

STATE OF COLORADO

Colorado Water Conservation Board Department of Natural Resources

1313 Sherman Street, Room 721
Denver, Colorado 80203
Phone: (303) 866-3441
Fax: (303) 866-4474
www.cwcb.state.co.us



John W. Hickenlooper
Governor

Mike King
DNR Executive Director

Jennifer L. Gimbel
CWCB Director

TO: Colorado Water Conservation Board Members

FROM: Joe Busto, Weather Modification Program Coordinator

DATE: November 4, 2011

SUBJECT: **Agenda Item 17b, November 15-16, 2011 Board Meeting**
Non-Reimbursable Investments – CWCB
Weather Modification Program –Water User Cost Share Assistance

Introduction

The CWCB has operated the states weather modification permitting program since 1987. The primary state authorities are permits for accurate information and ongoing monitoring of criteria for curtailment. In 2004 grants were developed by staff at the request of water users that were sponsoring permits to augment water supplies. In 2007 agreements were signed with downstream states of the Colorado River for more funding. In 2008 the CWCB adopted a strategic plan that was a mix of grants, new equipment, and studies.

Discussion

The previous six winters \$2.7M (63%) was spent on winter cloud seeding by ski areas and local agencies, \$810,000 by the CWCB (19%), and \$799,300 (18%) by the downstream water users. The request to the CWCB Members is for \$175,000 and has been the same for the three previous years. The new request to downstream water users is being developed and will be approximately \$167,000. This combined state and regional funding has led to several new specialized weather stations to guide seeding decisions and evaluate the efficacy and new high output machines at Winter Park, the Grand Mesa and Mancos Mountain in the San Juan Mountains that dispense four times the traditional rate of solution. Funding also extends the months programs operate as typically local funds can purchase about two to three months of seeding time. There are about 105 ice nuclei generators spread around the state. Grants are dispersed to benefit, the Gunnison, Southwestern, Grand Mesa, and the Upper Colorado River basin. Very recently led by Denver Water the Front Range Water Council developed a collaboration of seven water providers and four ski areas along the I-70 corridor for the upcoming winter 2011-12. It is staff's opinion that CWCB and Lower Basin funding creates local interest. Denver Water requested \$40,000 each from the Lower Basin and CWCB and their new total program should be about \$232,000 total.

At the Grand Mesa program: there is a new meteorologist, Grand Junction Water Treatment Plant staff operate cloud seeding machines remotely from a computer, and there is new interest from Powderhorn

Ski area based on this retooled and well managed program. Alcoholized propane seeding on the Grand Mesa is a newer technology in Colorado that opens the window for seeding by working at warmer cloud temperatures and not involving the expense of silver solution that has recently doubled. Staff believes that the modernization efforts of the CWCB and higher level collaboration are coming to fruition leading and will lead to more confident and credible programs. Former board member Don Schwindt requested that staff facilitate a dialogue between water users and ski areas and that seems to be developing nicely.

Staff Recommendation

Staff recommends that the Board request that the General Assembly authorize \$175,000 from the Construction Fund to be appropriated to the Colorado Water Conservation Board for the CWCB Weather Modification Permitting Program.

Water Project Construction Program - Project Data

Non-Reimbursable Investment

Grantee: Colorado Water Conservation Board **County:** Statewide

Project Name: Weather Modification - Water User Cost Share Assistance

Project Type: Grants for operations, grants for optimization of permitted cloud seeding programs

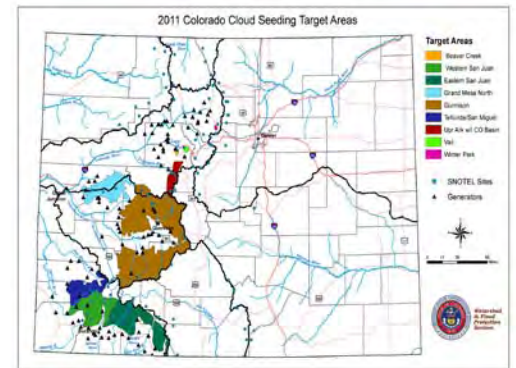
Drainage Basin: San Juan, Gunnison, Colorado **Water Source:** N/A

Total Project Cost: \$850,000 (Annual Total Avg.) **Funding Source:** CWCB Const. Fund

Type of Grantee: Local Governments/Water Districts **CWCB Non-Reimbursable Inv.:** \$175,000

SUMMARY

The CWCB has been permitting weather modification programs since 1972. Drought and water supply issues have led to more wintertime cloud seeding programs to address snowpack, water supply and stream low issues. There are currently active programs at: Vail/Beaver Creek Ski Area, Denver Water & Winter Park, Gunnison River Basin, Telluride, Western San Juan Mountains and Eastern San Juan Mountains. The CWCB also enforces criteria set on avalanche hazard levels at mountain passes and thresholds on snow water equivalent measured at the 110 NRCS SNOTEL sites in Colorado. The map shows cloud seeding ice nuclei generators as black triangles and the targeted areas as colored shapes.



The CWCB has had grants since 2004. Agreements were signed with water users in Arizona, Nevada, and California in 2007 for additional grants to local winter cloud seeding programs. The provisions of these agreements are that more water benefits the system, the water generated is non assignable and non attributable and is system water subject to water rights, and compacts. Collectively these entities are known as the Lower Basin. The Lower Basin agreement has no expiration date but annual exhibits signed by Director Gimbel sign funding and activities into action each year. A similar agreement was signed with the State of New Mexico. Since 2006 approximately \$2.7M has been spent by local entities in Colorado (ski areas, water districts), \$810,000 by state entities through the CWCB, and \$718,000 by out-of-state water agencies.

The focus of the CWCB staff was outlined in a 2008 Board Member approved strategic plan as a balance of grants to operations, assistance with modern equipment, and evaluations. The CWCB funding has done much to help develop Colorado's programs. Examples are: a Liquid (alcoholized) propane seeding unit on the Grand Mesa which works at warmer temperatures than silver thus expanding the window of opportunity for seeded events and two Colorado owned and operated remote control high output AgI Ice nuclei generators on Mancos Mountain in the San Juan Mountains and another one above the Cedaredge Water Treatment Plant. Both of those machines average 27grams of Silver Iodide output per hour and traditional Colorado machines average 6 grams/hour making them over four times more effective at releasing the material. The other benefit of these machines is they are not manual operated and with cell comms. can be placed at high elevations increasing the effectiveness of getting material in cloud. The goal is to get 2/3 up the mountain crest and use lower level steering winds to ramp material up into cloud base for more effective cloud seeding. Evaluations have shown that seeding material can be trapped when sited in mountain valleys. The funding also developed specialized weather stations with icing sensors that guide seed and no seed decisions and are used in evaluations on: the Grand Mesa, Winter Park, Purgatory, and Telluride Ski Resort is schedule for fall 2011. Three research grade precipitation gauges were purchased and will be deployed at Purgatory, Telluride, and the Grand Mesa. These precipitation gauges are useful by detecting precise snowfall rates during seeded and non seeded snowfall events.

Recent Developments

On August 2nd Denver Water put together a broad based partnership that is a multi-year \$300K/year cloud seeding program that involves the Front Range Water Council members, Keystone, Breckenridge, Arapahoe Basin, and Winter Park and they are hoping for assistance from the Lower Basin and the CWCB. The sustained CWCB and Lower Basin funding and modern methods were appealing and led to the Denver Water initiative in the Upper Colorado River Basin.