

Joe Lombardo  
Governor



Tiffany Greenameyer  
Director

Curtis Palmer  
Deputy Director

David Lenzner  
Deputy Director

**STATE OF NEVADA  
GOVERNOR'S FINANCE OFFICE  
Budget Division**

209 E. Musser Street, Suite 200 | Carson City, NV 89701-4298  
Phone: (775) 684-0222 | [www.budget.nv.gov](http://www.budget.nv.gov) | Fax: (775) 684-0260

Date: August 29, 2025

To: Tiffany Greenameyer, Clerk of the Board  
Governor's Finance Office

From: Michael Rankin, Executive Budget Officer *MR*  
Governor's Finance Office, Budget Division

Subject: INTERIM FINANCE COMMITTEE **INFORMATION** ITEM

The following describes an action item submitted for placement on the agenda of the next Interim Finance Committee meeting.

**NEVADA SYSTEM OF HIGHER EDUCATION**

Agenda Item Write-up:

Senate Bill (SB) 99 appropriated \$600,000 in fiscal year 2025 to the Desert Research Institute of the Nevada System of Higher Education for cloud seeding. Section 1 of SB 99 requires a report to the Interim Finance Committee describing the expenditures of the program. This report covers the period from July 1, 2024, through June 30, 2025.

Additional Information:

N/A

Statutory Authority:

SB 99

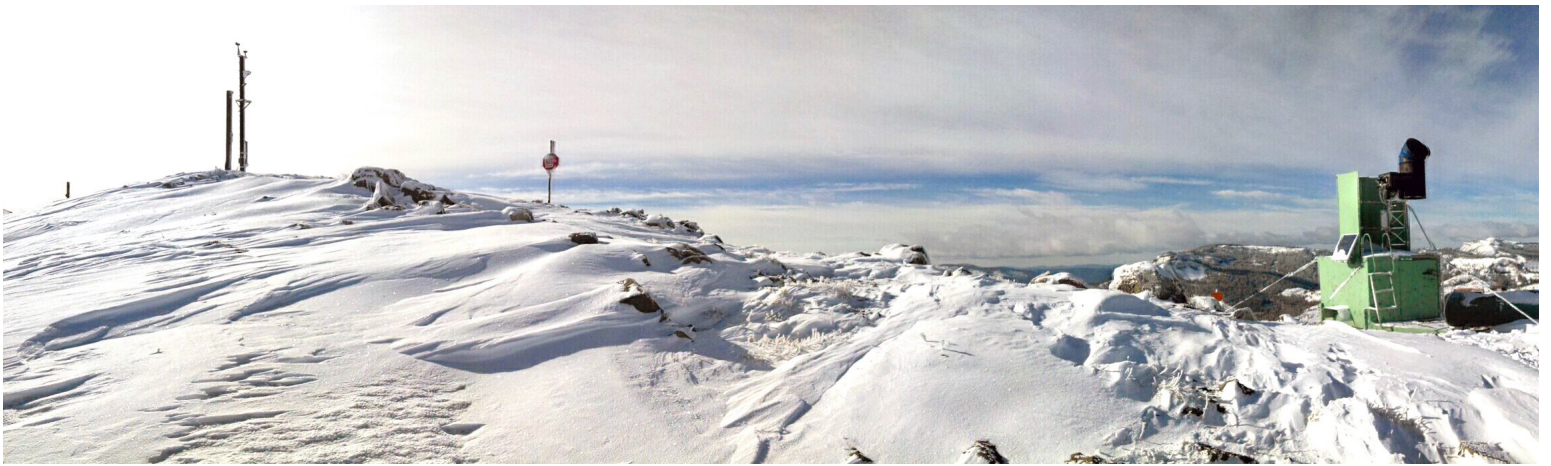
REVIEWED: \_\_\_\_\_

GFO INFO ITEM: \_\_\_\_\_

LCB AGENDA ITEM: \_\_\_\_\_

# Nevada State Cloud Seeding Program Summary Report

**FY 25**



*Frank McDonough*  
DRI

**SEPTEMBER 1, 2025**

# Summary Final Report

## **Nevada State Cloud Seeding Program**

### **Operations for FY2025**

Submitted to the Legislative Counsel Bureau

By Frank McDonough, Project Manager  
Division of Atmospheric Sciences – DRI  
September 1, 2025



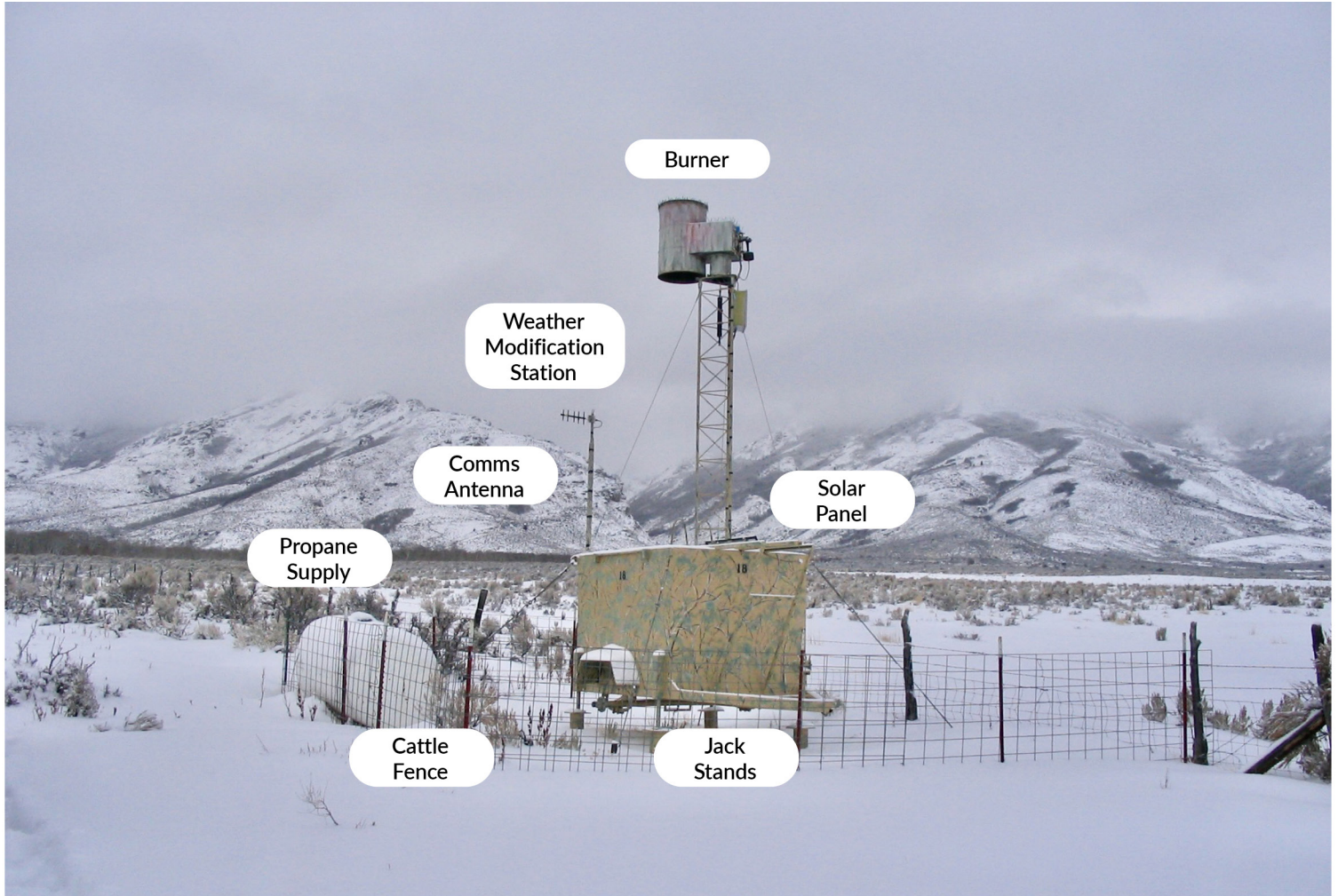
## Background

Nevada is the driest state in the United States. Critical water resources for the rapidly growing State of Nevada are primarily provided by mountain snowfall during winter storms. Periodic drought and competing water needs are often greater than many basins can deliver. Cloud seeding is a safe and proven method to increase the efficiency of clouds to produce additional snowfall.

In the 2023 legislative session, the legislature approved, and Governor Lombardo signed SB99, a bill that provided DRI with \$600,000 each year of the biennium to revive state support for what had been a long-running cloud seeding operations to benefit the State of Nevada. This report provides an overview of the expenditures for FY25, the second year of this biennium for the Nevada State Cloud Seeding Program.

## Executive Summary

During FY25, DRI's Cloud Seeding team operated cloud seeding generators during 82 storm periods with 1,788 generator-hours. The precipitation increases are estimated at 40,674 acre-feet of snow water equivalent. This is enough water for the yearly use of over 100,000 Nevada homes. The cost to the State for this additional seeding produced water for this year was \$14.75 per acre-foot. During the winter of 2024–2025 the State had fewer storms and clouds, and subsequent cloud seeding opportunities, than during the winter of 2023–2024. This was especially the case across the southern and central portions of the State, where less than half of the normal storm frequency was present. Across the northern half of the State there were still frequent opportunities for cloud seeding.



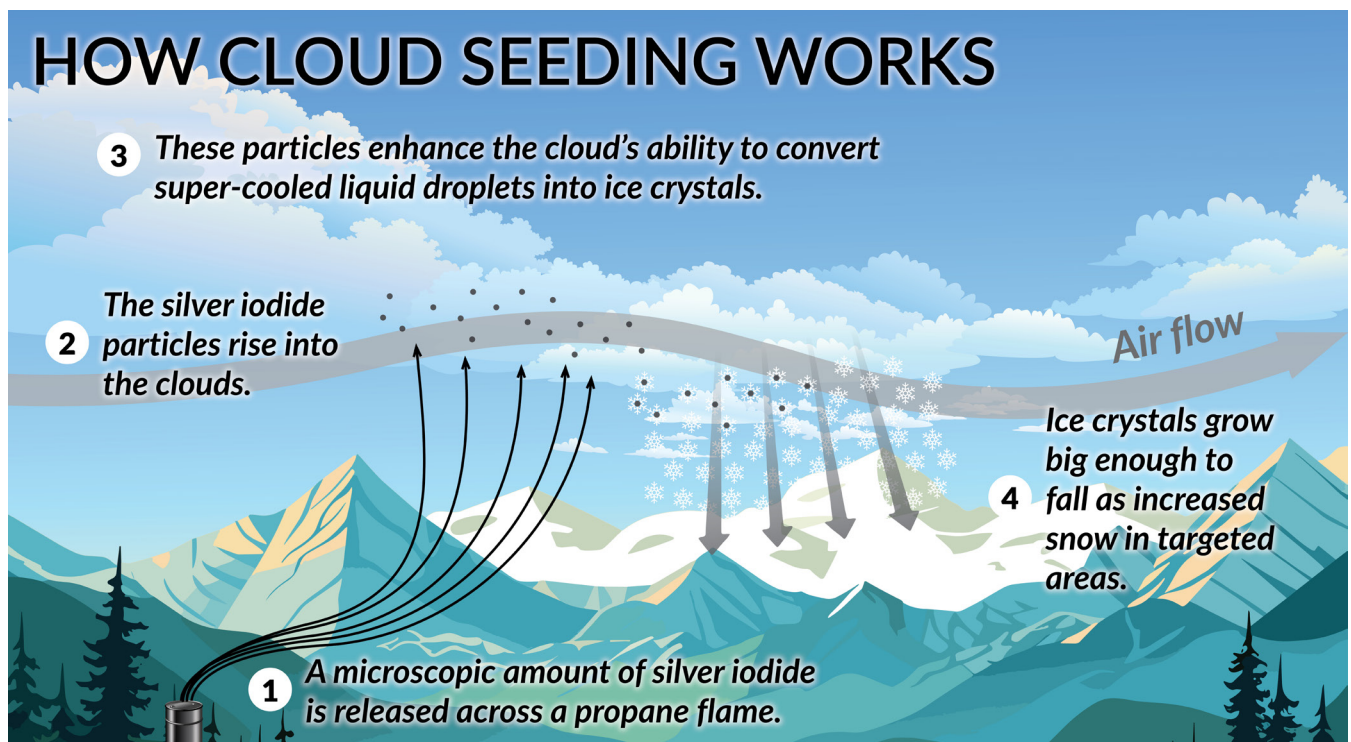
**FIGURE 1.** A DRI Cloud Seeding Generator sited in the Ruby Mountains.

## Cloud Seeding

Subfreezing clouds are collections of subfreezing liquid water drops, also known as supercooled liquid water drops, and/or ice crystals. The clouds form as moist air is lifted and cools to the point where the atmosphere can no longer hold the water vapor (100% relative humidity). Once the relative humidity reaches 100%, supercooled cloud droplets will start to form aided by small aerosol particles known as cloud condensation nuclei (sea salt, smoke, pollution aerosols, fungus spores, ...). Ice can also form in subfreezing clouds if sufficient numbers of ice forming aerosols (IN) are present. Typically cloud layers warmer than  $-15^{\circ}\text{C}$  ( $5^{\circ}\text{F}$ ) will not have sufficient active IN to produce ice crystals. On the other hand, if ice crystals can form in clouds dominated by supercooled cloud droplets, then the ice crystals will quickly grow at the expense of the liquid drops. The ice crystals eventually gain sufficient mass and fall to the surface as a snowflake.

The goal of cloud seeding is to introduce ice into subfreezing clouds containing supercooled liquid water (SLW). This enhances the precipitation efficiency of the clouds and adds to the snowpack and subsequent runoff.

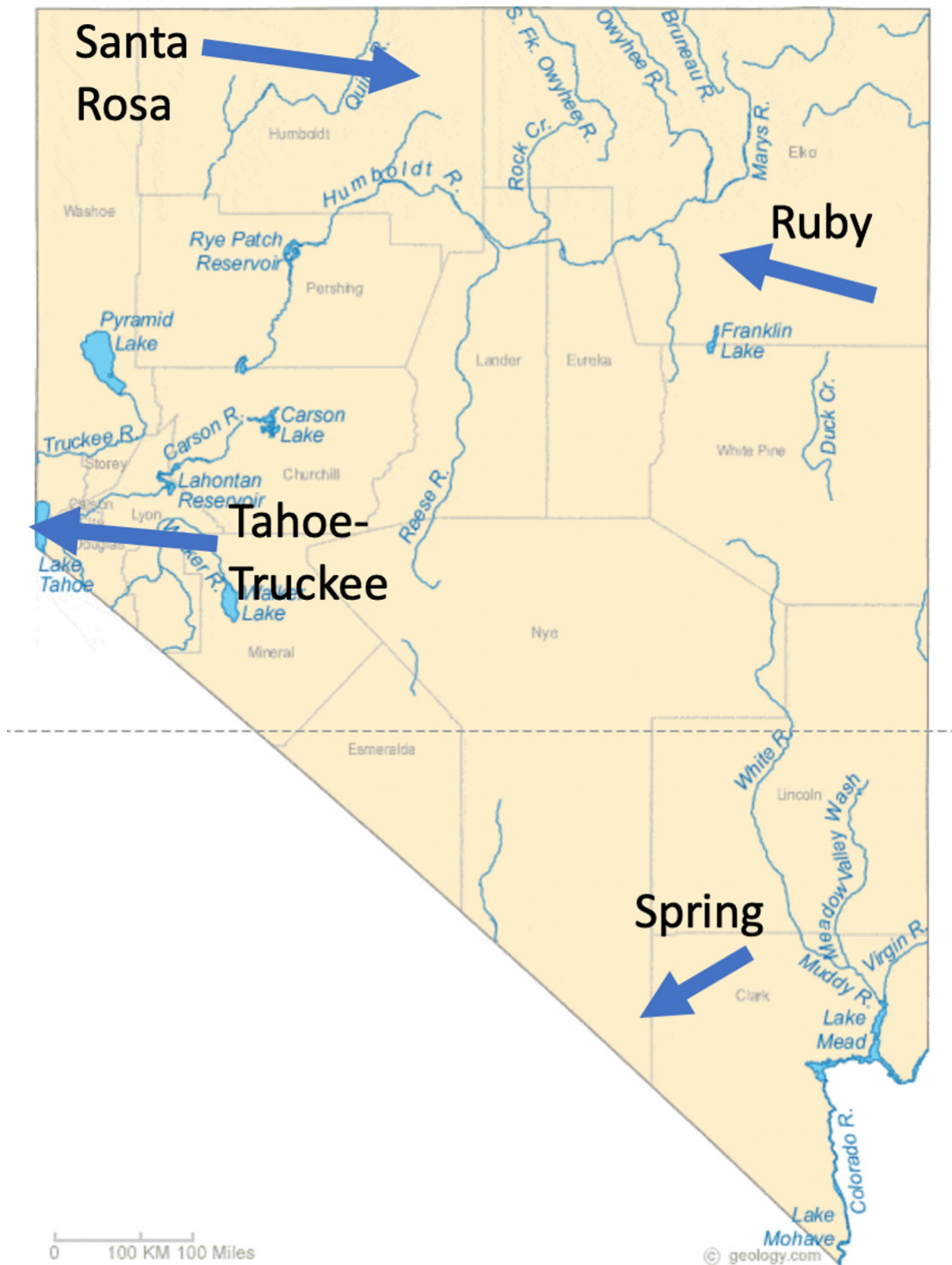
The primary method to do this is to introduce dust aerosols consisting of silver iodide (AgI) into clouds containing SLW. These environmentally safe aerosols require clouds to already be present, and cloud temperatures to be cooler than  $-5^{\circ}\text{C}$  ( $23^{\circ}\text{F}$ ) to activate ice crystal formation and subsequent growth (seedable clouds). The AgI is released from ground-based generators with the goal to get the AgI into the SLW portions of the clouds at the proper ice activation temperatures. The AgI does not need to be released directly into clouds but must reach cloudy air to create snowfall (Figure 2).



**FIGURE 2.** The cloud seeding conceptual model.

## Summary

Cloud seeding operations during the winter of 2024–2025 (water year 2025 (WY25)) were again conducted in the Ruby Mountains, Santa Rosa Mountains, Spring Mountains, and the Sierra Nevada's Tahoe-Truckee Watershed (Figure 3). Nineteen cloud seeding generators at 17 different sites were part of the project. Six were sited along the western base of the Ruby Mountains, two were sited just west of the Santa Rosa Mountains, four along the southern and western flanks of the Spring Mountains, and seven along the Sierra Crest, just west of Lake Tahoe.



**FIGURE 3.** Map of the State Program for winter 2024–2025.

## Results

During the winter of 2024–2025 the State had fewer storms and clouds, and subsequent cloud seeding opportunities, than during the winter of 2023–2024. This was especially the case across the southern and central portions of the State, where less than half of the normal storm frequency was present. Across the northern half of the State there were still frequent opportunities for cloud seeding.

The cloud seeding generators were operated during 82 storm periods with 1,788 generator-hours. The precipitation increases for this year were estimated at 40,674 acre-feet of snow water equivalent. This is enough water for the yearly use of 100,000 Nevada homes (Table 1). The cost to the state for this additional water was \$14.75 per acre-foot. An acre-foot of water is one foot of water covering an acre of land (43,560 sq ft), 325,851 gallons.

**TABLE 1.** Summary of operations during the winter of 2023–2024.

SEEDING REGION	NUMBER OF GENERATORS	SEEDED STORMS PERIODS	SEEDING GENERATOR HOURS	SNOW WATER EQUIVALENT PRECIPITATION INCREASES AC-FT
Tahoe-Truckee	7	35	857	17,990
Ruby Mountains	6	22	651	13,666
Santa Rosa Mountains	2	19	171	3,298
Spring Mountains	4	6	109	5,720
<b>TOTALS</b>	<b>19</b>	<b>82</b>	<b>1,788</b>	<b>40,674</b>

## Project Summary

Parts were ordered, and new equipment fabricated to make all of the generators operational. In addition, transportation and winter travel equipment was updated and repaired to allow technicians all season access. Cloud seeding materials were ordered and mixed. All of the equipment in the project areas were visited prior to the beginning of the season. The site visits were used to deliver all necessary supplies, including cloud seeding solution. The cloud seeding generators were repaired as necessary, cleaned, calibrated for 25 g hr<sup>-1</sup> flow rate of silver iodide solution, and made fully operational. In addition, all of the project weather stations, web cams, and other generator site equipment were made operational. Communication (satellite or cellular) accounts were established. In addition, propane deliveries were established for the sites.

Storms and cloud structures from the 2024–2025 winter and from previous winters were again reviewed as was the geography of each of the project’s mountains ranges. The project weather stations, icing detectors, webcams, as well as pertinent National Weather Service remote sensing platforms were all used to improve and update the cloud seeding weather forecasting methods. Additional forecasting tools and models were also used to determine a set of operational rules used to conduct the cloud seeding.

On November 1, 2024, the 24/7 operations started. The operations included monitoring weather in all of the project areas, operating generators when cloud seeding weather conditions were present, and testing and maintaining the project instruments and equipment. A new weather forecast was created for each day. When storms approached the area, the observational network of weather sensors were closely monitored. As clouds conducive to seeding moved into the area, the project meteorologist remotely started the cloud seeding generators. In addition to monitoring the weather, the project meteorologist also monitored the snowpack to ensure that the suspension snowpack limits and other weather hazards (i.e., flood watch, extreme avalanche, ...) were not present. The generators were monitored and quickly repaired by the project technicians as necessary to ensure operational continuity. The operational cloud seeding ended on May 1, 2025.

Analysis of the winter storms and seeding events were conducted from June 2025 through August 2025 with the final summary report drafted in late August 2025.

## Spending

The project spending is broken down into several basic categories (Table 2).

**TABLE 2.** Spending category breakdown for year 2 of SB99.

SPENDING CATEGORY	AMOUNT
Professional Salaries	\$69,069.99
Classified/Technician Salaries	\$169,760.27
Graduate Salaries	\$26,833.50
Fringe Benefits	\$136,168.64
Operations	\$198,167.60
TOTAL	\$600,000.00

## Conclusion

DRI fully utilized the \$600,000 in FY25, eliciting 40,674 acre-feet of snow water equivalent. This is enough water for the yearly use of over 100,000 Nevada homes at a cost to the state of \$14.75 per acre-foot of water. DRI's Cloud Seeding team is preparing for the upcoming winter season, and will be prepared on November 1, 2025, to seed winter storms as conditions allow to further augment Nevada's water supply.