

Nation

West seeks help in cloud seeding

Science may not support it, but states hit by drought willing to try

By Patrick O'Driscoll
USA TODAY

DENVER — A dry autumn has this city and others in the West wondering whether the drought of the past half-decade will drag into another winter.

The Denver Water Department isn't waiting to find out. It will spend hundreds of thousands of dollars this season to try to wring more snow out of storms in the Rocky Mountains. In November, a private contractor began to "seed" clouds with snowmaking chemicals as weather fronts crossed the Continental Divide.

With 75% of the West still suffering from drought, more water users than ever are turning to cloud seeding. Even though a recent national study found no scientific proof that it works, believers say it can increase the amount of snowfall over a season by 10%-20%. Skeptics say there's no way to tell how much a particular storm cloud would have rained or snowed without seeding.

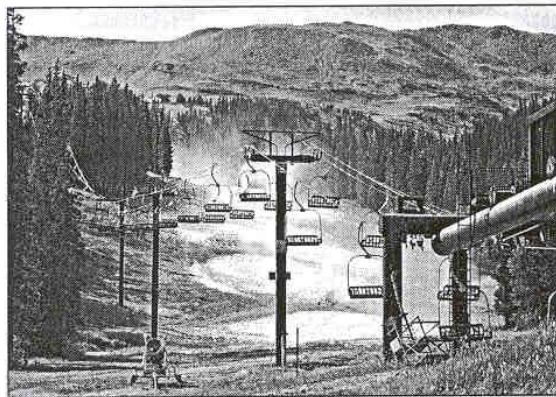
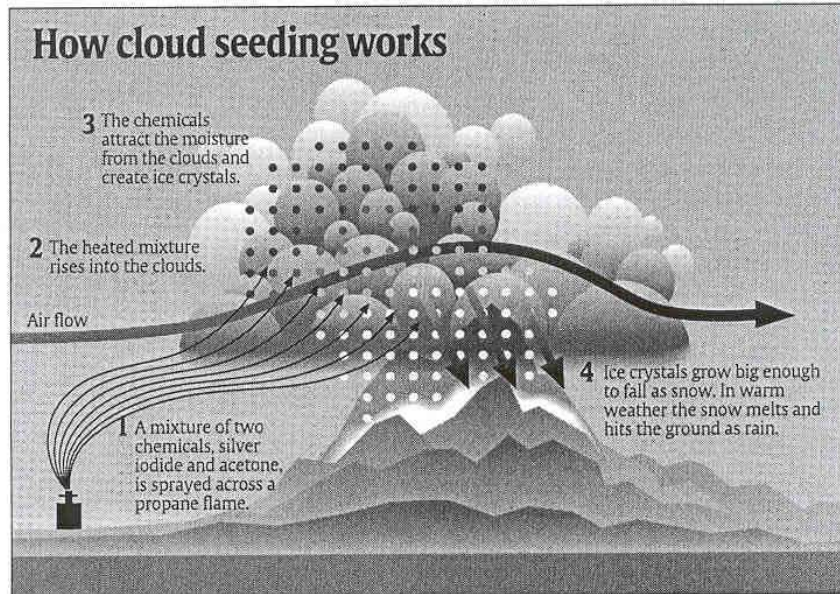
"I believe that it works, but it is as much art as it is science," admits Chips Barry, manager of Denver Water, which supplies more than 1 million people in the city and several suburbs.

Denver tried cloud seeding last year for the first time since the drought of 1977. "We think we got 15% additional snow," Barry says. "But it is impossible to prove conclusively that you were able to make it snow more than it would have."

He notes, however, that Denver's mountain reservoirs are now 75% full. They were only at 40% a year ago, Colorado's driest year on record.

Cloud seeders say their efforts won't end the drought but rather help get through it until normal weather returns.

"Cloud seeding is not a cure-all," says Tom Henderson of Atmospherics Inc., a weather-



Let it snow . . . please: Synthetic snow dots the slope at the base of the Loveland Ski Area near Dillon, Colo., in late October. About a week later, cloud-seeding efforts began nearby.

modification firm in Fresno, Calif. "The best we can do right now is increase, to a small degree, the precipitation that would have fallen had you not seeded."

Methods pioneered in '40s

The technology used to seed clouds is more than half a century old. A chemical mixture is sprayed over a propane flame. It floats to the clouds, where it attracts droplets of moisture that eventually fall as snow.

Novelist Kurt Vonnegut's brother, Bernard, was one of its

pioneers in the 1940s. So was Henderson, who used to sit in a surplus warplane and dump dry ice out the hatch over California's Sierra Nevada range.

Hydroelectric utilities, ski resorts and irrigation districts in California, Nevada, Colorado and other states have been seeding clouds for decades. Most use furnace-size propane burners on the ground. Some also fly aircraft into clouds and drop chemicals from above. They track storm fronts like TV meteorologists. Using radars, satellites and mountaintop weather stations, they gauge

when temperature, wind and other conditions are best.

By one estimate, there were 66 seeding projects in 10 states in 2001. Dozens of foreign countries also are trying it.

"There's always debate in the scientific community," says Shaun Parkinson of Idaho Power, a Boise utility that has begun cloud seeding this winter to boost stream flows for its hydroelectric plants. It will spend about \$700,000 a year on its pilot program.

A review in October of "weather modification" issues by the National Research Council concludes "there still is no convincing scientific proof" that cloud seeding works. Most skepticism surrounds summer efforts to squeeze more rain or limit hail in thunderstorms over the Great Plains. But the research council's 123-page report notes "strong suggestions of positive seeding effects" in winter in mountain areas.

That's because of the "orographic effect" of mountains. As clouds rise over the mountains, the moisture in the clouds cools and drops as snow or rain. Seeding such clouds, especially as they reach the tops of mountains, is thought to squeeze out more rain and snow than would fall naturally. On their own, such clouds are inefficient and drop only 10% of

their moisture as precipitation.

So ski resorts seed clouds to boost snowfall on their slopes now. Power companies, farmers and cities do it to bank water for later. More mountain snow in winter means more snowmelt running downstream in spring to drive power plants, irrigate fields and supply municipal drinking water.

For the first time, towns and farm groups in New Mexico are helping pay for cloud seeding in southwestern Colorado, says Larry Hjermstad of Western Weather Consulting in Durango, Colo. They hope more snow in the San Juan Mountains will send more spring runoff down the Animas and San Juan rivers, which flow south into their state.

Risk worth it for most

If cloud seeding is a gamble, it's a relatively cheap bet. Buying water from another city that has more than it needs is far more expensive. Barry of Denver Water says a season of cloud seeding costs less than one-tenth of what the city would pay for the amount of extra water seeding generates.

Vail Ski Resort, which has seeded clouds for nearly 30 winters, pays almost as much for one night of artificial snowmaking on 8 acres of its slopes as it spends on a season of cloud seeding. The Colorado resort estimates a 15%-20% improvement in its snowpack.

Nevada and Utah, the driest states, have had regular cloud seeding programs for decades. So have several California power companies and farm irrigation districts.

But weathering the drought is all that Denver Water wants from its program. Barry says cloud seeding won't become a permanent part of its water-supply strategy.

"Because then what do you do when you've got (another) drought? You've got nothing left to call on," he explains.

As for proving that cloud seeding works, the National Research Council report urges more scientific study. But financial support for such research has dropped. Funding peaked at \$20 million a year in the 1970s. Research now totals about \$500,000 a year.