costilla Creek Compact, Amended 1963

History of Divided Settlement and Conflicting Water Rights

The Costilla Creek Compact reflects the diverse mix of water users in both Colorado and New Mexico who have shared and sometimes fought over the waters of the stream. It was hammered out after years of confusing jurisdiction and conflicting claims in 1944.

The compact gives roughly one-third of the water to Colorado and roughly two-thirds to New Mexico. Since then, violence occasionally flared during the drought of the 1950s, but no lawsuits between the states have occurred.

Costilla Creek flows through the San Luis Valley, which has a rich American Indian, Hispano and Anglo immigrant history and was once part of the Ute Indian homeland. Located on the east side of the valley, Blanca Peak is one of the four Navajo sacred mountains. When the valley was part of Mexico, that government in the early 1840s carved out a land grant comprising more than 1 million acres from north of Taos to Blanca Peak. But the Utes hostilely opposed settlement and thus it was unsuccessful.



Costilla Creek

Costilla Creek arises in New Mexico high on the west side of the Sangre de Cristo Mountains of north-central New Mexico. At the Colorado-New Mexico state line, the stream flows generally west for 33 miles before it enters Colorado near the town of Garcia in the San Luis Valley. It then travels for some 13 miles through Colorado before re-entering New Mexico and emptying into the Rio Grande River. The Costilla Creek Compact Commission is authorized to administer the compact.

Forts and Fights Follow the Mexican-American War

After the 1846 Mexican-American War, settled by the 1848 Treaty of Guadalupe Hidalgo, the U.S. Army established Fort Massachusetts at the foot of Blanca. That was followed by Fort Garland, which Kit Carson commanded for a brief time. Hispano farmers from northern New Mexico then settled on grant lands and constructed *acequias* (direct flow irrigation ditches) for their crops and small communities.

When the Union Congress created the Colorado Territory in 1861, the dividing line between Colorado and New Mexico cut across the valley just north of the town of Costilla. After he left office, William Gilpin, the first territorial governor of Colorado, bought the Sangre de Cristo grant from Carlos Beaubien in 1863. He divided the grant into the northern Trinchera estate and the southern Costilla estate. Funded by Dutch investors, the United States Freehold Land & Emigration Company bought the Costilla estate.

Decades of Struggles Over Intertwined Priorities

Decades of water rights struggles followed. The acequias held the earliest water rights under Colorado and New Mexico prior appropriation law and a state court decree of 1889.

But U.S. Freehold filed a federal court lawsuit contending that it had riparian water rights attached to its land and the acequias had obtained more water under the state decree than they could actually use. In 1900, a settlement resulted in U.S. Freehold obtaining part of the water decreed to the *acequias*. When U.S. Freehold went bankrupt by the start of the 20th century, its land and water rights eventually passed into the hands of the San Luis Power and Water Company.

The San Luis People's Ditch, with the oldest continuous water right in Colorado dating to 1852, diverts in the Culebra watershed. In the Costilla Creek watershed, Hispano acequias successfully applied water to beneficial use by means of numerous ditches, while the land development companies floundered.

Mormon pioneers constructed the two Eastdale Reservoirs in Colorado during the early 1890s. The San Luis Power and Water Company bought the Eastdale reservoirs and some of the acequia water rights in 1909 and then constructed the Costilla Reservoir and Cerro Ditch in New Mexico.

Thus, an intermixed set of priorities existed across the Colorado-New Mexico state line decreed by the courts of the two states, necessitating coordinated administration by the state engineers of both states. By the advent of World War II, approximately 5,126 acres were being irrigated in Colorado and 4,978 acres in New Mexico in the Costilla Creek basin.

A Compact Sorts Out the Claims

Over the decades, significant problems had arisen because of conflicting jurisdiction between the two states over structures that were diverting water in each of them for use in the other. The New Mexico state engineer ultimately issued an order restricting the use of Costilla Reservoir to use only in New Mexico, but the reservoir and the Cerro Ditch in New Mexico were built to operate in connection with the Eastdale Reservoirs in Colorado for uses on both sides of the border.

Consequently, the San Luis Power and Water Company challenged the New Mexico state engineer's order by filing a federal court lawsuit, resulting in the Tenth U.S. Court of Appeals recommending that the two states enter into a compact.

Colorado and New Mexico agreed to the Costilla Creek Compact in February of 1944. A commission composed of the state engineers of Colorado and New Mexico oversees the compact. It sets forth the amount of water to be delivered to the water users in Colorado and New Mexico, and lays out how to allocate surplus flows and any storage in reservoirs constructed after the compact took effect. The commission has adopted an operating manual and installed remote gauging equipment.

Drought and Violence Follow, But No More Lawsuits

The 1950s drought led to conflicts between water users of the Costilla Creek watershed. Violence extended beyond destruction of head gates and ditches to acts of intimidation and death threats. There are even reports that lawbreakers shot at the water master who was appointed to oversee compact administration and that they also fired at representatives of the water company. The governors of Colorado and New Mexico worked together to restore the peace. A New Mexico state patrol officer accompanied the water master for several years.

The San Luis Power and Water Company divested its interests in 1956, and the Rio Costilla Cooperative Livestock Association obtained the New Mexico direct flow and storage rights. Successors to the Jaroso Colony in Colorado obtained the company's interests.

The compact requires specific deliveries to be made to water users in Colorado from the flows of Costilla Creek below the canyon mouth where the Creek leaves the mountains. The usable capacity of Costilla Reservoir is allocated 36.5 percent to Colorado water users and 63.5 percent to New Mexico users. Delivery is made by the Cerro Ditch.

No interstate water litigation has occurred between the two states since approval of the compact, although it was amended in 1963 to allow a change in point of diversion for the Cerro Ditch.

But peace has not prevailed. Operation of the Eastdale Reservoir on the Colorado side and the use of surplus water available in some years have continued to be contentious issues. ❑

Clifford H. Stone
Colorado Commissioner for Costilla Creek Compact

Like Delph Carpenter, Clifford Stone was another small-town home-grown lawyer/legislator/diplomat. He became the first director of the Colorado Water Conservation Board in 1937. A former county judge in Gunnison, Colo., Stone was elected to the Colorado House of Representatives in 1936. He co-sponsored the 1937 legislation creating the Colorado Water Conservation Board and the Colorado River Water Conservation District.

A direct product of the great Dust Bowl drought whose members were anxious about the future of Colorado's water, the new water conservation policy board was granted a leading role in interstate water negotiations and in shepherding reservoir construction. Stone resigned from the legislature to become the board's first director, an office he held from 1937 until 1952 when he died of a heart attack while attending a water meeting.

Known as "Judge" Stone, he first served as Colorado commissioner for the original Costilla Creek Compact, signed in 1944. Stone and Jean Breitenstein, attorney for the Colorado Water Conservation Board, played leading roles in the negotiation and ratification of the 1948 Upper Colorado River Compact. Stone served as vice chairman of the Upper Colorado River Commission and traveled throughout Colorado urging construction of water projects on both sides of the Continental Divide.

The Sangre de Cristo range, including Mt. Blanca (right) borders the east side of the San Luis Valley.

The 1938 Rio Grande Compact

The Rio Grande drainage is composed of two distinct sections: the Upper Basin extending southerly from its headwaters in Colorado's San Juan Mountains some 650 miles to Fort Quitman, Texas, and the Lower Basin, which extends from Fort Quitman to the Gulf of Mexico. Above Fort Quitman, nearly all the water is consumed for irrigation and other uses. The Upper Rio Grande Basin is subdivided into the San Luis Valley in Colorado; the Middle Rio Grande, the area of New Mexico above San Marcial; and the Elephant Butte-Fort Quitman section in southern New Mexico, western Texas and northeast Mexico. The Rio Grande River Compact apportions the water of the Upper Basin between these three regions. The Rio Grande Compact Commission is authorized to administer the compact.

A Contentious History Across State Borders

The Rio Grande River has a rich international past, dating to its use by American Indians for irrigation before Coronado "discovered" the waterway in 1540. By the late 1800s, the river was the source of tension for the same reason as most Western rivers are eventually fought over: There was more demand for the water than water available.

In the 1890s, with irrigation in Colorado's San Luis Valley already decades along, downstream users started experiencing water shortages. Upstream use was blamed. The Secretary of the Interior embargoed any additional development of reservoirs on federal lands along the Rio Grande in Colorado or New Mexico in 1896.

A few years later, Congress authorized the Rio Grande Project, which apportioned water between southern New Mexico and Texas and includes Elephant Butte and Caballo dams. The United States and Mexico signed a treaty dividing the waters of the Rio Grande, and Elephant Butte Reservoir was key to helping the United States meet its obligations.

But the embargo on upstream development continued intermittently through the 1920s and was reimposed in the 1930s to hasten final compact negotiations.

Federal Study Finds Colorado Reservoirs Help River Basin

In 1929, Colorado, New Mexico and Texas signed a temporary compact—a "standstill" agreement under which Colorado and New Mexico agreed in essence to maintain the status quo on the river. The three states agreed to collect additional data and negotiate a permanent compact. A 1937 comprehensive federal study of the water supplies and uses in the Upper Rio Grande Basin paved the way to agreement.

The federal water study confirmed that the normal water supply of the Upper Rio Grande Basin was fully appropriated. The study determined that importation of water or capture of flood flows that would otherwise spill from the Rio Grande Project were the only means by which water use in the basin could increase.

The study also found that reservoir development in Colorado would benefit the entire basin because the increased return flows from Colorado would enhance water supplies in New Mexico and such storage would have

By the late 1800s, the river was the source of tension for the same reason as most Western rivers are eventually fought over: There was more demand for the water than water available.

no adverse impact on the Rio Grande Project.

Engineers helped the states work out delivery schedules based on the principle that legitimate uses in each part of the basin were to be protected against new development in any other part of the basin. Their reports, with some important modifications, provided the framework for the Rio Grande River Compact. It was approved and signed by the three states and the United States on March 18, 1938.

The compact takes into account the dynamic nature of the stream and its tendency to produce highly variable flows. It tries to account for years that are wetter or drier than expected and even has a provision for "hypothetical spills" from Elephant Butte Reservoir in New Mexico.

Variable Stream Flow Makes for Complex Compact Rules

Essentially, the more water that flows into the Rio Grande system, the more Colorado owes downstream users. Since the Rio Grande is a variable river, the amount of water that must be delivered also varies tremendously from year to year.

The Rio Grande River Compact apportions water based upon how the river behaved during the compact study period, 1928 to 1937. A varying percentage of annual volumes of water flowing into the Rio Grande and Conejos systems in Colorado must be delivered by Colorado to New Mexico. And New Mexico, in turn, has flow and delivery requirements that determine how much water it must deliver to the downstream Rio Grande Project at Elephant Butte Reservoir.

The compact envisions a "normal release" of 790,000 acre-feet per year from Elephant Butte Reservoir, near Truth or Consequences, N.M. That water is delivered to the Rio Grande Project lands to irrigate about 160,000 acres in New Mexico and Texas, and it includes 60,000 acre-feet for Mexico.

In the Upper Basin, as flows increase, so does the percentage of water that must be delivered downstream, effectively capping the consumptive use of water above Elephant Butte. The compact implements these varying delivery obligations through delivery schedules.

Colorado has two separate delivery schedules under the compact: one for the Rio Grande and one for the Conejos River. There are several tributaries to the Rio Grande in Colorado that are not covered by the compact because those streams were fully appropriated and had not provided a substantial supply to the river system prior to the compact. Colorado must curtail diversions by holders of surface water rights, including pre-compact water rights, to comply with its annual obligations under the compact.

To ensure delivery of sufficient water to the Colorado-New Mexico state line, diversions on the Rio Grande and Conejos rivers are generally shut off between Nov. 1 and late March or April. During that time, reservoirs built before the compact are allowed to store water, but most other stream flow is delivered at the New Mexico state line.

In late March or early April, the Division Three Engineer in Colorado, in consultation with the affected water users, allows ditches to divert water from the Rio Grande based on their priority of rights. The amount of water available is limited to ensure that sufficient water remains in the streams to make the necessary compact delivery.

Because delivery obligations to New Mexico increase as flows in the river increase, the division engineer, in consultation with the federal Natural Resources Conservation Service, forecasts the estimated annual inflow at several sites in Colorado to determine how much water can be used in Colorado and how much must be delivered to New Mexico.

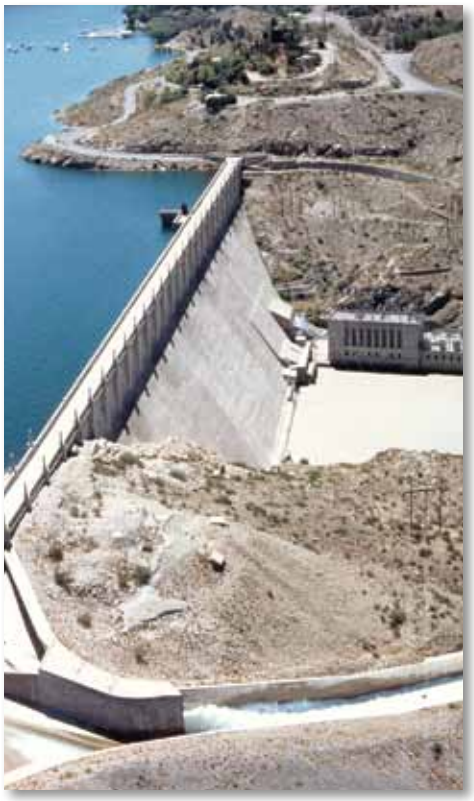
The runoff forecast is updated throughout the season and curtailment requirements are revised if necessary. The water commissioner may curtail water uses by reducing the quantity of water that is available for use by water users in Colorado.

There are many variables affecting stream flows that make this administration quite difficult, and can result in changing rates of curtailment throughout the irrigation season.

For example, late season rains, after the runoff is over, can add large, unanticipated

U.S. Fish and Wildlife Service staff regularly monitor the health of the San Luis Valley wetlands. These wetlands are an important storage mechanism for area water users.

. . . groundwater use in Colorado is potentially affecting how much surface water must be curtailed to meet compact obligations and may also be affecting in-state water rights.



Elephant Butte Reservoir can store 2,065,010 acre-feet of water to provide irrigation and year-round power generation.

inflows that increase the state line delivery obligation and that can require substantial increases in curtailments. In some years, the runoff forecasts are too high, causing greater curtailment during the peak of the runoff and very little curtailment after.

In years when the Rio Grande may have more water at the New Mexico line than required under the compact, the division engineer can minimize overdeliveries by allowing water to be diverted to ditches after the end of the irrigation season. These diversions are used for groundwater recharge, which allows the water to be stored in aquifers in Colorado where it incurs no evaporation losses, rather than being delivered to Elephant Butte Reservoir where it can incur substantial evaporation losses.

For all these reasons, it is difficult to achieve certainty on the amount of water available each year in the Rio Grande Basin, even after the forecast is determined. Farmers and ranchers, municipal providers and other water users must always take into account the variable flow of this river system.

Accounting for Every Drop of Water

The compact protects the Upper and Lower basins from overuse, but also has created provisions with built-in flexibility to allow for changes in hydrology or water use patterns.

The compact sets forth a complicated system of credits and debits as well as limitations on new storage in Colorado and New Mexico. The compact is closely linked to the Rio Grande Project system of storage and use on the lower portions of the river.

A provision of the compact recognizes that natural variations in water supply would result in underdeliveries in some years and overdeliveries in others. Thus, it allows Colorado and New Mexico to put less water in the system than they are scheduled to deliver and to build up debits. The maximum annual and accrued debits are 100,000 acre-feet for Colorado and 200,000 acre-feet for New Mexico.

Either state may exceed these debit limits if any excess amount is "secured" by water held in storage in reservoirs built after 1929. That water must be held in storage for the benefit of the downstream states until the debit falls below the maximum in the compact or there is a spill of water from Rio Grande Project storage. This provision is designed to prevent the upstream states from accruing a debit that would inhibit the downstream Rio Grande Project from having an adequate water supply.

The upstream states are further restricted on how much they can store in reservoirs built after 1929 within their borders when the downstream Rio Grande Project has less than 400,000 acre-feet of usable project water.

But the compact also contains provisions to protect Colorado and New Mexico from water overuse by the downstream states. For example, the amount the upstream states "owe" can be reduced when there is less storage space available in the Rio Grande Project than the amount they "owe." This occurred in 1984.

The compact also allows Colorado and New Mexico to build up credit when they deliver more than required.

If the downstream Elephant Butte Reservoir spills because it is full or water is released for flood control, the upstream states have no obligation to deliver water for the rest of the calendar year. If it spills, all debits are erased. The reservoir has spilled six times, most recently in 1995.

One of the most unusual provisions is for a "hypothetical spill" from Elephant Butte Reservoir, which attempts to balance out storage obligations. In 1995, paper calculations determined that the reservoir was full enough to spill and even though no water actually spilled, Colorado's accrued credits were erased.

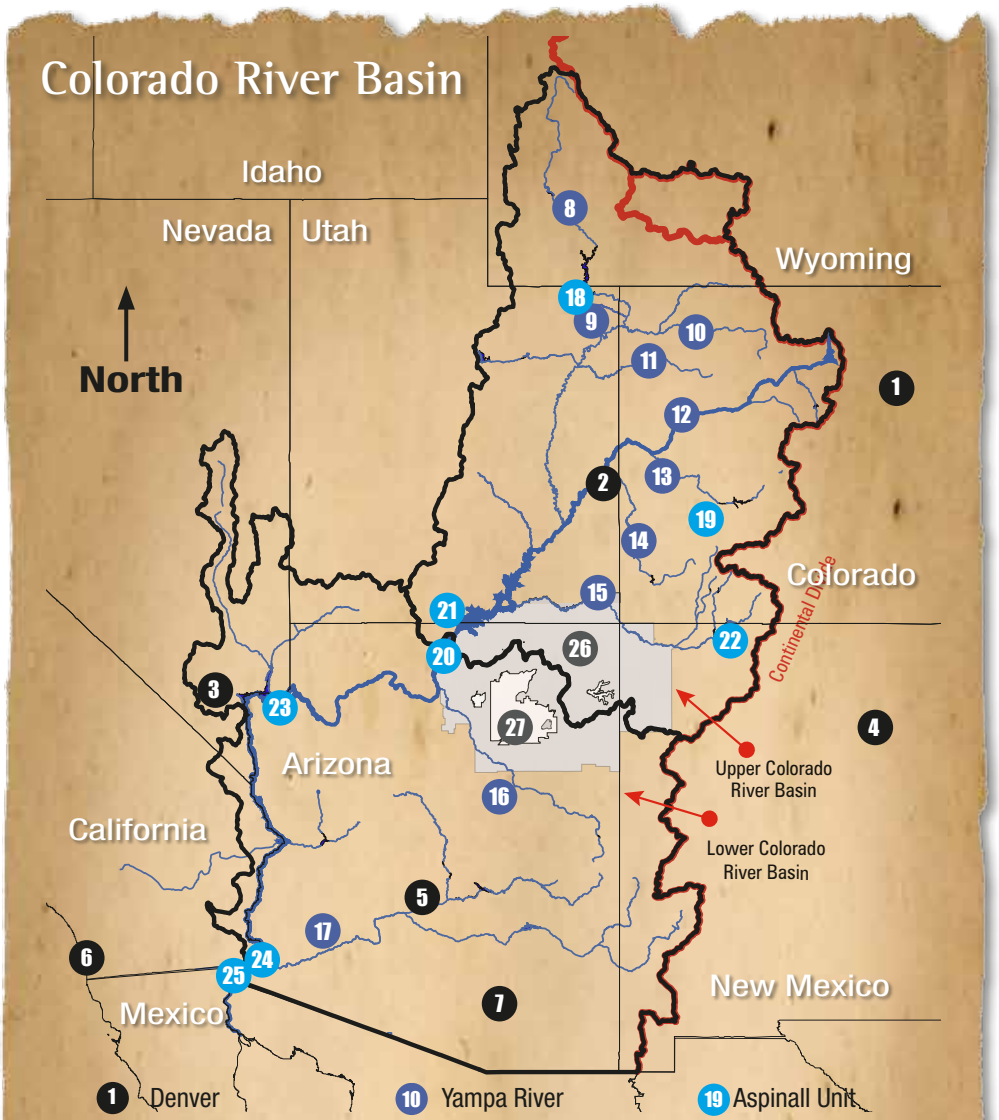
Forty years ago, Colorado racked up big debits under the compact. Since 1969, Colorado has worked hard to fulfill its compact obligations and now generally maintains a small credit in its Rio Grande River Compact account.

Reducing Groundwater Use in the San Luis Valley

A groundwater computer model shows that well pumping in heavily farmed areas of the San Luis Valley is reducing stream flows. This means that groundwater use in Colorado is potentially affecting how much surface water must be curtailed to meet compact obligations and may also be affecting in-state water rights. Wells in the area are not currently regulated, but the state engineer is developing rules and regulations. As an alternative to mandatory restrictions, Valley residents are working on voluntary measures to reduce their water consumption such as leaving some land fallow.

A decade of work has gone into studying the area's complex hydrogeology and developing a regional groundwater model trying to determine the impact of well pumping on streams. Regulations on groundwater use are expected to be filed in water court in 2010. ❑

The 1922 Colorado River & 1948 Upper Colorado River Basin Compacts



1 Denver
2 Moab
3 Las Vegas, Nev.
4 Las Vegas, N.M.
5 Phoenix
6 San Diego
7 Tucson
8 Green River
9 Pot Creek
10 Yampa River
11 White River
12 Colorado River
13 Gunnison River
14 Dolores River
15 San Juan River
16 Little Colorado River
17 Gila River
18 Flaming Gorge Reservoir
19 Aspinall Unit
20 Lee Ferry
21 Lake Powell
22 Navajo Reservoir
23 Lake Mead
24 Imperial Dam
25 All American Canal
26 Navajo Reservation
27 Hopi Reservation

The Colorado River originates in Rocky Mountain National Park and serves as the lifeblood of the southwestern United States as it flows 1,450 miles to Mexico. The Colorado and its tributaries drain from southwestern Wyoming and western Colorado, parts of Utah, Nevada, New Mexico and California, almost all of Arizona and part of the Republic of Mexico. Nearly 30 million people rely on its waters. The State Engineers, Bureau of Reclamation and U.S. Geological Survey are authorized to administer the Colorado River Compact. The Upper Colorado River Commission is authorized to administer the Upper Colorado River Basin Compact.

New Water Challenges Face the Grandest River in the West

By the early 1900s, Colorado officials, including its attorney Delph Carpenter, were looking downstream nervously, watching what was happening as the biggest river in the state flowed to the west.

California was growing fast, and that state's booming agricultural industry in the Imperial Valley was already heavily dependent on the Colorado River for irrigation water.

But California wanted more. Development interests were seeking federal funding for the construction of the All-American Canal near the Mexican border to irrigate the fertile Imperial Valley. Developers also wanted a massive flood control reservoir on the Colorado River that would prevent the kind of damage that had been caused by floods in the early 1900s.

Colorado officials worried that the rapid growth in California generated by these projects would give rise to a priority of use that would usurp future economic opportunity in slower-developing Colorado. A series of U.S. Supreme Court decisions in the early 20th century gave credence to this thinking.

The court had affirmed its authority to apportion water between states based on the idea that those who were first to use the water had first rights to its use, a doctrine known as prior appropriation. Colorado officials feared that faster-growing California would establish its priority to use much of the available Colorado River water before the upstream states could develop what they considered their rightful share.

As they struggled to find a solution, Colorado and other states were able to block Congressional funding of the California projects.

Delph Carpenter broke the stalemate by suggesting that under the Compact Clause of the U.S. Constitution, states could enter into treaty-like agreements that would apportion water without resorting to litigation. Carpenter's idea was that Colorado could allow the lower river projects to go forward with the protection afforded by a compact. The idea of the Colorado River Compact was born.

The Colorado River Basin will become more inextricably linked to the water supply challenges in other basins in the West as population demands increase.

American Indian Water Rights Claims

The Winters Doctrine, established by the U.S. Supreme Court in 1908, provides that American Indian reservations carry with them the right to an amount of water necessary to irrigate all "practicably irrigable acreage," including land not yet under cultivation but which could be irrigated.

Compared with other major Western rivers, states and tribes in the Colorado River Basin have made significant progress in quantifying reserved rights. However, several challenges remain. Principally, the Navajo Nation straddles lands in New Mexico, Arizona and Utah, in both the Upper and Lower basins. This geographic anomaly presents many tricky legal questions in the application of the Colorado River and Upper Colorado River Basin Compacts, including whether there is enough water in the respective allocations to satisfy the Navajo claims, and if not, whether water can be transferred from one basin to another.

A Simple Solution to Complex Issues

Although subject to intense negotiation among the seven Colorado River Basin states, the compact, approved in 1922, is simple in concept. It apportions the right to consume water from the river and its tributaries between the Upper Basin states and the Lower Basin states. The dividing point between the two basins is at Lee Ferry, Arizona (16 miles below present day Lake Powell).

The compact grants the states of each basin the right to use 7.5 million acre-feet of water per year "in perpetuity," and gives the Lower Basin the right to increase its beneficial consumptive use of such waters by 1 million acre-feet per year from the Colorado River system. The compact also obligates the Upper Basin states to "not cause the flow of the river at Lee Ferry to be depleted" below 75 million acre-feet over any period of 10 consecutive years. To date, the obligation has always been met.

The compact did not affect water rights that existed at the time it was approved. If the cumulative flow at Lee Ferry is ever less than 75 million acre-feet over any 10-year period, the Upper Basin states must curtail the use of post-1922 compact water rights until the Lee Ferry obligation is restored. The Colorado River's flow has varied dramatically, from 5 million acre-feet to 24 million acre-feet annually. In wet years, the Upper Basin states can store water, while in dry years, if storage in reservoirs is depleted, they may need to curtail their use.

After the 1922 compact was approved, lawmakers in Washington, D.C., were unwilling to fund water storage projects in the Upper Basin until all states agreed how to divide their apportionment. The Upper Basin states set to work negotiating a compact for the Upper Basin that was completed in 1948.

Because of the obligation to "not deplete" the flow of the river below 75 million acre-feet in any 10-year period and the amount of reservoir storage in the Upper Basin, the exact amount of water available for development in the Upper Basin on an annual basis is unknown. As a result, the Upper Colorado River Basin Compact uses percentages of whatever water is available and does not allocate specific quantities of water. An exception was made for Arizona, which receives 50,000 acre-feet of water for that portion of the state lying in the Upper Basin. The Upper Colorado River Basin Compact also outlines how the Upper Basin states will assure compliance with the flow requirement at Lee Ferry.

The states are entitled to the consumptive use of the following amounts of water in the Upper Basin: Arizona, 50,000 acre-feet; Colorado, 51.75 percent; New Mexico, 11.25 percent; Utah, 23 percent; and Wyoming, 14 percent. These percentages are of the remaining available balance after Arizona's apportionment.

After the states divided their share of water in the Upper Colorado River Basin Compact, the federal government enacted the Colorado River Storage Project Act in 1956. Reservoirs were necessary for the Upper Basin states to develop their apportionments and to manage flows at Lee Ferry. The act authorized construction of the Flaming Gorge, Aspinall (formerly Curecanti), Navajo and Glen Canyon (Lake Powell) dams to initiate the comprehensive development of water in the Upper Basin.

Division of the waters of the Colorado River among the Lower Basin states was contentious for decades. The Boulder Canyon Project Act ratified the 1922 compact as well as authorizing the construction of Hoover Dam and the construction of the Imperial Diversion Dam and All-American Canal System. The Lower Basin's 7.5 million acre-feet were divided as follows: California, 4.4 million acre-feet; Arizona, 2.8 million acre-feet; and Nevada, 0.3 million acre-feet.

Arizona and California battled in court for years after the 1922 compact was negotiated. There are 11 different U.S. Supreme Court cases titled *Arizona v. California.* All of them essentially deal with Arizona's claim that California was getting more than its fair share of the water.

A 1963 Supreme Court decision settled most of the dispute between Arizona and California. That ruling paved the way for construction of the Central Arizona Project (CAP), which allows Arizona to use its full apportionment of Colorado River water. Congress authorized the CAP in 1968 under the Colorado River Basin Project Act, which also gave California first priority to its 4.4 million acre-feet over the Central Arizona Project.

Uncertainties Cloud Colorado's Future Water Development

Until recently, water users in Colorado assumed there was water available for future development in the Upper Basin. To use it, they thought all that was required was another dam, diversion structure, pumping plant and canal, or pipeline system.

Today, some experts are concerned that the existing demand for water within the Upper Basin may exceed the available supply, although a number of projects to expand use are under consideration or being actively permitted.

This concern is further complicated by

Delph Carpenter (back row, fourth from left) stands with the other members of the Colorado River Commission at the signing of the Colorado River Compact, November 24, 1922. The signing took place at the Palace of the Governors, Santa Fe, New Mexico, with Secretary of Commerce Herbert Hoover presiding (seated).

three key uncertainties that make further development of water in the Upper Basin risky: the basic hydrology and the impact of climate change, unresolved legal disputes, and uncertainty over the location and quantity of future demand.

Variability in Historic Flows

The Colorado River Compact, the Upper Colorado River Basin Compact, the Boulder Canyon Project Act and a 1944 treaty with Mexico apportion 17.5 million acre-feet of water use per year from the Colorado River system. Some natural flow estimates suggest that less than 17.5 million acre-feet of water may be available for consumptive use in the Colorado River Basin. In addition, a number of studies using tree ring data have extended the hydrologic record back 500 years or more. These studies suggest a long-term mean annual flow at Lee Ferry in the range of 13.5 million acre-feet to 14.8 million acre-feet, and suggest droughts have occurred that were far more severe and longer lasting than have been experienced in the post-1905 record.

The prospect of changes in flows from potential climate change adds additional uncertainty, with the projected results of published studies varying widely. The amount and location of snowpack and the

Jean S. Breitenstein

Jean S. Breitenstein
Attorney for Colorado Water Conservation Board, Upper Colorado River Compact

Jean Breitenstein, attorney for the Colorado Water Conservation Board, participated in the 1948 Upper Colorado River Compact along with Clifford "Judge" Stone. He was particularly instrumental in the discussion of percentage allocations, in contrast to the acre-foot allocations made in the 1922 Colorado River Compact. He pointed out during the 1948 compact negotiations that, "Now we come along 20 odd years after the Colorado River Compact and hear the engineers say perhaps there wasn't as much water in the Colorado River as the negotiators of the Colorado River Compact thought there was."

Breitenstein argued that percentages "can apply regardless of the amount of water which is available. And if you use terms of percentage rather than fixed acre-foot quantities, then you have a flexible apportionment which can apply under all conditions and the proportion or ratio or whatever the engineers call it is always the same."

Breitenstein represented Colorado before the U.S. Supreme Court in the equitable apportionment cases of *Nebraska v. Wyoming, Colorado v. Kansas* and *Wyoming v. Colorado.* President Dwight Eisenhower appointed him to the U.S. District Court for Colorado in 1954 and then to the 10th U.S. Court of Appeals in 1957. The Supreme Court appointed him special master for the Pecos River Compact litigation between Texas and New Mexico.

Today, some experts are concerned that the existing demand for water within the Upper Basin may exceed the available supply, although a number of projects to expand use are under consideration or being actively permitted.

timing of spring runoff may change, which could alter water use patterns and the availability of water for storage.

The Lower Basin system is so heavily developed, and the supply and demand budgets are so numerically close, that even a small change in the mean natural flow at Lee Ferry could cause serious problems. For example, a sustained 10 percent reduction of natural flow at Lee Ferry, as some studies project, could mean that Lower Basin water suppliers could experience extended periods of shortage, including a number of individual years when projects might divert no water at all.

In the Upper Basin, there could be multiple-year periods when Lake Powell would be empty and the Upper Basin states could be forced to curtail use to comply with the compacts.

Unresolved Issues with Mexico Pose Uncertainty

The compact's negotiators sought to create a pact with sufficient flexibility to stand the test of time. However, as they readily acknowledged, the framers of the 1922 Colorado River Compact did not resolve every facet of water use on the Colorado River. Even today, there are outstanding questions related to the water delivery obligations to Mexico and the final quantification and future use of American Indian water rights.

The 1944 Mexican treaty requires that the United States deliver 1.5 million acre-feet per year at the international boundary. The treaty also provides that the United States can reduce its deliveries to Mexico in the event of "extraordinary drought." Extreme variability in flow is a hallmark of the hydrology of the Colorado River. What constitutes an "extraordinary" drought as opposed to an "ordinary" drought? If climate change reduces flows further, is this a "drought" or just nature reducing the baseline? Transboundary discussions to resolve these questions are underway.

Another potentially divisive issue relates to whether the water owed Mexico comes from the Upper or Lower Basin states, or both. The stakes are high for both basins. Depending on how the issues are resolved, the Upper Basin states' obligation at Lee Ferry could vary from 75 million acre-feet to 82.5 million acre-feet or more, in any period of 10 consecutive years.

Population Growth and Future Industries Create Demand Uncertainties

The third major uncertainty concerns the location and quantity of future demand for the waters of the Colorado River. Future water demands will be impacted by scenarios that may be dramatically different than what can be imagined. One thing appears certain: As population demands increase, the Colorado River Basin will become more inextricably linked to the water supply challenges in oth-

Pot Creek Memorandum of Understanding and Agreement

Colorado is party to two interstate Memoranda of Understanding. Pot Creek arises in the high Uintah Mountains in Utah and flows into Colorado before reaching the Green River. The Pot Creek watershed encompasses approximately 153 square miles; 108 square miles in Utah and 45 square miles in Colorado.

Colorado and Utah approved an MOU and Tentative Agreement concerning the waters of Pot Creek on April 1, 1958. The States agreed to distribute the waters based on the doctrine of prior appropriation and to use methods including appointment of a water commissioner and operation of stream gauging stations.

On March 1, 2005, the two states revised their agreement. Utah and Colorado agreed to a combined administration list; daily operations in accordance with the Pot Creek Operation Manual; the authority and responsibility of the water commissioner; and assurance of proper maintenance and operation of measuring devices and stream gauging stations.

Horseshoe Bend, located on the Colorado River south of Glen Canyon Dam.

er basins in the West.

States throughout the Colorado River Basin face major challenges. In the Upper Basin, the states struggle with the question of whether there is enough water available for future development. Uncertainties include population growth and proposed water-intensive new industries. For example, some estimates project that a large oil shale industry could require the use of all or perhaps more than all of Colorado's remaining unused compact entitlement.

Lower Basin states face more immediate challenges of impending shortages and the development of additional supplies. Las Vegas is looking to develop groundwater aquifers more than 200 miles to the north. The states are currently in discussions with Mexico concerning the potential development of conservation projects and seawater desalination plants. There is even vague talk of a pipeline from the Mississippi River that could deliver water to multiple points in the West. The Colorado River is one of four major sources of water for the Southern California coastal plain, and the pressure to use more Colorado River water is likely to increase.

Looking to the Future

The major question facing Colorado and the other states in the Colorado River Basin is whether the resolution of these uncertainties will involve litigation—which Delph Carpenter termed the water equivalent to war—or collaboration.

Perhaps the door to cooperation and collaboration was opened by the adoption of a major new agreement among all seven states in 2007. After more than three and a half years of intense negotiation, new rules for the operation of the major federal reservoirs lakes Powell and Mead were approved by the Secretary of the Interior.

These guidelines represent the first formal agreement among all Basin states under Colorado River management since the 1922 compact and cover three major areas:

- Coordinated operation of Lake Powell and Lake Mead
- Conditions under which the Secretary will declare shortage and surplus in the Lower Basin
- Rules allowing water users in the Lower Basin to develop and store conserved water in Lake Mead

The guidelines are effective only through 2025, and the states and Department of the Interior will begin the process of considering changes to them in 2020.

Resolving the looming uncertainties; avoiding future disputes; and managing the River to satisfy the competing demands of urban populations, agriculture, industry, recreation and the environment will require diplomacy, vision, leadership, and a flexible and adaptive approach to problem solving. ❑

Perhaps the door to cooperation and collaboration was opened by the adoption of a major new agreement among all seven states in 2007.

Reclamation's Yuma Desalinating Plant uses reverse osmosis membrane filters to remove salt from the water.

Congressman Wayne Aspinall confers with President Lyndon B. Johnson in the Oval Office. Aspinall was chairman of the House Interior Committee from 1959 to 1973.

Wayne Aspinall
U.S. Congressional Representative

Called the "Palisade Peach" by his college classmates, Wayne Aspinall grew into one of Colorado's most important water leaders. A member of the Colorado General Assembly, he became a Colorado congressman, the political and ideological successor to his fellow Western Slope water leader from the same district, Ed Taylor.

Chairman of the congressional committee through which all Department of Interior appropriations passed, Aspinall fathered the 1956 Colorado River Storage Project Act for the construction of Lake Powell, Flaming Gorge, Curecanti (later named Aspinall) and Navajo reservoirs, key features for operation of the Colorado River and Upper Colorado River compacts. Aspinall had to compromise to get these projects built, giving up on dams at Echo Park in Dinosaur National Monument and Marble Canyon in the Grand Canyon National Park.

Truly a "water buffalo" forged in the crux of the Depression and the Dust Bowl, Aspinall nevertheless helped pass the 1964 Wilderness Act.

Aspinall obtained passage of the 1968 Colorado River Basin Project Act that authorized the Central Arizona Project and, for Colorado, the Animas-La Plata, Dolores and Dallas Creek projects. He was defeated in 1972 at the advent of the environmental era.

The 1922 La Plata River Compact

A Century of Demand Exceeding Supply

Since 1879 in New Mexico and the late 1880s in Colorado, when settlers first began diverting water from the La Plata River to irrigate their crops, demand for water has exceeded supply. By 1900, the critically water-short nature of the La Plata River Basin became apparent when Colorado users diverted much of the flow, leaving New Mexico users without water during the late irrigation season. The situation worsened during the drought of 1917 and 1918. Angry at the lack of water available for its users, New Mexico notified Colorado of its intent to sue in the U.S. Supreme Court.

Heeding the rulings in *Kansas v. Colorado* and *Wyoming v. Colorado,* the states instead opted to resolve their dispute by interstate compact. In 1922, New Mexico and Colorado executed the La Plata River Compact, designed to equitably distribute the water of the La Plata River, to remove causes of controversy over the water and to promote interstate comity.

Water shortage problems in the La Plata River Basin continue today and require the state engineers of Colorado and New Mexico to cooperate in administering the La Plata River to achieve compact compliance.

La Plata River Basin Water Greatly Valued for Agriculture

The average annual stream flow for the La Plata River pales in comparison with the yield of other major interstate river systems that originate in the mountains of Colorado. From 1920 to 2000, the river's average annual yield at the interstate stream flow gauge measured about 26,000 acre-feet, but the flow varies greatly. The river's mean daily flow may decline 85 to 90 percent within a month of its high spring peak. During dry periods, the streambed may dry up for several miles in its mid to lower reaches after the first week of July.

Water users in Colorado and New Mexico who rely upon stream flows in the La Plata River Basin for irrigation and domestic use place great value on this resource. The La Plata River irrigates approximately 13,700 acres: 11,000 in Colorado and 2,700 in New Mexico. Currently, only one irrigation reservoir exists within the watershed, Red Mesa Reservoir. Located on Hay Gulch, a tributary to the La Plata River, it has an active storage capacity of only 1,100 acre-feet.

Seepage and consumption by riparian vegetation further deplete the water resources in the basin. The river channel is composed of cobbles, gravel, and fine sands that promote seepage into the shallow alluvium.

Dividing the Irrigation Season Flows

The compact requires Colorado to maintain and operate, at its own expense, gauging stations at Hesperus and at the state line to record the flow during the period between Feb. 15 and Dec. 1.

These stations provide the basis for compact compliance. Colorado's right to use water during the February to December period is restricted if the mean daily flow at the interstate gauge is less than 100 cubic feet per second. At such times, Colorado is to deliver half of the flow at the Hesperus station to the interstate gauge the following day, up to 100 cubic feet per second, provided New Mexico water users need the water.

Colorado and New Mexico are both entitled to the unrestricted use of the waters within their boundaries between Dec. 1 and Feb. 15.

In periods of low flow, the state engineers may jointly agree to rotate all the available water between the users in the two states. In both 1936 and 1955, the state engineers agreed to such a rotation. At the end of

The headwaters of the La Plata River rise 13,000 feet above sea level at Cumberland Peak in the La Plata Mountains, about 14 miles northwest of Durango, before descending into the arid land of southwestern Colorado and northwestern New Mexico. From its headwaters, the river quickly descends 4,900 feet during its six-mile journey to the gauging station in Hesperus, Colo. This river's highly variable flow then meanders generally south for approximately 31 miles before reaching the Interstate gauging station at the Colorado-New Mexico state line. South of this point the river continues for another 21 miles before its confluence with the San Juan River in Farmington, N.M. The State Engineers are authorized to administer the compact.

both of these rotations, the second state in rotation found itself wanting because there was little, if any, flow to divert.

Colorado, New Mexico Continue to Face Conflicts

In recent years, New Mexico has insisted Colorado provide more water to New Mexico, despite a decline in La Plata River drainage basin irrigation uses in New Mexico. Colorado maintains that compact water may be used only within the river's basin and that it has no obligation to provide water for other New Mexico areas of use.

There are no significant upstream reservoirs in the system, and after the spring runoff, the river can and does go dry in a stretch of the 31 miles between Hesperus and the state line. When the stream flows are so low that water does not reach New Mexico, the Colorado state engineer has invoked Colorado's "futile call" doctrine to allow upstream junior water diversions to beneficially use the limited stream flows.

A futile call may be invoked only if the required water cannot be delivered to the interstate gauge. Before 2000, New Mexico acknowledged that water may be undeliverable at times, but New Mexico has not agreed to futile call administration.

At other times during low flow, Colorado has diverted all the flow above the confluence of Cherry Creek and the La Plata River, with compact deliveries to New Mexico being made using the tributary flows from Cherry and Long Hollow creeks. New Mexico has resisted this practice of split river administration, arguing that the practice benefits Colorado at the expense of New Mexico.

Various projects have been proposed to assist Colorado in meeting its delivery obligations under the compact and to supplement the water supply to existing irrigated lands in Colorado, including:

- Animas-La Plata Project: The Animas-La Plata Project, initially designed to provide irrigation water to current and new La Plata River irrigators by means of a transbasin diversion from the Animas River to the La Plata River, would have assisted Colorado with compact compliance. The recently constructed A-LP Project no longer includes a transbasin diversion and no longer provides any irrigation water to either non-American Indian or American Indian users.
- Long Hollow Dam and Reservoir Project: After the A-LP Project was no longer designed to provide transbasin water for irrigation purposes, local water users and the state proposed the Long Hollow Dam and Reservoir Project to assist Colorado in providing water to its users while meeting its compact delivery obligation. The current project design includes a 5,400 acre-foot reservoir on Long Hollow, approximately 22 miles southwest of Durango, with a dam embankment about a half-mile upstream of the confluence with the La Plata River. Reservoir storage will be used to meet compact obligations, with a 300 acre-foot pool to be used specifically under split river conditions and to provide a supplemental irrigation supply. The current anticipated completion date is late 2013. Once completed, water will be delivered to the state line from the reservoir, especially in dry seasons, instead of being shepherded from Hesperus.
- Integration of Rain Squalls into Administration: Debate often occurs in Colorado over how to treat rainwater when it is impractical to distribute increases in stream flow over a limited part of a basin. In the La Plata River Basin, water users in both Colorado and New Mexico want additional stream flows administered within the allocation system of each state. New Mexico users also want these flows delivered under the terms of the compact.

Water administrators hope that once storage is available on the La Plata River, the difficulties between Colorado and New Mexico will ease because a stored source of water to help meet compact obligations will be available. ❑

Borens Cascade on the La Plata River photographed by William Henry Jackson circa 1882.

The 1968 Animas-La Plata Project Compact

A Water Project Rather than a River Sharing Agreement

The Animas-La Plata Project Compact is an unusual interstate compact because it is an agreement to ensure protection of the delivery of water from a water storage project, rather than an agreement on sharing the water of a natural stream.

Congress authorized the A-LP Project through two laws in the 1950s and 1960s to help the Upper Basin states of the Colorado River develop and store their water. After A-LP Project federal authorization was enacted, New Mexico and Colorado executed the A-LP Project Compact, approved by Congress in 1968, to implement the operation of the A-LP Project. It assured New Mexico an equal right with Colorado to divert and store water in and retrieve it from the A-LP Project by requiring Colorado water administrators to deliver Project water to New Mexico. The project also fulfills the water rights settlement of the two Indian tribes that live in Colorado—the Ute Mountain Ute Tribe and the Southern Ute Indian Tribe. These water rights date back to 1868.

The A-LP Project was initially designed by the Bureau of Reclamation to store water in a system of five reservoirs, including one in New Mexico, and to deliver water from the relatively water-rich Animas River through a transbasin diversion to the critically water-short La Plata River. The project was planned to provide water for irrigation, domestic, municipal, industrial, recreation, fish and wildlife, flood control and other beneficial purposes in both Colorado and New Mexico. The proposed combined capacity of the five reservoirs under this project design was just more than 237,190 acre-feet plus appropriate refills. The subsequent enactment of the National Environmental Policy Act in 1969, the Clean Water Act in 1972 and the Endangered Species Act in 1973 led to significant alteration of the project's design.

Reducing and Changing Project Design

In the A-LP Project's final environmental impact statement, issued by the Bureau of Reclamation in 1980, the agency selected an alternative design for the project, which included only the off-stream Ridges Basin Reservoir just below Durango, a transbasin diversion and additional water storage in the Southern Ute Reservoir on the La Plata River rather than the five initial reservoirs. That document required minimum bypass flows at the pumping plant on the Animas River to protect fish in that river. The project was to provide water to irrigate new and currently irrigated lands in both Colorado and New Mexico and deliver needed municipal and industrial water to Durango, Farmington and Aztec as well as to the Southern Ute Indian and Ute Mountain Ute tribes.

Construction of Ridges Basin Dam required the excavation of more than one million yards of soil to reach bedrock.

The A-LP Project faced further scrutiny in 1991 after the U.S. Fish and Wildlife Service issued a biological opinion that the Project would jeopardize the continued existence of the Colorado pikeminnow, a fish protected under the Endangered Species Act. As the Animas and La Plata rivers are tributaries to the San Juan River, the opinion limited project depletions to the San Juan River Basin of an annual average of 57,100 acre-feet and required establishment of the San Juan River Basin Recovery Implementation Program, an endangered fish recovery program.

In 1991, environmental organizations filed suit against the Bureau for failure to comply with federal environmental laws. As an alternative to costly litigation, Colorado Gov. Roy Romer and Lt. Gov. Gail Schoettler sponsored negotiations from 1996 to 1998 that led to a proposal for a downsized project (A-LP Lite) that included Ridges Basin Reservoir to store water to satisfy Ute tribal reserved water rights claims. Notably, A-LP Lite did not include a transbasin diversion and provided water only for municipal and industrial uses, not irrigation.

The United States, Colorado, New Mexico, the two Ute tribes, and water districts in Colorado and New Mexico negotiated a final settlement of the reserved water rights claimed by the Ute tribes in the Animas and La Plata rivers that modified A-LP Lite by reducing the proposed size of the reservoir and limited construction to only those features that would result in an average annual depletion of 57,100 acre-feet. The final supplemental environmental impact statement for the project issued by the Bureau in 2000 included this refined A-LP Lite.

Beginning in the 1970s, with a major study of alternative project designs and tribal reserved water rights filings, followed by numerous lengthy rounds of negotiations, the project design and the Ute settlement were finally resolved: a resolution of issues taking well over 20 years. The final settlement approved by Congress, the Colorado Ute Settlement Act Amendments of 2000, defines the current A-LP Project.

Lake Nighthorse Starts to Fill

The current A-LP Project includes a single off-stream reservoir, with a storage capacity of 120,000 acre-feet, and 90,000 acre-feet of active capacity. This reservoir, initially named Ridges Basin Reservoir and now known as Lake Nighthorse, was constructed just south of Durango at Ridges Basin. A pumping plant to fill the reservoir, located on the west side of the Animas River across from Durango's Santa Rita Park, was reduced in capacity as part of the project's downsizing.

Other project structures include a pipeline from the pumping plant southwest to the reservoir (Ridges Basin Inlet/Conduit), Ridges Basin Dam and the Navajo Nation Municipal Pipeline. The Navajo pipeline will transport A-LP Project municipal and industrial water from Farmington, N.M. to the Shiprock, N.M. area for the benefit of the Navajo Nation. Water will be trans-

ported from Lake Nighthorse to Farmington along the Animas River. Construction on the pipeline started in 2008 and will be completed in 2013.

In addition to the project's size reduction, the final settlement of the Ute tribes' reserved water rights claims includes an additional $20 million appropriated by Congress for each of the two Ute tribes for resource development activities. An initial $20 million in tribal development funds was provided to the two tribes in 1988 federal legislation.

On April 21, 2009, the Durango Pumping Plant first pumped water from the Animas River into Lake Nighthorse. The anticipated project completion date for the first fill of the reservoir is 2012.

Once completed, the A-LP Project will deliver municipal and industrial water for present and future uses to the two Ute tribes, the Navajo Nation, the San Juan Water Commission, the La Plata (New Mexico) Conservancy District and the state of Colorado. The Animas-La Plata Water Conservancy District and the city of Durango are also currently under contract to receive A-LP Project water.

In 2009, two newly formed entities—the La Plata Archuleta Water District and the La Plata West Water Authority—expressed an interest in purchasing some of the A-LP Project water for municipal use. The state of Colorado, while allocated 5,230 acre-feet of average annual depletions, has not yet elected to purchase A-LP Project water. If the state does not purchase its share of A-LP Project water, its share will be reallocated equally to the two Ute tribes.

Construction costs attributed to the tribes' portion of the A-LP Project were waived in the 2000 Settlement Act amendments. The federal government will pay the operation, maintenance and replacement costs for the project allocations of the two Ute tribes until they actually begin using their water.

The other entities entitled to water from the project will each pay for its proportionate share of the estimated construction costs for its water allocation. A final "true-up" of these costs will be conducted after the A-LP Project is officially completed.

The Colorado Water Resources and Power Development Authority, the San Juan Water Commission, the La Plata Water Conservancy District, the two Ute tribes and the Navajo Nation have entered into an intergovernmental agreement to form the A-LP Project Operations, Maintenance, and Replacement Association to operate the A-LP Project. In the fall of 2009, a contract was carried out between the association and the Bureau of Reclamation to transfer operation responsibilities for the A-LP Project to the association once project construction is completed. The facilities of the A-LP Project will still be owned by the United States. ❑

Average Annual Depletions from the A-LP Project

Ute Mountain Ute	16,525 acre-feet
Southern Ute	16,525 acre-feet
Navajo Nation	2,340 acre-feet
San Juan Water Commission	10,400 acre-feet
La Plata (New Mexico) Water Conservancy District	780 acre-feet
State of Colorado	5,230 acre-feet
A-LP Water Conservancy District	700 acre-feet
City of Durango	1,900 acre-feet

Leonard C. Burch

Leonard C. Burch
Animas-La Plata Project Compact

Leonard Burch of the Southern Ute Tribe first became the tribe's chairman in 1966, a position he held for 30 years. After his discharge from the U.S. Air Force, Burch learned about land records and contracts when he worked for the Realty Office of the Bureau of Indian Affairs. In the early 1970s, he helped to found the Council of Energy Resources Tribes, influential in convincing Congress to empower tribes to negotiate their own energy lease contracts. Under his leadership, the Southern Ute Tribe established its own department of energy and became the most successful American Indian energy company in the United States, with holdings from Canada to the Gulf of Mexico as well as on its own reservation.

Together with his boyhood friend and tribal attorney Sam Maynes, Judy Knight Frank, chair of the Ute Mountain Ute Tribe, and longtime Southwestern Water Conservation District board member Fred Kroeger, Burch walked every step of the way in obtaining congressional approval of the Animas-La Plata Project Compact and the Ute reserved water rights settlement. Though the project has been greatly downsized by the elimination of irrigation water features, the Animas-La Plata Project has now been built to provide water to three tribes, including the Navajo Nation, whose reserved water rights date back to 1868.

Burch and his wife, Irene, a member of the Navajo Nation, met at a boarding school established for the Consolidated Ute Agency by the Bureau of Indian Affairs. They raised seven daughters.

Glossary

acre-foot Volumetric measurement of water used for quantifying reservoir storage capacity and historical consumptive use. This is the amount of water that will cover an acre of land at a depth of 1 foot, or 325,851 gallons of water.

appropriation Placement of a specified portion of the waters of the state to a beneficial use pursuant to the procedures prescribed by law. Speculation is prohibited. The appropriator must have its own use for the water or have a contract to serve the customers that the water will benefit. Only previously unappropriated surface or tributary groundwater water can be appropriated. The appropriator must have a plan to divert; store; or otherwise capture, possess and control the water for beneficial use.

beneficial use Beneficial use is the basis, measure and limit of a water right. Colorado law broadly defines beneficial use of water as a lawful appropriation that uses reasonably efficient practices to put water to use without waste.

compact An agreement between two or more states approved by their state legislatures and the U.S. Congress. Compacts are akin to treaties between states. A water compact is a contract between two or more states setting the terms for sharing the waters of an interstate stream.

consumptive use Water use that permanently withdraws water from its source and is no longer available because it has evaporated, been transpired by plants, incorporated into products or crops, consumed by people or livestock, or otherwise removed from the immediate water environment.

cubic feet per second (cfs) Measurement of flow rate of water in a running stream or taken as direct diversion from the stream. Water flowing at 1 cubic feet per second will deliver 448.8 gallons per minute or 648,000 gallons per day or approximately 2 acre-feet per day.

A farmer irrigating a field near Greeley, circa 1910.

diversion or divert Removing water from its natural course or location, or controlling water in its natural course or location, by means of a water structure such as a ditch, pipeline, pump, reservoir or well. The Colorado Water Conservation Board may appropriate in-stream flows without diversion and local governmental agencies may make recreational in-channel diversions under specified statutory procedures.

equitable apportionment A division of the waters of an interstate stream between two or more states made either by the U.S. Supreme Court or the U.S. Congress.

futile call Determination made by the state or division engineer to lift a shutdown order if cessation of diversions by junior decreed water rights will not result in making water available to the senior calling right.

injury The action of another that causes or may cause the holders of decreed water rights to suffer loss of water at the time, place and amount they would be entitled to use under their water rights if the action had not occurred. Injury is a significant issue in any water court proceeding and in determinations of the state and division engineers.

priority The ranking of a water right vis-à-vis all other water rights drawing on the surface stream and tributary groundwater system. Priority is determined by the year in which the application for the water right was filed. The date the appropriation was initiated determines the relative priority of water rights for which the applications were filed in the same year. Priority is the most valuable aspect of a water right because priorities determine who may divert and use water in time of short water supply.

return flow Water that returns to streams, rivers and aquifers after it has been applied to beneficial use. It may return as a surface flow or as groundwater flow.

riparian Referring to land or habitat immediately adjacent to the stream channel.

riparian water law A legal system that permits water use only by those who own land along the banks of a stream or lake. The right typically is for reasonable use and is correlative with the right of every other property owner to prohibit unreasonable use that diminishes the in-stream quantity or quality of water. Colorado law does not recognize riparian rights.

water right A property right to the use of a portion of the public's surface or groundwater resource obtained under applicable legal procedures.

well Any structure or device used for the purpose or with the effect of obtaining groundwater for beneficial use from an aquifer. Every well requires a state engineer-issued permit.