



Wyoming Cloud Seeding Activities

The Wyoming Water Development Office (WDDO) became interested in cold season cloud seeding (a form of weather modification) in the early 2000's. The Office spent more than ten years conducting extensive research on the science and effectiveness of the technology to help determine whether seeding over certain parts of the state would be a valuable and affordable investment. WDDO's ten-year Wyoming Weather Modification Pilot Study showed positive results, indicating that cloud seeding over certain mountain ranges would incrementally augment snowpack and increase spring runoff. Since then, several other studies have been conducted to analyze cloud seeding opportunities across the state, all with positive results indicating seeding is a viable technology.

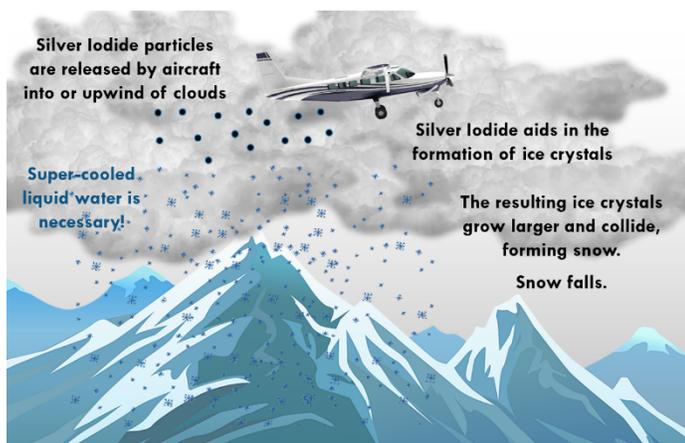
Seeding clouds continues to be proven as a safe and environmentally-friendly technology for increasing precipitation in small amounts.

WHAT IS CLOUD SEEDING?

Cold season seeding, and how it works

Cold season cloud seeding is conducted during the winter season (generally Nov. 15 through Apr. 15), over mountains to assist in a cloud's natural precipitation process by enhancing ice crystal production. When ice crystals grow sufficiently, they turn into snowflakes and fall to the ground. The presence of clouds and the potential for precipitation are pre-existing conditions needed for cloud seeding to be effective.

Silver iodide is a natural compound used during the cloud seeding process, chosen for its environmental safety and unique molecular structure, as it is very similar to the structure of naturally forming ice crystals. Silver iodide initiates the freezing process of water in a cloud, which increases the number of ice crystals, ultimately leading to the production of snow.



The process of seeding clouds can be conducted by either aircraft or ground-based generators. It is estimated that the production of snow can occur within 15 to 30 minutes from the start of seeding. In many cases, high performance radar imagery has documented snow development in less time.

CLOUD SEEDING FACTS:

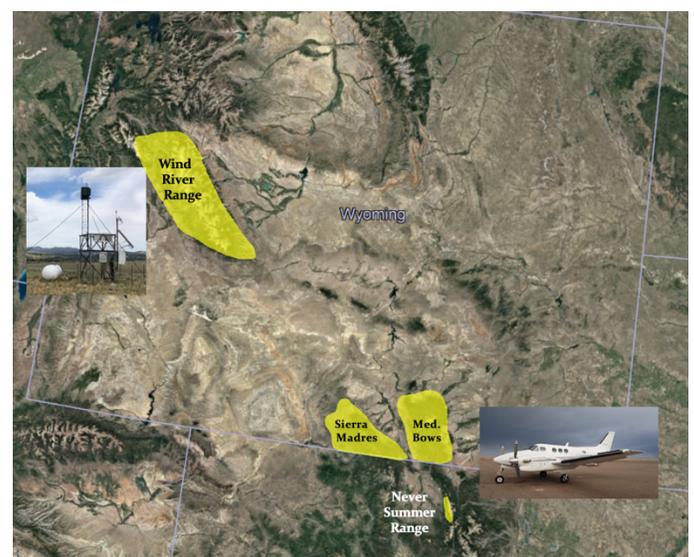
- Silver iodide (natural compound) initiates the freezing of liquid water that already exists within a cloud.
- Cloud seeding is not a large-scale process, but rather microscale, not impacting precipitation downwind.
- Operational programs include a strict suspension criteria

OPERATIONAL PROJECTS

A summary of Wyoming's ground-based and aerial cloud seeding projects

Currently, the WDDO manages two projects across the state:

1. Wind River Mountains Cloud Seeding (ground)
2. Medicine Bow and Sierra Madre Ranges Cloud Seeding (aerial)



Wind River Mountains

A ground-based cloud seeding project over the Green and Wind River Basins

Beginning in 2014, the Wind River Mountains have been the State's longest operational cloud seeding project. Cloud seeding is conducted using ten remote controlled generators located within the vicinity the range. Seeding activities for this project generally take place November 15 - April 15.

Funded in part by the Wyoming State Legislature, with additional funding from regional water users:

- Southern Nevada Water Authority
- Central Arizona Water Conservancy District
- Colorado River Board of California – Six Agency
- Genesis Alkali (Green River, WY)
- Solvay Minerals (Green River, WY)
- TATA Chemicals (Green River, WY)
- Ciner Wyoming (Green River, WY)
- Rocky Mountain Power (Green River, WY)
- Joint Powers Board (Green River/Rock Springs/Sweetwater Co.)

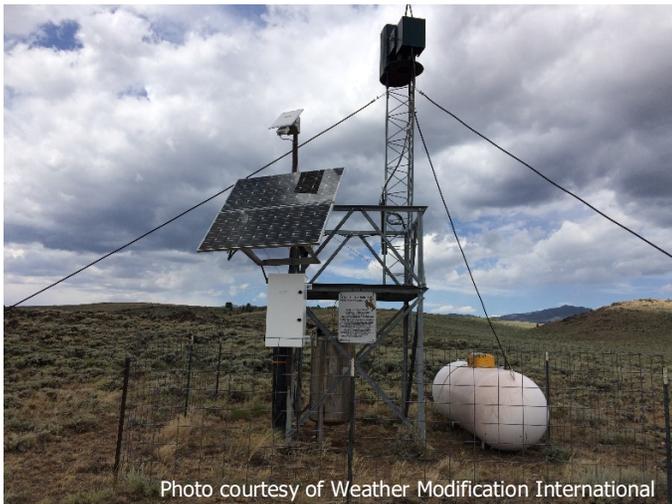


Photo courtesy of Weather Modification International

During the 2021 Legislative Session, the project budget was approved at a 37% (State of Wyoming) / 63% (other water users/funding partners) funding split for the 2021-2022 winter season.

Colorado River Basin Programmatic Funding Agreement

Wyoming is one of seven states taking part in a formal cost-share agreement (between Upper Basin and Lower Basin parties) to continue the use of weather modification efforts as a way to contribute additional water into the system for Colorado River Basin users. Collective contributions have the potential to reach \$1,500,000 in a single Water Year. This agreement allows the Upper Basin States flexibility and possible additional funding to expand programs.

Medicine Bow and Sierra Madre Mountain Ranges

Aerial seeding over the North Platte and Little Snake Basins

The winter of 2018-2019 was the first time the State of Wyoming conducted cloud seeding operations strictly with aircraft. The Medicine Bow and Sierra Madre Mountain Ranges will continue to be a target area for aerial seeding into the 2021-2022 winter season. Cloud seeding by aircraft is cost-effective, especially due to the region's terrain geography. The project's high-performance King Air 200 aircraft can achieve greater accuracy at targeting favorable seeding areas within clouds, rather than targeting from a fixed location on the ground (ground-based generators).

Seeding activities generally take place November 1 - April 15, with the aircraft based at the Cheyenne Regional Airport.



Photo courtesy of Weather Modification International

The project is funded in part by the Wyoming State Legislature, and our long-standing funding partner: the City of Cheyenne Board of Public Utilities.

Seeding Colorado's Never Summer Mountains

Colorado's Never Summer Mountain Range is an "add-on" to Wyoming's aerial project (contingent upon Colorado permitting). This additional cloud seeding effort is paid for and sponsored by Colorado's Jackson County Water Conservancy District (based in Walden, CO) and supports water supply in Wyoming's North Platte River Basin.

OTHER CLOUD SEEDING PROGRAMS:

- > Colorado Water Conservation Board
- > Idaho Power Company
- > North Dakota Atmospheric Resource Board
- > Utah Division of Water Resources
- > Desert Research Institute of Nevada