STATE OF COLORADO

Colorado Water Conservation Board
Department of Natural Resources
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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: November 5, 2012

SUBJECT: **Agenda Item 16a, November 13-14, 2012 Board Meeting**
Finance – Construction Fund En-Bloc Non-Reimbursable Investment
Satellite 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 Replacement of out of date DCPs is required to accommodate technology upgrades and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