STATE OF COLORADO

Colorado Water Conservation Board
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TO: Colorado Water Conservation Board Members

FROM: Joe Busto
Watershed Protection and Flood Mitigation Section

DATE: November 5, 2012

SUBJECT: **Agenda Item 16b, November 13-14, 2012 Board Meeting**
Finance – Construction Fund En-Bloc Non-Reimbursable Investment
Weather Modification Water User Cost Share Assistance

Introduction and Discussion

The CWCB has administered weather modification grants since 2004. This amount has been set at $175,000 for the last four years. In 2007, the CWCB signed formal agreements with water users in downstream states of Arizona, Nevada, and California to provide additional grants and technical assistance. The funding has been approximately $1M CWCB and $1M from three of the downstream states for the last six years. The cost share break down is approximately 60% local funds with 20% from the CWCB and 20% from the downstream states. This has been a successful and popular CWCB program that has deployed new cloud seeding equipment for both cloud seeding and evaluations and has lengthened the time that programs operate each year. Based on review by the CWCB Director and Staff Section Chiefs, the recommended funding level for this request was left at $175,000.

Staff Recommendation

Staff recommends that 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 Board for grants and technical assistance to water users and their fiscal agents for locally sponsored wintertime weather modification programs.

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**: Atmosphere

Total Project Cost: $1.25M est. winter 2012-13 **Funding Source**: CWCB Const. Fund

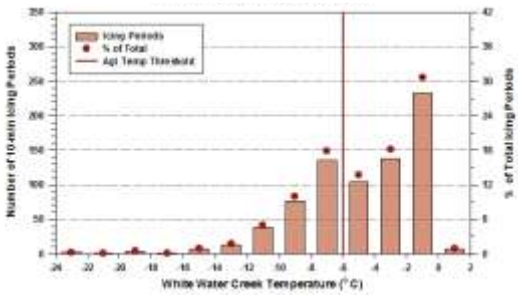
Type of Grantee: Water Districts/Fiscal Agents **CWCB Non-Reimbursable Inv.:** $175,000

SUMMARY

CWCB has had grants since 2004 requested by water users. Severalpermits developed after the 2002 drought and have grown. Regional drought at Lake Powell and Meade led to cooperative agreements and funding from Water Users downstream known as the Lower Basin. These agreements support working together, resolving issues, and being proactive. Since 2007 the CWCB has received $1.15M in Grants from the Lower Basin and that is matching the CWCB funding about 1:1. This new funding and agreement has allowed established research agencies like the Desert Research Institute (DRI) in Nevada to help the CWCB help the Colorado locals. Two examples illustrate recent successes. In 2011 Denver Water led and effort for seven water providers and four ski areas to seed the Upper Colorado that now the CWCB and Lower Basin can partner with. And since 2011 the City of Grand Junction operates, orders and stocks solutions, and does light repairs of DRI built equipment for the Grand Mesa. With 40 total sponsors and renewed interest in seeding this program has been successful for the CWCB and the Colorado River Seven Basin States.

Newer warmer climate seeding in Colorado

At right is a Liquid Propane dispenser on the Grand Mesa that doesn't use Silver Iodide for seeding. This is helpful with warming climates. It can be turned on at zero degrees Celsius and Silver iodide is only active at minus six degrees Celsius and colder. In Utah these units have been programmed to be automated meaning they turn themselves off and off when conditions are warranted for seeding or not.



New & Upgraded Weather Stations in Colorado

The unit above is a seeding unit and is also a meteorological tower that archives icing rate and precipitation data on line to display and graph for annual reporting. This data lives on line and can be found by searching for Whitewater Creek weather station. The graph is from the Grand Mesa program annual report from 2012-13 and shows good propane seeding periods right of the red line and good silver seeding left of the red line. What is surprising is with the Grand Mesa at 10,000 feet it is possible sun and wind exposure limit the cold cloud conditions and Silver Iodide potential. More stations like this are needed in Colorado.

Newer Remotely Operated Silver Iodide Seeding in Colorado

Remote cloud seeding machines have been in Colorado since 2007 and are used almost exclusively in CA, ID, NV, and in WY. Two new sites on Denver Water land at 8960 elevation and the USFS Fraser Experimental forest at 9590 elevation effectively target the Winter Park. The 2012 DRI annual report documents use of 32 of 40 potential seeding events. Remotes get out of valley inversions where studies on the Grand Mesa and in Utah have shown seeding material can pool on the Valley floor and the distance to cloud doesn't help get high ice crystal concentrations needed for effective seeding. High elevation sites at or near low level winds use the terrain to ramp material into cloud base. They removes uncertainty in targeting. We have five remotes and 104 manual generators in Colorado. Several manual sites may be good sites and dispersion modeling can assist in answering those questions and refine our programs.