



**COLORADO**  
Colorado Water  
Conservation Board  
Department of Natural Resources

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**TO:** Colorado Water Conservation Board Members

**FROM:** Joe Busto, Weather Modification Program Coordinator,  
Watershed Protection and Flood Mitigation Section

**DATE:** November 18-19, 2015 Board Meeting

**AGENDA ITEM:** 18d. Non-Reimbursable Project Investments “En-Bloc” approval  
Weather Modification Permitting

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### Introduction

The CWCB has had grants for winter cloud seeding since 2004. Colorado River downstream water users have been matching CWCB funding since 2007. To date the CWCB has provided \$1.5M and the Lower Basin has provided \$1.5. Weather modification is one of the three legs of the stool for the Colorado River drought contingency plan along with extended reservoir operations and demand management.

The CWCB WM budget has been \$175,000 for the last seven years. Staff is requesting this funding for grants to operations, new equipment, and help with evaluations and studies as directed by the 2012 Weather Modification Rules and Regulations. The Lower Basin matches the CWCB dollar for dollar. The most important part of this work is that the Idaho Power Company and the Desert Research Institute have agreed to help Colorado grow and develop as well as import state of the art equipment.

The CWCB has helped by bringing in remote machines to Winter Park, the Grand Mesa, and near Mesa Verde. However, there are still 105 low elevation generators in operation. Modeling studies are suggested in the 2012 DNR Weather Modification Rules to evaluate program design. One was completed for the Front Range Water Council program. There is a scientific means to retire machines, import newer machines, and focus on areas with high cloud seeding potential. This funding has been matched with other funding with support from the new DNR rules to do modeling and climatology studies to differentiate where cloud seeding generators are well or poorly sited.

### Staff Recommendation

Staff recommends the Board request the General Assembly to authorize \$175,000 from the Construction Fund to be appropriated to the Department of Natural Resources for allocation to the CWCB for the Weather Modification Program.



The CWCB has had grants since 2004. Water Manager sponsored programs were developed after the drought of early 2000s. State-to-state agreements were signed in 2007 to provide grants. Each year the CWCB distributes grants from the CWCB, New Mexico Interstate Stream Commission, Southern Nevada Water Authority, Central Arizona WCD, and California Six Agency Committee and reports on the expenditures. The CWCB funding gives staff leverage to match the pledged support of the Lower Basin dollar for dollar. The goals are to remake Colorado's programs and deploy state of the art and industry standard equipment. This will make our programs better.

At right is the Idaho Power ice nuclei generator design. It has been 17 years in development and is considered the best design in the field. They have agreed to help us at the CWCB and provide these machines for our program. Also pictured at right is a white remote sensing unit called a radiometer. It takes vertical columns of atmospheric information that is similar to a weather balloon launch but with continuous data every seven minutes. Several cloud seeding programs in other states have purchased one of more of these to remove the guess work and stop seeding the whole storm system so they can focus on wetter cloud conditions. They will save lots of money by not wasting silver and confining operations to periods of abundant liquid water.

Typically each year about \$1M is spent on cloud seeding with \$175,000 or 18% from the CWCB and \$175,000 or 17% from the Lower Basin and New

Mexico. The work of CWCB providing grant and technical assistance and equipment upgrades is a part of the augmentation goals of the Colorado River Seven Basin states and has been ongoing since 2007.

Plans for winter 2015-16 include a plume dispersion modeling study in the Central Mountains Program to try and discern which generators are well sited or not and where to put new remote generators at higher elevations. Desert Research Institute will operate remote operated generators at Winter Park, and a DRI remote generator at Telluride, and near Mancos, Colorado will be operated by the local contract Western Weather Consultants. The radiometer that is being leased to own by the CWCB will be at Gunnison all winter. Also two new Idaho Power remotes are being imported and tested by the City of Grand Junction that was funded as a mix of BRT, CWCB, and Lower Basin funding. The rest of the funding is grants to the traditional contractor run programs.

Pictured at right is a top view and cross section of particle dispersion modeling. When coupled to a weather model it can faithfully represent the seeding process and help us evaluate the existing program designs and refine their designs for increased efficiency. This is suggested in the new WM rules meant to empower local sponsors to seek "independent" evaluations of their programs.

#### PROJECT DETAILS

|                      |                        |
|----------------------|------------------------|
| Project Cost:        | \$1M+ annually         |
| NRI Funding Request: | \$175,000              |
| Funding Source:      | Construction Fund      |
| Project Type:        | Grants, Equip. & Evals |
| Type of Grantee:     | Grants to Sponsors     |

#### LOCATION

|                 |                          |
|-----------------|--------------------------|
| Benefits:       | Statewide                |
| Water Source:   | Various                  |
| Drainage Basin: | Colorado, Gunnison, & SW |

