

**Snowpack Augmentation for Water Supply Enhancement Summary Recommendations – Long-term
Water Augmentation Committee**

Chuck Cullom (CAWCD)

August 18 2020

Snowpack augmentation through ground-based cloud seeding has been deployed across the western United States for more than 50 years to enhance water supply, hydropower generation, forest health, and recreation.ⁱ Current research demonstrates that appropriately deployed ground-based cloud seeding can increase precipitation in winter orographic storm systems.ⁱⁱ While the quantification of the translation of increased precipitation into enhanced streamflow has a significant degree of uncertainty, current research suggests potential increases range 5 to 15%.^{iii iv}

The application of snowpack augmentation in northern Arizona provides an opportunity to augment water supplies in watersheds with headwaters above 8,000' in elevation and consistent winter orographic storms. These watersheds include: the Verde, Salt, and Little Colorado River watersheds. The most likely target locations for snowpack augmentation in these watersheds are located on federal and states lands. The implementation steps to develop snowpack augmentation programs in Arizona may likely include the following:

- Siting studies to identify the most suitable target locations for snowpack augmentation.
- Review by ADWR of the suitability of existing permitting and regulatory oversight of winter cloud seeding operations.
- Development partnerships to fund and implement snowpack augmentation projects among key stakeholders likely to include: downstream water users, land managers, hydropower generators, and regulators.

ⁱ The North American Weather Modification Council provides summaries of the history, purposes, and research regarding weather modification efforts in North America. <http://www.nawmc.org/>

ⁱⁱ Precipitation from orographic cloud seeding: French and others, January 22, 2018:
<https://www.pnas.org/content/115/6/1168>

ⁱⁱⁱ Quantifying snowfall from orographic cloud seeding: Friedrich and others, February 24, 2020:
<https://www.pnas.org/content/117/10/5190>

^{iv} Rasmussen and others 2018: <https://journals.ametsoc.org/jamc/article/57/11/2639/21626/Evaluation-of-the-Wyoming-Weather-Modification>