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NOTICE REGARDING (COVID-19)

Before we begin, the record will reflect that pursuant to the provisions of Executive Order N-29-20 issued by Governor Gavin Newsom on March 19, 2020, this meeting will be conducted by teleconference only.



Call to Order

Board of Directors Workshop - Resources
Thursday, June 3, 2021

Chairperson – Director Hayes
Vice-Chair – Director Harrison



Introductions

Following the introduction of Directors and District staff, participants may use this time to state their name and agency/affiliation in order to be included in the formal record of attendees.

Public Comment

Any person may address the Board on matters within its jurisdiction.

- *Please use the chat feature on the Zoom toolbar or digitally raise your hand to let the moderator know you would like to make a comment.*



Summary of Previous Meeting (Pg. 3)

Board of Directors Workshop – Resources – May 6, 2021



Discussion Item 4.1 (Pg. 10)

Bob Tincher, PE, MS – Chief Water Resources Officer/Deputy GM

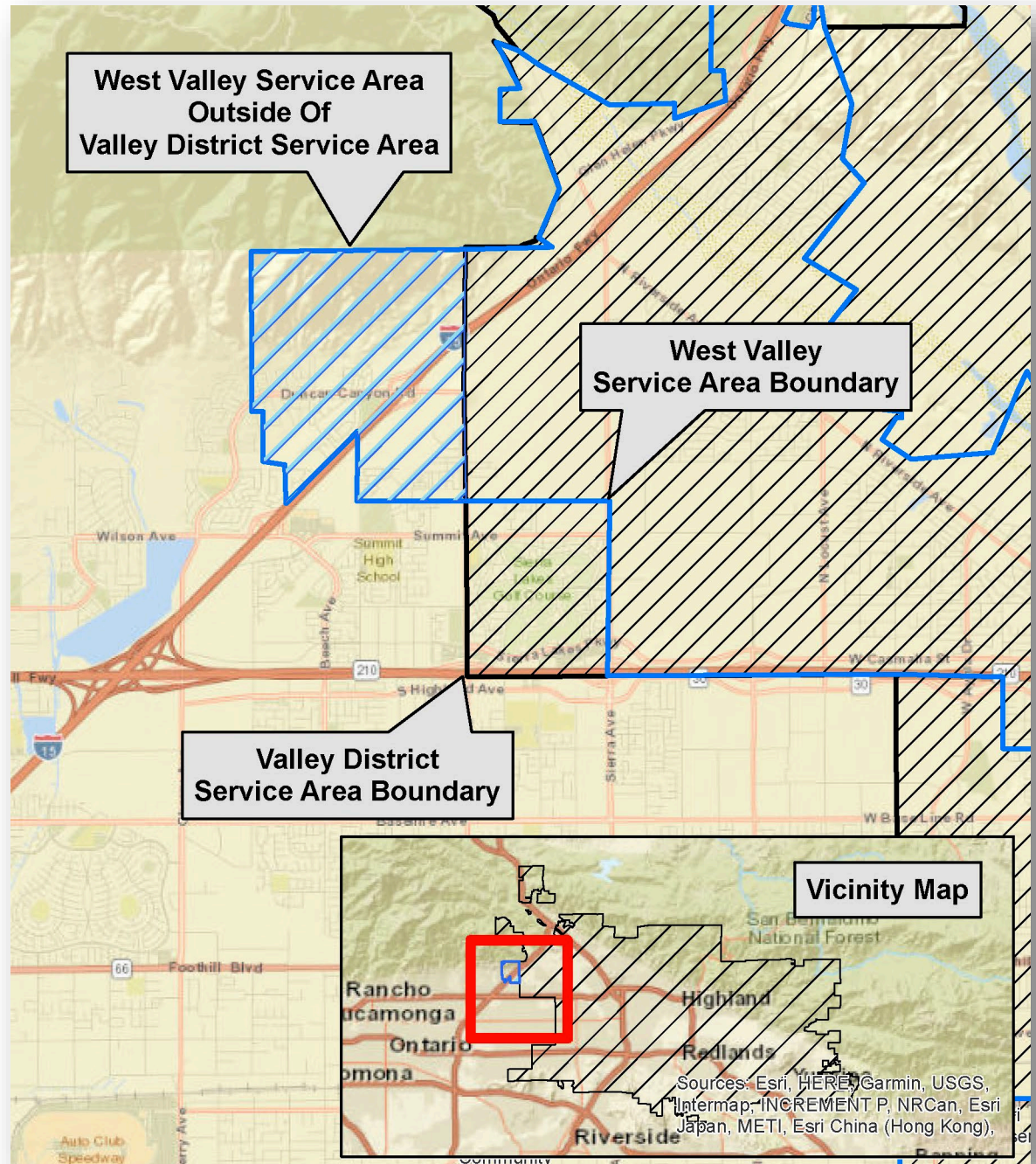
Consider Agreement for the Delivery of Metropolitan Water District of Southern California State Water Project Water to West Valley Water District

Staff Recommendation

Direct staff to place this item on an upcoming Board of Directors meeting for consideration

A Small Portion of WVWD's Service Area is Outside Valley District

The portion that is outside of Valley District is within the Inland Empire Utilities Agency, a member agency of Metropolitan Water District of Southern California



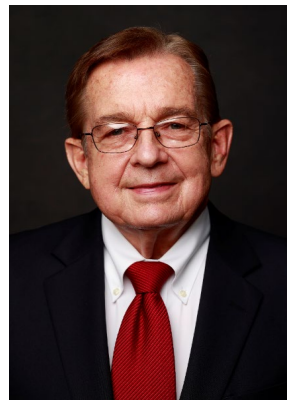
Director Comments and Discussion



**Paul
Kielhold**
President



June Hayes
Vice President



**T. Milford
Harrison**
Treasurer



**Gil J.
Botello**
Director



**Susan
Longville**
Director

Staff Recommendation

Direct staff to place this item on an upcoming Board of Directors meeting for consideration



Discussion Item 4.2 (Pg. 20)

Bob Tincher, PE, MS – Chief Water Resources Officer/Deputy GM

Consider Allowing the City of Redlands to Pay San Bernardino Basin Groundwater Council Water Costs Over the Next Two Years

Staff Recommendation

Direct staff to place this item on an upcoming Board of Directors meeting for consideration.

Director Comments and Discussion



**Paul
Kielhold**
President



June Hayes
Vice President



**T. Milford
Harrison**
Treasurer



**Gil J.
Botello**
Director



**Susan
Longville**
Director

Staff Recommendation

Direct staff to place this item on an upcoming Board of Directors meeting for consideration.

Discussion Item 4.3 (Pg. 30)

Bob Tincher PE, MS – Chief Water Resources Officer/Deputy GM
Adekunle Ojo, MPA – Manager of Water Resources

Staff Review of Cloud Seeding

Staff Recommendation
Receive and file



Weather Modification “Cloud Seeding”



Overview

- SAWPA Cloud Seeding Feasibility Study Recap
- The Science
- Does it work?
 - Idaho Study
 - Do the Idaho study results transfer to our area?
- What is the actual benefit of cloud seeding, how much water do we receive for our investment
- Staff conclusions



SAWPA Cloud Seeding Feasibility Study Recap

Calculating Seasonal Precipitation Increases

Methodology

- 58 storms over 5 seasons were considered, 47 of the 58 were found to be seedable
- Of the seedable events 21% were considered seedable by aircraft only, and 79% were found to be seedable by aircraft or ground based systems
- **Estimated** seasonal increases to precipitation were determined for each target area by adding the **potential** increase for each of the 47 individual storm events.

Total Projected Increases

Ground Only Seeding

| Target Area | Seasonal Precip. Increase (inches) | Percent Increase | Avg. Natural Streamflow (AF) | Streamflow Increase (AF) | Percent Increase |
|-----------------------------|------------------------------------|------------------|------------------------------|--------------------------|------------------|
| NW | 0.41 | 3.5% | 25,000 | 2,043 | 8.2% |
| NE | 0.49 | 4.1% | 65,000 | 4,330 | 6.7% |
| SW | 0.59 | 3.7% | 5,000 | 447 | 9.0% |
| SE | 0.49 | 4.5% | 10,000 | 1,373 | 13.7% |
| TOTAL w/ Ground Only | | | 105,000 | 8,193 | 7.8% |

With Aerial Support in the NE Target

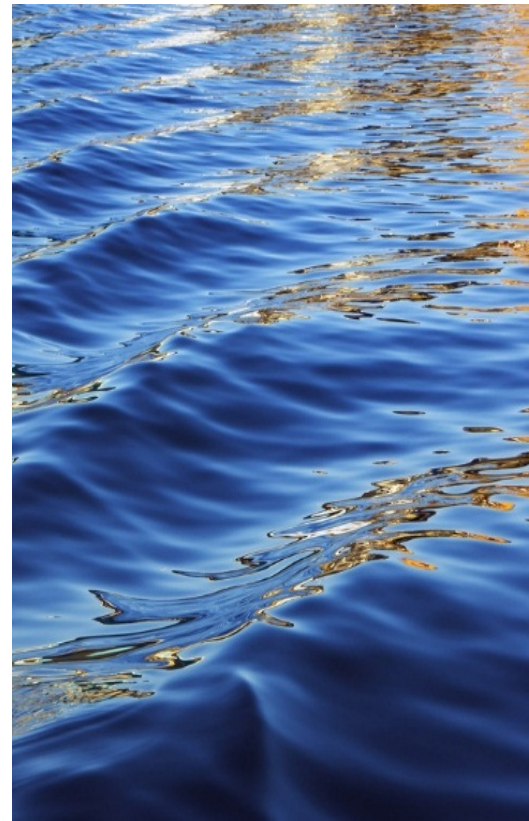
| Target Area | Seasonal Precip. Increase (inches) | Percent Increase | Avg. Natural Streamflow (AF) | Streamflow Increase (AF) | Percent Increase |
|--------------|------------------------------------|------------------|------------------------------|--------------------------|------------------|
| NW | 0.41 | 3.5% | 25,000 | 2,043 | 8.2% |
| NE | 0.89 | 7.3% | 65,000 | 7,772 | 12.0% |
| SW | 0.59 | 3.7% | 5,000 | 447 | 9.0% |
| SE | 0.49 | 4.5% | 10,000 | 1,373 | 13.7% |
| TOTAL | | | 105,000 | 11,635 | 11.1% |

Next Steps

- SAWPA looking for investors in a cloud seeding field study



The Science



Cloud Seeding Mechanisms

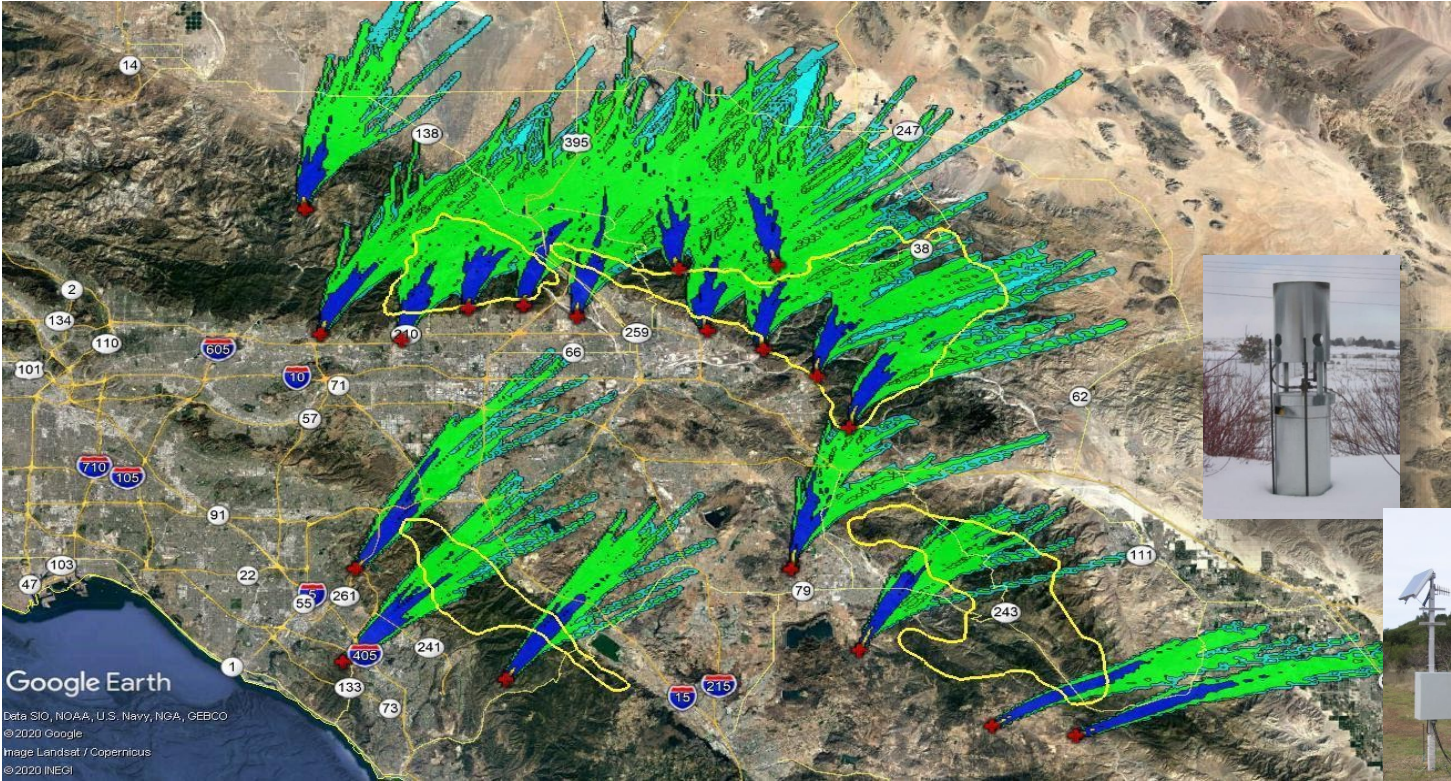
- ⬡ - Silver Iodide
- ▲ - Supercooled Liquid Water (SLW)
- ❄️ - Ice Crystals / Snowflakes



Aerial Seeding

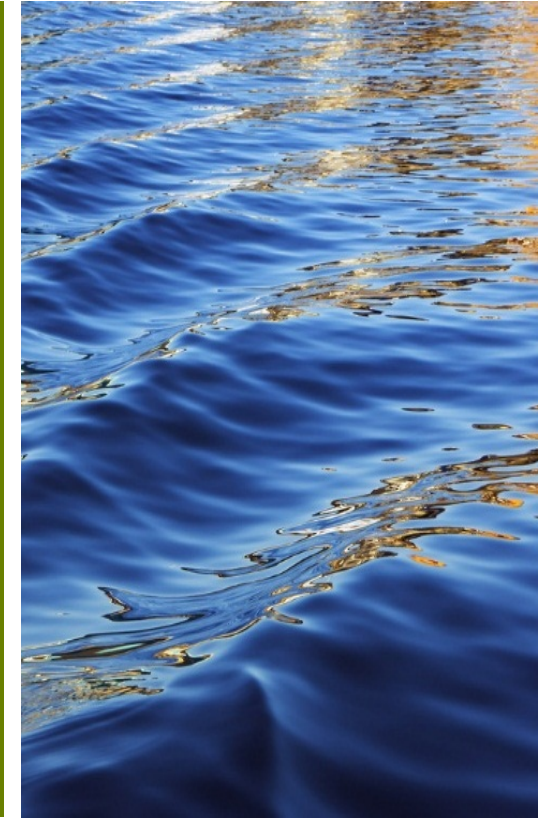


Ground Based Seeding Dispersion Model





Does it Work?



Original Cloud Seeding Racetrack Experiment (1948)



Photo Courtesy of Dr. Vincent Schaefer

Idaho Power's Cloud Seeding Case Studies

April 2, 2021

Derek Blestrud
Senior Atmospheric Scientist



SNOWIE

Seeded & Natural Orographic Wintertime clouds: the Idaho Experiment

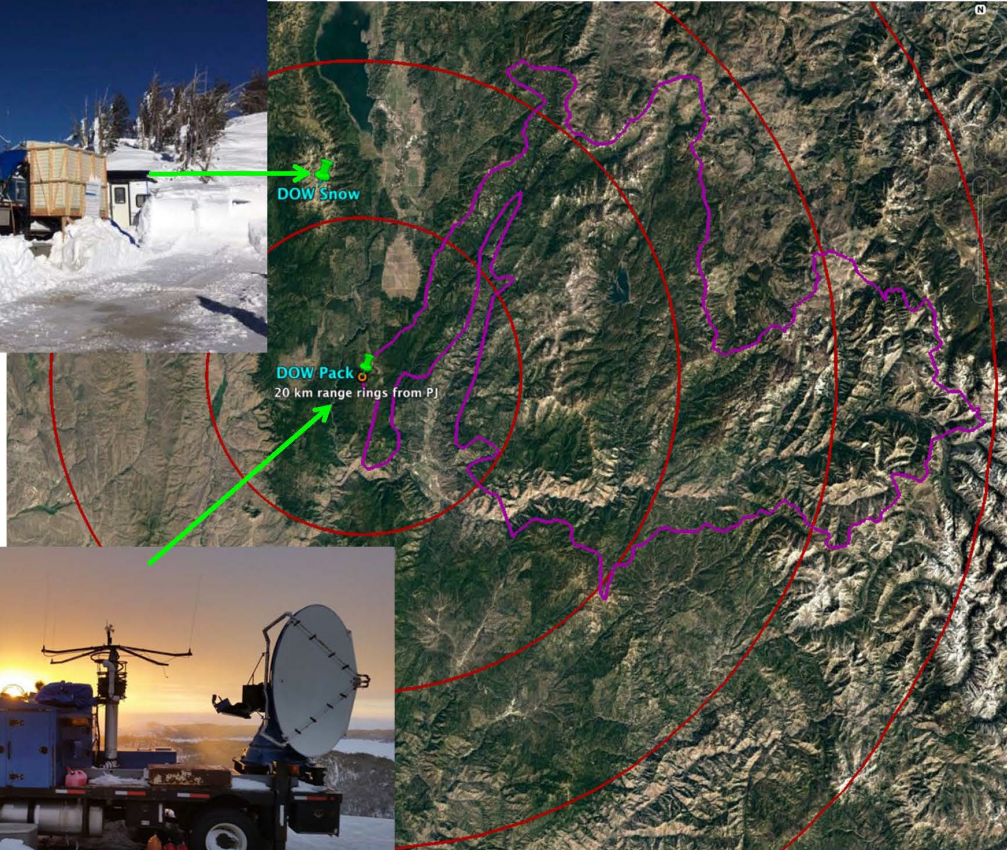
- National Science Foundation funded SNOWIE to study winter precipitation processes (\$2.1M)
- Field campaign early **2017** (Jan. – March), focus on Payette Basin
- Goal:
 - further understand natural and dynamic winter precipitation processes
 - determine physical processes by which cloud seeding effects winter precipitation
- Field Effort:
 - Over 75 additional instruments (research aircraft, ground based instruments)
 - 4 PI's, 11 scientists operating instruments and analyzing data
- Results will directly benefit weather modeling over complex terrain



SNOWIE

Seeded & Natural Orographic Wintertime clouds: the Idaho Experiment

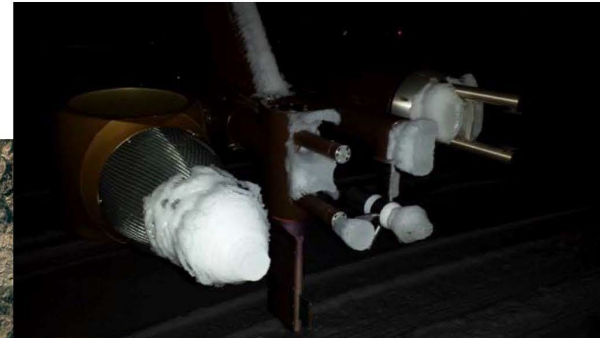
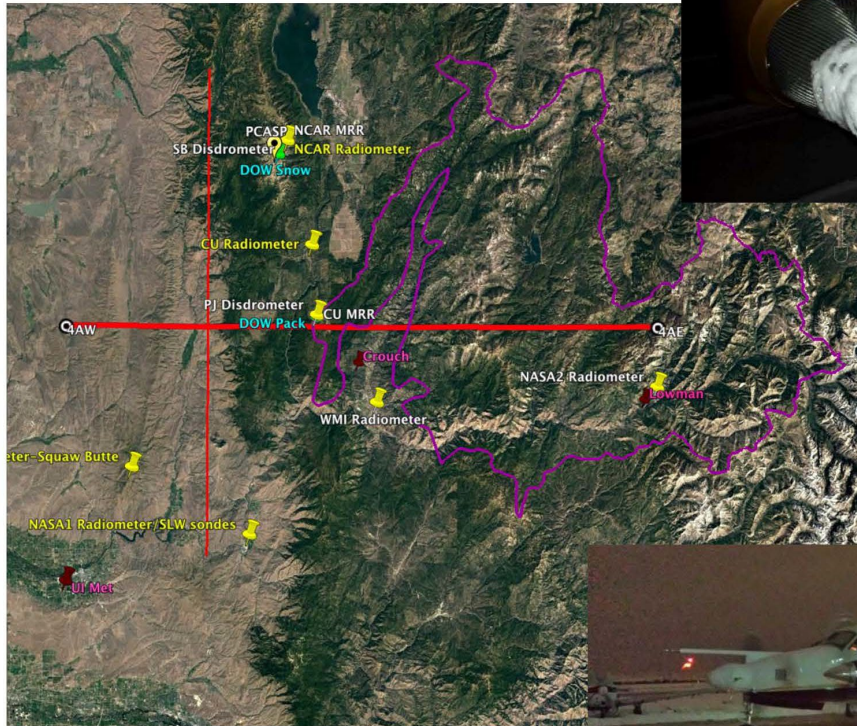
- Collaborative effort between:
 - National Center for Atmospheric Research (NCAR)
 - University of Wyoming
 - University of Colorado, Boulder
 - University of Illinois
 - Idaho Power Company
- Additional Efforts
 - BSU – silver sampling
 - WMI - Research seeding aircraft
 - WMI - Ice nuclei counter



DOW Snow

DOW Pack
20 km range rings from PJ



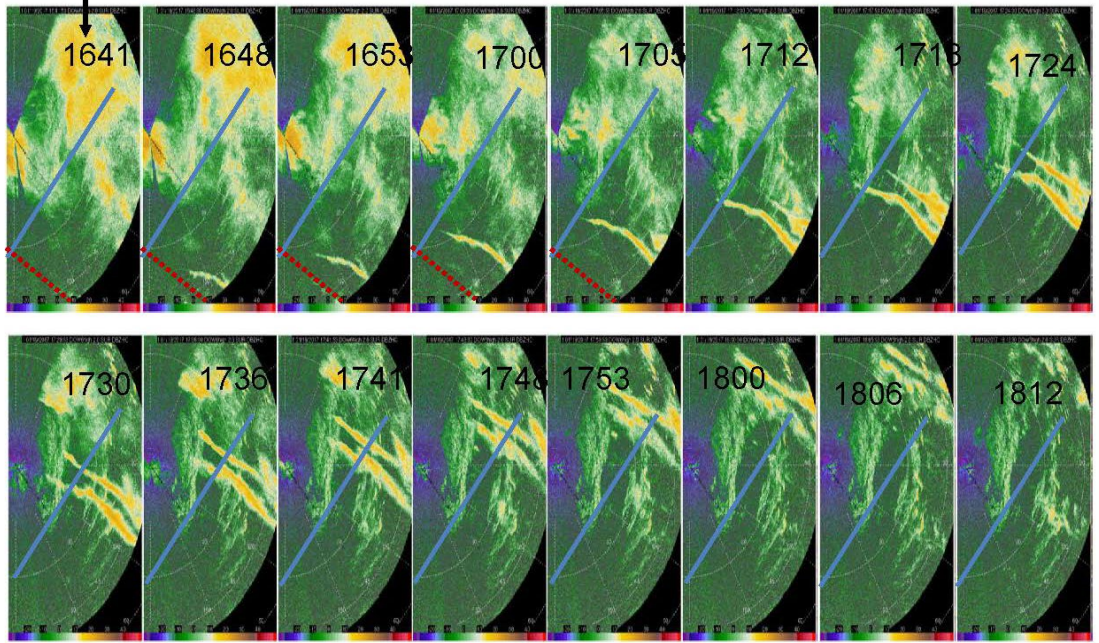


UW King Air
 with profiling
 radar and lidar



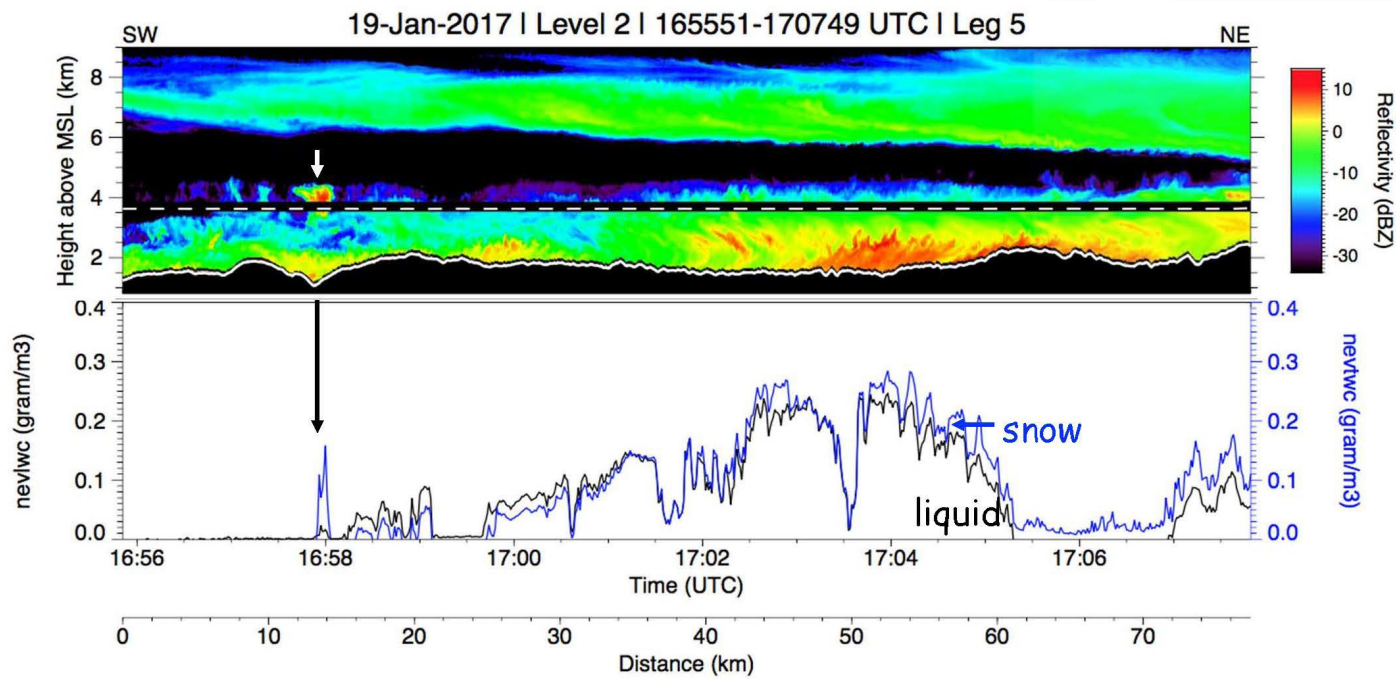


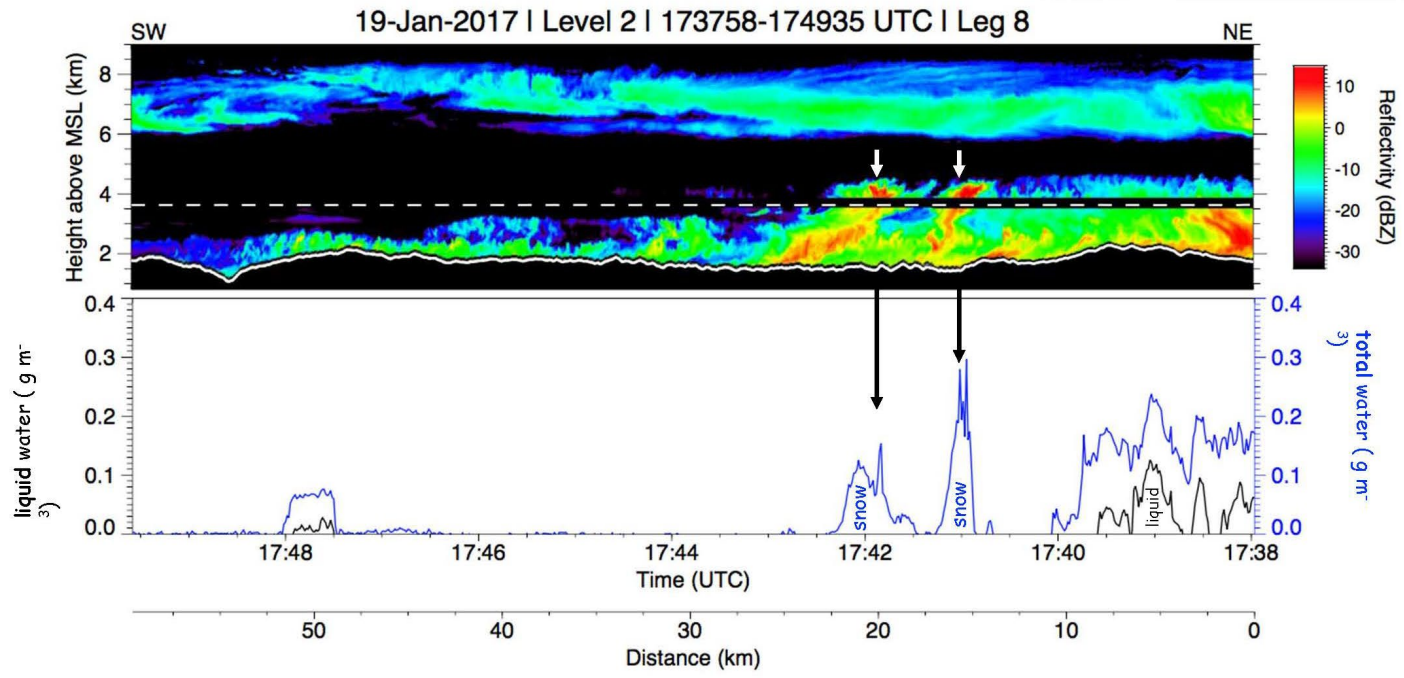
time UTC Snow Bank DOW 2° elevation 19 Jan 2017



seeding aircraft flies
two seeding legs
(burn-in-place flares)

— King Air flight track
..... seeding flight track





Benefit **Estimation**

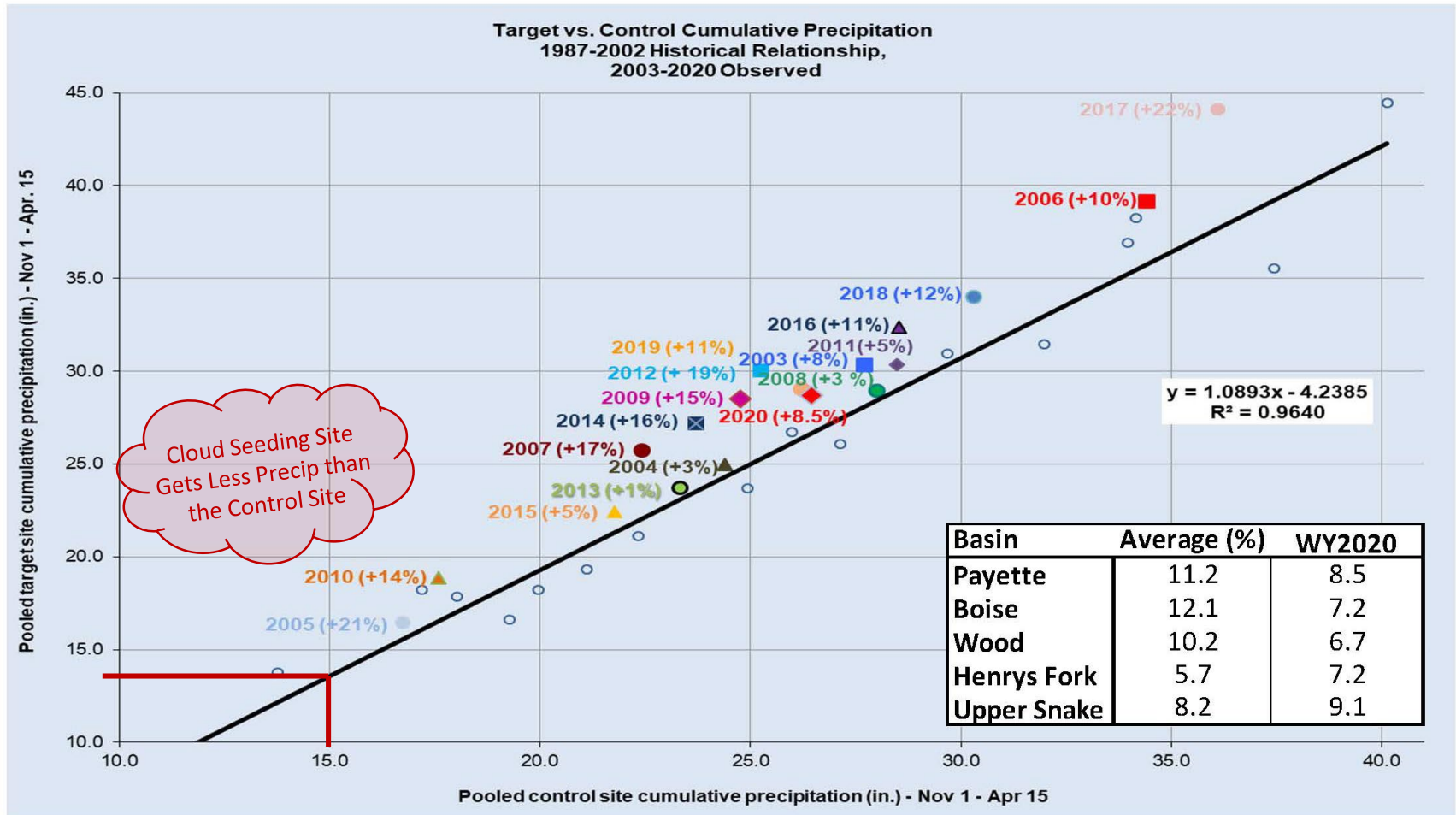
Several different approaches to assess benefits:



- 1) Target-Control Analysis
- 2) Hydrologic modeling using IPC's River Forecast System
- 3) Weather Modeling (WRF)

Benefits -Target Control

With Cloud Seeding



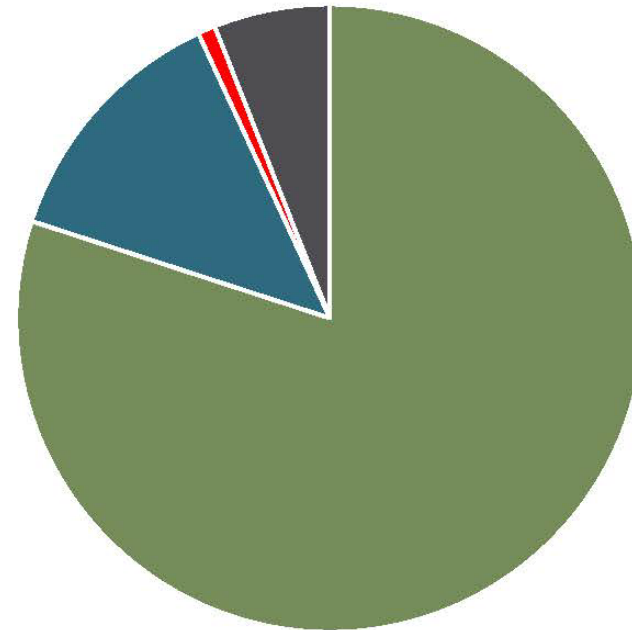
No Cloud Seeding




Extra Area Effects

- To put quantities into context...
 - Nature will condense about 20% of the water vapor as moist air rises over a mountain barrier (the remaining 80% remains uncondensed).
 - Winter storms are typically about 30% efficient, meaning 30% of the 20%, or 6% of the total, reaches the ground.
 - If cloud seeding increases precipitation 15%, that amounts to 15% of the 6%, or 0.9% of the total water vapor is the additional amount cloud seeding pulls from the atmosphere.

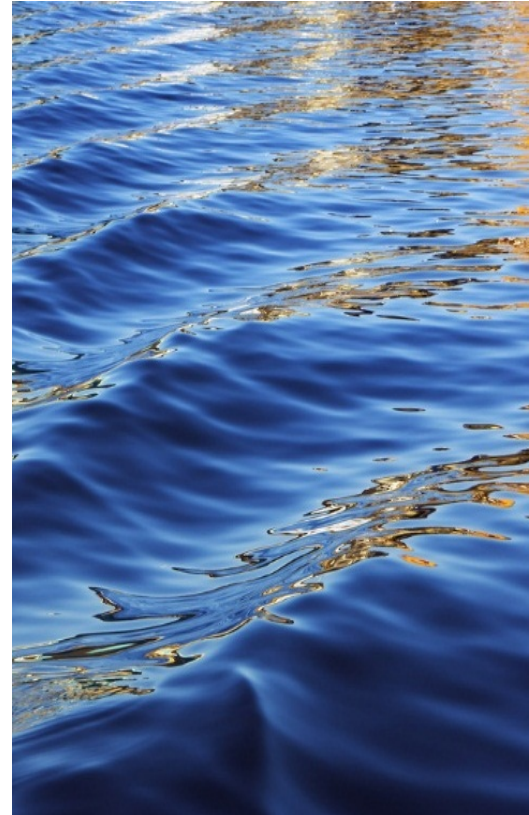
Atmospheric Water Budget




■ Uncondensed Water Vapor ■ Condensed into Cloud
■ Cloud Seeding ■ Precipitation

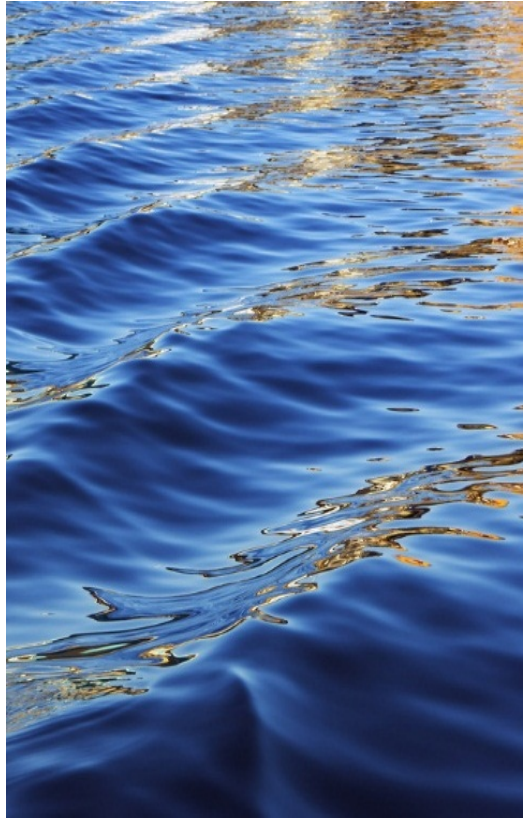


Do the Idaho Study
Results Transfer to
Our Area?





What is the **actual** benefit of cloud seeding, how much water do we receive for our investment?



Quantifying **Actual** Benefit

Valley District Region Water Management Strategies

- Cost
- Measured Benefit (field data)
- Cost/acre-foot

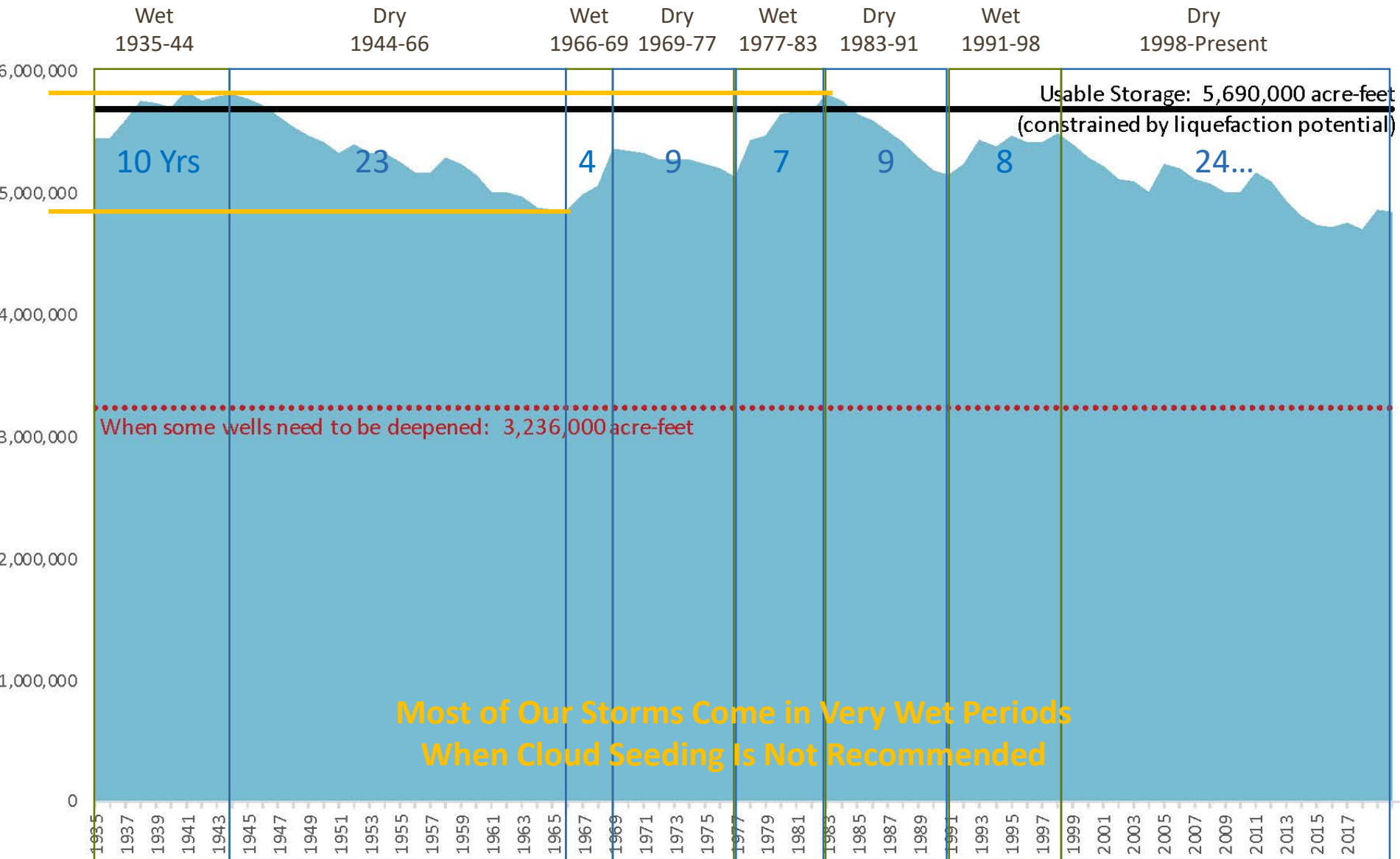
Cloud Seeding

- Cost
- ~~• Measured Benefit (field data)~~
- ~~• Cost/acre-ft~~

Our Water Supply Strategies are Measurable and Effective



San Bernardino Basin Usable Storage (in acre-feet)



Staff Conclusion

- We get most of our rain in flood type years when seeding is not implemented
- Cloud seeding does not meet the criteria (cost/acre-ft) that we use to evaluate and recommend water supply projects
 - Staff would not recommend cloud seeding, at this time, because there is no way to quantify the actual water produced for the Board's investment
- Even if we could measure the amount of water produced, the Idaho Study indicates that it would be a very small (1%), seemingly negligible, amount of water which would result in a high cost/acre-ft

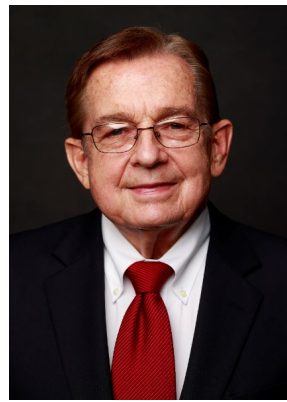
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Staff Recommendation
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Future Business



Adjournment
