



SANTA ANA WATERSHED
PROJECT AUTHORITY

SAWPA Building Irrigation Replacement and Landscaping Refresh

February 20, 2024

Item No. 6.A

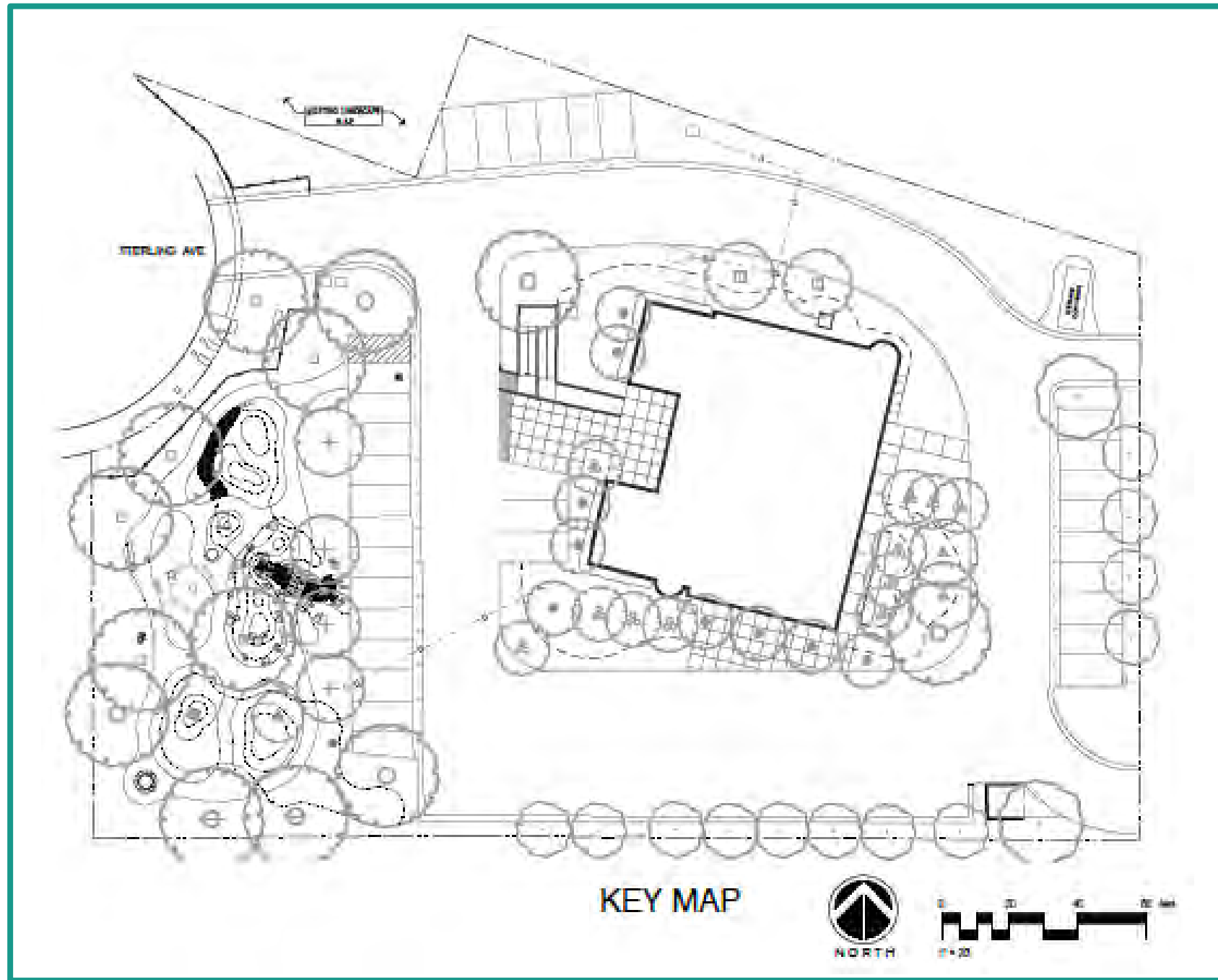
David Ruhl

Executive Manager of Engineering and Operations

Recommendation

- Authorize the GM to award a contract for public works construction to the lowest responsive, responsible bidder, FS Contractors, Inc., for the Irrigation Replacement and Landscape Refresh Project, in an amount not to exceed \$189,734.75; and
- Approve \$240,000 from the Building Reserve Fund for construction and inspection support for the Project.

Irrigation Replacement and Landscape Refresh



- Refresh plantings and SAWPA building grounds with new landscape
- Replace irrigation system

Summary of Bids

- Bids Received January 31st
- Seven (7) bids received as follows:

<u>Bidder (1)</u>	<u>Bid Amount</u>
• FS Contractors, Inc.	\$189,734.75
• Four Seasons Landscaping	\$206,360.21
• Marina Landscape	\$206,487.34
• Mariposa Landscapes, Inc.	\$207,966.25
• David Ollis Landscape	\$237,159.00
• Evolution Landscaping and Plumbing	\$244,712.25
• American Landscape	\$245,784.38
• Estimate of Construction Costs	\$190,203.00

Bid Analysis and Recommended Award

Bid Analysis

- Bid reviewed for compliance with the Bid Documents
- Qualified to perform the work
- References contacts
- FS Contractors, Inc. submitted the lowest, responsive, responsible bid (award recommended)
- Funding from the Building Reserve Fund for construction and inspection support for the project

Recommendation

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- Approve \$240,000 from the Building Reserve Fund for construction and inspection support for the Project.

Questions?

Thank You

David Ruhl
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Santa Ana River Weather Modification Pilot Program Status Update

Item No. 6.B

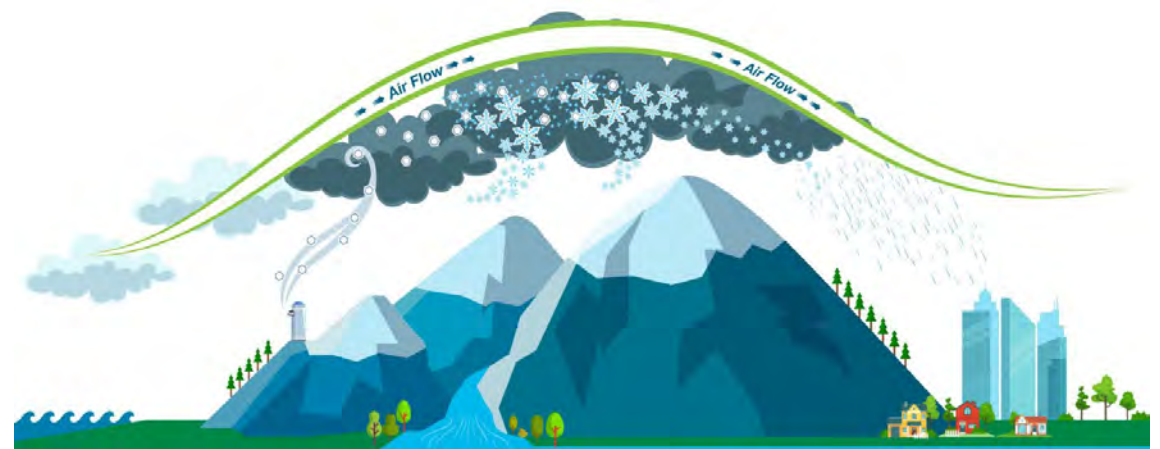
Rachel Gray

Water Resources and Planning Manager



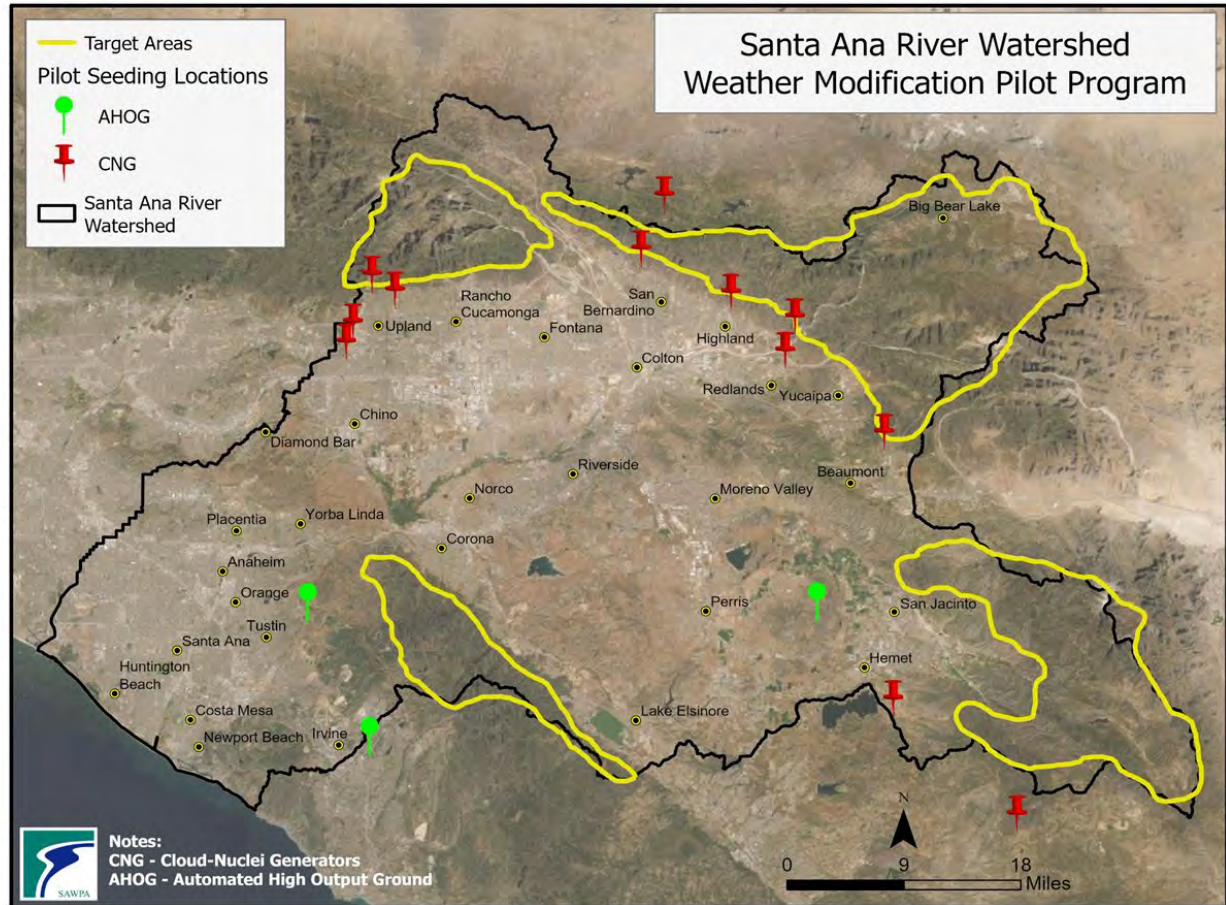
Presentation Overview

- Background Information
 - Pilot Program Overview
 - Funding
- Operations
 - Summary of Cloud Seeding Operations
 - Notifications
 - Summary of Past Storms
- Validation
- Communications Plan
- Program Schedule



Pilot Project Overview

- Pilot Program
 - 4-year study
 - 4 Target Areas (NW, NE, SW, SE)
 - Use of ground-seeding units (15)
 - Use of Validation Study to assess increases in precipitation
 - Communications Plan
- Pilot Program Operator
 - North American Weather Consultants (NAWC)



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Funding

SAWPA Member
Agencies

Big Bear City
Community
Services District

Big Bear Lake
Department of
Water & Power

Chino Basin Water
Conservation
District

City of Corona
Utilities
Department

City of Santa Ana
Municipal Utility
Services

Lake Elsinore and
San Jacinto
Watersheds
Authority

San Antonio Water
Company

San Gorgonio Pass
Water Agency



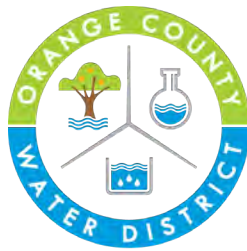
SAN GORGONIO PASS
WATER AGENCY
Established 1961



LAKE ELSINORE & SAN JACINTO
WATERSHEDS AUTHORITY



CHINO BASIN
Water
Conservation
District



SINCE 1933



Powered by water. Driven by service.



A REGIONAL WATER AGENCY
SINCE 1954



Pilot Funding

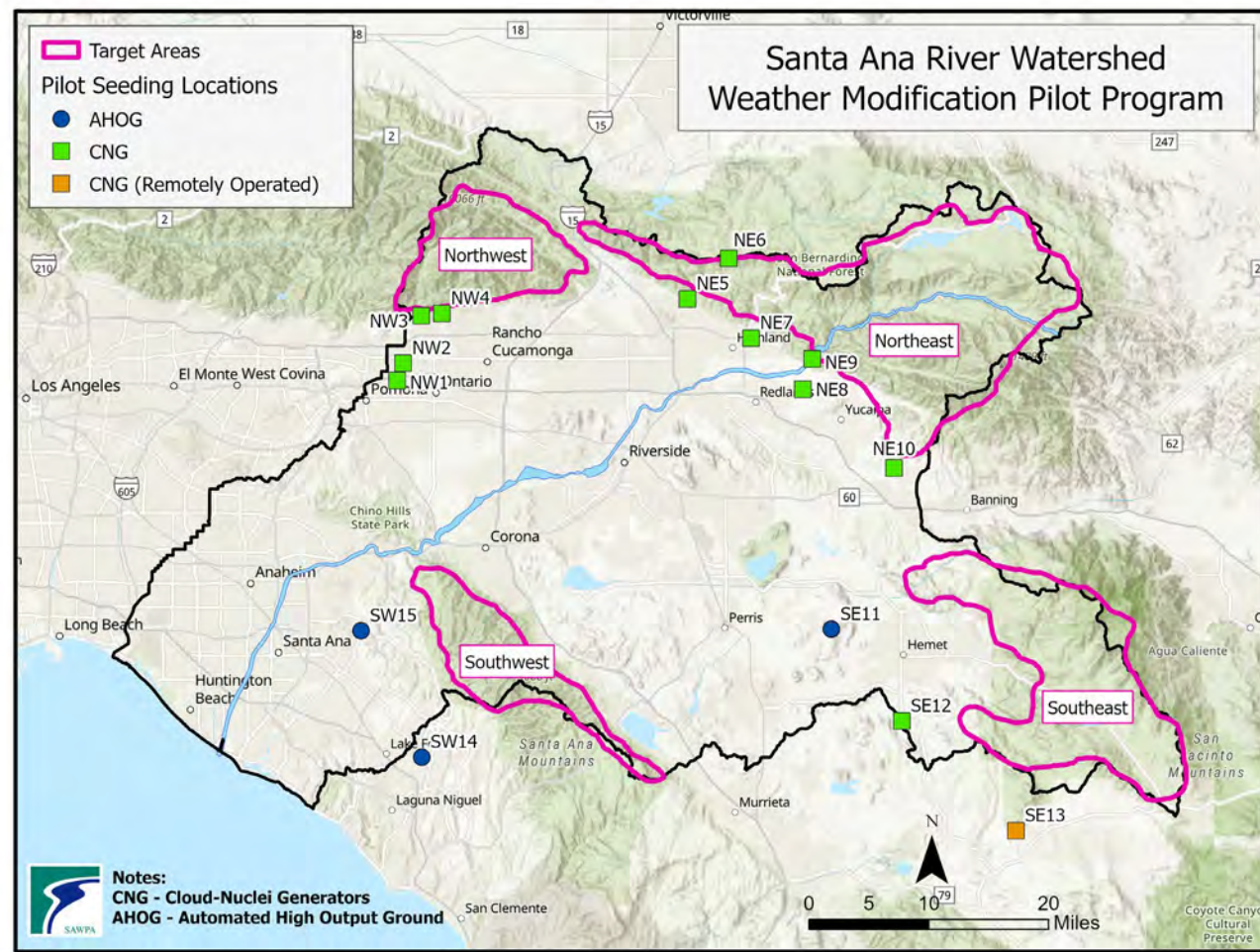
Source	Amount
Prop 1 Round 2 Grant (DWR)	\$861,400
SAWPA (IEUA, WMWD, EMWD, SBVMWD, OCWD)	\$691,000
Local Funding Partners: <ul style="list-style-type: none">• Big Bear City Community Services District• Big Bear Lake Department of Water & Power• Chino Basin Water Conservation District• City of Corona Utilities Department• City of Santa Ana Municipal Utility Services• Lake Elsinore and San Jacinto Watersheds Authority• San Antonio Water Company• San Geronio Pass Water Agency	\$94,000
Total (4 years)	\$1,646,400



Operations

Site (15)	Sponsors (11)
Northwest	
NW1	Chino Basin Water Conservation District
NW2	
NW3	San Antonio Water Company
NW4	
Northeast	
NE5	City of San Bernardino MWD
NE6	Private Landowner
NE7	San Bernardino Valley MWD
NE8	San Bernardino Valley Water Conservation District
NE9	
NE10	San Gorgonio Pass Water Agency
Southeast	
SE11	Eastern Municipal Water District
SE12	
SE13	Private Landowner
Southwest	
SW14	El Toro Water District
SW15	East Orange County Water District

Cloud Seeding Ground-Based Unit Locations



\\sawpa\GIS\projects\Mark_Norton\WeatherMod_21\WeatherMod2.aprx LoPilotProgramSites SW-3108

Example Sites



SW14: ETWD



NE10: SGPWA



NW2: CBWCD

Summary of Incident Reports

Site	Agency	Contact	Date of Incidence	Time of Incidence	Summary and Action
NE5	City of San Bernardino Municipal Water Department	Jose Machuca	December 21, 2023	1830	SBMWD staff (Jason Rodriguez) was performing a site inspection when he encountered the fire department at the entrance of the facility. The Fire Department was called by a resident who thought there was a fire at SBMWD facility. SBMWD staff informed the Fire Department about the Pilot Program. SAWPA spoke with the Captain and notified Fire Department of Pilot Program on January 5, 2024.
NE10	San Gorgonio Pass Water Agency	Matt Howard	December 22, 2023	1715	Resident → Fire Department → Matt Howard → NAWC → SAWPA. SAWPA notified Fire Department of Pilot Program on December 20, 2023.
NW1	Chino Basin Water Conservation District	Dave Schroeder	December 29, 2023	1710	Resident → Fire Department → Dave Schroeder → NAWC → SAWPA. Dave Schroeder explained the Pilot Program to fire department. SAWPA notified Fire Department of Pilot Program on January 4, 2024.

Key Timeline

Task	Completion Date or Time Period
Seasonal Program Start	November 15, 2023
Notifications to Fire Department	December 2023 – January 2024
Seasonal Program Operational Period	November 15, 2023 – April 15, 2024
Seasonal Program End	April 15, 2024
Seasonal Equipment Collection Deadline	May 30, 2024
Draft Seasonal Report Delivered	June 1, 2024

Summary of Cloud Seeding Operations

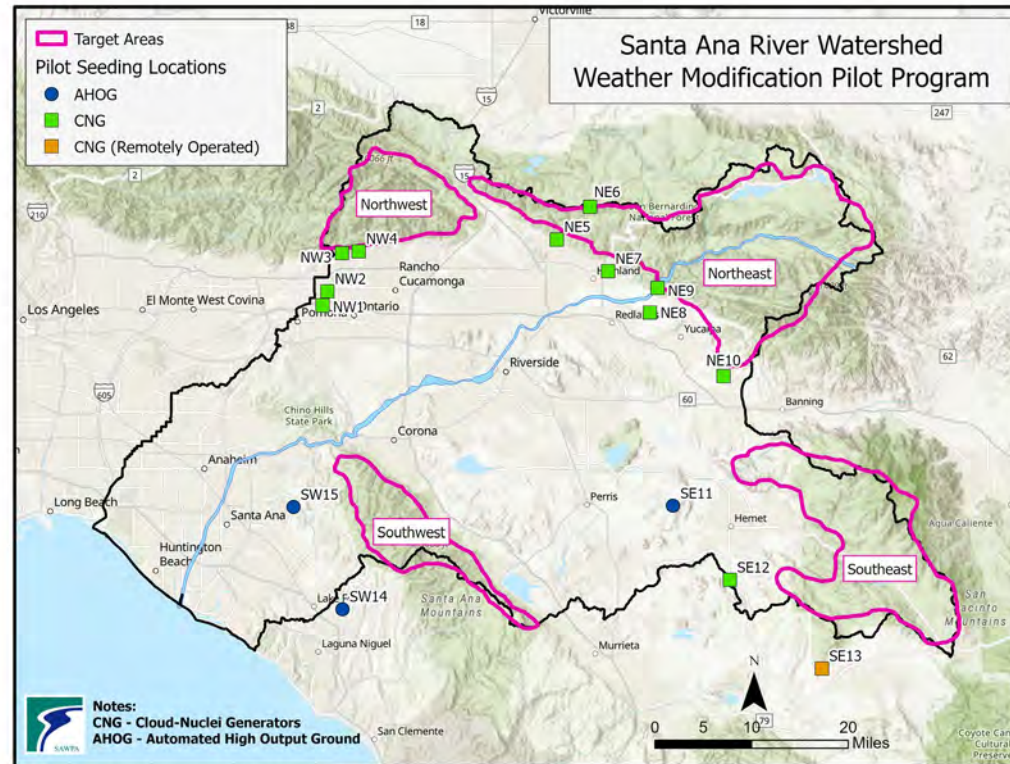
CNG Units	Sponsor	Nov 17-18, 2023	Dec 21-22, 2023	Dec 29-30, 2023	Jan 3, 2024	Jan 20-21, 2024	Jan 21-22, 2024	Feb 1, 2024
NW1	CBWCD			23.00	6.50			10.00
NW2	CBWCD			23.00	7.00			9.00
NW3	SAWCO	11.25	22.00	21.00	5.75			23.50
NW4	SAWCO	13.25	20.75	22.00				23.00
NE5	City of SB Municipal WD		26.50	21.25	8.75	17.25	24.50	
NE6	Private		21.50	9.00	12.25	17.00	14.25	11.75
NE7	SBVMWD		22.75	21.00	9.00	17.00		
NE8	SBVWCD		22.25	18.75	9.75	18.50	23.25	7.75
NE9	SBVWCD		23.00	18.75	9.50	18.25	23.25	8.00
NE10	SGPWA		24.25	21.25	9.25	17.75	24.75	11.50
SE12 (Remote)	EMWD		8.75	5.50	9.75			14.00
SE13	Private		19.00	6.50	8.00	15.25	24.50	12.25
Total Running Hours		24.5	210.75	211	95.5	121	134.5	130.75

AHOGS Units	Sponsor	Nov 17-18, 2023	Dec 21-22, 2023	Dec 29-30, 2023	Jan 3, 2024	Jan 20-21, 2024	Jan 21-22, 2024	Feb 1, 2024
SE11	EMWD	-	5 flares		2 flares		4 flares	1 flare
SW14	ETWD	-	1 flare	3 flares		1 flare	3 flares	
SW15	EOCWD	-						

Rainfall for February 2-9 Storms (Not Seeded)

NW Target (rainfall-inch)		
	Feb 2-9	Total
Middle Fk Lytle Ck	15.48	15.48
Lytle Crk RAWS	14.64	14.64
Deer Creek Dam	12.40	12.40
San Sevaine	9.45	9.45
Wrightwood FS	7.39	7.39
Wrightwood	5.66	5.66
Mormon Rock RAWS	6.75	6.75
Upper Day Cyn	5.31	5.31
Mt Baldy	2.96	2.96
	Average	8.89

SW Target (rainfall-inch)		
	Feb 2-9	Total
Santiago Pk 5638	11.81	11.81
Horsethief/Rice Cyn	10.79	10.79
Leach/Dickey Cyn	10.11	10.11
Upper Harding Cyn	8.86	8.86
Holy Jim Cyn	8.03	8.03
McVicker Cyn	8.03	8.03
Indian Cyn	7.88	7.88
Coldwater Cyn	7.52	7.52
El Cariso	6.97	6.97
El Cariso RAWS	6.63	6.63
Santa Rosa Plateau	6.17	6.17
Modjeska Cyn	5.94	5.94
Santiago Creek	5.67	5.67
Fremont Cyn RAWS	5.38	5.38
Silverado Motorway	3.85	3.85
Santiago Pk 5660	3.55	3.55
Upper Silverado Cyn	2.17	2.17
	Average	7.02



NE Target (rainfall-inch)		
	Feb 2-9	Total
Beaumont 4NNE	4.58	4.58
Oak Creek Cyn	7.79	7.79
Oak Glen WS	7.28	7.28
Cable Cyn	6.18	6.18
Bernina Drive	12.00	12.00
Panorama Pt	11.88	11.88
Manzanita Flats	8.93	8.93
Cedar Glen	8.11	8.11
Crest Park	7.68	7.68
Deep Creek	7.56	7.56
Running Springs FS	6.67	6.67
Heaps Peak RAWS	5.98	5.98
Wildwood Cyn	5.59	5.59
Fawnskin	4.45	4.45
Big Bear Lake	4.06	4.06
Fawnskin RAWS	3.97	3.97
Heart Bar	3.22	3.22
Converse RAWS	2.47	2.47
	Average	6.58

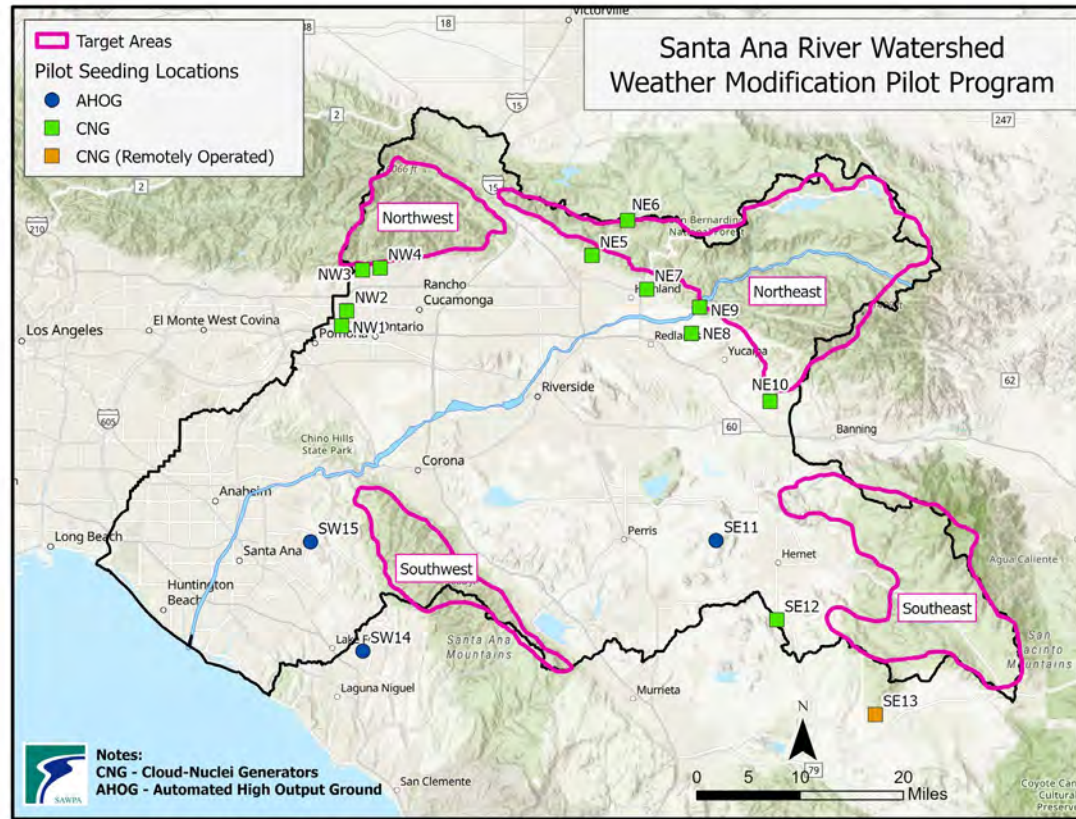
SE Target (rainfall-inch)		
	Feb 2-9	Total
Upper Tahquitz Crk	3.50	3.5
Thomas Mtn	4.07	4.07
Vista Grande RAWS	5.02	5.02
Poppet Flat RAWS	5.00	5
Allandale	3.50	3.5
Pine Cove Dutch Flat	3.31	3.31
Vista Grande	4.37	4.37
Keenwild RAWS	4.29	4.29
Anza RAWS	1.51	1.51
Pine Cove Rocky Pt	1.66	1.66
Snow Crk 7N Idyll	5.15	5.15
	Average	3.76

Snowfall for February 2-9

Storms (Not Seeded)

NW Target: Feb 2-9 (snow-inch)

Mt Baldy Notch	56
Mountain High	52
Mt Baldy Parking Lot	35
Wrightwood	20
Average	41



NE Target: Feb 2-9 (snow-inch)

Snow Valley	97
Bear Mtn Summit	74
Green Valley Lake	64
Barton Flats	46
Arrowbear Lake	37
Running Springs	37
Forest Falls	36
Lake Arrowhead	34
Big Bear City Yard	30
Big Bear Moonridge	24
Angelus Oaks	20
Oak Glen	18
Average	43

SE Target: Feb 2-9 (snow-inch)

Mt San Jacinto LV	24
Pine Cove	19
Average	22

Suspension Criteria

Flood

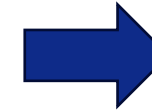
- Warm storm rain on snow
- Freezing level is >8,000 feet
- Quantitative precipitation forecast is > 3 inches in 24 hours

Burn Scars

- Threat of debris flow
- Coordinate with flood control districts

Severe Weather

- Winter storm warnings
- Flash flood warnings
- Severe thunderstorm warnings
- Sustained winds more than 30 mph at the sites



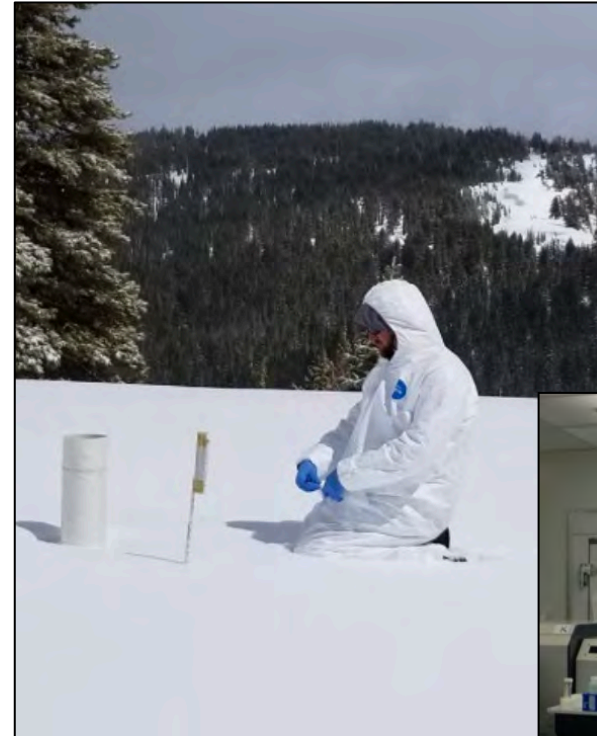
Real-Time Considerations:

1. Input from FCDs on potential for flooding and mud slides/debris flows.
2. Consecutive Storms
3. Input from WWTPs

Validation

Cloud Seeding Independent Validation

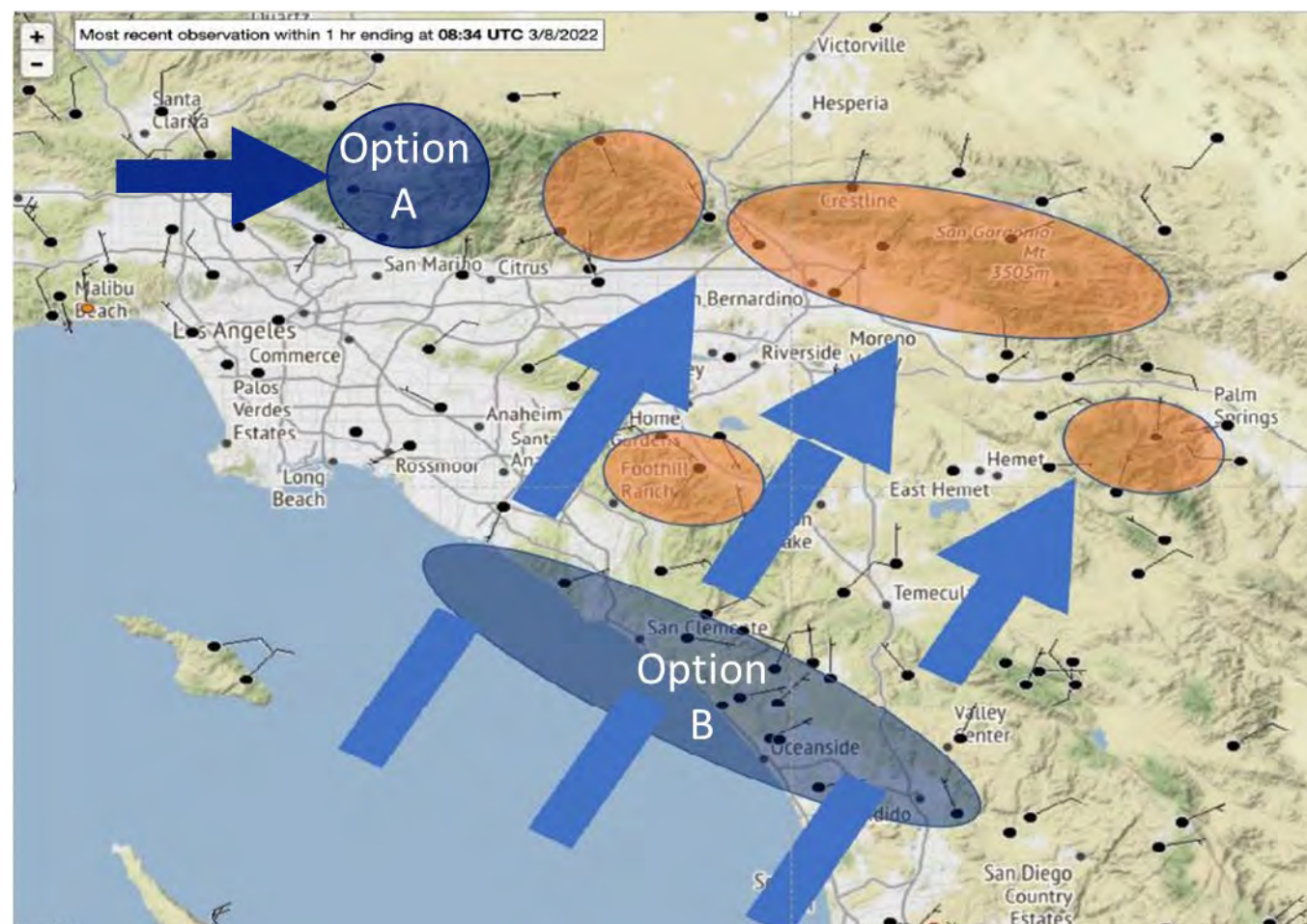
- Validation Consultant
 - Desert Research Institute (Reno, NV)
- Purpose
 - Verify deposition of silver iodide
 - Verify increases in precipitation and stream flows
 - Evaluate increases by target areas in watershed
 - Review of operations
 - Review of suspension criteria



Validation Study Approach (4-Year Study)

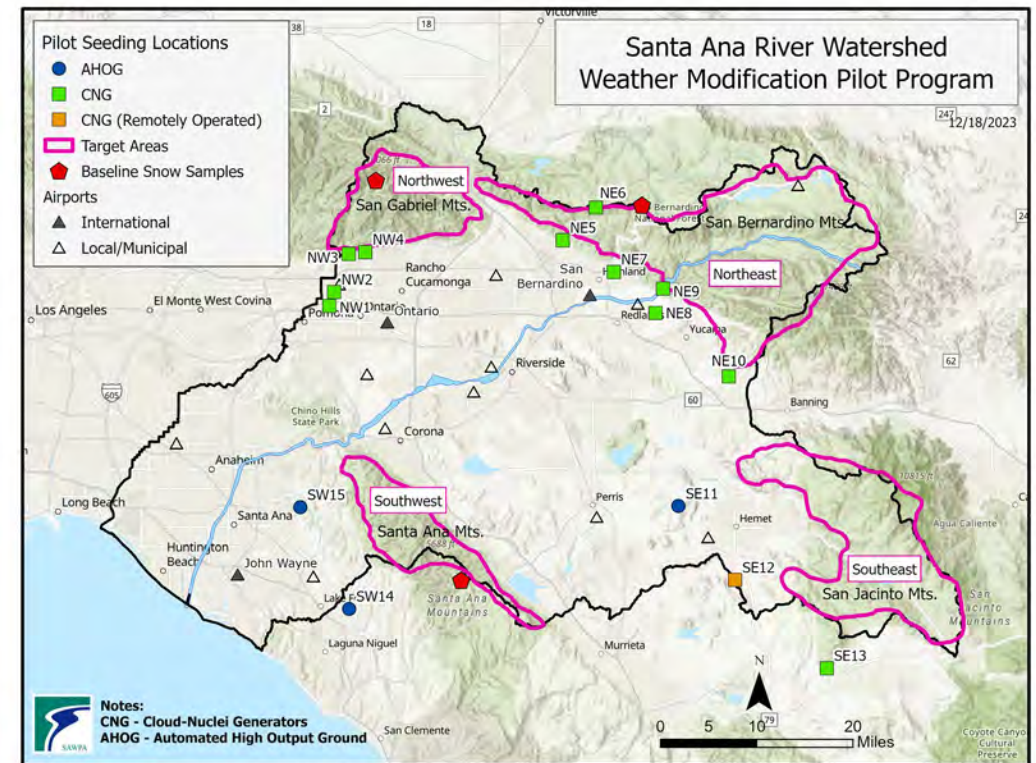
Control Area Options:

- Verify deposition
 - Measure elemental **silver** in snow before and after cloud seeding
- Verify increases in precipitation
 - Compare “Target Areas” to “Control Areas”
 - Two options: A and B



DRI Tasks

- Collected Baseline Snow Samples
- DRI coordinating with NAWC for collection of seeded snow samples
- Snow-Water Equivalent:
 - Assessing precipitation as rainfall and snowfall
- Target/Control Statistical Analysis:
 - Identify rain stations
 - Identify snow data
- Runoff: assessing locations of stream gauges





Communications

Summary of Communications

SAWPA staff has boosted outreach efforts to raise awareness of the Pilot Program. Activities include:

- Installation of Pilot Program signs at six site unit locations.
- SAWPA's Pilot Program's webpage has been updated with a contact section for inquiries, presentation requests, and mailing list subscriptions.
- Staff distributed a press release in early January following the initial cloud seeding events
- Established email address (weathermodification@sawpa.gov) for public questions.
 - To date, 22 responses answered and documented.
- Developed a cloud seeding event chart, accessible on SAWPA's website, which is updated after seeding events.
- Staff is planning a site unit tour in April for funding partner Big Bear Lake Department of Water and Power.

Month/Year	Start	End	Target Area(s)
December 2023	12/21/2023	12/22/2023	NW, NE, SW, and SE
	12/29/2023	12/30/2023	NW, NE, SW, and SE
January 2024	1/3/2024	1/3/2024	NW, NE, SE
	1/20/2024	1/21/2024	NE, SE, SW
	1/21/2024	1/22/2024	NE, SE, SW
February 2024	2/1/2024	2/1/2024	NW, NE, SE

*Last updated: February 5, 2024

Cloud Seeding Event Chart

Pilot Program Site Signage



Custom Door Hangers



WEATHER MODIFICATION PILOT PROGRAM IN YOUR NEIGHBORHOOD

Cloud seeding taking place 11/2023 to 11/2027

What is the Weather Modification Pilot Program?
In 2020, the Santa Ana River Watershed Project Authority (SAWPA) conducted a study on the economic and technical feasibility of implementing a weather modification program, also known as cloud seeding, to increase water supply in the region. Based on the results of the study, SAWPA will now conduct a 4-year Weather Modification Pilot Program to gather data to validate the program and determine the long-term feasibility for implementation in the Santa Ana River Watershed.

Why Cloud Seeding
Cloud seeding is a type of weather modification used to increase the amount of the precipitation, including snow or rain, during the storm season. This process works through releasing particles of silver iodide into clouds when storms occur, which increases the chances of droplet condensation by 5-15 percent.

What to Expect
If you just received this door hanger you should expect to see temporary smoke and hear occasional humming noise throughout the duration of the Pilot Program - but only during storm events. While smoke can be expected to be visible coming from the ground-based seeding units, this does not pose as a fire hazard. **Cloud seeding is safe and has been studied for decades.**



SANTA ANA WATERSHED PROJECT AUTHORITY



How Cloud Seeding Works

Storms come into the watershed region bringing in moist air over the mountains, which cool and forms clouds composed of supercooled water droplets. Silver iodide particles mixed with acetone are vaporized and released into the atmosphere using ground based seeding systems. Silver iodide particles rise into cold, high-altitude air; moisture in the air condenses to form ice crystals on the particles. As the ice crystals form and grow in the clouds, they become large enough to fall to the ground as ice, snow, or rain.



On-Site Work
Work is being performed by SAWPA's contractor. An operations work truck may be occasionally present in your neighborhood throughout the duration of the Pilot Program.

Learn More
Scan the QR code below or visit sawpa.org for additional information.



If you have any questions about the Weather Modification Pilot Program, please call (951) 840-0230 or email weathermodification@sawpa.org

Pilot Program Contact Section

For more information or to request a presentation, please submit the form below:

Online Contact

First Name: Last Name:


Email: Company/Organization:

Message:

Please Use Check One Below if you would like to sign up for SAWPA's Weather Modification Working List.

Weather Modification Working List: ☐

SANTA ANA WATERSHED PROJECT AUTHORITY [Join our Working List](#)



SANTA ANA WATERSHED PROJECT AUTHORITY

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FOR IMMEDIATE RELEASE
January 9, 2024

Santa Ana Watershed Project Authority Begins First Year of Cloud Seeding Pilot Program to Increase Local Water Supply

Riverside, CA – The Santa Ana Watershed Project Authority (SAWPA) conducted the first cloud seeding event of the Santa Ana River Watershed Weather Modification Pilot Program during recent storms in late December and early January. The Pilot Program, launched in November 2023, is intended to evaluate the effectiveness of enhancing local water supplies through cloud seeding in the region. If shown to be effective, cloud seeding can enhance the watershed resilience of the Santa Ana River Watershed by increasing snow and rainfall from storms by 5-15 percent in targeted areas.

The Santa Ana River Watershed, spanning portions of Riverside, San Bernardino, and Orange Counties, plays a vital role in supporting diverse ecosystems, providing water resources, and offering recreational opportunities to millions of residents. Recognizing the importance of enhancing and preserving this valuable natural resource, SAWPA initiated the Pilot Program to provide an additional source of water supply to adapt to the impacts of climate change risks and help sustain the health of the watershed.

SAWPA collaborated closely with local water agencies, government agencies, and community stakeholders on planning and implementing the 4-year Pilot Program targeting areas across the watershed. The cloud seeding program involves the release of silver iodide particles from ground-based units during storm events to increase ice and snow formation in clouds resulting in additional precipitation. Cloud seeding was performed during three storms during the last week of December and first week of January.

Over a 4-year period, cloud seeding will be validated as a tool in advancing water supply reliability for the region by enhancing our local supplies. The additional water produced through cloud seeding would support rural habitat and be captured by existing downstream infrastructure that is critical to recharging local groundwater aquifers used for water supply.

"These initial cloud seeding events represent a milestone for the Santa Ana River Watershed Weather Modification Pilot Program," said Jeff Mosher, General Manager for SAWPA. "The program underscores the commitment of SAWPA to evaluate new local water supplies. If proven viable through this pilot study, cloud seeding could help support a more sustainable future for the environment and communities in the Santa Ana River Watershed."

The Pilot Program is a 4-year evaluation and validation effort that will allow SAWPA to investigate the increase in water supply from cloud seeding and the potential benefits for the region. SAWPA will monitor and evaluate the program's implementation, ensuring that the efforts align with the project's objectives and the needs of the region.

Press Release



Pilot Program Schedule

Pilot Program Schedule

	2023				2024					
Task	Mar	Apr-Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Project Operations & Demobilization										
Project Validation										
Review NAWC Operations										
Snow Chemistry										
Baseline Snow Samples										
Seeded Snow Samples										
Lab Analysis and Report										
Snow Water Equivalent										
Target-Control Evaluation										
Stream Flow Analysis										
Surface Water Modeling Contract Award										

Questions