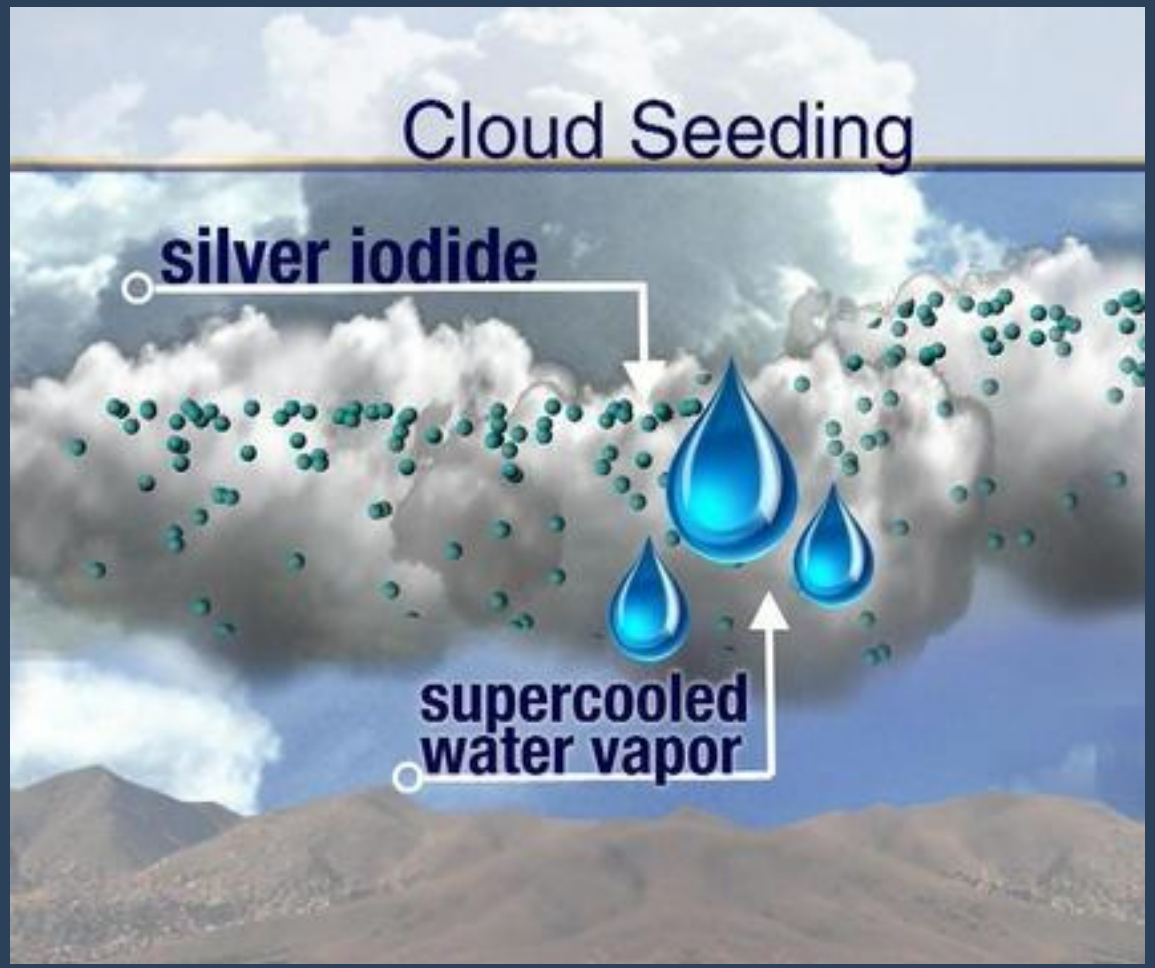


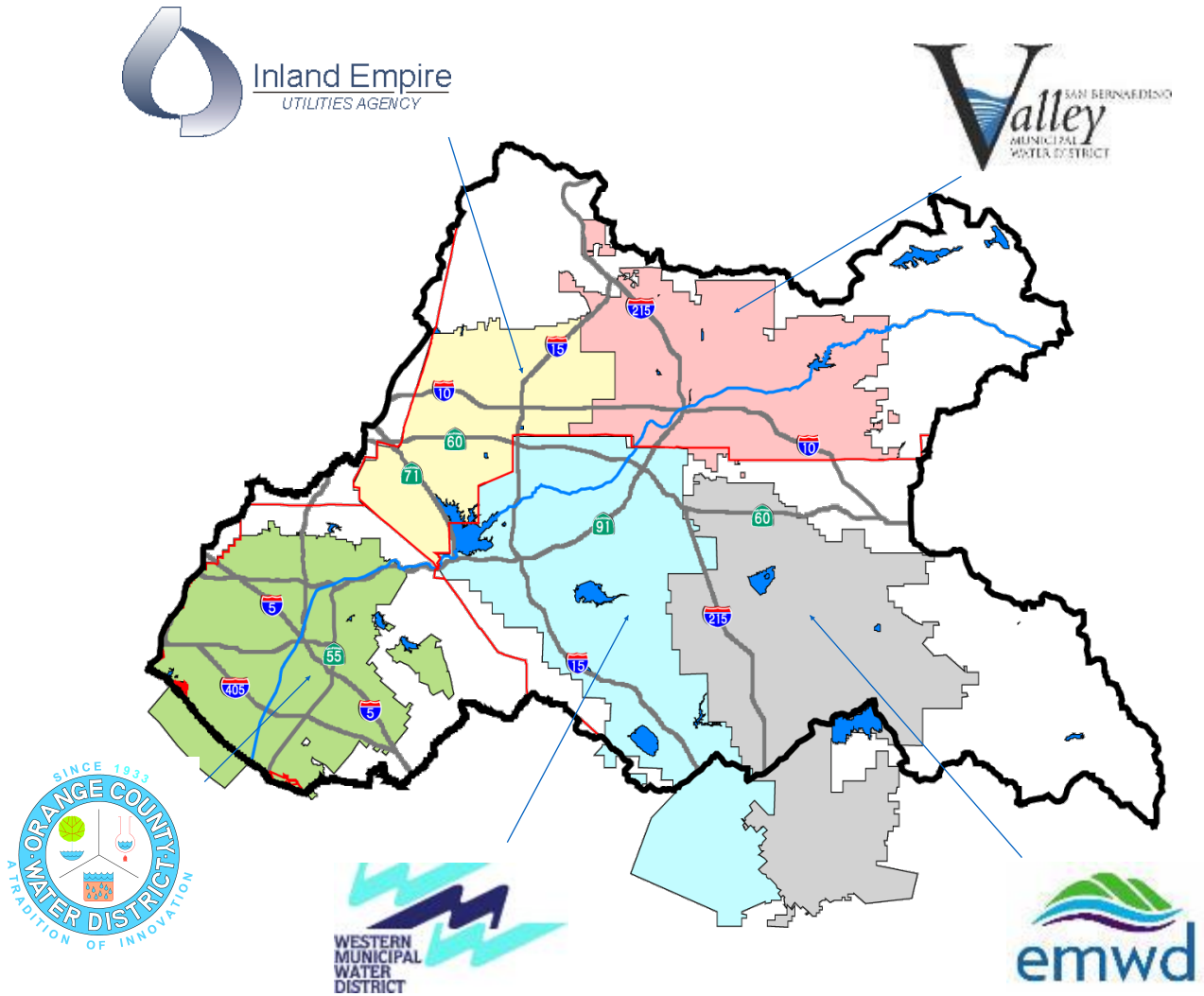
Source: CBS News

Santa Ana River Watershed Weather Modification Pilot Program

Mark Norton PE
Water Resources & Planning Manager
Santa Ana Watershed Project Authority
Authority Administrator, LESJWA

SAWPA

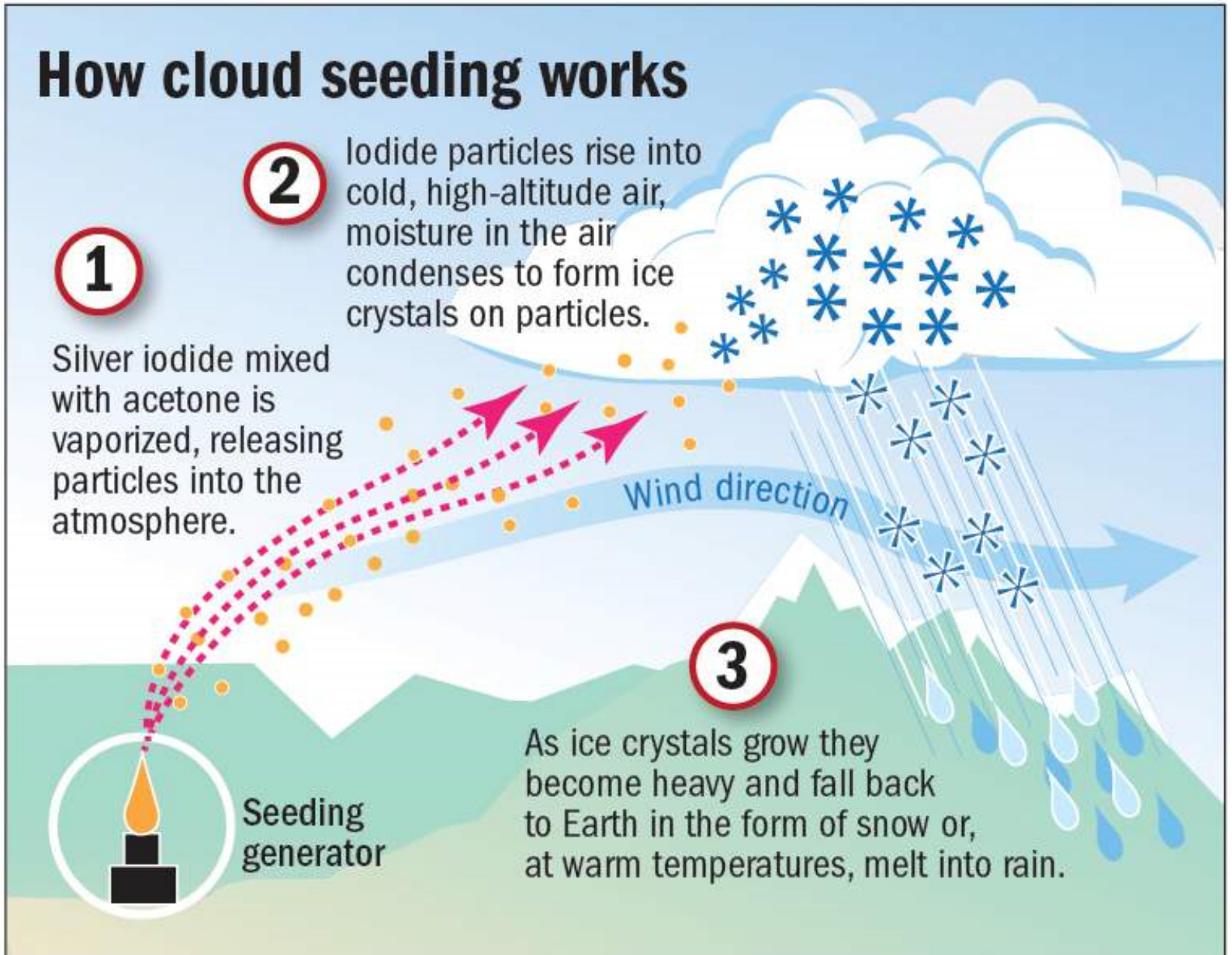
SAWP: Joint Powers Authority with five Member Agencies



Stakeholders:

- 97 Water-related Agencies
- 4 Counties
- 63 Cities
- State, environmental, and regulatory agencies
- Federal agencies
- Other special districts
- Special interest groups

How Cloud Seeding Works?



Source: The Fact Site

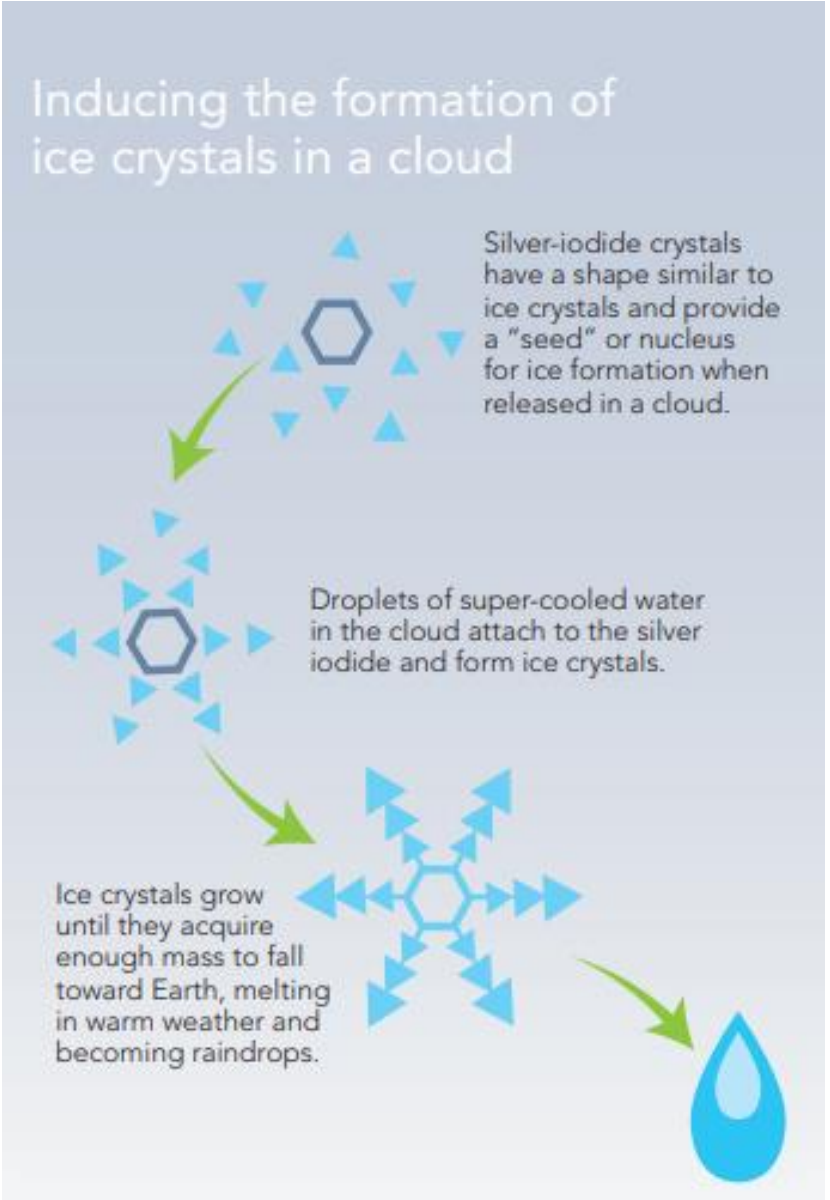
Cloud Seeding History

Background

- Physics is well known
- Started in the U.S. in the 1940s
- Challenges: Overselling, limited science
- Misconceptions remain

Recent Advances

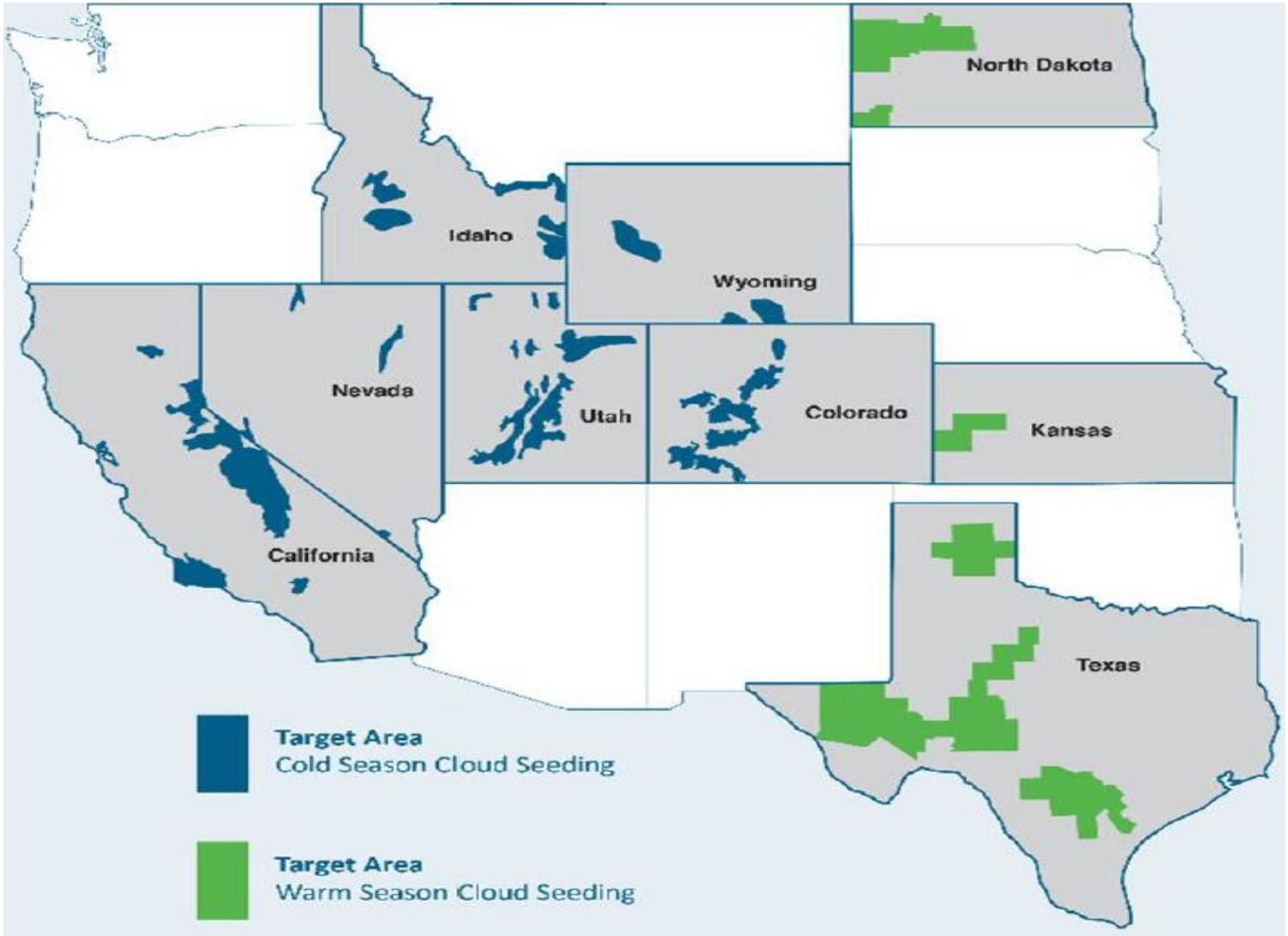
- Weather forecasting
- Computing / Modeling
- Seeding methods
- Scientific validation studies



Source: North American Weather Modification Council

U.S. Projects

- Cold Season Cloud Seeding Leaders
  - CA, CO, ID, UT, WY, NV
- Applications
  - Power Utilities (hydropower)
  - Ski areas
  - Water Resource Agencies
  - Irrigation Districts
- California Projects
  - Santa Barbara County
  - San Luis Obispo
  - Sacramento Municipal Water District
- CA DWR
  - Cloud seeding is a “safe and effective means of augmenting local water supplies."



Source: North American Weather Modification Council

Ground Based Seeding Methods

CNG's (Cloud Nuclei Generators)

- Ideal for orographic lift (winds caused by land barriers)
- Create a continuous plume
- Inexpensive to install and operate

AHOGS (Automated High Output Ground Seeding) Systems

- Ideal for strong convective storm attributes (turbulence)
- Delivers higher concentration of silver iodide
- Operated remotely – rapid release

Licensing and Permitting

- Operators are licensed and carry liability insurance
- Suspension criteria turns off program during high precip/flood conditions
- Though no CA state permit required, CEQA mitigated negative declaration will be conducted
- There have been no successful legal challenges to any operation in US for over 50 years

Cloud Rustling – Downwind Effects Misconception

- “Robbing Peter to pay Paul”
- Cloud seeding activates precipitation otherwise unavailable
- Long-term research (44+ studies) consistently shows no precipitation decreases; some downwind increases shown

Potential Environmental Effects

- Silver iodide is not soluble or biologically available
- 50 years of physical, biological, aquatic, soils and vegetation studies found:
  - Subtle or indiscernible effects
  - Potentially beneficial (more runoff)
- Strong studies with credible results and regulations reflect recent research

Potential Health Effects

- Silver Iodide (AgI)
  - Not been measured above background, even after decades of operations
- Concentrations
  - EPA drinking water quality 0.1 mg/L
  - U.S. Public Health Service level 0.05 mg/L
  - Seeded rainfall is 0.1 mcg/L or 1000 times less than EPA standard

Why consider cloud seeding in the Santa Ana River Watershed?

Precipitation – and flows in the Santa Ana River – have been trending down

- Cloud seeding increases precipitation (with an emphasis as snow in upper elevations)
- Produces a local supply
- Potential to reduce the use of imported water

Dry years and droughts occur

- Cloud seeding works in both dry and wet years

Cost effective

- Costs for 8%-11% increase in streamflow is a fraction of the cost of imported water

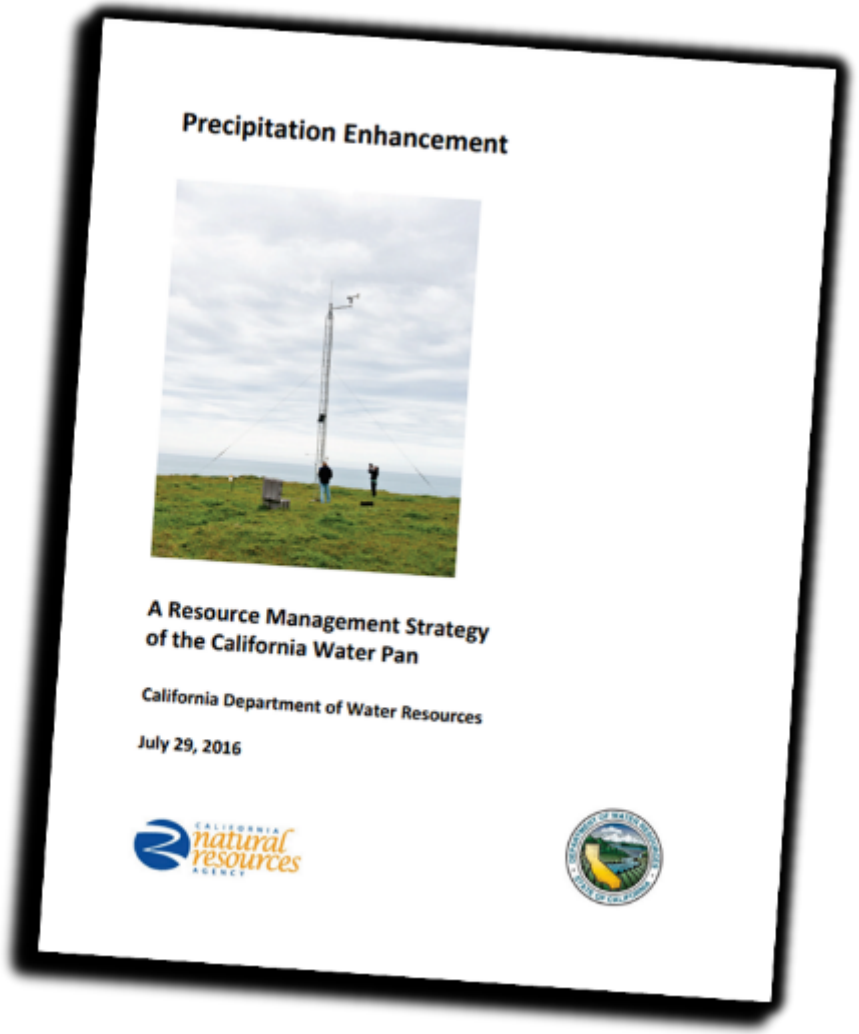
Supports local water storage

- Natural infiltration
- Takes advantage of existing stormwater capture infrastructure

Water rights

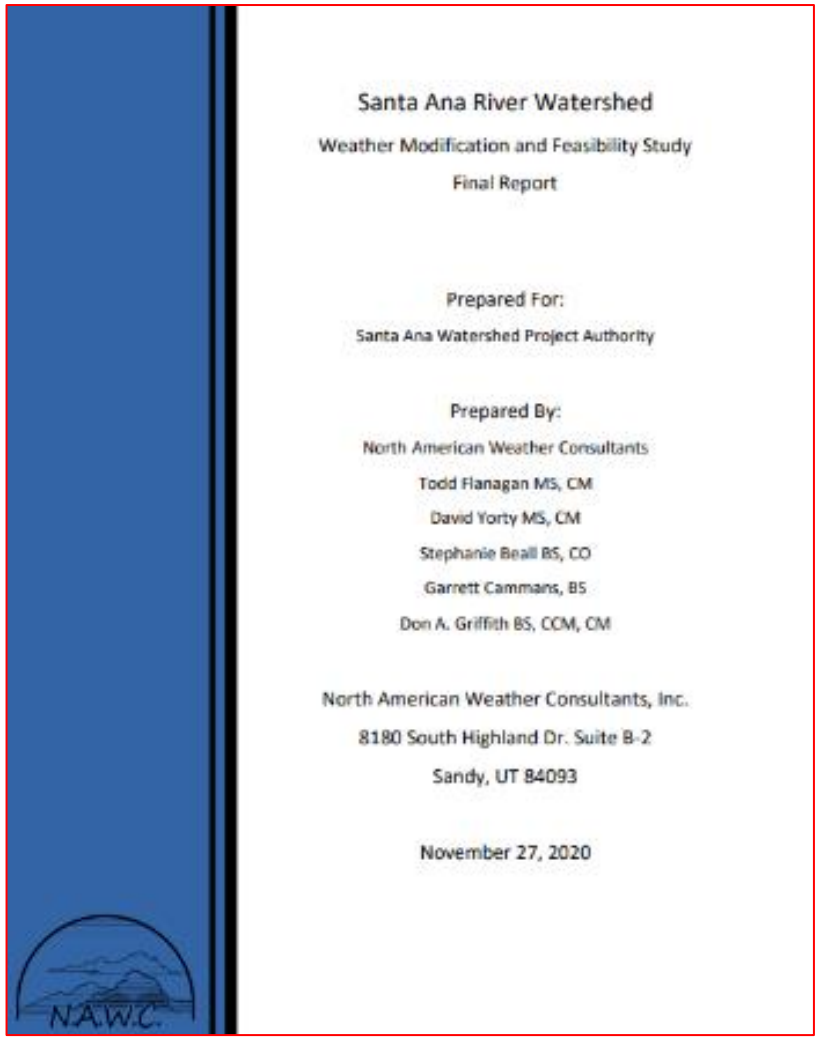
- DWR “Precipitation Enhancement Report” (2016):

“State law says that water gained from cloud seeding is treated the same as natural supply in regard to water rights.”



2020 Feasibility Study Outcomes

- Finding:
  - …the proposed cloud seeding program would be both technically and economically feasible…
- Pilot Program (annual basis)
  - Cost: $250,000
  - Benefits:
    - Streamflow increase = 8,200 AF
    - Percent increase in streamflow = 8%
  - Cost per acre-foot (AF) = ~$25 /AF


Santa Ana River Watershed

Weather Modification and Feasibility Study

Final Report

Prepared For:

Santa Ana Watershed Project Authority

Prepared By:

North American Weather Consultants

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8180 South Highland Dr. Suite B-2

Sandy, UT 84093

November 27, 2020

N.A.W.C.

Feasibility Study (2020)

https://sawpa.org/latest-info/watershed-cloud-seeding-feasibility-study/

Feasibility Study Outcomes

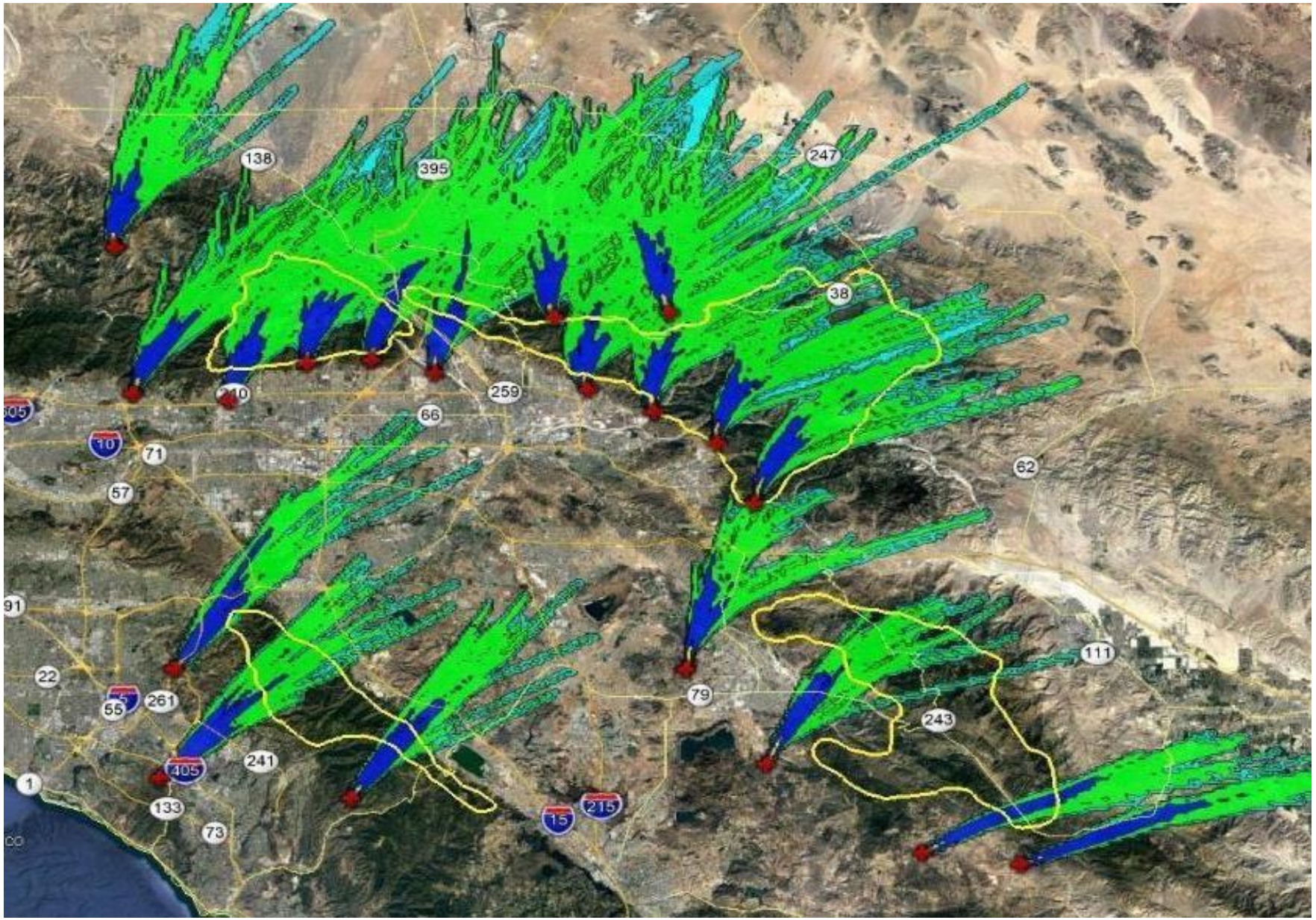
Ground Based Seeding Dispersion Model

4 seeding areas:

- NW
- NE
- SW
- SE

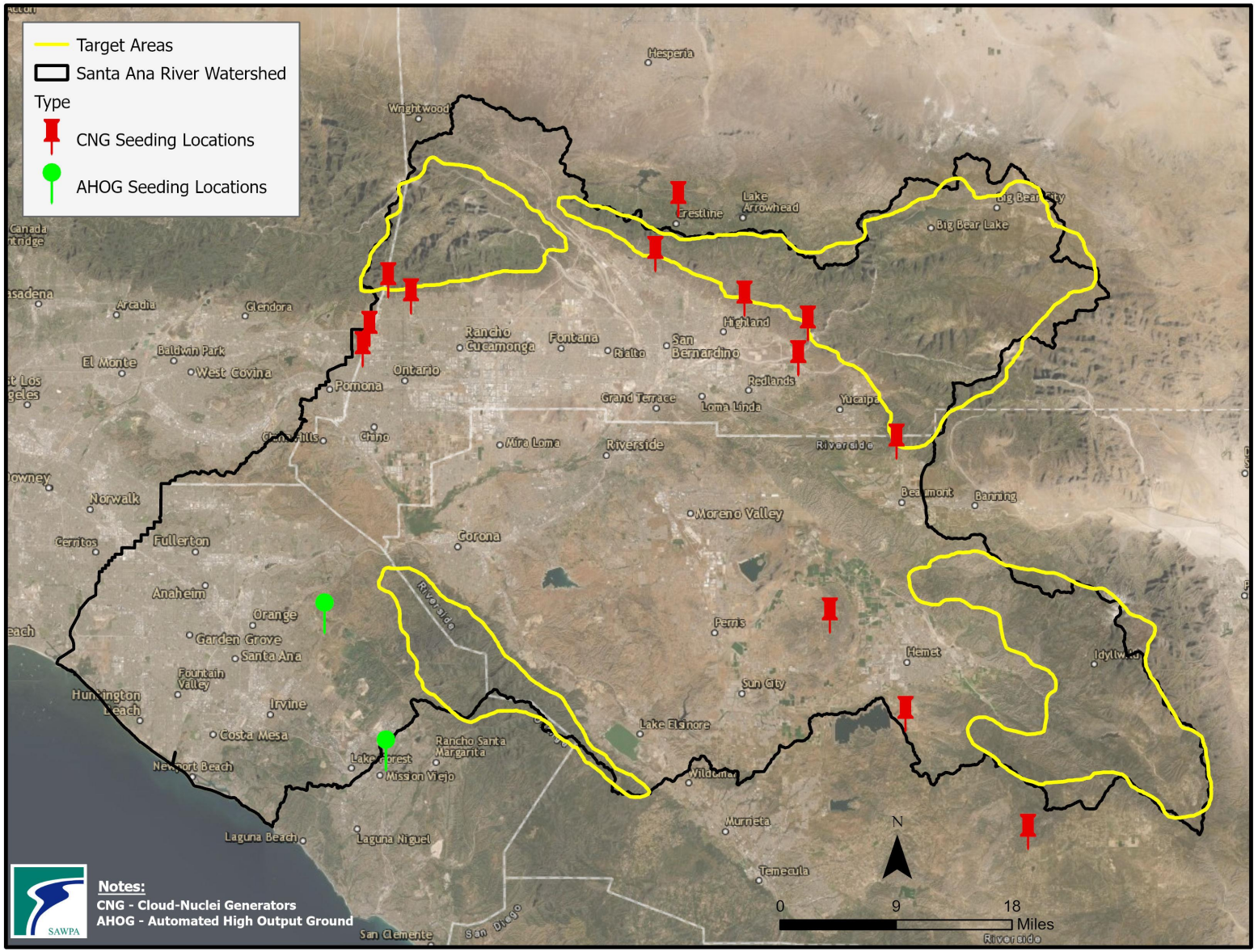
Included a number of ground sites in each area

Map reflects one of many projected seed plume scenarios



Purpose of Weather Modification Pilot Program

- Verify increases in precipitation
  - Compare Target areas to Control areas
  - 3-4 years needed
- Evaluate increases by areas in watershed
- Benefit/Cost evaluation
- Review of operations
- Review of suspension criteria



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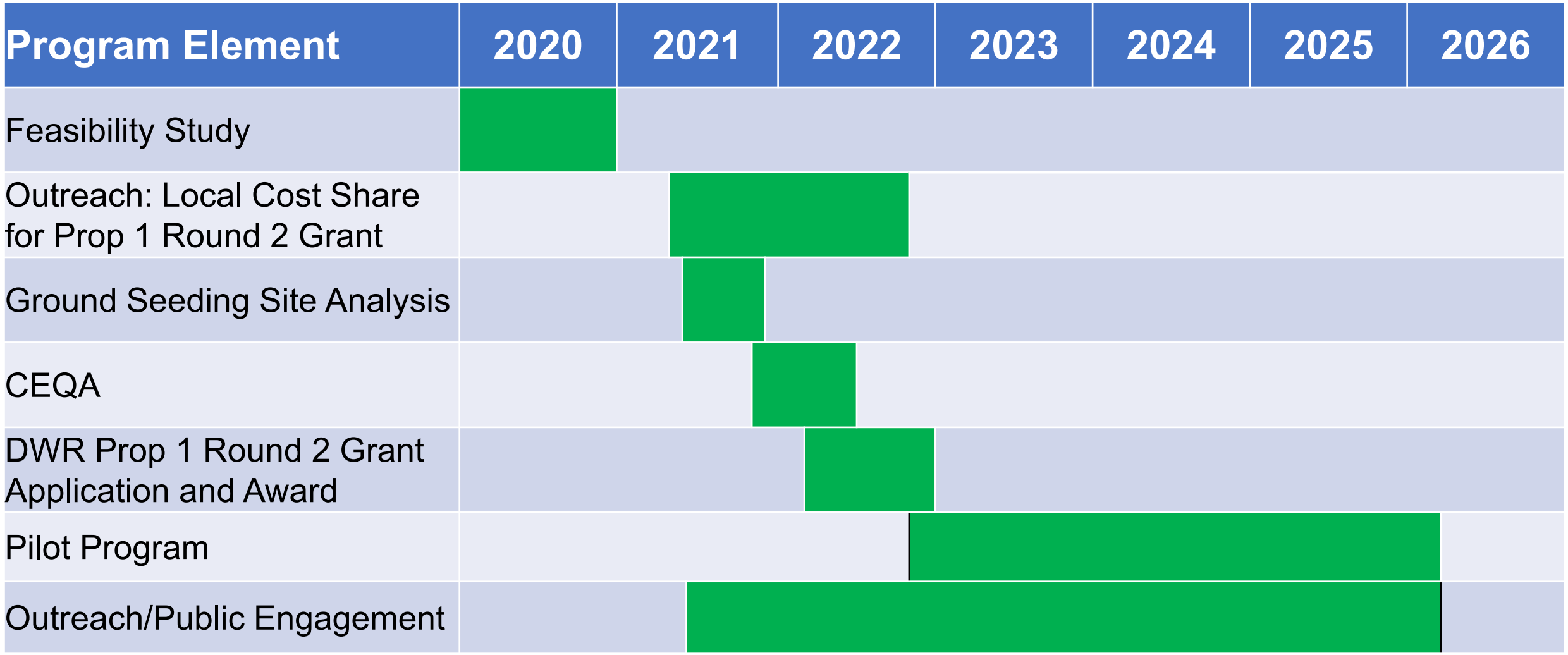
Pilot Program Schedule



Pilot Program Funding

- Prop 1 Round 2 Grant: Cover 50% of cost
- Local cost share (50% match)
  - SAWPA member agencies
  - Other agencies in the watershed
- Commitments (based on current outreach)
  - Chino Basin Water Conservation District, $20,000
  - Big Bear Lake Dept of Water & Power, $12,000
  - Lake Elsinore & San Jacinto Watersheds Authority $10,000
  - San Antonio Water Agency, $5,000
  - City of Corona, $5,000
  - Other cities/agencies are interested providing support

PROP 1
GOVERNOR EDMUND G. BROWN, JR.
WATER BOND 2014
RELIABILITY | RESTORATION | RESILIENCE

Thank You!

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