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TOP STORY

Cloud seedings silver lining hard to prove

By Kavan Peterson, Staff Writer

Two years ago, as a severe drought parched much of the West, a handful of states set out to prove once and for all whether seeding clouds with chemicals could help arid regions squeeze extra rain or snowfall out of the atmosphere.

Colorado and Nevada shot skyward tiny particles of silver iodide, which has a similar crystalline structure to ice, hoping to fool the clouds into creating snow. Utah tested a rarer method of snowmaking: injecting clouds with super-cooled propane gas from mountaintop tanks.

It snowed. But was the snow made by man or Mother Nature?

"Going into this project, I thought we'd finally got to the stage where we'd be able to discriminate between seeded and non-seeded snow," said professor Bill Cotton, a nationally recognized cloud-seeding expert and climate researcher at Colorado State University who received a \$100,000 federal grant to evaluate the state's weather modification program.

Did Colorado's cloud-seeding experiment, which cost the state \$1.2 million, boost snow pack in critical Rocky Mountain watersheds?

Maybe, Cotton said. Can he prove it? "My conclusion is not really."

After only one season of operations, federal funding to analyze cloud-seeding projects in five states (Colorado, Nevada, North Dakota, Texas and Utah) has dried up before scientists could find proof or disproof. The cloud-seeding experiments were too brief or inconclusive to unlock Mother Nature's secrets, say researchers who will release their findings at an [American Meteorological Society](#) conference in San Diego on Jan. 11.

Researchers from Colorado, Nevada and Utah will issue final reports on their snowmaking experiments. Experiments in North Dakota and Texas that took place in the summer and involved dropping salt particles in clouds to try to suppress crop-damaging hail storms and increase rainfall were delayed by funding problems and will not be completed until later this year.

With no relief from the drought in sight, states such as Wyoming now are looking at taking the lead where the federal government left off to determine whether humans can manipulate the weather to increase precipitation.

Some climate scientists believe that recent technological advancements in weather science may help generate enough evidence to finally prove that the questionable science of weather modification isn't just an expensive form of rain dancing. What they lack, however, is long-term commitment from policy-makers to fund the necessary research.

The debate over whether humans can make rain or suppress severe hail storms by seeding clouds with chemicals has persisted for decades among scientists, lawmakers and water officials. In the 1970s, the federal government spent more than \$20 million a year researching weather-modification projects such as cloud seeding. But nearly all that funding was pulled in the 1980s when it became apparent that earlier evidence had been greatly exaggerated and scientists began questioning whether cloud seeding worked.

More than a decade later, as a severe drought began to significantly impact much of the West in 2001, Congress revisited weather modification and approved \$3.2 million for research on existing state cloud-seeding programs.

The silver iodide method of cloud seeding studied in Colorado and Nevada is the most commonly used weather-modification technique. The particles have been shown to stimulate formation of snowflakes under laboratory conditions. Releasing silver iodide into clouds is a tricky, imprecise process involving either airplane-mounted flares or mountaintop smoke generators. Researchers in Colorado and Nevada hoped to use powerful computer modeling to distinguish between seeded snowflakes and natural snowflakes, but were unsuccessful.

"Where we've been lacking is the physical research that can distinguish between naturally occurring precipitation and the new snow that falls as a result of the seeding," said Steve Hunter, a research meteorologist for the [U.S. Bureau of Reclamation](#) who oversaw the state projects.

Utah's propane gas experiment in the Wasatch Mountains appeared to produce the most concrete results, Hunter said. The scientist in charge of Utah's project, Arlin Super, a retired professor of meteorology with 30 years of experience in cloud seeding, said the propane method appeared to increase snowfall by at least 7 percent.



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"Doing this one winter is hardly definitive, but it looks real intriguing," Super said.

Although researchers said they observed verifiable increases of precipitation in most of the experiments, a single year of data probably would not provide enough evidence to convince skeptics, Hunter said.

"What we really need is a lot more political will to follow through with the research because it may take five to 10 years to show statistical evidence how and why cloud seeding works," Hunter said.

According to the latest [U.S. Seasonal Drought Outlook](#), released by the National Oceanic and Atmospheric Administration's Climate Prediction Center, the American West can expect to face continued drought conditions and water shortages.

Many believe this will lead to increased pressure to seed clouds. But policy-makers should be asking for more proof that cloud seeding works and won't cause harmful results, said Robert Serafin, director emeritus of the federally funded [National Center for Atmospheric Research](#) (NCAR) in Boulder, Colo.

Serafin co-authored a report for the [National Academy of Sciences](#) last year that concluded there is no convincing scientific proof that cloud seeding works. The 144-page report, [Critical Issues in Weather Modification](#), called for a nationally coordinated research effort into weather modification before large-scale cloud-seeding projects are attempted.

The lack of scientific certainty and lukewarm federal support, however, hasn't stopped states from attempting to use this technology to increase rainfall and snowfall. At least 10 Western states have more than 66 ongoing cloud-seeding programs, Serafin said.

"These states are spending millions of dollars a year on this technology, but almost nothing on research to find out if it even works," Serafin said.

"What if in fact they're producing less snow? Those kinds of issues really deserve to be answered," he said.

One Western state that hasn't done much cloud seeding so far Wyoming recently has indicated it may become the first state to commit to a long-term cloud-seeding research project.

The Wyoming Water Development Commission has proposed to the Legislature a five-year, \$8.85 million project to study cloud seeding to increase snowfall in Wyoming's Medicine Bow and Sierra Madre mountain ranges.

If approved, Wyoming's program by far would be the largest cloud-seeding research project conducted since the 1980s, said Dan Breed, an NCAR meteorologist in Boulder.

"The important thing about Wyoming's program is that it's designed to facilitate the long-term research needed to provide verifiable evidence of cloud seeding's efficacy," Breed said.

The Legislature, which ordered the commission to come up with a cloud-seeding proposal, will consider the proposal when it convenes Jan. 11.

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