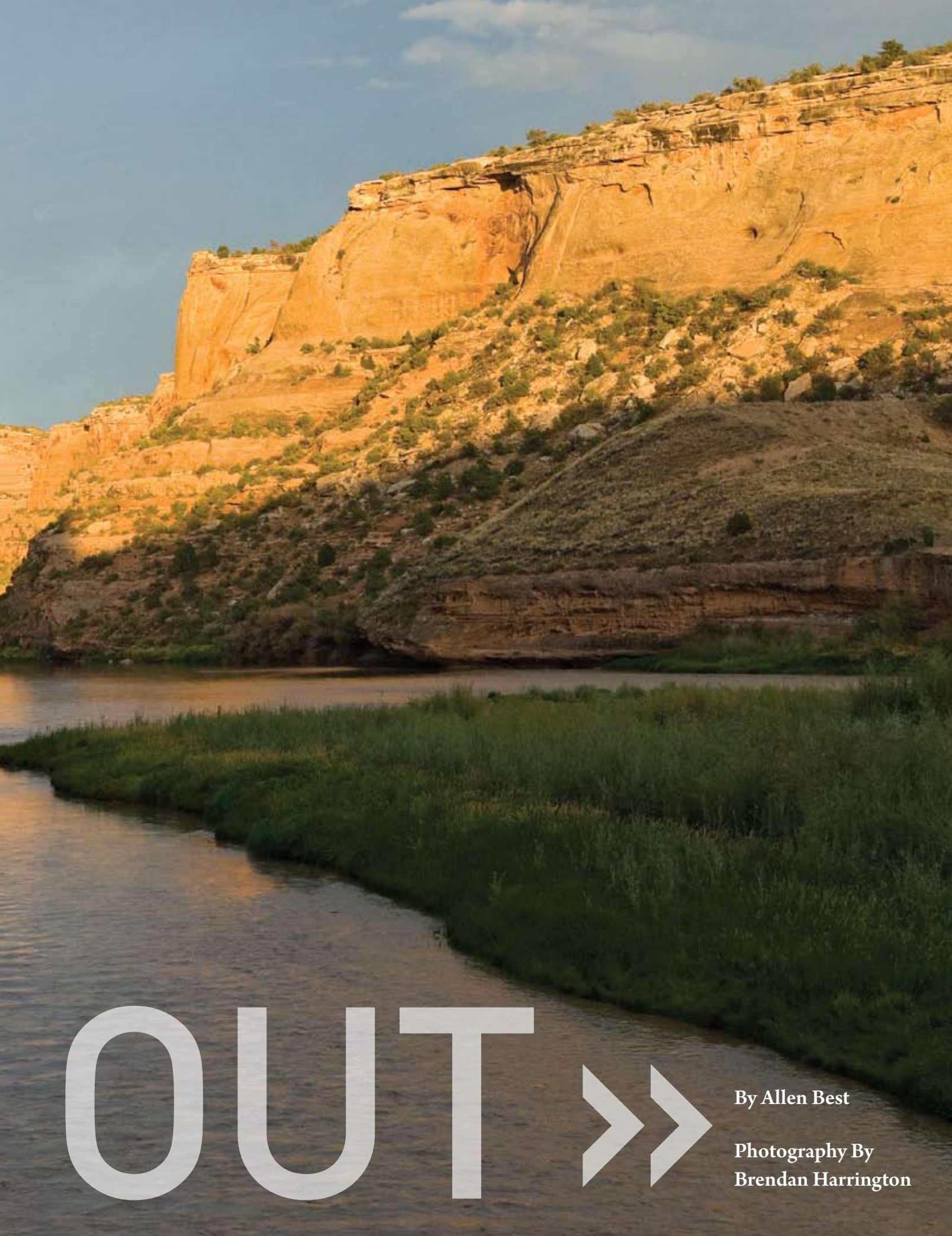


Front Range cities
get up to 50 percent of their
water from the Western Slope, but
population growth and future droughts
could limit transmountain diversions
or stop them altogether under the 1922
Colorado River Compact

TAPPED



OUT



By Allen Best

Photography By
Brendan Harrington

BE MORE
THAN A LEADER.
BE AN
INFLUENTIAL
LEADER.

> **Don't settle for just success in your career. Become influential and make the world a better place.**

Regis University College for Professional Studies not only has the degrees adult learners want in business, computer sciences, counseling, education, the humanities and more, but we teach an academically rigorous core curriculum that provides the critical thinking and problem-solving skills you need to become a responsible leader. The type of leader who creates solutions that make a difference.

You'll change your life and change the world. And your career will never be the same again. **Experience the power of influence.**



BE INFLUENTIAL.

> 1.800.276.9917 > CPS.Regis.edu/beinfluential

COLORADO · NEVADA · ONLINE

[cover story] TAPPED OUT

I. STORM ON THE HORIZON

It's been said that every glass of water in Colorado comes from the Western Slope. Strictly speaking, that's wrong. A few places — Burlington, Trinidad and Castle Rock come to mind — get no water from west of the Continental Divide.

Yet the saying rings true, because without tunnels perforating the Continental Divide, augmenting native supplies with 400,000 acre-feet of water on average from the Colorado River and its tributaries, Front Range cities and the farms sprawling eastward would be very different places.

Rocky Ford cantaloupes would be more scarce, corn fields near Greeley a more risky proposition, and most of the larger cities along the Front Range altogether less lush and perhaps smaller in population. Water from the Western Slope constitutes 30 percent to 50 percent of water along the Front Range in any given year.

That's why this specter of a "compact call" on the Colorado River matters. Should Colorado be forced to curtail use of Western Slope water appropriated after 1922, most transmountain diversions would likely be limited and perhaps stopped altogether. Colorado might survive well enough for one year, even two or three. After all, while the state had a hollow-eyed look during the 2002 drought, it bounced back.

But drought leading to a call from the lower-basin states of Arizona, Nevada and California would likely be more prolonged and possibly more intense. Continued population growth would elevate the stakes. The consequences could be dire.

"It's not going to happen in the next five years, but we are going to have to be serious about it," says Jennifer Gimbel, director of the Colorado Water Conservation Board, a key state agency.

The 1922 Colorado River Compact provides the trip-wire for curtailment. The agreement apportions waters of the river and its tributaries among the seven basin states. One clause specifies that the upper-basin states — Colorado, Wyoming, Utah and New Mexico — must allow passage of 7.5 million acre-feet of water annually at Lee's Ferry, at the entrance to the Grand Canyon, based on a 10-year rolling average.

Meeting this delivery obligation was never a problem. Then came 2002 — followed by several more dry years in the Colorado River Basin. Even then, downstream deliveries continued. But Lake Powell shrank — shockingly so. The West's premier splash-splash joint, Powell's express purpose is to store water necessary to meet the downstream commitment at Lee's Ferry.

But by autumn 2005, the reservoir that had taken 17 years to fill was down by two-thirds, the canyon walls scummy with the bathtub rings of higher-water marks. A dead pool, the point below which no water can be released, looked like just another bad winter or two away.

Instead, deep snows returned in 2006, causing rising water levels in Powell, which is now at 64 percent of capacity. Even so, the eyes of Coloradans had widened. An assistant state attorney general, James Eklund, was assigned to put the 1922 compact under a legal microscope. Many began to speculate about the potential for litigation. It's a dispute nobody seems to want.

"We would probably have a good 15 years of litigation in the Supreme Court over these issues," says Jim Lochhead, an attorney with Brownstein Hyatt Farber Schreck who represented Colorado in river issues for many years. That would be an unacceptable outcome for public entities managing public resources, he says.

Eric Wilkinson, general manager of the Northern Colorado Water Conservancy District, the state's largest diverter of Western Slope water, discounts talk of what he calls an Armageddon-type situation. Colorado, he says, has both the time and the tools to allow it to meet downstream obligations without yanking the rug from under post-1922 water-right owners on the Western Slope.

But even if no compact call comes, water margins will erode in coming decades as Colorado and the American Southwest becomes more hot, dry and crowded.

The Colorado Demography Office projects the state's population, now at 5 million, will grow to 7.8 million in the next quarter-century, with most of that population huddled along the Front Range. Demographers predict similar growth for the broader Colorado River system, which includes Los Angeles, San Diego and Salt Lake City. Similar to Denver, they are outside the basin but get Colorado River waters. That area's population of 30 million is projected to get another 12 million to 14 million people.

Rising temperatures might well mean declining water volumes. Although the nearly two-dozen computerized climate-change models are inconclusive about precipitation, they unequivocally point to sharply increasing temperatures — temperatures that will result in more rapid runoff accompanied by increased evaporation and transpiration. State and federal officials now accept that water availability in the Colorado River Basin will decline 10 percent to 20 percent.

"It's a unique game of musical chairs, because we're taking away chairs and adding people at the same time," says Brad Udall, managing director of the Western Water Assessment, an interdisciplinary team of experts on natural climate variability and human-caused climate change.

"Given the over-allocation of the system, you are definitely looking at future problems," Udall says. "It's just a matter of when."

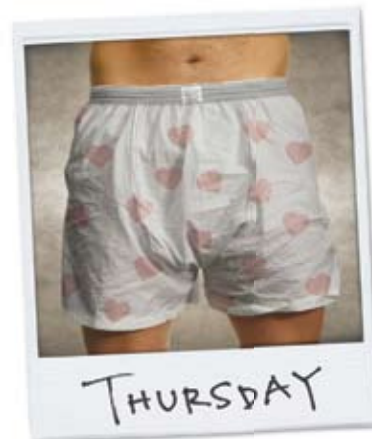
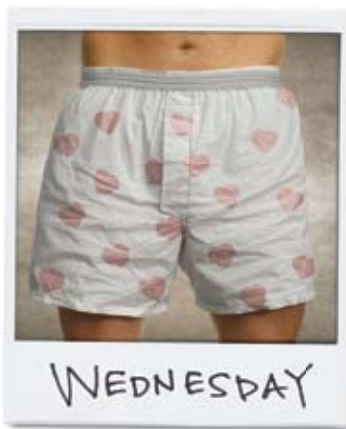
II. 2002 AND EYES WIDE OPEN

The 2002 drought left Colorado smoky and crinkly. Some commuters wore respirators as the Hayman Fire smothered downtown Denver in smoke. During the Coal Seam Fire in Glenwood Springs, flames literally emerged from the ground to leap across Interstate 70, the Colorado River and railroad tracks.

Water planners had not imagined such a severe dryness. Corn stalks withered in farm fields, and suburban lawns looked

tired and old. Dust devils spun eerily over mudflats in Dillon Reservoir. In Aurora, city officials announced supplies had declined to 26 percent of capacity. Dendrochronologists, who determine the dating of past events by examining the growth rings in trees, concluded that stream flows in parts of Colorado were the lowest in 300 years.

The next summer, 2003, was shaping up as even worse when a freakish March storm



useonlywhatyouneed.org

**USE ONLY
WHAT YOU
NEED.**

D DENVER WATER



Coloradans along the Front Range get much of their water from the Western Slope, the area drained by the Colorado River. Here the river passes through Knowles Canyon in Rabbit Valley recreation area, one mile from the Utah border.

spun north from New Mexico, smothering the northern Front Range in 3 to 5 feet of snow. Still, Coloradans saw the world differently. State officials finally took steps to shut down illegal well-pumping by farmers in the South Platte River Valley. City users had learned how to curb use 15 percent to 25 percent. And Aurora residents agreed to pay \$700 million to draw water downstream from the Brighton area.

Most eye-opening of all was Lake Powell. There, 4 million acre-feet flowed in while

8.2 million acre-feet were released downstream into the Grand Canyon.

"It started to scare you, because if nothing else, you could see that the reservoir would empty out if the drought continued for another year or two at that severity," says Randy Seaholm, chief of the water supply protection for the Colorado Water Conservation Board.

Attorney Glenn Porzak says he soon began pointing out the importance of 1922 to his clients, including Vail Re-

sorts plus several mountain towns, Coors Brewing and others. "They won't be in great shape," he says of the ski towns, but they'll be in better shape than many cities along the Front Range.

Porzak says he believes most people erroneously believe the problem is of future diversions. "I don't think people realize that if you have a compact call, most of the transmountain diversions for Denver, northern Colorado, Aurora, Colorado Springs and Pueblo will be junior."

Colorado's first-in-time, first-in-right doctrine of prior appropriation grants water to junior water users only after earlier and more senior appropriations are satisfied. Think of it like a big dinner table, where the mashed potatoes get passed around based on the ages of people. An 1887 decree on Clear Creek, for example, trumps one from 1948.

In case of compact curtailment, only those water appropriations after 1922 would be affected, and only those on the Western Slope – because that is the area drained by the Colorado River.

Front Range cities are certainly aware of the threat. Pueblo officials earlier this year sold Columbine Ditch, which diverts Eagle River water across the Continental Divide at Fremont Pass. The water right, says Alan Ward, water resources administrator for Pueblo Board of Water Works, was adjudicated in 1936 – making it junior to the compact call. That made the water right less secure. That fact was a consideration in Pueblo's decision to sell, Ward says.

III. TAPPING THE COLORADO RIVER

Pueblo still gets much of its water from the Western Slope, as do the 80 percent of Coloradans who live along the Front Range, a percentage little changed in the last century. Also unchanged is where the rain and snow fall, 75 percent west of the Continental Divide.

Farm leaders early on set out to modify nature's way. The first significant transcontinental diversion was a ditch blasted into the flanks of the Never Summer Range, above Grand Lake. It began delivering water to farmers of the Poudre

River between Fort Collins and Greeley by 1895.

Then Denver set out to colonize the hinterlands. First came the pioneer bore of the Moffat Tunnel, which in 1936 began diverting Fraser Valley water. This enabled the giant post-World War II boom. Later came the Dillon Reservoir and the equally important 23.3-mile Roberts Tunnel, Denver's savior in the 2002 drought.

Up and down the spine of the Continental Divide are other bores: from the Eagle River south of Vail; the Blue River near Breckenridge; the humongous Adams Tunnel between Grand Lake and Estes Park; and, with President John Kennedy in Pueblo to launch the work in 1962, the Fryingpan-Arkansas project.

More grand diversions have been proposed, but whether Colorado has enough water remaining under its compact entitlement to justify the enormous expense is

unclear. Most estimates have ranged from 200,000 acre-feet per year to 500,000 acre-feet. A \$1 million study authorized by the Colorado Legislature, to be completed in December, hopes to more firmly nail down a range.

Much depends upon assumptions. The study will also suggest how the changing climate may alter water flows within individual basins in Colorado. Some valleys could actually benefit.

But not one drop of Colorado River water has entered the Pacific Ocean in more than 10 years. If Colorado uses more water, some other state uses less.

IV. CRAFTING THE COMPACT

Presidential candidate John McCain last year told the *Pueblo Chieftain* that he favored reworking the Colorado River Compact to reflect population growth and changing water needs. For that innocent

remark McCain was endlessly skewered in Colorado and beyond. Even in the lower basin, where McCain is from, people have become protective of the compact.

In one sense, the compact seems terribly unfair. About 70 percent of the water in the Colorado River in its native configuration comes from Colorado. The state, however, is entitled to keep about a quarter of it, or 3.8 million acre-feet. California, while contributing almost nothing to the river, gets even more than Colorado — 4.4 million acre-feet.

Still, the compact today must be seen as a wise agreement. It has given Colorado and other states certainty.

"The good thing about the compact is that everybody realizes it's the best thing we've got, and nobody will try to change it unilaterally," says Eric Kuhn, general manager of the Colorado River Water Conservation District. "And if somebody

The Wet Infrastructure Leader Around The World.

MWH...ensuring the conservation and control
of the world's irreplaceable resource — water.

mwhglobal.com • 303.533.1900



BUILDING A BETTER WORLD

STRATEGY ■ MANAGEMENT ■ CONSULTING ■ ENGINEERING ■ CONSTRUCTION

[cover story] TAPPED OUT

opens it up, there are risks to both sides."

The compact was adopted in 1922 after marathon negotiations held in Santa Fe, N.M. Colorado was represented by Delph Carpenter, a brilliant water lawyer from Greeley. Carpenter understood that if Colorado's prior appropriation doctrine were applied to the entire Colorado River, California might have it all sewn up within a few decades. Denver's population nearly doubled between 1900 and 1920, but Los Angeles had grown nearly 600 percent. Carpenter figured Colorado needed 50 years to develop its share. Even that was optimistic.

The compact opened the way for federal construction of Hoover Dam, delivering both water and electricity for the great 20th century expansion of Los Angeles. Later, the federal government built Lake Powell and other upper-basin reservoirs. In this way, the Colorado River was tamed hydraulically and put into a regulatory framework, giving both cities and farmers certainty.

The treaty was flawed, however. It assumed an average annual flow of 16.4 million acre-feet average flow at Lee's Ferry. Tree-ring reconstructions suggest an average flow of 13.5 million acre-feet over the last three centuries.

Natural climatic variability could temporarily worsen the shortages. Tree rings show several 30-year megadroughts from about 1,000 years ago, including the time the ancestral Pueblo abandoned Mesa Verde.

Irrespective of cyclical drought, global warming models predict greater aridity. The science remains mostly theoretical but has a firmness that water officials find compelling. "The science is all pointing in the same direction," says the River District's Kuhn, a nuclear engineer by training. Mid-range estimates of drying reduce annual yields to 12.7 million acre-feet. That's 22 percent less water than what Delph Carpenter and his fellow negotiators had assumed.

If these predictions prove correct, the hydraulic system of the Colorado River system created during the last 90 years may begin to unravel. A study issued this year by Balaji Rajagopalan, an associate professor of civil, environmental and architectural engineering

at the University of Colorado-Boulder, found that the 60 million acre-feet of storage in the Colorado River dams would meet needs of the increasing population. Climate change is the game-changer. Rajagopalan says that if water volumes in the basin decline by 20 percent, chances run 50-50 that reservoirs will dry by 2057.

V. BANKING WATER

Even short of complete reservoir depletion, a compact curtailment could occur. What will cities do? The consensus seems to be that cities must get water.

"You are not going to short these cities," says Udall of the Western Water Assessment. "Cities can take some short-ages, but you're not going to dry them up."

Udall suspects the solution will be transfer of water from farms, particularly for water used for low-value crops like alfalfa. That's exactly the proposition two Western Slope water districts have been talking about with constituents. The concept is called water banking. Farmers could lease pre-1922 water rights to junior users.

The Montezuma Valley Irrigation Co. near Cortez, for example, has senior water rights that its members use to grow alfalfa, beans and other crops. Aurora might pay money upfront as an option, then more if a curtailment actually occurred. Montezuma Valley and Aurora's diversion sites are far apart, but most importantly they're above Lee's Ferry.

"It's very important to note that this would be entirely a matter of willing participants," says Bruce Whitehead, executive director of the Southwestern Water Conservancy District. "In general, the concept has been well received by folks in our area."

Kuhn, whose Glenwood Springs-based district co-sponsored the idea, says the real test will be whether cities pay what it takes to secure senior water rights. "The problem with water banking is that we are in a situation now where we have a public offering fire insurance after the fire. That's what government does."

Counterintuitively, some call for a more traditional type of banking, additional reservoirs. Colorado Senate Minority Leader Josh

Penry, who is now seeking the Republican nomination for governor, says Colorado must embark on a new round of storage. Environmental groups concur – but with strong limits. Multiple needs must guide construction of new storage, said Taylor Hawes, of the Nature Conservancy, "so that the environment is part of the planning and not an afterthought."

Meanwhile, water officials are pondering how Colorado might administer a compact curtailment: Allocate the state's storage rights in Blue Mesa Reservoir, a federal facility, for this eventuality? Cut back all users proportionately? Favor municipal users? Require that Western Slope reservoirs be dumped?

Dick Wolfe, the state water engineer who is responsible for administering water rights, says a compact curtailment would be more complex than any rights he now administers. Developing rules for administration will take time, he says.

Dave Little, director of planning for Denver Water, says none of his agency's long-range scenarios assume what he calls "the worst of the worst," meaning no water from the Western Slope. Still, he concedes that's a possibility. Denver gets about 50 percent of its water from the Western Slope.

Most water officials expect a lower-basin call, should it occur, to trigger a lengthy legal fight.

"How long was the litigation with Kansas on the Arkansas (River)?" says Hamlet "Chips" Barry, general manager of Denver Water. "Twenty years. Does anybody think the litigation on the Colorado River will be any shorter?"

Barry, however, doubts lower-basin states would litigate. The outcome would be uncertain, and water managers always want to minimize risk. Even with full delivery, California and Nevada already have their troubles.

VI. THE VIEW FROM VEGAS

Pat Mulroy understands risk. Clear-voiced and incisive, she's executive director of the Southern Nevada Water Authority, which serves Las Vegas and Henderson. The area several years ago

surpassed Manhattan in population. Aside from The Strip, with its excesses of water-laden tromp o'loeil, the water policy is one of restraint. Her district has spent millions of dollars paying people to remove sod. New homeowners have no choice. Front lawns must be of gravel. Las Vegas gets just 4 inches of precipitation annually.

In Las Vegas it's already hot, dry, and at least until the financial meltdown, crowded. Mulroy expects more of the same.

"We keep forgetting that we're a subset of national population growth, and if we are expecting the country to grow by 150 to 200 million people in the next 50 years, it's pretty naïve to believe that we won't have increased population," she says. She also has faith that climate scientists have global warming right.

All that said, a compact call would require "pretty extraordinary circumstances, and those would be political, not hydrological," Mulroy says. "Quite frankly, if we get to a point where the lower basin feels compelled to make a call, we will not have done the necessary preparatory work in anticipation of a very dry Colorado River."

Mulroy likes the balance of the compact. "People forget that the compact allows seven states to do whatever seven states agree to do. But it does not allow any one state to roll the others."

Nevada was allocated very little water from the Colorado River. Las Vegas is now trying to mine distant aquifers left over from the ice ages. As a stopgap, Mulroy has negotiated leases of water from farmers in Arizona.


Looking deeper into the future, she calls for other measures: removal of water-robbing tamarisk along riverbanks; greater investment in cloud seeding; and development of desalinization plants. A report issued by her agency last year even suggested moving Mississippi River water into the West.

Colorado probably needs a jigsaw, too. Answers of the 20th century mostly required the services of engineers. Tomorrow's answers likely involve improved mechanisms for sharing and conserving. Complicating this planning is the still-great uncertainty. Climate modelers are only now starting to earn their stripes.

For water managers, a basic question is how much risk they – and their constituents – are willing to tolerate.

What history does tell us is that permanence is an illusion. Drought, at least in part, sent the Ancestral Pueblo packing from their cliff dwellings. The wheezy Dust Bowl dislodged farmers from the plains. Could transmountain diversions be upended, too?

Available evidence says it could happen. ☉




WE ALL SERVE

Peter Boucher, Human Resources' EVP for First Data of Greenwood Village, CO, a 2009 Secretary of Defense Freedom Award recipient, with employee and Colorado Army National Guardsman CSM Rob Lawrence

Colorado Employer Support of the Guard and Reserve is honored to salute our 2009 award winners for exceptional support of their National Guard and Reserve employees.

Pro Patria Award
 Arapahoe County Sheriff ★ Berthoud Floor Covering
Above and Beyond Award
 InfoPrint Solutions ★ American Innovations-IMD
 Colorado Division of Youth Corrections

We all serve. Whether serving our communities or our country, members of the National Guard and Reserve depend on their military units, families, and employers for support.



6848 S. REVERE PARKWAY, CENTENNIAL, CO 80112
 720-250-1176 ★ WWW.ESGR.MIL