Colorado Water Conservation Board

FINANCE SUB-COMMITTEE MEETING
SEPTEMBER 26, 2012
BERTHOUD, COLORADO

NON-REIMBURSABLE INVESTMENTS

Colorado Water Conservation Board
Department of Natural Resources

2012

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

TO: Finance Sub-Committee
Colorado Water Conservation Board

FROM: Kirk Russell, P.E., Chief
Finance Section

DATE: September 14, 2012

SUBJECT: Agenda for Finance Sub-Committee Meeting on September 26, 2012

Attached for your review is the proposed agenda for the CWCB Finance Sub-Committee Meeting. The purpose of the meeting is to review all of the applications for non-reimbursable project investments from the Construction Fund to be considered for inclusion in the 2013 CWCB Projects Bill.

The Finance Sub-Committee Notebooks are delivered to you ahead of the Board Notebooks to assist in your review. These Notebooks are going to all Board members for their information. All Board members, as always, are welcome to attend and participate.

The meeting is open to the public. The staff Project Manager for each project will be present to give a short presentation and to answer any questions the Committee may have. The Committee will decide if a request needs to be heard again at the November Board meeting or if the item is acceptable to the Committee it can be recommended to the full Board en-bloc.

If you have any questions, please call me at 303-866-3441, ext. 3232. See you in Berthoud on the 26th at the meeting.

AGENDA

COLORADO WATER CONSERVATION BOARD

FINANCE SUB-COMMITTEE MEETING

1:00 pm – 3:30 pm, Thursday, September 26, 2012
Northern Colorado Water Conservancy District Offices
Berthoud, Colorado

1:00 – 1:10	Opening Comments and Review Agenda
1:10 – 1:40	Construction Fund Growth Rate – Policy 13
1:40 – 3:10	Non-Reimbursable Project Review
3:10 – 3:30	Impacts of Historic Low Loan Interest Rates
3:30	Adjourn Finance Sub-Committee

Colorado Water Conservation Board
September 26, 2012 Sub-Financial Committee

Review of Available Funds in the Construction Fund for FY12/13

			Projected Gains			
Projected Equity Gained						
	Interest Earnings - Treasury		$ 1,600,000			
	Interest Earnings - Loans		$ 6,500,000			
	Federal Mineral Lease Income		$ 15,200,000			
		Total	**$ 23,300,000**			
	Construction Fund Target Growth @ **3.71%**		$364,200,000 x .0371 =	**$ 13,511,820**		
	Available for Operations and Non-Reimbursable Project Investments					**$ 9,788,180**
Projected Equity Reduction to the Construction Fund						
	CWCB Operations				$ 7,200,000	
	Automatically Refreshed Funds / Accounts per Statute					
	Wild and Scenic Fund	Up to	$ 400,000			
	In-Stream Flow Acquisitions	Up to	$ 1,000,000			
	Stream Gauge Fund	Up to	$ 250,000			
	Colorado Water Education Foundation - Annual Support *		$ 150,000			
			Refreshed Subtotal =		$ 1,800,000	
		Total			**$ 9,000,000**	
	Available for 2013 Projects Bill - Non-Reimbursable Project Investments			**=**		**$ 788,180**

Non-Reimbursable Investment Applications

	For Consideration by Finance Committee for 2013 CWCB Projects Bill		**Benefit**	**Req Amount**		**Staff Recommended**
1	DWR - Jeff Baessler	Satellite Monitoring System Maintenance	Statewide	$ 300,000		$ 300,000
2	CWCB - Joe Busto	Weather Modification Permitting	Statewide	$ 175,000		$ 175,000
3	CWCB - Thuy Patton	Colorado Floodplain Map Modernization	Statewide	$ 500,000	Up To $500K	$ 500,000
4	CWCB - Chris Sturm	Colorado Watershed Restoration Program	Statewide	$ 250,000	($500K in 2012)	$ 250,000
5	CWCB - Kevin Houck	Flood & Drought Response Fund - Refreshed	Statewide	$ 300,000	Up To $300K	$ 300,000
6	CWCB - Joe Busto	Rio Grande Water Supply Forecasting Development Proj	Rio Basin	$ 215,000		$ 215,000
7	CWCB - Ray Alvarado	CDSS Operations and Maintenance	Statewide	$ 150,000		$ 100,000
8	CWCB - Ted Kowalski	Colorado River Basin Study Implementation	Colo Basin	$ 150,000		$ 75,000
9	CWCB - Andy Moore	Arkansas River Decision Support System	Ark Basin	$ 500,000		$ 250,000
						$ 2,165,000
	2013 Projects Bill Requested Non-Reimbursable Investments					**$ 2,165,000**

Footnotes:

* HB 02-1152 provided that the Colorado Water Education Foundation is annually refreshed for $150,000 with Board member approval.

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TO: Colorado Water Conservation Board
Finance Committee

FROM: Jeff Baessler, Stream and Lake Protection Section
Tom Ley, Division of Water Resources State Hydrographer

DATE: September 14, 2012

SUBJECT: **Non-Reimbursable Investment Item #1**
Satellite Linked Monitoring System and Stream Gage Refurbishment Program.

Introduction

The Division of Water Resources (DWR) has requested an appropriation of $300,000 for the continued operational viability of the state Satellite-linked Monitoring System (SMS) and Stream Gage Refurbishment Program. Each year, funding for this program has been reviewed and approved by both the Finance Committee and the Board. It has been recognized that it is critical for both the State's water planning and water administrative agencies to support and maintain state-of-art stream gaging programs and continue to provide accurate water resources data to support multi-agency and water user needs. The DWR Satellite-linked Monitoring program is outlined in §37-60-121 and §37-80-102 C.R.S.

Staff Recommendation

Staff recommends that the Board request the General Assembly to authorize $300,000 from the Construction Fund to be appropriated to the Department of Natural Resources for allocation to Division of Water Resources (DWR) to enhance, renovate, and replace the Data Collection Platforms in the existing satellite monitoring system and to refurbish existing stream gages.

Discussion

The $300,000 request for FY 2013-2014 will support the continued, long-term operational viability of over 520 satellite-linked water resources monitoring sites. These funds will be allocated as follows:

1. $245,000 for replacement of out-dated Data Collection Platforms (DCP) and associated satellite telemetry equipment and upgrading of satellite transmission components. Replacement of out of date DCPs is required to accommodate technology upgrades and

changes which are mandated by NOAA, the Federal Agency managing the GOES satellite resource.

2. $55,000 for refurbishing existing stream gages as needed to maintain operational reliability of stream flow data collection. This is a recurring annual request to cover refurbishment and repair costs which arise due to deterioration of the physical stream gage infrastructure.

The requested funding amount of $300,000 remains unchanged from the 2012-2013 appropriation and will be sufficient to maintain the operational viability of the system during 2013-2014. (Further details of the DWR Satellite Monitoring System funding request are explained in the attached memo from Scott Cuthbertson to Jennifer Gimbel dated August 1, 2012).

Attachment

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF WATER RESOURCES

John W. Hickenlooper
Governor

Mike King
Executive Director

Dick Wolfe, P.E.
Director/State Engineer

MEMORANDUM

To: Jennifer Gimbel**,** Director, Colorado Water Conservation Board

From: Scott Cuthbertson, Deputy State Engineer-- Public Safety

Cc: Tom Ley, Jeff Baessler

Date: August 1, 2012

RE: Division of Water Resources Satellite-linked Monitoring System and Stream Gage Refurbishment Funding Request for FY2013-14

Summary

The Colorado Division of Water Resources (DWR) requests a total of $300,000 from the CWCB Construction Fund for FY2013-14. The requested funds will support the continued, long-term operational viability of over 520 satellite-linked water resources monitoring sites, including replacement of out-dated data collection platforms and satellite telemetry transmission components and refurbishment/renovation of gaging stations. The specific distribution of the funds requested is as follows:

1. The sum of $245,000 will be used to replace out-dated Data Collection Platforms (DCP) and associated satellite telemetry equipment and upgrading satellite transmission components. The replacement of out of date DCPs is required to accommodate technology changes and upgrades mandated by NOAA, the Federal Agency that manages the GOES satellite resource.

2. The remainder of $55,000 will refurbish existing stream gages as needed to maintain operational reliability of stream flow data collection. This is a recurring annual request to cover refurbishment and repair costs which arise due to deterioration of the physical stream gage infrastructure.

Introduction

The Division of Water Resources and CWCB, consistent with Section 37-60-121 and Section 37-80-102 C.R.S., maintain the stream gaging program to support multi-agency and water user needs such as water rights administration, compact protection, flood forecasting and warning and Decision Support System implementation and use. DWR must maintain the electronics in satellite-linked data collection stations; refurbish gage station infrastructure and non-electronic hardware for stations that are deteriorating; refurbish/replace cableways used for high flow measurements or implement alternate means of high flow measurement (for subsequent calibration of the upper end of stage-discharge

relationships) and continue, as necessary, the operation of vital gages which are currently operated by the United States Geological Survey (USGS). The current request is part of a continuing annual request for funds to support this program.

Background

The Satellite-linked Monitoring System (SMS) has been operating since 1985, starting with 82 linked gaging stations. As the need for the data has increased, the SMS has expanded. Since inception, in excess of 8 million dollars has been invested in the development of the SMS infrastructure. Currently, DWR operates and maintains over 520 data collection platforms (DCPs) on rivers, streams, reservoirs, ditches and canals to collect and transmit basic stream flow and water elevation data to support the Division's primary mission of water rights and compact administration. Additional benefits of the system include flow alerts based on parameter thresholds, such as: low flow alerts in support of CWCB ISF programs; high flow alerts in support of flood protection decision making and flood warning; and, rate of change alerts below dams and reservoirs. Collectively, these platforms and the computer equipment in Denver are the Satellite-linked Monitoring System (SMS). The USGS and other entities operate an additional 300+ sites in Colorado. The USGS and DWR are working to improve data availability and reduce duplication through improved gaging station effectiveness. The SMS provides basic water flow data to the staffs of the Division of Water Resources and Colorado Water Conservation Board and many public and private entities, such as: the Cities of Colorado Springs and Aurora, the Denver Water Board, the Arkansas River Compact Commission, Emergency Coordinators for most Colorado counties, water rights owners, recreationists such as fishermen and rafters, and conservation groups. Many programs of the DWR, such as various river operations analysis spreadsheets used in each of the seven DWR Division offices for water administration, and the DWR Safety of Dams Program rely upon the real-time data acquired through the SMS. Water resources accounting programs utilizing the SMS include the Dolores Project, the Colorado-Big Thompson Project and the Fryingpan-Arkansas River Project. CWCB programs, such as Stream and Lake Protection, Flood Protection and Water Supply Protection also utilize the real-time data.

FY2013-14 Funding Request

Replacement of Satellite Telemetry Equipment. For FY2013-14, the DWR request for the replacement of out-dated DCPs and upgrade of associated satellite telemetry equipment is $245,000. The request in this category of funding is level and the same as FY's 11-12 and 12-13.

The National Oceanic and Atmospheric Administration (NOAA) operates the GOES satellite by which stream stage and water body surface elevation data are telemetered from remote sites to the central computer in Denver. The use of this satellite and all the ancillary hardware and software, including staffing, is valued at over $500 million dollars. The State of Colorado has been able to utilize this system at no charge. By 2001, the use of the GOES satellite system had increased to the point where demand had begun to exceed satellite channel capacity. NOAA, therefore, mandated that all DCPs using the GOES satellites for data transmission must be upgraded by May 31, 2013 to transmit data at 300 baud as compared to 100 baud rate of first generation DCPs. DWR has completed the upgrade to high data rate of all DCPs it owns and operates on the satellite monitoring system. DWR is actively engaging entities that own, and are responsible for the few remaining DCPs on the network needing this upgrade, to complete their upgrades by the 2013 deadline. An important benefit of the high data rate upgrade program has been the more frequent (from once per four hours to once per hour) transmission of data from remote sites to the central computer. This has resulted in near 'real-time' data on the system.

NOAA, through the Satellite Telemetry Interagency Working Group (of which the State of Colorado is a non-voting member) continues to explore means of increasing the capacity of the GOES satellite system. The next technology upgrade is implementation of the narrow band transmission protocol, which was initiated in Spring 2012. This improvement will cut the band width of each telemetry assignment from 300 kHz to 150 kHz, effectively doubling the satellite transmission capacity. Most GOES transmitter manufacturers have agreed this will be a firmware upgrade to their equipment. However, platforms deployed in the field will need to be replaced. Those platforms that are compatible with narrow band protocol will then be brought back to the electronics lab, have their firmware upgraded and then be subjected to a benchtop certification test protocol. Many early high data rate DCPs procured and installed by DWR beginning in 2001 are not compatible with the narrow band protocol and will need to be replaced. Records show that 139 of these

units were purchased and installed. These DCPs are approaching their useful life of 10 years and are scheduled for replacement because of age. A number of these early high data rate DCPs have failed and have already been replaced.

Useful DCP life is sometimes shorter in the humid and/or harsh cold environments in which the equipment is housed. In order to continue using the present system to collect and transmit basic stream flow and water body elevation data, DWR projects that electronic equipment will be replaced, on average, every 10 years. DWR owns about 480 total sets of electronic (DCP and stage sensor) equipment out of the 520+ gages it operates. With an average life of 10 years, we project 45-50 replacements per year. At current equipment costs, the cost of DCP replacement with newest generation GOES transceivers, as well as replacement of gage height sensors ranges from $3750 to $6000 per gage, depending on the type of gage height sensor needed (shaft encoder, constant flow bubbler or radar sensor). Total annual projected equipment costs are $195,000. The life of antennas, batteries, solar panels, wiring, and grounding equipment varies considerably. We currently project an average annual expense of this equipment is approximately $25,000. Travel (vehicle mileage, per diem, etc.) and overtime support for the DWR Electronics Specialist IV to perform this work around the State is projected at $30,000. Total annual cost (at current prices) is $250,000.

Refurbishment of Existing Stream Gages. DWR requests $55,000 for refurbishing existing stream gages in FY2013-14. The request in this category of funding is level and the same as FY's 11-12 and 12-13. Approximately 60% of Colorado's satellite-linked gaging stations are located in the rivers and streams of the state. The others are located in reservoirs, ditches, and canals. Gaging station physical infrastructure (shelters, stream controls, independent reference gages, etc.) must be properly maintained and periodically refurbished in order to collect data of quality and high accuracy.

An important physical component of many DWR stream gages around the State is the ability to measure high flows so that the upper end of stage-discharge relationships can be improved and maintained to yield accurate high/flood flow data. High flow measurement capability varies from gage to gage. High flows at stream gages are measured from cableways near the gage or from nearby up- or downstream bridges. Cableways at DWR stream gages are given a detailed inspection each four years. Many cableways, primarily because of age, have been found to need replacement of key components of the cableway system. High flow measurement sustainability projects address such identified cableway design/safe use issues. These may include replacement of cable, improvements to the cable anchorage system, replacement of A-frame components, replacement of cable cars, etc. Costs can run from as little as $1000 per cableway to as much as $20,000 per cableway, depending on what components need replacement before a cableway can be returned to safe service. Alternatively, existing cableways found to have design or safe use deficiencies are, under certain site conditions, being replaced with bank-operated cableways. Costs of installing bank-operated cableways range from $6000 to $9000 per site. As current funding allows, we have been slowly addressing some of these needs. However, several larger manned cableway improvement projects need to be accomplished.

FY11-12 Accomplishments

The CWCB provided $300,000 in FY2011-12 for satellite telemetry equipment upgrade and replacement and stream gage refurbishment.

Satellite Telemetry Upgrade Program. Of the funds allocated, $245,000 were expended on the procurement and installation of new generation, high data rate, satellite-linked monitoring equipment and associated components. As discussed earlier, high data rate DCP upgrades have been completed at all DWR gage stations. The focus in FY12 was to continue replacing the earliest high data rate DCPs that were installed in 2001 and 2002, i.e., replace older 8210 and Satlink 1 DCPs with new Satlink2 DCPs. A total of 40 DCPs were upgraded.

Streamgage Refurbishment. An allocation of $55,000 along with carryover funds from the previous fiscal year were used on refurbishment of existing stream gages throughout the State. Refurbishment projects were completed at the stream gages listed in Table 1 in FY 2011-12.

Table 1. CO DWR Streamgage Refurbishment Projects, FY11-12.

Gage	Funds spent	Description
Div. I		
South Platte at Julesburg, Channel 1 and 2	$318.59	upgrade DCP installation, install 2 radar units
South Platte at Denver	$2,782.16	replace gage shelter roof, instrument shelf, floor
South Platte River nr Atwood	$514.18	install radar gage on bridge
South Platte River nr Masters	$208.09	paint shelter
South Platte River nr Weldona	$320.51	install radar gage on bridge
South Platte River nr Balzac	$43.86	CSI radar unit, mothball stilling well and intakes, riprap banks us and ds
Boulder Creek near Orodell	$10,640.93	procure/install bank-op cableway
South Boulder Creek near Eldorado Springs	$2,200.00	control repairs
Big Thompson River at Mouth nr LaSalle	$7,510.00	repairs to control at REW/LEW, bank stabilization/riprap at shelter and well
S. Platte nr Henderson/St Vrain Creek nr Lyons	$377.51	rent coring drill for vents, antenna masts
Mini excavator rental for channel work at three gages	$612.15	channel work at three gages
Div. II		
Arkansas River above Pueblo	$729.36	replace cable, clips, thimbles, backstays, repair car
Arkansas River above Pueblo Reservoir (new inflow loc)	$4,922.00	procure/install bank-op cableway
Huerfano River at Badito	$240.00	channel work
Lake Creek bel Twin Lakes	$4,922.00	procure/install bank-op cableway
Grape Creek near Westcliffe	$9,340.00	control repair at REW and on weir crest, riprap banks near shelter
Horse Creek at Hwy 194	$320.00	bank work and stabilization at control REW, clean out weir pool
Lake Creek above Twin Lakes	$5,140.60	riprap bank ds right side of control; clean channel above control
Arkansas River at Salida	$170.96	install CFB and outside gage
Orifice line for CFB projects	$227.35	
Div. III		
Kerber Creek nr Villa Grove	$311.85	clean gage pool, install OG, bank stabilization, OSG
Garner Creek nr Villa Grove	$36.82	R&R inlets
San Antonio River nr Manassa	$4,922.00	procure/install bank-op cableway
Trinchera Creek above Turner's Ranch	$362.55	install bank-operated cableway unit procured in FY11, OSG
Conejos River below Platoro Reservoir	$1,308.22	install CFB, construct drainage around shelter --CFB cost share?
Rio Grande River nr Del Norte	$5,463.88	outside staff gage/mass anchor, u bars, a-frameplace cable, sheaves, eyebolts
Carnero Creek/La Garita Creek nr La Garita	$207.96	outside staff gages--supplies and installation
Culebra Creek at San Luis	$196.00	plexiglass shield for antenna
Cherry Creek	$1,050.77	control work
Cottonwood Creek	$317.59	move gage shelter to old site,
North channel, Conejos R near LaSauses	$163.31	outside staff gage--supplies and installation
Div. IV		
Cow Creek near Ridgway Reservoir	$2,066.60	rock for us channel and bank work, boulder vanes
Surface Creek at Cedaredge	$4,599.84	refurbish control control; Big Ditch:clean out approach, wing wall work
Leroux Creek above Carl Smith Reservoir	$1,696.48	install stilling well and intake pipes
Uncompahgre River upstream of South Canal	$66.38	finish outside gage
Div. V		
Fryingpan River near Thomasville	$481.68	install bank-operated cableway (unit is on-hand)
Snowmass Creek	$455.87	new batteries/wiring
Orifice line for CFB projects	$227.35	
Roaring Fork above Fryingpan	$24.98	print cableway plans
Div. VI		
Michigan River at Walden	$205.79	install new temporary gage (CFB)
Talamantes Creek	$256.37	install shelter and SatMon eqmt
Div. VII		
Little Navajo River below Little Oso Diversion	$424.04	R&R shelter
Groundhog Reservoir and Outflow	$171.59	new gages: installation of SatMon eqmt
Total spent or encumbered	$76,558.15	

COLORADO WATER CONSERVATION BOARD

CONSTRUCTION FUND
NON-REIMBURSABLE PROJECT INVESTMENT APPLICATION

Satellite Linked Monitoring & Stream Gage Refurbishment Program

(Project Name)

Application Deadline: August 1 for funds available July 1 the following year.

Funding recommendations will be considered at the November CWCB Board Meeting.

Instructions: This application form should be emailed, typed, or printed neatly. You may attach additional sheets as necessary to fully answer any question, or to provide additional information that you feel would be helpful in evaluating this application. Include with your application a cover letter summarizing your request. If you have difficulty with any part of the application, contact Kirk Russell, PE, Finance Section Chief for assistance, at (303) 866-3441, ext. 3232 or email kirk.russell@state.co.us.

Generally, the applicant is also the prospective owner and sponsor of the proposed project. If this is not the case, contact CWCB before completing this application.

Part A. - Description of the Applicant (Project Sponsor or Owner);

1. Applicant Name(s): Colorado Water Conservation Board (CWCB) and Colorado Division of Water Resources (DWR)

Mailing address: 1313 Sherman Street, Room 721, Denver, CO 80203

Taxpayer ID#:

Email address: Jeffrey.baessler@state.co.us

Phone Numbers: Business: 303-866-3441 X3202

Home:

Fax: 303-866-3441 X3202

2. Person to contact regarding this application if different from above:

Name: Jeff Baessler

Position/Title: Deputy Section Chief, Stream and Lake Protection Section

Non-Reimbursable Project Investment Application - CWCB Construction Fund

Form Revised April 2010

3. Provide a brief description of your organization below:

CWCB and DNR are state water agencies under the Colorado Department of Natural Resources.

Part B. - Description of the Project or Study

1. Name of the study or project: Satellite-linked Monitoring System and Stream Gage Refurbishment

2. What is the purpose of this grant application? Check one.

	Study
	Demonstration project.
	Rehabilitation or replacement of existing
x	Other (Please describe)

The purpose is for the continued operation of the State Satellite Linked Monitoring System and refurbishment program.

3. General location of the study or demonstration project. (Please include county, and approximate distance and direction from the nearest town):

This is a statewide project

4. Please provide a brief narrative description of the proposed study or demonstration project including purpose, need, and service area. (Attach scope of study, if available)

This project supports the continued operational viability of the State Satellite Linked Monitoring System and Stream Gage Refurbishment Program

Non-Reimbursable Project Investment Application - CWCB Construction Fund

Form Revised April 2010

5. Explain why you are requesting a grant, instead of a loan. (the Construction Fund exists primarily to provide low interest loans for the construction or rehabilitation of raw water projects. Non-reimbursable investments are approved only when the project or study is of statewide interest and benefits a wide range of people and organizations, and/or a large geographical area.

This is a project of statewide importance

6. List the names and addresses of any technical or legal consultants retained to represent the applicant or to conduct investigations for the proposed project or study.

Name Address & Phone Number

7. List any feasibility study or scope of work that has been completed or is now in progress for the proposed project or study. (Submit one copy with this application):

Non-Reimbursable Project Investment Application - CWCB Construction Fund

Form Revised April 2010

8. What is the estimated cost of the study/demonstration project? Please include estimated Study, Planning, Engineering, and Construction costs, if known:

Estimated Planning/Study Costs:	
Estimated Engineering Costs:	
Estimated Construction Costs:	
Estimated Total Costs:	$ 300,000

9. **How much funding are you requesting?** $ 300,000

Part C. - Project Sponsor Financial Information

1. The CWCB Construction Fund is primarily a revolving loan fund. Non-reimbursable investments are approved only when the project or study is of statewide interest and benefits a wide range of people. Provide copies of the two most recent annual reports, financial statements, corporate reports or other current documentation of financial condition and operations with this application.

2. Provide a brief narrative description of potential sources of funding (in addition to the CWCB) which have been explored or which will be explored for the proposed project or study. (Examples would be Local County and Town Governments, Water Conservancy Districts, USDA Rural Development, The Natural Resources Conservation Service, The U.S. Environmental Protection Agency, Commercial Banks, etc.)

The above statements are true to the best of my knowledge:

Signature of Applicant: /s/

Print Applicant's Name: Tom Ley / Jeff Baessler

Project Title: Satellite-Linked Monitoring System and Stream Gage Refurbishment

Date: August 8, 2012

Return this application to:

Mr. Kirk Russell, P.E., Chief
Finance Section
COLORADO WATER CONSERVATION BOARD
1580 Logan Street, Suite 600
Denver, CO 80203

Submit applications by email to: kirk.russell@state.co.us or fax to (303) 894-2578
For questions call (303) 866-3441, ext. 3232

STATE OF COLORADO

Colorado Water Conservation Board
Department of Natural Resources
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Phone: (303) 866-3441
Fax: (303) 866-4474
www.cwcb.state.co.us

TO: Colorado Water Conservation Board Members

FROM: Joe Busto
Watershed Protection and Flood Mitigation Section

DATE: September 14, 2012

SUBJECT: **Non-Reimbursable Investment Item #2**
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

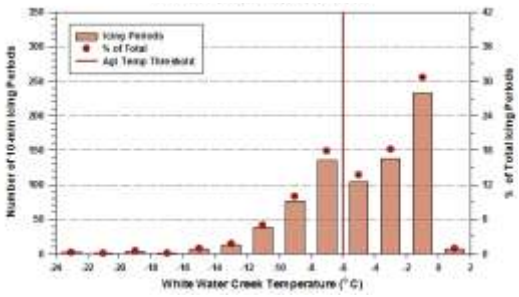
Type of Grantee: Water Districts/Fiscal Agents **CWCB Non-Reimbursable Inv.:** $175,000

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.

COLORADO WATER CONSERVATION BOARD

CONSTRUCTION FUND
NON-REIMBURSABLE PROJECT INVESTMENT APPLICATION

CWCB Weather Modification Program – Water User Cost Share Assistance

(Project Name)

Application Deadline: August 16 for funds available July 1 the following year.

Funding recommendations will be considered at the November CWCB Board Meeting.

Instructions: This application form should be emailed, typed, or printed neatly. You may attach additional sheets as necessary to fully answer any question, or to provide additional information that you feel would be helpful in evaluating this application. Include with your application a cover letter summarizing your request. If you have difficulty with any part of the application, contact Tim Feehan, PE, Finance Section Chief for assistance, at (303) 866-3441, ext. 3211 or email tim.feehan@state.co.us

Generally, the applicant is also the prospective owner and sponsor of the proposed project. If this is not the case, contact CWCB before completing this application.

Part A. - Description of the Applicant (Project Sponsor or Owner);

1. Applicant Name(s): Joe Busto

Mailing address: 1313 Sherman Street, Room 721
Denver, CO 80203

Taxpayer ID#:

Email address: Joe.busto@state.co.us

Phone Numbers: Business: 3-866-3441 ext.3209

Home: 303 587 5585

Fax:

2. Person to contact regarding this application if different from above:

Name: Kevin Houck

Position/Title: Section Chief, Watershed and Flood Mitigation

3. Provide a brief description of your organization below:

The CWCB was redelegated the responsbilty to operate a cloud seeding permitting program on July 1, 2012 and there are updated rules and regulations for this program. In addition since 2007 formal agreements were signed between Arizona, Nevada, and California to add grants to the CWCB grants program to extend operations, fund proposals for new equipment and evaluations. To date approximately $985,000 has been has been received by the CWCB from these downstream states to distribute to locally sponsored winter cloud seeding programs. Recently the FRWC developed the state's largest coalition with seven water providers and four ski areas working together in the Upper Colorado region on cloud seeding. The State of New Mexico through the NMISC has committed $15,000 in funding for winter 2012-13 and wants to renew a five year agreement.

rPart B. - Description of the Project or Study

1. Name of the study or project: CWCB Weather Modification Program – Water User Cost Share Assistance

2. What is the purpose of this grant application? Check one.

	Study
	Demonstration project.
	Rehabilitation or replacement of existing
X	Other (Please describe)

The funding is provided to local water boards and commissions, cities or counties that have a primary interest in cloud seeding for snowpack for more water supply. Funding is used for grants for operations, modernizing equipment, and studies and evaluations.

3. General location of the study or demonstration project. (Please include county, and approximate distance and direction from the nearest town):

There are active wintertime cloud seeding programs in southwestern Colorado, Gunnison Basin, the Grand Mesa, and the Upper Roaring Fork Basin. Denver Water has renewed their cloud seeding permit for the central Rocky Mountains that is centered near Green Mountain and Dillon Reservoir.

4. Please provide a brief narrative description of the proposed study or demonstration project including purpose, need, and service area. (Attach scope of study, if available)

The CWCB staff is focused on developing our cloud seeding programs. The CWCB and Lower Basin funding has been used to buy high resolution snow gauges deployed at Telluride, Grand Mesa, and Purgatory Ski Area. The precipation gauges can detect subtle difference from seeded and non seeded events for evaluations. Weather stations are at the Grand mesa, Witner Park, Purgatory and Telluride that have icing sensors to guide seed no seed decision and used for evaluations of the efficacy of the programs. New high output generators are at Cedaredge, Winter Park, and Mancos Mtn. that dispense four times the rate of Silver Iodide (AgI) of typical Colorado machines. CWCB funding has helped all wintertime programs and they are in the Upper Colorado, Upper Gunnison, Lower Colorado (Grand Mesa), and Southwestern Basins (Western & Eastern San Juans and Telluride).

Non-Reimbursable Project Investment Application - CWCB Construction Fund

Form Revised April 2010

5. Explain why you are requesting a grant, instead of a loan. (the Construction Fund exists primarily to provide low interest loans for the construction or rehabilitation of raw water projects. Non-reimbursable investments are approved only when the project or study is of statewide interest and benefits a wide range of people and organizations, and/or a large geographical area .

The CWCB funding leverages out of state funding with a goal of modernizing traditional seeding methods deployed for the last 40 years in Colorado. This is building on successes from the field and other states. Another new remote generator will be deployed on the Grand Mesa winter 2012-13 paid for by the Lower Basin and CWCB. Remote generators are used almost exclusively in NV, CA, ID, WY. Results from Australia and Wyoming research projects have documented their efficacy. With warming climates and the price of silver iodide propane seeding is being explored in Colorado. Specialized weather stations are being developed to characterize seeding potential for operations and evaluations.

There are 40 total sponsors of winter seeding and several of them are: Southwestern WCD, Dolores WCD, City of Durango, Durango Mountain Resort, Florida WCD, Pine River Irrigation Distirct, Pagosa Areas W&S, Gunnison County, Crested Butte Ski Area, Crested Butte W&S, Town of Gunnison, Collbran WCD, Grand Mesa WCD, North Fork WCD, Fruitland Mesa WCD, Crawford WCD, City of Grand Junction, Colorado Springs Utilties, and Denver Water, Colorado Springs utilities, Northern Colorado WCD.

Expected program costs for winter 2012-13 are $175,000 Vail, $300,000 Front Range Water Council (Upper Colorado, $300,000 Telluride & San Junas, and $90,000 at Gunnison. CWCB will have $175,000 from a FY 2013 allocation and expects $150,000 from the Lower basin, $15,000 from NM for a total of $1.25 M.

6. List the names and addresses of any technical or legal consultants retained to represent the applicant or to conduct investigations for the proposed project or study.

Name	Address & Phone Number
Larry Hjermstad Western Weather Consultants	POB 58, Durango Colorado (970) 247 8813
Don Griffith North American Weather Consuoltants	8180 South Highland Drive, Suite B-2, Sandy, UT 84093 (801) 942 9005
Slade Connell Water Enhancement Authority	10001 Kannah Creek Road, Whitewater, CO 81527, (970) 264-4241

7. List any feasibility study or scope of work that has been completed or is now in progress for the proposed project or study. (Submit one copy with this application):

Allthough not completed for two winters there are good initial results from the state of the art cloud seeding full randomized cloud seeding research program sponsored by the Wyoming Water Development commission. That program has spent $14M and eight years and seeks to develop results with a 90-95% confidence in statistically significant results.

For 2012-13 in progress is an update of a ten year data set that characterizes seeding potential by warm and cold cloud conditions statewide. This study performed by HDR Engineering will be helpful to determine what months are best for seeding and what areas are better for warm cloud (propane) and cold cloud (silver iodide) seeding.

For 2012-13 also in progress is an MOU with the Colorado Avalanche Information Center to develop modeling guidance for cloud seeders based on new 4km resolution weather modeling. Cross sections of modeling in the target areas will be provided for “thresholds” of wind speed, temperature, cloud water, and precipitation rates need to initiate operations. The data will be archived and used for analysis of contractors seeding periods versus modeling results.

Non-Reimbursable Project Investment Application - CWCB Construction Fund

Form Revised April 2010

8. What is the estimated cost of the study/demonstration project? Please include estimated Study, Planning, Engineering, and Construction costs, if known :

Estimated Planning/Study Costs:	
Estimated Engineering Costs:	
Estimated Construction Costs:	
Estimated Total Costs:	$1.25M total expected expenditures in Colo. 2012-13

9. **How much funding are you requesting?** $175,000

Part C. - Project Sponsor Financial Information

1. The CWCB Construction Fund is primarily a revolving loan fund. Non-reimbursable investments are approved only when the project or study is of statewide interest and benefits a wide range of people. Provide copies of the two most recent annual reports, financial statements, corporate reports or other current documentation of financial condition and operations with this application.

2. Provide a brief narrative description of potential sources of funding (in addition to the CWCB) which have been explored or which will be explored for the proposed project or study. (Examples would be Local County and Town Governments, Water Conservancy Districts, USDA Rural Development, The Natural Resources Conservation Service, The U.S. Environmental Protection Agency, Commercial Banks, etc.)

The above statements are true to the best of my knowledge:

Signature of Applicant: 

Print Applicant's Name: Joe Busto

Project Title: CWCB Weather Modification Program – Water User Cost Share Assistance
Date: July 27, 2012

Return this application to:

Mr. Kirk Russel, P.E., Section Chief
Finance Section
COLORADO WATER CONSERVATION BOARD
1580 Logan Street, Suite 600
Denver, CO 80203

Submit applications by email to: kirk.russelll@state.co.us or fax to (303) 894-2578
For questions call (303) 866-3441, ext. 3232

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

TO: Colorado Water Conservation Board Members

FROM: Thuy Patton – Floodplain Mapping Coordinator
Watershed Protection and Flood Mitigation Section

DATE: September 14, 2012

SUBJECT: **Non-Reimbursable Investment Item #3**
Water Supply Planning and Finance Section
Colorado Floodplain Map Modernization Program

Introduction and Discussion

In early 2003, Congress approved a substantial funding package to provide updated floodplain mapping nationwide. Similar funding levels have been allocated by Congress in subsequent years. The CWCB approved and the General Assembly authorized a non-reimbursable investment of $500,000 in the 2003 Construction Fund Bill with annual funding amounts in all subsequent Bills. Staff is now requesting a total of $500,000 for program funding.

Colorado has received over $10 million in federal grant dollars for floodplain mapping activities since 2003 as part of the floodplain Map Modernization program initiated by FEMA. The FEMA funds are being matched by CWCB and local cost-share dollars to implement the map update work that includes engineering and GIS to create new digital countywide maps. The funds authorized in the 2003 and all subsequent Construction Fund Bills have provided the required non-federal matching dollars. The State funds are further leveraged by local cost share dollars and in-kind services from many communities thus far.

Staff Request

The staff of the Watershed Protection and Flood Mitigation Section is requesting approval by the Board for a non-reimbursable investment from the CWCB Construction Fund in the amount up to $500,000 to provide matching dollars and related study funds in order to take advantage of the federal grant funds from FEMA for modernized floodplain maps in Colorado.

Staff Recommendation

Staff recommends that the Board request the General Assembly to authorize $500,000 from the Construction Fund to be appropriated to the Department of Natural Resources for allocation to the CWCB for technical activities related to the Colorado Floodplain Map Modernization Program.

Water Project Construction Program – Project Data
Non-Reimbursable Investment

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

Project Name: Colorado Floodplain Map Modernization Program

Project Type: Matching Funds for Federal Grants

Drainage Basin: All River Basins in Colorado **Water Source:** N/A

Total Project Cost (Annual): $1,900,000 **Funding Source:** CWCB Const. Fund

Type of Grantee: State Government

CWCB Non-Reimbursable Inv.: $500,000 (up to)

Colorado has received approximately $10.0 million in federal grant dollars for floodplain mapping activities as part of the floodplain Map Modernization Program (Program) initiated by FEMA in 2003. The FEMA funds are being matched by CWCB and local cost-share dollars to implement the map update work to create new digital countywide maps. The initial Program funds authorized in the 2003 and all subsequent Construction Fund Bills have provided the required non-federal matching dollars (80/20 cost share program). The State funds are further leveraged by local cost share dollars and in-kind services from many communities thus far. The total funding amounts have been instrumental in keeping Colorado as a lead state within FEMA Region 8 and will continue to benefit Colorado communities in the future. It is expected that significant FEMA funding will continue as long as the Program exists. Program deliverables will become part of the Flood DSS system to increase data capture and enhance Colorado's decision support tools.

The Program will eventually impact the entire state, and the objective is to develop updated watershed-based countywide floodplain maps using current base map information within a digital environment. The use of GIS technology will be employed for all new countywide studies for ease of distribution, updating and viewing. The table below summarizes funding provided by the CWCB and FEMA/Local governments for CWCB managed projects (in progress or completed).

COUNTY/WATERSHED	CWCB Funds	FEMA/Local Funds	COUNTY/WATERSHED	CWCB Funds	FEMA/Local Funds
Archuleta	$71,000	$228,760	Mesa	$33,960	$435,780
Boulder	$17,807	$524,709	Montrose	$60,376	$241,503
Clear Creek	$2,950	$158,605	Montezuma	$53,000	$452,735
Chaffee	$44,000	$399,290	Morgan	$25,000	$270,700
Delta	$21,630	$277,763	Park	$18,800	$165,200
El Paso	$75,635	$1,332,030	Pitkin	$20,772	$466,388
Elbert	$141,548	$301,982	Prowers	$76,605	$691,024
Fremont	$23,294	$146,240	Pueblo	$71,768	$945,902
Garfield	$29,912	$325,000	Rio Grande	$58,300	$152,810
Gunnison	$79,250	$272,422	Summit	$21,098	$189,876
La Plata	$74,200	$391,910	Teller	$23,100	$207,900
Logan	$30,550	$271,050	Weld	$112,419	$658,530
St. Vrain	$88,580	$354,320	Purgatoire	$100,000	$108,100
Clear Creek Wtsd	$114,060	$456,240	Cache La Poudre	$718,834	$150,000

COLORADO WATER CONSERVATION BOARD

CONSTRUCTION FUND
2012-2013 NON-REIMBURSABLE PROJECT INVESTMENT APPLICATION

Colorado Floodplain Map Modernization $500,000

Application Deadline: August 2 for funds available July 1 the following year.

Funding recommendations will be considered at the November CWCB Board Meeting.

Instructions: This application form should be emailed, typed, or printed neatly. You may attach additional sheets as necessary to fully answer any question, or to provide additional information that you feel would be helpful in evaluating this application. Include with your application a cover letter summarizing your request. If you have difficulty with any part of the application, contact Kirk Russell, PE, Finance Section Chief for assistance, at (303) 866-3441, ext. 3232 or email kirk.russell@state.co.us

Generally, the applicant is also the prospective owner and sponsor of the proposed project. If this is not the case, contact CWCB before completing this application.

Part A. - Description of the Applicant (Project Sponsor or Owner);

1. Applicant Name(s): Colorado Water Conservation Board, Thuy Patton

Mailing address: 1313 Sherman Street, Rm 721
Denver, CO 80203

Taxpayer ID#:

Email address: Thuy.patton@state.co.us

Phone Numbers: Business: 303-866-3441 ext 3230

Home: 720-219-7441

Fax: 303-861-4272

2. Person to contact regarding this application if different from above:

Name:

Position/Title

Non-Reimbursable Project Investment Application - CWCB Construction Fund

Form Revised April 2010

3. Provide a brief description of your organization below:

The Watershed Protection and Flood Mitigation Section of the CWCB has evolved over time and expanded its operations to include watershed protection and flood-related activities that assist in the prevention of loss of life and damage to property caused by flooding events.

Part B. - Description of the Project or Study

1. Name of the study or project: Colorado Floodplain Map Modernization and Risk Map Program

2. What is the purpose of this grant application? Check one.

- [X] Study
- [ ] Demonstration project.
- [ ] Rehabilitation or replacement of existing
- [ ] Other (Please describe)

3. General location of the study or demonstration project. (Please include county, and approximate distance and direction from the nearest town):

This is a statewide program eventually affecting most or all counties and communities throughout Colorado.

4. Please provide a brief narrative description of the proposed study or demonstration project including purpose, need, and service area. (Attach scope of study, if available)

This request is for a non-reimbursable investment from the Construction Fund to the CWCB's Floodplain Map Modernization fund. The original investment in the 2003 Construction Fund Bill was $500,000 and these dollars are used to leverage against federal grant dollars and local matching dollars for Map Modernization and Risk Map activities in Colorado. So far, the CWCB has encumbered or pledged matching dollars for new digital floodplain maps in Douglas, Boulder, Larimer, Fremont, Clear Creek, Montezuma, Mesa, Garfield, Pueblo, Teller, LaPlata, Weld, Archuleta, Summit, Delta, Elbert, Montrose, Rio Grande, Park, Gunnison, Morgan, Prowers, Pitkin, Chaffee, and El Paso Counties, as well as Clear Creek, St. Vrain, Purgatoire, and Cache La Poudre Watersheds. FEMA has granted about $9.0 million thus far for Colorado floodplain map modernization projects. We anticipate an excellent chance for continued substantial FEMA funding in Colorado during the next several years and beyond, with total allocations expected to surpass $10 million in the next few years.

5. Explain why you are requesting a grant, instead of a loan. (the Construction Fund exists primarily to provide low interest loans for the construction or rehabilitation of raw water projects. Non-reimbursable investments are approved only when the project or study is of statewide interest and benefits a wide range of people and organizations, and/or a large geographical area **.**

A regular funding program does not currently exist for non-federal matching dollars, other than the CWCB construction fund, for the required non-federal cost-share that would allow Colorado to fully take advantage of millions of federal grant dollars over the coming years. FEMA is providing increased levels of funding for floodplain map modernization in those States that are able to support and provide matching funds. The State match is bolstered by additional matching dollars and in-kind services from local governments, which allows Colorado to capitalize on this tremendous opportunity. The goal is to update and modernize Colorado's aging fleet of floodplain maps for floodplain management, flood hazard mitigation, flood insurance, and flood response purposes. In addition, the new digital maps will eventually be integrated into the Flood DSS to enhance Colorado's decision making tools.

6. List the names and addresses of any technical or legal consultants retained to represent the applicant or to conduct investigations for the proposed project or study.

Anderson Consulting Engineers	Fort Collins, CO	970-226-0120
ICON Engineering	Centennial, CO	303-221-0802

7. List any feasibility study or scope of work that has been completed or is now in progress for the proposed project or study. (Submit one copy with this application):

There are a number of scopes of work that are completed or in progress to address floodplain mapping activities in Colorado. Copies of these can be made available as needed and are also located on the L:drive in the Section A folder. At the onset of the Map Modernization program, the CWCB developed a Business Case Plan which determined priorities for countywide DFIRM projects for each year of the program. The priorities were determined upon several factors. The Business Case Plan is a working document amended for FEMA and the State to reassess the previous determined priorities, previous project completions and yearly anticipated budget. The Program has now transitioned to Risk Map, which will integrate the role of Risk in the map modernization process. The Business Case Plan and any other related documents can be made available upon request.

Non-Reimbursable Project Investment Application - CWCB Construction Fund

Form Revised April 2010

8. What is the estimated cost of the study/demonstration project? Please include estimated Study, Planning, Engineering, and Construction costs, if known:

Estimated Planning/Study Costs:	
Estimated Engineering Costs:	$1,900,000
Estimated Construction Costs:	
Estimated Total Costs:	**$1,900,000**

9. **How much funding are you requesting?** $500,000

Part C. - Project Sponsor Financial Information

1. The CWCB Construction Fund is primarily a revolving loan fund. Non-reimbursable investments are approved only when the project or study is of statewide interest and benefits a wide range of people. Provide copies of the two most recent annual reports, financial statements, corporate reports or other current documentation of financial condition and operations with this application.

2. Provide a brief narrative description of potential sources of funding (in addition to the CWCB) which have been explored or which will be explored for the proposed project or study. (Examples would be Local County and Town Governments, Water Conservancy Districts, USDA Rural Development, The Natural Resources Conservation Service, The U.S. Environmental Protection Agency, Commercial Banks, etc.)

The above statements are true to the best of my knowledge:

Signature of Applicant: Thuy Patton

Print Applicant's Name: Thuy Patton

Project Title: CWCB Floodplain Mapping Coordinator

Date: August 2, 2012

Return this application to:

Mr. Kirk Russell, P.E., Chief
Finance Section
COLORADO WATER CONSERVATION BOARD
1580 Logan Street, Suite 600
Denver, CO 80203

Submit applications by email to: kirk.russell@state.co.us or fax to (303) 894-2578
For questions call (303) 866-3441, ext. 3232

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

TO: Colorado Water Conservation Board Members

FROM: Chris Sturm, Stream Restoration Coordinator

DATE: September 14, 2012

SUBJECT: **Non-Reimbursable Investments Item #4**
Colorado Watershed Restoration Program

Introduction

The CWCB supports watershed restoration projects presented by multiple stakeholders with diverse interests. The results are plans and projects designed to satisfy a range of non-consumptive and consumptive water use objectives. Many of these efforts are completed on small budgets funded through several sources of local, state and/or federal funds. There is often a community volunteer component that contributes in-kind services through donated materials and time. The Colorado Watershed Restoration Program (CWRP) has funded 33 projects with nearly $1,000,000 since its first grant cycle in January 2009. The projects have leveraged $5.50 for every $1.00 contributed by CWRP.

Staff Recommendation

Staff recommends that the Board request the General Assembly to authorize $250,000 from the Construction Fund to be appropriated to the Department of Natural Resources for allocation to the CWCB for the Colorado Watershed Restoration Program.

Water Project Construction Program - Project Data
Non-Reimbursable Investment

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

Project Name: Colorado Watershed Restoration Program

Project Type: Watershed Protection and Flood Mitigation

Drainage Basin: All River Basins in Colorado **Water Source**: N/A

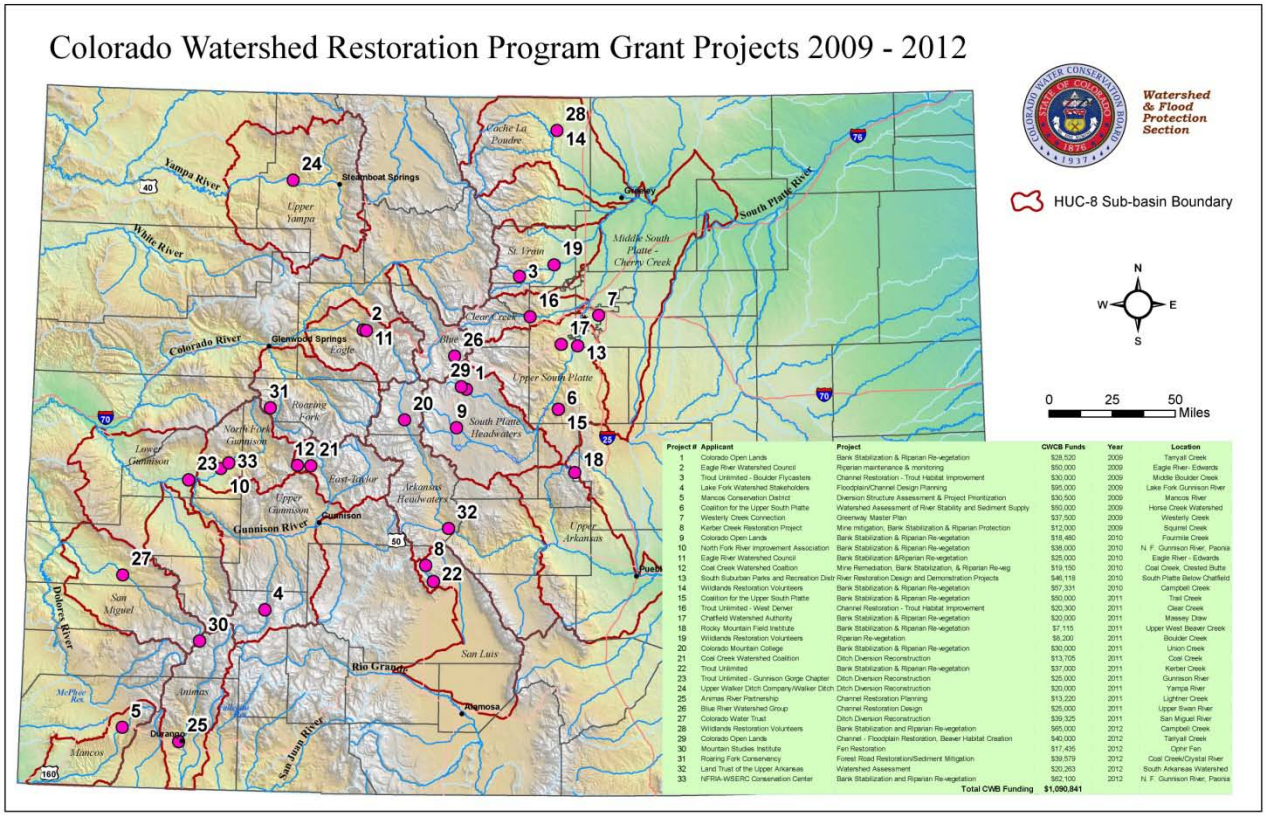
Total Project Cost: up to 50% cost share **Funding Source**: CWCB Const. Fund

Type of Grantee: State Government

CWCB Non-Reimbursable Inv.: $250,000

SUMMARY

The Program objective is to provide funding for watershed restoration studies and projects. Special consideration is given to projects that reduce flood hazards, protect infrastructure, and increase benefits for water supply. Past projects successfully completed with aid from the Construction Fund include channel stabilization and restoration on Clear Creek near Golden, riparian re-vegetation on the Eagle River in Edwards, and channel restoration and diversion reconstruction on the San Miguel River. Program funding has also been used in conjunction with funding from the Water Quality Control Division to develop a Measureable Results Program (MRP). Studies and projects resulting from this program can have far reaching benefits for water supply (e.g. SWSI), flood protection, forest restoration, enhancement of aesthetic and environmental quality, recreation, and increased economic benefit. The CWCB has not had access to a regular and reliable source of funding for this Program in past years. Instead, special allocations on an annual basis from Severance Tax and Construction Fund investments have provided support for the Program. The Program has funded 33 projects since the first grant cycle in January 2009. Total project funding exceeds $1,000,000. The projects have leveraged $5.5 for every $1 contributed by the Program. Twenty-three of the thirty-three projects funded have been mapped with focus areas identified in the Non-Consumptive Needs Assessment. The Program is intended for statewide benefit. The map below displays projects funded since 2009.



COLORADO WATER CONSERVATION BOARD

CONSTRUCTION FUND
NON-REIMBURSABLE PROJECT INVESTMENT APPLICATION

Colorado Watershed Restoration Program

(Project Name)

Application Deadline: August 1 for funds available July 1 the following year.

Funding recommendations will be considered at the November CWCB Board Meeting.

Instructions: This application form should be emailed, typed, or printed neatly. You may attach additional sheets as necessary to fully answer any question, or to provide additional information that you feel would be helpful in evaluating this application. Include with your application a cover letter summarizing your request. If you have difficulty with any part of the application, contact Tim Feehan, PE, Finance Section Chief for assistance, at (303) 866-3441, ext. 3211 or email kirk.russell@state.co.us

Generally, the applicant is also the prospective owner and sponsor of the proposed project. If this is not the case, contact CWCB before completing this application.

Part A. - Description of the Applicant (Project Sponsor or Owner);

1. Applicant Name(s): Colorado Water Conservation Board
Watershed and Flood Protection Section

Mailing address: 1313 Sherman Street, Room 721
Denver, Co 80203

Taxpayer ID#: Email address:

Phone Numbers: Business: 303 866 3441

Home: 720 2109 4384

Fax: 303 866 4474

2. Person to contact regarding this application if different from above:

Name:

Position/Title

3. Provide a brief description of your organization below:

The Watershed and Flood Protection Section of the CWCB has evolved over time and expanded its operations to include watershed protection, flood mitigation, and forest restoration. The Watershed Restoration Program provides grant funding and technical expertise to partners for multi-objective plans and projects designed to reduce flood hazards, stabilize and restore stream channels, provide habitat, reduce erosion, and increase the capacity to utilize water.

Part B. - Description of the Project or Study

1. Name of the study or project: Colorado Watershed Restoration Program

2. What is the purpose of this grant application? Check one.

	Study
	Demonstration project.
	Rehabilitation or replacement of existing
X	Other (Please describe)

Provide funds for multi-objective studies and projects aiding watershed restoration efforts throughout the state.

3. General location of the study or demonstration project. (Please include county, and approximate distance and direction from the nearest town):

Project funds will be used statewide where watershed restoration needs of high priority are identified through a competitive grant process. Priorities will be correlated with local requests, local contributions, community needs and the need to serve Colorado watersheds not previously served.

4. Please provide a brief narrative description of the proposed study or demonstration project including purpose, need, and service area. (Attach scope of study, if available)

Multi-objective stream and watershed restoration studies and projects designed to stabilize channels, reduce impacts due to historic mining or agricultural activities, improve watershed conditions to abate natural disasters, protect/enhance riparian and in-channel habitats, and improve recreation opportunities. Other project components may include reduction of water related risk to infrastructure, flood hazard reduction, and flood mitigation. There are degraded stream systems throughout the state in need of restoration designed to benefit non-consumptive and consumptive water uses. Projects are generally funded in all major river basins submitting applications to the Colorado Watershed Restoration Program.

Non-Reimbursable Project Investment Application - CWCB Construction Fund

Form Revised April 2010

5. Explain why you are requesting a grant, instead of a loan. (the Construction Fund exists primarily to provide low interest loans for the construction or rehabilitation of raw water projects. Non-reimbursable investments are approved only when the project or study is of statewide interest and benefits a wide range of people and organizations, and/or a large geographical area **.**

The CWCB staff is requesting a non-reimbursable expenditure for Watershed Restoration because the program is 1) Staff initiated, 2) Endorsed by the Board, 3)Consistent with CWCB statutory responsibilities, and 4) Able to provide benefits for non-consumptive and consumptive water uses throughout the state. Presently the sources of state funding for these activities are not consistent and reliable. The funding will allow CWCB to cost-share with the federal government and other stakeholders to complete this much-needed work. The Colorado Watershed Restoration Program has leveraged $5.5 for every $1 contributed by the CWCB since its inception in 2009.

6. List the names and addresses of any technical or legal consultants retained to represent the applicant or to conduct investigations for the proposed project or study.

Name Address & Phone Number

The CWCB and the Colorado Watershed Restoration Program grantees have access to numerous qualified consulting firms in Colorado. Some of the work can also be completed in-house as well to further help leverage grant dollars.

7. List any feasibility study or scope of work that has been completed or is now in progress for the proposed project or study. (Submit one copy with this application):

The CWCB has a number of completed watershed restoration master planning studies that have been very useful to a variety of users. Some of them have been used as a first step toward design and implementation of projects to address watershed restoration needs. Some examples include the Uncompahgre Rapid River Assessment, the Eagle River Inventory and Assessment, Coal Creek Riparian and Habitat Assessment, the Dolores River Dialogue, and the Mancos River Watershed Rapid Assessment. All of this information is available to the public via the Internet and CWCB's Imaging System.

Non-Reimbursable Project Investment Application - CWCB Construction Fund

Form Revised April 2010

8. What is the estimated cost of the study/demonstration project? Please include estimated Study, Planning, Engineering, and Construction costs, if known:

Estimated Planning/Study Costs:	$100,000
Estimated Engineering Costs:	$300,000
Estimated Construction Costs:	$600,000
Estimated Total Costs:	$1,000,000

9. **How much funding are you requesting?** $250,000

Part C. - Project Sponsor Financial Information

1. The CWCB Construction Fund is primarily a revolving loan fund. Non-reimbursable investments are approved only when the project or study is of statewide interest and benefits a wide range of people. Provide copies of the two most recent annual reports, financial statements, corporate reports or other current documentation of financial condition and operations with this application.

2. Provide a brief narrative description of potential sources of funding (in addition to the CWCB) which have been explored or which will be explored for the proposed project or study. (Examples would be Local County and Town Governments, Water Conservancy Districts, USDA Rural Development, The Natural Resources Conservation Service, The U.S. Environmental Protection Agency, Commercial Banks, etc.)

The above statements are true to the best of my knowledge:

Signature of Applicant:

Print Applicant's Name: Chris Sturm, Stream Restoration Coordinator

Project Title: Colorado Watershed Restoration Program

Date: August 9, 2011

Return this application to:

Mr. Kirk Russell, P.E., Chief
Finance Section
COLORADO WATER CONSERVATION BOARD
1580 Logan Street, Suite 600
Denver, CO 80203

Submit applications by email to: kirk.russell@state.co.us or fax to (303) 894-2578
For questions call (303) 866-3441, ext. 3211

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

TO: Colorado Water Conservation Board Members

FROM: Kevin Houck, P.E. – Chief
Watershed Protection and Flood Mitigation Section

DATE: September 14, 2012

SUBJECT: **Non-Reimbursable Investment Item #5**
Flood and Drought Response Fund

Introduction and Discussion

A $150,000 Flood Response Program was authorized in the 2001 Construction Fund Bill (SB 01-157) and enacted by the Colorado General Assembly. This amount was increased in the 2007 Construction Fund Bill (SB 07-122) to $300,000 to reflect the additional cost of performing existing program functions and the addition of valuable services under the program. The Flood Response Fund (Fund) was originally created to give the CWCB an ability to quickly respond to events and have program funds in the areas of: 1) flood documentation, 2) flood forecasting and outlooks, 3) post-event floodplain mapping, 4) aerial photography, and 5) flood mitigation. In FY 2012/13, drought preparedness, response, and recovery activities were added to the fund scope through board approval and statutory change.

The current request is to refresh the account up to $300,000 for FY 2013/14. Staff clearly recognizes that there will be years in the future when both flood conditions and drought conditions exist during the same water year and/or during the same fiscal year. In those situations, the Fund could be stressed by needs from the two extreme conditions, and Staff will prioritize expenditures.

Staff Recommendation

Staff recommends that the Board request the General Assembly to authorize $300,000 from the Construction Fund to be appropriated to the Department of Natural Resources for allocation to the CWCB for technical activities related to flood and drought response, as called out in the scope of the Flood and Drought Response Fund.

Water Project Construction Program - Project Data
Non-Reimbursable Investment

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

Project Name: Colorado Flood and Drought Response Fund

Project Type: Program Funds for post event floodplain mapping, flood and drought forecasting, aerial photography, natural hazard mitigation, documentation and natural hazard preparedness and response.

Drainage Basin: All River Basins in Colorado **Water Source**: N/A

Total Project Cost: $300,000 **Funding Source**: CWCB Const. Fund

Type of Grantee: State Government **Median Household income**: N/A

CWCB Non-Reimbursable Inv.: $300,000 (refresh up to) **Interest Rate**: N/A Term: N/A

A $150,000 Flood Response Program was authorized in the 2001 Construction Fund Bill (SB 01-157) and enacted by the Colorado General Assembly. This amount was increased in the 2007 Construction Fund Bill (SB 07-122) to $300,000 to reflect the additional cost of performing existing program functions and the addition of valuable services under the program. The Flood Response Fund (Fund) was originally created to give the CWCB an ability to quickly respond to events and have program funds in the areas of: 1) flood documentation, 2) flood forecasting and outlooks, 3) post-event floodplain mapping, 4) aerial photography, and 5) flood mitigation. The FY 2012/13 request included an expanded scope involving drought response activities, and this year's request also includes this expanded scope.

The current request is to refresh the account up to $300,000 for FY 2013/14 for flood and drought response purposes. Use of this fund to address both flood and drought increases the efficiency and effectiveness of the CWCB to adequately respond to natural hazards affecting Colorado while also recognizing the current fiscal constraints by utilizing existing resources. Staff clearly recognizes that there will be years in the future when both flood conditions and drought conditions exist during the same water year and/or during the same fiscal year. In those situations, the Fund could be stressed by needs from the two extreme conditions, and Staff will prioritize expenditures.

COLORADO WATER CONSERVATION BOARD

CONSTRUCTI0N FUND
2013-2014 NON-REIMBURSABLE PROJECT APPLICATION

CWCB Flood and Drought Response Fund

Instructions: This application form should be emailed, typed, or printed neatly. You may attach additional sheets as necessary to fully answer any question, or to provide additional information that you feel would be helpful in evaluating this application. Include with your application a cover letter summarizing your request for a non-reimbursable investment. If you have difficulty with any part of the application, contact Kirk Russell of the Water Supply Planning and Finance Section (Colorado Water Conservation Board) for assistance, at (303) 866-3441 or email Kirk at Kirk.russell@state.co.us .

Generally, the applicant is also the prospective owner and sponsor of the proposed project. If this is not the case, contact Tim Feehan before completing this application at (303) 866-3441.

Part A. - Description of the Applicant (Project Sponsor or Owner);

1. Applicant Name(s): Colorado Water Conservation Board staff
Kevin Houck and Taryn Hutchins-Cabibi

Mailing address: 1313 Sherman Street, Room 721
Denver, CO 80203

Taxpayer ID#: On file

Email address: On file

Phone Numbers: Business: 303-866-3441

Home: 303-809-5324

Fax: 303-866-4474

2. Person to contact regarding this application if different from above:

Name: Same

Position/Title

3. Provide a brief description of your organization below:

The Flood Protection Program and Office of Water Conservation and Drought Planning are two of the major program areas in the CWCB, which exist to prepare for, respond to, and mitigate the negative impacts from natural hazards such as droughts and floods. The CWCB is authorized by Statute to perform such activities.

ırPart B. - Description of the Project or Study

1. Name of the study or project: Flood and Drought Response Fund

2. What is the purpose of this grant application? Check one.

XX	Study
	Demonstration project.
	Rehabilitation or replacement of existing
	Other (Please describe)

This request is to request a continuation the existing Flood and Drought Response Fund up to $300,000 to continue to provide services related to the program. This program is currently authorized in C.R.S. 37-60-123.2 and provides valuable technical services for Colorado communities and the public at large.

3. General location of the study or demonstration project. (Please include county, and approximate distance and direction from the nearest town):

Funds from this project would be used statewide in areas where flood or drought events occur or where mapping/hazard mitigation needs of high priority are identified. Priorities will generally be correlated with local request and contribution and community need. Statewide flood and drought updates will typically be provided during a presentation to the Board at its March meetings or as needed.

4. Please provide a brief narrative description of the proposed study or demonstration project including purpose, need, and service area. (Attach scope of study, if available)

Provide engineering, meteorological, and other technical services related to the 5 major elements of the Flood Response Fund. The major elements of the program along with their anticipated funding needs are:

Flood and drought documentation	$50,000
Natural hazard assessment	$95,000
Hazard Mitigation	$65,000
Flood and drought forecasting	$80,000
Post event aerial Mapping	$10,000

Non-Reimbursable Application - CWCB Construction Fund

Form Revised August 2004

5. Explain why you are requesting a grant, instead of a loan. (The Construction Fund exists primarily to provide low interest loans for the construction or rehabilitation of raw water projects. Non-reimbursable investments are approved only when the project or study is of statewide interest and benefits a wide range of people and organizations, and/or a large geographical area **.**

The CWCB staff is requesting a non-reimbursable expenditure for the Flood and Drought Response Fund since activities within the major program elements are 1) Staff initiated, 2) Required by Statute, 3) Endorsed by the Board, and 4) Provide valuable technical information for citizens of the state. To our knowledge there is no other source of funding available through other means to assist with the goals of the Fund.

6. List the names and addresses of any technical or legal consultants retained to represent the applicant or to conduct investigations for the proposed project or study.

Name Address & Phone Number

The CWCB has access to numerous qualified engineering consulting firms in Colorado through the As-Needed engineering program as well as standard contracting mechanisms. The CWCB has good working relationships with many qualified firms in addition to expertise provided by other federal, state, and local agencies and various partners. Some of the work can also be completed in-house as well to further help leverage grant dollars.

7. List any feasibility study or scope of work that has been completed or is now in progress for the proposed project or study. (Submit one copy with this application):

The CWCB has a number of completed documentation reports that have been highly useful for the scientific community and local governments as a whole. Publicly available information produced by the CWCB is either posted to our website or included in Laserfiche.

Non-Reimbursable Application - CWCB Construction Fund

Form Revised August 2004

8. What is the estimated cost of the study/demonstration project? Please include estimated Study, Planning, Engineering, and Construction costs, if known:

Estimated Planning/Study Costs:	$200,000
Estimated Engineering Costs:	$100,000
Estimated Construction Costs:	N/A (future projects and loan requests may result)
Estimated Total Costs:	$300,000

9. **How much funding are you requesting?** $300,000

Part C. - Project Sponsor Financial Information

1. The CWCB Construction Fund is primarily a revolving loan fund. Non-reimbursable investments are approved only when the project or study is of statewide interest and benefits a wide range of people. Provide copies of the two most recent annual reports, financial statements, corporate reports or other current documentation of financial condition and operations with this application.

2. The Flood and Drought Response Fund often works on an informal cost share basis. Some activities are staff driven and are not conducive to cost-sharing. Funds will be sought from other partners to match CWCB funding whenever possible.

The above statements are true to the best of my knowledge:

Signature of Applicant: On File

Print Applicant's Name: Kevin Houck and Taryn Hutchins-Cabibi

Project Title: Flood and Drought Response Fund

Date: August 1, 2012

Return this application to:

Mr. Kirk Russell, P.E., Chief
Water Supply Planning and Finance Section
COLORADO WATER CONSERVATION BOARD
1580 Logan Street, Suite 750
Denver, CO 80203

To submit applications by Email, send to: kirk.russell@state.co.us
To submit applications by Fax, send to: (303) 894-2578
For questions, call Telephone No.: (303) 866-3441

STATE OF COLORADO

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Department of Natural Resources
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Denver, Colorado 80203
Phone: (303) 866-3441
Fax: (303) 866-4474
www.cwcb.state.co.us

TO: Colorado Water Conservation Board Members

FROM: Joe Busto
Watershed Protection and Flood Mitigation Section

DATE: September 14, 2012

SUBJECT: **Non-Reimbursable Investment Item #6**
Rio Grande Forecasting Development Projects

Introduction and Discussion

Forecasting of water supply is important to Colorado's water rights system, compact obligations, and beneficial use of water. At the July 2012 CWCB meeting, staff and a National Oceanic Atmospheric Administration employee (Steve Vasiloff) updated the CWCB board about a multi-agency effort to develop projects in the Rio Grande to minimize forecast errors. Staff illustrated how these errors can result in impacts in the tens of millions of dollars per year. A recent supreme court decision requires use of these April 1 forecasts for ground water modeling, thus making the need for increased accuracy even greater.

Two projects were identified for funding by staff, and the CWCB directed staff to apply for funding. Project #1 was a Compact Compliance Tool to develop and interpret hydrographs and runoff scenarios as well as identify the probability of meeting compact obligations for $65,000. This was identified as the highest priority for the DWR and NWS West Gulf River Basin Forecast Center. Also highlighted in July was Project 5, which was coupling mobile radar data to spatial snowpack and hydrologic models. This project requires $150,000 CWCB funds and will seek a similar amount of matching federal funding. Staff and NOAA believe that Project Five is the bold step into the future to create the precipitation estimation and the spatial gap filling elements missing in current forecasts methods. Current methods rely heavily on a few SNOTEL sites and a simple snow model. Another element of Project 5 is building a business case for gap filling radars. Until we can accurately answer the question of how much precipitation falls in the mountains, forecasts back into the right answer by tweaking models to get the right answer for the wrong reasons. Better observations through radar will lead to better modeling and management decisions.

Based on review by the CWCB Director and Staff Section Chiefs the recommended funding level for this request was left at $215,000.

Staff Recommendation

Staff recommends that the Board request the General Assembly to authorize $215,000 from the Construction Fund to be appropriated to the Department of Natural Resources for allocation to the CWCB for Rio Grande Forecasting Development Projects.

Water Project Construction Program - Project Data
Non-Reimbursable Investment

Grantee: CWCB & NOAA **County:** Alamosa, Rio Grande

Project Name : Rio Grande Water Supply Forecasting Development Projects

Project Type: New tools and modeling for water supply forecasts in the Rio Grande with statewide implications

Drainage Basin: Rio Grande **Water Source**: Rio Grande and Conejos Rivers

Total Project Cost: $365,000 **Funding Source**: CWCB Const. Fund

Type of Grantee: NOAA/NWS **CWCB Non-Reimbursable Inv.:** $215,000

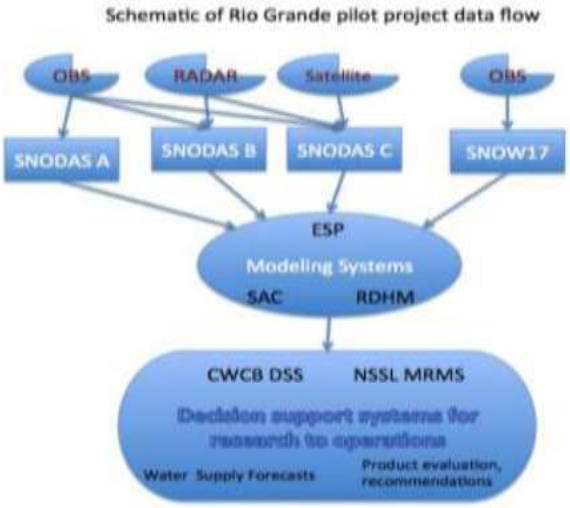
SUMMARY

The CWCB and NOAA presented at the July CWCB meeting in Gunnison to highlight previous work by the CWCB to develop new datasets and modeling for water supply forecasts. In the past seven years, the forecasts have shown forecast errors up to 24% of the river volume in the Rio Grande basin, creating issues for water rights administration, compact compliance, and beneficial use of water within the basin.

Rio Grande at Del Norte	June Forecast Water Supply [ac-ft]	Actual Water Supply [ac-ft]	Forecast Error June Forecast – Actual [ac-ft]
WY2005	795,000	683,000	+112,000 (16%)
WY2006	350,000	412,000	-62,000 (-15%)
WY2007	450,000	593,000	-143,000 (-24%)
WY2008	655,000	623,000	+32,000 (5%)
WY2009	490,000	513,000	-23,000 (-4%)
WY2010	485,000	455,000	+30,000 (+7%)

In August of 2011, a team of agencies was convened to look at water supply forecasting projects that might increase forecasting accuracy. The team consisted of experts from Riverside Technologies, National Center for Atmospheric Research, Portland Natural Resources Conservation Services, National Weather Service, CWCB staff, and the National Oceanic Atmospheric Administration.

Five projects were developed by this team and ranked one through five by the National Weather Service. These projects included:
Project 1 – DSS Compact Compliance Tool
Project 2 – Generate Historic Forecasts
Project 3 – SCA, Snow-17, SNODAS
Project 4 – Enhanced Ground Observation Network, Radar & Distributed Models.
Project 5 – Radar estimated precipitation and hydrologic modeling



Staff believes that even though all five projects proposals are worthy, the state should balance the short term need in the Rio Grande (Project 1) with the long term needs for the state (Project 5). Project 1 will assist DWR with tracking forecasted runoff to actual runoff for use in evaluating the likelihood of meeting compact compliance in the Rio Grande basin. Project 5 will examine results from four snow models and two hydrologic models to make eight different combined forecasts. The project will examine which scenarios produce more accurate forecasts. The graphic shows the data flow as developed for the project. This will closely examine the forecasting process, the existing models, potential new data sources, and new models to see if value can be added to the traditional basin runoff forecasting process.

This request is to fund Projects 1 and 5 as outlined above. The cost of Project 1 is $65,000. The cost of Project 5 is $300,000. The intent is to leverage $150,000 of funding with a request for matching federal funds for Project 5. Projects 2, 3, and 4 are not being requested for funding.

COLORADO WATER CONSERVATION BOARD

CONSTRUCTION FUND
NON-REIMBURSABLE PROJECT INVESTMENT APPLICATION

Rio Grande Water Supply Forecasting Development Projects

(Project Name)

Application Deadline: August 16 for funds available July 1 the following year.

Funding recommendations will be considered at the November CWCB Board Meeting.

Instructions: This application form should be emailed, typed, or printed neatly. You may attach additional sheets as necessary to fully answer any question, or to provide additional information that you feel would be helpful in evaluating this application. Include with your application a cover letter summarizing your request. If you have difficulty with any part of the application, contact Kirk Russell, PE, Finance Section Chief for assistance, at (303) 866-3441, ext. 3232 or email kirk.russell@state.co.us.

Generally, the applicant is also the prospective owner and sponsor of the proposed project. If this is not the case, contact CWCB before completing this application.

Part A. - Description of the Applicant (Project Sponsor or Owner);

1. Applicant Name(s): Joe Busto
CWCB-Watershed & Flood Protection Section

Mailing address: 1313 Sherman Street, Room 721
Denver, CO 80203

Taxpayer ID#:

Email address: Joe.busto@state.co.us

Phone Numbers: Business: 3-866-3441 ext.3209

Home: 303 587 5585

Fax:

2. Person to contact regarding this application if different from above:

Name: Steve Vasiloff Phone: (405) 325- 6138

Position/Title Meteorologist, NOAA - National Severe Storms Lab

Non-Reimbursable Project Investment Application - CWCB Construction Fund

Form Revised April 2010

3. Provide a brief description of your organization below:

NOAA-NSSL serves the nation by lead time and accuracy of severe weather warnings and forecasts to save lives and reduce property damage. NSSL provides the precipitation products to the nation for River Basin Forecast Centers to make severe forecasts. Radar data that is gauge corrected can be provided to River Basin Forecast Centers and used in work stations to make forecasts. NOAA-NSSL has the support of NOAA and NWS to work with the CWCB to advance water supply forecasts methodologies.

rPart B. - Description of the Project or Study

1. Name of the study or project: Rio Grande Forecasting Development Projects (1& 5)

2. What is the purpose of this grant application? Check one.

	Study
X	Demonstration project.
	Rehabilitation or replacement of existing
	Other (Please describe)

CWCB Board Director Smith asked staff to develop methods to improve forecasting of water supply in the Rio Grande. Five projects were developed. Project 1 was recommended by the NWS for funding to address the short term need that will immediately benefit the DWR. Project 5 was recommended by the CWCB staff and NOAA staff to specifically address the request to improve the forecast process and make recommendations. Projects 2, 3, and 4 are not being requested for funding.

3. General location of the study or demonstration project. (Please include county, and approximate distance and direction from the nearest town):

The Upper Rio Grande River Basin. Project One is specific to the Rio Grande basin but has implications statewide as it has potential as a new tool not currently available to the DWR to track water supply forecasts. Project Five is also specific to this basin, but may have implications statewide and nationally as it creates new data sources to be utilized in modern modeling techniques.

4. Please provide a brief narrative description of the proposed study or demonstration project including purpose, need, and service area. (Attach scope of study, if available)

At the Request of Board Director Smith, the CWCB convened a group of scientists, consultants, and agencies to address ongoing water supply forecast errors. Five projects were developed. Project One is called the Compact Compliance Tool and will help DWR determine probabilities of meeting compact obligations based on deviation from forecasted to actual runoff values. Project Five involves using radar to do detailed estimation of the winter precipitation to feed distributed snow and hydrologic models. Project Five will use four snow models and two hydrologic models for a total of eight scenarios that will help determine what forecast inputs and models were performing well or not and why? Results of this process will be used to evaluate and improve forecasting methods.

Minimizing forecast errors can have impacts of the millions of dollars of water in the Rio Grande each year. State and federal partnerships will be needed to address water supply forecast issues. Sparse data and limited SNOTEL sites using simple snow modeling are major obstacles that will need to be overcome in order to get to better accuracy of stream volumes in wet and dry years. The nation uses radars to fill spatial gaps for severe weather forecasting and this project will capitalize on well defined methods used in warm season precipitation estimation and forecasting for the cold season. This project works within federal infrastructure to research and develop new operational applications for water supply forecasting.

Non-Reimbursable Project Investment Application - CWCB Construction Fund

Form Revised April 2010

5. Explain why you are requesting a grant, instead of a loan. (the Construction Fund exists primarily to provide low interest loans for the construction or rehabilitation of raw water projects. Non-reimbursable investments are approved only when the project or study is of statewide interest and benefits a wide range of people and organizations, and/or a large geographical area .

A grant is requested because more accurate water supply forecasts would help surface and groundwater administration in the Rio Grande. Both Project One and Project Five are not currently being done by any of the River Basin Forecast Centers. If successful, they could be implemented in other watersheds in Colorado. Project One is called the Compact Compliance Tool and was estimated to cost $65,000. Project Five is mobile radar coupled to distributed models and is estimated to cost $300,000 total. For Project Five, $150,000 is the request for CWCB funding and a matching request will be given to NOAA to fund the remaining $150,000. This request leverages federal funding, and involves scientific work which is best served through the grant process.

This request is being developed as a demonstration project in the Rio Grande basin with statewide implications. Success that is demonstrated in this watershed will allow techniques to be used in all of Colorado's river basins.

6. List the names and addresses of any technical or legal consultants retained to represent the applicant or to conduct investigations for the proposed project or study.

Name	Address & Phone Number
Carrie Langston – Multi Radar Multi Sensor System Support	
J.J Gourley – Chief, Hydrology Group	
Ami Arthur – GIS, Systems Programming	
Brian Kaney – Web Display Development	
	NOAA-NSSL Staff, 120 David L. Boren Boulevard
	Norman, OK 73072, phone (405) 325- 6138

7. List any feasibility study or scope of work that has been completed or is now in progress for the proposed project or study. (Submit one copy with this application):

The Study plan, explanation of all five projects, and explanation of the forecasting process and issues are outlined in the attached documents. Using radar to feed new distributed snow models and will create close to 3,500 new data points to feed distributed modeling. These projects were endorsed by the National Weather Service Office of Hydrologic Development as a path to better modeling technologies. It is a new concept to use radar precipitation to force models for winter snowpack. However gauge corrected radar provided by NOAA-NSSL is a nationwide product to all 13 NWS River Basin Forecast Centers covering the U.S. Gap filling radars are the appropriate tool to do detailed accounting of precipitation processes and in each watershed and create complete basin wide coverage. This project will demonstrate the feasibility of using radars to force models for better management decisions.

8. What is the estimated cost of the study/demonstration project? Please include estimated Study, Planning, Engineering, and Construction costs, if known :

Estimated Planning/Study Costs:	$365,000
Estimated Engineering Costs:	
Estimated Construction Costs:	
Estimated Total Costs:	$365,000

9. **How much funding are you requesting?** $215,000

Part C. - Project Sponsor Financial Information

1. The CWCB Construction Fund is primarily a revolving loan fund. Non-reimbursable investments are approved only when the project or study is of statewide interest and benefits a wide range of people. Provide copies of the two most recent annual reports, financial statements, corporate reports or other current documentation of financial condition and operations with this application.

2. Provide a brief narrative description of potential sources of funding (in addition to the CWCB) which have been explored or which will be explored for the proposed project or study. (Examples would be Local County and Town Governments, Water Conservancy Districts, USDA Rural Development, The Natural Resources Conservation Service, The U.S. Environmental Protection Agency, Commercial Banks, etc.)

The above statements are true to the best of my knowledge:

Signature of Applicant: 

Print Applicant's Name: Joe Busto

Project Title: Rio Grande Water Supply Forecasting Development Projects
Date: July 30, 2012

Return this application to:

Mr. Kirk Russell, P.E., Section Chief
Finance Section
COLORADO WATER CONSERVATION BOARD
1580 Logan Street, Suite 600
Denver, CO 80203

Submit applications by email to: kirk.russelll@state.co.us or fax to (303) 894-2578
For questions call (303) 866-3441, ext. 3232

STATE OF COLORADO

Colorado Water Conservation Board
Department of Natural Resources
1580 Logan Street, Suite 600
Denver, Colorado 80203
Phone: (303) 866-3441
Fax: (303) 894-2578
www.cwcb.state.co.us

TO: Colorado Water Conservation Board Members

FROM: Joe Busto, Watershed & Flood Protection Section

DATE: July 2, 2012

SUBJECT: **Agenda Item 13, July 17-18, 2012 Board Meeting**
State of the Science for Basin Forecasting

Background

Accuracy of basin water forecasts is critical for effective water management around the state. For example, when forecasts change during the runoff period in the Rio Grande watershed, the DWR often must curtail senior water rights holders during the irrigation season to make up for the changed volume. The CWCB has partnered to add SNOTEL sites around the state to partially address forecast errors, but more is needed to fully address the problem. An April meeting between NOAA, NWS-Office of Hydrologic Development, DWR, and the CWCB examined potential partnerships to develop a more comprehensive observation and hydrologic accounting approach to further improve this process.

The current radar coverage in mountainous areas of Colorado is often too poor for use in water management, flash flood prediction, aviation, avalanche forecasting, snow removal, and cloud seeding, among other uses. Complete basin radar coverage would benefit the economics and safety of Colorado. Radar coverage projects have been recently cosponsored by CWCB in the Gunnison and Durango areas, and both projects were well-received by local officials.

As a demonstration of the effectiveness of this technology, the CWCB recently cosponsored an effort with the Urban Drainage and Flood Control District to improve flash flood forecasting in the Denver area. This project used radar calibrated to rain gauge data to feed streamflow simulations to set debris flow and flooding thresholds for the Fourmile Creek fire area following the large fire in 2010. It has been effective in managing the elevated flash flood threat in this watershed, and this methodology could be utilized statewide with complete radar coverage, including recent burn scars.

Over the last eight years, several CWCB projects were performed to develop new observations and utilize new modeling for greater certainty of snowpack and water. Staff will provide an overview of previous work by the agency and then discuss potential projects developed through a multi-agency collaboration to address water supply forecast issues in the Rio Grande watershed with future applications in other areas of the state.

Staff Recommendation

This is an information item with no formal board action requested.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Weather Service
Office of Hydrologic Development, R/PSD
325 Broadway – David Skaggs Research Center
Boulder, Colorado 80305-3328

July 03, 2012

Joe Busto
Colorado Water Conservation Board
1313 Sherman Street, Suite 721
Denver, Colorado 80203

Dear Joe,

I am writing to offer you my endorsement of your collection of proposed forecast projects that you recently shared with us, and my encouragement to continue to pursue them. It is my belief that the five projects you outlined in your email today, if funded, could help advance our collective capabilities to monitor and forecast our precious and oftentimes scarce water resources in Colorado.

Furthermore, as you are aware, we are currently working on the development of new and enhanced national capabilities for high resolution, integrated modeling and data services at the National Water Center, which is slated to open next year. If successful, the results of your proposed projects would be of interest to us (e.g. improved methodologies to monitor and predict snowpack), leading to potentially broader (i.e. national) impacts of these projects.

Please keep us apprised of your efforts and any developments along these lines.

Sincerely,

Timothy Schneider

IWRSS/ National Water Center Program Office
NOAA/NWS/Office of Hydrologic Development
Phone: 303-497-5160
Timothy.Schneider@noaa.gov

Cc: Andy Rost

State of the Science for Basin Forecasting
Background

How has the CWCB helped with Forecasts?

- **SNODAS (2004-09) -** The CWCB, in partnership with Riverside Technologies Inc. (RTi), used a newer snowpack model (SNODAS) and tailored the data for use in Colorado. Three basins were calibrated and new tools were developed for the Colorado Basin River Forecast Center (CBRFC). The Rio Grande basin, which makes use of SNODAS to track runoff and issue basin forecasts, was also examined. The final report recommended better input data to SNODAS.
- **Snow Covered Area Archive (2011) -** The CWCB completed a Snow Covered Area Archive Project in 2011 that provided ten years of SNODAS and Moderate Resolution Spectrodiameter (MODIS) satellite imagery to all the RFCs that cover Colorado. Methods to use this data operationally are under development.
- **SNOTELs (2004-11) -** The CWCB partnered with other agencies to install twenty SNOTEL sites for a statewide total of 110, an 18% increase**.** The Natural Resources Conservation Service (NRCS) is at maximum capability making the ability to operate and maintain any future SNOTEL sites uncertain.
- **Mobile Dual Polarization Radar (2009-ongoing)** – Summer 2009 in Gunnison, summer 2010 in Durango, in February 2011 in Durango, NOAA-NSSL deployed mobile radar to collect data in beam blocked areas of NWS network. The results were published in an abstract for the 2011 Western Snow Conference.
- **Rainfall Runoff Models for the Fourmile Burn area (2011**) – CWCB partnered with the Urban Drainage and Flood Control District (UDFCD) to develop methodologies to use radar data in real-time operational models to reflect the post-fire conditions. This increases the capabilities of the local response agencies during flood season.
- **Dust on Snow Research Program (2009-ongoing) –** CWCB funds partners with the Center for Snow and Avalanche Studies (CSAS) to collect data on dust layers in snowpack. CSAS is also working with the National Center for Atmospheric Research to develop this dataset as inputs to models for forecasts.

Rio Grande Projects/Background:

A team of the West Gulf River Basin Forecast Center (WGRFC), National Center for Atmospheric Research (NCAR), Riverside Technologies Inc. (RTi), the National Oceanic Atmospheric Administration National Severe Storms Lab (NOAA-NSSL), Colorado Division of Water Resources (DWR), and Portland Natural Resources Conservation Services (NRCS) and CWCB staff is working together to develop approaches to address forecast improvements. A need exists to continue to develop methods to analyze and display the existing data, develop new data, and develop new approaches. CWCB staff's role includes serving as a liaison between these agencies and water users in the Rio Grande. These ideas were presented to the September 13, 2011 Rio Grande BRT. An explanation of five proposed projects developed by this team is provided in this narrative.

Science Team Agency	Areas of Expertise
Colorado Division of Water Resources	Water administration in the Rio Grande Basin
Colorado Water Conservation Board	Water management in Colorado
National Center for Atmospheric Research	Data networks, atmospheric research and modeling
National Operational Hydrologic Remote Sensing Center	SNODAS, remote sensing
Natural Resources Conservation Services	Forecasting with regression models, SNOTEL stations
NOAA-National Severe Storms Laboratory	Radar technology, research to operations
Riverside Technology, inc	Forecast models, operational systems, DSS tools
NWS-West Gulf River Forecast Center	Forecasting with regression and hydrologic models

What is a water supply forecast?

A water supply forecast is a prediction of seasonal volumetric runoff. The forecast presents a range of possible runoff volumes with probabilities of occurrence. This range in forecast volumes reflects uncertainty with future weather conditions, errors in data, and uncertainty in the forecasting procedure.

RIO GRANDE BASIN

Streamflow Forecasts - April 1, 2011

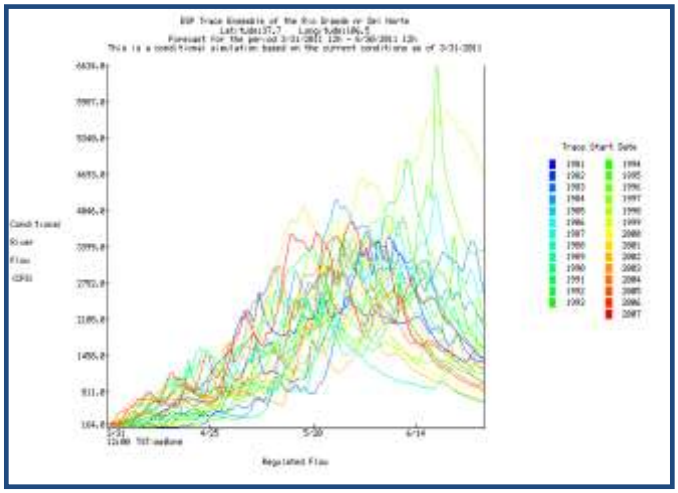
Forecast Pt	<==== Drier === Future Conditions === Wetter ====>						
	========== Chance of Exceeding * ==========						
Forecast Period	90% (1000AF)	70% (1000AF)	50% (Most Prob) (1000AF)	30% (% AVG.)	10% (1000AF)	30 Yr Avg (1000AF)	
Rio Grande nr Del Norte (2)							
APR-SEP	280	340	390	73	440	525	531

Who is responsible for issuing the water supply forecasts in the Rio Grande Basin?

The Natural Resources Conservation Service (NRCS) and the National Weather Service West Gulf River Forecast Center (WGRFC) in the Rio Grande are responsible for issuing forecasts.

What are the two water supply forecasts techniques?

The first technique is multivariate regression analysis, which predicts seasonal water supply as a function of snow water equivalent at SNOTEL stations. Other variables, such as year-to-date precipitation, may also be included. Regression methods have historically been the sole technique in the Rio Grande Basin.



The second technique uses hydrologic models to track snow accumulation and ablation and to perform soil moisture accounting. To generate a water supply forecast, the Ensemble Streamflow Prediction (ESP) program uses the snowpack and soil moisture conditions and historical weather

data to generate a series of possible runoff scenarios. The runoff traces produce the probabilistic information.

How accurate have the historical water supply forecasts?

The forecasts have been accurate in some years. In other years, the forecast error has been as large as 24%. Typically, the forecast models tend to perform best in average years, with dry and wet years being more difficult to predict.

The Issue

Rio Grande at Del Norte	June Forecast Water Supply [ac-ft]	Actual Water Supply [ac-ft]	Forecast Error June Forecast – Actual [ac-ft]
WY 2005	795,000	683,000	+112,000 (16%)
WY 2006	350,000	412,000	-62,000 (-15%)
WY 2007	450,000	593,000	-143,000 (-24%)
WY 2008	655,000	623,000	+32,000 (5%)
WY 2009	490,000	513,000	-23,000 (-4%)
WY 2010	485,000	455,000	+30,000 (+7%)

As a rule of thumb in U.S. water management, 1 ac-ft is the planned water usage of a suburban family household annually.

1 ac-ft = 326,000 gallons of water 2007 error = 46,618,000,000 gallons

How do forecast errors affect water users in the Rio Grande Basin?

The water supply forecasts are used by the DWR to determine Colorado's delivery obligations under the Rio Grande Compact, as well as the water available for San Luis Valley water users. Forecast errors may result in too much or too little water being delivered to New Mexico. Correspondingly, too much or too little water is made available to local water users, depending on the direction of the forecast error.

Basin underrepresentation by SNOTEL, sun, wind, dust, temperature, terrain, soil moisture, groundwater recharge, and spring weather complicate the timing and volume of runoff.

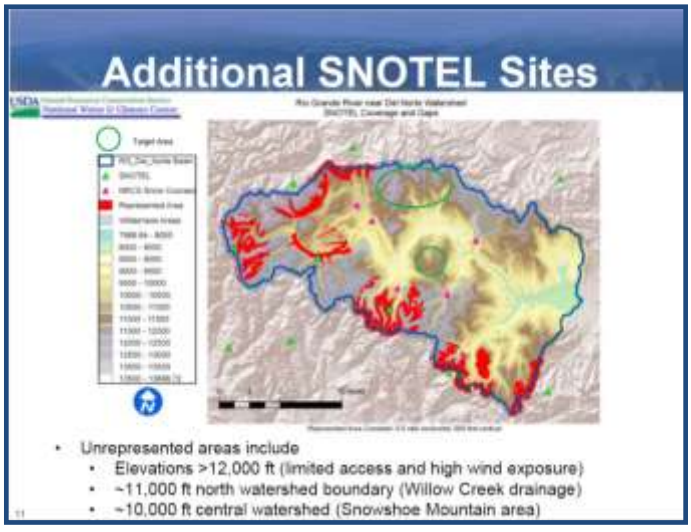
What is the economic impact of forecast errors?

It is difficult to assign an exact cost, but assuming a lease rate for water in the Rio Grande is $135/ac-ft, then the potential cost of the forecast error in 2007 of 143,000 ac-ft is estimated to be $19,305,000.

Will more SNOTEL sites help?

Starting in 2004, the CWCB developed a popular program to cost share with the NRCS and local agencies in the development of more SNOTEL sites.

More SNOTEL sites will help as inputs to models, but they are not the sole answer to more accurate forecasts. By nature, they are in snow catchment basins and will always

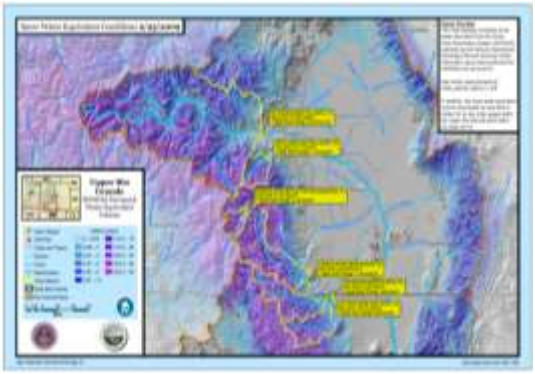


have values that do not fully represent the basin-wide snow hydrology.

The red areas in the above figure show regions where NRCS has the highest confidence in hydrology for the Rio Grande watershed. The Rio Grande has significant wilderness lands where no SNOTELs can be deployed. The green circles show areas where additional SNOTEL sites, if they could be installed, would be most valuable.

What is SNODAS?

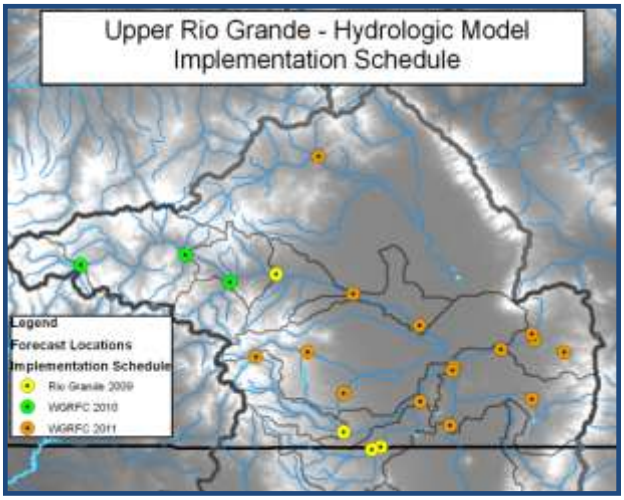
In recent years, remotely sensed data and land surface models have been used to estimate snowpack characteristics for the conterminous U.S. The CWCB partnered with the USBR and Riverside Technology, inc (Riverside) to develop products for the Rio Grande Basin using the Snow Data Assimilation System (SNODAS). These products were distributed to the CWCB, CDWR, WGRFC, NRCS, and San Luis Valley Irrigation District (SLVID) throughout the last four snow seasons.



David McClow of the USGS published a 2012 paper titled "Evaluation of SNODAS Depth and SWE for the Colorado Rocky Mountains, USA". McClow states that SNODAS products have the potential to substantially improve the calibration and performance of spatially distributed hydrologic models in snow-dominated catchments of the western U.S. It is the only nationwide, moderate resolution, gridded snow water equivalent (SWE) product available at a daily time step. The objective of this study was to evaluate the accuracy of SNODAS snow depth and snow water equivalent in the Colorado Rocky Mountains using two independent methods, including (1) ground-based snow surveys, and (2) water-balance calculations on headwater basins. Results from this study indicate that SNODAS can provide reliable data for input to moderate- to large-scale hydrologic models, which are essential for creating accurate runoff forecasts. Refinement of SNODAS SWE estimates for alpine areas to account for wind redistribution of snow could further improve model performance.

What recent projects have led to the current state of basin forecasting for the Rio Grande watershed?

In 2009, the CWCB and the Rio Grande Water Conservation District (RGWCD) partnered to redevelop the NWS hydrologic models for the four index gages specified (yellow circles). The NWS is now able to produce water supply forecasts using hydrologic models coupled with Ensemble Streamflow Prediction, in addition to the traditional regression-based methods.



In 2009, the NWS continued redevelopment of the hydrologic models down to the Lobatos gage (green and orange circles) Now the NWS is running the 22 redeveloped hydrologic models and Ensemble Streamflow Prediction.

In 2011, the U.S. Army Corps of Engineers worked to redevelop the hydrologic models for 55 tributary and local inflow points for the Rio Grande in New Mexico. The WGRFC will use these to forecast for the Water Operations Model to support the USACE and USBR in annual operating plans for their reservoirs.

In 2012, RTi continues to work with the WGRFC to develop basin and reservoir models that are used for water supply forecasting/ESP or for forecasting flood flows. In terms of water supply forecasting, RTi was hired to develop hydrologic models for six water supply forecast points in the Pecos River Basin in New Mexico.

What is the current NWS snowpack model?

The current snowpack model used by the National Weather Service is SNOW-17. Water supply forecasting uses SNOTEL to feed a calibrated lumped model called SNOW-17 developed in 1973. Its primary inputs are year-to-date precipitation and air temperature. SNOW-17 is a conceptual model, and most of the important physical processes that take place within a snow cover are explicitly included in the model, but only in a simplified form. There has been a scientific debate about whether calibrated lumped models are better than distributed models, and the answer is still uncertain.

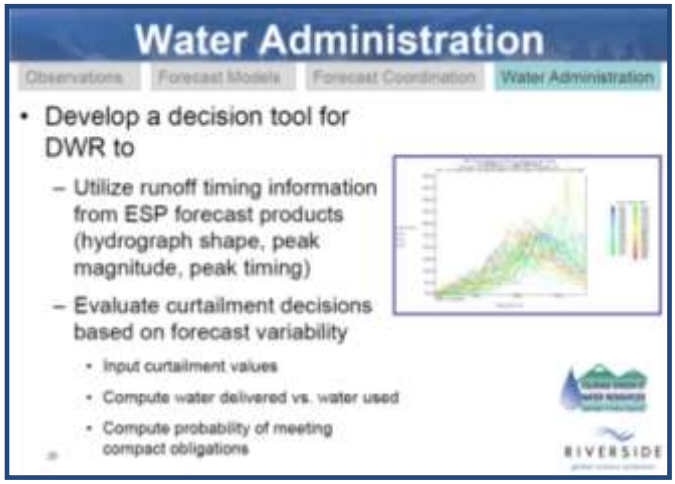
How is SNODAS used in the Rio Grande?

RTi, the CWCB, and the San Luis Valley ID, and RGWCD teamed up to provide SNODAS, above the Lobatos, Del Norte, and Magote compact index stream gauges to assist the Division Engineer in tracking melt out for comparison of forecasted runoff to actual runoff.

Five projects to improve forecasting are proposed by the aforementioned multi-agency team and are described below. These are presented in order of ranking of importance and immediate usefulness, as determined by the National Weather Service. These projects would take place in the Rio Grande watershed as demonstration projects, but the technologies could be eventually expanded statewide.

Project 1 - Rio Grande Compact Decision Support Tool

A DSS tool will be developed for the DWR that will combine the Ensemble Streamflow Prediction traces and planned curtailments to estimate water for delivery to New Mexico, water available to CO water users, and the probability of compact compliance. The tool provides improved scenario for establishing curtailments by using runoff timing information from the ESP to supplement the official seasonal forecast volumes. The tool will help to maximize the likelihood of compact compliance by using probabilistic information to account for the variability in the forecasts. The cost of this project is estimated to be $65,000.

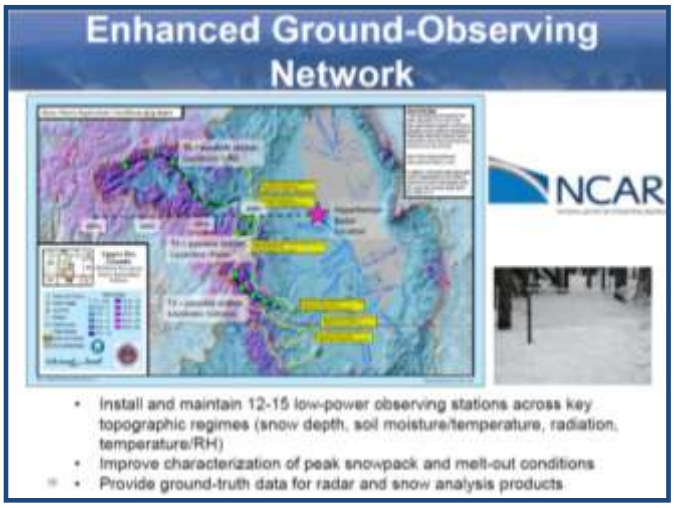


Project 2 - Generate historical forecasts

The redeveloped hydrologic models will be used to generate historical forecasts using Ensemble Streamflow Prediction for the period 1981-2008 at 22 forecast locations in CO to understand which of the hydrologic models perform well for forecasts. The results will support the WGRFC in future forecasts when disparate values are predicted by the regression models and the hydrologic models. The cost of this project is estimated to be $110,000.

Project 3 - Satellite data to improve SNOW-17

The dataset of historical snow-covered area from SNODAS and MODIS will be utilized to investigate whether the inclusion of observed snow-covered area data in the forecast models has the potential to improve the models or to explain historical errors. The cost of this project is estimated to be $35,000.

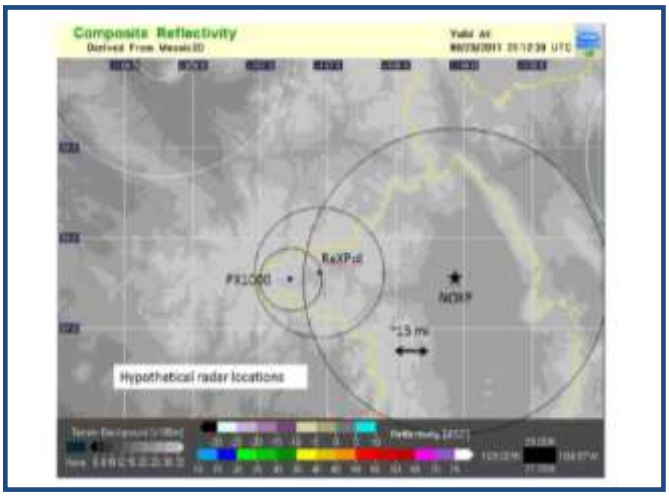


Project 4 – Enhanced Ground Observing Network

A network of 15 snow hydrometeorology stations will be installed and maintained for two snow seasons. These additional observations will enhance the precipitation and SNODAS SWE products. These observations will be used to validate basin average estimates of SWE and snow-covered area. Additional funding will be needed for O&M low cost sensors were intentionally selected to minimize future costs. The cost of this project is estimated to be $125,000.

Project 5 – Radar coupled to SNODAS coupled to the National Weather Service's Research Distributed Hydro Model

Radar will be deployed in the Rio Grande Basin from October 2013-May 2014. Radars will produce an enhanced gridded precipitation product (see http://nmq.ou.edu) as well as an enhanced SNODAS SWE product. The cost of this project is estimated to be $300,000. A more thorough description of this project is provided on the following pages.



NWS Priority Ranking of the Five Proposals:

Project Title (1)	Lead Agencies	Explanation	Cost Est.
Compact Compliance Tool	DWR, WGRFC, RTi	Ensemble Streamflow Prediction (ESP) forecasts to evaluate curtailment scenarios and estimate the probability of Compact compliance	$65,000
Strengths: Increase DWR understanding and use of forecasts to administer water and meet obligations.			
Limitations: None, but is short term need			
Project Title (2)	Lead Agencies	Explanation	Cost Est.
Generate Historic Forecasts	WGRFC, RTi	Use the 22 new hydrologic models to generate historic ESP forecasts for 1981-2008.	$110,000
Strengths: Builds historic data set for newly developed 22 hydrologic models to strengthen forecasts			
Weaknesses: None, but is short term need			
Project Title (3)	Lead Agencies	Explanation	Cost Est.
Snow Covered(4) Area data to improve snow modeling	WGRFC, RTi	Select four forecast locations and compared estimated from MODIS, SNODAS, and SNOW-17	$35,000
Strengths: Three sources of data for comparison. MODIS data was developed for the RFC and NRCS use			
Weaknesses: None, but may take time for CBRFC to develop methodology for use			
Project Title (4)	Lead Agencies	Explanation	Cost Est.
More Ground Observations	NCAR & CWCB	8 SNOTEL stations that will fill gaps in elevation bands not represented by existing SNOTELs	$65,000
Strengths: All models will benefit from different elevation band info. Designed to be low maintenance and calibrated to local SNOTEL SWE. Creates a legacy for better observations in the Rio Grande.			
Limitations: Will require to be maintained locally, probably by DWR.			
Project Title (5)	Lead Agencies	Explanation	Cost Est.
Radar + SNODAS + Distributed Hydro model	NOAA & CWCB	Radar coupled to SNODAS. Data provided to RFC operational system.	$300,000
Strengths: Radar creates continuous coverage and more detailed precipitation estimates. This will provide a rich source of data to models that can accept more detailed detailed.			
Limitations: New data sets from radar, new snow model, and new hydro model. Radar coverage issues remain after project. Project is only to demonstrate the feasibility.			

Summary: Staff believes all five projects have merit, and the Compact Compliance DSS tool may immediately benefit the DWR. Staff believes the Radar+SNODAS+Distributed Hydro (Project 5, outlined in more detail in the following pages) will benefit the state by building integrated systems through state of the art technology. This project will also help build the business case for gap filling radars. Filling the gaps will create complete Basin precipitation coverage and the resulting benefits are numerous.

State of the Science Basin Forecasting

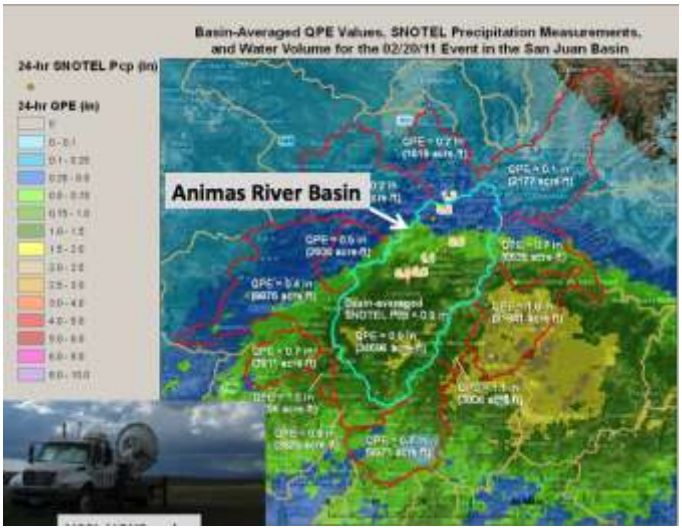
Forecasting Development Demonstration Project for the Upper Rio Grande (Project 5)

Introduction: In order to determine sources of and improve upon errors in water supply forecasts, a multi-faceted multi-agency approach is needed. The goal is to improve forecasting through demonstration of existing observing technology and modeling concepts through a pilot project in the Upper Rio Grande.

Project overview: A mobile Doppler radar will be deployed by the National Severe Storms Laboratory (NSSL) near Creede, CO during the 2013 water year with high confidence in observations over at least 75% of the basin above Del Norte. The NOAA/National Severe Storms Lab's (NSSL) Multi-Radar, Multi-Sensor system (MRMS; http://www.nssl.noaa.gov/projects/q2/) will be the platform for data integration and display. Calibrated radar data, along with MODIS satellite Snow Covered Area Gridded data (MODSCAG), will be used to adjust Snow Data Assimilation System (SNODAS; http://www.nohrsc.noaa.gov/) grids, recalling that SNODAS is based largely on a 3-hr forecast and limited SNOTEL data. In companion, the hydrologic modeling system operated by the West Gulf River Forecast Center (WGRFC) will run in parallel with the latest distributed hydrologic model. Each system will use different versions of a snow analysis to demonstrate the impacts of each component on the water supply forecast. In addition, enhanced intermediate products will be made available to the end user through the Colorado Decision Support System and other user-friendly interfaces to elicit feedback and recommend improvements to operations.

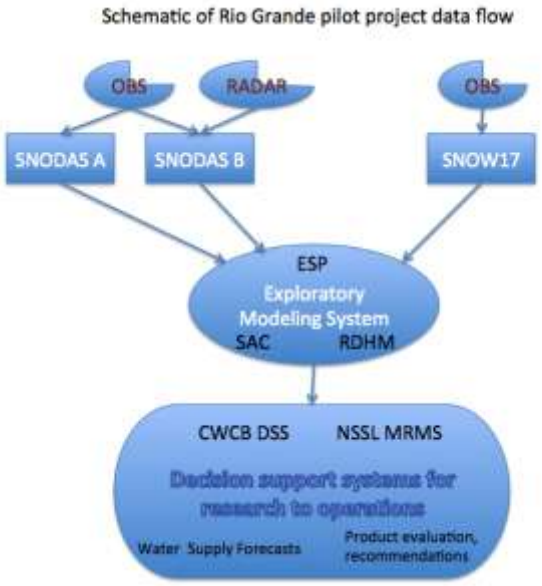
Upper Rio Grande Pilot Project

Objective: Improve snowpack observations and assess hydrologic model performance for improved situation awareness and water supply forecasts through sensitivity studies.



Observations: Radar has proven to provide spatial estimates of snowfall water equivalent (SWE). The image to the right shows basin-mapped SWE over the San Juan Mountains using an NSSL mobile gap-filling radar. For example, the Animas River Basin-average SWE from radar was equivalent to SNOTEL. Radar can provide spatial SWE estimates at up to 100 m resolution. In the Upper Rio Grande (3500 sq km), this conservatively equates to a data point every 1 km or 3500 SNOTELs for hourly/daily SWE precipitation observations.

Hydrologic Models: Historically, water supply forecasts used a multivariate regression analysis, which predicts seasonal water supply as a function of SWE observations at SNOTEL stations and snow courses. The CWCB has recently funded the development of hydrologic models for the West Gulf River Forecast Center (WGRFC). Hydrologic models are able to incorporate many more variables and new methods. There are two essential hydrologic modeling paradigms. The RFC SAC model requires calibration with at least a 30 year record of SNOTEL data. The SAC model is furthermore calibrated for a limited number of streamflow locations. Finally, this model uses large areas to compute mean areal precipitation; often these areas contain guesses for input data based on nearby data. New distributed models are more physically-based and use grid cells that can be aggregated to any scale. Thus streamflows can be extracted at many more points without the need for additional calibration.



The standard input to the SAC model for SWE is SNOTEL data through the SNOW17 model. This model uses limited physical processes to provide snowmelt to the model. The advanced SNODAS is a grid-based product at 1 km resolution with multiple inputs and a sophisticated physics package to drive SWE accumulation and depletion.

Project outline (see schematic):

1. Create new radar-derived SWE products by elevation band for decision support systems and model input
2. Using NSSL's MRMS system, nudge SNODAS with radar and MODSCAG data
3. Set up Research Distributed Hydro Model (Model A)
4. Set up the operational SAC model to mirror WGRFC configuration (Model B)
5. Integrate results within the Exploratory Modeling System
6. For a total of six scenarios, each model with run:
    a. With only SNOTEL
    b. With only SNODAS (already nudged with SNOTEL)
    c. With SNODAS nudged by radar

Partner roles:

1. CWCB – 1 August 2012 application to the state for $150K to set up hydrologic models and data infrastructure
2. NOAA Testbed – October 2012 application to NOAA for $150K to collect radar data in the Upper Rio Grande near Creede, CO for 7 months (1 Oct 2013-31 April 2014)
3. NOHRSC – advise on best practices for nudging SNODAS
4. WGRFC – advise on hydrologic model configuration and calibration; coordinate on use of NSSL-derived products

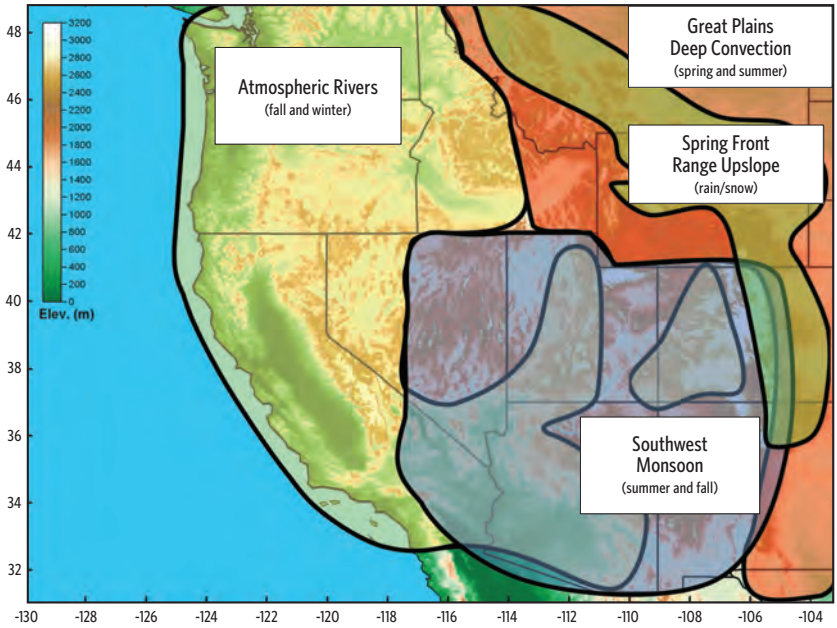
21ST CENTURY

Western Observing System for Extreme Precipitation

The Western States Water Council supports developing an improved observing system for extreme precipitation events in the West (position #332, adopted June 2011). A better ability to forecast the timing and amount of precipitation expected from major storms will benefit state flood management, emergency response, and traffic operations programs, as well as state, federal, and local reservoir managers and coastal resources managers. Recognizing the importance of preparing for climate extremes, the Western Governors' Association and the National Oceanic and Atmospheric Administration (NOAA) signed a memorandum of understanding in 2011 which called for undertaking projects to help reduce disaster risks associated with extreme events.

At the request of the Council and the California Department of Water Resources (CDWR), NOAA's Hydrometeorology Test Bed (HMT) program worked with the research community to develop a vision for a proposed 21st century Western observing

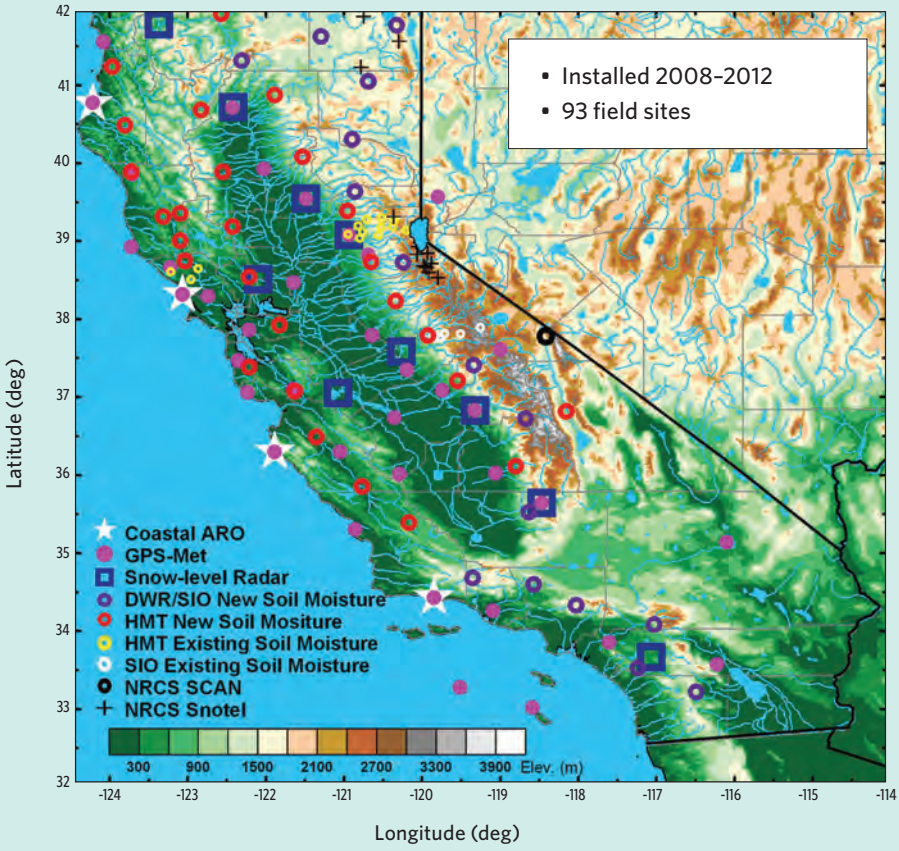
Regional variation in sources of Western extreme precipitation. *NOAA figure*



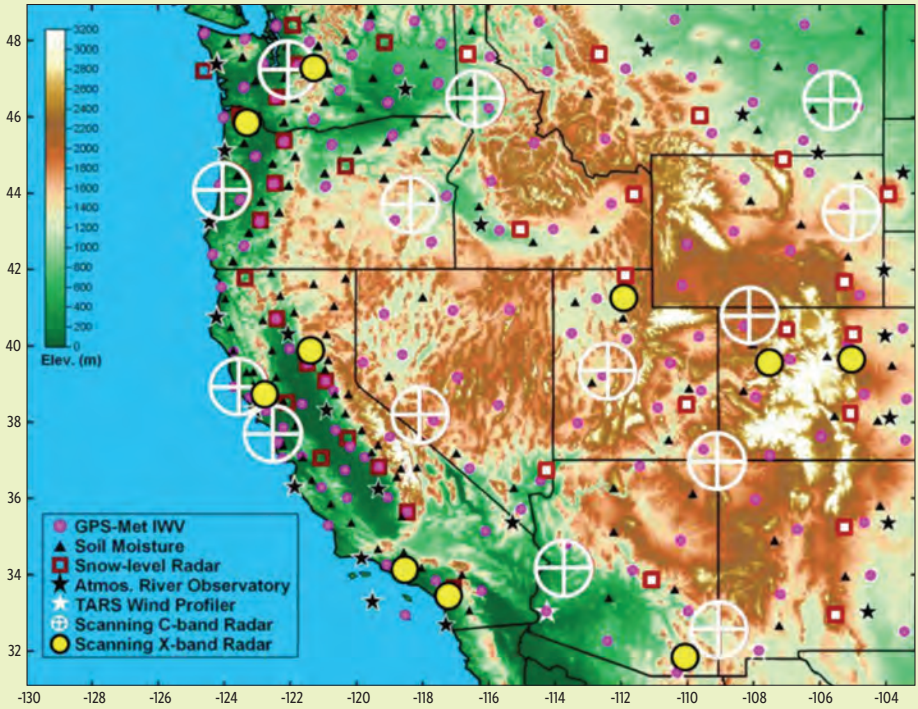
system for extreme precipitation. The observing system is based on experience gained in California, where the HMT program has partnered with other federal agencies, local agencies, and CDWR for almost 10 years to carry out field research and monitoring of winter storms. The HMT project's success in California and recent CDWR/NOAA efforts to permanently install HMT monitoring technologies prompted the Council's interest in expansion of these monitoring capabilities more broadly in the West.

The **HMT project's success in California** and recent CDWR/NOAA efforts to permanently install HMT monitoring technologies prompted the Council's interest in **expansion of these monitoring capabilities** more broadly in the West.

Examples of Existing and Potential Instrumentation



An AR-focused long-term observing network is being installed in California as part of a 5-year project between CDWR, NOAA and Scripps Inst. of Oceanography.
NOAA figure

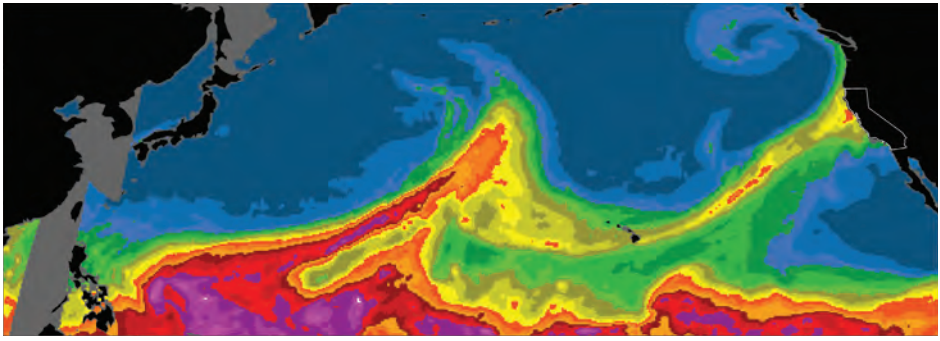


Schematic network of new land-based sensors to improve monitoring, prediction and climate trend detection for hydrometeorological conditions that create extreme precipitation and flooding. Offshore coastal sensors not shown.

NOAA figure.

The HMT project in California identified a major gap in existing hydrometeorological monitoring and precipitation forecasting — our limited ability to track and quantify water vapor transport from the Pacific Ocean across the West's mountainous terrain. Existing meteorological observations do not measure winds and water vapor far up enough into the atmosphere. Using new methodologies and technologies that have largely only become available in the past decade, the envisioned 21st century observing system would fill this gap and augment or complement existing monitoring networks already in place.

The HMT project in California identified a **major gap in existing hydrometeorological monitoring and precipitation forecasting** — our limited ability to track and quantify water vapor transport from the Pacific Ocean across the West's mountainous terrain.



Satellite image of atmospheric river reaching West Coast. Atmospheric river storms — storms fueled by concentrated streams of water vapor from the Pacific Ocean — are responsible for most episodes of major West Coast flooding. The HMT's efforts in California were responsible for identifying this storm type and its importance for flood management and water supplies.
NOAA figure

The envisioned Western observing system will require research and the development and installation of instrumentation to improve real-time tracking of hydrometeorological conditions, forecast lead times, and quantitative precipitation estimates for major storms in the West. Examples of needed instrumentation include atmospheric river observatories with specialized radars and other meteorological instrumentation such as wind profilers and water vapor monitors, together with precipitation, streamgage, and soil moisture networks and new types of snow instrumentation. Examples of needed research include developing offshore monitoring systems (e.g., buoy-mounted systems) to provide early warning and forecasting capabilities for major storms hitting the West Coast. The network design and combinations of instrumentation would vary from place to place as needed for observing specific storm types responsible for causing extreme precipitation in different areas of the West. West-wide installation of the observing system is estimated to cost in the range of $200 million over six years.

Using **new methodologies and technologies** that have largely only become available in the past decade, **the envisioned 21st century observing system would fill this gap** and augment or complement existing monitoring networks already in place.


western states
water council

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

TO: Colorado Water Conservation Board Members

FROM: Ray Alvarado
Interstate, Federal &Water Information Section

DATE: September 14, 2012

SUBJECT: **Non-Reimbursable Investment Item #7**
CDSS Operations and Maintenance

Introduction

Colorado's Decision Support Systems (CDSS) are a joint effort of CWCB and DWR, with the purpose of providing data and analytical tools to aid in water resources planning and management in the State. Currently there are DSSs in place for the Colorado River and Rio Grande Basins, and the development of the South Platte DSS is ongoing.

CDSS is an invaluable and successful system of water resources data and analytical tools developed over the last 20 years by CWCB and DWR. With $20 million invested in the increasingly utilized CDSS, this decision item request is needed to provide the funding necessary for ongoing maintenance of CDSS.

Staff Recommendation

Staff recommends that the Board request the General Assembly to authorize $100,000 from the Construction Fund to be appropriated to the Department of Natural Resources for allocation to the CWCB for CDSS operations and maintenance. Note that the original staff recommendation was for $150,000; however, based upon review by the CWCB Director and Staff Section Chiefs, the recommended funding level for this request has been reduced to $100,000.

Water Project Construction Program – Project Data
Non-Reimbursable Investment

Applicant: Ray Alvarado for CWCB

Project Name: CDSS Operating & Maintenance
Project Type: O&M

County: Several **Drainage Basin:** Statewide
Water Source: Statewide

Total Study Cost: $150,000

Funding Sources: CWCB Construction Fund

Type of Applicant: Grant **Median Household Income:** N/A

CWCB Investment: $20 million under original CRDSS effort

COLORADO WATER CONSERVATION BOARD

CONSTRUCTION FUND
NON-REIMBURSABLE PROJECT INVESTMENT APPLICATION

CDSS Operation and Maintenance

(Project Name)

Application Deadline: August 1 for funds available July 1 the following year.

Funding recommendations will be considered at the November CWCB Board Meeting.

Instructions: This application form should be emailed, typed, or printed neatly. You may attach additional sheets as necessary to fully answer any question, or to provide additional information that you feel would be helpful in evaluating this application. Include with your application a cover letter summarizing your request. If you have difficulty with any part of the application, contact Kirk Russell, PE, Finance Section Chief for assistance, at (303) 866-3441, ext. 3232 or email kirk.russell@state.co.us.

Generally, the applicant is also the prospective owner and sponsor of the proposed project. If this is not the case, contact CWCB before completing this application.

Part A. - Description of the Applicant (Project Sponsor or Owner);

1. Applicant Name(s): Colorado Water Conservation Board

Mailing address: 1313 Sherman St, Denver CO 80203

Taxpayer ID#:

Email address: Ray.alvarado@state.co.us

Phone Numbers: Business: 303-866-3441

Home:

Fax:

2. Person to contact regarding this application if different from above:

Name: Ray Alvarado

Position/Title CDSS Project Coordinator

3. Provide a brief description of your organization below:

The Colorado Water Conservation Board (CWCB) was created in 1937 for the purpose of aiding in the protection and development of the waters of the State. The Mission of the CWCB is to Conserve, Develop, Protect, and Manage Colorado's Water for Present and Future Generations.

Part B. - Description of the Project or Study

1. Name of the study or project: State of Colorado

2. What is the purpose of this grant application? Check one.

	Study
	Demonstration project.
	Rehabilitation or replacement of existing
X	Other (Please describe)

Colorado's Decision Support Systems (CDSS) is an invaluable and successful system of water resources data and analytical tools developed over the last 20 years by CWCB and DWR. With $20 million invested in the increasingly utilized CDSS, this decision item request is needed to provide the funding necessary for ongoing maintenance of CDSS, without additional FTE's.

3. General location of the study or demonstration project. (Please include county, and approximate distance and direction from the nearest town):

Statewide

4. Please provide a brief narrative description of the proposed study or demonstration project including purpose, need, and service area. (Attach scope of study, if available)

Use and maintenance of the CDSS is a joint effort of the CWCB and DWR. The two agencies work closely together to ensure there is no duplication in staff assignments and that each component of the CDSS is overseen by the division that has the most in-house infrastructure. The DWR is responsible for all CDSS data collection, database work, development, and operation of all CDSS administration tools. The CWCB is the State's primary water resource planning agency and therefore, is responsible for the development and operation of that portion of the CDSS. The CDSS is a dynamic process and the need to update and enhance the system becomes more important as the use of the DSS expands.

5. Explain why you are requesting a grant, instead of a loan. (the Construction Fund exists primarily to provide low interest loans for the construction or rehabilitation of raw water projects. Non-reimbursable investments are approved only when the project or study is of statewide interest and benefits a wide range of people and organizations, and/or a large geographical area **.**

This is a program of the CWCB and a grant is the appropriate funding mechanism.

6. List the names and addresses of any technical or legal consultants retained to represent the applicant or to conduct investigations for the proposed project or study.

Name	Address & Phone Number
N/A	

7. List any feasibility study or scope of work that has been completed or is now in progress for the proposed project or study. (Submit one copy with this application):

Colorado River Decision Support System (CRDSS)
Rio Grande River Decision Support System (RGDSS)
South Platte River Decision Support System (SPDSS)
Arkansas River Decision Support System (ArkDSS)

These are river basins that DSS have being implemented and where operation and maintenance under the CDSS umbrellia, where this grant request would be used, along with CDSS software developed tools.

Non-Reimbursable Project Investment Application - CWCB Construction Fund

Form Revised April 2010

8. What is the estimated cost of the study/demonstration project? Please include estimated Study, Planning, Engineering, and Construction costs, if known:

Estimated Planning/Study Costs:	
Estimated Engineering Costs:	
Estimated Construction Costs:	
Estimated Total Costs:	$150,000

9. **How much funding are you requesting?** $150,000

Part C. - Project Sponsor Financial Information

1. The CWCB Construction Fund is primarily a revolving loan fund. Non-reimbursable investments are approved only when the project or study is of statewide interest and benefits a wide range of people. Provide copies of the two most recent annual reports, financial statements, corporate reports or other current documentation of financial condition and operations with this application.

2. Provide a brief narrative description of potential sources of funding (in addition to the CWCB) which have been explored or which will be explored for the proposed project or study. (Examples would be Local County and Town Governments, Water Conservancy Districts, USDA Rural Development, The Natural Resources Conservation Service, The U.S. Environmental Protection Agency, Commercial Banks, etc.)

The above statements are true to the best of my knowledge:

Signature of Applicant:

Print Applicant's Name: Ray Alvarado

Project Title: CDSS Operation and Maintence

Date: 7/31/2012

Return this application to:

Mr. Kirk Russell, P.E., Chief
Finance Section
COLORADO WATER CONSERVATION BOARD
1580 Logan Street, Suite 600
Denver, CO 80203

Submit applications by email to: kirk.russell@state.co.us or fax to (303) 894-2578
For questions call (303) 866-3441, ext. 3232

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

TO: Colorado Water Conservation Board Members

FROM: Ted Kowalski, Chief
Interstate, Federal &Water Information Section

DATE: September 14, 2012

SUBJECT: **Non-Reimbursable Investment Item #8**
Colorado River Basin Study Implementation

Introduction

For the last several years, the Colorado Water Conservation Board has been involved with a basin-wide collaborative effort, with the Colorado River basin states and the U.S. Bureau of Reclamation, to study water supplies and demands for the Colorado River and to explore options and strategies for addressing supply/demand imbalances. This study (the "Basin Study") is almost complete, with a projected release date at the end of November, 2012. It will be essential that Colorado and other stakeholders have money available to support implementation and participate in negotiations, additional studies, and other work related to implementation of the Basin Study.

As described above, the Colorado River Basin Study will likely have a number of strategies and options that should be explored further, with the other Colorado River Basin States and the U.S. Bureau of Reclamation. Colorado will need to have funds available for any additional feasibility work or pre-feasibility work associated with basin-wide options for helping bridge the supply/demand imbalances. Without adequate funding, Colorado's interests may not be adequately protected.

Staff Recommendation

Staff recommends that the Board request the General Assembly to authorize $75,000 from the Construction Fund to be appropriated to the Department of Natural Resources for allocation to the CWCB to assure that Colorado can participate in implementation of the Colorado River Basin Study. Note that the original staff recommendation was for $150,000; however, based upon review by the CWCB Director and Staff Section Chiefs, the recommended funding level for this request has been reduced to $75,000.

COLORADO WATER CONSERVATION BOARD

CONSTRUCTION FUND
NON-REIMBURSABLE PROJECT INVESTMENT APPLICATION

Colorado River Basin Study Implementation

(Project Name)

Application Deadline: August 1 for funds available July 1 the following year.

Funding recommendations will be considered at the November CWCB Board Meeting.

Instructions: This application form should be emailed, typed, or printed neatly. You may attach additional sheets as necessary to fully answer any question, or to provide additional information that you feel would be helpful in evaluating this application. Include with your application a cover letter summarizing your request. If you have difficulty with any part of the application, contact Kirk Russell, PE, Finance Section Chief for assistance, at (303) 866-3441, ext. 3232 or email kirk.russell@state.co.us.

Generally, the applicant is also the prospective owner and sponsor of the proposed project. If this is not the case, contact CWCB before completing this application.

Part A. - Description of the Applicant (Project Sponsor or Owner);

1. Applicant Name(s): Colorado Water Conservation Board

Mailing address: 1313 Sherman St, Denver CO 80203

Taxpayer ID#: Email address: Ted.kowalski@state.co.us

Phone Numbers: Business: 303-866-3441

Home:

Fax:

2. Person to contact regarding this application if different from above:

Name: Ted Kowalski

Position/Title Interstate, Federal and Water Information Section Chief

3. Provide a brief description of your organization below:

The Colorado Water Conservation Board (CWCB) was created in 1937 for the purpose of aiding in the protection and development of the waters of the State. The Mission of the CWCB is to Conserve, Develop, Protect, and Manage Colorado's Water for Present and Future Generations.

Part B. - Description of the Project or Study

1. Name of the study or project: State of Colorado

2. What is the purpose of this grant application? Check one.

	Study
	Demonstration project.
	Rehabilitation or replacement of existing
X	Other (Please describe)

For the last several years, the Colorado Water Conservation Board has been involved with a basin-wide collaborative effort, with the Colorado River basin states and the U.S. Bureau of Reclamation, to study water supplies and demands for the Colorado River and to explore options and strategies for addressing supply/demand imbalances. This study is almost complete, and it will be essential that Colorado and other stakeholders have money available to support implementation.

3. General location of the study or demonstration project. (Please include county, and approximate distance and direction from the nearest town):

Statewide

4. Please provide a brief narrative description of the proposed study or demonstration project including purpose, need, and service area. (Attach scope of study, if available)

As described above, the Colorado River Basin Study will likely have a number of strategies and options that should be explored further, with the other Colorado River Basin States and the U.S. Bureau of Reclamation. Colorado will need to have funds available for any additional feasibility work or pre-feasibility work associated with basin-wide options for helping bridge the supply/demand imbalances. Without adequate funding, Colorado's interests may not be adequately protected.

Non-Reimbursable Project Investment Application - CWCB Construction Fund

Form Revised April 2010

5. Explain why you are requesting a grant, instead of a loan. (the Construction Fund exists primarily to provide low interest loans for the construction or rehabilitation of raw water projects. Non-reimbursable investments are approved only when the project or study is of statewide interest and benefits a wide range of people and organizations, and/or a large geographical area **.**

These funds will support the protection of Colorado's Compact entitlements, which is a critical part of the CWCB's mission the Interstate, Federal, and Water Information Section's programs. Thus, a grant is appropriate funding mechanism for this work.

6. List the names and addresses of any technical or legal consultants retained to represent the applicant or to conduct investigations for the proposed project or study.

Name	Address & Phone Number
N/A	

7. List any feasibility study or scope of work that has been completed or is now in progress for the proposed project or study. (Submit one copy with this application):

Colorado River Basin Study (along with the Bureau of Reclamation and the Colorado River Basin States)

Non-Reimbursable Project Investment Application - CWCB Construction Fund

Form Revised April 2010

8. What is the estimated cost of the study/demonstration project? Please include estimated Study, Planning, Engineering, and Construction costs, if known:

Estimated Planning/Study Costs:	
Estimated Engineering Costs:	
Estimated Construction Costs:	
Estimated Total Costs:	$150,000

9. **How much funding are you requesting?** $150,000

Part C. - Project Sponsor Financial Information

1. The CWCB Construction Fund is primarily a revolving loan fund. Non-reimbursable investments are approved only when the project or study is of statewide interest and benefits a wide range of people. Provide copies of the two most recent annual reports, financial statements, corporate reports or other current documentation of financial condition and operations with this application.

2. Provide a brief narrative description of potential sources of funding (in addition to the CWCB) which have been explored or which will be explored for the proposed project or study. (Examples would be Local County and Town Governments, Water Conservancy Districts, USDA Rural Development, The Natural Resources Conservation Service, The U.S. Environmental Protection Agency, Commercial Banks, etc.)

The above statements are true to the best of my knowledge:

Signature of Applicant:

Print Applicant's Name: Ted Kowalski

Project Title: Colorado River Basin Study Implementation

Date: 7/31/2012

Return this application to:

Mr. Kirk Russell, P.E., Chief
Finance Section
COLORADO WATER CONSERVATION BOARD
1580 Logan Street, Suite 600
Denver, CO 80203

Submit applications by email to: kirk.russell@state.co.us or fax to (303) 894-2578
For questions call (303) 866-3441, ext. 3232

COLORADO WATER CONSERVATION BOARD

CONSTRUCTION FUND
NON-REIMBURSABLE PROJECT INVESTMENT APPLICATION

Colorado River Basin Study Implementation

(Project Name)

Application Deadline: August 1 for funds available July 1 the following year.

Funding recommendations will be considered at the November CWCB Board Meeting.

Instructions: This application form should be emailed, typed, or printed neatly. You may attach additional sheets as necessary to fully answer any question, or to provide additional information that you feel would be helpful in evaluating this application. Include with your application a cover letter summarizing your request. If you have difficulty with any part of the application, contact Kirk Russell, PE, Finance Section Chief for assistance, at (303) 866-3441, ext. 3232 or email kirk.russell@state.co.us.

Generally, the applicant is also the prospective owner and sponsor of the proposed project. If this is not the case, contact CWCB before completing this application.

Part A. - Description of the Applicant (Project Sponsor or Owner);

1. Applicant Name(s): Colorado Water Conservation Board

Mailing address: 1313 Sherman St, Denver CO 80203

Taxpayer ID#: Email address: Ted.kowalski@state.co.us

Phone Numbers: Business: 303-866-3441

Home:

Fax:

2. Person to contact regarding this application if different from above:

Name: Ted Kowalski

Position/Title Interstate, Federal and Water Information Section Chief

3. Provide a brief description of your organization below:

The Colorado Water Conservation Board (CWCB) was created in 1937 for the purpose of aiding in the protection and development of the waters of the State. The Mission of the CWCB is to Conserve, Develop, Protect, and Manage Colorado's Water for Present and Future Generations.

Part B. - Description of the Project or Study

1. Name of the study or project: State of Colorado

2. What is the purpose of this grant application? Check one.

	Study
	Demonstration project.
	Rehabilitation or replacement of existing
X	Other (Please describe)

For the last several years, the Colorado Water Conservation Board has been involved with a basin-wide collaborative effort, with the Colorado River basin states and the U.S. Bureau of Reclamation, to study water supplies and demands for the Colorado River and to explore options and strategies for addressing supply/demand imbalances. This study is almost complete, and it will be essential that Colorado and other stakeholders have money available to support implementation.

3. General location of the study or demonstration project. (Please include county, and approximate distance and direction from the nearest town):

Statewide

4. Please provide a brief narrative description of the proposed study or demonstration project including purpose, need, and service area. (Attach scope of study, if available)

As described above, the Colorado River Basin Study will likely have a number of strategies and options that should be explored further, with the other Colorado River Basin States and the U.S. Bureau of Reclamation. Colorado will need to have funds available for any additional feasibility work or pre-feasibility work associated with basin-wide options for helping bridge the supply/demand imbalances. Without adequate funding, Colorado's interests may not be adequately protected.

Non-Reimbursable Project Investment Application - CWCB Construction Fund

Form Revised April 2010

5. Explain why you are requesting a grant, instead of a loan. (the Construction Fund exists primarily to provide low interest loans for the construction or rehabilitation of raw water projects. Non-reimbursable investments are approved only when the project or study is of statewide interest and benefits a wide range of people and organizations, and/or a large geographical area **.**

These funds will support the protection of Colorado's Compact entitlements, which is a critical part of the CWCB's mission the Interstate, Federal, and Water Information Section's programs. Thus, a grant is appropriate funding mechanism for this work.

6. List the names and addresses of any technical or legal consultants retained to represent the applicant or to conduct investigations for the proposed project or study.

Name	Address & Phone Number
N/A	

7. List any feasibility study or scope of work that has been completed or is now in progress for the proposed project or study. (Submit one copy with this application):

Colorado River Basin Study (along with the Bureau of Reclamation and the Colorado River Basin States)

Non-Reimbursable Project Investment Application - CWCB Construction Fund

Form Revised April 2010

8. What is the estimated cost of the study/demonstration project? Please include estimated Study, Planning, Engineering, and Construction costs, if known:

Estimated Planning/Study Costs:	
Estimated Engineering Costs:	
Estimated Construction Costs:	
Estimated Total Costs:	$150,000

9. **How much funding are you requesting?** $150,000

Part C. - Project Sponsor Financial Information

1. The CWCB Construction Fund is primarily a revolving loan fund. Non-reimbursable investments are approved only when the project or study is of statewide interest and benefits a wide range of people. Provide copies of the two most recent annual reports, financial statements, corporate reports or other current documentation of financial condition and operations with this application.

2. Provide a brief narrative description of potential sources of funding (in addition to the CWCB) which have been explored or which will be explored for the proposed project or study. (Examples would be Local County and Town Governments, Water Conservancy Districts, USDA Rural Development, The Natural Resources Conservation Service, The U.S. Environmental Protection Agency, Commercial Banks, etc.)

The above statements are true to the best of my knowledge:

Signature of Applicant:

Print Applicant's Name: Ted Kowalski

Project Title: Colorado River Basin Study Implementation

Date: 7/31/2012

Return this application to:

Mr. Kirk Russell, P.E., Chief
Finance Section
COLORADO WATER CONSERVATION BOARD
1580 Logan Street, Suite 600
Denver, CO 80203

Submit applications by email to: kirk.russell@state.co.us or fax to (303) 894-2578
For questions call (303) 866-3441, ext. 3232

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

TO: Colorado Water Conservation Board Members

FROM: Andy Moore
Interstate, Federal &Water Information Section

DATE: September 14, 2012

SUBJECT: **Non-Reimbursable Investment Item #9**
Arkansas River Decision Support System

Introduction

Colorado's Decision Support Systems (CDSS) are a joint effort of CWCB and DWR, with the purpose of providing data and analytical tools to aid in water resources planning and management in the State. Currently there are DSSs in place for the Colorado River and Rio Grande Basins, and the development of the South Platte DSS is ongoing.

The Arkansas River Decision Support System (ArkDSS) is the last DSS to be developed for CDSS. The feasibility study was completed in December 2011, resulting in a proposed implementation process including four phases, at an estimated total cost of $7,590,000. $500,000 has previously been approved by the Board for Phase 1, which is getting underway. The funding requested herein will be used to continue the ArkDSS implementation with the beginning of Phase 2, which includes data compilation and data collection activities that will provide the foundation for the ArkDSS.

Staff Recommendation

Staff recommends that the Board request the General Assembly to authorize $250,000 from the Construction Fund to be appropriated to the Department of Natural Resources for allocation to the CWCB to begin implementation of Phase 2 of the ArkDSS. Note that the original staff recommendation was for $500,000; however, based upon review by the CWCB Director and Staff Section Chiefs, the recommended funding level for this request has been reduced to $250,000.

Water Project Construction Program – Project Data
Non-Reimbursable Investment

Applicant: Andy Moore for CWCB

Project Name: Arkansas River Decision Support System
Project Type: Water Resources Planning Study

County: Numerous **Drainage Basin:** Arkansas River
Water Source: Arkansas River and tributaries

Total Study Cost: $7,590,000 (as estimated in the feasibility study); requesting $500,000 with this application

Funding Sources: CWCB Construction Fund

Type of Applicant: Grant **Median Household Income:** N/A

CWCB Investment: Currently $700,000. In SB07-122 the General Assembly provided $200,000 to conduct the feasibility study, which was completed in December 2011. In HB11-1274, $500,000 was allocated for Phase 1 implementation.

Past use of the Funds: The feasibility study was completed in December 2011 with the $200,000 provided in SB07-122. The $500,000 in HB11-1274 for Phase1 is planned to be utilized in the current fiscal year.

Current Request: This request is for funding to begin Phase 2 of the ArkDSS, which includes data compilation and data collection as identified in the feasibility study. **For FY 2013/2014, an appropriation of $500,000 is being sought from the Construction Fund to begin implementation of Phase 2 of the ArkDSS.**

COLORADO WATER CONSERVATION BOARD

CONSTRUCTION FUND
NON-REIMBURSABLE PROJECT INVESTMENT APPLICATION

Arkansas River Decision Support System

(Project Name)

Application Deadline: August 1 for funds available July 1 the following year.

Funding recommendations will be considered at the November CWCB Board Meeting.

Instructions: This application form should be emailed, typed, or printed neatly. You may attach additional sheets as necessary to fully answer any question, or to provide additional information that you feel would be helpful in evaluating this application. Include with your application a cover letter summarizing your request. If you have difficulty with any part of the application, contact Kirk Russell, PE, Finance Section Chief for assistance, at (303) 866-3441, ext. 3232 or email kirk.russell@state.co.us.

Generally, the applicant is also the prospective owner and sponsor of the proposed project. If this is not the case, contact CWCB before completing this application.

Part A. - Description of the Applicant (Project Sponsor or Owner);

1. Applicant Name(s): Colorado Water Conservation Board

Mailing address: 1313 Sherman St., Suite 721
Denver, CO 80203

Taxpayer ID#:

Email address: andy.moore@state.co.us

Phone Numbers: Business: 303-866-3441

Home:

Fax:

2. Person to contact regarding this application if different from above:

Name: Andy Moore

Position/Title: Water Resources Engineer

3. Provide a brief description of your organization below:

The Colorado Water Conservation Board (CWCB) was created in 1937 for the purpose of aiding in the protection and development of the waters of the state. The agency is responsible for water project planning and finance, stream and lake protection, flood hazard identification and mitigation, weather modification, river restoration, water conservation and drought planning, water information, and water supply protection.

Part B. - Description of the Project or Study

1. Name of the study or project: Arkansas River Decision Support System (ArkDSS)

2. What is the purpose of this grant application? Check one.

- [X] Study
- [ ] Demonstration project.
- [ ] Rehabilitation or replacement of existing
- [ ] Other (Please describe)

3. General location of the study or demonstration project. (Please include county, and approximate distance and direction from the nearest town):

Arkansas River Basin – Division 2

4. Please provide a brief narrative description of the proposed study or demonstration project including purpose, need, and service area. (Attach scope of study, if available)

The ArkDSS will be similar to other DSSs developed in Colorado, with data collection and development of modeling tools to aid in water resources planning and management. The feasibility study was completed in December 2011, resulting in a proposed implementation including four phases, at an estimated total cost of $7,590,000. The $500,000 requested herein will be used to begin Phase 2 implementation, which includes data compilation and data collection activities that will provide the foundation for the ArkDSS.

Non-Reimbursable Project Investment Application - CWCB Construction Fund

Form Revised April 2010

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5. Explain why you are requesting a grant, instead of a loan. (the Construction Fund exists primarily to provide low interest loans for the construction or rehabilitation of raw water projects. Non-reimbursable investments are approved only when the project or study is of statewide interest and benefits a wide range of people and organizations, and/or a large geographical area **.**

The ArkDSS will be part of Colorado's Decision Support Systems, to aid in water resources planning for the State. Water users and planners within the Arkansas Basin, as well as the State, will benefit from the data and tools developed as part of the ArkDSS.

6. List the names and addresses of any technical or legal consultants retained to represent the applicant or to conduct investigations for the proposed project or study.

Name	Address & Phone Number
N/A	

7. List any feasibility study or scope of work that has been completed or is now in progress for the proposed project or study. (Submit one copy with this application):

The feasibility study for the ArkDSS was completed in December 2011. The report is available for download on the web page below:
http://cwcb.state.co.us/water-management/basin-roundtables/Pages/ArkansasBasinRoundtable.aspx

Non-Reimbursable Project Investment Application - CWCB Construction Fund

Form Revised April 2010

8. What is the estimated cost of the study/demonstration project? Please include estimated Study, Planning, Engineering, and Construction costs, if known:

Estimated Planning/Study Costs:	$7,590,000
Estimated Engineering Costs:	
Estimated Construction Costs:	
Estimated Total Costs:	$7,590,000

9. **How much funding are you requesting?** $500,000

Part C. - Project Sponsor Financial Information

1. The CWCB Construction Fund is primarily a revolving loan fund. Non-reimbursable investments are approved only when the project or study is of statewide interest and benefits a wide range of people. Provide copies of the two most recent annual reports, financial statements, corporate reports or other current documentation of financial condition and operations with this application.

2. Provide a brief narrative description of potential sources of funding (in addition to the CWCB) which have been explored or which will be explored for the proposed project or study. (Examples would be Local County and Town Governments, Water Conservancy Districts, USDA Rural Development, The Natural Resources Conservation Service, The U.S. Environmental Protection Agency, Commercial Banks, etc.)

The above statements are true to the best of my knowledge:

Signature of Applicant:

Print Applicant's Name: Andy Moore

Project Title: Arkansas River Decision Support System (ArkDSS)

Date: 8/1/2012

Return this application to:

Mr. Kirk Russell, P.E., Chief
Finance Section
COLORADO WATER CONSERVATION BOARD
1580 Logan Street, Suite 600
Denver, CO 80203

Submit applications by email to: kirk.russell@state.co.us or fax to (303) 894-2578
For questions call (303) 866-3441, ext. 3232