BIG PIVOTS

ENERGY and WATER transitions in Colorado and beyond

July 21, 2025 BigPivots.com Issue No. 102

Hard questions about mining of groundwater in Colorado

by Allen Best

To understand the predicament in the Republican River Basin of eastern Colorado, you need to appreciate the volume of water being hoisted from the underlying High Plains Aquifer. The most important component is the Ogallala.

Farmers and the few small towns in the Republican River Basin average 720,000 acre-feet of withdrawals annually. In one hot and dry year, 2012, they pumped 940,000 acre-feet. As a point of reference, Blue Mesa Reservoir, the largest water body in the state, can hold 947,435 acre-feet.

Groundwater mining cannot be sustained far into the future in many areas of the Republican River Basin. Wells in some areas have not declined while wells in other areas have declined 13 feet during the last decade. Pumping at existing rates cannot be maintained. Within 25 years, about a third of land that's now irrigated will have no water. In other places, pumps already sputter.

"Sustainable" and "pumping" do not belong in the same sentence in this basin. The water of the Republican River Basin in the High Plains Aquifer accumulated from 18 to 4 million years ago.

Far from the snowmelt of the Rocky Mountains, it is recharged by minimal surface water. Based on studies, the Republican River Compact of Colorado, Nebraska and Kansas assumes that 17% of the water on the surface trickles down through the ground to the aquifers. So, only very slowly is the aquifer recharged. It's mostly an ancient bank account with now small, almost tiny deposits and fast-and-furious withdrawals.

Varying degrees of difficulty in the Republican, Denver Basin and San Luis Valley aquifers

The Republican River Basin and several other regions of the state rely largely on groundwater. In a 2024 decision, Colorado Supreme Court justices pointed out that it would be difficult to overstate the importance of groundwater given the state's population and arid climate. The 285,000 wells poked into the earth across the state deliver 18% of Colorado's water.

The Republican River Basin, the San Luis Valley, and the south metro area of the

This report, in a somewhat shorter version, was first published in the summer 2025 issue of Headwaters magazine. Photos by Allen Best unless otherwise noted.

Denver Basin are all, to varying degrees, rethinking water — both its sources and uses. All three have historically relied heavily on groundwater, and all have made at least limited progress in shifting toward more sustainable groundwater use in the last 20 years. The cities have adopted policies that foster smaller, less water-intensive lawns. They have diversified their sources. Two south-metro water utilities that 20 years ago pulled nearly all their water from wells, today have lessened that dependency to 60% to 65%.

Farmers in the Republican River Basin and San Luis Valley have somewhat different challenges. They have taken action to use less water and to save their communities, but whether those actions match the scale of the challenges they face is another matter. Changes can best be achieved before emergency sirens wail. In the Republican River Basin, some already see a swirl of red lights warning of catastrophe ahead.

It's going fast! What needs to be done in the Republican River Basin?

The Republican River Basin consists of 7,000 square miles, an area slightly smaller than New Jersey. It is largely located within a triangle between Julesburg, Limon and Cheyenne Wells. A few businesses cater to travelers but agriculture constitutes nearly all of the basin's economic foundation.

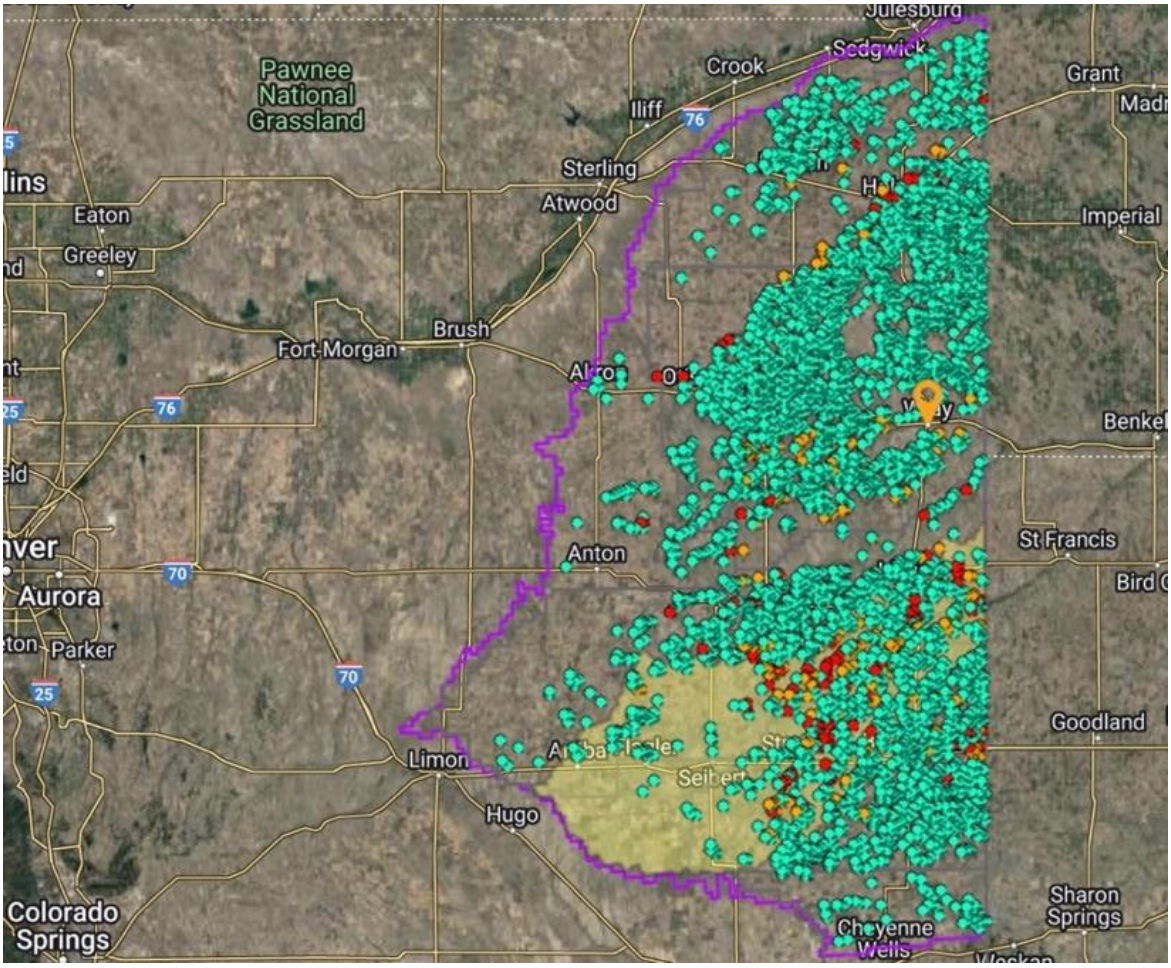
An average 17 inches of precipitation falls per year across the basin, less in some areas. High-dollar agriculture depends almost entirely upon water drawn from the Ogallala. A 2010 state report found that of the basin's 600,000 acres then under irrigation, only 1,000 were supplied by surface water. Locals suggest the true number is far, far less.

Dryland farming prevailed until the arrival of high-capacity pumps and rural electrification in the late 1940s. Farmers in the 1950s began converting dryland areas to irrigation, dramatically expanding crop yields. Other farmers arrived to plow hitherto virgin turf. Twice in the 1970s, groundwater extraction exceeded a million acre-feet per year.

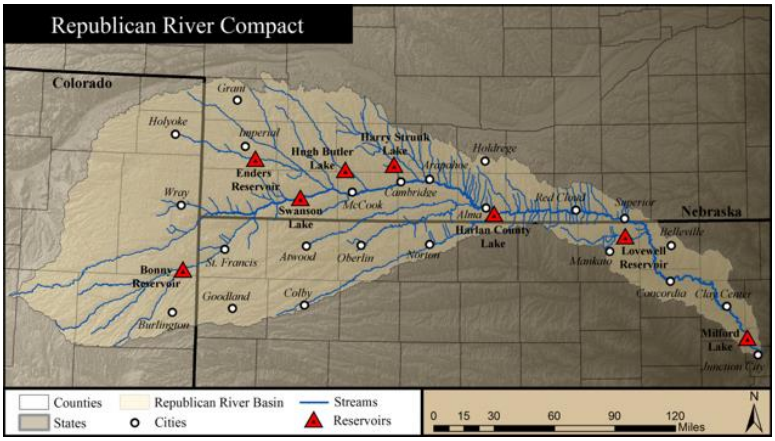
Drafting of groundwater via 5,000 wells today produces a bounty of herbaceous crops. Most end up in the bellies of livestock. Two feedlots near Yuma alone can each hold more than 150,000 cattle and several others can accommodate 75,000. The basin also has three hog farms, several dairies, and an ethanol plant.

In 1942, Colorado, Nebraska and Kansas allocated the waters of the Republican River and its tributaries in an interstate compact. The state engineer in 1973 ordered a moratorium on new wells. The most powerful limitation did not come until 1990. Rules were changed, reducing the allowed rate of depletion, effectively precluding new well permits.

Existing wells, however, were drawing down the aquifers in the Republican River



Basin. Kansas in the 1990s complained that it was getting shorted by Nebraska. Nebraska in turn blamed Colorado. A 2002 settlement stipulation among the three states represented a new line in the sand. By whatever means, Colorado had to figure out how to deliver water to the downriver states.



Colorado responded by forming the Republican River Water Conservation District. In effect, the state gave farmers and others in the eight-county district responsibility for figuring out how to comply with the compact. To help achieve compliance, legislators gave the district authority to levy fees on irrigators. The fee, originally $5 per acre, has been boosted twice and is now $30 per acre annually.

This $15 million in annual revenue is used in several ways. An early project was a pipeline to boost the amount of water flowing into Nebraska. The pipeline carries water from eight wells previously used for irrigation. They had been drilled amid hills with sugar-

Above: **Legislators in 2023 appropriated $30 million to be dispersed to farmers in the Republican River Basin who would be willing to end pumping for irrigation.** ***Photo/Office of Jared Polis. Below,*** **trees grow in what formerly was the Bonny Reservoir.**

like sand between Wray and Holyoke in the deepest part of the aquifer. The water from these wells flows 12.6 miles through the pipeline and into the North Fork near the Nebraska border. The wells are pumped from October to April, ensuring minimal loss to evaporation or riverine trees or grasses.

This pipeline, since its completion in 2012, has allowed Colorado to meet its compact delivery requirements. The cost of the wells, pipeline, and water rights was $72 million. Faced with declining production from these wells, the district in 2025 is planning four more wells and 9.5 miles of pipe at an estimated cost of $14 million to deliver what the compact pledges to Nebraska.

In another move toward compact compliance, Bonny Reservoir, a 165,238 acre-

Nearly all the water drawn from the Ogallala aquifer in the Republican River Basin produces food for livestock, including these dairy cattle near Holyoke.

foot impoundment on the South Fork of the Republican, was drained. Prior to the 2011 draining, Bonny had delighted boaters and anglers but lost too much water to evaporation and seepage. Water now flows more efficiently downstream.

More actions were needed to ensure Nebraska and Kansas received their apportioned water. Beginning in 2006, Colorado removed 30,000 to 35,000 acres from irrigation. A multi-state agreement in 2016 specified that Colorado would remove an additional 25,000 acres in the South Fork drainage by 2029. Dick Wolfe, then Colorado's state engineer, was asked at the time how this was to be done. He paused a moment, then likened it to getting a haircut: a snip here, a snip there.

This snipping of irrigated acreage has been encouraged with financial incentives assembled from pots of local, state and federal funds. The money is delivered via two federal programs: the Conservation Reserve Enhancement Program (CREP), and the Environmental Quality Incentives Program (EQIP). The latter allows farmers to use the land for dryland farming or grazing.

By early 2025, the Republican River Water Conservation District had retired 17,120 of the 25,000 acres as required by the 2016 settlement. It was a milestone, a time for momentary celebration. The harder work lies ahead. Nearly 8,000 additional acres must be retired to meet the December 2029 deadline. If the goal is not met, the state engineer has authority to shut down wells. Nobody wants that, least of all the state engineer. To help sweeten the incentives in 2025, state legislators appropriated $6 million. This adds $750 to the $4,500 per acre paid to farmers participating in CREP and $750 to the $3,500 per acre in EQIP.

Using less water is the paramount challenge. This has been accomplished almost

exclusively by taking land out of irrigation. There are other ways, too. Today, corn is king, responsible for about 85% of irrigated acres in the basin. It commonly receives 20 to 22 inches of supplemental water. A growing realization of late has been that less can be more. Planting fewer seeds — say 18,000 per acre instead of 30,000 — will save money and require less fertilizer. Fewer seeds will then require only 12 to 14 inches of supplemental water, meaning less pumping and shaving electricity bills. Lower crop yields can counterintuitively produce better profit margins.

Most of the water in the Republican River comes from the aquifers, and by Wray, top photo, there's little in the river. During winter, water is pumped from wells north of Wray to be delivered into the North Fork of the Republican at the Nebraska state line.

Conversations are also underway about water-conserving crop alternatives: milo, millet and wheat, kidney and pinto beans, even black-eyed peas. It's partly a matter of developing markets. Deb Daniel, the general manager of the district since 2011, has been toying with how to emphasize productivity strategies with the phrase "crop per drop."

None of this adds up to the scale of the challenge, though.

Kenny Helling, a fourth-generation farmer from the Idalia area of Yuma County, believes more is needed than financial incentives to take land out of production. "Continuing to throw money at the problem

won't fix the problem," he says. Ways must be found to keep land in irrigation, because irrigated land pays more in property taxes. Those taxes are crucial for operating fire departments, schools and other community purposes. "It's a very big concern to me."

The answers? Helling sees value in permits specifying reduced volume of pumped water. He would like to see more crop rotation.

Helling was a member of the Republican River Water Conservation District Board of Directors for nine years. He says the district needs other tools. The true authority for limiting pumping belongs to the eight groundwater subdistricts within the basin. They do not use it. Why?

"Everybody on those groundwater management districts are generally irrigators," says Helling. "Most of them are neighbors. A lot of them go to church together. A lot of them might have kids and grandkids in school together. Nobody wants to make anybody mad. And so, unfortunately, the groundwater management districts do not use all the authority they could to restrict the amount of water used."

Colorado legislators, he says, need to give the Republican River Water Conservation District more authority. It needs sticks, not just carrots. "We need to use less water."

Tim Pautler told members of the Colorado Groundwater Commission something similar in May 2025. A dryland farmer from the Stratton area, he has served on the Republican River Water Conservation District's Board of Directors for 21 years. He says that the board has accomplished almost no basin-wide conservation. It hasn't figured out how to substantially reduce water use.

Most landowners who have taken advantage of the incentives have been irrigators who have less groundwater available in their wells. Nearly all in the southwestern portion of the basin, where many wells were already sputtering. He says if reduced water use is the goal, the fees charged to farmers must be based on acre-feet of water pumped and not just on irrigated acres.

There's no pretense of sustainability in the Republican River Basin. The water deposited over millions of years is now being mined. The task is to maximize value of the remaining water, to prolong the availability of the High Plains Aquifer. Few have yet been willing to talk about the gravity of the challenge.

"I hope enough water remains in the hole to sustain society," says Pautler. "I hope we don't go completely dry."

South Metro cities in the Denver Basin starting to diversify water sources

Unlike the sparsely populated Republican River Basin, the south metro area of the Denver Basin has large and still-growing cities. Most of the south metro area lies within Douglas County, whose population ballooned between 1980 and 2025 from 25,200 to nearly 400,000.

Castle Rock, the county's largest city, has 87,000 residents. Based on approved development, the city expects to grow to a population of 120,000 to 140,000. Parker, the second largest city, has 68,000 residents and has zoning for 80,000. Utilities serving these two cities in 2005 were almost 100% dependent upon extractions from the underlying Dawson, Denver, Arapahoe and Laramie-Fox Hills aquifers. Both cities as well as other jurisdictions have lessened their dependence, but they have much work to do.

How much water remains? That's not an easy answer to deliver, as a consultant told the Castle Rock City Council in 2005. A council member asked him: "Just how much water remains?" Perhaps leery of trying to offer easy answers that required a half-hour explanation, he simply smiled and said: "It's dark down there."

That absence of total certainty was at the heart of a Colorado Supreme Court decision handed down in late 2024. Parker Water and Sanitation District, Castle Rock Water and others had squared off in water court beginning in 2021 with the Colorado Division of Water Resources. Parker Water has 33 wells that are 515 to 2,745 feet deep. State-issued permits for the newest five wells limit the volumes to what could be withdrawn during 100 years at a rate of 1% a year. Parker Water and several other south-metro jurisdictions disputed the state's authority to attach this stipulation.

The stipulation was premised on a 1973 law in which state legislators ordered a "slow sip" of Denver Basin aquifers. Later legislation and rulemaking clarified that withdrawals

Castle Rock believes it has underlying water in the Denver Basin aquifers to satisfy its needs for 300 years but is also making efforts to reduce per-capita use while also diversifying sources. It has 87,000 residents now but expects to grow to between 120,000 and 140,000.

were not to exceed 1% of total recoverable water in that portion underlying the land of the permittee's well in any given year.

This dispute is about the future. When the cities reach those 100-year limits and the total volumetric limits associated with their wells, will they be able to continue pumping. Must they cease pumping even if water remains in the aquifer?

Aurora, which lies within a half-mile of Parker Water wells, argued its water rights could be harmed if Parker pumped more than the total volume of water found to be available for its wells.

It's crucial to understand that water underground knows no property lines, no signs saying "Welcome to Parker." Water could, in theory, flow from below Aurora's land to Parker's wells. Underground, there are no fences.

Colorado Supreme Court justices, in their November 2024 majority opinion, warned of a "race to the bottom of the aquifer, with earlier permittees receiving a significant head start." What would happen if Parker Water, Castle Rock Water and others had their druthers? "Absent a total volumetric limit, a permittee who continues to pump at the maximum permitted rate for more than 100 years would end up pulling water to its well that would not otherwise be underlying its land," said the justices in their majority opinion.

In his dissent, Justice Brian Boatright came to the opposite conclusion, siding with the south-metro jurisdictions.

Some south-metro entities may seek state legislation that reflects what they believe is the best policy. As it stands now, a permit-holder that has withdrawn the total volumetric amount identified on a well permit must cease pumping, says Jason Ullmann, the state engineer and director of the Colorado Division of Water Resources. He has authority

A study by the U.S. Geological Survey published in 2011 used a model that found 1% to 2% of precipitation becomes water in the bedrock aquifers and 7% in the alluvial aquifer. For urban irrigation, such as at the Watercolor subdivision in Castle Rock, 2.5 inches of water makes it back to underlying aquifers each year.

to notify users in writing of their violations. Could he shut down wells? They would be given "time as may reasonably be necessary to correct deficiencies," he says. But yes, they would be "subject to enforcement."

Just how much water remains in the Denver Basin aquifers? The Division of Water Resources issues well permits, and in doing so, estimates the potential volume of water underlying the applicant's parcel. But the state agency does not track changes in volume over time, nor does it track the amount of water that wells pump. It requires well owners to maintain pumping records.

When asked how much water remains in Castle Rock's wells, Mark Marlowe, director of the city's water utility, suggested consultation of a hydrogeologist, perhaps from the U.S. Geological Survey. Pressed further, he said Castle Rock's groundwater supply will last more than 300 years "from a legal standpoint" based on current rates of use.

The practical effect of the Supreme Court ruling on Castle Rock? Very little in the short term, Marlowe says. In 2005, Castle Rock set out to create a pathway to dramatically lessen groundwater dependence. "We've been headed down this road for a long time," he says. So why participate in Parker's lawsuit? Because, he replied, the city wants to make long-term use of its investment in groundwater extraction. And as a practical matter, the city commonly extracts less than the 1% allowed annually.

Marlowe's answer is not totally satisfying, but the work done by Castle Rock since 2005 must be acknowledged. It was

Ron Redd, right, manager of Parker Water and Sanitation District, talks with Joe Frank, general manager of the Lower South Platte Water Conservancy District, and Jim Yahn, manager of the North Sterling and Prewitt reservoirs, at the takeout from the South Platte River for water that goes to Prewitt Reservoir, between Brush and Sterling. Prewitt's owners discussed becoming a partner but have failed to come to an agreement. "There is still hope that Prewitt would be part of the plan," says Yahn. "The decree that Parker and Lower South Platte are seeking still has Prewitt Reservoir as a component of the plan."

100% dependent on groundwater extraction then. It is adding new impoundments to store surface water, pumping water upstream from Chatfield Reservoir, and doubling the daily capacity for treating wastewater. Castle Rock already has lessened its dependence on groundwater to less than 69% over the last four years and Marlowe says he's confident that by 2050 it will lessen to 25%.

Several of Castle Rock's successes have involved working with other south-metro jurisdictions, including the Parker Water and Sanitation District. In 2013, when Ron Redd was hired by Parker Water as general manager, the utility was still 90% groundwater reliant. He was given a mission: transition to renewable sources.

A key project has been water reuse. Water introduced into the South Platte River from other basins or from groundwater can be reused. Aurora Water set out to do so in 2003. The $680 million Prairie Waters Project pumps water from the river-side aquifer near Fort Lupton to a reservoir in the southeast metropolitan area. From there, in 2010, Parker Water, Castle Rock and eight other south-metro communities joined Denver Water and Aurora Water in a partnership called WISE (Water Infrastructure and Supply Efficiency) to further manage infrastructure cooperatively and deliver the reclaimed water to their members.

Making this possible was a new 75,000-acre-foot impoundment called Rueter-Hess

Reservoir. Completed in 2012, it is a core asset for Parker Water and three other utilities who share its use.

The Platte Valley Water Partnership is even more ambitious. Parker Water and Castle Rock Water have joined with the Lower South Platte Water Conservancy District.

They plan to detain South Platte River water that currently flows downstream into Nebraska during winter and spring runoff. The South Platte River Compact allows the use of this water. Little excess exists in many years, but when there is, such as in 2023, no place exists to store that water. The project plans to use Prewitt Reservoir and a new reservoir northwest of Akron in the capture and storage of those flows before pumping some of that water 125 miles to Rueter-Hess Reservoir.

Farmers will also have access to a cut of this “new” water — with agricultural users receiving 50% of the captured water and municipalities receiving 50%. Construction is set to begin around 2035, at an anticipated cost of $780 million.

As of mid-July, it's not clear how the Nebraska lawsuit against Colorado involving water for Nebraska's proposed Perkins Canal might affect this project.

A final important component of the path forward for the water utilities who mine Denver Basin aquifers lies in conservation, particularly for outdoor landscaping. The prevailing theme at one time was use as much as you want — but pay for it. That thinking has shifted to limits and goals of reduced use.

Parker has reduced groundwater dependence to 60% and has goals to reduce it to 25%. Might that be achieved in tapping the aquifers of the San Luis Valley? The idea has provoked outrage for more than 30 years.

“Thanks, but no thanks,” is how Redd describes Parker’s response to the idea of a lengthy straw sucking water from two river basins away.

“We have our project, and financially it makes a lot more sense to go that route.”

For that matter, the San Luis Valley aquifers have their own problems.

20th century expansions bump up hard against 21st century realities in the San Luis Valley

Center, as its name implies, lies at the center of the San Luis Valley. The valley is among the nation's two most prominent places for growing potatoes. Among the growers is a fourth-generation family operation, Aspen Produce LLC.

Jake Burris married into the family. In addition to spuds, the family grows barley and alfalfa on 3,500 acres. Some neighboring farmers also grow canola. Burris is president of the board of managers of one of six subdistricts in the San Luis Valley's Rio Grande Water Conservation District. His subdistrict — called Subdistrict No. 1 — was formed in 2006 in response to a declining water table. What's known as the unconfined aquifer supports this area, the most agriculturally productive in the San Luis Valley. With just seven inches of annual precipitation, irrigation in the San Luis Valley is everything. And in Subdistrict 1, much of that water comes from 3,617 wells..

Alfalfa is the thirstiest crop, using 24 to 36 inches of water to get three cuttings. The strong sunshine and cooler temperatures found above elevations of 7,000 feet produce a high-quality hay that draws orders from dairies as far as California. Alfalfa is grown on 21,100 acres in the district. Potatoes cover 51,100 acres. Barley is grown on 28,000 acres. Some have replaced barley with rye. Several thousand acres have together been devoted to canola, lettuce, and other crops. A recent census found about 25,000 acres had been fallowed.

The San Luis Valley has two primary aquifers. Lower in the ground, separated by relatively impermeable beds of clay from what lies above, is the confined aquifer. The first well into the confined aquifer was bored in 1887. Because of the pressures underground, it was an artesian well. No pumping was needed to bring water to the

Potato plants blossom in the San Luis Valley.

surface. Louis Carpenter, a professor at the Colorado Agriculture College (now Colorado State University), estimated the valley had 2,000 artesian wells when he visited in 1891.

The unconfined aquifer lies above the confined aquifer. The unconfined aquifer existed prior to major water development in the valley but water volumes rose greatly when farms began using Rio Grande water in the 1880s. Four ditches deliver Rio Grande water to the farms and hence to the aquifer. Introduction of high-capacity pumps in the 1950s and center-pivot sprinklers in the 1970s accelerated groundwater extraction. In 1972, the state engineer imposed a moratorium on new wells from the confined aquifer, followed in 1981 by a moratorium on new wells in the unconfined aquifer. These moratoria acknowledge that groundwater drafting had to be limited.

Then came 2002, hot and dry, escalating the challenge. Impact to the unconfined aquifer was drastic with rising temperatures causing growing water demand even as snowpack declined.

The unconfined aquifer “has been dropping overall since about 2002,” says Craig Cotten, the Colorado Division of Water Resources engineer for Division 3, which encompasses the San Luis Valley. “We just have not had a real good series of years as far as the surface water.”

In 2004, state legislators passed a law that sets the San Luis Valley's aquifers apart from those of the Republican River and Denver Basin groundwater stories. That law, SB04-222, explicitly orders both the confined and unconfined aquifers in the San Luis Valley be managed for sustainability. The Colorado law governing the Denver Basin aquifers requires a “slow sip” but does not imagine sustainability. In the Republican River Basin, no law speaks to sustainability. There, only the interstate compact insists upon limits.

Here's another difference. Water from aquifers create the Republican River and its tributaries. In the south-metro area, surface streams cause little recharge to the Denver Basin aquifers. In the San Luis Valley, the Rio Grande as well as some surface streams coming off the San Juans contribute water to both the unconfined and confined aquifers. The hydrogeology is more complex.

This 2004 law also encouraged the formation of groundwater subdistricts within the Rio Grande Water Conservation District. The thinking was that very local groups of farmers could work together to figure out how to keep their portions of the aquifers

Amber Pacheco shows a seed mix being planted with a no-till drill at the Peachwood Farm north of Moffat. The intent is to resort the land to native vegetation over a period of several years. The farm was purchased by the Rio Grande Water Conservation District and has been put into a conservation easement held by Colorado Open Lands. The easement consists of land formerly irrigated by 12 center-pivot sprinklers. This is believed to be the nation's first parcel of land put under a groundwater conservation easement. *Photo/Matthew Litt*

sustainable. They could also be more effective in this pursuit by working together than doing so individually.

Six subdistricts have been created in the Rio Grande Water Conservation District and one in the Trinchera Water Conservancy District. Subdistrict No. 1 began operations in 2012 after the state approved its operating plan.

All these groundwater districts have the goal of reducing water consumption as necessary to replenish the aquifers or by introducing water into the aquifer from the Rio Grande or other sources.

Exactly how much restoration of the aquifers is needed? The state law specified a return to volumes that approximate those of 1976 to 2001 in the confined aquifer. But there's some guesswork about how much water the confined aquifer had then. Detailed records on Subdistrict No. 1 were not kept until 1976.

In August 2024 the unconfined aquifer in Subdistrict 1 was estimated to have averaged almost 1.2 million acre-feet less water during the five preceding years than it had in 1976. The rules approved by the Colorado Supreme Court in 2011 in a document called the Plan for Water Management call for the unconfined aquifer recovery within 200,000 to 400,000 acre-feet of where it was in 1976. That would be deemed sustainable, as ordered by the 2004 law.

To achieve this, the state engineer said that Subdistrict No. 1 would need to recover 170,000 acre-feet each year between now and 2031. Initially, Subdistrict No. 1 aimed to take 40,000 acres out of irrigation per year, or

David Freel, president of Subdistrict No. 4, and his brother George Freel confer with Amber Pacheco. The Freels sold the farm with the understanding it would be taken out of irrigated production. The water district hopes that this becomes an example of what can be done with land once irrigation ceases so that the soil stays intact and does not produce blowing sand that impacts neighbors and drivers on roads and highways. ***Photo/Matthew Litt***

about 80,000 acre-feet of annual groundwater pumping, to allow the unconfined aquifer to recover. That goal is unattainable, say water officials, and hence a rethink is needed. Success has occurred, though. In 2024, for example, roughly 176,000 acre-feet were pumped from the confined and unconfined aquifers in Subdistrict No. 1, the fewest since groundwater metering began in 2009. That's about a 30% reduction.

More sustained success will be necessary. "You don't recover that unconfined aquifer through single years of good runoff," says Ullmann, the state engineer. "There are difficult decisions that have to be made in order to recover and restore the aquifers, but that's what these subdistricts are trying to do."

This success is at least partly due to efforts to modify irrigation practices and taking land out of production. Amber Pacheco, deputy general manager of the Rio Grande Water Conservation District, explains that it's difficult to quantify the reductions.

"Some farmers, for example, have simply reduced the number of alfalfa cuttings (and hence the irrigation required), for example. Or they only irrigate when they need to do so. Others have changed the cover crops planted after a potato harvest to reduce the amount of water needed."

As in the Republican River District, local efforts to take land out of production use the foundation of federal programs, particularly CREP, or Conservation Reserve Enhancement Program. The subdistrict provides 20% of funds and the federal government 80%.

As did the Republican district in 2022, the Rio Grande district got an additional $30 million allocation of federal money funneled through the state. That money allows $3,000 in payment per acre-foot of curtailed groundwater use.

More must be done to recover the aquifer. The current proposal assembled by Burris and other directors of Subdistrict No. 1, their fourth iteration, would require aquifer recharge as a condition of pumping on a one-to-one basis. Water for recharge would come from water secured from the Rio Grande or native flows into the unconfined aquifer. This new plan allows subdistrict members with surface water credits to pump from the aquifer, because they are resupplying it.

The pumping allowed under the plan would be cut drastically. The Rio Grande district does not have authority to shut down wells, but it does have authority to assess fees for over-pumping. That fee stands at $150 per acre-foot. The plan would elevate that to $500. And, if aquifer recovery is not achieved, it would rise to $1,000.

Ultimately, the state engineer has authority to curtail wells that do not provide replacement water pursuant to an approved groundwater management plan or some other augmentation plan.

Some farmers in the subdistrict disagree with this plan. Opponents banded together as the Sustainable Water Augmentation Group, or SWAG, and filed a lawsuit to block implementation of the plan. A five-week trial has been scheduled for early 2026. Nobody expects that court's decision to be the end of it. Whoever loses might well appeal the decision to the Colorado Supreme Court, a process likely to continue into 2028.

Might the problem of the depleted unconfined aquifer be resolved by diverting more water from the Rio Grande? The river has long been over-appropriated. This year, for example, rights junior to 1880 were being curtailed in May. As with the Republican River, water must be allowed to flow downstream as required by the Rio Grande Compact.

For the unconfined aquifer to recover quickly, Mother Nature would need to quickly step up. "It would take multiple years of above-average flows [in the Rio Grande] to recover to the level that we need," says Pacheco. In fact, 19 of the last 20 years have been sub-average as compared to 1970 to 2000. This year's runoff in mid-May was forecast to be 61% of the average from 1890 through 2024.

Parting thoughts about balancing demands of today and tomorrow

The San Luis Valley, like the Republican River Basin, has almost no tax base other than irrigated agriculture. “Nearly everything in the valley is somehow related to agriculture. Our hospital, our schools — everything is dependent on agriculture’s existence in the valley,” says Amber Pacheco from her office in Alamosa. From her office in Wray, Deb Daniel has a parallel observation.

What then constitutes sustainability of the water that is the foundation of agriculture or, in the case of Parker, Castle Rock, and other south metro communities, their economic vitality? What decisions should be made now to foster that vitality through the 21st century?

Thoughts about conservation have shifted over time. When Colorado's gold and silver miners arrived, they had no goal of conserving. They either mined the veins to exhaustion, or it became too costly to continue. In a sense, that has happened in the Republican River Basin. The only limits to this groundwater mining are those triggered by the interstate compact. Because the Republican River and its tributaries get most of their water from aquifers, pumping must be limited — or supplemented.

In the last 20 years, the Republican River Water Conservation District has done some of both. It has or soon will have committed $86 million to pump water from wells expressly to deliver water to the Nebraska state line. One of the directors, Tim Pautler, has called this a strategy of kicking the can down the road. Other directors have started to agree.

"It's like the clock is ticking when it comes to sustainability," said Rod Lenz, the board chair, at the board’s quarterly meeting in May 2025. "What more can we do with the tools we have? Do we dare ask for more tools such [as would be delivered by] statute changes? Do we really want all the groundwater districts in the basin to ask the state engineer to reconsider how much we're allowed to pump, or do we just stay in compliance until we can't?"

In the San Luis Valley, coming off the century-defining drought of 2002, state

legislators went in exactly the opposite direction. They said that the unconfined aquifer was to be managed sustainably. Granted, that's easier said if you have a major river flowing nearby, even if that river has been hammered hard by the warming, drying climate of the 21st century.

The south metro area falls somewhere between these two extremes. State legislators nearly a half-century ago ordered a "slow sip" of the groundwater such as to preserve it for a century. In some places, there seems to be sufficient water to slow sip for another 300 years. In other places, the aquifer might have enough water for a few decades. Some water utilities hope for a completely sustainable water supply in decades ahead. Much work has been done. The harder work lies yet ahead.

What we need are aspirations premised not on entitlement and enrichments solely for today, but instead to build economies and cultures that more comprehensively look several generations ahead. That should be the question in all these meetings, all these court cases, all of these individual actions. Based on what we know and understand today, what should we be doing for the kids, grandkids and their grandkids, too? Are we doing better than kicking the can down the road?

How much groundwater remains in Baca County?

No interstate compacts complicate extraction of water from the Ogallala and other aquifers in far southeastern Colorado around the towns of Springfield and Walsh. Some wells have run dry, while others continue to produce tolerably well. How exactly is the groundwater holding up in Baca County and a small adjoining area of Prowers County?

The Division of Water Resources, using a $250,000 appropriation from state legislators in 2023, has contracted with Wilson Water Group to provide scenario analyses for future groundwater use and provide community facilitation to identify and establish groundwater resource goals for residents of the basin. The company's report is due in 2026.

The state's last study of aquifers in that corner of Colorado was completed in 2002. McLaughlin Water Engineers estimated the various formations altogether held 22 million acre-feet of recoverable water.

This study will employ new technology to gain an improved understanding of what lies underground in the Southern High Plains Aquifer and how the various formations are connected. Tracy Kosloff, the deputy director of the Colorado Division of Water Resources, reports a complex geology that is only partly understood. That complex hydrogeology

explains why some pumps can be sputtering, delivering miniscule amounts of water, while other pumps nearby can still deliver robust quantities. The study will clarify this complexity and provide greater insights into the deeper formations that were not well understood in 2002.

Wilson Water Group is also to present this new information to groundwater users and help facilitate discussions about how best to manage the resources. Baca County residents have had disagreements in the past about the best path forward, with some wanting an end to any new permits and others believing that no moratorium is necessary.