

Valley County Board of Commissioners

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SHERRY MAUPIN
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DOUGLAS A. MILLER
Clerk
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IN THE OFFICE OF THE VALLEY COUNTY BOARD OF COMMISSIONERS CASCADE, IDAHO February 6, 2023

PRESENT: **ELTING HASBROUCK (CHAIRMAN)**
 NEIL THOMPSON (COMMISSIONER)
 SHERRY MAUPIN (COMMISSIONER)
 DOUGLAS MILLER (CLERK)

Edgar Allen led the pledge of allegiance.

Chairman Hasbrouck presented the commissioners' agenda for February 6, 2023. Commissioner Maupin made a motion to approve the commissioners' agenda for February 6, 2023. Commissioner Thompson seconded the motion. No further discussion, all in favor. Motion passed to approve the commissioners' agenda for February 6, 2023.

Chairman Hasbrouck presented the commissioner meeting minutes from January 23, 2023. Commissioner Thompson made a motion to approve the commissioner meeting minutes from January 23, 2023. Commissioner Maupin seconded the motion. No further discussion, all in favor. Motion passed to approve the commissioner meeting minutes from January 23, 2023.

Chairman Hasbrouck presented the Fiscal Year 2022 National Culvert Removal, Replacement and Restoration Grant program. Commissioner Maupin made a motion to approve the Fiscal Year 2022 National Culvert Removal, Replacement and Restoration Grant Program. Commissioner Thompson seconded the motion. No further discussion, all in favor. Motion passed to approve the Fiscal Year 2022 National Culvert Removal, Replacement and Restoration Grant.

Facilities Director, Scott Clingan presented the contract with Wessco Waste & Recycling Equipment for the new bailer for the recycling center. Commissioner Maupin made a motion to approve the contract with Wessco Waste & Recycling Equipment. Commissioner Thompson seconded the motion. No further discussion, all in favor. Motion passed to approve the contract with Wessco Waste & Recycling Equipment.

Sheriff, Patti Bolen presented the LEADs Online Agency Agreement and provided explanation regarding the program that would be utilized by the Valley County Sheriff's Office. Commissioner Maupin made a motion to approve the LEADs Online Agency Agreement. Commissioner Thompson seconded the motion. No further discussion, all in favor. Motion passed to approve the LEADs Online Agency Agreement.

Chairman Hasbrouck presented the Edward Byrne Memorial Justice Assistance Grant. During the presentation of the grant the commissioners had questions regarding the ongoing maintenance cost. Lieutenant, Kevin Copperi provided additional information to the commissioners. The commissioners requested additional information before they would approve the grant and requested that the matter be brought up to the commissioners later.

Chairman Hasbrouck presented the Four Corners Mitigation Grant. Commissioner Maupin made a motion to approve the Four Corners Mitigation Grant. Commissioner Thompson seconded the motion. No further discussion, all in favor. Motion passed to approve the Four Corners Mitigation Grant.

Chairman Hasbrouck presented the letter of commitment related to the Four Corners Mitigation Grant. Commissioner Maupin made a motion to approve the letter of commitment related to the Four Corners Mitigation Grant. Commissioner Thompson seconded the motion. No further discussion, all in favor. Motion passed to approve the letter of commitment related to the Four Corners Mitigation Grant.

Road Department Employee, Mickee Ellis presented the lease for storage and removal of gravel with Donna Valdez. Commissioner Maupin made a motion to approve the lease agreement with Donna Valdez for the storage and removal of gravel. Commissioner Thompson seconded the motion. No further discussion, all in favor. Motion passed to approve the lease agreement with Donna Valdez for the storage and removal of gravel.

Chairman Hasbrouck presented the support letter to create the Idaho's North-South Middle Mile Network. Commissioner Maupin provided a brief overview of the project and explained the involvement of Valley County. Chairman Hasbrouck made a motion to approve the Idaho's North-South Middle Mile Network Support letter. Commissioner Maupin seconded the motion. No further discussion, all in favor. Motion passed to approve the Idaho's North-South Middle Mile Network Support Letter.

Chairman Hasbrouck began the workshop related to the Waterways Management Plan. Waterways Sergeant, Kevin Turner provided concerns to the commissioners regarding enforcement of the wake zone areas that were being recommended in the proposed waterways management plan. The commissioners had the opportunity to ask Waterways Sergeant Turner questions related to enforcement of the no wake zone areas. Chief Deputy Prosecuting Attorney, Brian Oakey explained the next steps in approval of any recommended changes of the Waterways Management Plan and advised that it would require a Public Hearing to adopt a new ordinance. He presented on the legal challenges that would occur but advised that they would

follow the rule of the law. The commissioners asked Waterways Sergeant Turner if a contractor could be hired to place buoys on the waterways within Valley County. Sergeant Turner indicated that he had contacted a few contractors who were interested but has not received quotes. Leonard Long who is a member of the Friends of Payette Lake presented to the commissioners and felt that the Waterways Management Plan was developed specifically as an education tool. Jim Pace presented on models that have been utilized for management of Waterways specifically at Hayden Lake which is in Idaho. He provided an outline of the management plan that had been utilized and advised that the manager, Todd Walker was willing to present to the commissioners during a future meeting. He also discussed the creation of an improvement district that was established to assist with management of the waterways. He informed the commissioners that he sent them an email which provided information regarding the process that was developed. Edgar Allen provided additional information to the commissioners and wanted to make sure that the commissioners were aware that the Waterways Management Plan was not the actual ordinance but was just recommendations. Recreation Coordinator, Dave Bingaman provided additional comments to the commissioners regarding the Waterways Management Plan and felt an education plan needed to be developed on waterways within Valley County. Chairman of the Waterways Committee, Jally Zeidel advised that his main concern related to the recommendations is the expense of additional buoys that are being recommended. He described the revenue sources that are received to fund the Valley County Waterways program. The commissioners asked about the staffing of the Waterway Deputies and Waterways Committee Chairman advised that additional deputies should be hired. Planning & Zoning Director, Cynda Herrick felt that the commissioners should adopt the Waterways Management Plan via resolution with additional work to be done through the ordinance process. She advised that Planning & Zoning commission would consider the plan during the comprehensive plan review for land use recommendations. Art Troutner with Valley Soil & Water Conservation District provided comments to the commissioners and felt that water quality needed to be of the highest priority when the plan was adopted. The commissioners requested that the Waterways Management Plan be placed on a future agenda for adoption through a resolution with another committee being established. Mr. Bill Leaf provided additional comments to the commissioners. Commissioner Maupin made a motion to approve the concept of the Waterways Plan and place the matter back on a commissioners' agenda to approve via a resolution. Commissioner Thompson seconded the motion. No further discussion, all in favor. Motion passed to approve the concept of the Waterways Plan and place the matter back on a commissioners' agenda to approve via a resolution.

Commissioner Thompson made a motion to go into Executive Session per Idaho Code 74-206 1(d)-"To consider records that are exempt from disclosure as provided in Chapter 1, Title 74, Idaho Code."-Indigent & Charity. Commissioner Maupin seconded the motion. No further discussion, by roll call vote all commissioners voted "aye". The commissioners went into Executive Session per Idaho Code 74-206 1(d)-Indigent at 10:45 a.m.

Chairman Hasbrouck brought the commissioners out of Executive Session per Idaho Code 74-206 1(d)-Indigent at 10:53 a.m.

Decision after Executive Session

23-M0122	Lien
23-M0122	Approval Cremation

Valley County Veteran's Service Officer, Jamie Coffey Kelly presented to the commissioners regarding the work that had been conducted since August 1, 2022, with local Valley County Veterans. A copy of her presentation will be appended to the commissioner meeting minutes.

Treasurer, Johanna Defoort began the discussion regarding the reinvestment of ARPA funds, and she provided the commissioners with three potential options which will be appended to the commissioner meeting minutes. The commissioners discussed the options presented and discussed the need to allocate the American Rescue Plan Act funds soon. Chairman Hasbrouck made a motion to authorize Treasurer, Johanna Defoort to invest the American Rescue Plan funds as discussed. Commissioner Maupin seconded the motion. No further discussion, all in favor. Motion passed to authorize Treasurer, Johanna Defoort to invest the American Rescue Plan funds as discussed.

Planning & Zoning Director, Cynda Herrick presented the facts and conclusions for CUP 22-42 Brutsman Appeal. Commissioner Maupin made a motion to approve the facts and conclusions for CUP 22-42 Brutsman Appeal. Commissioner Thompson seconded the motion. No further discussion, all in favor. Motion passed to approve the facts and conclusions for CUP 22-42 Brutsman Appeal.

Human Resource Director, Pat Duncan presented on her request to change the holiday pay from 8 hours to 10 hours and she provided her explanation to the commissioners. Chairman Hasbrouck made a motion to authorize holiday policy to a day instead of hourly basis. Commissioner Thompson seconded the motion. No further discussion, all in favor. Motion passed to authorize holiday policy to a day instead of hourly basis.

Human Resource Director, Pat Duncan presented on the potential need to go over her allotted budget for the employee recognition program. The commissioners were made aware of the possibility and advised that they would allow the expense line for employee recognition to go over budget.

Human Resource Director, Pat Duncan presented on the possibility of allowing Valley County to utilize existing housing for students who are considering employment in Valley County but not necessarily for the county. Commissioner Maupin made a motion to allow Valley County Housing to be used for interested potential applicants and to be used for community college students. Commissioner Thompson seconded the motion. No further discussion, all in favor. Motion passed to allow Valley County Housing to be used for potential applicants and to be used for community college students seeking employment.

Durena Farr with Valley Soil & Water Conservation District introduced Mr. Shaun Parkinson who is with Idaho Power to provide the commissioners with a presentation regarding cloud seeding in Idaho. A copy of the presentation will be appended to the commissioner meeting minutes. Ms. Pamela Pace also provided comments to the commissioners regarding the cloud seeding program presentation.

Chairman Hasbrouck opened the Public Hearing for appeal of Planning & Zoning Commission Approval of CUP 22-34 Shoemaker Donnelly Storage at 1:25 p.m. Chairman Hasbrouck asked if the commissioners had any ex-parte communication or conflict of interest. All commissioners advised that they did not have any ex-parte communication or conflict of interest related to CUP 22-34 Shoemaker Donnelly Storage.

Chairman Hasbrouck asked for a staff report. Planning & Zoning Director, Cynda Herrick provided a staff report to the commissioners related to CUP 22-34 Shoemaker Donnelly Storage.

Chairman Hasbrouck asked to hear from the appellant. Mr. Todd Jurdana who resides in Donnelly, Idaho, provided testimony to the commissioners regarding the appeal of CUP 22-34 Shoemaker Donnelly Storage.

Chairman Hasbrouck asked to hear for the applicant of CUP 22-34 Shoemaker Donnelly Storage. Mr. Jeff Hatch who owns Hatch Design Architecture provided testimony to the commissioners regarding the application for CUP 22-34 Shoemaker Donnelly Storage.

Chairman Hasbrouck asked to hear testimony from those that are proponent of the appeal.

Mr. Mike Fairchild who resides in Donnelly, Idaho, provided testimony to the commissioners as a proponent of the appeal.

Ms. Susan Dorris who resides in Donnelly, Idaho, provided testimony to the commissioners as a proponent of the appeal.

Ms. Heather Beaman who resides in Donnelly, Idaho, provided testimony to the commissioners as a proponent of the appeal.

Mr. Bradley Beaman who resides in Donnelly, Idaho, provided testimony to the commissioners as a proponent of the appeal.

Ms. Alison Hatzbuler who resides in Donnelly, Idaho, provided testimony to the commissioners as a proponent of the appeal.

Ms. Sherry Reavs who resides in Donnelly, Idaho, provided testimony to the commissioners as a proponent of the appeal.

Mr. Chris Renfro who resides in Donnelly, Idaho, provided testimony to the commissioners as a proponent of the appeal.

Mr. Mike Burkinbine who resides in Donnelly, Idaho, provided testimony to the commissioners as a proponent of the appeal.

Mr. David Galliopoli who resides in McCall, Idaho, provided testimony to the commissioners as a proponent of the appeal.

Mr. Lenoard Long who resides in Cascade, Idaho, provided testimony to the commissioners as a proponent of the appeal.

Mr. Joey Peitri who resides in McCall, Idaho, provided testimony to the commissioners as a proponent of the appeal.

Mr. Art Troutner who was representing Valley Soil & Water Conservation District provided testimony to the commissioners as a proponent of the appeal.

Ms. Durena Farr who resides in Donnelly, Idaho, provided testimony to the commissioners as a proponent of the appeal.

Chairman Hasbrouck asked to hear from those who were uncommitted. Record would reflect non.

Chairman Hasbrouck asked to hear testimony from those who are opponents of the appeal.

Mr. Craig Shoemaker who resides in McCall, Idaho, provided testimony to the commissioners as an opponent of the appeal.

Mr. Roger Burgon who resides in Meridian, Idaho, provided testimony to the commissioners as an opponent of the appeal.

Chairman Hasbrouck asked to hear additional testimony from the applicant of CUP 22-34 Shoemaker Donnelly Storage. Mr. Jeff Hatch provided further testimony to the commissioners.

Chairman Hasbrouck asked to hear rebuttal testimony from the appellant of CUP 22-34 Shoemaker Donnelly Storage. Mr. Todd Jurdana who was the appellant of CUP 22-34 Shoemaker Donnelly Storage provided additional testimony to the commissioners.

Commissioner Maupin had additional questions for Planning & Zoning Director, Cynda Herrick and she provided a response.

Chairman Hasbrouck closed the Public Hearing at 3:07 p.m. and brought the matter back to the commissioners for deliberations. Commissioner Maupin provided her opinion regarding the application and requested additional information regarding the drainage of the area. She also had concerns regarding the possibility of obtaining a septic permit. She felt that the City of Donnelly also needs to provide input of the property since it was in impact. Commissioner Thompson provided his opinion regarding the application, and he had concerns regarding the need for improvements of the road. He also had concerns regarding the impact of the water quality for the area. Chairman Hasbrouck provided his opinion regarding the application and had concerns with the landscaping proposal and had significant concerns with the drainage of the area. The commissioners wanted to see DEQ Comments, Army Corp of Engineer Report, Central District Health determination of Septic can be installed on area and statement from ITD, management of landscaping without chemicals, architectural review. Commissioner Maupin made a motion to table CUP 22-34 Shoemaker Donnelly Storage to obtain further information. Commissioner Thompson seconded the motion. No further discussion, all in favor. Motion passed to table CUP 22-34 Shoemaker Donnelly Storage to obtain further information.

The commissioners began a workshop with Idaho Department of Lands and in attendance were members of Idaho Department of Recreations, City of McCall, Idaho Department of Lands, Valley County.

Commissioner Maupin made a motion to go into Executive Session per Idaho Code 74-206 1(f)- "To communicate with legal counsel for the public agency to discuss the legal ramifications of and legal options for pending litigation, or controversies not being litigated but imminently likely to be litigated. The mere presence of legal counsel at an executive session does not satisfy this requirement."-Litigation Commissioner Thompson seconded the motion. No further discussion,

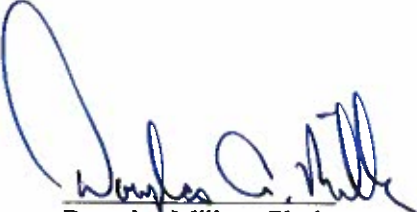
by roll call vote all commissioners voted "aye". The commissioners went into Executive Session per Idaho Code 74-206 1(f)-Litigation at 4:25 p.m.

Chairman Hasbrouck brought the commissioners out of Executive Session per Idaho Code 74-206 1(f)-Litigation at 5:18 p.m.

The commissioners adjourned at 5:19 p.m.


Chairman, Elting Hasbrouck

Attest:


Douglas Miller, Clerk

An Overview of Wintertime Cloud Seeding

February 6th, 2023

Shaun Parkinson





Presentation Outline

- What is cloud seeding
- How cloud seeding is conducted
- IPC's history of cloud seeding
- Cloud seeding in Idaho
- SNOWIE research project
- Benefit estimates
- Extra area effects
- Environmental concerns

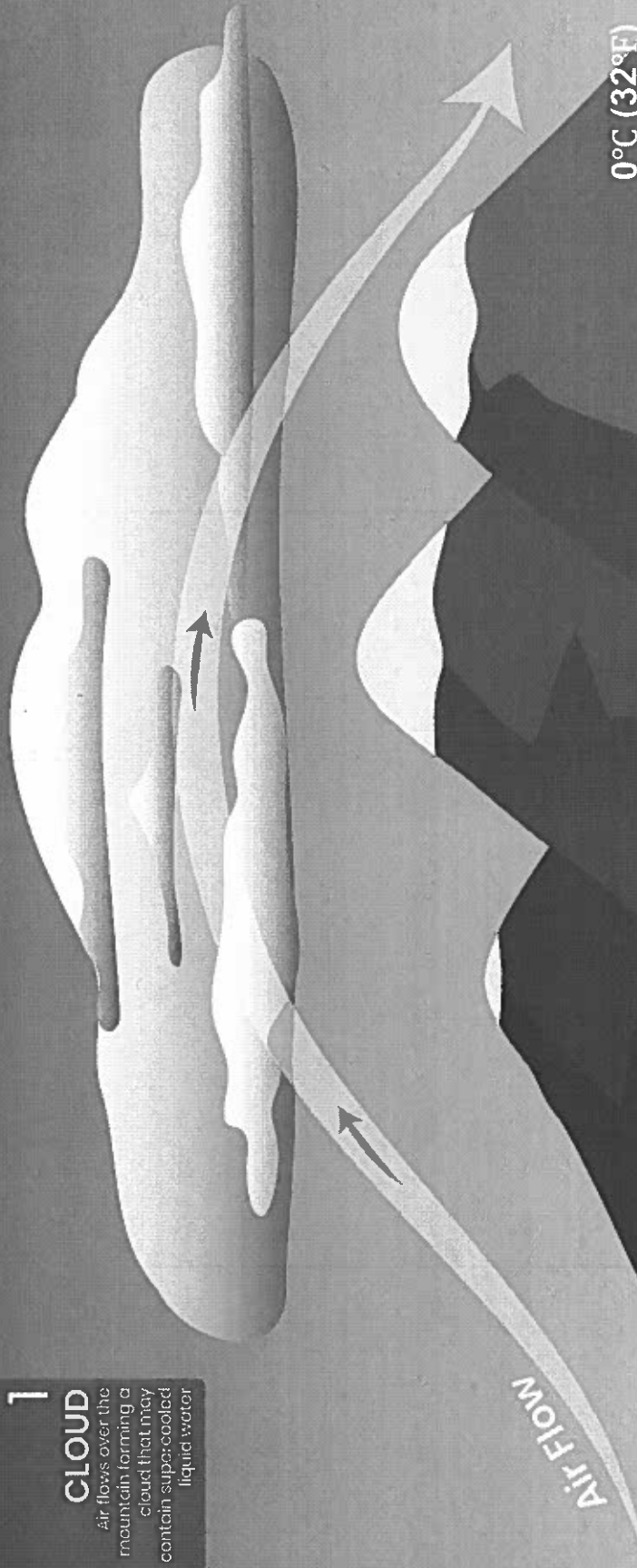
WINTER CLOUD SEEDING

WITH SILVER IODIDE

1

CLOUD

Air flows over the mountain forming a cloud that may contain supercooled liquid water



0°C (32°F)

NCAR
RAI

WINTER CLOUD SEEDING

WITH SILVER IODIDE

1

CLOUD

Air flows over the mountain forming a cloud that may contain super-cooled liquid water.

2

RELEASE

Silver iodide particles are released by a plane or ground-based generator.

Air flow

0°C (32°F)

NCAR
RAI

WINTER CLOUD SEEDING

WITH SILVER IODIDE

1
CLOUD
Air flows over the mountain forming a cloud that may contain super-cooled liquid water

2
RELEASE
Silver iodide particles are released by a plane or ground based generator

3
MERGE
Silver iodide particles reach the targeted cloud

Air Flow

0°C (32°F)

NCAR
RAI

WINTER CLOUD SEEDING

WITH SILVER IODIDE

1

CLOUD

Air flows over the mountain forming a cloud that may contain supercooled liquid water

2

RELEASE

Silver iodide particles are released by a plane or ground based generator

3

MERGE

Silver iodide particles reach the targeted cloud

4

ICE

The silver iodide forms ice crystals

0°C (32°F)

Air Flow

WINTER CLOUD SEEDING WITH SILVER IODIDE

1

CLOUD

Air flows over the mountain forming a cloud that may contain supercooled liquid water

2

RELEASE

Silver iodide particles are released by a plane or ground based generator

3

MERGE

Silver iodide particles reach the targeted cloud

4

ICE

The silver iodide forms ice crystals

5

SNOW

The ice crystals grow at the expense of supercooled water and become large enough to fall and create snow

0°C (32°F)

Air Flow

Two key criteria : 1) Supercooled liquid water (SLW) 2) Temperature for silver iodide to nucleate ice

1
CLOUD
Air flows over the mountain forming a cloud that may contain supercooled liquid water

Temperature
< -6 °C (21°F)

4
ICE
The silver iodide forms ice crystals

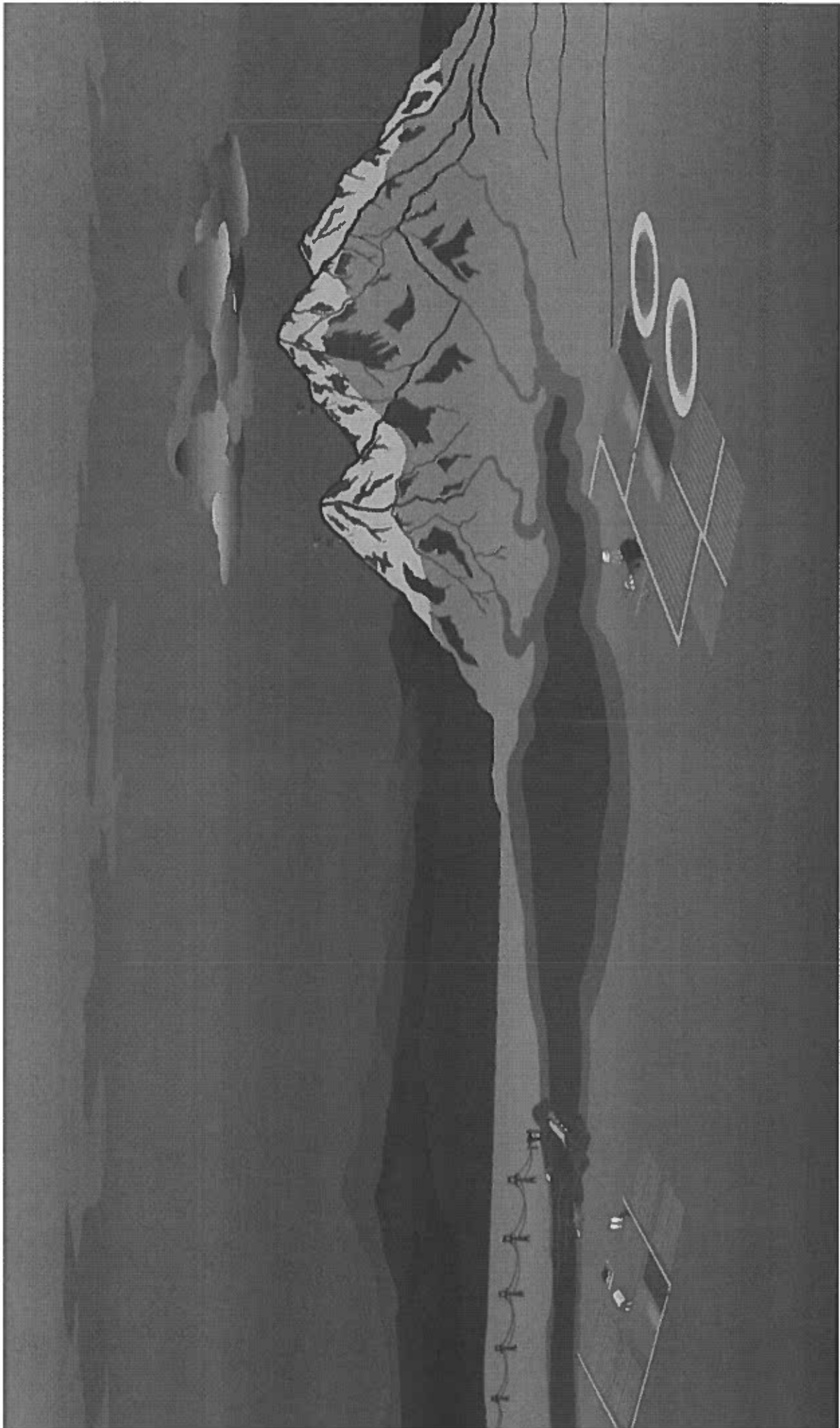
2
RELEASE
Silver iodide particles are released by an aircraft or ground based generator

3
DISPERSION
Silver iodide particles reach the targeted cloud

5
SNOW
The ice crystals grow at the expense of supercooled water and become large enough to fall and create snow

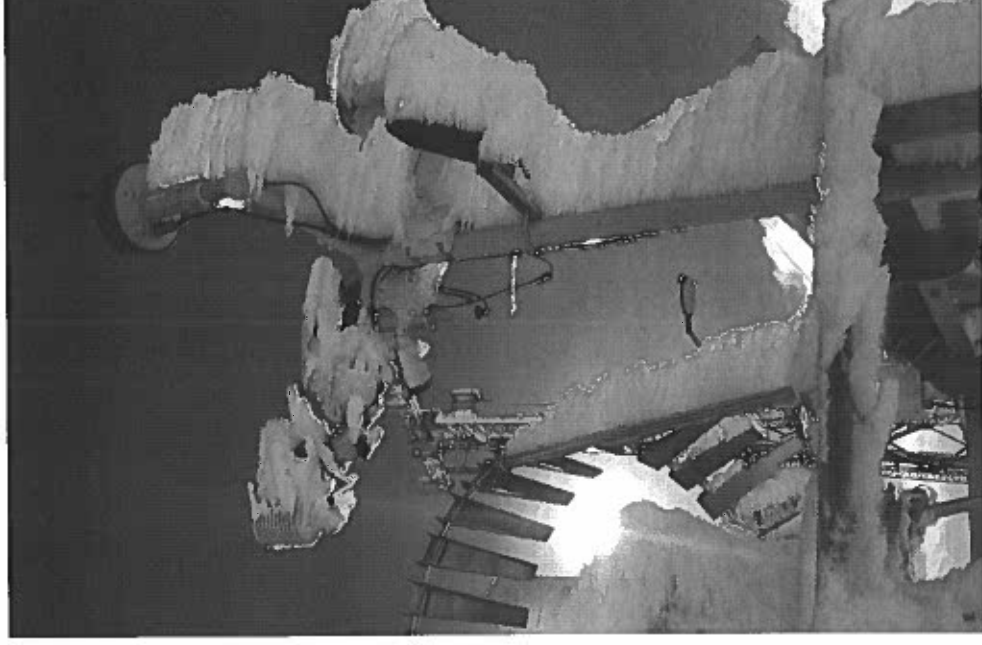
Ground-based seeding has additional criteria that impact dispersion
(wind direction, atmospheric stability)

0°C (32°F)

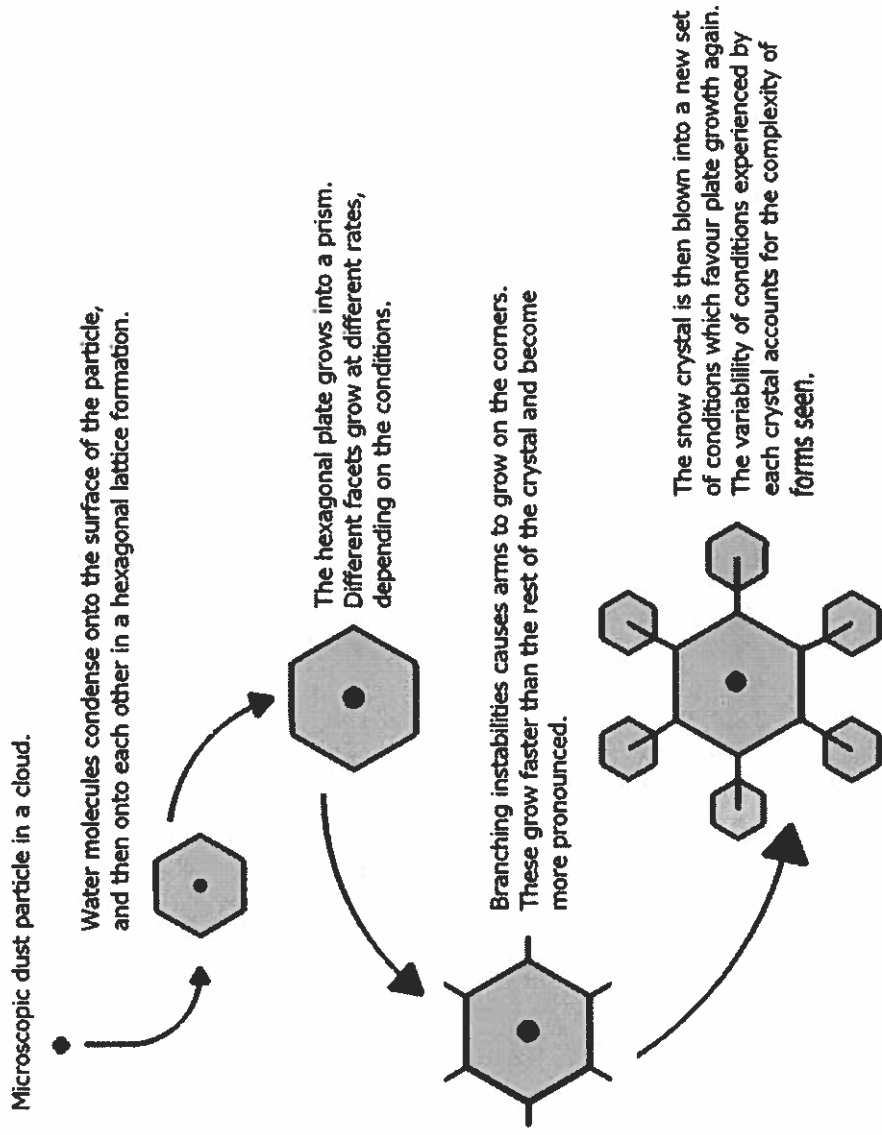


Supercooled Liquid Water (SLW)

- Water that is cold enough to freeze, but remains in the liquid state
 - Water **can** freeze at 32°F
 - Water requires a nucleation process to freeze
 - Impurities in nature such as dust
 - Water in the liquid state can be present in clouds much colder than 32°F
 - Often down to 0°F or even colder

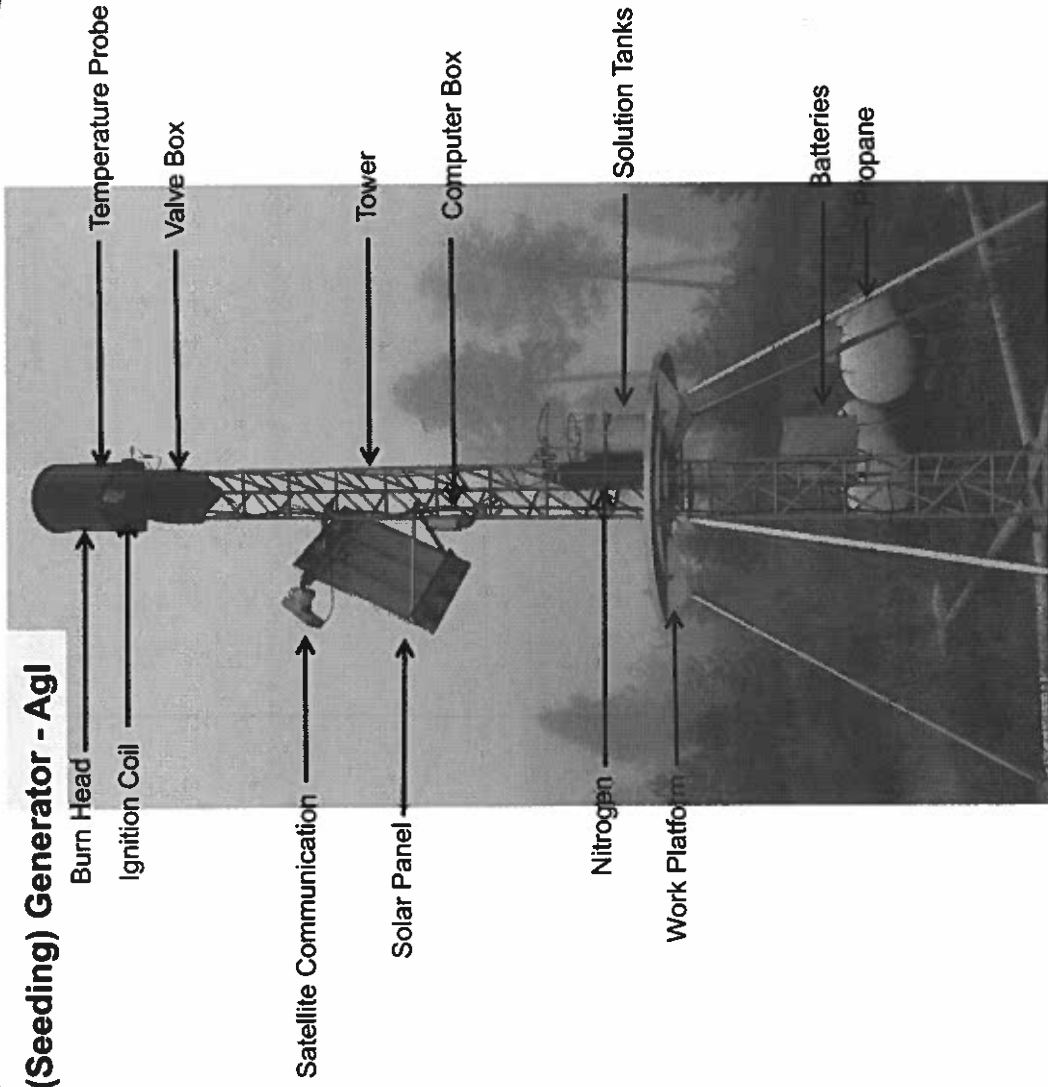


How does a snowflake/raindrop develop? (Cold Cloud)

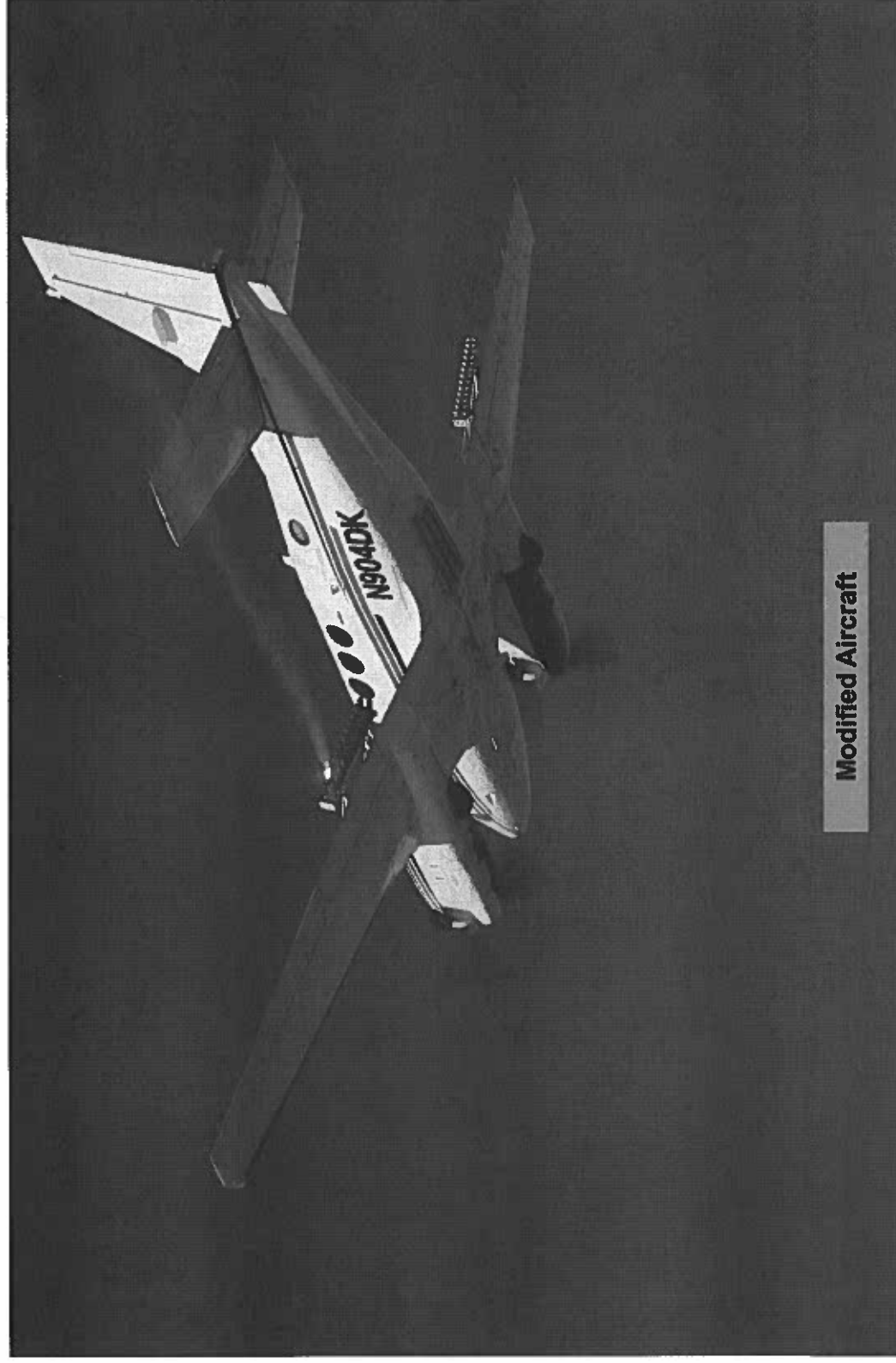


Seeding Mechanisms

Remote Cloud Nucleating (Seeding) Generator - AgI



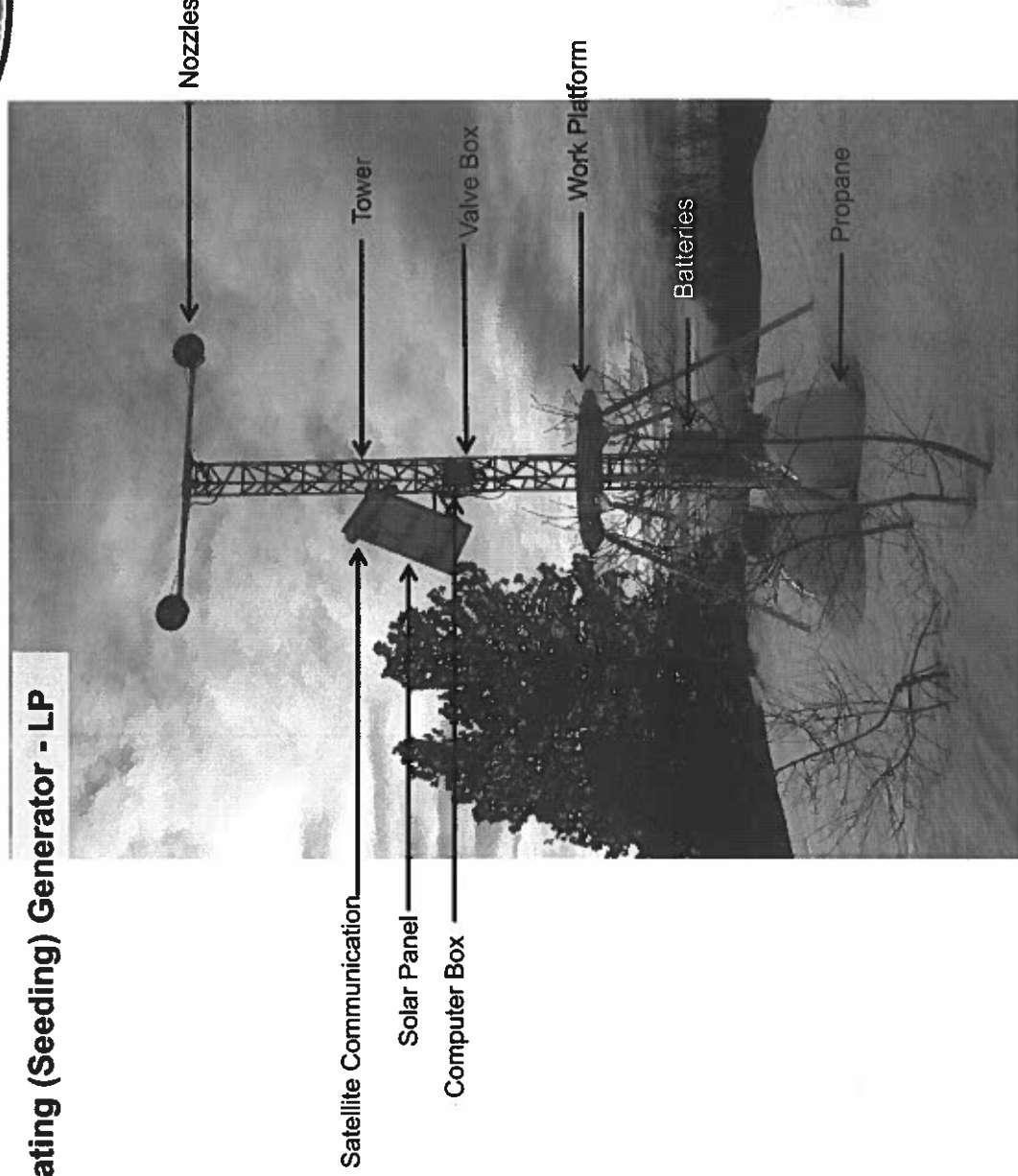
Seeding Mechanisms



Modified Aircraft

Seeding Mechanisms

Remote Cloud Nucleating (Seeding) Generator - LP

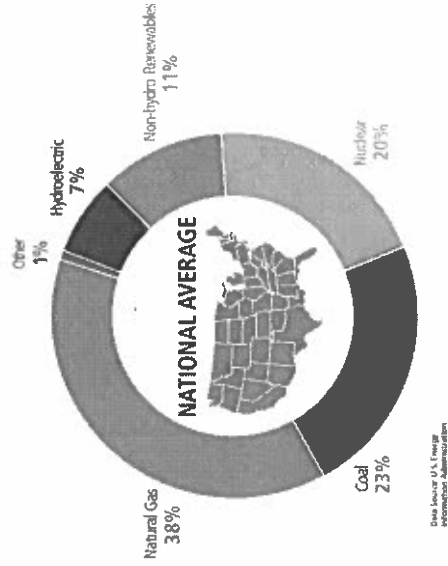
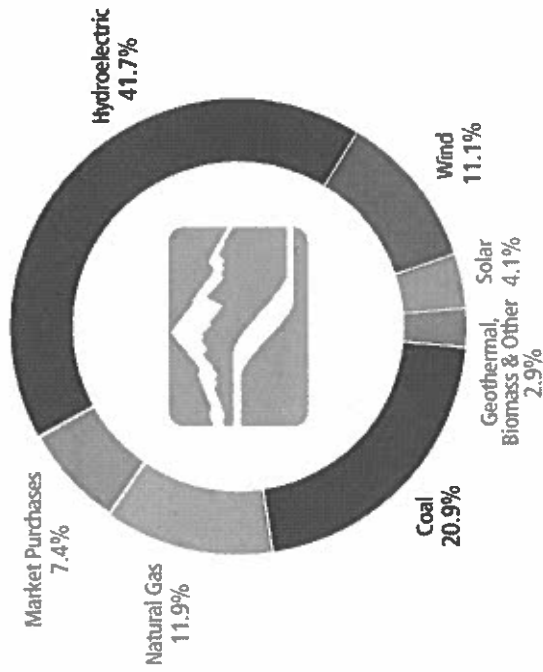


IPC's Cloud Seeding History

Potential to Augment Hydroelectricity



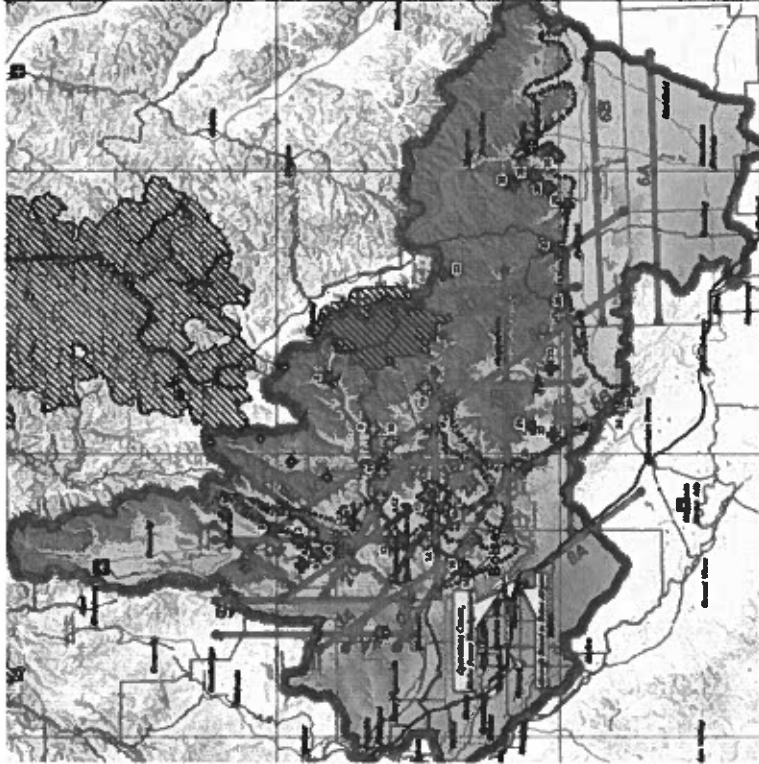
2020 Energy Mix





Idaho Power's Cloud Seeding History

- Began investigating cloud seeding in 1993 (shareholder question)
 - Literature review 1993 and 1994
 - Climatology study 1994 and 1995
 - Feasibility and Project Design 1995 -
- Operational in fall of 2003 (Payette - 7 generators, aircraft, assessment)
 - Completed second year of assessment and third year of operations in May 2005
- In 2008 collaborated with HC RC&D and E Idaho Counties to enhance their program (motivated by CAMP)
- In 2010 started working with WW RC&D to evaluate cloud seeding opportunities in western Wyoming
- In 2011 started working with NCAR to develop WRF model to guide and evaluate CS operations and projects
- In 2013 – contracted with Big Wood Canal Company to seed Wood River with aircraft
- WY 2015 Expansion (44 generators, 2 aircraft)
 - Boise and Wood Basin's – remote generators and aircraft seeding
 - Continued expansion in Salt and Wyoming Ranges
 - IWRB funding a grant for equipment associated with expansion
- WY 2023 Current Program
 - 57 Generators Agl, 1 propane
 - 3 aircraft



WY 2023 Idaho Collaborative Cloud Seeding Program

Central Mountains

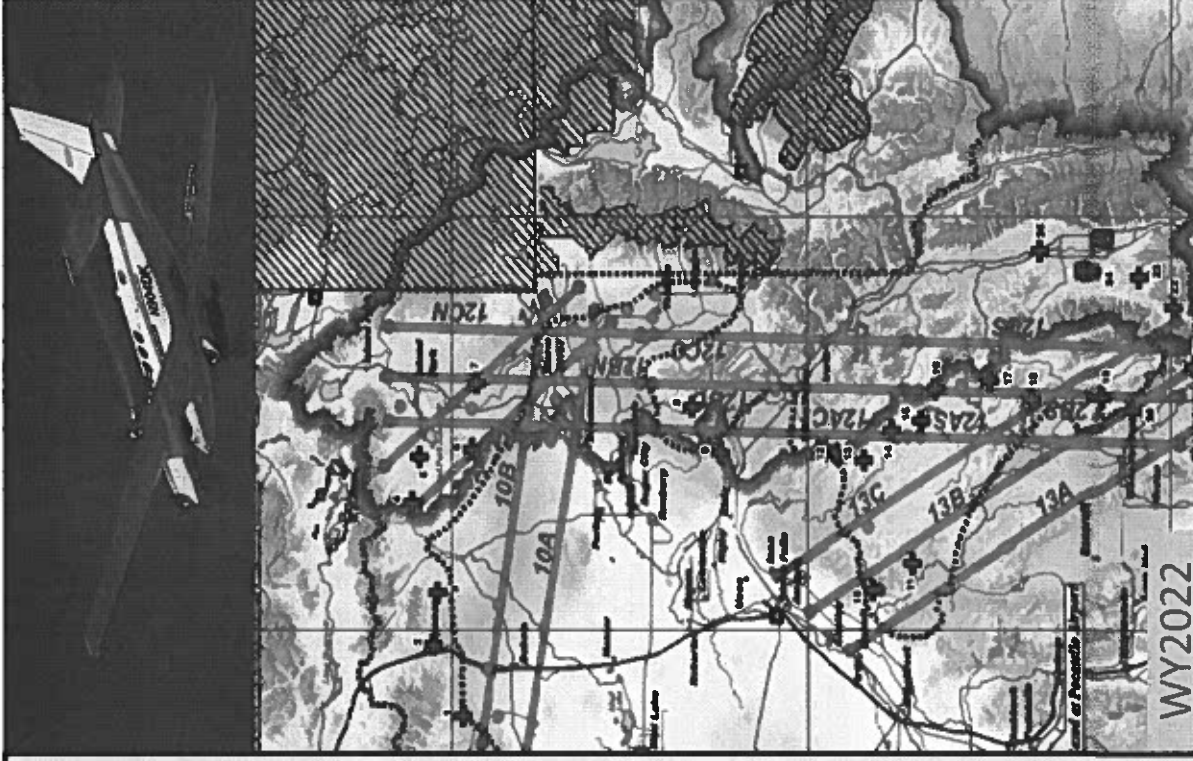
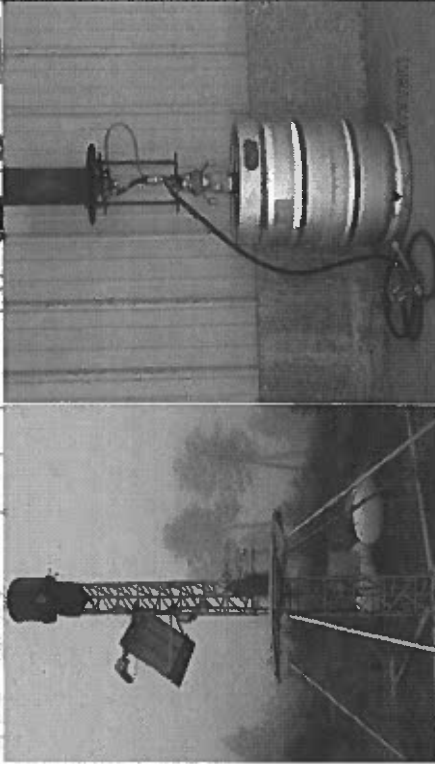
- 32 IPC Remote Ground Generators
 - 17 Payette
 - 15 Boise/Wood
- 2 Aircraft

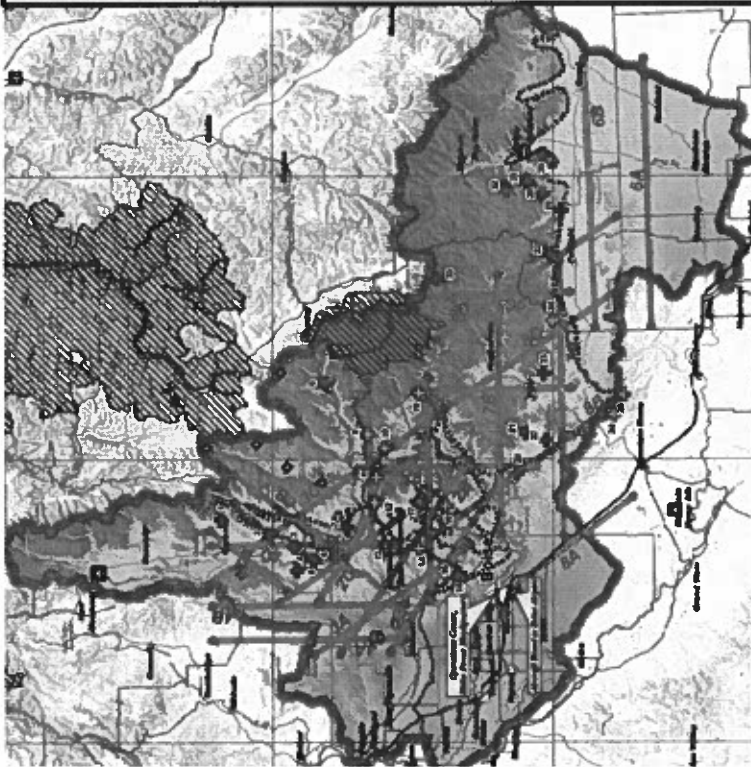
Upper Snake

- 25 IPC Remote Ground Generators
- 1 Aircraft
- 25 Let It Snow Manual Ground Generators

Across the Program

- High Performance Computing System
- High Resolution WRF Weather Model
- WRF-WxMod Module
- High Resolution weather instrumentation





WY 2023 Idaho Collaborative Cloud Seeding Program

Payette Basin

Idaho Power (IPC)

Boise Basin

IPC

IWRB

Local Water Users

Wood Basin

IPC

IWRB

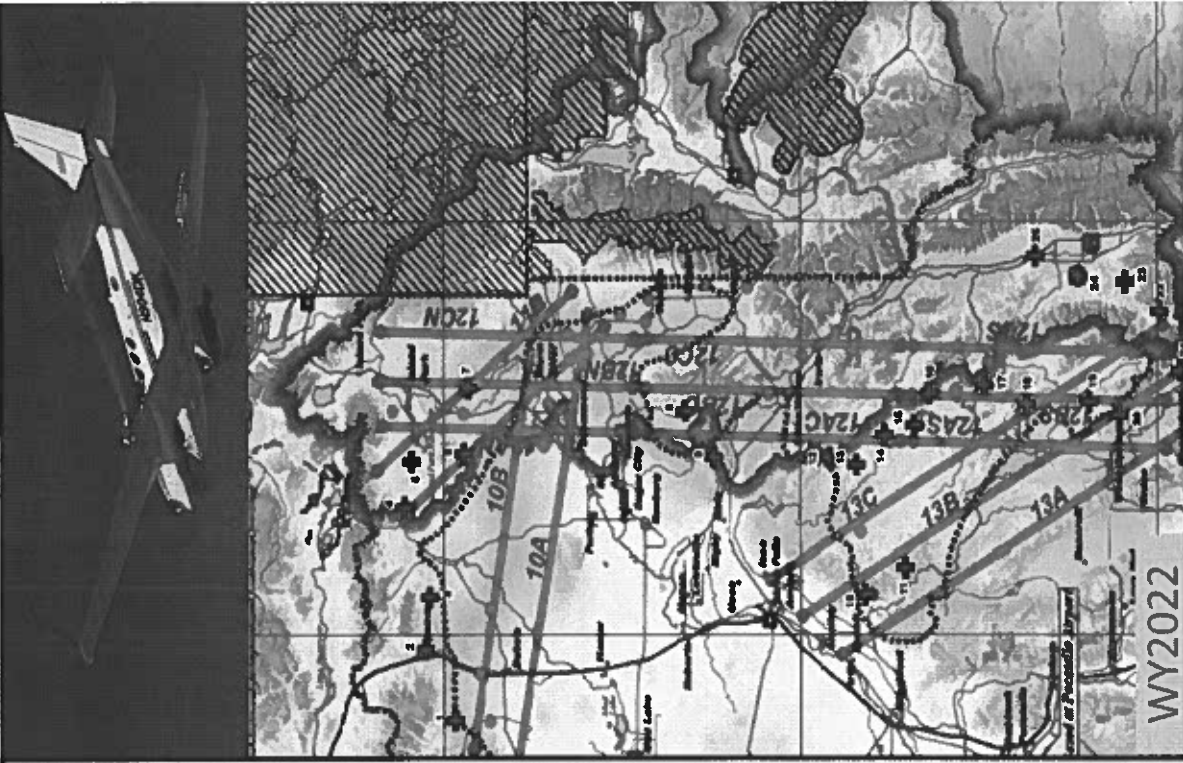
Local Water Users

Upper Snake Basin

IPC

IWRB

Local Water Users



WY2022



SNOWIE

Seeded & Natural Orographic Wintertime clouds: the Idaho Experiment

- National Science Foundation funded SNOWIE to study winter precipitation processes (\$2.1M)
- Goal:
 - further understand natural and dynamic winter precipitation processes
 - determine physical processes by which cloud seeding effects winter precipitation
- 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
- A Second NSF grant awarded to continue analyzing data from 2017

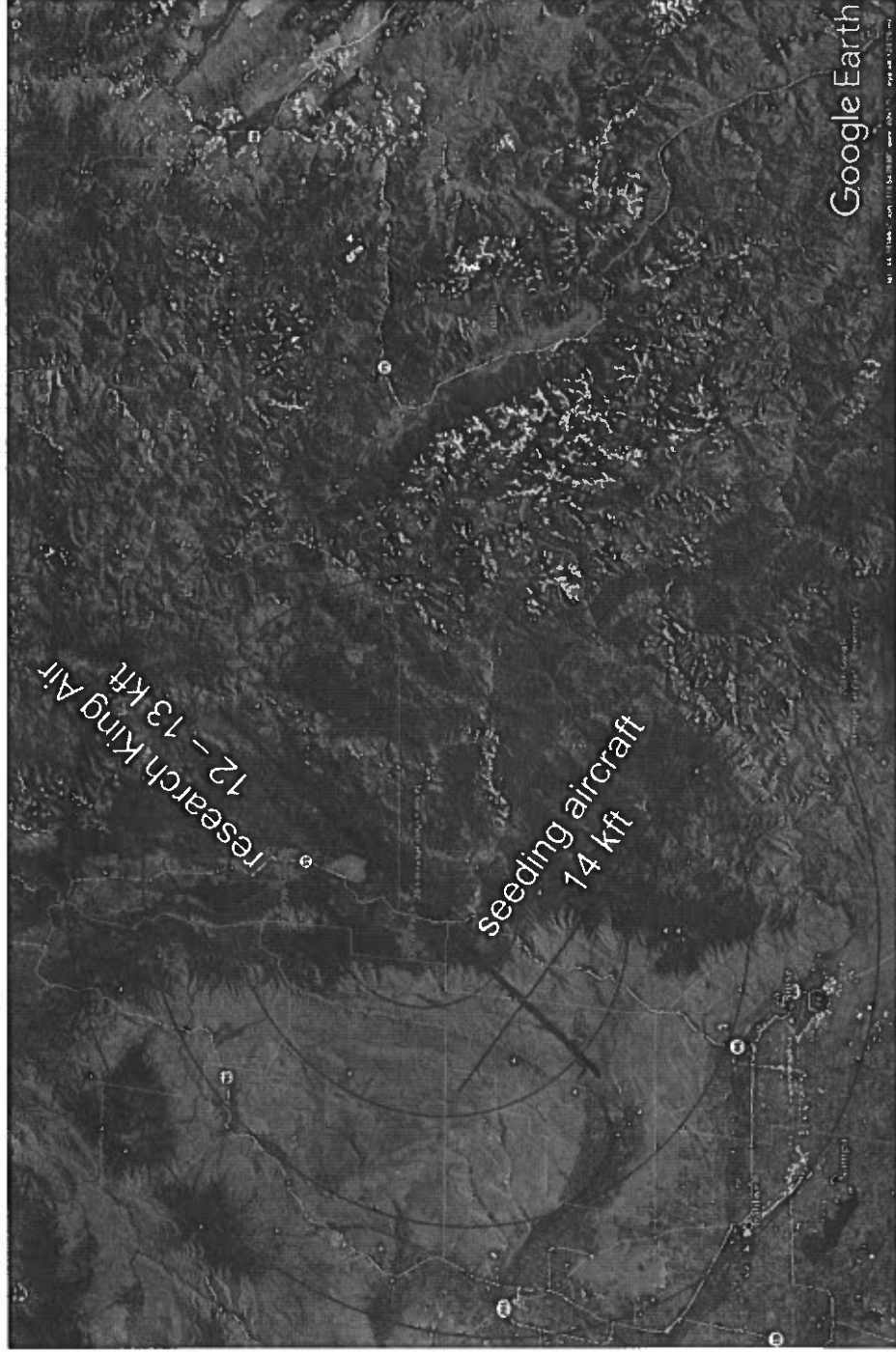


DOWRY

DOWRY Pack
20 km range rings from 01

SNOWIE IOP

Seeded and Natural Orographic Wintertime clouds - the Idaho Experiment
Intensive Observation Period

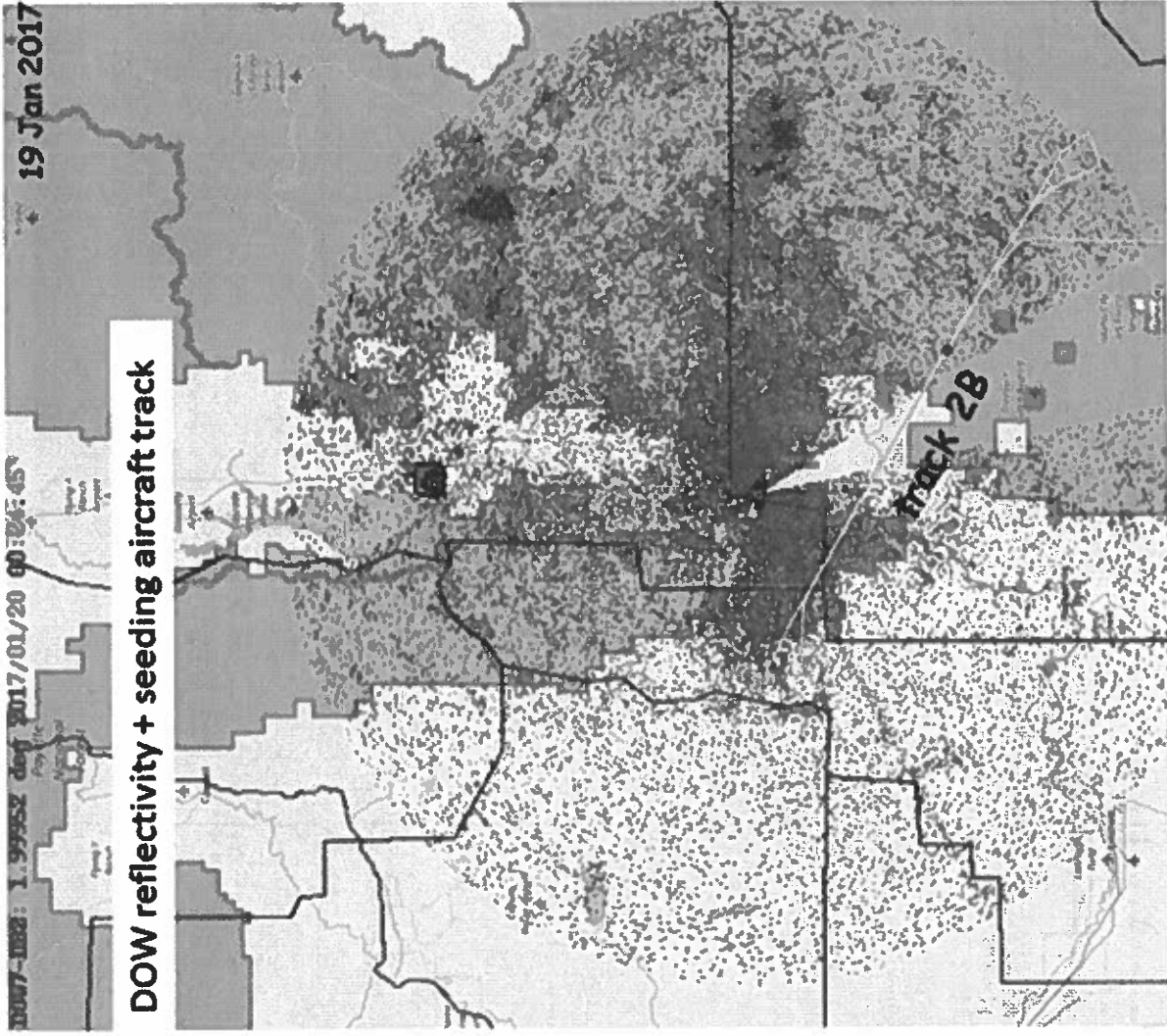


19 Jan 2017

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DOW reflectivity + seeding aircraft track

Track 28





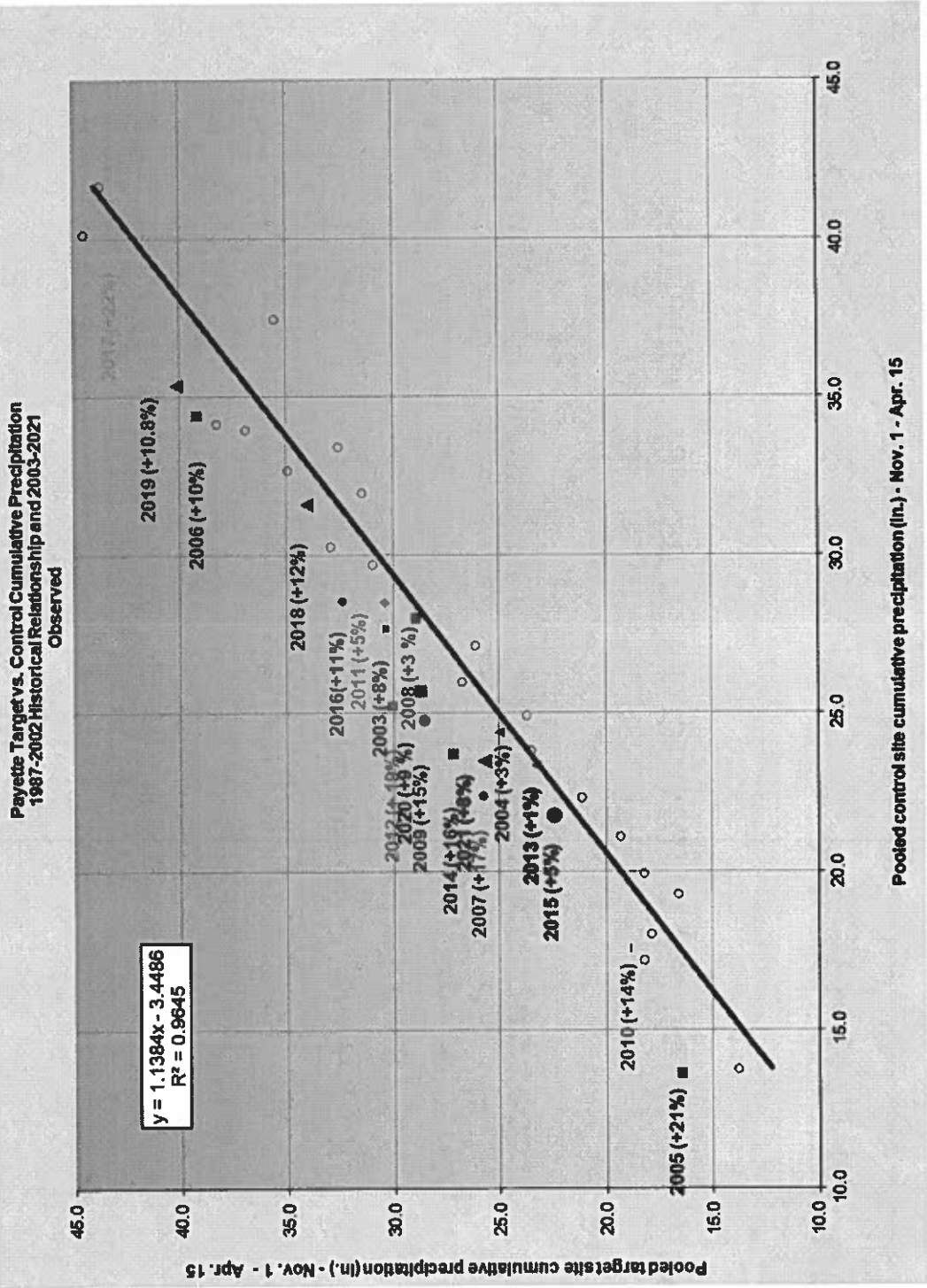
Benefit Estimation

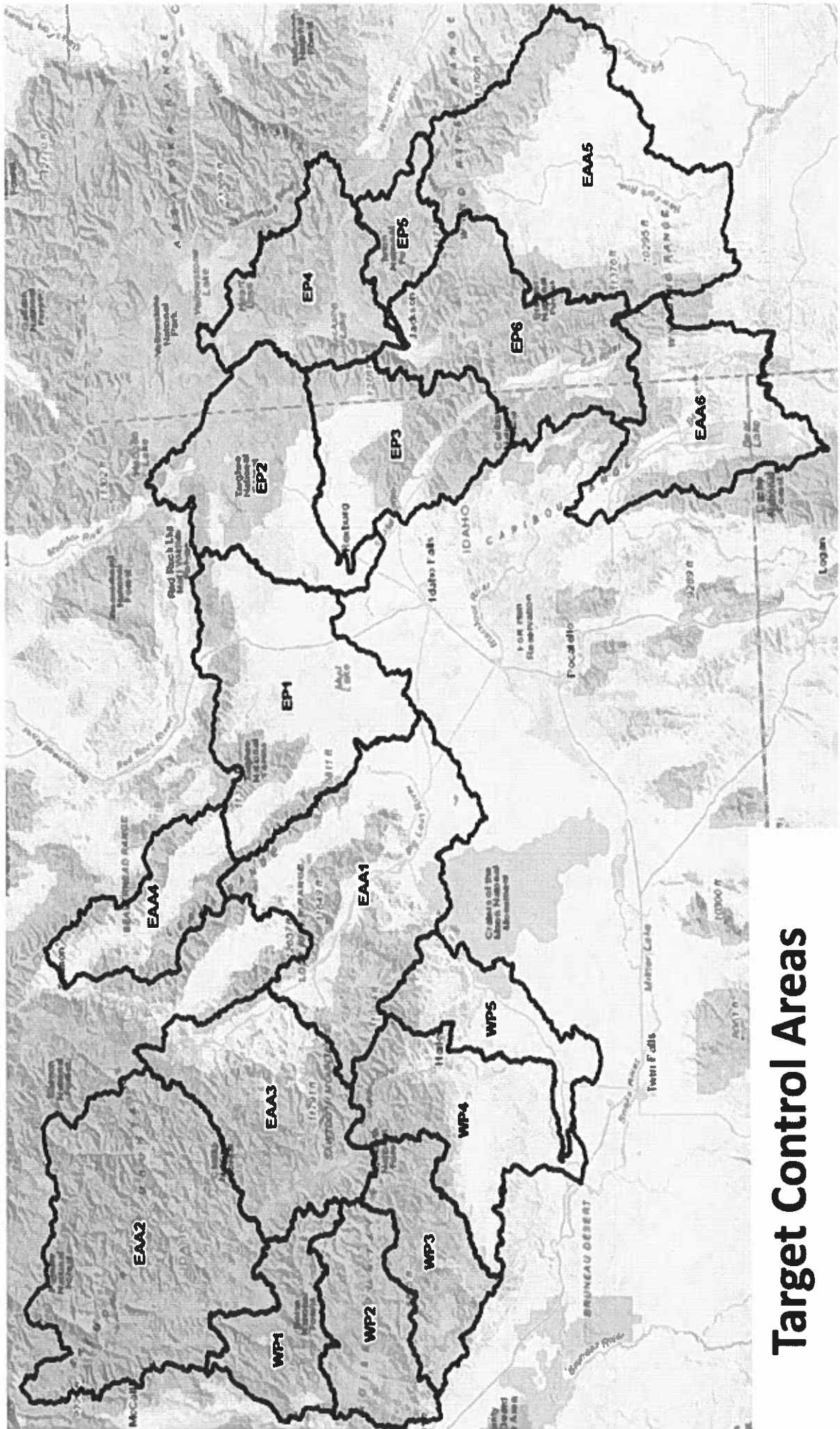
Several different approaches to assess benefits:

- 1) Target-Control Analysis
- 2) Hydrologic modeling
 - IPC's River Forecast System,
 - *WRF-Hydro (in development)*
- 3) *Weather Modeling (WRF / WRF-WxMod) (in development)*



Target Control





Target Control Areas

Basin Wide Target Control Results

November 1 - April 1

Year	Payette		Boise		Wood			Henrys Fork		Upper Snake			
	WP1	WP2	WP2	WP3	WP4	WP5	EP1	EP2	EP3	EP4	EP5	EP6	
2003	8%												
2004	3%												
2005	19%												
2006	12%												
2007	14%												
2008	4%												
2009	16%												
2010	16%												
2011	7%												
2012	18%												
2013	1%	4%					2%	3%	3%	3%	3%	3%	3%
2014	15%	24%			10%		3%	5%	11%	10%	10%	10%	11%
2015	5%	15%			13%		3%	4%	12%	10%	10%	10%	11%
2016	14%	8%			8%		4%	6%	5%	5%	5%	5%	6%
2017	21%	21%			16%		9%	11%	12%	10%	10%	10%	11%
2018	15%	12%			9%		6%	9%	8%	7%	7%	8%	8%
2019	15%	10%			11%		6%	8%	17%	14%	14%	15%	11%
2020	6%	7%			7%		5%	8%	10%	9%	9%	9%	8%
2021	8%	10%			9%		4%	5%	9%	8%	8%	9%	7%
2022	6.6%	6.5%			6.1%		5.1%	4.0%	5.8%	5.9%	6.4%	5.4%	
Average	11.2%	11.7%			10.0%		4.5%	5.9%	9.9%	8.9%	9.4%	7.6%	





Estimated Runoff Benefits (Current)

Average Additional Runoff (Natural flow)

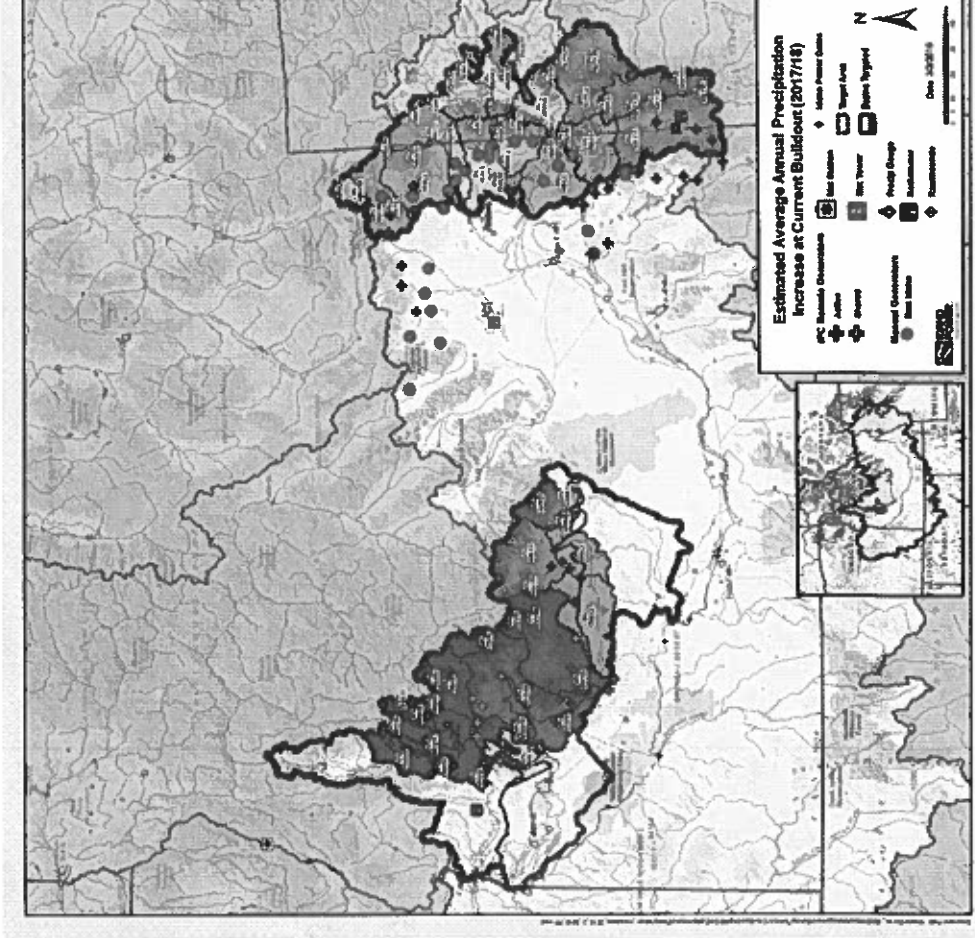
- Payette – 223 KAF
- Boise – 273 KAF
- Wood – 112 KAF
- Upper Snake – 632 KAF

Abv Palisades – 464 KAF
Henry's Fork – 168 KAF

Total – 1,240 KAF

Cost of Additional Water

~\$3.20/AF





Extra Area Effects

- Other Names
 - Down Wind Effects
 - Down Range Effects
- One of the most commonly asked question about cloud seeding;
 - “Does increasing precipitation in a particular area decrease the amount of precipitation down range?”
 - This is the “Rob Peter to pay Paul” scenario.
- Research on the subject has shown there are neutral or positive effects (more precipitation) from a well run program



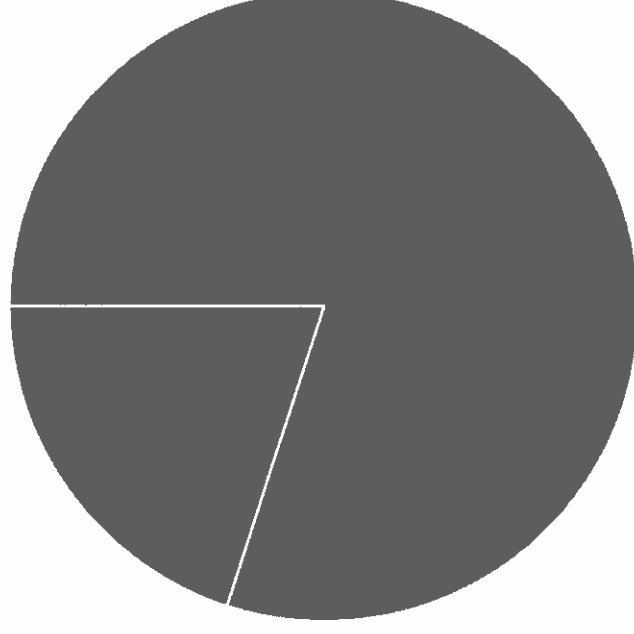
Extra Area Effects

- Solak et al. (2003) used a target/control regression approach and concluded positive benefits up to 200 km down range of the target area in central and southern Utah. He also concluded that the apparent limit to extra area increases was about 160 – 200 km.
 - North American Weather Consultants expanded this work and concluded that there was a:
 - 14% in the target area
 - 14% increase 0-120 km east of the target area
 - 5% increase 120-240 km east of the target area

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).

Atmospheric Water Budget



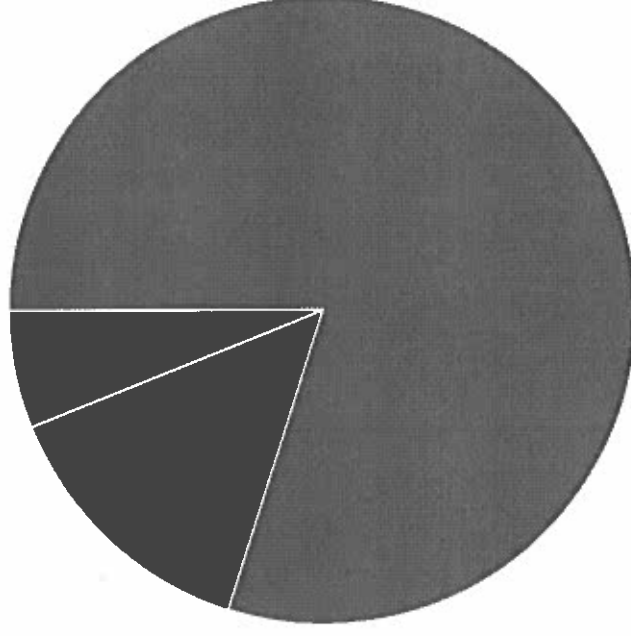
- Uncondensed Water Vapor
- Condensed into Cloud



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.

Atmospheric Water Budget



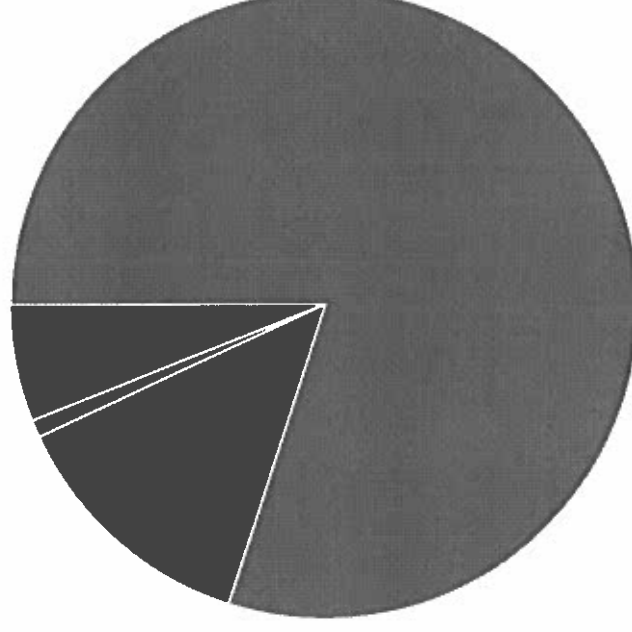
■ Uncondensed Water Vapor ■ Condensed into Cloud
■ Precipitation



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





Environmental Safety of Silver Iodide

- The WMA has issued a statement on toxicity of silver originating from cloud seeding...
[EnvironmentalImpact.pdf \(weathermod.org\)](#)
- “The published scientific literature clearly shows **no environmentally harmful effects arising from cloud seeding with silver iodide aerosols have been observed; nor would they be expected to occur. Based on this work, the WMA finds that silver iodide is environmentally safe as it is currently being dispensed during cloud seeding programs.**”
- Australia’s Natural Resource Commission’s review of Snow Hydro’s seeded watershed resulted in no evidence of adverse environmental impact.
<https://www.nrc.nsw.gov.au/accordion-content-main/publications-cloud-seeding>
 - “Our review of Snowy Hydro’s analysis of data from its environmental monitoring over the first phase of the trial (2004 to 2009) found that it provides **no evidence that the trial has had adverse environmental impacts over this period.** The analysis provides **no evidence of accumulation of silver iodide or indium trioxide in sampled soils, sediment, potable water or moss in the areas being tested.** It also provides no evidence of impacts on mountain riverine ecosystems or snow habitats. In addition, it detected no difference between the concentrations of ammonia and nitrogen oxides in seeded and unseeded snow.”
- Other Technical Documents:
 - [Publications \(weathermod.org\)](#)



Environmental Safety

More than 20 comprehensive studies and data reviews of the environmental affect of the use of silver iodide for cloud seeding all concur that there is ***no evidence for adverse effects to human health or the environment*** from the use of silver iodide for cloud seeding.

- PG&E EA – 1995, 2006
- Snowy Hydro – 2004-2014, ongoing
- Williams and Denholm – 2009
- USBR Project SkyWater – 1977, 2009, 2013
- Cardno/Entrix Geochemistry and Impacts of Silver Iodide Use in Cloud Seeding (for PG&E) – 2011
- Santa Barbara County CEQA – 2013
- BSU and Heritage Environmental: Literature Review – 2015
- Sacramento Municipal Utility District – 2017
- State of Wyoming Level III Feasibility Study Laramie Range Siting and Design Final Report – 2017
- Placer County Water Agency CEQA – 2018



IDEQ Review

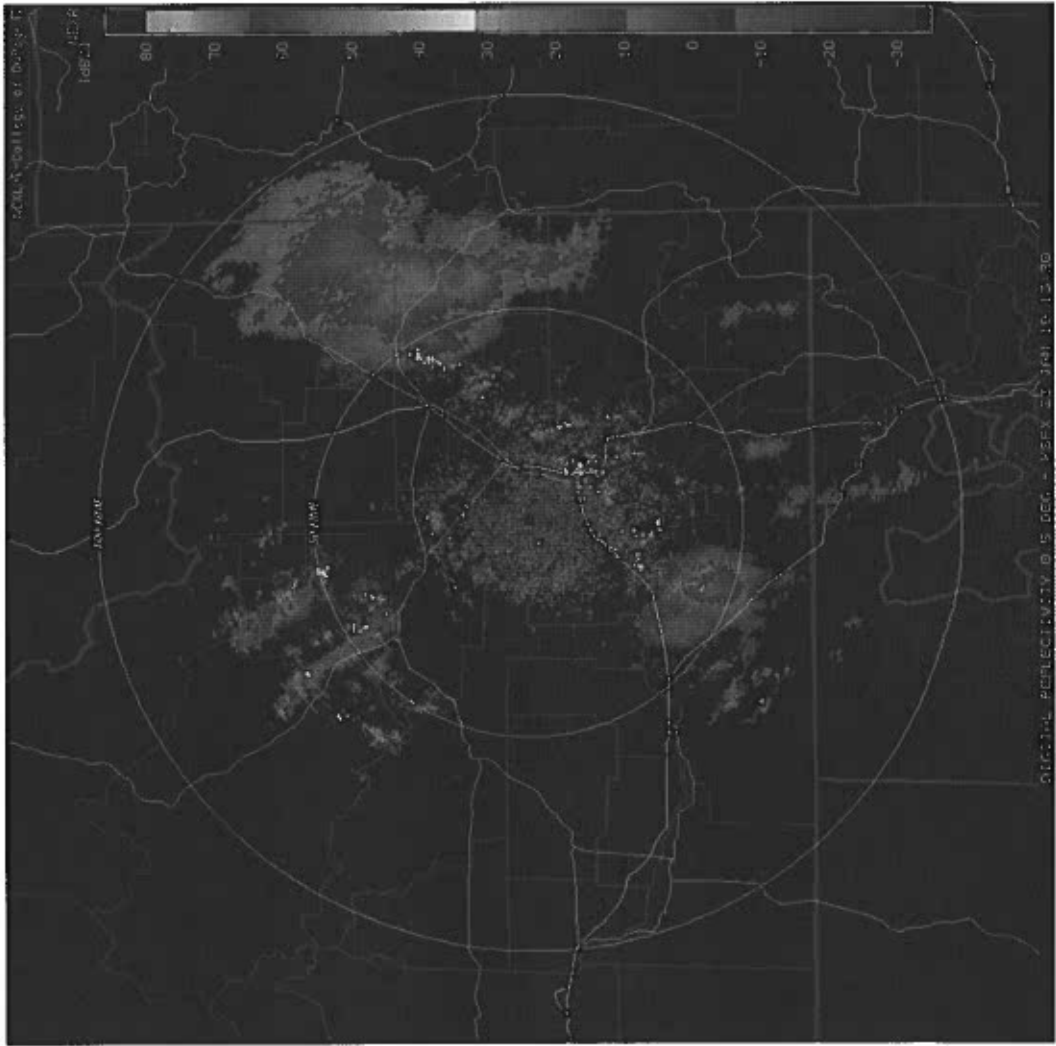
- IDEQ reviewed cloud seeding with respect to water and air quality.
- Water quality - DEQ determined it is **unlikely that cloud seeding will cause a detectable increase in silver concentrations in target area** or pose a chronic effect to sensitive aquatic organisms.
- Air quality permit not needed based on screening thresholds.
- http://www.idwr.idaho.gov/waterboard/WaterPlanning/CAMP/ESPA/WorkingGroups/PDF/WM//2010/02-09-10_MtgPresent.pdf



Flooding

- Cloud seeding has raised concerns about flooding from early on
 - Rain-on-snow
 - Excessive snowpack
- Well-designed and responsibly conducted programs include suspension criteria
- Suspension criteria was part of Idaho Power's original proposal to the IPUC
- Suspension criteria are reviewed and updated.
 - Ex. Suspension criteria for the Upper Snake were modified to incorporate reservoir conditions.

Pocatello NWS Radar





Questions?

