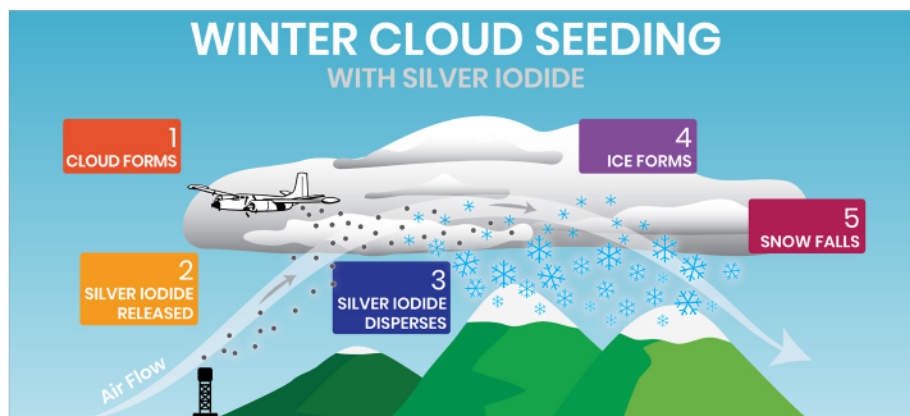


WINTER CLOUD SEEDING

INCREASING
SNOWPACK

Enhancing Snowfall

In mountainous regions where water supply depends on winter snowpack, cloud seeding aims to enhance snowfall by dispersing silver iodide (AgI) particles into clouds to form ice and cause, or enhance, snowfall. Cloud seeding may use ground-based generators and/or aircraft to disperse AgI into the clouds. Targeting suitable conditions for cloud seeding occurs on short time scales (hours) and small spatial (50–100 km) scales and does not alter large-scale weather patterns or the climate. It cannot overcome a drought and variability in effectiveness occurs due to seasonal variations in weather patterns. Ultimately, cloud seeding should be viewed as one tool in a water resource manager's toolbox of mitigation strategies for long-term water management solutions under a changing climate and growing water scarcity. Specifically, cloud seeding can offer an effective strategy for increasing water supply.



Ground-based generators and/or aircraft are often used to disperse silver iodide into the clouds.

Recent
Advances

- Scientifically-proven technology to enhance snowfall
- One tool as part of a broader strategy for water resource management
- Model simulations inform cloud-seeding program designs & estimate potential benefits

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NEW OPPORTUNITIES

Clouds that contain supercooled liquid water are candidates for cloud seeding to enhance the efficiency of the snow formation process. However, weather dynamics in mountain watersheds can differ greatly. Therefore, it is necessary to study and understand the weather patterns and characteristics of clouds in a region of interest before starting a cloud-seeding program. Recent advances in computer modeling and documented observations of seeding benefits are providing new opportunities to understand the effects of cloud seeding and to more efficiently design and operate cloud-seeding programs.

Roza Irrigation District is sponsoring a study in collaboration with the National Science Foundation (NSF) National Center for Atmospheric Research (NCAR) Research Applications Laboratory (RAL) focused on the following objectives:

- Assess the potential for cloud seeding to increase snowpack in the Yakima River Basin
- Complete a detailed analysis of cloud and precipitation characteristics in the basin
- Analyze weather conditions under both present and future climate scenarios
- Complete a preliminary program design and cost-benefit analysis for a cloud-seeding pilot project in the Yakima River Basin

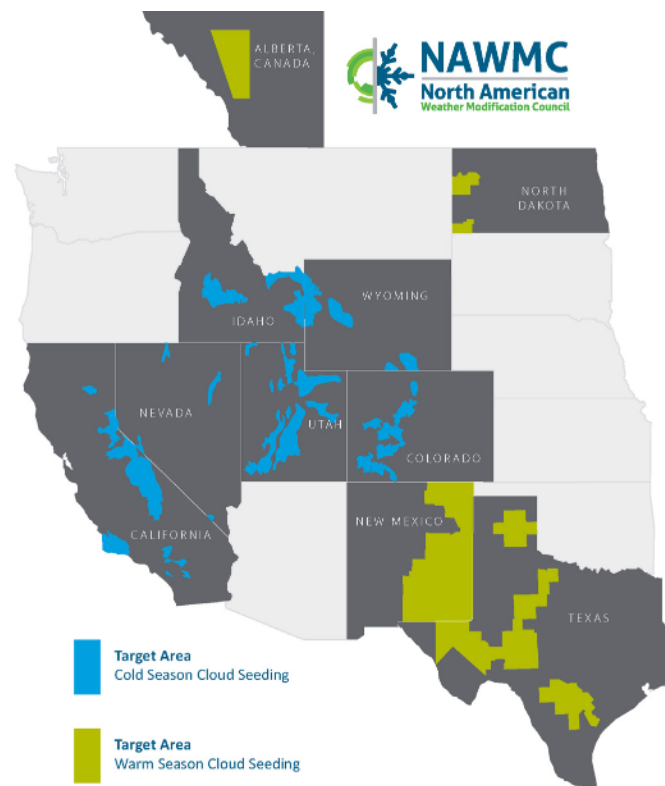
FREQUENTLY ASKED QUESTIONS

Where is cloud seeding being conducted in the United States? Many states in the Western U.S. operate winter cloud-seeding programs, including Idaho, Wyoming, Colorado, Utah, Nevada, and California.

What are the benefits and downwind effects of cloud seeding? The overall magnitude of



Ground-based generator
PHOTO COURTESY IDAHO POWER COMPANY



impact due to cloud seeding is relatively small compared to natural precipitation, but it can be an important contributor to the water supply in some watersheds. While there is no evidence that suggests an increase in precipitation from cloud seeding directly leads to a systematic decrease elsewhere, this is an active area of further research.

Is cloud seeding cost effective? Though water costs vary across the region, cloud seeding through ground-based or aerial AgI release has been shown to be cost effective in most regions.

Is silver iodide released in cloud seeding harmful to the environment or humans? Measured concentrations of silver in snowpack are less than or similar to natural background levels of silver (e.g., due to mineral dust) and these trace values are orders of magnitude below the levels considered concerning by environmental regulatory agencies worldwide.

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